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RUSTENBURG PLATINUM MINES LIMITED

THE PROPOSED AMANDELBULT CONCENTRATOR CHROME RECOVERY PLANT AND ASSOCIATED INFRASTRUCTURE, ACCESS ROAD AND RAILWAY SIDING, RUSTENBURG PLATINUM MINES, LIMPOPO PROVINCE ADDENDUM

INTEGRATED ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME PREPARED IN TERMS OF REGULATION 50 and 51 OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (ACT NO. 28 0F 2002)

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EXECUTIVE SUMMARY

This executive summary provides an overview of the proposed project, including the location, a description of the pre- development environment, motivation and a brief project description, followed by a summary of the public consultation conducted and an overview of the environmental impact assessment as well as the key findings of the Environmental Impact Assessment.

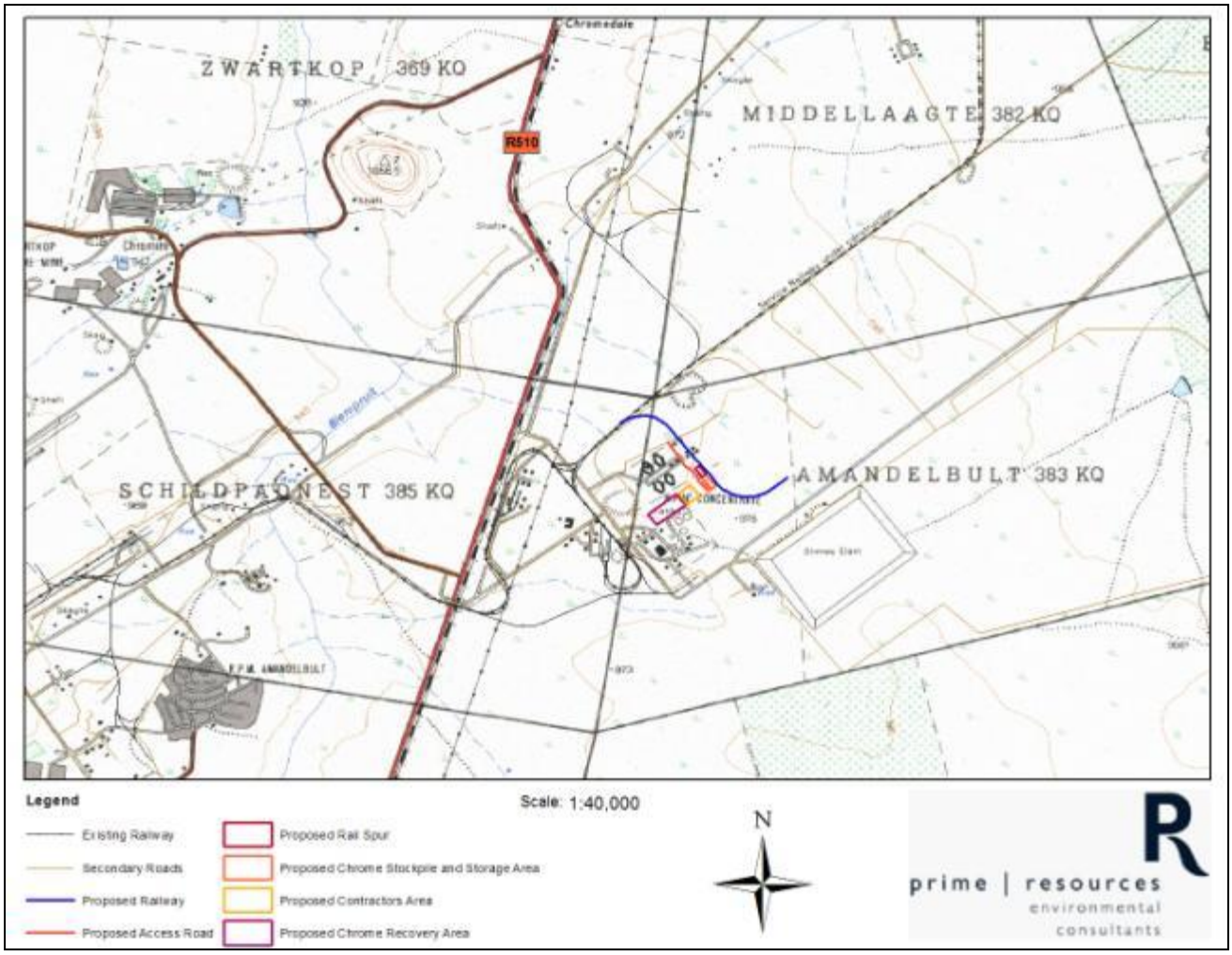
Project Overview

Prime Resources (Pty) Ltd completed an amendment to the RPM – AS approved Environmental Impact Assessment (EIA) and Management Programme (EMP) in December 2008. The amendment was completed in terms of the requirements of the Minerals and Petroleum Resources Development Act (No 28 of 2002) (MPRDA) and the Regulations thereof (GN. No. R527, 2004). The Integrated EIA / EMP was submitted to the Limpopo Department of Mineral Resources in March 2009. Subsequent to the submission of the Integrated EIA/ EMP, it was determined that there was a discrepancy concerning the ownership of the chromite mineral rights. RPM was advised at that stage that, until the discrepancy was resolved, the amendment would not be reviewed by the Department of Mineral Resources (DMR) (previously referred to as the Department of Minerals and Energy {DME}) and no amendment to the Mining Right would be issued.

The discrepancy has now been resolved, however, and AAP now wishes to recommence with the environmental authorisation process. Prime Resources was therefore appointed to update the 2008 scoping report and integrated EIA / EMP to reflect the most recent project description and project location and to comply with the current applicable environmental legislation before the development can commence.

Project Location

The proposed chrome recovery plant and related infrastructure will be located within Rustenburg Platinum Mine's mining right area 25 km south of the town of Thabazimbi in the Limpopo Province of South Africa, on the farm Amandelbult 383 KQ.



Description of the Pre-development Environment

Geology

South Africa's PGE reserves are located in one of the largest layered mafic intrusions in the world, namely the Bushveld Igneous Complex (BIC). The Tumela and Dishaba Mines serve to target resources the north-western sector of the BIC. The Merensky and UG2 deposits are located in the sector of Lower, Critical and Main Zone rocks, overlain by upper Zone rocks with magnetite layers, which transgress and appear to truncate the first three zones to the north and south. The geology of the area is mainly made up of gabbro, norite and pyroxenite rocks of the BIC. The two platinum bearing ore bodies currently being exploited are the Merensky Reef and the UG2 Chromitite. The Merensky Reef comprises of feldspathic pegmatoidal pyroxenite, bounded by thin Chromitite bands. The reef varies in thickness form 10 cm to 300 cm. The UG2 Chromitite, which underlies the Merensky Reef by 35 m to 50 m, is 150 cm wide. The mining right area is situated in the north-western sector of the BIC. Both the UG2 and Merensky reefs are mined at the Tumela Mine and Dishaba Mine.

Climate

The climate is semi arid and hot in the Limpopo and Olifants River basins, but cooler with a higher humidity on the Waterberg plateau and Soutpansberg. Temperatures in the Thabazimbi region are generally high in the summer months, while winter months are characterised by lower

temperatures. Rainfall varies from 217 mm to 570 mm per annum. The mean annual evaporation at Thabazimbi is 2017 mm, which exceeds the mean annual rainfall. Winds are light to moderate and are predominantly in a north-westerly direction during the summer months, with westerly winds occurring frequently in the winter. The average daily temperature for the summer months is 23.2°C (ranging between 19.7°C – 25.2°C), where the maximum can reach 39.5°C and the minimum temperature can be as low as 3.5°C. The average daily temperature for the winter months is 16.2°C (ranging between 12.0°C – 22.7°C), with a maximum of 38.2°C and a minimum of -4.6°C.

Topography

The topography in the area of the Amandelbult CRP is classified as homogenous and the gradient ranges between +1.0% to -1.1% and slopes towards the north-west. The flat terrain is interrupted by the existing mines infrastructure (Mine Hostel an Amandelbult Concentrator Plant) and the tailings dam.

Soil Quality

The major soil types encountered include those of the orthic phase Valsrivier (Va) and Swartland (Sw) (all moderately structured and clay rich soils), along with the more structured forms, including the Sterkspruit (Ss), Arcadia (Ar), Milkwood (Mk) and Mayo (My) forms, and the hydromorphic forms including the Sepane (Se), Bonheim and Rensburg Forms.

The dominant soils in the area have adequate levels of calcium and magnesium, but deficiencies in potassium, phosphorous and zinc, which indicates that there is a need for fertiliser applications of Zn, P and K if sustainable vegetation cover is to be achieved. There is also low organic matter content (0.46 – 0.90 C%) when compared to the optimum ranges for the above mentioned elements. The majority of the proposed project CRP project area is underlain by soils which are sensitive nature to both compaction and erosion. Soils are moderate to shallow, (100mm to 600mm), generally poorly drained, with a susceptibility to erosion and compaction and in places show some signs of dampness at depth. The potential of the wet based soils for economic crop production and/or market gardening is poor, the use of these areas as wilderness lands being the preferred option. The potential for economic farming of the structured soils is considered to be as best "grazing land" or low intensity crop production. The production of the crops on these soils will require good water and drainage management for all but the hardiest crops. The land capability of the proposed CRP project area ranges from grazing potential to wilderness potential. The highly structured nature of the soils that characterise the majority of the study area make for extremes of workability and at best poor grazing potential lands.

Land Use

Except for existing mine buildings, ancillary structures and current land usage (mining and minor residential), much of the land in the Amandelbult Concentrator Plant area is open natural veld.

Biodiversity

Floral Diversity

The vegetation associated with the proposed CRP project consisted of typical Dwaalboom Thornveld vegetation with three ecological units based on vegetation structure, namely

undisturbed Thornveld, disturbed Thornveld and modified areas. The majority of the proposed infrastructure will be located in the disturbed Thornveld while a portion of the proposed railway line extension will be located in the undisturbed Thornveld within a game camp.

Faunal Diversity

No avifaunal species of conservation concern were recorded, however suitable feeding or breeding habitat exists in the undisturbed Thornveld for at least nine species of conservation concern which include the *Ardeotis kori* (Kori Bustard), *Gyps africanus* (White-backed Vulture), *Aquila rapax* (Tawny Eagle), *Polemaetus bellicosus* (Martial Eagle) and the *Sagittarius serpentarius* (Secretarybird) classified as vulnerable, as well as the *Falco biarmicus* (Lanner Falcon), *Leptoptilos crumeniferus* (Marabou Stork), *Buphagus Erythrorhynchus* (Red-billed Oxpecker) and the *Certhilauda chua*na (Short-clawed Lark) classified as near threatened. Four mammal species were identified during the field survey in the game camp by sight or field evidence such as spoor, droppings or burrows namely *Tragelaphus strepsiceros* (Kudu), *Giraffa camelopardalis* (Giraffe), *Sylvicarpa grimmia* (Duiker) and *Connochaetes taurinus* (Blue Wildebeest). A further 25 species have a high likelihood of occurrence due to the presence of suitable habitat, five of which are of conservation concern and listed as Near Threatened namely *Eidolon helvum* (Straw-coloured Fruit Bat), *Myotis tricolor* (Cape Hairy Bat), *Pipistrellus rusticus* (Rusty Pipistrelle*), Mellivora capen*sis (Honey Badger) and *Ceratothecum simum* (White Rhino).

Ecological Sensitivity

The habitat associated with the undisturbed Thornveld including the game camp was classified as Medium to High Ecological Sensitivity due to the natural condition of the veld and the absence of human disturbances. Although no species of conservation concern were recorded during the time of the survey (likely due to timing of the assessment), suitable habitat exists in this area for at least seven species of conservation concern. Furthermore, since the survey was conducted during winter when most herbaceous plants are dormant and numerous faunal species have migrated (avifauna) or are inactive, it is likely that this area will support higher faunal diversity during summer.

The disturbed Thornveld was classified as medium to low ecological sensitivity due to the high level of disturbance in the area. The area has been extensively overgrazed by large herds of cattle while the close proximity of the Mine Hostel, roads and Amandelbult Concentrator Plant makes the area largely unsuitable for mammal species. Furthermore the area does not provide a corridor for faunal movement since it is largely surrounded by transformed areas. Despite this, the area did support indigenous floral species with a well developed tree layer.

The modified areas are unlikely to support any ecological processes as a large portion of this area has already been cleared of vegetation and the remainder of the area is currently used for stockpiling of soil. Furthermore, the close proximity of the Amandelbult Concentrator Plant makes it highly unlikely that any faunal species will be present within these areas and the modified areas are therefore classified as having low ecological sensitivity.

Wetlands

According to the approved Amandelbult EMPRs, no natural wetlands have been identified within the proposed CRP project area.

Surface Water

The primary river within the Amandelbult mining right area is the Crocodile River, located approximately 8 km to the east of the proposed Amandelbult CRP. The second river which flows through the Amandelbult mining right area is the Bierspruit, which is a tributary of the Crocodile River and located approximately 2.5 km to the west of the project area. The Amandelbult CRP area falls within the Crocodile River (West) catchment, the mean annual run-off for this catchment is 12.5 mm. The proposed Amandelbult CRP falls within quaternary catchment A24F, within the Crocodile River (West) and Marico River Water Management Area. Drainage for the Amandelbult CRP area will be westwards towards the Bierspruit through a drainage channel beginning at the Mine Hostels. The calculated average monthly flow in the Bierspruit at its confluence with the Crocodile River is 30.814 mm3. The slope of the land surrounding the project area is very flat with slopes ranging from <0.5º to 0.5º. Surface flow off these areas will occur at a very slow rate.

Two sets of samples were used during the hydrological assessment to determine the water quality, representative of the end of the dry season and the middle of the wet season during the hydrological year 2011/2012. The water of the Crocodile River samples for both the dry and wet seasons reflect water of good quality, although there is a slight (and expected) increase in almost all the determinants from the rainy to the dry seasons. The Bierspruit shows a notable difference in the concentrations of most of the determinants between the dry and rainy seasons. The water quality in the Bierspruit is of a relatively poor quality in terms of the Electrical Conductivity (EC), Total Dissolved Solids (TDS), sodium, chloride and nitrate. Most of these variables only have an aesthetic effect if exceeded. However, nitrate has an acute health effect.

Groundwater

Six aquifers were identified within the study area and are associated with the following:

- Large-scale faulting, diabase dykes and/or large pockets of weathering
- Insignificant weathering and fracturing.
- Saprolite (formed as a result of intensive and in-situ weathering processes) to sap rock (differentially weathered and fractured bedrock underlying the saprolite) zones
- Clay is overlain by unconsolidated and structured quartzitic sands and gravels
- Thin with outcrops of the fractured bedrock aquifer in the river course
- Ultramafic intrusive rocks

Groundwater flow occurs under semi-confined and confined conditions in fractured rock formations in the vicinity of the Tailings Dam Complex at the Amandelbult Concentrator Plant and Services Section. Return water from the tailings dams drains northwards into the Return Water Dam and is potentially responsible for reduced groundwater quality in this area.

Due to the layered nature of the geology, less resistant rock units may undergo preferential weathering, resulting in increased vertical heterogeneity and distinct and separate hydraulic zones. The groundwater regime of the mining right area is divided into four distinct subcompartments. However, where faults or shear zones cut across diabase intrusions, aquicludes can be locally connected.

Groundwater Quality

The underlying Geology, the tailings complex and the aquifer heterogeneity may have a significant influence on the groundwater quality. Several of the boreholes around the Amandelbult Concentrator Plant Section had unacceptable water quality (DWAF Domestic Use; class 4) according to the SANS 241-1:2011 standards as the standards were exceeded in terms of the average EC level, TDS, Ca, Mg, Na, Cl, S04, ammonia, Fe, Mn and Cd concentrations. Down-gradient groundwater quality appears unaffected by the current mining activities.

Air Quality

Agricultural activities, vehicle entrainment and exhaust gas emissions, domestic fuel burning, fugitive emissions from mining operations and veld fires have been identified as sources of air pollution in the surrounding area. The sensitive receptors associated with the proposed CRP project area in terms of air quality include, the Mine Hostel and Rethabile Mine Village.

Traffic

The road linking Amandelbult to Rustenburg is the R510 and the road network linking Amandelbult with Pretoria and Johannesburg includes the R510 - R556 - N4 Bakwena toll road. Existing traffic demand along the R510 and R556 is approximately 10% to 20% of the available road capacity.

The R510 is a two lane, 7 m wide, undivided road with well-maintained gravel shoulders. The traffic volumes on this road vary between 170 and 220 vehicles per hour per direction and volumes of up 360 vehicles per hour per direction were noted in the vicinity of Northam. The surface condition of the road is in a good condition with few surface defects apart from smoothening of wheel paths in some areas

The R556 between R510 and the Bakwena N4 toll road is a 7,4m wide surfaced two lane road with 2m wide surfaced shoulders on either side. Weekday traffic volumes are low, approximately 100 vehicles per hour per direction of which approximately 11% is made up of heavy vehicles. The road surface is not in as good a condition as the R510, as the surfacing is fairly old and is showing signs of aggregate loss, together with surface cracking and some minor surface failures.

Noise

The noise sensitive areas associated with the proposed CRP project area include the adjacent Mine Hostel and the Rethabile Mine Village. The present ambient noise levels at the Amandelbult Concentrator Plant are characterised by the noise emissions from the existing mining operations, as well as self-generated community noise. The ambient noise levels were calculated for both day and night situations for the noise sensitive areas such as the Mine Hostel and Rethabile Mine Village. The ambient noise level in the noise sensitive areas either remain much the same or show an increase during the night, due to the fact that meteorological conditions favour the propagation of sound during the night. According to SANS 10103 2 the maximum limit for noise levels in residential areas during the day is 55 dBA and 45 dBA at night. The levels at the sensitive receptors fall within the maximum limits.

Archaeology

There were no resources of significance identified within the area. This is assumed to be due to the harsh environmental conditions in the area, i.e. a lack of open water, suitable soil and a lack of

stone for building materials, particularly during pre-colonial times. The potential presence of heritage resources is also thought have been influenced by previous agricultural activities and mining in the area.

Visual Aspects

The visual quality of the proposed CRP project area is low as the proposed development will take place within the mining footprint. Visual aspects of the proposed CRP project area include the adjacent Amandelbult Concentrator Plant and Mine Hostel.

Socio-Economic

The proposed development lies within the surface right area of the Amandelbult Concentrator Section situated on the North - Western limb of the Bushveld Complex. The mine is located in the Limpopo Province within the Thabazimbi Local Municipality, approximately 40 km south of Thabazimbi, 15km north of Northam and 100 km north of Rustenburg. Approximately 93274 people reside within the area immediately surrounding the project site, of these 88% are Black Africans and 10% are White. The majority of the population within the study area is aged between 15 and 34 (44%) and between 35 and 64 (33%). These age brackets constitute the economically active people within the study area. In 2011, approximately 38% of the population within the study area was considered to be functionally numerate and literate (in possession of at least Grade 9). However, only 6.4% of the population over the age of 20 years has received tertiary education, compared with 9% within the Waterberg District as a whole. Only 49% of the economically active population were employed in 2011. The most significant employer in the Thabazimbi Municpal Area is the mining sector (68.7% with a 7.8% increase average per annum) which has made substantial contributions to in-migration.

Mantserre

Mantserre is located 32km from Amandelbult Concentrator Section. It consists of 4 900 residents of whom 54 are employees of the mine. Residents were originally resettled in Mantserre from the farm where the mine is now situated. The resettlement took place long before Amandelbult Mine was in operation, as part of the former government's plan to create the Bophuthatswana homeland in the early 1960s. Amandelbult Mine was established in 1974 on some of the land that previously belonged to the Baphalane Tribe.

Northam

The town of Northam is located approximately 15km from Amandelbult Concentrator Section. There are 4 000 residents.

Rethabile

Rethabile also known as the Amandelbult Mine Village is considered a residential area with ancillary land uses including business, social and other erven at the Anglo Platinum Mine. Amandelbult is a fully functional township and totally independent from Thabazimbi Municipality regarding infrastructure services, i.e. water, sanitation, electricity, roads and stormwater. From a social infrastructure perspective the town has a golf course, community hall as well as sports facilities.

Thabazimbi

The town of Thabazimbi is located approximately 25 km from the proposed development and was established in 1932 as an iron-ore mining town, it has subsequently supported two platinum mines and an andalusite mine. Infrastructure is generally well developed in terms of roads, electricity supply, water and sanitation. The town is considered the hob of the Thabazimbi Municipality and provides support services for the outlying towns.

Smash Block.

Chromite (formerly Schilpadsnest) is situated 10km from Amandelbult Concentrator Section. It is an informal settlement with approximately 10 000 residents.

Motivation for the Project

The current practice of depositing UG2 tailings onto the tailings dam may be regarded as sub-optimal use of resources. The UG2 concentrators treat sufficient amounts of UG2 tailings to justify the recovery of chrome. The construction of a new chrome plant will bring about employment opportunities resulting in socio-economic benefits. The project would also increase the life of the tailings dam as lower volumes of tailings would need to be pumped to the tailings facility.

Project Description

The proposed chrome recovery plant (CRP) will be installed prior to the secondary circuit, Mainstream Inert grinding (MIG) process and scavenger flotation. The new CRP will be of a modular design consisting of twin modules of spiral concentrators, employing a multi-stage configuration of separators and spirals. From the siding the chromite material will be loaded via front end loaders onto trucks and then wagon trains (once the railway network becomes operational) where it will be transported to local customers or the port for export, depending on the market. Once the chromite's been extracted the concentrate will be redirected to the platinum beneficiation plant for further processing

The chromite recovery plant consists of the following components:

- The chrome recovery plant will comprise two modules, with the combined capacity of 250 kilotons per month and will each be approximately 30m by 30m in size;
- Each chromite recovery module will comprise feed systems, thickeners, cyclones, spirals;
- Chromite will be recovered separately as either chemical or metallurgical grade and deposited separately onto a stockpile;
- Chromite from the stockpile will be transported from a dispatch facility via a rail siding and link to the existing rail system. These facilities will comprise typical infrastructure i.e. weighbridges and Front End Loaders;
- In the event of railway disruptions the local road network will be utilised to transport the chromite to the nearest dispatch facility.
- A 1 km long and 8 m wide access road, to provide direct access to the CRP;
- A maintenance workshop, stores facility, offices, ablution area, and an additional water tank will be constructed within the chrome recovery plant area.

Public Participation

A public participation process, designed to engage all potential Interested and Affected Parties was undertaken during the environmental process in 2008. However, to ascertain the current concerns or issues regarding the proposed Amandelbult Chrome Recovery Plant another public involvement process is currently being undertaken. The public participation process includes the publication of media notices, the erection of site notices, distribution of background information documents, commenting on the draft Scoping Report, draft EIA/EMP and draft Basic Assessment Report, focus group meetings with community leaders as well as community meetings.

Environmental Impact Assessment

The potential impacts of the proposed development on the receiving biophysical and socio-economic environment during construction, operation and decommissioning / closure were assessed during the EIA. The significance of potential impacts were rated using Anglo American Platinum's prescribed method for impact assessments.

Specialist studies were undertaken and conducted by the following individuals and companies:

Environmental Receptor	Specialist
Socio-Economic	Prime Resources
Surface Water	African Environmental Development
Ecology	Strategic Environmental Focus
Soils, Land Use and Land Capability	Earth Science Solutions
Air Quality	Royal HaskoningDHV
Traffic	UWP Consulting

Key findings of the Environmental Impact Assessment

Potential Environmental Impacts

The potential negative impacts identified this far, include the following:

- Soil contamination and reduced land capability;
- Loss of biodiversity;
- Reduction in surface water quality;
- Reduction in groundwater quality;
- Reduction in air quality;
- Increased traffic;
- Increased ambient noise levels;
- Damage to buried heritage resources; and
- Socio-economic conditions will be negatively impacted upon at decommissioning and closure of the project.

The potential positive impacts identified include the following:

- Socio-economic conditions may be improved by the job opportunities and opportunities for local businesses arising from the proposed project.

Impacts on the Physical Environment

Receptor	Impacts	Pre-mitigation
Soil	▪ The potential loss of soil through erosion or compaction. ▪ Potential soil contamination through hydrocarbon and other chemical spills or incorrect waste management.	**Medium (-)**
Biodiversity	▪ Clearing activities during construction will result in the loss of vegetation and habitat in undisturbed areas.	**Significant (-)**
	▪ Potential mortality of fauna through vehicle collisions, trapping or poaching. ▪ Increase in alien invasive vegetation. ▪ Impact of settling dust on leaves.	**Medium (-)**
Surface Water	▪ Potential reduction in water quality of the Bierspruit through contaminated surface run-off.	**Significant (-)**
Groundwater	▪ Contaminated surface run-off seeping into the groundwater may result in the reduction in groundwater quality.	**Medium (-)**

Proposed Management Measures for Impacts Affecting the Physical Environment

Receptor	Mitigation	Post-mitigation
Soil	▪ Topsoil should be stripped, stockpiled and managed according to the compiled soil management programme. ▪ Cement mixing must be undertaken in a mixing plant/ bin or on an impermeable surface (bunded area), which is connected to the dirty stormwater system. Cement should be delivered in bags and stored on pallets in a dry covered area within the storm water bunded area. ▪ Erosion measures as per the soil management programme should be implemented. ▪ To prevent diesel and oil spills, all vehicles and equipment should be kept in good working condition and all leaks repaired immediately. Any hydrocarbon spills should be cleaned immediately. ▪ Chromite stockpile should be bunded to ensure that chromite is deposited and stored on an impermeable surface. Any windblown concentrate should be cleaned immediately.	**Low (-)**
Biodiversity	▪ Update the existing ecological specialist report by undertaking a summer survey to determine whether there are any species of conservation concern within the access road and rail siding footprint. The ecological (faunal and floral) surveys should be conducted during summer months to establish the following: ▪ Should species of conservation be found within the development footprint, they are to be salvaged and relocated to the existing Amandelbult game reserve. ▪ An induction programme should be compiled for all personnel to ensure compliance to all aspects of the EMP as well as educating personnel in the safe and proper conduct within areas of natural habitat. ▪ No fauna may under any circumstance be handled, removed or be interfered with. ▪ An alien invasive eradication and monitoring plan must be compiled and implemented. ▪ Dust suppression measures should be implemented.	**Medium (-)**
Surface Water	▪ All waste should be disposed of correctly.	**Low**

	▪ Good housekeeping should be implemented to minimise hydrocarbon and chemical spills. ▪ Implement and maintain the clean and dirty water management system.	**(-)**
Groundwater	▪ All waste should be disposed of correctly. ▪ Good housekeeping should be implemented to minimise hydrocarbon and chemical spills. ▪ Implement and maintain the clean and dirty water management system.	**Low (-)**

Impacts on the Social Environment

Receptor	Impacts	Pre-mitigation
Traffic	▪ Increase in traffic as a result of the project which may result in an increase in road safety risks and result in degradation of road surfaces.	**Medium (-)**
Heritage / Cultural	▪ Uncovering and damaging of potential unknown heritage resources during construction.	**Low (-)**
Noise	▪ Construction and decommissioning activities as well as activities such as the loading of chromite onto trucks and rail wagons during operation will result in an increase in ambient noise levels.	**Medium (-)**
Air Quality	▪ The generation of dust and particulate matter from construction activities and the movement of vehicles throughout the life of the project as well as from the stockpiling and transport of chromite.	**Medium (-)**
Socio-economic	▪ Job opportunities, opportunities for local businesses through procurement and a positive impact on the socio-economic aspects of the local community throughout the construction and operational phases.	**Medium (+)**
	▪ Loss of job opportunities, opportunities for local businesses during decommissioning and closure.	**Significant (-)**

Proposed Management Measures for Impacts Affecting the Social Environment

Receptor	Mitigation	Post-mitigation
Traffic	▪ Appropriate safety signage should be erected for road users. ▪ Fit heavy vehicles with reverse sirens. ▪ All drivers must drive with the headlights on at all times. ▪ The speed of construction vehicles should be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads. ▪ Maintain internal mine road surfaces. ▪ Alert roads authority to maintain the road structure associated with the R510 and R556 and to budget for rehabilitation.	**Low (-)**
Heritage / Cultural	▪ If any archaeological, heritage or cultural resources are unearthed during construction, construction activities should be halted and the ECO notified and dealt with appropriately.	**Low (-)**
Noise	▪ Fit silencers and screens on equipment. ▪ Restrict activities to daylight hours only. ▪ Any complaints relating to noise should be recorded and AAP should respond to complaints appropriately. ▪ Unnecessary noise generated from machinery should be avoided through ensuring that all machinery is regularly serviced and well maintained.	**Low (-)**

Air Quality	▪ All access roads should be adequately maintained so as to minimise dust. Methods such as wet suppression, paving or chemical stabilisation should be implemented. ▪ Vegetation of topsoil stockpiles should be implemented. ▪ The chromite will be wet when stockpiled. ▪ During the transfer of material to piles, drop heights should be minimised. ▪ A good housekeeping system which will include clearing the chrome product which has been blown off the stockpile should be implemented.	**Low (-)**
Socio-economic	▪ Employment opportunities should be prioritised for residents from local communities surrounding Amandelbult. ▪ Where feasible, training and skills development programmes for locals should be initiated prior to the construction phase. ▪ The employment percentage (in terms of HDSA and women) should be in line with the commitments made in the SLP. ▪ Recruitment philosophy as well as the rules and requirements should be included in the contractors' contracts. ▪ Ensure that the procurement targets as detailed in the Mining Charter of 2012 and SLP are implemented. ▪ The commitments laid out in the SLP regarding closure and downscaling must be adhered to.	**Medium (-)**

RUSTENBURG PLATINUM MINES

AMENDMENT OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE PROPOSED AMANDELBULT CONCENTRATOR CHROME RECOVERY PLANT AND ASSOCIATED INFRASTRUCTURE, ACCESS ROAD AND RAILWAY SIDING, RUSTENBURG PLATINUM MINES, LIMPOPO PROVINCE

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ACRONYMS

AAP	Anglo American Platinum Limited
AQI	Air Quality Index
BEE	Black Economic Empowerment
BID	Background Information Document
BIC	Bushveld Igneous Complex
BGL	Below Ground Level
CEC	Cation Exchange Capacity
CRP	Chrome Recovery Plant
CSSS	Clean Stream Scientific Services
DACE	Department of Agriculture, Conservation and Environment
DEA	Department of Environmental Affairs
DEDET	Department of Economic Development, Environment and Tourism
DME	Department of Mineral and Energy Affairs
DMR	Department of Mineral Resources
DOA	Department of Agriculture
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework

EMP	Environmental Management Programme
EMPR	Environmental Management Program Report
EMS	Environmental Management System
EMZ	Environmental Management Zones
FAII	Fish Assemblage Integrity Index
GN	Government Notice
HDSA's	Historically Disadvantaged South Africans
HRD	Human Resource Development
IEM	Integrated Environmental Management
IAPs	Interested and Affected Parties
IDP	Integrated Development Plans
IWULA	Integrated Water Use License Application
IWWMP	Integrated Waste and Water Management Plan
LEMA	Limpopo Environmental Management Act
LED	Local Economic Development
KTPM	Kilo Tonnes per Month
kW	Kilowatt
MBGL	Meters below Ground Level
MAMSL	Meters Above Mean Sea Level
MAP	Mean Annual Precipitation
MAR	Mean Annual Run-off
MPRDA	Minerals and Petroleum Resources Development Act (Act 28 0f 2002)
MQA	Mining Qualifications Authority
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (Act 39 of 2004)
NPL	Northam Platinum Limited
NQF	National Qualifications Framework
NWA	National Water Act (Act 36 of 1998)
PGE	Platinum Group Elements
PPP	Public Participation Process
RLS	Rustenburg Layered Suite
RPM	Rustenburg Platinum Mines
RPM-AS	Rustenburg Platinum Mines – Amandelbult Section
ROM	Run of Mine
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANS	South African National Standard
SAR	Sodium Absorption Ratios
SASS5	South African Scoring System 5
SG	Specific Gravity
SLP	Social and Labour Plan
SMME's	Small, Medium or Micro Enterprises
TDS	Total Dissolved Solids
TWQR	Target Water Quality Guidelines
WDM	Waterberg District Municipality
WUL	Water Use License

1 UNDERTAKING

AMANDELBULT CONCENTRATOR PLANT

I, ……, duly and properly authorised by Anglo American Platinum Ltd / Amandelbult Concentrator, hereby declare that the information provided in this Integrated Environmental Impact Assessment and Environmental Management Programme, prepared in order to update and amend the existing Environmental Management Programme (MP6/2/2/48EM) (and all subsequent amendments thereto) in order to align it with the requirements of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), "MPRDA", is true, complete, and correct. I understand that this undertaking is legally binding and that failure to give effect hereto will render the applicant liable for prosecution in terms of Section 98 (b) and 99 (1)(g) of the MPRDA.

Signed on this …… day of ……2013… at …… (Place)

……
Robbie Van der Schyff
Amandelbult Concentrator Manager

APPROVAL

Approved in terms of Section 39(4) of the Mineral and Petroleum Resources Development Act, 2002 (Act 29 of 2002)

Signed at……this…….day of……2013

……
REGIONAL MANAGER
REGION: Limpopo Province

2 INTRODUCTION AND BACKGROUND

2.1 Applicant's Contact Details

Name of Applicant/Owner:	Rustenburg Platinum Limited (RPM)
RPM Contact Details:	55 Marshall Street, Johannesburg, 2001 PO Box 62179, Marshalltown, 2107 Tel: (011) 373-6111 Fax: (011) 373-5111
Mine Contact person:	Mr Robbie Van der Schyff – Concentrator Manager
Mine Environmental Contact:	Mr. Riaan Richards
Mine's Physical Address:	Amandelbult Concentrator Amandelbult 383 KQ Waterberg District Municipality Limpopo Province
Mine's Postal Address:	P.O. Box 2 Chromite 0362
Telephone Number:	(014) 784 1701
Fax Number:	086 760 3220
Email:	rvdschyff@angloplat.com
Commodity:	Chromite
Mineral Rights Ownership:	Amandelbult 383 KQ: RPM - Mining Licence 10/2003
Surface Rights Ownership:	Amandelbult 383 KQ: RPM - T 15698/1973 (farm)

2.2 Background

Rustenburg Platinum Mines Limited (RPM) is fully owned by Anglo American Platinum Limited (AAP). The RPM operations near Northam, Limpopo Province, were previously referred to as Rustenburg Platinum Mines – Amandelbult Section (RPM-AS), but a restructuring exercise in 2009 subdivided RPM-AS into four core business units, namely:

- Tumela Mine
- Dishaba Mine
- Amandelbult Concentrator Plant and
- Amandelbult Services

The proposed development lies within the jurisdiction of the Amandelbult Concentrator Plant division.

Prime Resources (Pty) Ltd completed an amendment to the RPM – AS approved Environmental Impact Assessment (EIA) and Management Programme (EMP) in December 2008. The amendment was completed in terms of the requirements of the Minerals and Petroleum Resources Development Act (No 28 of 2002) (MPRDA) and the Regulations thereof (GN. No. R527, 2004). The Integrated EIA / EMP was submitted to the Limpopo Department of Mineral Resources in March 2009. Subsequent to the submission of the Integrated EIA/ EMP, it was determined that there was a discrepancy concerning the ownership of the chromite mineral rights. RPM was advised at that stage that, until the discrepancy was resolved, the amendment would not be reviewed by the Department of Mineral Resources (DMR) (previously referred to as the Department of Minerals and Energy {DME}) and no amendment to the Mining Right would be issued.

The discrepancy has now been resolved, however, and AAP now wishes to recommence with the environmental authorisation process. Prime Resources was therefore appointed to update the 2008 scoping report and integrated EIA / EMP to reflect the most recent project description and project location and to comply with the current applicable environmental legislation before the development can commence.

2.3 Location of Project

The proposed Amandelbult Chrome Recovery Plant (CRP) and associated chromite stockpiles, access road and railway line extension, are located within AAP's Amandelbult mining right area 25 km south of the town of Thabazimbi in the Limpopo Province of South Africa, on the farm Amandelbult 383 KQ. The project falls within the Amandelbult Concentrator Plant core business unit. The location of the proposed CRP and related infrastructure can be seen in (Refer to Appendix 1 for an A3 copy).

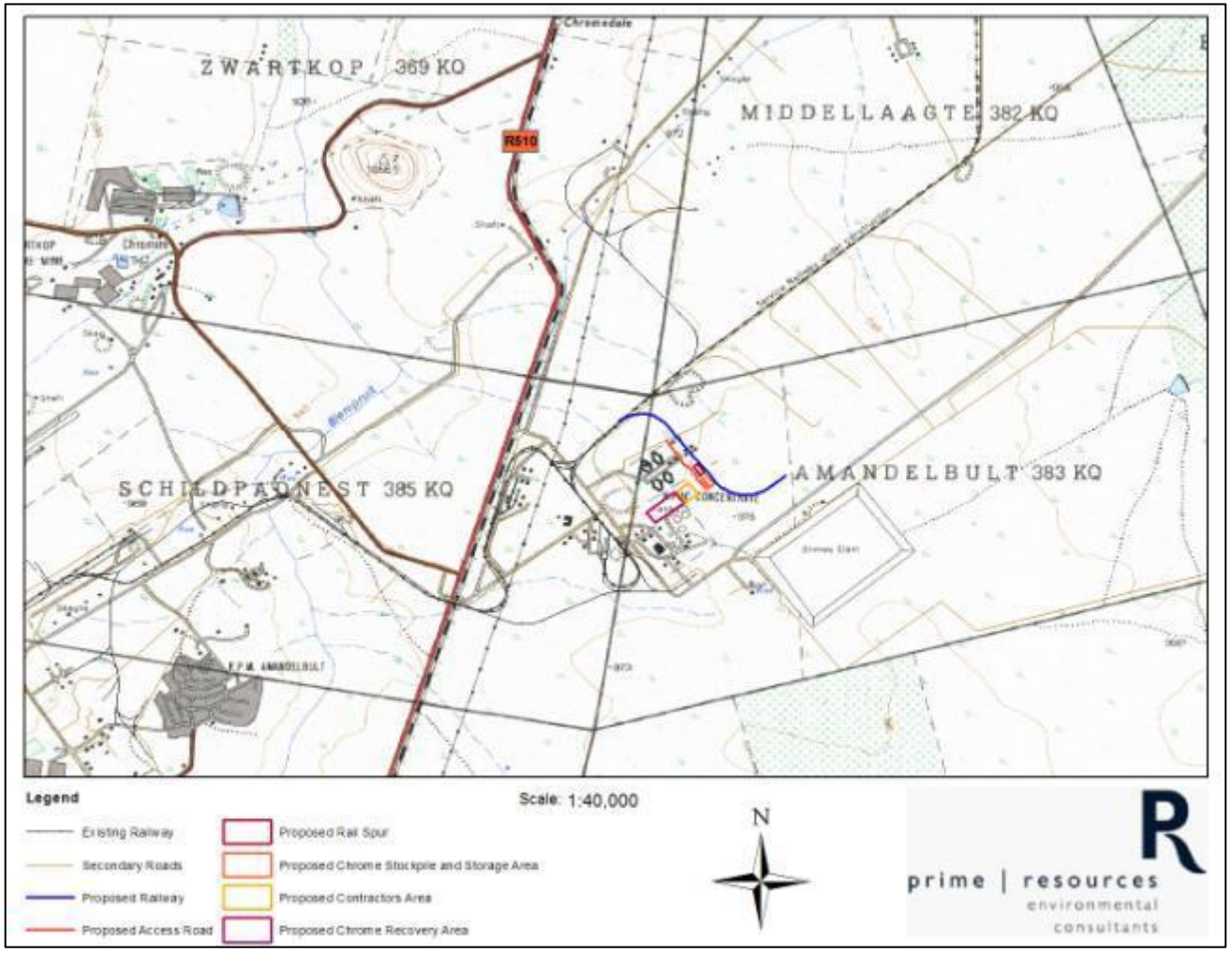

Figure 1: Location of the proposed CRP and related infrastructure.

2.4 Legislation

In order to ensure this development is undertaken in an environmentally responsible manner, there are significant pieces of legislation which focus and guide this integrated EIA / EMP, they are as follows:

2.4.1 The Constitution of South Africa (Act 108 of 1996)

Everyone has the right:-

- To an environment that is not harmful to their health or well-being; and
- To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:-
    - Prevent pollution and ecological degradation;
    - Promote conservation; and
    - Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

2.4.2 The Mineral and Petroleum Resources Development Act (Act 28 of 2002)

The MPRDA is the key legislation in governing mining activities within South Africa. It details the requirements and processes which need to be followed and adhered to by mining companies. The DMR is the delegated authority that deals with all mining related applications.

The MPRDA by definition:-

- Recognises that minerals and petroleum are non-renewable natural resources; acknowledging that South Africa's mineral and petroleum resources belong to the nation and that the State is the custodian thereof.
- Affirms the State's obligation to protect the environment for the benefit of present and future generations, to ensure ecologically sustainable development of mineral and petroleum resources and to promote economic and social development.
- Recognises the need to promote local and rural development and the social upliftment of communities affected by mining.
- Reaffirms the State's commitment to reform to bring about equitable access to South Africa's mineral and petroleum resources.

Section 102 of the MPRDA indicates that a prospecting right, mining right, mining work programme or EMP may not be amended or varied (including by extension of the area covered by it or by the addition of minerals or seams, mineralised bodies, or strata, which are not at the time the subject thereof) without the written consent of the Minister.

It is the intention of the Applicant to amend the existing and DMR-approved EMP (DMR Ref 1995/05/18) to incorporate the proposed Amandelbult CRP.

Section 39 of the MPRDA, when read together with Regulations 50 and 51 of GNR527 of 2004,

promulgated in terms of the MPRDA, describes the process for the preparation of an EIA/EMP. This process requires that the following are produced / undertaken:

- EIA report as per Regulation 50; and
- EMP as per regulation 51.

This EIA has thus been prepared to meet the requirements of Regulation 50 of the MPRDA Regulations of GN527, April 2004:

MPRDA REGULATION 50	CONTENT	SECTION
(a)	An assessment of the environment likely to be affected by the proposed mining operation, including cumulative environmental impacts	5
(b)	An assessment of the environment likely to be affected by the identified alternative land use or developments, including cumulative environmental impacts	5
(c)	An assessment of the nature, extent, duration, probability and significance of the identified potential environmental, social and cultural impacts of the proposed mining operation, including cumulative environmental impacts	8
(d)	A comparative assessment of the identified land use and development alternatives and their potential environmental, social and cultural impacts	8
(e)	Determine the appropriate mitigatory measures for each significant impact of the proposed mining operation	8 and 9
(f)	Details of the engagement process of IAP followed during the course of the assessment and an indication of how the issues raised by IAPs have been assessed	10
(g)	Identify knowledge gaps and report on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information	11
(h)	Description of the arrangements for monitoring and management of environmental impacts	12
(i)	Inclusion of technical and supporting information as appendices	Appendices

This EMP has been prepared to meet the requirements of Regulation 51 of the MPRDA Regulations of GN527, April 2004:

MPRDA REGULATION 51		CONTENT	SECTION
(a)	Description of the environmental objectives and specific goals for -	(i) mine closure	15.5
		(ii) the management of identified environmental impacts emanating from the proposed mining operation	15.2
		(iii) the socio-economic conditions as identified in the social and labour plan	15.4

MPRDA REGULATION 51		CONTENT	SECTION
		(iv) historical and cultural impacts (if applicable)	15.3
(b)	An outline of the implementation programme must include -	(i) a description of the appropriate technical and management options chosen for each environmental impact, socio-economic condition and historical and cultural aspect for each phase of the mining operation	9
		(ii) action plans to achieve the objectives and specific goals contemplated in paragraph (a) which must include a time schedule of actions to be undertaken to implement mitigatory measures for the prevention, management and remediation of each environmental impact , socio-economic condition and historical and cultural aspect for each phase of the mining operation	9
		(iii) procedures for environmental related emergencies and remediation	13
		(iv) planned monitoring and environmental management programme performance assessment	12.8
		(v) financial provision in relation to the execution of the environmental management programme which must include (aa) the determination of the quantum of the financial provision contemplated in regulation 54 (bb) details of the method providing for financial provision contemplated in regulation 53	16
		(vi) an environmental awareness plan contemplated in section 39(3)(c) of the Act	14
		(vii) all supporting information and specialist reports that must be attached as appendices to the environmental management programme	Appendices
		(viii) an undertaking by the applicant to comply with the provisions of the Act and regulations thereto	1

2.4.3 The National Environmental Management Act (Act 107 of 1998) and Environmental Impact Assessment Regulations of 2010

The National Environmental Management Act (NEMA) is enabling legislation intended to provide a framework for integrating environmental management into all developmental activities and to promote co-operative environmental governance with regard to decision making by state organs

on matters affecting the environment.

The principles of NEMA are:

- To avoid and minimize disturbance to ecosystems or loss of biological diversity and to rectify damage where possible;
- To avoid, minimize and remediate pollution and degradation;
- Avoid and minimize the creation of waste and to promote recycling and re-use where possible;
- Negative environmental impacts must be anticipated and prevented where possible, and where that is not possible, impacts must be minimised and remedied;
- The social and economic impacts must also be considered together with environmental impacts of activities when making decisions.

These principles underpin the principle of Integrated Environmental Management (IEM). A vital component of the IEM principle is accountability to the various parties that may be interested in or affected by a proposed development. Public participation during the formulation of development proposals is a requirement of the IEM procedure, in terms of the identification of truly significant environmental impacts (scoping) by interested and affected parties (IAPs).

The IEM procedure is designed to ensure that the environmental consequences of development proposals are understood and adequately considered during the conceptual design process, allowing negative aspects to be resolved or mitigated and positive aspects to be enhanced. It is thus a code of practice for ensuring that environmental considerations are fully integrated into all stages of development, by providing a procedural and regulatory mechanism for EIA's. These regulatory mechanisms are supplied in the form of the EIA Regulations and the subsequent listings which provide a toolkit for the assessment of impacts based on the scope of the project.

Section 28 of NEMA further stipulates that every person who causes-, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. This section has recently been amended by the National Environmental Laws Amendment Act, no. 14 of 2009, which stipulates (in item 12) that the aforementioned duty of care to remediate applies to any significant pollution of degradation which:

- Occurred before the commencement of the Act,
- Arises or is likely to arise at a different time from the actual activity that caused the contamination; or
- Arises through an act or activity of a person that results in a change to pre-existing contamination

It should be noted that, while the DMR are still the competent authority for mining-related activities in terms of the MPRDA, the Department of Environmental Affairs (DEA) and the local authority, the Limpopo Department of Economic Development, Environment and Tourism, are the competent authority for new activities within a mining right area which are listed in terms of NEMA

and the EIA Regulations of 2010.

The EIA Regulations of Government Notice (GN) 543, June 2010 (and updated in December 2010, previously GN385 of 2006), 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, GNR544, 545, 546 (previously, GNR385, 386 and 387) provide lists of activities for which environmental authorisation, either in the form of a Basic Assessment or full EIA / EMP, is required before the activity can commence.

The following activities listed in terms of the above are relevant to the proposed CRP project:

Table 1: Listed activity invoked by the proposed Amandelbult CRP in terms of the EIA Regulations GNR 544 of 2010

ACTIVITY NUMBER	ACTIVITY DESCRIPTION	APPLICABILITY TO THE PROJECT
22	The construction of a road, outside urban areas, with a reserve wider than 13,5 meters or, where no reserve exists where the road is wider than 8 metres, or for which an environmental authorisation was obtained for the route determination in terms of Activity 5 in Government Notice 387 of 2006 or Activity 18 in Notice 545 of 2010.	Applicable to the proposed access and haul road
53	The expansion of railway lines, stations or shunting yards where there will be an increased development footprint – excluding: railway lines, shunting yards and railway stations in industrial complexes or zones; underground railway lines in mines; and additional railway lines within the reserve of an existing railway line.	Applicable (railway line and siding)

A Basic Assessment will be required for the listed activities of the CRP project. A Basic Assessment Report and accompanying EMP have been compiled to meet the requirements of NEMA and will be submitted to LEDET to obtain environmental authorisation for the above mentioned listed activities.

<u>Limpopo Environmental Management Act (Act No. 7 of 2004)</u>

The aim of the Limpopo Environmental Management Act (LEMA) (Act 7 of 2004) is to:
"consolidate and amend the environmental management legislation of or assigned to the Province; and provide for matters incidental thereto". Although NEMA still remains the overarching legislation governing environmental management in South Africa, there are certain provisos in LEMA should be taken into consideration during the compilation of future EIA's.

The Limpopo Environmental Management Act does not, however, define any specific issues that would potentially emerge as a result of the current mine development. The mine will be more

stringently regulated under national legislation (i.e. NEMA and the associated NEMA EIA regulations of 2010).

Waterberg District Municipality Environmental Management Framework

In 2010, DDEA, DEDET and the Waterberg District Municipality (WDM) commissioned the compilation of an Environmental Management Framework (EMF) for the WDM.

The EMF aims to support decision-making in the WDM area in order to facilitate appropriate and sustainable development. The EMF consists of a status quo report (which describes the current status quo for the WDM), a desired state report (which outlines what the desired state of the WDM should be), and then the main report, the EMF, which essentially outlines and describes how to achieve the desired state from the status quo. After collation of all information, the EMF describes eleven Environmental Management Zones (EMZ). The Amandelbult Concentrator Plant section falls within Zone 11 which is classified as a major infrastructure corridor. This zone represents areas where the concentration of linear infrastructure is proposed in order to prevent the unnecessary large impact that uncoordinated infrastructure location would have on the district. Any activity or development that will compromise the functioning of the areas as a corridor is regarded as an undesired activity.

2.4.4 National Environmental Management: Air Quality Act (Act 39 of 2004)

The National Environmental Management: Air Quality Act (NEM: AQA) repeals the Atmospheric Pollution Prevention Act (45 of 1965). According to the Act, the DEA, the provincial environmental departments and local authorities are separately and jointly responsible for the implementation and enforcement of various aspects of the NEM: AQA. Each of these spheres of government is obliged to appoint an air quality manager and to co-operate with each other and co-ordinate their activities through mechanisms provided for in NEMA:AQA.

The purpose of the Act is to set norms and standards that relate to:

- Institutional frameworks, roles and responsibilities
- Air quality management planning
- Air quality monitoring and information management
- Air quality management measures
- General compliance and enforcement.

Section 18(1) of the Act allows for the declaration of priority areas which are based on the following:

- If ambient air quality standards are being, or may be exceeded.
- If the area requires specific air quality management action.

The proposed CRP project area is situated within an area which has been formally declared as an air quality priority area in terms of Section 18(1) of the NEM:AQA, known as the "the Waterberg-Bojanala Air Priority Area" (Notice No. 495 of 15 June 2012 contained in Government *Gazette* No. 35435). This area was declared after research indicated that the ambient air quality within the Waterberg District Municipality may exceed national ambient air quality standards in the near future; and that a trans-boundary situation exists between the Waterberg District Municipality and

the Bojanala Platinum District Municipality in the North West which may cause a significant negative impact on air quality in both areas. The same trans-boundary air pollution impact was found to also be a possibility between South Africa and its neighbours, particularly Botswana.

GN248 of 31 March 2011 provides the list of activities in terms of Section 21(1)(a) for which a license is required in terms of Chapter 5 of the Act. However, none of the activities in terms of the above schedule will be triggered by the proposed Amandelbult CRP.

2.4.5 The National Heritage Resources Act (Act 25 of 1999)

The National Heritage Resources Act serves to protect and manage the South African heritage and cultural resources. These resources include places, buildings, structures and equipment of cultural significance, historical settlements and townscapes, archaeological and paleontological sites, graves 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, power line, 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 000m^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 National Heritage Resources Act. Heritage considerations therefore will form part of this environmental process. The proposed Amandelbult CRP will invoke a listed activity in terms of SAHRA (Table 1).

Table 1: Listed activity invoked by the proposed Amandelbult CRP in terms of SAHRA

SECTION	ACTIVITY NUMBER	LISTED ACTIVITY	DESCRIPTION
38	1(a)	The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;	A new section of railway line (1.5 km) which will connect to an existing line on the mine property and a new access road (1 km) will be constructed to service the proposed CRP.

SECTION	ACTIVITY NUMBER	LISTED ACTIVITY	DESCRIPTION
	(c)	Any development or other activity which will change the character of a site— exceeding 5 000 m2 in extent;	

The listed heritage considerations were taken into account as part of the environmental process. The public consultation procedure for the project included SAHRA as an IAP.

2.4.6 The National Water Act (Act 36 of 1998)

The National Water Act (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 Affairs (DWA). 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 DWA, while Section 39 identifies several water uses where the need for a license is dispensed with. The use of water for which a license is not required is also described.

Regulation 704 of 1999 (regulations for the use of water for mining and related activities) regulates 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 DWA.

RPM have submitted an Integrated Water Use Licence Application (IWULA) including an IWWMP to the Limpopo Department of Water Affairs in September 2011, which comprised the water uses at the Amandelbult Section and which is currently being considered by the Department.

No water use licence is required for the proposed development as the intention is to integrate the CRP's dirty water system with the existing dirty water management system associated with the Amandelbult Concentrator. A WULA for the existing dirty water management system at the Amandelbult Concentrator has been submitted to the DWA.

2.4.7 The National Environmental Management: Waste Act (Act 59 of 2008)

The National Environmental Management: Waste Act (NEM:WA) 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 licensing and control of waste management activities.

This Act succeeds Section 20 of the Environmental Conservation Act, no. 73 of 1989 and provides measures for waste management covering the various aspects of activities which generate waste. The schedules at the back of the Act also provide definitions for activities which require a waste management license while also identifying the relevant environmental authorisations which are further required for said activities.

GN 718, dated July 2009, under the NEM:WA, 2009, lists the waste management activities which may not commence, be undertaken or be conducted unless a licence is issued in respect of that activity. None of the activities in terms of the above schedule will be triggered by the proposed Amandelbult CRP.

2.4.8 National Environmental Management: Biodiversity Act (Act No. 10 of 2004)

This act provides for the management and conservation of South Africa's biodiversity within the framework of NEMA; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of South African National Biodiversity Institute (SANBI); and for matters connected therewith. None of the activities proposed by the proposed Amandelbult CRP are associated with NEMBA.

3 METHDOLOGY APPLIED TO CONDUCT THE EIA AND COMPILE THE EMP

Initially, a gap-analysis was conducted to review all existing environmental work and processes conducted for the proposed Amandelbult CRP in 2008 for relevance and applicability.

3.1 Specialist Studies

The specialist studies conducted in 2008 namely the Surface Water Quality Assessment, Air Quality Assessment, Traffic Assessment and Soil Quality Assessment were updated to reflect the latest project layout. Additional specialist studies were conducted including an Ecological Assessment and a Social Impact Assessment.

3.2 Impact Rating Methodology

As stipulated in Regulation 50(c) of the MPRDA, the EIA must include "an assessment of the nature, extent, duration, probability and significance of the identified potential environmental, social and cultural impacts of the mining operation, including the cumulative environmental impacts". Significance of both positive and negative impacts will be determined through the evaluation of potential impact consequence and impact likelihood of occurrence.

The impacts were assessed according to Anglo American Platinum's prescribed method for impact assessments. This method follows the principle of rating impacts in accordance with a Significance Rating Matrix. This matrix provides a rating on a scale of 1 to 25 (low to extreme) based on the consequence multiplied by the likelihood of an impact occurring. Additional management measures to mitigate an impact are required when an impact has a risk rating of 21 to 25 (extreme). When an impact is rated between 13 to 20 (high), proactive management of the activity is required. Risk rating of 6 to 12 (medium) would require an active management of the risk and any rating between 1 to 5 (low) only requires monitoring and management as appropriate. The following is a brief summary of the methodology:

CAPITAL PROJECTS RISK MATRIX	CONSEQUENCE				
CONSEQUENCE TYPE	1 - INSIGNIFICANT	2 - MINOR	3 - MODERATE	4 - HIGH	5 - MAJOR
Schedule	Less than 1% impact on overall project timeline	May result in overall project timeline overrrun equal to or more than 1% and less than 3%	May result in overall project timeline overrrun equal to or more than 3% and less than 10%	May result in overall project timeline overrrun equal to or more than 10% and less than 30%	May result in overall project timeline overrrun 30% or more
Cost	Less than 1% impact on the overall budget of the project	May result in overall project budget overrun equal to or more than 1% and less than 3%	May result in overall project timeline overrrun equal to or more than 3% and less than 10%	May result in overall project timeline overrrun equal to or more than 10% and less than 30%	May result in overall project timeline overrrun 30% or more
Quality and Technical Integrity	No significant impact on quality of deliverables or effect on production	Quality issues that can be addressed prior to handover or could affect production by more than 1% and less than 3%	Quality issues that can be addressed during ramp-up or could affect production by more than 3% and less than 10%	Quality issues that require significant intervention to maintain performance or could affect production by more than 10% and less than 30%	Quality issues that require significant intervention to achieve performance or could affect production by 30% or more
Safety	First aid case	Medical treatment case	Lost time injury	Permanent disability or single fatality	Numerous permanent disabilities or multiple fatalities
Occupational Health	Exposure to health hazard resulting in temporary discomfort	Exposure to health hazard resulting in symptoms requiring medical intervention and full recovery (no lost time)	Exposure to health hazards/agents (over the OEL) resulting in reversible impact on health (with lost time) or permanent change with no disability or loss of quality of life	Exposure to health hazards/agents (significantly over the OEL) resulting in irreversible impact on health with loss of quality of life or single fatality	Exposure to health hazards/agents (significantly over the OEL) resulting in irreversible impact on health with loss of quality of life of a numerous group/population or multiple fatalities
Environment	Lasting days or less; affecting small area (metres); receiving environment highly altered with no sensitive habitats and no biodiversity value (e.g. urban/industrial areas)	Lasting weeks; affecting limited area (hundreds of metres); receving environment altered with little natural habitat and low biodiversity level	Lasting months; affected extended area (kilometres); receiving environment comprising largely natural habitat and moderate biodiversity value	Lasting years; affecting area on sub-basin scale; receving environment classified as having sensitive natural environment with high biodiversty value	Permanent impact; affecting area on a whole basin or regional scale; receiving environment classified as highly sensitive natural habitat with very high biodiversity value.
Legal and Regulatory	Technical non-compliance. No warning received; no regulatory reporting required	Breach of regulatory requirements; report/involvement of authority. Attacts administrative fine	Minor breach of law; report/investigation by authority. Attracts compensation/penalties/ enforcement action	Breach of law; may attract criminal prosecution, penalties/enforcement action. Individual licence temporarily revoked	Significant breach of law. Individual or company law suits, permit to operate substantially modified or withdrawn
Social / Communities	Minor disturbance of culture/social structures	Some impacts on local population, mostly repairable. Single stakeholder complaint in reporting period	Ongoing social issues. Isolated complaints from community members/stakeholders	Significant social impacts. Organised community protest threatening continuity of operations	Major widespread social impacts. Community reaction affecting business continuity. "Licence to operate" under jeopardy
Reputation	Minor impact; awareness/concern from specific individuals	Limited impact; convern/complaints from certain groups/organisations (e.g. NGOs)	Local impact; public concern/adverse publicity localised within neighbouring communities	Suspected reputational damage; local/regional public concern and reactions	Noticeable reputational damage; national/international public attention and repercussions

PROBABILITY		RISK LEVEL				
5 – Almost Certain > 90%	90% and higer likelihood of occurring	11 (Medium)	16 (Significant)	20 (Significant)	23 (High)	25 (High)
4 – Likely 30% - 90%	Between 30% and less than 90% likelihood of occurring	7 (Medium)	12 (Medium)	17 (Significant)	21 (High)	24 (High)
3 – Possible 10% - 30%	Between 10% and less than 30% likelihood of occurring	4 (Low)	8 (Medium)	13 (Significant)	18 (Significant)	22 (High)
2 – Unlikely 3% - 10%	Between 3% and less than 10% likelihood of occurring	2 (Low)	5 (Low)	9 (Medium)	14 (Significant)	19 (Significant)
1 – Rare < 3%	Less than 3% likelihood of occuring	1 (Low)	3 (Low)	6 (Medium)	10 (Medium)	15 (Significant)

RISK RATING	RISK LEVEL	GUIDELINES FOR RISK MATRIX
21 to 25	High	A high risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised immediately.
13 to 20	Significant	A significant risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised as soon as possible.
6 to 12	Medium	A moderate risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised as part of the normal management process.
1 to 5	Low	A low risk exists that management's objectives may not be achieved. Monitor risk, no further mitigation required.

The potential environmental impacts have been evaluated according to their significance, which is determined as a result of the consequence and likelihood. The consequence is determined as a function of the severity, duration, and spatial scale, whereas the likelihood of the impact is determined as a function of the frequency of the activity and frequency of the incident/impact. The consequence multiplied by the likelihood presented the significance of the potential impact. All impacts were assessed with and without management measures in place.

3.3 Public Consultation

The public consultation process discussed in Section 10 was conducted. The public consultation conducted was in line with MPRDA requirements as well as with the Anglo and Amplats internal requirements.

3.4 Financial Provision

The financial provision was calculated both for areas requiring decommissioning and areas requiring restoration. These are defined as:

- Decommissioning costs: Costs pertaining to the removal of plant and infrastructure and the rehabilitation of the surface following demolition. Decommissioning costs include footprint rehabilitation (backfilling, topsoiling, profiling, vegetating).

3.5 Report Compilation

The report was compiled to meet the requirements of the MPRDA as well as the Anglo and Amplats internal reporting requirements.

4 PROJECT DESCRIPTION

Refer to Figure 1 for the on site locality plan for the proposed Amandelbult CRP (hereafter to include all associated infrastructure) (see Appendix 1 for an A3 scale map).

4.1 Introduction

Rustenburg Platinum Mines propose to erect a CRP at its Amandelbult Concentrator Section in order to extract chromite, which is a by-product of the platinum beneficiation process. The proposed CRP will be installed prior to the secondary circuit, Mainstream Inert grinding (MIG) process and scavenger flotation. The new CRP will be of a modular design consisting of twin modules of spiral concentrators, employing a multi-stage configuration of separators and spirals (Figure 3). The two final chromite concentrates will be pumped to the respective stockpile areas via their own dewatering separators. From the stockpiles the chromite material will be loaded via front end loaders onto trucks or wagon trains it will be transported to the Transnet depot in Pretoria to be distributed to local customers or the port for export, depending on the market.

Below is a summary of the key components of the proposed Amandelbult CRP:

- The installation of a new agitated Primary Rougher Tails surge tank ahead of the Chrome-Silica Cyclone for UG2 #1 plant.
- The installation of two agitated surge tanks, one for UG2 #1 and the other for UG2 #2 CRP feed surge tanks.
- The installation of two agitated tails surge tanks for thickened chrome plant tails prior to the silicate regrind cyclones of both #1UG2 and #2UG2.
- Installation of two flash float cells prior to the CRP products being pumped to the de-watering separators. The flash float concentrates will be pumped to the chrome rougher concentrate sumps of UG2#1 and UG2#2 plant.
- The construction of a twin module spiral concentrator plant adjacent to the existing grout plant area complete with its own water recovery circuit;
- Each chrome recovery module will comprise feed systems, thickeners, cyclones, spirals;
- Chromite will be recovered separately as either chemical or metallurgical grade and deposited separately onto a 18 600m² stockpile which will cater for approximately 100 000 tons. The stockpile will be constructed on a concrete slab and all run-off water will be contained and returned to the thickener;
- Chromite from the stockpile will be transported from a dispatch facility via the existing regional road network to transport the final product. These facilities will comprise typical infrastructure i.e. weighbridges and Front End Loaders. A rail siding and rail link to the existing railway system may also be constructed at a later stage to transport chromite.
- A maintenance workshop, laboratory, stores facility, offices, ablution area, and an additional water tank will be constructed within the CRP area; and

- Process water will be used by the chrome plant. A separate water storage tank will be added at the chrome plant. The chrome plant will not be a net user of water, and will in fact recover water for use in the main process since less material will ultimately be sent to the tailings dam. It is estimated that 1m³ (1 000 L) of water for every ton of final product is returned to the system.

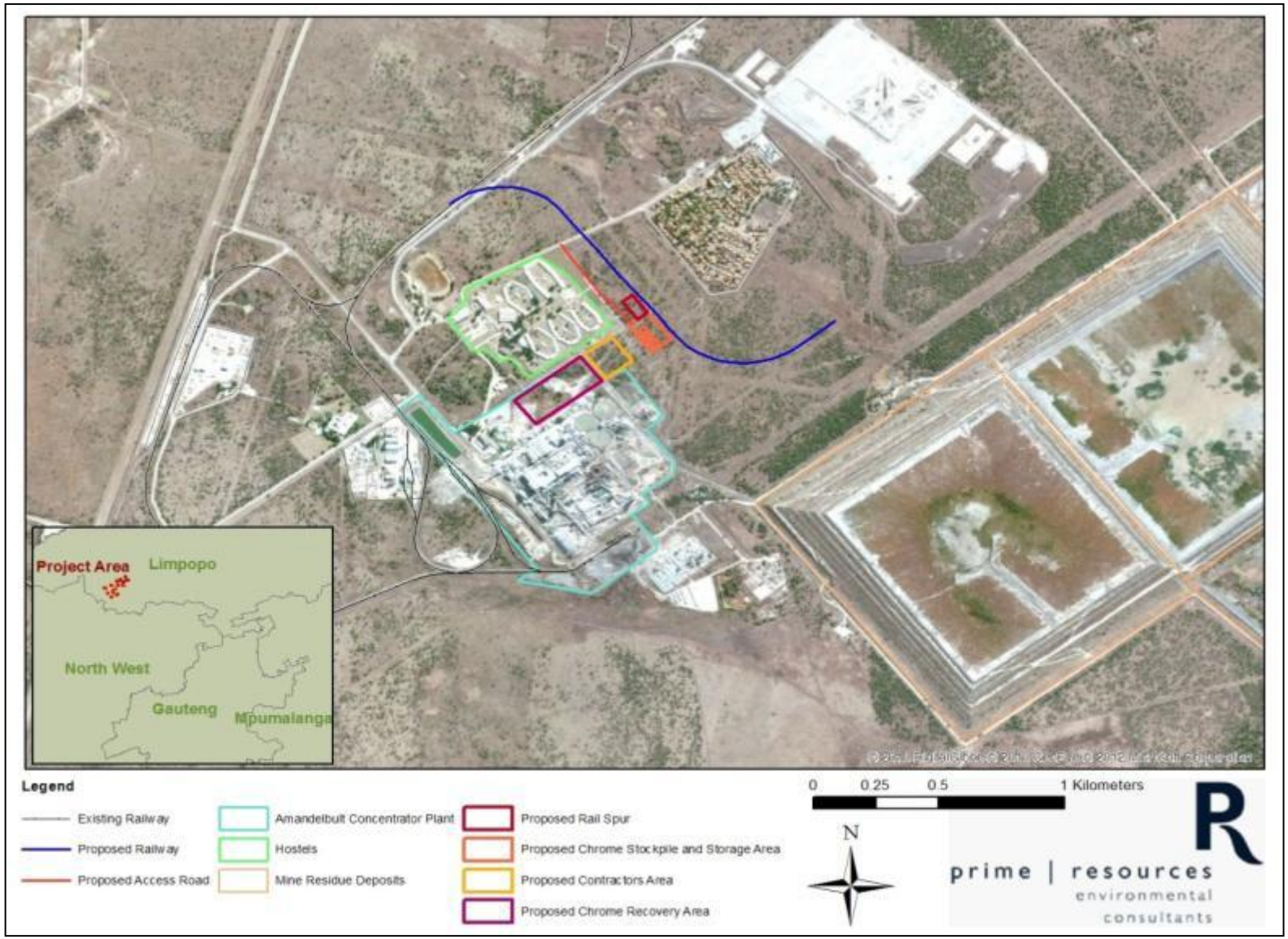

Figure 2: On site locality plan for the proposed Amandelbult CRP.

4.2 Process Description

4.2.1 Chrome Feed Surge Tank and De-sliming Cyclones

The chrome-silica cyclone underflow from both UG2 plants will serve as a dedicated feed stream to the chrome plant and will be pumped to the two new chrome plant agitated feed surge tanks (approximately 200 m3). Each feed stream will have a sampler prior to the surge tank to determine the composition of the CRP plant feed. A tramp removal screen might be installed ahead of the surge tanks to remove any tramp material that may damage or interfere with the operation of the spiral concentrators. The tramp material will be collected in a telecom hopper for disposal to a suitable waste disposal site.

The new CRP will be of a twin modular design having a dedicated feed line from the surge tank complete with pumps. The primary control parameter for the new chrome recovery feed pumps will be to deliver a constant volume to the de-sliming / separator cyclones ahead of the new spiral sections. The de-sliming cyclone underflow will report to the spiral plants by gravity feeding. The dilute de-sliming cyclone overflow will bypass the CRP to feed the appropriate tails thickener.

Dilution water will also be added to the CRP feed surge tank to control the feed slurry to the required relative density. During periods when the main plant is operating at reduced throughput, the volume of dilution water will increase to maintain a constant volume to the chrome plant feed pumps.

4.2.2 Spiral Concentration Circuit

Feed to the spiral concentration circuit will be pumped from the new CRP feed sump. The following set of general design criteria will be applied:

- The spiral nests will be arranged in manner that will ensure optimum and equal feed distribution between all individual spirals starts.
- Where possible the various stages of rougher, cleaner and re-cleaner spirals will be stacked vertically above one another to maximise gravity feed arrangements to each section.
- Manual isolation valves will be installed on each discharge line of the various feed distributors to allow any single nest of spirals to be taken offline without affecting the rest of the circuit.
- The number starts and turns of the various stages of spirals should allow enough space for optimum operator and maintenance access while conserving structural height and space.
- Each spiral will have adjustable cutters to allow for the production of a concentrate and tailings, and middling's where applicable.
- Dilution water will be added to the feed of each spiral stage via a main type manifold and each spiral will have its own manual dilution water control valve.
- The spiral plant will be designed to produce two grades of chromite concentrates namely chemical and metallurgical grade and verified via test work results.

- The design and layout of the spiral plants must allow for future additions and modifications aimed at optimising the recovery of especially the ultra fine chromite particles.
- Each of the stages may have bypass facilities, to allow the concentrates to be directed to alternative sumps, in order to vary and maximise the production of any particular grade of concentrate.

4.2.3 Chrome Plant Tailings Treatment and Water Recovery

The two CRP modules will each have its own dedicated tailings thickener and combined water recovery circuit. The design will utilise a conventional thickener for water recovery purposes.

The overflow from each of de-sliming cyclones will gravity feed to the corresponding thickener feed box of the CRP tailings thickeners. The tailings streams from the spiral sections will combine in the thickener feed box before flowing by gravity to the feed well of the CRP thickener. The thickener underflow will have a slurry Specific Gravity (SG) of approximately1.60. A dedicated line will be installed for each of the thickener underflow streams to be pumped to the corresponding new agitated surge tank that will feed the silica regrind cyclones in both UG2 plants. In both plants, the CRP thickener tails will thus combine with the silica-rich stream from the chrome-silica cyclones. An optional line will also be installed for the CRP tails in the silica overflow pump to be pumped directly to the MIG section in the event of the silica mill being unavailable.

The capacity and integrity of any existing mechanical equipment, electrical installation and reticulation, and civil and structural construction that will be redeployed in the new integrated circuit will be evaluated and verified as part of the design study.

The overflow from the CRP tailings thickener will report to a suitably sized process water storage tank for dedicated re-use within the CRP. The design of the CRP process water tank must allow for the draining of the tank of built-up solids content for re-introduction within the plant. This process design option might result in the spiral plant having a positive water balance. It will therefore be necessary to provide a pipeline for returning all excess water to the main concentrator process water storage dam.

A separate pump and delivery line will be installed from the existing clear water tank at the main concentrator which will deliver make-up water to the new CRP process water tank.

4.2.4 Chromite Concentrate Stockpiling

The two chrome concentrates, chemical and metallurgical grade, from each module will be individually pumped to de-watering separators located at the end of overhead stacker booms from where the underflow will drop directly onto the respective stockpiles. There will be a common metallurgical grade and common chemical grade product sump for combined product from the modules for the two products. The overflow from each of the de-watering separators will gravity feed to a central sump from where it will be pumped to the CRP tailings thickener.

The two chrome concentrates will able to gravity feed to two individual flash float cells. The flash float tails will then report to the transfer tanks to be pumped to the individual de-watering

separators. The flash float concentrates will combine in a suitably sized transfer tank complete with pumps, from where it will be pumped to the chrome rougher concentrate sumps of both plants.

Sufficient concrete slab stockpiling facilities will be provided for each of the two grades of concentrate. The design of the stockpile will allow both trucks and rail wagons to be loaded directly from the stockpile using a Front End Loader (FEL).

4.2.5 Dispatch Facility

Both road and rail dispatch facilities will be evaluated. A suitable weighbridge will be provided for road transport. Loading will take place by utilising FELs only.

4.2.6 Transport

The road will be the primary option of transport for the CRP project until the railway extension and siding is constructed from which the rail option will be utilised. From the dispatch facilities the chromite material will be loaded via front end loaders onto 35 tonne trucks where it will be transported to the Transnet depot in Pretoria, via the national road network, to be distributed to local customers or the port for export, depending on the market. Transport operations would not be on a 24-hour 7-day per week basis, but rather on a 12-hour per day 5 day per week basis.

Environmental authorisation for the railway line extension is being applied for to ensure that the necessary permits will be in place when the railway line extension is constructed at a later stage. The chromite material will be loaded via front end loaders into wagons at the railway siding for distribution once the rail option is in place.

Access Road

The proposal is to construct a 1 km and 8 m wide tarred access road which is dedicated to the provision of access to a proposed CRP and The Amandelbult Concentrator.

Proposed Railway Line Extension

The proposal is to extend the existing railway line to construct a 1.5 km rail siding which will be able to accommodate a 100 wagon train. The proposed rail siding is approximately 1.5 km in extent with a servitude of approximately 30 in extent. The purpose of the rail siding will be to connect the CRP to the existing railway line for the distribution of the chrome.

4.3 Water Balance

The proposed new CRP will require sufficient amount of potable water, gland seal and process water during construction, commissioning and normal operation. Potable water is used for human consumption and dilution. Gland seal water is used for pumps seal arrangements and process water is used for dilution, screen spray and hosing. It is envisaged that water will be tapped from the existing Amandelbult Concentrator Plant. Each module has a dedicated thickener for water recovery and thickening of the tails prior feeding the respective concentrator silica section. The

tails from each of the CRP module is returned as feed to the existing concentrator silica section.

4.3.1 Potable/Gland Seal Water

The proposed new CRP requires potable water for human consumption and ablutions, gland seal water for pumps sealing arrangement and process water for dilution, screen spray and hosing. Potable and gland seal water will be tapped from the existing UG2 concentrator plant. Potable and gland seal water will be required on a continuous basis. Potable water is estimated at 65 m^3 and 25 m^3 per day during construction and operation respectively. Gland seal water is estimated at 44 m^3/h during normal operation.

4.3.2 Process Water

Process water demand is sub-divided under the following:

Commissioning Start-up

Start-up during commissioning requires each of the CRP sumps, tanks and thickeners be filled with water for hydro-testing purpose. Water in the hydro-tested tanks, sumps and thickeners will be used as start-up water. Water will be gradually pumped to the respective tanks, sumps and thickener at a rate of approximately 150 m^3/h or the rate at which the concentrator can achieve to feed the CRP with, during hydro testing and commissioning purposes.

Commissioning start-up water will be pumped from the existing Amandelbult Concentrator storage water source. Nominal process water demand for both modules during commissioning is estimated at 2030 m^3.

Normal Operation Demand

Process water demand during normal operation is estimated at 619 m^3/h per module for dilution and screen spray. Hosing water per module is estimated at between 50 m^3/h to 100 m^3/h. The required water will be sourced from the CRP process water storage tank. There will not be a need for top-up water during normal operation.

4.3.3 Return Water

The excess water from the proposed CRP is estimated at between 100 m^3/h to 200 m^3/h. This will be pumped back to the existing Amandelbult process water storage tank.

4.3.4 Make/Top Up Water

The CRP top up or make-up water is estimated at 150 m^3/h. Top up water is only required during commissioning, extended shut down or upset conditions. Top-up water isn't required during normal operation. It is envisaged that zero or no water will be pumped from the existing Amandelbult process water storage tank during normal operation.

4.3.5 Storm Water and Spillage Management

Drainage from the stockpile areas will gravitate to the lowest point, which will have a retaining wall to cater for storm water and 2 days stockpile run off and will be pumped via a sump and spillage pump arrangement to the spiral process water tank. A closed water management system is therefore proposed. There will be no drainage of water emanating from the CRP.

The general operational spillage emanating from within the CRP will be contained within a 5° sloped, bunded concrete area. Floors will be sloped towards a spillage sump(s), which will be protected with a 6 mm slotted wedge-wire screen. A vertical spindle type spillage pump will be used to transfer the spillage to the rougher spiral feed sump. The structural layout should allow for maximum access by a skid steer loader to remove excessive settled spillage. The CRP tailings thickeners area will require its own spillage bund and spillage pumping system and this pump is to return the spillage to the thickener feed.

4.4 Electricity

Electricity will be for the proposed CRP will be supplied by two 2 MVA transformers with power draw expected to be approximately 3MVA from the Eskom grid. Electricity availability has been confirmed.

4.5 Waste Management

The waste hierarchy of prevent, minimise, reduce, re-use, recycle and disposal should be applied. This includes separation, treatment and on/off-site handling. A record of all waste mass per waste type generated by the CRP is to be kept. The types of non-mineral waste expected to be produced by the proposed development are:

- General waste: domestic and building waste;
- Industrial waste: wood, rubber, paper and refurbishable waste (pumps, valves etc,); and
- Hazardous waste: hydrocarbon or chemical contaminated waste.

The general and domestic waste generated at the CRP should be transported by a licensed company and disposed of at a licensed landfill site. Currently general and domestic waste generated at Amandelbult Concentrator is transported by Ingwe Waste Management and disposed of at Thabazimbi Landfill Site. Industrial waste is to be handled at designated waste areas. All scrap metal should be sorted and sold to scrap metal dealers. Used tyres are to be taken back to the suppliers and used oil is returned to suppliers for refining. Wastes such as paper and fluorescent tubes should be sorted for recycling at source.

It should be ensured that used/ expired/ surplus products and/or their containers are locally returnable (e.g. tyres, batteries and oils), procurement contracts require the suppliers to take responsibility for their removal from the site for correct off-site management. Clear responsibility for the waste generated by the operation is required. The operation should, where applicable, apply a cradle-to-grave approach to ownership of waste management and disposal.

It is anticipated that the bulk of the hazardous chemicals transported and stored on site will be hydrocarbons, namely diesel and oils. All hazardous substances will be controlled by the existing mine stores at Amandelbult, applying the same procedures that are currently in use. Qualified carriers should be appointed to transport/ deliver hazardous substances, in accordance with formal documented procedures, legal and other requirements and should be disposed of at a licensed hazardous waste landfill site. Currently any hazardous waste generated at the Amandelbult Concentrator is transported by Enviroserv Waste Management and disposed of at Holfontein Landfill Site. Used Oil is to be collected by a licensed company. Currently used oil at the Amandelbult concentrator is collected by OilKol for recycling. The necessary approvals for the hazardous substances present on site will be obtained. A procedure should be established for the review and approval of new hazardous substances, with conditions if necessary, before they are allowed on site.

The designs and operational controls for waste separation, temporary storage, recycling, treatment, transportation and disposal for the CRP include demarcated areas for the placement of waste containers (e.g. bins and skips). Each area will be demarcated according to each waste type (colour coded and labelled). The design ensures environmental risks are minimised by incorporating impermeable surfaces and polluted water separation systems. The facility will also contain covered hazardous waste storage areas with individual bunds and security fencing all round with an access controlled waste entry and exit point.

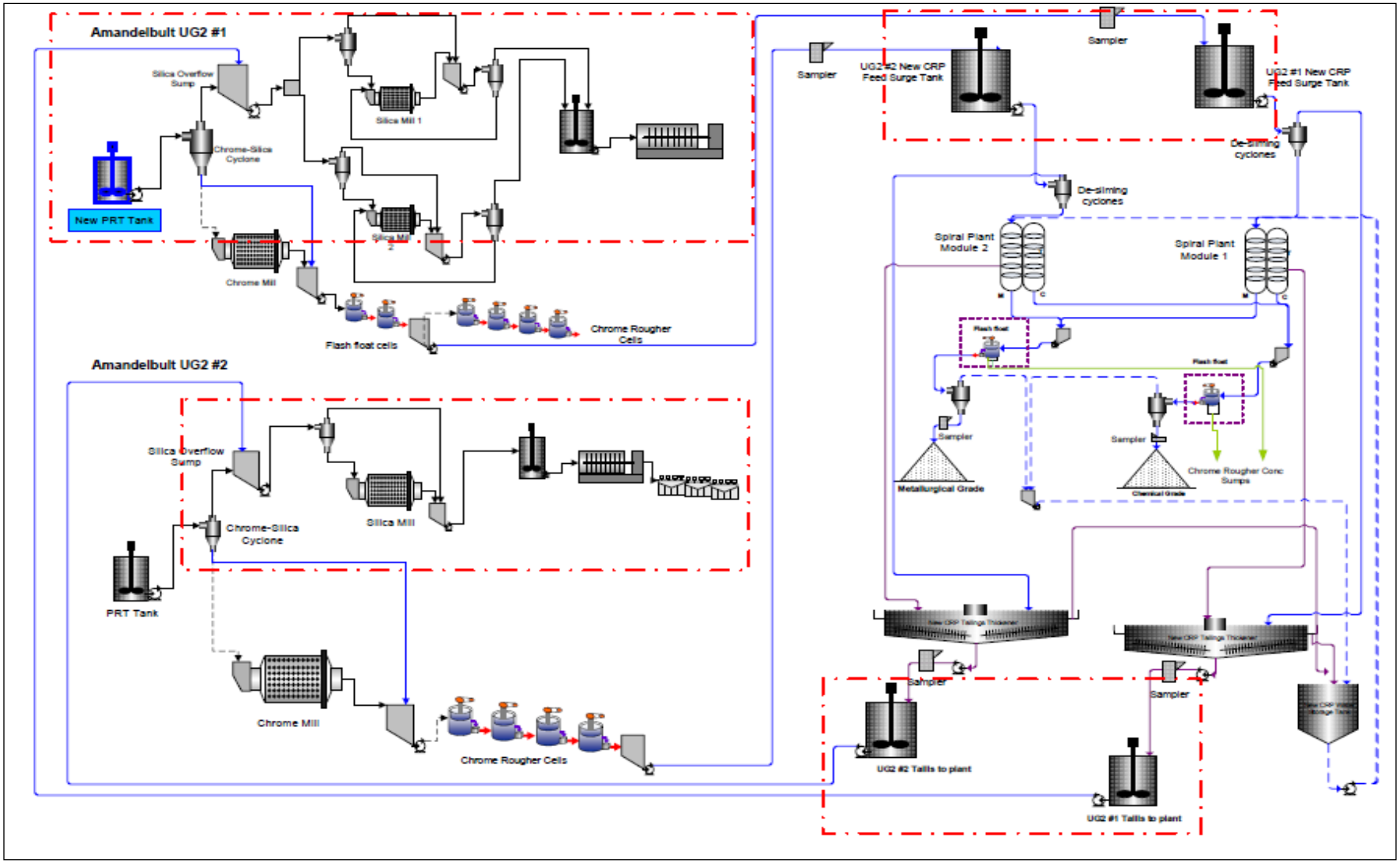

Figure 3: CRP Process Flow.

5 DESCRIPTION OF THE PRE-MINING ENVIRONMENT

This section describes the baseline conditions of the environment prior to the commencement of the proposed CRP project.

5.1 Geology

The following information was obtained form approved EMPRs for the Amandelbult Section.

5.1.1 Regional Geology

South Africa's PGE reserves are located in one of the largest layered mafic intrusions in the world, namely the Bushveld Igneous Complex (BIC). The BIC is a world-class repository for a number of ore bodies yielding a range of mineral commodities that include chrome, vanadium, titaniferous magnetite and PGEs. The complex is extensive in size, stretching approximately 350 km east to west and 250 km north to south. It is roughly saucer-shaped with the edges dipping inwards towards the centre. At the rim of the 'saucer', pyroxenites, norites, gabbros and Chromitites are found inter-layered in a variety of combinations. Unique to the BIC is the presence of two stratiform deposits, known as the Merensky Reef and the UG2 Reef, that can be traced for hundreds of kilometers along the rim that contain economically exploitable quantities of PGEs. The BIC remains AAP's primary source of reserves and resources. PGE's are recovered from the tabular Merensky Reef that is present along the entire strike length of the western limb of the BIC. The Platreef (present only along the northern limb) also contains economic quantities of PGE's. The UG2 (present also along the western limb) also contains economic quantities of PGE's.

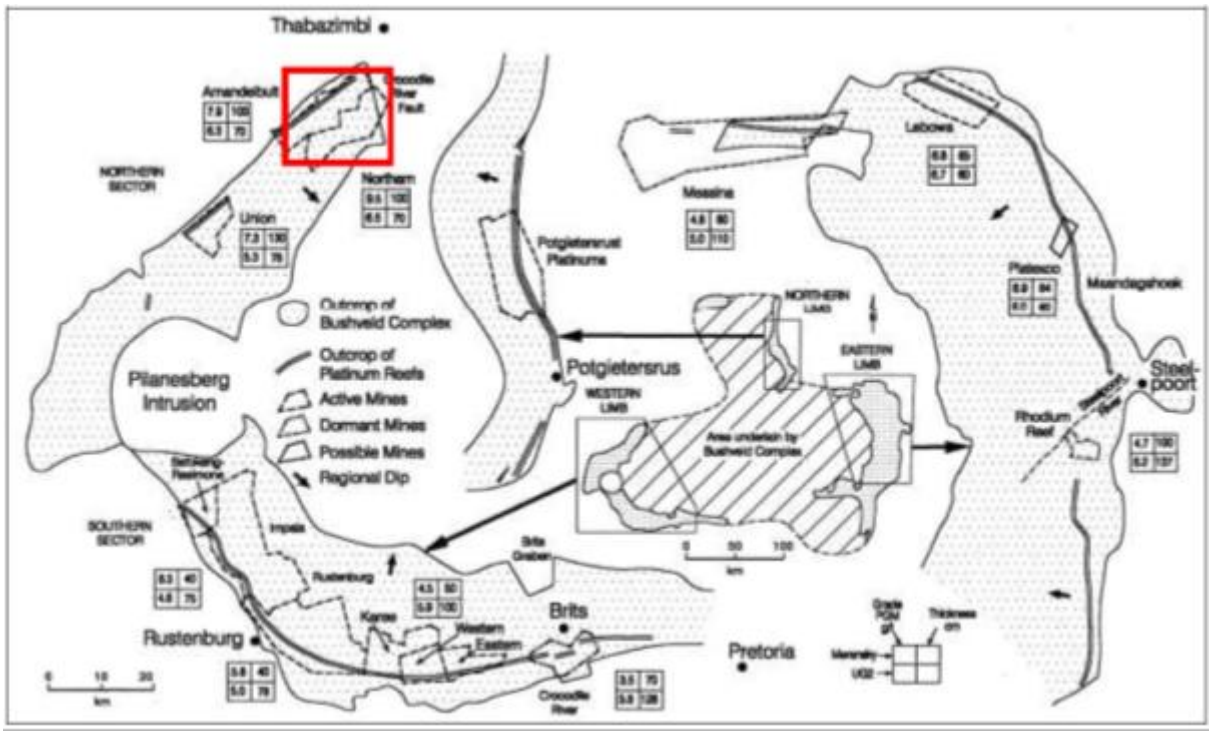

Figure 4: Bushveld Igneous Complex and the location of the mining right area (red square).

The Tumela and Dishaba Mines serve to target resources the north-western sector of the BIC

(Figure 4). The Merensky and UG2 deposits are located in the sector of Lower, Critical and Main Zone rocks, overlain by upper Zone rocks with magnetite layers, which transgress and appear to truncate the first three zones to the north and south. The geology of the area is mainly made up of gabbro, norite and pyroxenite rocks of the BIC. The two platinum bearing ore bodies currently being exploited are the Merensky Reef and the UG2 Chromitite (Figure 5).

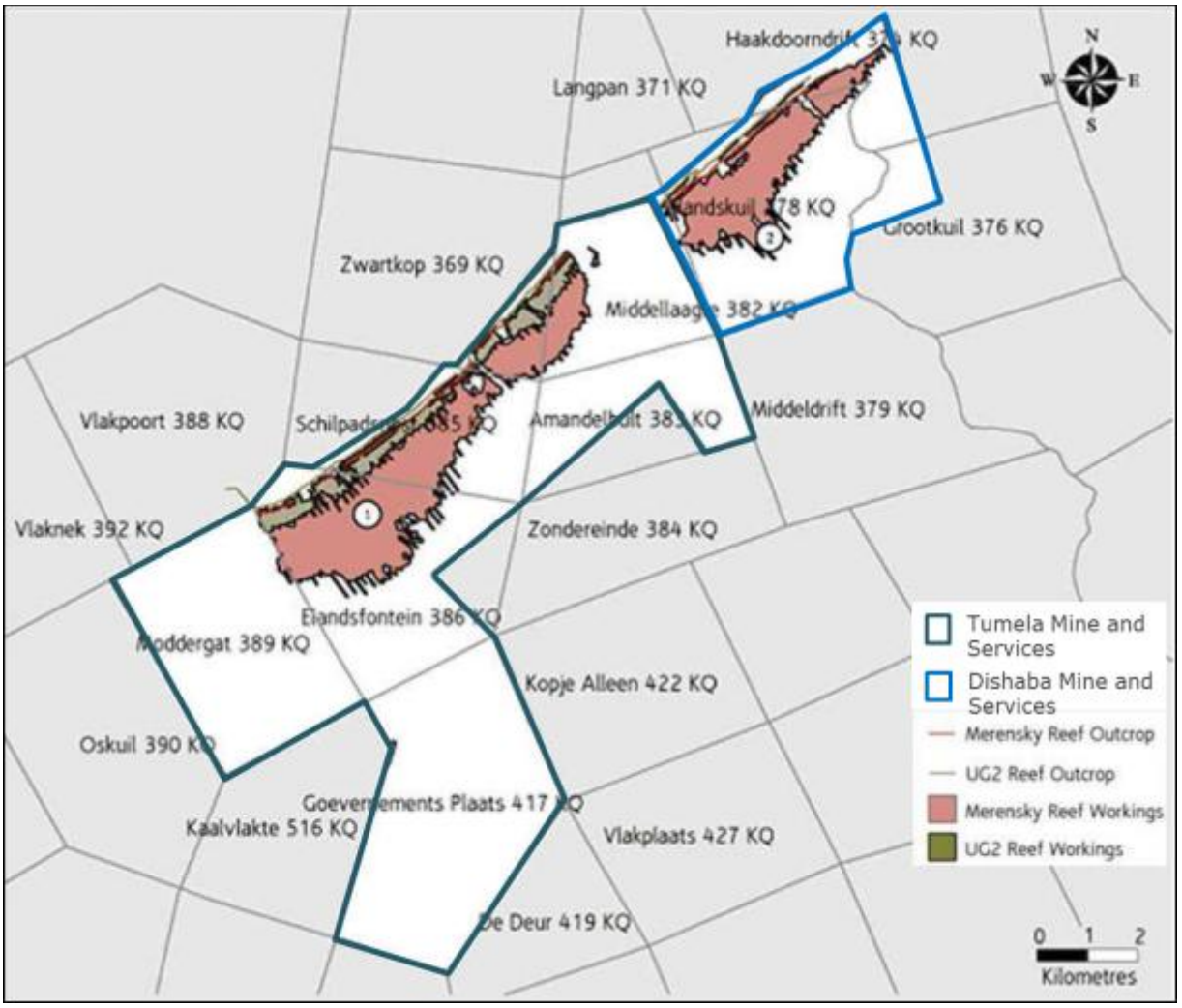

Figure 5: Merensky and UG2 reef outcrop and associated mine workings.

The majority of the surface exposures are covered by either weathered norites or black turf. The ore bodies dip towards the southeast. The dip of the ore bodies varies between 18º towards the south west of the property to 22º towards the northeast. The Merensky Reef comprises of feldspathic pegmatoidal pyroxenite, bounded by thin Chromitite bands. The reef varies in thickness form 10 cm to 300 cm. The UG2 Chromitite, which underlies the Merensky Reef by 35 m to 50 m, is 150 cm wide.

5.1.2 Local Geology

The mining right area is situated in the north-western sector of the BIC. The Upper Zone transgression to the south of the mining right area is known as the northern "gap". At the south-western end of the 20 km Merensky Reef sub-outcrop, there is an abrupt change in strike, with the

reef swinging towards the footwall and almost doubling back on itself, on the farm Vlakpoort. The layering dips at 15º-24° to the south-east, with approximately 20 km of Merensky Reef strike length. Faults of various sizes occur throughout the mining right area, and include major north-west trending faults with associated throws of up to 500 m. The oldest faults are commonly low angle reverse faults with fault planes dipping at between 15º and 30º. Generally the majority of faults are normal and steep with dips of between 70º and vertical. Strike set faults appear to be the youngest and have throws of up to 30 m which hamper mining operations. Major and minor dykes are found throughout the mining right area and are well delineated by airborne and ground magnetics and have been confirmed in underground excavations. They have a north-west to south-east orientation and their thickness varies from centimetres up to approximately 50 m. The depth of weathering is approximately 30 m with the majority of the area covered by a black turf soil. Both the UG2 and Merensky reefs are mined at the Tumela Mine and Dishaba Mine.
The following section details the stratigraphy associated with the shaft areas (Figure 6).

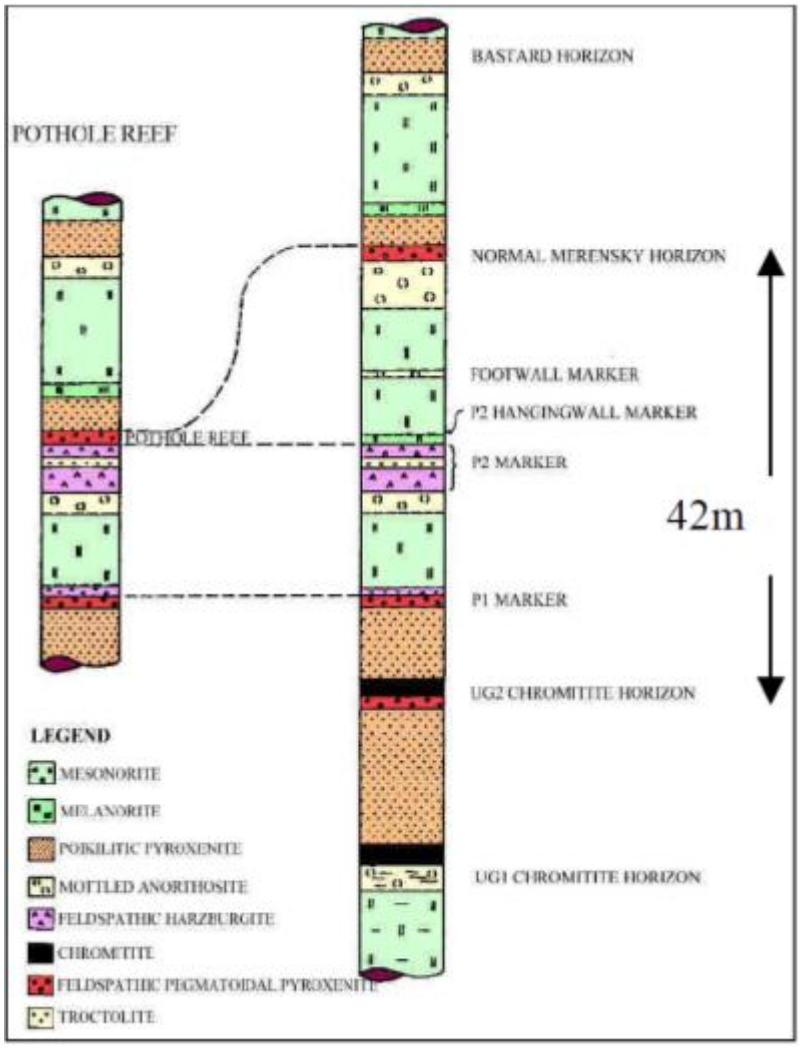

Figure 6: Stratigraphic sequence of the critical zone.

5.2 Climate

According to approved EMPRs for the Amandelbult Section, the climate is semi arid and hot in the

Limpopo and Olifants River basins, but cooler with a higher humidity on the Waterberg plateau and Soutpansberg. Temperatures in the Thabazimbi region are generally high in the summer months, while winter months are characterised by lower temperatures. Rainfall varies from 217 mm to 570 mm per annum. The months of November to March are characterised by the highest rainfall. Between May and September, rainfall is generally low. The majority of the rainfall occurs as thunderstorms and heavy showers. The mean annual evaporation at Thabazimbi is 2017 mm, which exceeds the mean annual rainfall. Winds are light to moderate and are predominantly in a north-westerly direction during the summer months, with westerly winds occurring frequently in the winter.

5.2.1 Rainfall and Evaporation

According to the hydrology assessment conducted by AEL in 2013 for the proposed CRP project (attached as Appendix 3.1), the proposed CRP, associated infrastructure, road and railway extension is located within quaternary catchment A24F. Quaternary catchment A24F has a mean annual rainfall of 602.25 mm, the rainfall at the study area is however lower than the average rainfall with a mean annual rainfall of 564 mm (Figure 7). The annual A-Class Pan evaporation in the general vicinity surrounding the CRP project area ranges between 2200mm and 2600 mm (Figure 8).

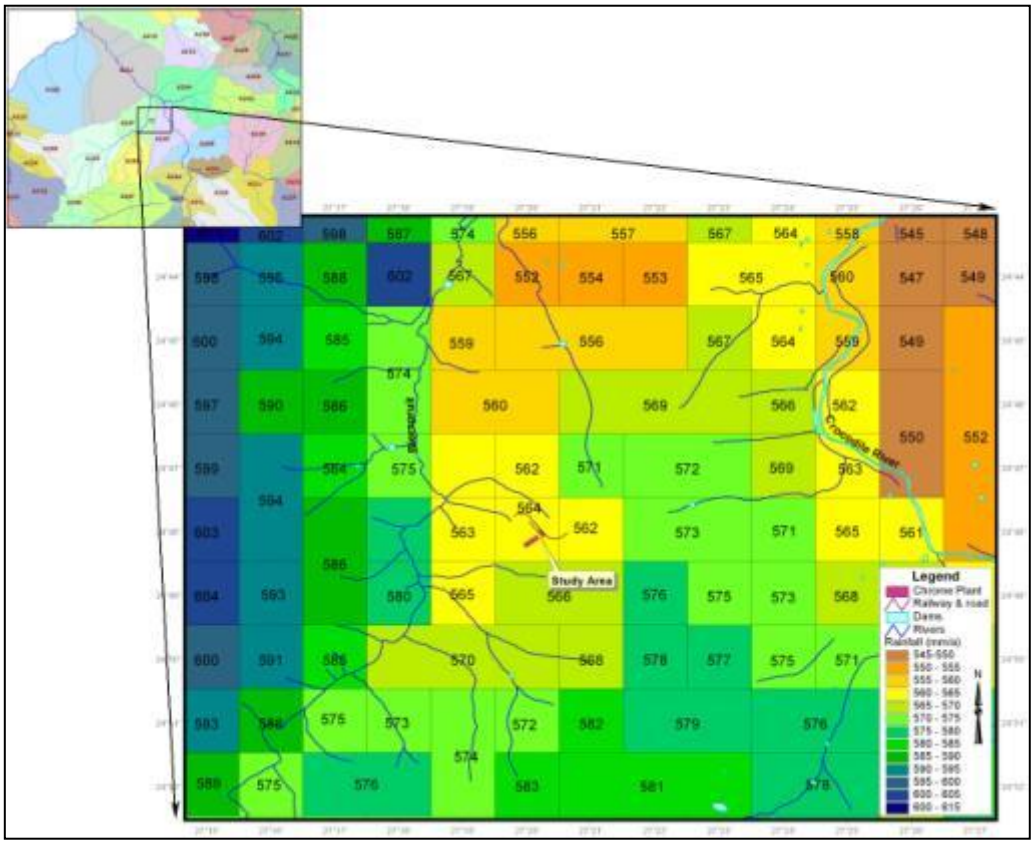

Figure 7: The Mean Annual Precipitation (MAP) for the areas surrounding the CRP project area.

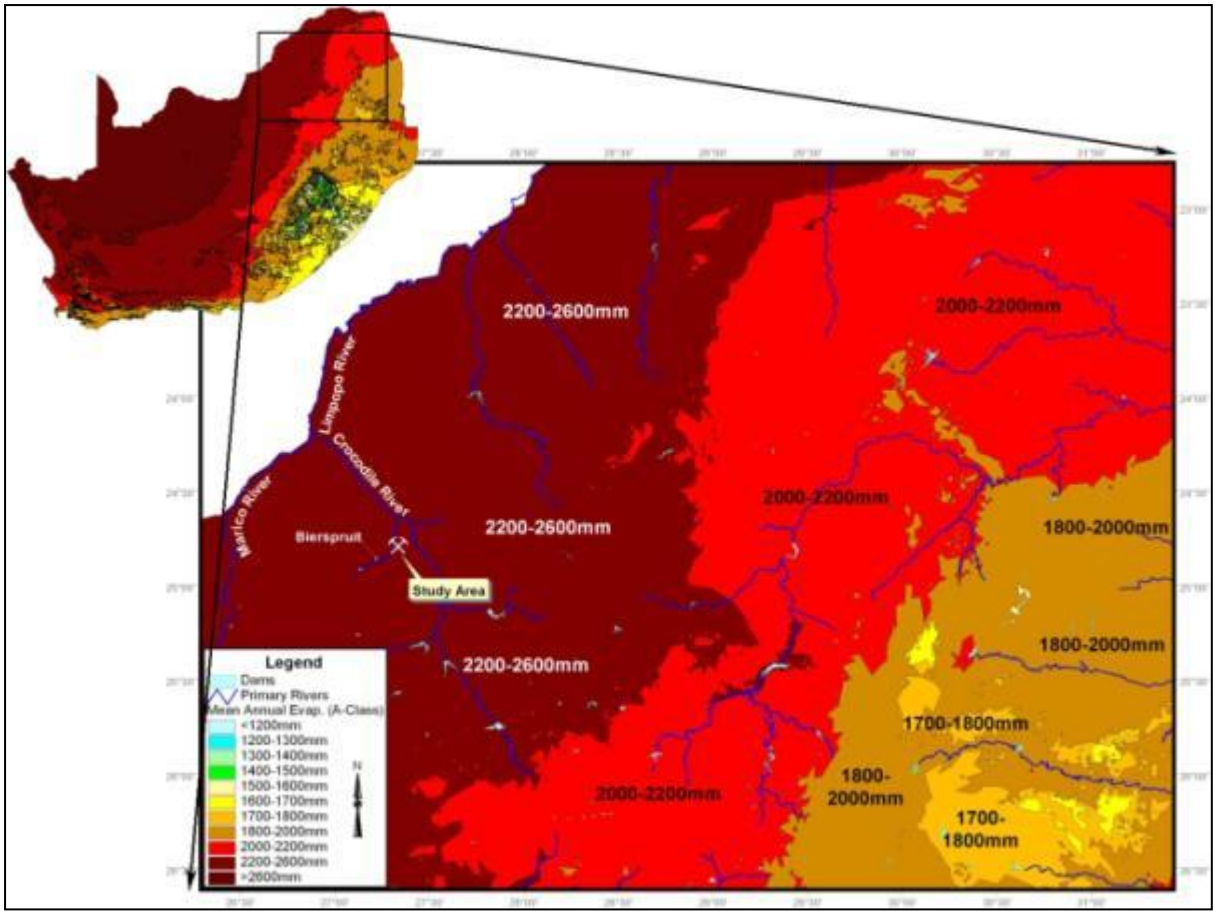

Figure 8: The average A-Class Pan evaporation rate for the areas surrounding the CRP project area.

5.2.2 Temperature

The following information was obtained from the air quality assessment conducted by Royal HaskoningDHV in 2013 for the proposed CRP project (attached as Appendix 3.2). A daily average temperature of 19.7°C (ranging from 12.0°C to 25.2°C) was recorded at the Amandelbult Section weather station for 2012. The Amandelbult Section station experiences high temperatures in the summer months and low temperatures in the winter months. The average daily temperature for the summer months is 23.2°C (ranging between 19.7°C – 25.2°C), where the maximum can reach 39.5°C and the minimum temperature can be as low as 3.5°C. The average daily temperature for the winter months is 16.2°C (ranging between 12.0°C – 22.7°C), with a maximum of 38.2°C and a minimum of -4.6°C.

5.2.3 Wind Data

The 2012 annual windrose recorded at the onsite Amandelbult Section mine station and the seasonal windroses are depicted in Figure 9. According to the air quality assessment conducted by Royal HaskoningDHV in 2013 for the proposed CRP project, the percentage of calm conditions recorded at the station is low (1%), indicating that the wind speed is above calm conditions (>0.5 m/s) throughout the year, the annual average wind speed is 1.5 m/s. The dominant wind direction throughout the year is from the north-west segment of the windrose, shifting from the north west during summer towards the west south-west and south-west during winter. The wind direction

during the day (summer) blows from north north-west to north-west and during the day in winter blows from the south-west. The nightime wind at the onsite station during winter also blows from the south-west but the summer night-time wind shifts and blows dominantly from the north-east segment of the windrose.

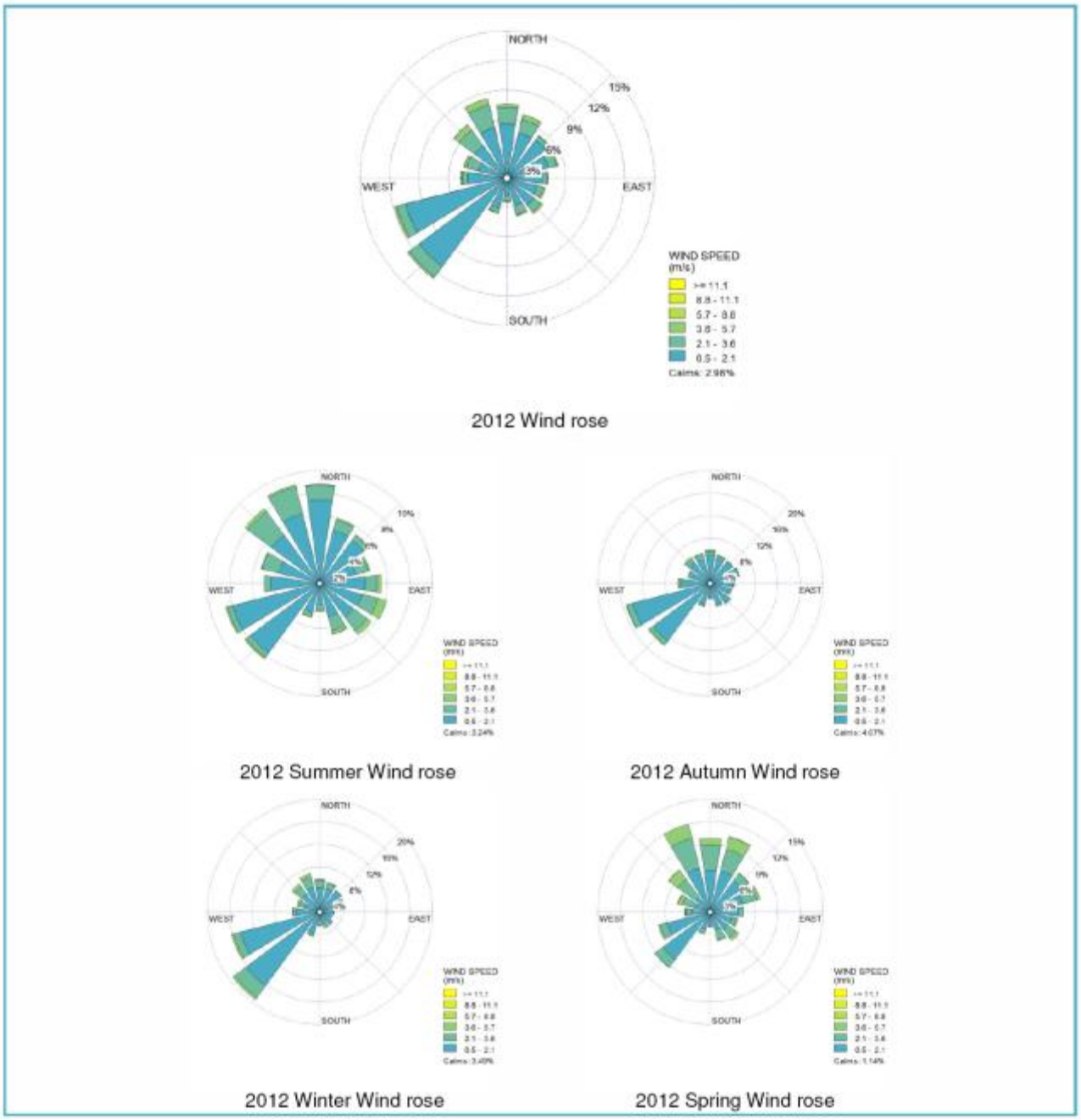

Figure 9: Windroses recorded at the onsite Amandelbult Section station.

5.3 Topography

According to the air quality assessment conducted by Royal HaskoningDHV in 2013 for the proposed CRP project, the topography in the area of the Amandelbult CRP is classified as homogenous and the gradient ranges between +1.0% to -1.1% and slopes towards the north-west. The flat terrain is interrupted by the existing mines infrastructure (Mine Hostel an Amandelbult Concentrator Plant) and the tailings dam.

5.4 Soil Quality

The following information was taken from a Soil Quality Assessment that was undertaken by Earth Science Solution in 2013 for the proposed CRP project (attached as Appendix 3.3).

The major soil types encountered include those of the orthic phase Valsrivier (Va) and Swartland (Sw) (all moderately structured and clay rich soils), along with the more structured forms, including the Sterkspruit (Ss), Arcadia (Ar), Milkwood (Mk) and Mayo (My) forms, and the hydromorphic forms including the Sepane (Se), Bonheim and Rensburg Forms (Figure 10).

The term "black-turf" or "cotton soils" is often used for the heavy clay rich and structured materials. The soils included by this lay-term are the more clay rich structured and darker soils such as the Ar, Rensburg, Ss, and Sw Soil Forms.

A representative set, which included four samples (AM1, AM2, AM3 and AM4), from the differing soil forms/types were taken and sent for analyses for both chemical as well as physical parameters as part of the Soil Quality Assessment.

Table 2: Results of the chemical soil analysis

ELEMENT	UNIT	AM1	AM2	AM3	AM4	OPTIMUM RANGE
pH	mg / kg	7.30	7.15	6.95	5.25	5.2 – 6.5
Calcium	mg / kg	2753	5438	2766	1120	> 200
Magnesium	mg / kg	1412	529	290	201	> 60
Potassium	mg / kg	30	122	59	24	> 40
Phosphorus	mg / kg	5	6	7	6	20 - 80
Zinc	mg / kg	0.6	0.7	1.5	0.4	2 - 10
Organic matter	%	0.46	0.65	0.79	0.71	> 0.75

In general, the chemistry (Table 2) of the materials is typical for soils derived from intrusive parent materials. The soils of these parent materials are slightly acidic in pH, with a range of between 5.25 and 7.30, which is within the accepted range for good nutrient mobility. The soils are also saline in character, and may become susceptible to an increase in salinity if their water regime is not well managed.

The dominant soils in the area have adequate levels of calcium and magnesium, but deficiencies in potassium, phosphorous and zinc, which indicates that there is a need for fertiliser applications of Zn, P and K if sustainable vegetation cover is to be achieved. There is also low organic matter content (0.46 – 0.90 C%) when compared to the optimum ranges for the above mentioned elements. The cation exchange capacity (CEC) values, which give an indication of the potential for a soil to retain and supply nutrients, of the soils in the area are moderate to high, as a result of the high clay content.

The analytical results may not be truly representative of the soils in their natural state as tailings spills are evident on the area where the CRP will be located. However, the results are indicative of the current baseline conditions in the proposed project area.

Figure 10: Soil types within the proposed CRP project area.

In terms of the physical characteristics of the soil, topsoil clay percentages range from as low as 12% to a high of 22% to 40% depending on the host/parent geology from which they are derived and their position in the topography. Subsoil clays range from 35% to 70%. The soil also has very low to moderate in-situ permeability rates on the structured clay rich loams and sandy clay loams respectively. It has poor to very poor intake (infiltration) rates with moderate to good (40 to 65mm/m) water holding capacities. The soil in the area has moderate nutrient status and the structure of the topsoil varies from apedal to weak crumby for the most part, with areas of strong blocky (Vertic), with moderate blocky and extremes of massive structure in the subsoil where the soils are associated with the more basic intrusive parent materials. The soils range from silty clay loams to sandy clay loams and glaycutanic.

The soil forming mechanisms in the area are wind, water and temperature, which have resulted in the formation of moderate to shallow in-situ soils with saprolitic horizons on hard rock. The midslopes and lower midslope positions are dominated by erosion platforms and old land surfaces, while the lower slopes (flood plane areas) are dominated by recent accumulations of transported materials (colluvial) from the upslope positions. The end result is a complex of differing soil forms within a relatively small spatial area. The majority of the proposed project CRP project area is underlain by soils which are sensitive nature to both compaction and erosion.

Soil Fertility

The soils mapped in this area contain moderate to high levels of most of the nutrients required for good plant growth apart from Zn, P and K and organic content, which are lacking. The soil depths are also inhibiting due to the extreme soil structure. However, despite this some of the soils sampled and analysed returned nutrient levels acceptable for moderate arable growth. There are also no indications of any toxic elements that may limit natural plant growth. Therefore, standard fertiliser treatments will be sufficient for optimum agricultural production of crops and/or to retain soil fertility of soil which is stockpiled for any length of time.

Erosion Potential

The majority of the soils mapped can be classified as having a moderate to high erodibility index. This is largely ascribed to the moderate clay and Ca content of the soils and the low organic carbon content. The gentle sloping topography that characterises the study site will however aid in reducing the erosion potential.

Dryland Production Potential

The dryland production potential of the shallow Va, Sw, Ss, Mk and My form soils are poor to very poor, due to a relatively low nutrient status of the soils in their natural state. Fertilizers would be required to increase the productivity of the majority of these soils for economically viable dryland cropping to be viable, and extremely good drainage and water management.

Soil Utilization Potential

Soils are moderate to shallow, (100mm to 600mm), generally poorly drained, with a susceptibility to erosion and compaction and in places show some signs of dampness at depth. The potential of the wet based soils for economic crop production and/or market gardening is poor, the use of

these areas as wilderness lands being the preferred option. The potential for economic farming of the structured soils is considered to be as best "grazing land" or low intensity crop production. The production of the crops on these soils will require good water and drainage management for all but the hardiest crops.

Land Capability

The land capability of the proposed CRP project area ranges from grazing potential to wilderness potential (Figure 11). The areas that classify as grazing land are generally confined to the shallower and transitional zone hydromorphic soil Forms that are moderately well drained. These soils are generally darker in colour, and are not always free draining to a depth of 750mm, but are capable of sustaining palatable plant species on a sustainable basis, especially since only the subsoils (at a depth of 500mm) are periodically saturated. In addition, there should be no rocks or pedocrete fragments in the upper horizons of any of the soil groups. If present it will limit the land capability to wilderness land. The areas that classify as either conservation or wilderness land are found associated with the more structured, and shallower and rockier soils. The highly structured nature of the soils that characterise the majority of the study area make for extremes of workability and at best poor grazing potential lands.

Figure 11: Land capability of the soils within the proposed CRP project area.

5.5 Land Use

5.5.1 Present Regional Land-Use

Except for existing mine buildings, ancillary structures and current land usage (mining and minor residential), much of the land in the Amandelbult Concentrator Plant area is open natural veld (Figure 12).

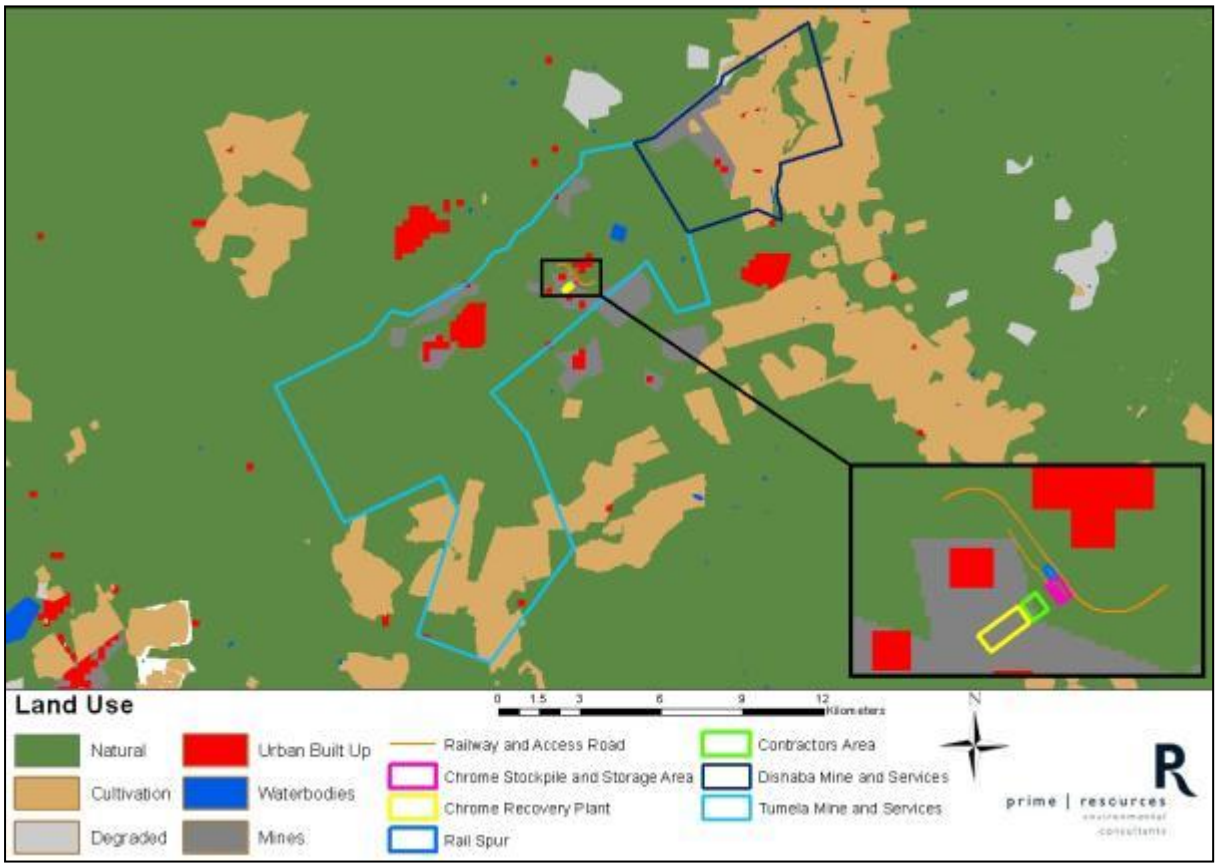

Figure 12: Land use surrounding the CRP project area.

5.5.2 Present Local Land-Use

The following information was obtained from site visits to the proposed CRP project area.

The CRP

The proposed CRP will be located adjacent to the Amandelbult Concentrator Plant and Mine Hostel. Photographs were taken at point 1a and 1b (indicated in Figure 13) which display points at the location the CRP. For the most part the land use of the area of the proposed CRP is comprised of disturbed natural veld due to tailings spills and a tailings spill storage area.

The Stockpile Area

The photograph taken at point 2 in Figure 13 represents the location of the proposed stockpile area. The land use of the area of the proposed stockpile area is comprised of natural veld.

The Access Road

The location of the proposed access road is represented by the photograph taken at point 3 in Figure 13. The land use of the area is comprised of disturbed natural veld due to tailings spills.

The Railway Line Extension

The photograph taken at point 4 in Figure 13 represents the location of the proposed railway line extension. The land use of the area is comprised of natural veld.

The Contractors' Laydown Area

The location of the proposed contractors' laydown area is represented in the photograph taken at point 5 in Figure 13. The land use of the area is comprised of natural veld.

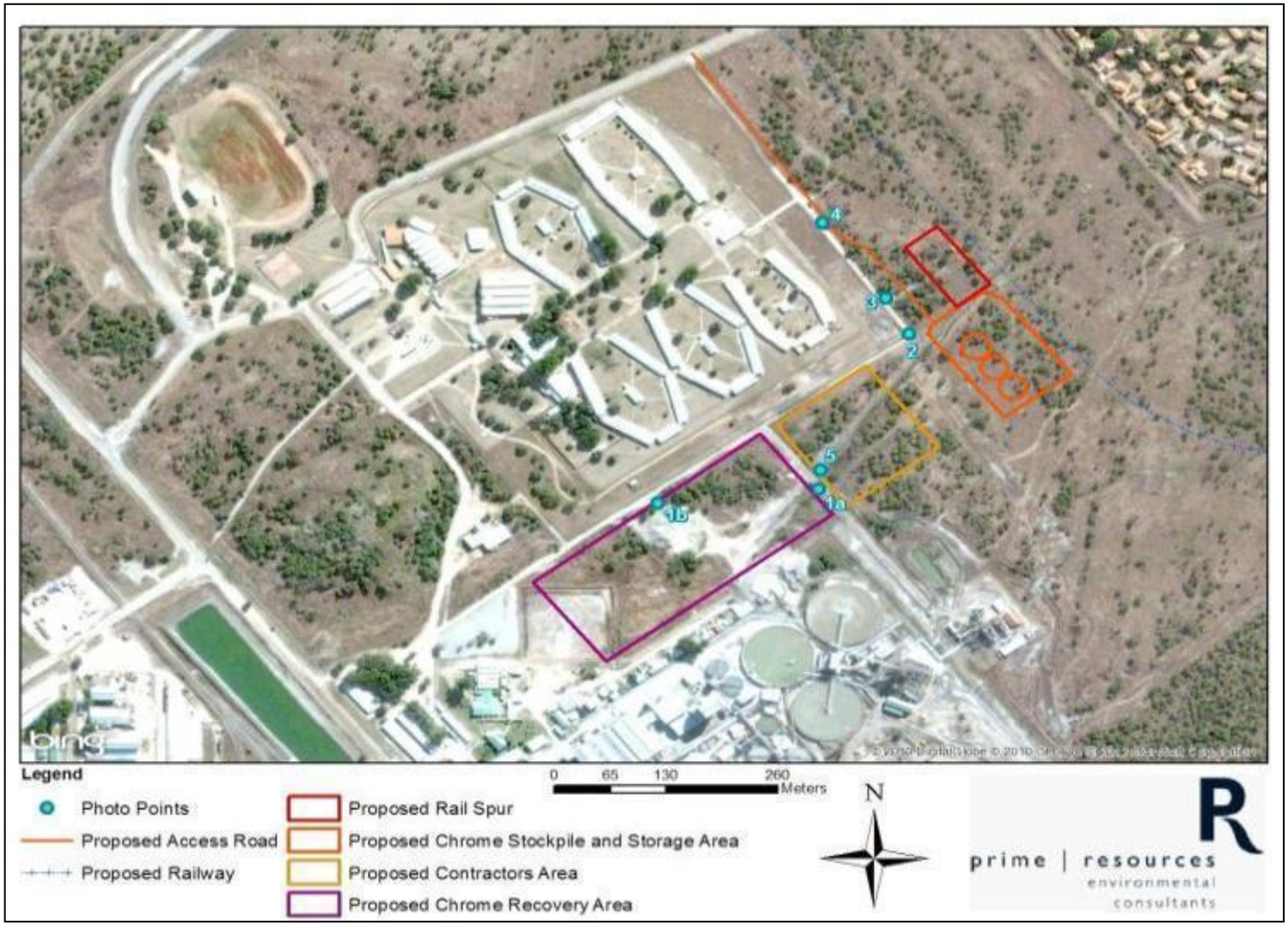

Figure 13: Photographed points at the proposed CRP and associated stockpile area, access road, railway line extension and contractors' laydown area.

Point 1a: Proposed location of the CRP, the area is comprised of disturbed natural veld with evidence of tailings spills.

Point 1b: Proposed location of the CRP, the area is comprised of a tailings storage area.

Point 2: Proposed location of the stockpile area, the area is comprised of natural veld.

Point 3: Proposed location of the access road, the area is comprised of disturbed natural veld.

Point 4: Proposed location of the railway line extension, the area is comprised of natural veld.

Point 5: Proposed location of the contractors' laydown, the area is comprised of natural veld.

5.6 Biodiversity

The following information was obtained from the Ecological Assessment conducted by S.E.F in 2013 for the proposed CRP project (attached as Appendix 3.4).

5.6.1 Floral Diversity

The proposed CRP project area is situated within the Savanna Biome. The vegetation associated with the proposed CRP project consisted of typical Dwaalboom Thornveld vegetation with three ecological units based on vegetation structure, namely undisturbed Thornveld, disturbed Thornveld and modified areas. These areas correspond broadly to the *Acacia nilotica – Acacia karroo* open schrubland. The majority of the proposed infrastructure will be located in the disturbed Thornveld while a portion of the proposed railway line extension will be located in the undisturbed Thornveld within a game camp.

Disturbed Thornveld was recorded throughout the central part of the study area associated with the proposed rail siding, railway line and chrome stockpile and storage area. The disturbed Thornveld was impacted on by overgrazing, roads, pollution and other human activities and it was therefore considered as a separate ecological unit. Although the woody component within the disturbed Thornveld was largely undisturbed, the grass layer has been overgrazed with low basal cover and low species diversity recorded at the time of the survey.

Extensive leakage from the water tower and pipeline within the disturbed Thornveld has resulted in the presence of permanent surface water. Despite the long term presence of the surface water, no aquatic vegetation was recorded and the area was trampled by cattle. However, numerous alien species namely *Melia azedarac, Schinus moll, Schinus terebinthifolius, Opuntia ficus-indica* and *Pennisetum setaceum* were recorded underneath the water tower, where the shade and constant supply of water have enabled these species to become established. No species of conservation concern were confirmed to occur, however suitable habitat for some species of conservation concern *Brachystelma discoideum, Brachystelma gracillimum, Drimia altissima, Drimia sanguine and Stenostelma umbelliferum* and the following nationally protected species *Erythrophysa transvaalensis, Brachyselma* species, *Ceropegia* species, *Cyranthus* species and Orchidaceae was identified. Table 3 summarizes the species recorded in disturbed Thornveld.

Table 3: Species recorded in disturbed Thornveld

TREES	HERBS	GRASSES
Acacia tortilis subsp. *heteracantha*	*Asparagus larcinus*	*Fingerhuthia africana*
Acacia nilotica subsp. *kraussiana*	*Abutilon* sp.	*Ischaemum afrum*
Acacia mellifera subsp. *detinens*		*Enneapogon cenchroides*
Acacia erubescens		*Setaria* sp.
Ziziphus mucronata		
Ziziphus zeyheriana		

In the undisturbed Thornveld very little human disturbance was observed and the grass layer was well developed at the time of the survey, while the woody component included various species (Table 4). No species of conservation concern were confirmed to occur, however suitable habitat

for some species of conservation concern namely *Brachystelma discoideum, Brachystelma gracillimum, Drimia altissima, Drimia sanguine and Stenostelma umbelliferum* and the following nationally protected species *Erythrophysa transvaalensis, Brachyselma* species, *Ceropegia* species, *Cyranthus* species and Orchidaceae was identified. No alien species were observed in this area at the time of the survey, although it is possible that alien species will be present during summer periods when summer climatic conditions become favourable.

Table 4: Species recorded in undisturbed Thornveld

TREES	HERBS	GRASSES
Acacia tortilis subsp. *heteracantha*	*Asparagus larcinus*	*Fingerhuthia africana*
Acacia nilotica subsp. *kraussiana*	*Abutilon* sp.	*Ischaemum afrum*
Acacia mellifera subsp. *detinens*		*Aristida bipartita*
Ziziphus mucronata		*Panicum* sp.
Ziziphus zeyheriana		*Chloris virgata*
		Trachypogon spicatus

The areas associated with the proposed contractors' laydown area and the CRP are defined as modified. At the time of the survey, these modified areas were used for stockpiling of soil while some portions have been cleared of natural vegetation. Although isolated indigenous species (Table 5) still remained. The high level of transformation indicates that normal ecological processes are no longer taking place. No species of conservation concern or suitable habitat was identified within these areas. Two alien species namely *Bidens pilosa* and *Tipuana tipu* were identified in these areas during the field survey.

Table 5: Species recorded in modified areas

TREES	HERBS	GRASSES
Acacia tortilis subsp. *heteracantha*	*Asparagus larcinus*	*Setaria* sp
Acacia nilotica subsp. *kraussiana*		*Fingerhuthia africana*

5.6.2 Faunal Diversity

Avifauna

During the above mentioned Ecological Assessment a field survey was conducted during which 37 bird species (refer to the report attached as Appendix 3.4 for the full list), of the 110 which may occur within the proposed CRP project area, were recorded. Although no species of conservation concern were recorded, suitable feeding or breeding habitat exists in the undisturbed Thornveld for at least nine species of conservation concern which include the *Ardeotis kori* (Kori Bustard), *Gyps africanus* (White-backed Vulture), *Aquila rapax* (Tawny Eagle), *Polemaetus bellicosus* (Martial Eagle) and the *Sagittarius serpentarius* (Secretarybird) classified as vulnerable, as well as the *Falco biarmicus* (Lanner Falcon), *Leptoptilos crumeniferus* (Marabou Stork), *Buphagus Erythrorhynchus* (Red-billed Oxpecker) and the *Certhilauda chua*na (Short-clawed Lark) classified as near threatened.

Mammals

Four mammal species were identified during the field survey in the game camp by sight or field evidence such as spoor, droppings or burrows namely *Tragelaphus strepsiceros* (Kudu), *Giraffa*

camelopardalis (Giraffe), *Sylvicarpa grimmia* (Duiker) and *Connochaetes taurinus* (Blue Wildebeest). A further 25 species (refer to the report attached as Appendix 3.4 for the full list) have a high likelihood of occurrence due to the presence of suitable habitat, five of which are of conservation concern and listed as Near Threatened namely *Eidolon helvum* (Straw-coloured Fruit Bat), *Myotis tricolor* (Cape Hairy Bat), *Pipistrellus rusticus* (Rusty Pipistrelle*), Mellivora capen*sis (Honey Badger) and *Ceratothecum simum* (White Rhino).

Herpetofauna

There are12 amphibian species which may occur within the region of the proposed CRP project (refer to the report attached as Appendix 3.4 for the full list). Due to the timing of the survey, no amphibian species were identified during the field survey. However, there is limited suitable habitat within the proposed CRP project area.

There are 41 reptile species which may occur within the region of the proposed CRP project (refer to the report attached as Appendix 3.4 for the full list). None of these species have had their conservation status adequately evaluated. No reptile species were observed during the field survey although suitable habitat for at least 21 species (refer to the report attached as Appendix 3.4 for the full list) was observed within the undisturbed Thornveld area specifically in the game camp area.

Lepidoptera

There are 367 Lepidoptera species have been recorded in Limpopo Province of which nine species are of conservation concern (refer to the report attached as Appendix 3.4 for the full list). However, it is unlikely that any of these species occur within the proposed CRP project area.

5.6.3 Ecological Sensitivity

Within the proposed CRP project area the area where a portion of the proposed railway extension will be was classified as having a medium to high ecological sensitivity. The area where the rail siding, the rest of the railway line extension and the chrome stockpile and storage area will be located was classified as having a medium to low ecological sensitivity. The modified areas where the contractors' laydown area and the CRP will be located were classified as having a low ecological sensitivity (Figure 14). These areas are described in the paragraphs below.

The habitat associated with the undisturbed Thornveld including the game camp was classified as Medium to High Ecological Sensitivity due to the natural condition of the veld and the absence of human disturbances. Although no species of conservation concern were recorded during the time of the survey (likely due to timing of the assessment), suitable habitat exists in this area for at least seven species of conservation concern. Furthermore, since the survey was conducted during winter when most herbaceous plants are dormant and numerous faunal species have migrated (avifauna) or are inactive, it is likely that this area will support higher faunal diversity during summer.

The disturbed Thornveld was classified as medium to low ecological sensitivity due to the high level of disturbance in the area. The area has been extensively overgrazed by large herds of cattle while the close proximity of the Mine Hostel, roads and Amandelbult Concentrator Plant makes the

area largely unsuitable for mammal species. Furthermore the area does not provide a corridor for faunal movement since it is largely surrounded by transformed areas. Despite this, the area did support indigenous floral species with a well developed tree layer.

The modified areas are unlikely to support any ecological processes as a large portion of this area has already been cleared of vegetation and the remainder of the area is currently used for stockpiling of soil. Furthermore, the close proximity of the Amandelbult Concentrator Plant makes it highly unlikely that any faunal species will be present within these areas and the modified areas are therefore classified as having low ecological sensitivity.

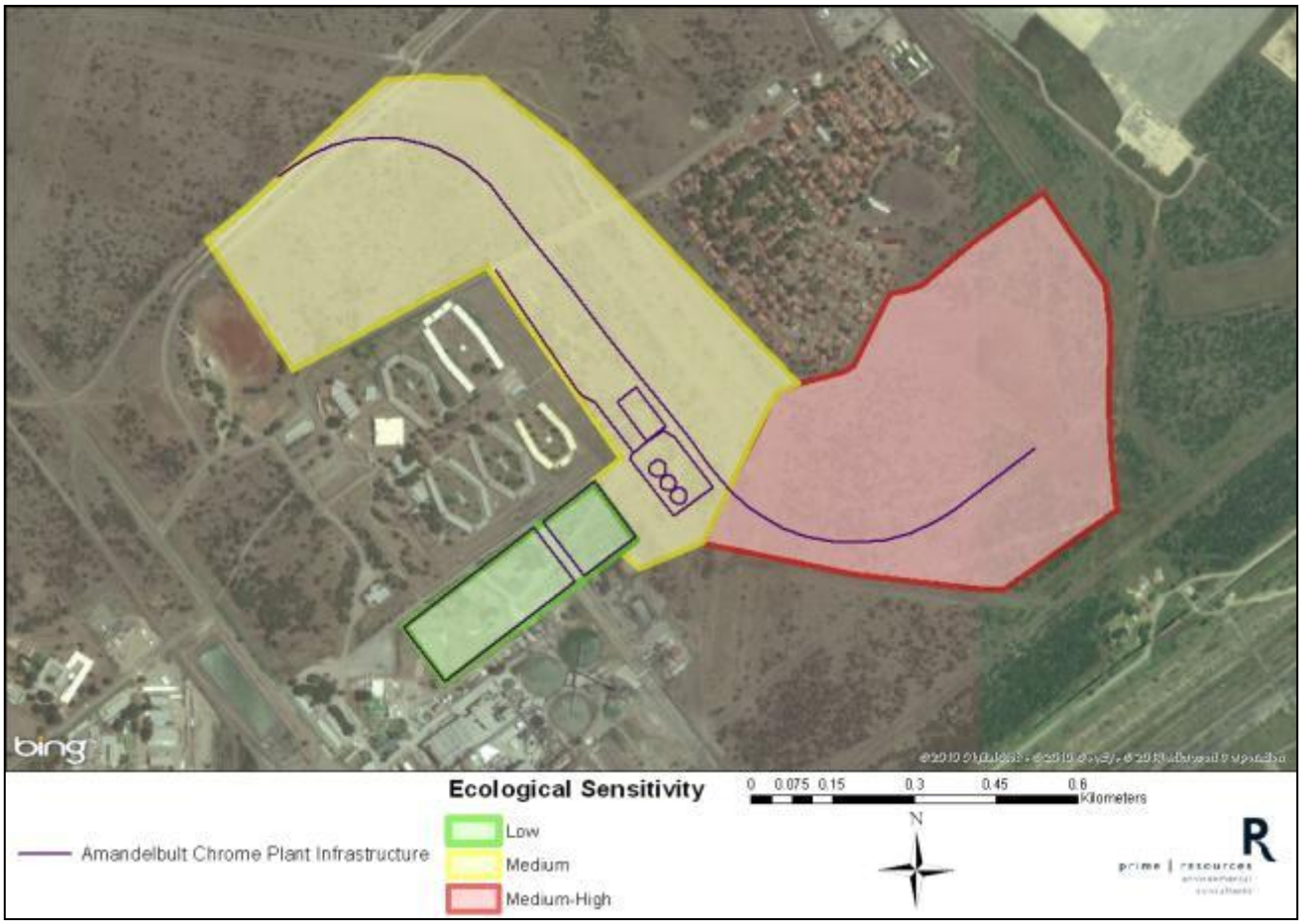

Figure 14: Ecological sensitivity of the proposed CRP project area.

5.7 Wetlands

According to the approved Amandelbult EMPRs, no natural wetlands have been identified within the proposed CRP project area.

5.8 Surface Water

A hydrology assessment was undertaken by AEL in 2013 for the proposed CRP project.

5.8.1 Surface Water Resources

According to the above mentioned hydrology assessment, the primary river within the Amandelbult mining right area is the Crocodile River, located approximately 8 km to the east of the proposed

Amandelbult CRP. The second river which flows through the Amandelbult mining right area is the Bierspruit, which is a tributary of the Crocodile River and located approximately 2.5 km to the west of the project area (Figure 15). The Amandelbult CRP area falls within the Crocodile River (West) catchment, the mean annual run-off for this catchment is 12.5 mm. The proposed Amandelbult CRP falls within quaternary catchment A24F (Figure 16), within the Crocodile River (West) and Marico River Water Management Area.

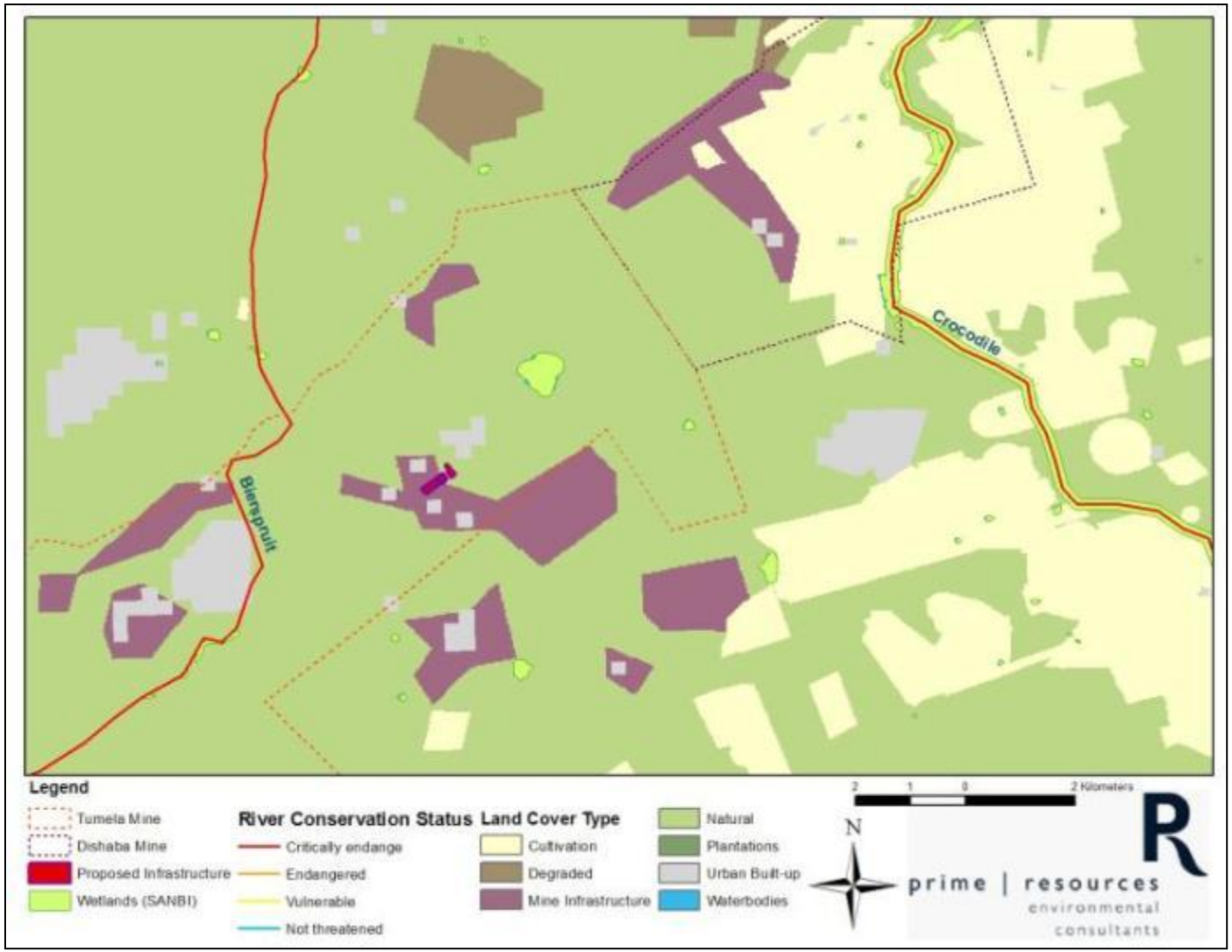

Figure 15: The position of the Bierspruit and Crocodile River in relation to the Amandelbult CRP and surrounding land cover type.

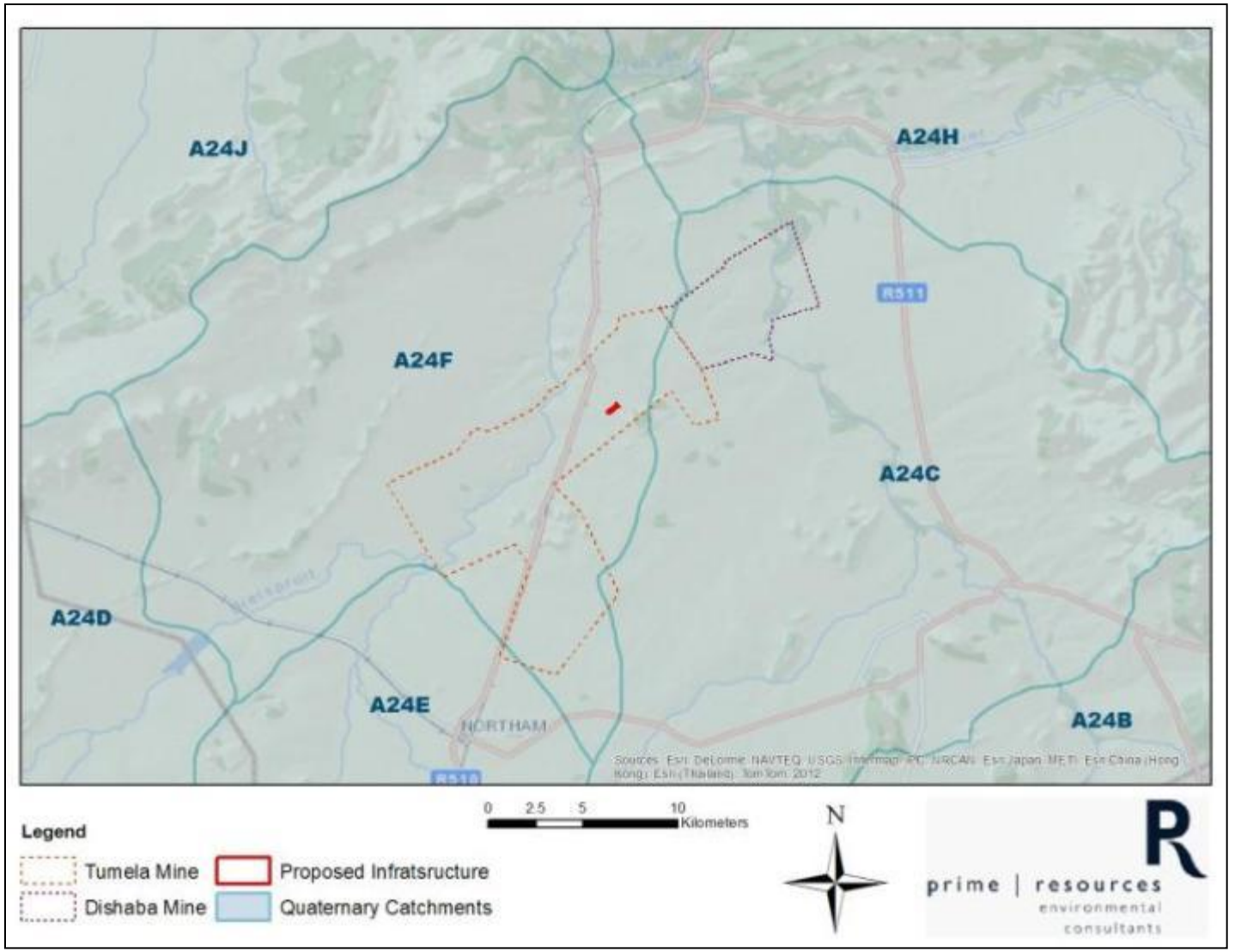

Figure 16: Map indicating the catchment boundaries relevant to the Amandelbult CRP project area.

5.8.2 Hydrology

Drainage for the Amandelbult CRP area will be westwards towards the Bierspruit through a drainage channel beginning at the Mine Hostels (Figure 17). The calculated average monthly flow in the Bierspruit at its confluence with the Crocodile River is 30.814 mm^3. The slope of the land surrounding the project area is very flat with slopes ranging from <0.5º to 0.5º. Surface flow off these areas will occur at a very slow rate.

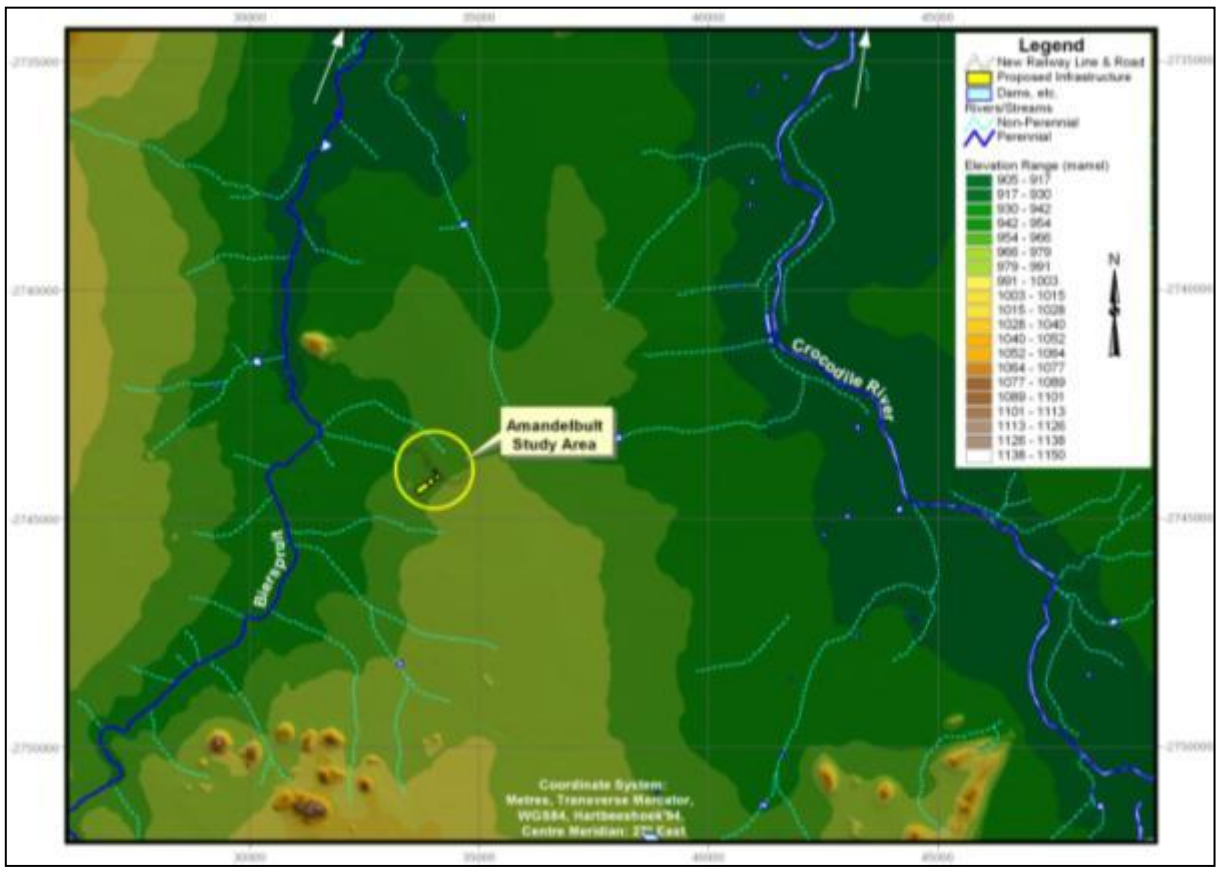

Figure 17: Rivers and drainage channels in the vicinity of the CRP project area.

5.8.3 Water Quality

Amandelbult has an extensive surface water monitoring programme and water samples are collected on a regular basis. In terms of surface water quality, sampling has historically taken place at both upstream and downstream localities on the Bierspruit and Crocodile Rivers.

Two sets of samples were used during the hydrological assessment to determine the water quality, representative of the end of the dry season and the middle of the wet season during the hydrological year 2011/2012. Refer to Table 6 and Table 7 for a summary of the water quality of the Bierspruit and Crocodile River within the Amandelbult mining right area.

Table 6: Water quality of the Bierspruit and Crocodile River within the Amandelbult mining right area during the rainy season

RAINY SEASON (07 FEBRUARY 2012)	BIERSPRUIT			CROCODILE RIVER		SANS 241: 2011	
Determinant	**AMD-A**	**AMD-E**	**AMD-P**	**AMD-G**	**AMD-I**	**Standard Limits**	**Risk**
pH (…@25°C)	7.99	7.98	8.28	8.12	8.24	≥5.0 - ≤9.7	Operational
Electrical Conductivity (mS/m)	55.9	80.1	113	67.7	67.7	≤170	Aesthetic
Total Dissolved Solids (mg/l)	274	379	620	355	361	≤1200	Aesthetic
Total Hardness (mg/l $CaCO_3$)	192	231	370	199	201		
Calcium (mg/l)	39	44	62	41	40	<150 (SANS 241: 2006 Class I)	
Magnesium (mg/l)	23	29	52	24	25	<70 (SANS 241: 2006 Class I)	
Sodium (mg/l)	38	59	108	61	60	≤200	Aesthetic
Potassium (mg/l)	5	5	8	8	8	<50 (SANS 241: 2006 Class I)	
Total Alkalinity (mg/l)	134	112	215	132	138		
Chloride (mg/l)	54	78	197	79	79	≤300	Aesthetic
Sulphate (mg/l)	29	90	63	62	65	250 and 300	Acute Health: ≤500 Aesthetic: ≤250
Nitrate (mg/l N)	5.14	5.65	0.18	0.98	0.71	≤11	Acute Health

Table 7: Water quality of the Bierspruit and Crocodile River within the Amandelbult mining right area during the dry season

DRY SEASON (08-09 NOVEMBER 2011)	BIERSPRUIT			CROCODILE RIVER		SANS 241: 2011	
Determinant	**AMD-A**	**AMD-E**	**AMD-P**	**AMD-G**	**AMD-I**	**Standard Limits**	**Risk**
pH (…@25°C)	8.18	8.45	8.39	8.31	8.34	≥5.0 - ≤9.7	Operational
Electrical Conductivity (mS/m)	264.6	218.8	219.9	80.9	78.6	≤170	Aesthetic
Total Dissolved Solids (mg/l)	1638	1120	1190	437	452	≤1200	Aesthetic
Total Hardness (mg/l $CaCO_3$)	962	684	685	272	269		
Calcium (mg/l)	153	115	91	52	51	<150 (SANS 241: 2006 Class I)	
Magnesium (mg/l)	141	96	111	35	34	<70 (SANS 241: 2006 Class I)	
Sodium (mg/l)	250	182	204	96	73	≤200	Aesthetic
Potassium (mg/l)	21	11	12	8	8	<50 (SANS 241: 2006 Class I)	
Total Alkalinity (mg/l)	155	67	270	188	186		
Chloride (mg/l)	590	449	482	90	98	≤300	Aesthetic
Sulphate(mg/l)	388	198	127	70	75	250 and 300	Acute Health: ≤500 Aesthetic: ≤250
Nitrate (mg/l N)	1.37	28.97	0.21	1.51	<0.02	≤11	Acute Health

The water of the Crocodile River samples complied with the SANS 241:2011 limits for both the dry and wet seasons, although there is a slight (and expected) increase in almost all the determinants from the rainy to the dry seasons. This indicates that the water in the Crocodile River is of a high quality.

The Bierspruit shows a notable difference in the concentrations of most of the determinants between the dry and rainy seasons. As the Bierspruit is a non-perennial stream, a notable difference in the concentrations between the dry and rainy seasons is expected, due to evaporation, however, not to the extent shown in these samples. Some variables exceeded the SANS 241:2011 limits including Electrical Conductivity (EC), Total Dissolved Solids (TDS), sodium, chloride and nitrate. Most of these variables only have an aesthetic effect if exceeded. However, nitrate has an acute health effect.

5.8.4 Downstream Water Use

Due to its non-perennial nature, the Bierspruit is not used extensively by industry, other than by a few local mines including Swartklip Mine which has the largest dam in the river, the Bierspruit Dam, Amandelbult Tumela Mine, which has a nature reserve along the Bierspruit, as well as one or two other smaller mines that may be using water from the Bierspruit on a small scale.

5.9 Groundwater

5.9.1 Aquifer Classification

According to the geohydrological study conducted in 2006 by WSP for a previous project, the aquifers across the mining right area may be classified as either Major or Minor aquifer systems.

Major aquifer systems comprise highly permeable geological formations with significant fracturing which may be highly productive and able to support large abstractions for public supply and other purposes. Water quality in these systems is generally good (EC<150 mS/m). The major aquifer system located at the mining right area consists of large-scale faulting, diabase dykes and/or large pockets of weathering. This system occurs across 10% of the mining area as narrow bands mirroring the most prominent geological structures.

Minor aquifer systems can be fractured or potentially fractured rock which does not have a significant primary porosity. Aquifer extent maybe limited with variable water quality. These aquifers are not major sources of groundwater but are important in terms of local supply as well as baseflow contribution to rivers. The minor aquifer system beneath the mining right area comprises area is of insignificant weathering and fracturing. These systems occur across approximately 90% of the mining area.

Shallow Aquifers

The geohydrological study conducted in 2006 by WSP, showed that during dry seasons, deep desiccation cracks in the montmorillonitic "black turf" cover extend down to 1.5m below ground level. This may allow surface contamination to reach shallow, perched water tables during heavy rains following a dry season and before the desiccated clays become hydrated. The hydrophilic

nature of the clays may reduce surface infiltration during wet months, possibly forming temporary, seasonally perched aquifers within the black turf horizon.

Under normal conditions, slow downward infiltration through the thick clayey cover should result in contaminant attenuation due to clay chemistry (high buffer capacity). Groundwater therefore moves slowly and receives limited recharge through the black clays associated with norite weathering.

Numerical finite triangulation techniques indicate that groundwater flow direction is predominantly from south to north across the area. The average seepage velocity is estimated between 0.1 and 20 m/annum, which implies that shallow groundwater may not migrate as far as deeper subsurface fissure flow. Recharge to the groundwater regime is estimated at 3% of MAP across the area and between 5 and 7 percent of MAP within the drainage lines.

The shallow aquifer within the mining right area was described further in the Integrated Groundwater Management report, dated 2008. According to the said report, a shallow unconfined, phreatic (or water table) aquifer comprises of the saprolite (formed as a result of intensive and in-situ weathering processes) to sap rock (differentially weathered and fractured bedrock underlying the saprolite) zones. The saprolite (where present) and saprock are treated as a single weathered aquifer unit, referred to as the weathered overburden, that varies in thickness from 12 to 50 m based on existing borehole logs and evidence of borehole depths. This differentially weathered overburden can be described as highly weathered, yellowish white to yellowish brown sandy, silty soil derived from the in-situ decomposition of the underlying norite.

Crocodile River Alluvial Aquifer

Along the river courses this combined aquifer unit is partially or totally replaced by alluvial aquifers (river sand), which were deposited by the river and retained a hydraulic connection with it. The weathered aquifer as well as the alluvial aquifer of the Crocodile River support most irrigation and domestic water supply boreholes throughout the region.

The [then] DWAF conducted a study in 1982 to delineate the alluvial aquifer associated with the Crocodile River. This was done to determine the geohydrological potential of the aquifer and also to determine the relationship between surface water and groundwater with a view to effectively manage the combined system.

The study delineated the alluvial aquifer in close proximity to the river. Close to the eastern boundary of the Dishaba Mine it was found that the aquifer only extends for approximately 300 m west of the Crocodile River. The reason for this is that the area is underlain by very shallow bedrock (mainly gabbro and norite), generally less than 9 m below the surface. The majority of the aquifer is on the eastern side of the river where in fact some high yielding boreholes were found.

The physical characteristics of the aquifer were also determined by the [then] DWAF by drilling a number of boreholes across the aquifer. In all instances it was found that there was an impermeable clay layer at depths carrying from 2 m to 8 m below the surface on the river bed. The clay is overlain by unconsolidated and structured quartzitic sands and gravels. There are indications that the clay layer is underlain by more sands and gravels. It would seem as if the clay

layer occurs as an almost continuous horizon in and along the river bed, forming "tongues" literally into the adjacent and older alluvial deposits, and pinching out with distance from the river.

It was observed that the river banks are mainly composed of a semi-pervious loamy soil. The soil has a reasonably high clay content and is well consolidated. Based on all the above mentioned information, the conclusion drawn was that the river could only be regarded as partly penetrating the aquifer, and serves as a semi-pervious groundwater boundary.

As part of the study, then [then] DWAF developed piezometric maps. These maps revealed that there is a gradient towards the river along the greater part of the western bank, and generally influent conditions along the eastern bank. The groundwater contours tend to be parallel with the course of the river, manifesting a distinct groundwater gradient from west to east. The higher groundwater levels along the west bank are seen to reflect the geohydrological nature of this zone in that very shallow bedrock (gabbroic) is overlain by a decomposed and very clayey overburden.

According to the Integrated Groundwater Management report, dated 2008, the Crocodile River, in the vicinity of the Dishaba Mine, is a gaining stream, i.e. shallow groundwater in the upper weathered aquifer flows towards the stream. The 1 m to 4 m thick silty clays (i.e. black turf) overly most of the area. These highly impermeable clays prohibit infiltration of rainwater, except where desiccation cracks allow rapid infiltration of rainfall. Groundwater intersected at the relatively impermeable interface (~ 15 - 18 mbgl) between the upper weathered and underlying fractured bedrock aquifer was under pressure due to the presence of the overlying black turf layer (i.e. potentiometric levels were measured at 3 – 5 mbgl). Analyses of groundwater information generated during the 2008 study do not indicate a direct link with water inflows from the Crocodile River. Direct inflow from shallow water sources (e.g. shallow groundwater, infiltration from tailings dams) is only evident in the case of mine fissure inflows at shallow depths (30 mbgl) in 50 East Decline Shaft at the Dishaba Mine.

The northwest-flowing Crocodile River flows through the Dishaba Mine area 1.9 km from the No. 2 Shaft / nearest infrastructure. Two local farmers abstract groundwater from the Crocodile River in excess of 10 million m^3/annum. These are situated 13 km upstream of the mining right area and 100 km downstream.

Weathered Horizon in the Vicinity of the Bierspruit

As described in the Integrated Groundwater Management report, dated 2008, the weathered horizon in the vicinity of Bierspruit is very thin with outcrops of the fractured bedrock aquifer in the river course. Groundwater was intersected in a thin horizon of river alluvium above the weathered overburden to fractured bedrock interface. Significant ponding occurs along the Bierspruit in areas where mine discharge occur despite the presence of numerous fracture systems, indicating only very slow and/or limited infiltration. Chemical analyses of mine fissure inflows in 1 Shaft at the Tumela Mine indicated minor inflows of shallow water sources (i.e. shallow groundwater).

Fractured Rock Aquifer

According to the geohydrological study conducted in 2006 by WSP, the mining right area is underlain by ultramafic intrusive rocks. Fractured contact zones between weathered and

unweathered crystalline rocks commonly have high groundwater potential, particularly the norite on which the mine is situated. Deep fracturing in the solid crystalline rocks provides potential pathways for groundwater to levels concurrent with mining activities.

Similarly, the deeper fractured bedrock aquifer was described in the Integrated Groundwater Management report as being unweathered and fractured semi-confined bedrock aquifer in the unweathered, fractured norites, anorthosites and pyroxenites underlying the upper aquifer. The intact bedrock matrix has a very low matrix hydraulic conductivity and its effective hydraulic conductivity is determined by fractures and mine openings. Groundwater flows through interconnected fracture systems with the potential of rapid vertical groundwater flow from the weathered overburden as well as surface water bodies to greater depths along interconnected conductive zones.

The geohydrological study conducted in 2006 by WSP further states that the principle groundwater occurrence is therefore D2 – intergranular and fractured (DWAF Geohydrological Series, Polokwane 2326). Median boreholes yields from such aquifers in the area vary from 0.1 to 0.5 litres per second at the surface, but may increase markedly with depth due to the intersection of faults, joints or fractures.

Groundwater flow occurs under semi-confined and confined conditions in fractured rock formations in the vicinity of the Tailings Dam Complex at the Amandelbult Concentrator Plant and Services Section. Return water from the tailings dams drains northwards into the Return Water Dam and is potentially responsible for reduced groundwater quality in this area.

Due to the layered nature of the geology, less resistant rock units may undergo preferential weathering, resulting in increased vertical heterogeneity and distinct and separate hydraulic zones. Although these structures may increase groundwater movement along their flanks, they generally do not allow the lateral flow of groundwater. Thus, the groundwater regime of the mining right area is divided into four distinct subcompartments (Figure 18). However, where faults or shear zones cut across diabase intrusions, aquicludes can be locally connected.

According to the approved EMPR for the Tailings Dam extension (2002) the Tailings Dam Complex at the Amandelbult Concentrator Plant and Services Section straddles two of these compartments (2 and 3). The other two compartments are located to the west (1) and to the east (4) of the Tailings Dam Complex which are the Tumela Mine and Dishaba Mine respectively.

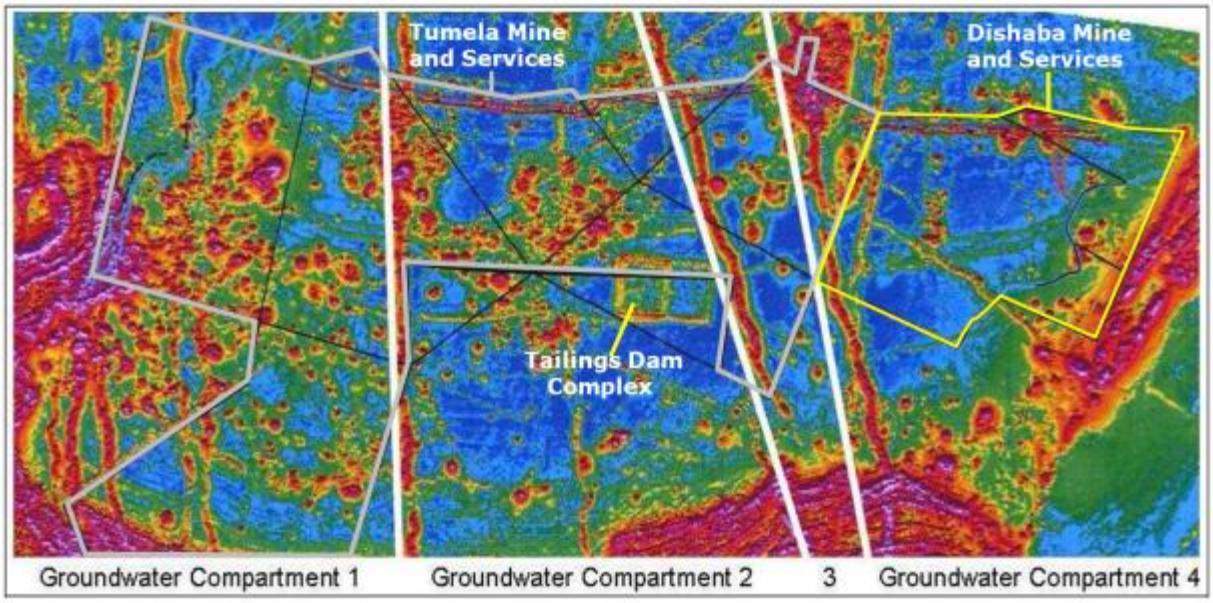

Figure 18: Aeromagnetic anomaly map of groundwater compartmentalisation of the mining right area due to northeast-southwest diabase dykes (emphasised with white lines).

5.9.2 Groundwater Quality

The following information was gathered from results of the ongoing groundwater monitoring programme at Amandelbult. The information is associated with the Amandelbult Concentrator Plant which is in close proximity to the proposed CRP project area.

Groundwater Quality associated with the Amandelbult Tailings Impoundments and Amandelbult Concentrator Plant

The underlying Geology may have a significant influence on the groundwater quality. According to the 2012 water quality monitoring results (refer to Figure 19), several of the boreholes around the Amandelbult Concentrator Plant Section had unacceptable water quality (DWAF Domestic Use; class 4) according to the SANS 241-1:2011 standards as the standards were exceeded in terms of the average EC level, TDS, Ca, Mg, Na, Cl, S04, ammonia, Fe, Mn and Cd concentrations. The following conclusions may be drawn:

- The tailings complex may be considered to be the most significant influence on groundwater quality;
- Groundwater quality varies significantly as a result of aquifer heterogeneity; and
- Down-gradient groundwater quality appears unaffected by the current mining activities.

Amandelbult Concentrator (Tailings): Average water quality										
Variable	Permit conditions (1873 B)	Groundwater localities								
		EMPR05	EMPR07	EMPR08	EMPR15	EMPR19	EMPR20	EMPR22	EMPR23	WM04
		Borehole west of Tailings Dam and Water Care Works	Borehole north of Tailings Dam	Borehole north of tailings Dam	Borehole south of Tailings Dam	Borehole north of new Tailings Dam extension	Borehole north of new Tailings Dam Extension	Borehole east of new Tailings Dam extension	Borehole south of new Tailings Dam extension	Borehole north of tailings dam
pH ()	5.5 - 9.5	8.61	7.23	7.11	7.60	8.64	7.30	7.45		*9.65*
EC (mS/m)	70 - 150	122.95	*498.00*	*238.20*	*245.65*	*618.00*	118.30	*203.80*		*173.45*
TDS (mg/l)	-	609.00	3046.00	1455.00	1573.00	2527.00	642.00	1133.00		907.50
Ca (mg/l)	-	8.25	88.46	101.77	125.11	60.38	54.38	154.46		4.67
Mg (mg/l)	-	70.93	209.82	127.40	157.56	394.67	34.52	118.08		6.39
Na (mg/l)	-	132.25	663.16	232.82	209.25	341.94	164.52	105.07		355.89
K (mg/l)	-	1.65	3.74	1.64	2.09	11.41	1.23	1.88		1.08
M alk (mg/l)	-	188.25	108.20	151.55	445.00	19.60	562.20	594.20		149.45
T hardness (mg/l)	-	312.50	1085.00	778.50	961.00	1776.00	278.00	872.00		38.00
Cl (mg/l)	-	196.70	536.80	466.05	391.10	1703.50	50.00	387.60		347.70
F (mg/l)	1	0.18	0.18	0.18	0.23	0.26	0.18	0.54		0.18
SO_4 (mg/l)	-	85.78	1478.83	434.11	420.73	2.83	0.13	8.84		102.34
PO_4 (mg/l)	10	0.03	0.03	0.03	0.03	0.04	0.03	0.03	*Dry*	0.03
NH_3 (mg/l)	6	0.57	0.07	0.48	0.14	*19.30*	1.03	0.84		0.10
NO_3 (mg/l)	15	0.53	0.32	0.19	0.16	0.30	0.27	0.33		0.21
Al (mg/l)	-	0.006	0.006	0.006	0.006	0.006	0.006	0.006		0.006
Fe (mg/l)	0.3	0.006	*2.770*	*12.148*	0.295	0.006	0.006	*59.000*		0.006
Mn (mg/l)	0.1	*0.203*	*0.497*	*0.819*	*0.530*	0.001	*0.506*	*0.585*		0.001
Cd (mg/l)	0.005	0.001	0.002	0.004	0.001	0.001	0.001	*0.023*		0.001
Co (mg/l)	-	0.002	0.003	0.002	0.002	0.002	0.002	0.002		0.002
Cr (mg/l)	0.05	0.002	0.002	0.002	0.002	0.002	0.002	0.002		0.002
Cu (mg/l)	0.01	0.004	*0.017*	*0.013*	0.001	*0.057*	0.001	0.001		0.001
Ni (mg/l)	-	0.003	0.003	0.003	0.003	0.003	0.003	0.003		0.003
Pb (mg/l)	0.01	0.001	0.001	0.001	0.001	0.004	0.001	0.001		0.001
Zn (mg/l)	0.1	0.004	*0.123*	0.004	0.004	0.004	0.004	0.004		0.004

Figure 19: Average groundwater quality.

5.10 Air Quality

According to an air quality assessment conducted by Royal HaskoningDHV in 2013 for the proposed CRP project, the following sources of air pollution in the surrounding area have been identified:

- Agricultural activities;
- Vehicle entrainment and exhaust gas emissions;
- Domestic fuel burning;
- Fugitive emissions from mining operations; and
- Veld Fires.

The Amandelbult Concentrator Section is located within the Waterberg-Bojanala Priority Area. The Thabazimbi ambient air quality station had a 80% data availability for April 2013 and the average PM10 concentration was 48.1 µg/m3 (PM2.5 = 26.81 µg/m3) and the maximum recorded was 86.93 µg/m3 (54.68 µg/m3), the station is west of Thabazimbi approximately 30 km north of the proposed CRP project area.

The Amandelbult Concentrator Section implemented their dust fallout monitoring network in 2010. The dust fallout results utilised were based on the 2012 results. There is currently no ambient air quality monitoring being conducted at the Tumela Dishaba or Amandelbult Concentrator sections and the PM10 and PM2.5 concentrations are calculated from the dust fallout results. The PM10 concentrations range between 30.7 µg/m3 to 213.5 µg/m3, with the annual average of 71.1 µg/m3. This calculated annual PM10 concentration exceeds the annual national standard for PM10 (50 µg/m3) and the future annual standard (40 µg/m3). The PM2.5 concentrations range between 18.8 µg/m3 to 130.5 µg/m3, with the annual average of 43.4 µg/m3. This calculated annual PM2.5 concentration exceeds the annual national standard for PM2.5 (25 µg/m3) and the future annual standard (20 µg/m3). This can be attributed to the sites where the samples were taken being situated within a mining environment and in close proximity to the tailings dam. The low rain fall in the region may also contribute to the high dust fallout.

The sensitive receptors associated with the proposed CRP project area in terms of air quality include, the Mine Hostel and Rethabile Mine Village (Figure 20).

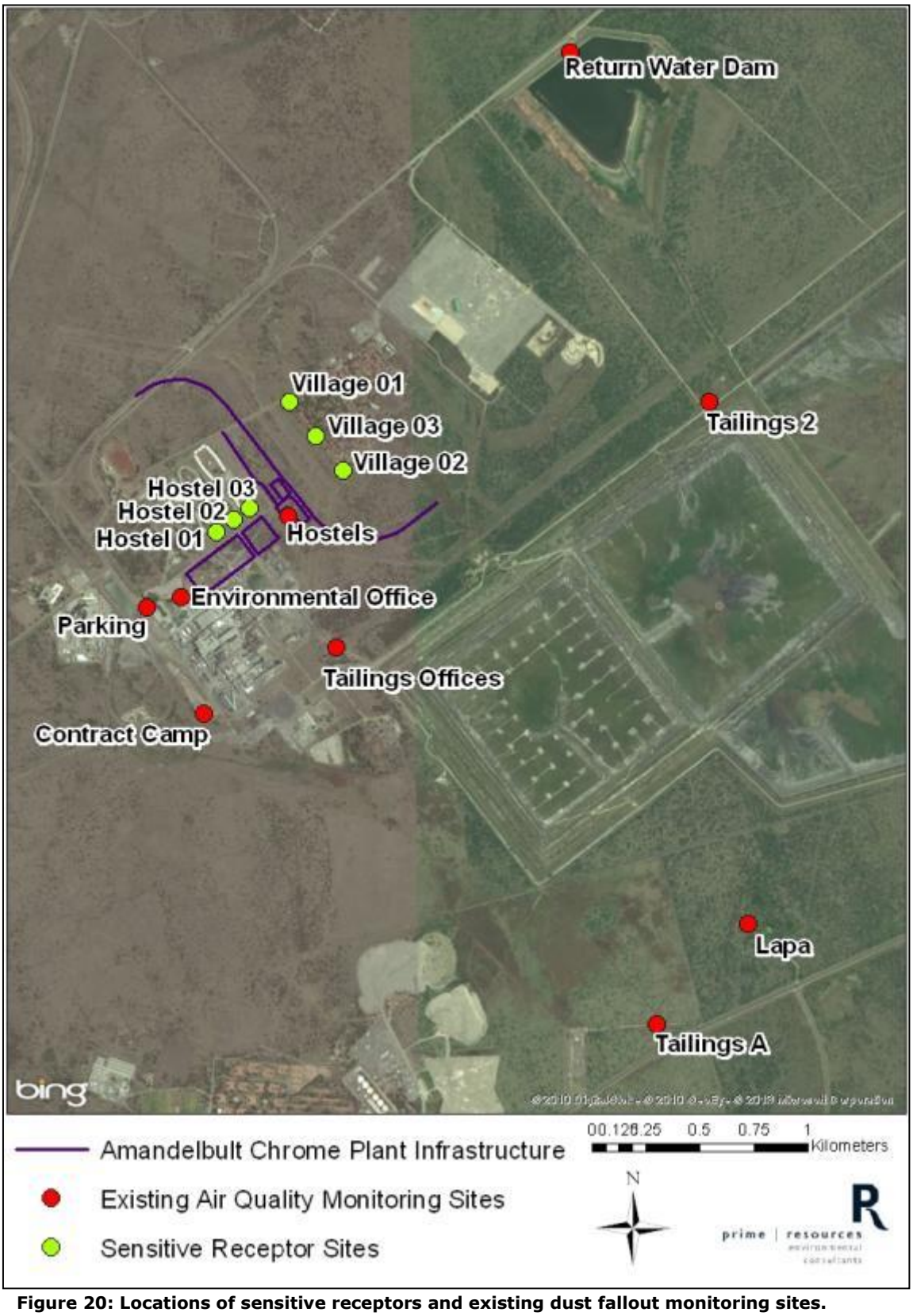

Figure 20: Locations of sensitive receptors and existing dust fallout monitoring sites.

5.11 Traffic

According to a traffic assessment conducted by UWP in 2013 for the proposed CRP project (a copy is a attached as Appendix 3.7) the road linking Amandelbult to Rustenburg is the R510 and the road network linking Amandelbult with Pretoria and Johannesburg includes the R510 - R556 - N4 Bakwena toll road. Existing traffic demand along the R510 and R556 is approximately10% to 20% of the available road capacity.

The R510 is a two lane, 7 m wide, undivided road with well maintained gravel shoulders. The traffic volumes on this road vary between 170 and 220 vehicles per hour per direction and volumes of up 360 vehicles per hour per direction were noted in the vicinity of Northam. Traffic volumes decrease substantially, 90 vehicles per hour per direction, to the north of Amandelbult. Light vehicles occasionally form queues behind heavy vehicles along the R510. Approximately 12% of the traffic along this road is heavy vehicles. The surface condition of the road is in a good condition with few surface defects apart from smoothening of wheel paths in some areas. There were also no noticeable structural defects apart from minor rutting and a few isolated longitudinal cracks. Road markings vary from fair to poor. Stray livestock have been noted to graze next to the road causing a potential safety risk to motorists.

The R556 between R510 and the Bakwena N4 toll road is a 7,4m wide surfaced two lane road with 2m wide surfaced shoulders on either side. Weekday traffic volumes are low, approximately 100 vehicles per hour per direction of which approximately 11% is made up of heavy vehicles. No delays to motorists were observed. Occasionally stray livestock have been noted inside the road reserve next to the road, causing a potential safety risk to motorists. As R556 approaches the N4 access interchange traffic volumes increase to approximately 200 to 220 vehicles per hour per direction through the built up areas of Segwaelane and Mlolokwe. The road surface is not in as good a condition as the R510, as the surfacing is fairly old and is showing signs of aggregate loss, together with surface cracking and some minor surface failures. The road is due for maintenance resurfacing within the next few years. Structural defects include numerous longitudinal cracks and undulations along the entire length of the road. The rate of deterioration appears to be relatively slow as the road has been in a similar condition for many years. Road markings vary from fair to poor.

5.12 Noise

5.12.1 Sensitive Receptors

The noise sensitive areas associated with the proposed CRP project area include the adjacent Mine Hostel and the Rethabile Mine Village.

5.12.2 Noise Sources and Ambient Noise Levels

A noise-level assessment relating to the Amandelbult Concentrator Plant area which is adjacent to the proposed CRP project area was undertaken by Acoustic Consulting CC (2007) for a previous project. The present ambient noise levels at the Amandelbult Concentrator Plant are characterised by the noise emissions from the existing mining operations, as well as self-generated community noise. The ambient noise levels were calculated for both day and night situations for the noise

sensitive areas such as the Mine Hostel and Rethabile Mine Village (Figure 21 and Figure 22).

Indicated by the results of the assessment, the ambient noise level in the noise sensitive areas nearest to the existing major sources of noise either remain much the same or show an increase during the night, due to the fact that meteorological conditions favour the propagation of sound during the night. According to SANS 10103 2 the maximum limit for noise levels in residential areas during the day is 55 dBA and 45 dBA at night. The levels at the sensitive receptors fall within the maximum limits.

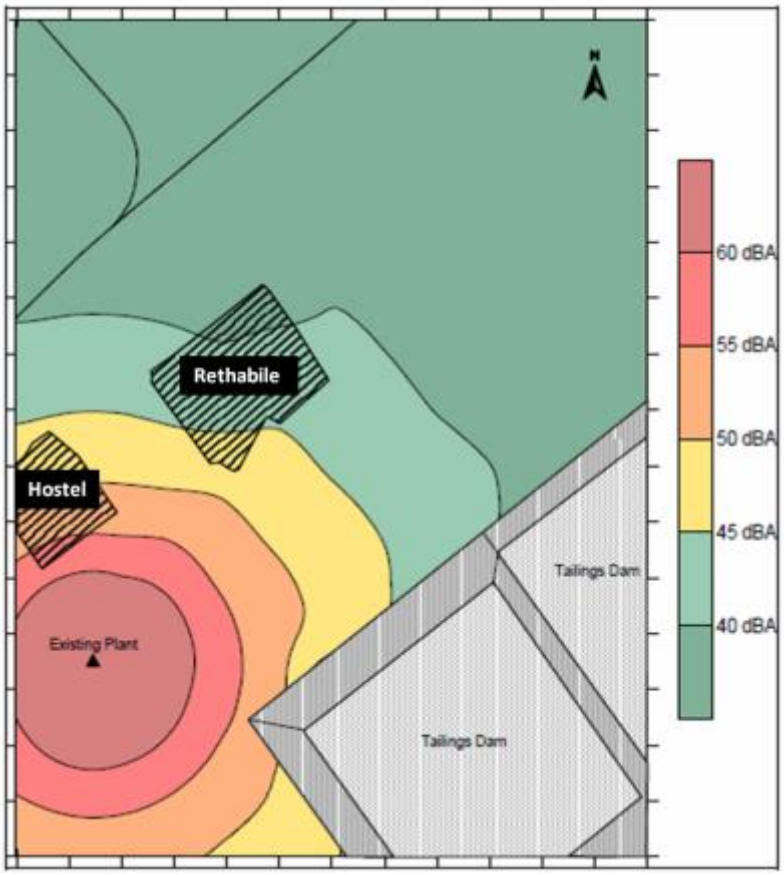

Figure 21: Calculated noise levels for the environment of the Amandelbult Concentrator Plant during the day.

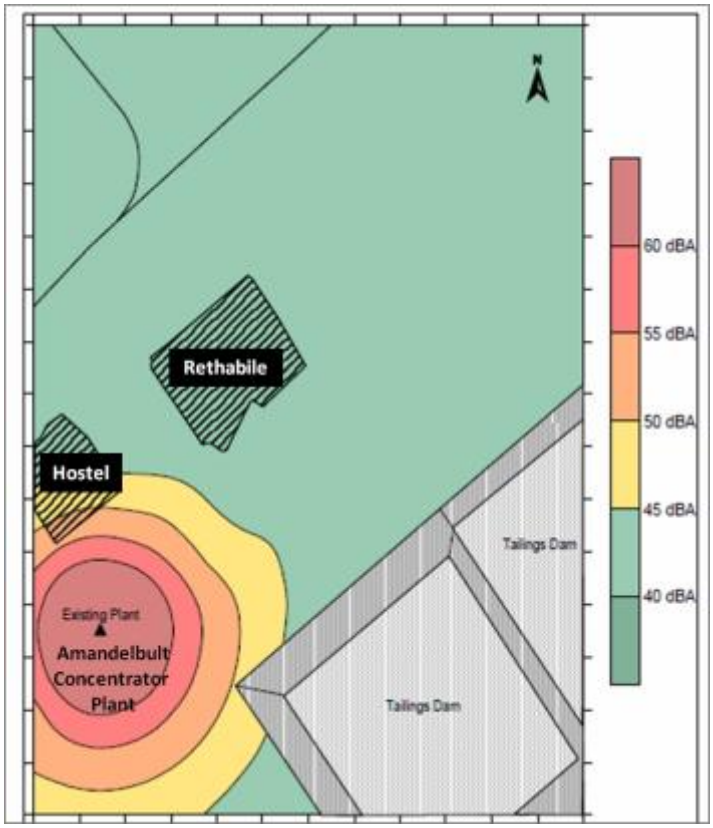

Figure 22: Calculated noise levels for the environment of the Amandelbult Concentrator Plant during the night.

5.13 Archaeology

According to the Heritage Assessment undertaken in 2007 by the National Cultural History Museum for a previous project (attached as Appendix 3.5) there were no resources of significance identified within the area. This is assumed to be due to the harsh environmental conditions in the area, i.e. a lack of open water, suitable soil and a lack of stone for building materials, particularly during pre-colonial times. The potential presence of heritage resources is also thought have been influenced by previous agricultural activities and mining in the area. Refer to for a map of existing archaeological sites in the proximity of proposed CRP project area.

5.14 Sensitive Environments

There are no sensitive areas in close proximity to the proposed CRP project area as the development will take place in the footprint of the existing mining activities. The Bierspruit River is located approximately 3 km from the proposed CRP project area and the Crocodile River is located approximately 8 km away. The nearest archaeological sites to the proposed CRP project area are approximately 1.2 km away (Figure 23).

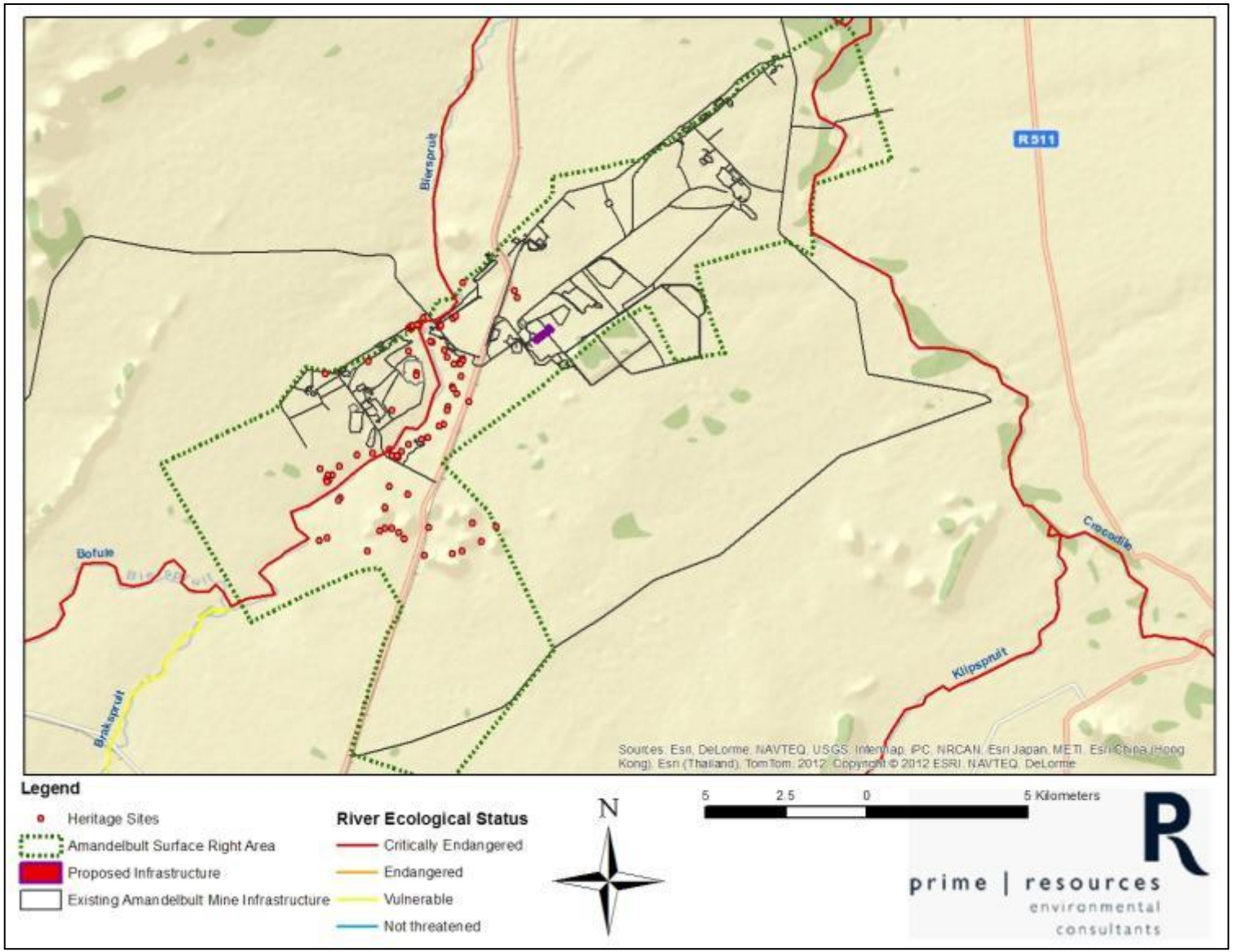

Figure 23: Sensitive areas in proximity to the proposed CRP project area.

5.15 Visual Aspects

The visual quality of the proposed CRP project area is low as the proposed development will take place within the mining footprint. Visual aspects of the proposed CRP project area include the adjacent Amandelbult Concentrator Plant and Mine Hostel.

5.16 Socio-Economic

The following baseline information was obtained from Social Impact Assessment conducted by Prime Resources in 2013 for the proposed CRP project (Attached as Appendix 3.6).

5.16.1 Provincial Context

The proposed development lies within the surface right area of the Amandelbult Concentrator Section situated on the North - Western limb of the Bushveld Complex. The mine is located in the Limpopo Province within the Thabazimbi Local Municipality, approximately 40 km south of Thabazimbi, 15km north of Northam and 100 km north of Rustenburg.

Limpopo Province is the fourth largest province in South Africa and has the fifth largest population, of 5.4 million people. Approximately 89% of the population live in rural areas and the province has an unemployment rate of 50%. Limpopo Province is rich in minerals such as copper, asbestos, coal, iron-ore, platinum, chrome, diamonds and phosphates. The provincial economy is growing, with primary products and manufactured goods being marketed both locally and for export. The economy of the northern region of Limpopo Province is based on trading, tourism, game farming and cattle farming, while mining is the major economic activity in the south-western region. The greatest potential for employment occurs in the mining, agriculture and tourism sectors. The central region serves as the main economic and governmental hub of the province.

5.16.2 Surrounding Communities

The area directly surrounding the proposed development is largely rural and is dominated by mining entities. The following communities reside within its sphere of influence: Mantserre, Northam, Rethabile Mine Village, Thabazimbi and Smash Block (Figure 24).

Mantserre

Mantserre is located 32km from Amandelbult Concentrator Section. It consists of 4 900 residents of whom 54 are employees of the mine. Residents were originally resettled in Mantserre from the farm where the mine is now situated. The resettlement took place long before Tumela Mine, Dishaba Mine and the Amandelbult Concentrator were in operation, as part of the former government's plan to create the Bophuthatswana homeland in the early 1960s. Tumela Mine, Dishaba Mine and the Amandelbult Concentrator were established in 1974 on some of the land that previously belonged to the Baphalane Tribe.

Social infrastructure includes:

- High school;
- Local soccer stadium; and

- Multi-purpose centre.

No waste disposal services are provided for the area and there is no waterborne sewage. There is however access to piped potable water.

Northam

The town of Northam is located approximately 15km from Amandelbult Section. There are 4 000 residents.

Social infrastructure includes:

- Two primary schools and one secondary school;
- A clinic;
- Household electricity;
- Waste disposal services; and
- Waterborne sewage.

Rethabile

Rethabile also known as the Amandelbult Mine Village is considered a residential area with ancillary land uses including business, social and other erven at the Anglo Platinum Mine. Amandelbult is a fully functional township and totally independent from Thabazimbi Municipality regarding infrastructure services, i.e. water, sanitation, electricity, roads and stormwater. From a social infrastructure perspective the town has a golf course, community hall as well as sports facilities.

Thabazimbi

The town of Thabazimbi is located approximately 25 km from the proposed development and was established in 1932 as an iron-ore mining town, it has subsequently supported two platinum mines and an andalusite mine. Infrastructure is generally well developed in terms of roads, electricity supply, water and sanitation. The town is considered the hob of the Thabazimbi Municipality and provides support services for the outlying towns.

Smash Block.

Chromite (formerly Schilpadsnest) is situated 10km from Amandelbult Concentrator Section. It is an informal settlement with approximately 10 000 residents.

Social infrastructure includes:

- One primary school which need urgent renovation to be conducive to the learning process; and
- A mobile clinic.

There is no waterborne sewage, no household electricity and no waste disposal service.

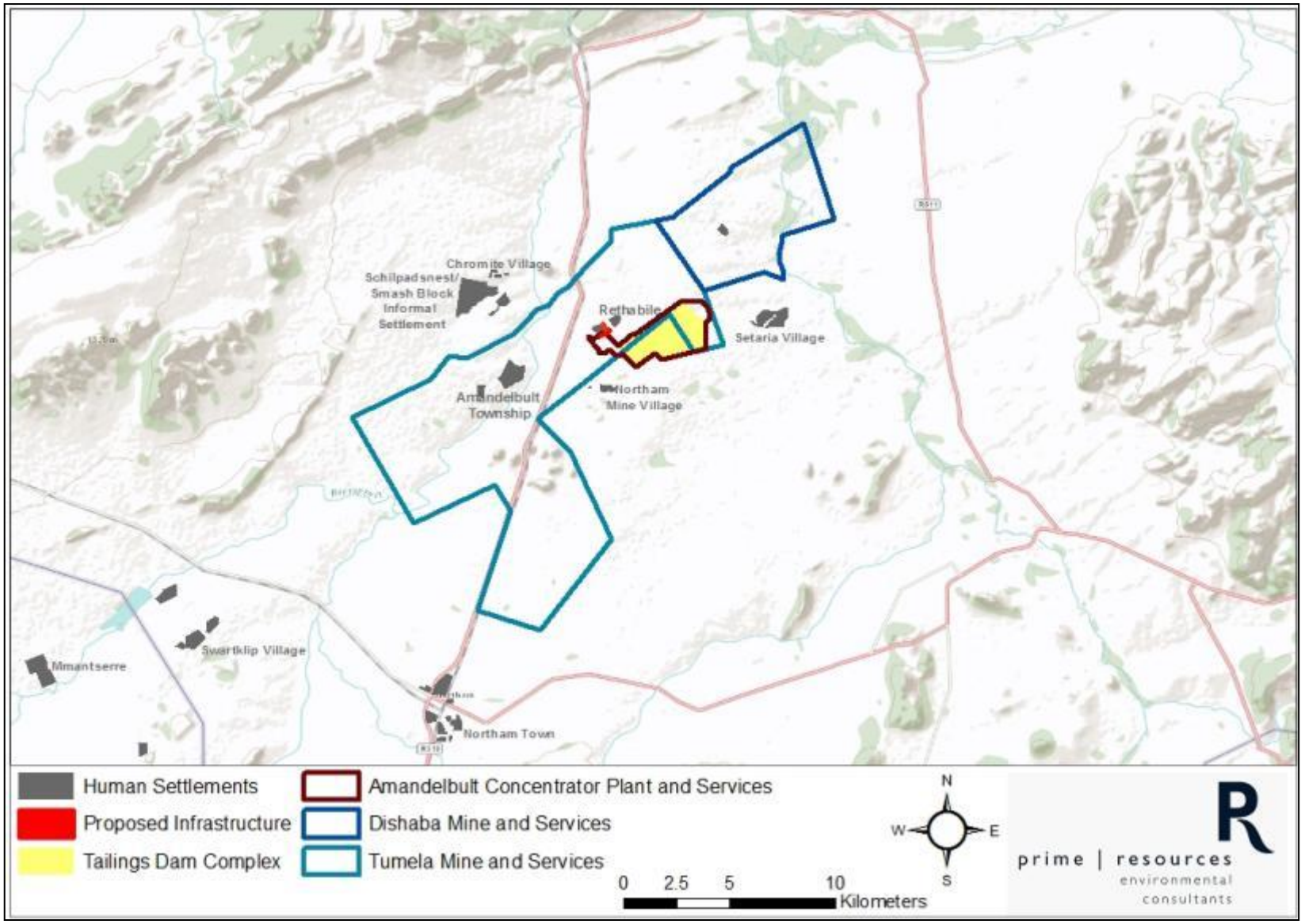

Figure 24: Surrounding communities.

5.16.3 Population Demographics

Approximately 93274 people reside within the area immediately surrounding the project site, of these 88% are Black Africans and 10% are White.

Table 8: Demographics within the Study Area

	THABAZIMBI	NORTHAM	SMASH BLOCK	AMANDELBULT	MANTSERRE
BLACK AFRICAN	37178	30066	10642	112	4330
COLOURED	227	195	8	-	15
INDIAN OR ASIAN	88	106	13	-	5
WHITE	8615	1286	10	-	1
OTHER	106	218	52	1	-
TOTAL	**46214**	**31871**	**10725**	**113**	**4351**

The majority of the population within the study area is aged between 15 and 34 (44%) and between 35 and 64 (33%). These age brackets constitute the economically active people within the study area.

Table 9: Percentage population in the Study Area

	THABAZIMBI	NORTHAM	SMASH BLOCK	AMANDELBULT	MANTSERRE
	Total	Total	Total	Total	Total
0 - 4	4657	2668	1042	10	486
5 - 9	3459	1276	332	3	380
10 - 14	3037	1074	210	3	290
15 - 19	3211	1337	346	1	342
20 - 24	4884	3767	1573	6	385
25 - 29	5647	5429	2252	15	537
30 - 34	4868	4340	1741	19	454
35 - 39	4057	3376	1052	18	306
40 - 44	3271	2489	712	9	201

	THABAZIMBI	NORTHAM	SMASH BLOCK	AMANDELBULT	MANTSERRE
45 - 49	2820	2625	680	6	176
50 - 54	2335	1918	442	11	221
55 - 59	1692	1015	228	9	150
60 - 64	917	288	68	2	138
65 - 69	573	77	17	1	91
70 - 74	346	69	16	-	69
75 - 79	199	38	5	-	62
80 - 84	148	31	5	-	36
85 +	95	54	6	-	26
Total	**46215**	**31870**	**10726**	**113**	**4350**

5.16.4 Educational Profile

In 2011, approximately 38% of the population within the study area was considered to be functionally numerate and literate (in possession of at least Grade 9). However, only 6.4% of the population over the age of 20 years has received tertiary education, compared with 9% within the Waterberg District as a whole.

Table 10: Educational Profile for the Study Area

	THABAZIMBI	NORTHAM	SMASH BLOCK	AMANDELBULT	MANTSERRE
NO SCHOOLING	10	8	8	3	9
SOME PRIMARY	13	14	19	23	17
COMPLETED PRIMARY	6	7	9	5	5
SOME SECONDARY	36	40	45	39	35
GRADE 12/STD 10	25	27	18	28	32
HIGHER	10	5	1	2	2

According to the 2012 / 2013 IDP for the Thabazimbi Municipality, there are: 30 pre-schools / crèches, 25 Primary schools, 4 combined schools, 4 high schools and 4 private schools located within the Thabazimbi Municipal Area.

5.16.5 Major Economic Activities and Employment Statistics

Only 49% of the economically active population were employed in 2011. The most significant employer in the Thabazimbi Municpal Area is the mining sector (68.7% with a 7.8% increase average per annum) which has made substantial contributions to in-migration. Other sectors that are responsible for employment in the municipal area include: agriculture (8.3%), households (4.9%), and community services (3.6%). The Municipal area experienced an average decrease in unemployment of 1.5%. An estimated 10.3% of people in the Municipal area who are economically active are unemployed, which can be attributed to a lack of employment opportunities and / or lack of relevant skills.

In terms of employment, a great challenge that the municipality faces is the fact that most of the mines in the area are mature and are nearing the end of life, which will have implications for future employment rates.

5.16.6 Workforce Demographics

The majority of employees at Tumela and Dishaba Mines, the Amandelbult Concentrator Plant and the Services supporting each of the aforementioned sections originate from the Moses Kotane (30.5%) and the Thabazimbi (19.5%) Municipalities. More specifically labour is drawn from the following villages which surround the mine:

- Ramokokastad;
- Kraalkoek;
- Rhenosterkraal;
- Manamakgotheng;
- Sandfontein;
- Modderkuil;
- Mogwase;
- Magong;
- Mononono;
- Kameelboom;
- Motlhabe;
- Mokgalwaneng;
- Mantserre;
- Welgeval;
- Thabazimbi;
- Regorogile;
- Northam and Koedoeskop; and
- Smashblock (formely known as Schilpadsnest).

5.16.7 Social Infrastructure

Education Facilities

According to the 2012 / 2013 IDP for the Thabazimbi Municipality, there are: 30 pre-schools / crèches, 25 Primary schools, 4 combined schools, 4 high schools and 4 private schools located

within the Thabazimbi Municipal Area.

Health Care Facilities

Within the Thabazimbi Municipality there are: 5 hospitals, 10 clinics, 3 mobile clinics and 3 satellite clinic offices.

Water Supply

The number of households with their water supply within the Thabazimbi Municipality (for 2007) is indicated in Table 11.

Table 11: Water sources and number of households in the Thabazimbi Municipality in 2007

WATER SOURCES	NUMBER OF HOUSEHOLDS	PERCENTAGE OF HOUSEHOLDS
Piped water inside dwelling	10 624	44.5
Piped water inside the yard	6 281	26.3
Piped water from access point outside the yard	5 064	21.2
Borehole	868	3.6
Dam / pool	44	0.2
Water vendor	953	4.0
Total	**23 872**	**100**

In the 2012 / 2013 Integrated Development Plan (IDP) for the Thabazimbi Municipality, some areas were identified as facing challenges that need to be addressed regarding sanitation and water. A shortage of potable water and groundwater, especially during summer, are major challenges that are being faced at present. Bulk water is imported from the Magalies Water Scheme; however, this source is not adequate during summer months. Infrastructure is needed to increase the water supply to meet the current water demand.

To address the water shortages the Thabazimbi Municipality has commenced with the construction of a bulk water supply pipeline between Zand Rivierspruit and Rooiberg, this pipeline is currently 97% complete. Due to a lack of service coverage by the municipality approximately 3660 households are experiencing water backlogs.

Sanitation

Table 12 indicates the number of households that had access to sanitation facilities in the Thabazimbi Municipality in 2007:

Table 12: Number of households by access to sanitation facilities in the Thabazimbi Municipal area

SANITATION FACILITIES	NUMBER OF HOUSEHOLDS	PERCENTAGE OF HOUSEHOLDS
Flush toilets (connected to a sewerage system)	16 646	69.7
Flush Toilet (with septic tank)	99	0.4
Dry toilet facility	772	3.2
Pit toilet with Ventilation (VIP)	135	0.6
Pit toilet without Ventilation	5 075	21.3

SANITATION FACILITIES	NUMBER OF HOUSEHOLDS	PERCENTAGE OF HOUSEHOLDS
Chemical toilets	44	0.2
None	1 100	4.6
Total	23 872	100

According to the Thabazimbi Municipality IDP 2012 / 2013, 6 946 households had no access to sanitation facilities in 2009.

Electricity Infrastructure

Table 13 shows the number of households that utilise each power source (this shows that only 68.87% of the population use electricity).

Table 13: Number of households by access to power sources in the Thabazimbi Municipal area

POWER SOURCE	NUMBER OF HOUSEHOLDS	PERCENTAGE OF HOUSEHOLDS
Electricity	13 575 56.87	56.87
Gas	123 0.52	0.52
Paraffin	717 3.0	3.0
Wood	854 3.58	3.58
Coal	15 0.06	0.06
Other	8 587 35.97	35.97
Total	23 872 100	100

According to the Thabazimbi Municipality IDP 2012 / 2013, the number of households with no electricity connections decreased from 245 in 2007 to 94 in 2008.

6 MOTIVATION FOR THE PROPOSED PROJECT

6.1 Benefits of the Project

The current practice of depositing UG2 tailings into tailings dams may be regarded as sub-optimal use of resources. The UG2 concentrators treat sufficient amounts of UG2 arisings to justify the recovery of chrome from the final flotation tailings streams.

The Amandelbult Chrome Recovery Pant will have several benefits. The construction of a new plant will result in employment opportunities with the creation of approximately 300 jobs in the construction phase and approximately 60 jobs in the operational phase. There is, therefore, a socio-economic benefit associated with the plant. The interception of the UG2 tailings for processing will result in a lower volume of tailings that would need to be disposed of on the tailings facility. In addition the tailings which would be pumped to the tailings facility would be less abrasive and this will result in an increased tailings capacity. This will result in less frequent replacement of pipes, less upgrade requirements if volumes are increased in future and will also increase the life of the tailings dam due to the decreased volume of tailings sent to the tailings dam.

6.2 The 'No Project' Option

If the Amandelbult CRP does not go ahead the chromite will continue to be deposited on the tailings dam, which is a sub-optimal use of resources. The volume of tailings sent to the tailings dam will remain unaltered and this will mean that the tailings dam will reach capacity sooner than if the project goes ahead. There will also be no added socio-economic benefits if the Amandelbult CRP does not go ahead.

Further to the above, the disadvantages of the proposed development pertain to the potential impacts identified and discussed further in Section 8.

7 CONSIDERATION OF PROJECT ALTERNATIVES

7.1 Introduction

The objective of this chapter is to identify any feasible alternative locations as well as technical alternatives for the proposed CRP project.

7.2 Alternative Locations

Two sites were considered for the CRP (Figure 25). Both of the sites considered are located adjacent to the Amandelbult Concentrator Plant, just beyond the perimeter fence. The first alternative site is located adjacent to the Kilken plant. The second alternative is located north east of the Amandelbult Concentrator Plant and adjacent to the Mine Hostel just beyond the road. Both the alternatives are similar in terrain and environmental sensitivity. However, the first option is situated in the overflow area for the Kilken plant, and therefore the second option is the preferred alternative and is assessed in Section 8. Secondly the second option minimizes the length of piping for tie-ins to the existing plant and therefore also pumping requirement, which in turn reduces power consumption for pumping the Concentrator material to the CRP.

The proposed location of the chromite stockpile was chosen as it will be in close proximity to the existing main railway line and the CRP. The construction of a short extension and rail siding will provide a link to this existing railway line and will thus allow transport of the stockpiled chromite concentrate via rail (once the railway siding and railway line extension is constructed).

During the initial planning phase a railway alignment investigation was undertaken by the railway engineers RNH. Based on the project requirements, potential future extensions associated with the existing Amandelbult Concentrator Plant as well as the requirements of Eskom the location of the railway siding and railway line extension was deemed to be the most technically feasible.

The option to load and dispatch the chromite concentrates by road will initially be the primary mechanism of transport, trucks will be used to transport the stockpiled concentrates to local buyers or the Transnet depot in Pretoria using the existing national road network.

Figure 25: CRP location alternatives.

7.3 Alternative Techniques

The technology for the chromite recovery process is a concentration process which utilises the widely adopted spirals technology. Few applicable alternatives currently exist to spirals technology and thus no technological alternatives with regard to the recovery process were considered. A sampling trial exercise and pilot test work has been done in conjunction with the spiral suppliers to quantify as to the best type and sizing of spirals to use.

In terms of stockpile storage area design, certain chrome plants utilise a sacrificial layer for the base of the chromite stockpile. Although this method is cheaper to implement, it is also inadequate for containing spillages and thus a concrete slab will be used.

7.4 'No Project' Alternative

Should the CRP not be constructed the mine will continue to operate as it does currently. The chromite will continue to be deposited on the tailings dam, which is a sub-optimal use of resources. The volume of tailings sent to the tailings dam will remain unaltered and this will mean that the tailings dam will reach capacity sooner than if the project goes ahead. Finally, there will be no added socio-economic benefits if the Amandelbult CRP project does not go ahead.

8 ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES

8.1 Introduction

As per the requirements of MPRDA Regulation 50 (a), (b) and (c), this section describes the impacts that the activities discussed in Section 4 could potentially have on the receiving environment as well as details the impact assessment ratings and mitigation measures.

This section further provides specific mitigation measures related to the potential impacts identified as per MPRDA Regulation 50(e) as well as 51(b) (i) and (ii).

The biophysical impacts identified and which will be assessed in the section include impacts associated with:

- Soil, land use and land capability;
- Biodiversity (Fauna and Flora);
- Surface water;
- Groundwater; and
- Air quality.

The socio-economic impacts which have been identified include those that affect:

- Ambient noise;
- Archaeological, cultural and heritage;
- Traffic; and
- Socio-economic conditions.

8.2 Impact Assessment

8.2.1 Soil, Land Use and Land Capability

The following information was obtained from the Soil Quality Assessment that was undertaken by Earth Science Solution in 2013 for the proposed CRP project.

(i) Construction Phase

Impact Assessment

The clearing of vegetation and stripping of topsoil for the establishment of the CRP and associated infrastructure, road and railway extension may result in an increase in surface run-off. This increase in surface run-off could increase the erosion in the area, which would result in the loss of soils for rehabilitation purposes.

The incorrect handling and stockpiling of topsoil could result in the loss of soil fertility. Disturbance of the clay rich and relatively more sensitive soils, in the areas where the stockpile, access road and railway extension will be located, will lead to the formation of hard clods on drying.

Soils may become contaminated by the incorrect disposal of hazardous and non-hazardous waste generated during the construction phase and as part of the contractors lay down area and

chemical toilets. Spillage of oils, greases, diesel, cement etc. during the establishment of infrastructure, or from construction vehicles could lead to the contamination of soils.

The significance of the impact on soil during the construction phase is considered to be medium prior to and low after the implementation of mitigation measures.

Mitigation Measures

- The topsoil should be removed as per the double strip method in order to preserve the seeds, nutrients and micro-organisms that are found within the top 15cm of topsoil;
- Soils should not be stripped when wet as this can lead to compaction and loss of the structure of the soil;
- An average topsoil depth of 250mm be stockpiled separately from the lower 400 to 500mm of subsoil where present;
- The clay rich and relatively more sensitive soils should only be worked in the dry state as they are highly susceptible to compaction and erosion and are difficult to work in the wet state. Damage to the structural integrity of the soils will occur if worked in a wet state.
- Stockpiles should be re-vegetated and slopes kept to less than 1:3 to protect the topsoil from erosion, to discourage weed growth and to maintain the active populations of beneficial microorganisms;
- Soil should be ameliorated to enhance the arable capability of the soils, so that they can be used for rehabilitation at closure and to maintain the soils viability during storage;
- The stockpiles should be located where they will not be disturbed by future activities or future development of buildings or infrastructure and where possible upstream of the CRP's natural stormwater flow path;
- The stockpiles are to be clearly demarcated. No vehicle should be allowed to drive on the topsoil stockpiles;
- Stockpiles should be no more than 2.5m high to best retain the organic components of the topsoil;
- Stockpiles should be provided with retaining- and stormwater diversion berms and silt traps to prevent the loss of topsoil and contamination of water sources due to runoff in the wet season;
- Soil stripping should be done during the winter month as it will help maintain the structural integrity of the soils;
- To prevent diesel and oil spills, all vehicles and equipment should be kept in good working condition and all leaks repaired immediately;
- Cement mixing undertaken outside of the central batching area must be undertaken in a mixing plant/ bin or on an impermeable surface (bunded area);
- Ensure that the bunded impermeable surface where the bulk batching of cement is undertaken is connected to the dirty stormwater system; and
- Cement should be delivered in bags and stored on pallets in a dry covered area within the storm water bunded area.

(ii) Operational Phase

Impact Assessment

Soils may become contaminated by incorrect disposal of hazardous and non-hazardous waste generated during operation, hydrocarbon spills from vehicles used to transport the chromite, concentrate spills during interception as well as from windblown particulate matter from the chromite stockpiles.

Other than contamination of soil the impacts on the soils during the operational phase will be confined for the most part to the maintenance of the stockpiles which will have a high erosion potential.

The significance of the impact on soil during the operational phase is considered to be medium prior to as well as after the implementation of mitigation measures.

Mitigation Measures

- Management of the soil vegetation cover on all stockpiles and berms;
- Diverting of all surface water in a controlled manner along protected channels, and on the upslope side of the dirty water areas;
- Restriction of vehicles, personnel or livestock on soil stockpiles;
- To prevent diesel and oil spills, all vehicles and equipment should be kept in good working condition and all leaks repaired immediately;
- A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times;
- Concentrate spillages are to be cleaned up and remediated as soon as possible; and
- The chromite stockpile should be bunded to ensure that chromite is deposited and stored on an impermeable surface.

(iii) Decommissioning and Closure Phase

Impact Assessment

Soils may become contaminated by the incorrect disposal of waste and the spillage of hydrocarbons or chemicals during decommissioning and rehabilitation activities which would contaminate the soil compromising future land use and land capability.

Following the rehabilitation of the land and vegetation during the closure phase, the soil will be returned to its original chemical composition and no erosion is expected to occur. Run-off water is expected to be clean therefore the potential for soil contamination will no longer exist.

The significance of the impact on soil during the decommissioning and closure phases is considered to be low prior to as well as after the implementation of mitigation measures.

Mitigation Measures

- Soil replacement should be undertaken with the preparation of a seed bed to facilitate re-vegetation and to limit potential erodibility at rehabilitation;

- Soil amelioration to enhance the arable capability of the soils, so that they can be used for rehabilitation at closure;
- Before placing or re-spreading topsoil AAP should consider whether the locations for the spreading of the available topsoil are chemically compatible with the available topsoil and whether there is sufficient stockpiled topsoil to complete the planned task;
- Soils should be replaced to a similar depth as was encountered prior to the construction operation, but at least to a depth that will sustain grazing (400mm) land capability;
- Where topsoil supply is limited the following should be considered:
    - Topsoil and the vegetation should be laid in strips alternating with areas on which there has been no placement of topsoil as this will increase the coverage; and
    - An underlying layer of subsoil will commonly produce better results than a thin layer of topsoil alone. This will serve to "stretch" the supply of topsoil. Also, in the application of topsoil, even if there is very little available, the smallest quantities will commonly introduce essential micro-organisms and seeds into the growth region;
- Chemical testing of the topsoil should be carried out prior to replacing the topsoil;
- Topsoil should be fertilized according to the requirements identified through chemical testing; and
- The areas to be rehabilitated should be levelled so as to emulate the pre-construction contours, and soils should ideally not be placed on slopes with a gradient greater than 6 % to limit the potential for erosion.

(iv) Cumulative Impact

Tailings spills from the existing Amandelbult Concentrator Plant have contaminated the soil in the areas earmarked for the proposed CRP. Any contamination from the activities associated with the CRP project, as detailed above, would further contaminate the soil in the area and result in a loss in soil resource as well affect the future land capability.

8.2.2 Biodiversity (Flora and Fauna)

(i) Construction Phase

Impact Assessment

Establishment of infrastructure associated with the project will necessitate the removal of vegetation and the subsequent destruction of habitat which may lead to the mortality of flora and fauna. An increase in run-off, due to the removal of vegetation, could lead to erosion, which will reduce the fertility of soils and subsequently affect the re-establishment of vegetation.

Construction vehicles and equipment may contain seeds and traces of vegetation from other sites, which could result in the spread of alien invasive vegetation. The presence of construction vehicles could result in the mortality of fauna due to collisions. Construction personnel on-site could lead to an increase in the harvesting of natural vegetation for fuel as well as poaching, trapping and hunting of faunal species. Uncontrolled fires caused by construction personnel may destroy the natural vegetation in the area and in the surrounding areas. Food left by construction workers

could attract fauna to the area, increasing risk of negative interactions.

The incorrect disposal of hazardous and non-hazardous waste generated during the construction phase, spillage of hydrocarbons from construction vehicles as well as contaminated run-off could lead to a negative impact on the growth of the surrounding vegetation and could negatively impact on the health of the fauna in the area. The release and settling of dust on leaves, generated from construction activities and vehicle entrainment, could reduce vegetation growth due to an obstruction in photosynthesis and the persistence of pollinators which would have an on the vegetation growth and subsequently faunal habitat in the area.

The highest significance rating of an impact on biodiversity during the construction phase is significant, prior to and medium after the implementation of mitigation measures.

Mitigation Measures

- Undertake a summer survey to determine whether there are any species of conservation concern within the proposed CRP project area. The ecological (faunal and floral) surveys should be conducted during summer months to establish the following:
    - Comprehensive species list including sensitive, rare, threatened and protected species;
    - Detailed amphibian surveys;
    - Baseline data which can be used to establish vegetation monitoring plans as well as monitoring plans for any species of conservation concern (fauna and flora); and
    - Identify species or areas of high sensitivity based on summer surveys. Should species of conservation be found within the development footprint, they are to be salvaged and relocated to the existing Amandelbult game reserve. The connectivity of the game camp at Amandelbult and the game camp at Dishaba should be investigated to determine the extent that the newly constructed railway line will have on faunal species of conservation concern recorded at Dishaba. Should it not be possible to institute a salvage and relocation programme the Applicant should consider realigning the affected portion of the rail siding as far south as possible to avoid impacting the centre of the game camp.
- If the diversion berms are constructed in areas containing natural vegetation, these berms should be revegetated with the same species dominating the surrounding vegetation and the re-vegetation of these berms should be overseen by a suitably qualified botanist;
- An independent Environmental Control Officer (ECO) should be appointed to oversee all construction and operational activities;
- No open fires should be allowed in areas containing natural vegetation, especially during the dry season;
- Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas;
- Offices and change rooms should be landscaped with indigenous plant species that will be beneficial to faunal species such as bats and birds. Bat and owl nesting boxes could be erected to encourage these species to reside in the area which will result in environmentally friendly insect and rodent control;

- An induction programme should be compiled for all contractors, subcontractors and workers to ensure compliance to all aspects of the EMP as well as educating personnel in the safe and proper conduct within areas of natural habitat;
- No wild animal may under any circumstance be handled, removed or be interfered with by construction workers;
- No wild animal may be fed or under any circumstance be hunted, snared, captured, injured or killed. This includes animals perceived to be vermin. Checks of the surrounding natural vegetation must be regularly undertaken to ensure no traps have been set. Any snares or traps found on or adjacent to the site must be removed and disposed of;
- As far as possible, domestic cats should be safely removed from the site;
- To prevent possible collisions with animals, drivers of construction vehicles must remain vigilant to the possibility of animals crossing their paths and a strict speed limit of 40 km/h should be adhered to;
- All food should be securely stored away to prevent attraction of faunal species and all rubbish should be disposed of away from the site. Bins located around the infrastructure should have tightly fitting lids to prevent faunal species raiding the bins and thereby becoming habituated to humans.
- During construction, the construction area and immediate surroundings should be monitored regularly for emergent invasive vegetation;
- Surrounding natural vegetation should not be disturbed to minimize chances of invasion by alien vegetation;
- All alien seedlings and saplings must be removed as they become evident for the duration of construction and operational phase;
- Manual / mechanical removal is preferred to chemical control;
- All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction site. This should be verified by the ECO;
- An alien invasive eradication and monitoring plan must be compiled and implemented whereby all emergent invasive species are removed during construction. The monitoring plan must also ensure that the reemergence of invasive species is monitored continuously during the operational and decommissioning phases and that monitoring and eradication continues post decommissioning;
- Relevant dust control regulations must be adhered to;
- Erosion control measures should be implemented; and
- Implement dust suppression methods to control

(ii) Operational Phase

Impact Assessment

Vehicle movement on site could increase the spread of alien invasive vegetation. Vehicles present on site could result in the mortality of fauna through collisions. Collisions with trains may also result in the mortality of fauna. The construction of the eastern portion of the railway line in the undisturbed Thornveld containing the game camp will lead to faunal habitat fragmentation since

affecting faunal behaviour.

An increase in personnel on site could lead to an increase in the harvesting of natural vegetation for fuel as well as poaching, trapping and hunting of faunal species. Uncontrolled fires caused by personnel may destroy the natural vegetation in the area and in the surrounding areas. Food left by personnel could attract fauna to the area, increasing risk of negative interactions.

The incorrect disposal of hazardous and non-hazardous waste generated during the construction phase, spillage of hydrocarbons from construction vehicles as well as contaminated run-off could lead to a negative impact on the growth of the surrounding vegetation and could negatively impact on the health of the fauna in the area.

Increased run-off from surface infrastructure could lead to erosion, which will reduce the fertility of soils and the subsequent re-establishment of vegetation. Contaminated run-off from the CRP and associated infrastructure, the settling of dust (generated by vehicle entrainment and windblown dust from stockpiles) and the presence of hazardous and non-hazardous waste generated from operations and hydrocarbon spills if not adequately contained within the dirty water management system could additionally affect the growth potential of the surrounding vegetation.

The significance of the impact on biodiversity during the operational phase is considered to be medium prior to and low as after the implementation of mitigation measures.

Mitigation Measures

- The chromite stockpile should be constructed on a concrete slab of at least 30cm thick to prevent heavy metals from leaching into the soil. This stockpiling area should also be edged with gutters to prevent any water run-offs during the rainy season;
- Dust which is generated during operations such as excavation, dumping, loading and transportation poses the highest risk of hexavalent chromium pollution and it is therefore important to limit the amount of dust generated through the use of strong covers over stockpiles and during transport;
- Implement dust suppression methods to control and minimise dust generation;
- Disturbance of natural vegetation should be avoided;
- Monitor and implement an alien invasive species control and eradication programme;
- No fires should be permitted on site;
- A waste management plan should be implemented;
- Erosion control measures should be implemented;
- Drivers should be vigilant and adhere to the speed limit to prevent collisions with fauna;
- Fauna should not be interfered with in any way including, trapping, poaching or feeding; and
- Harvesting of vegetation should be discouraged.

(iii) Decommissioning and Closure Phase

Impact Assessment

During the decommissioning phase, vehicles will be needed for the demolition and stripping of the CRP and associated infrastructure, which may result in the spread of alien invasive vegetation.

Increased run-off from decommissioning activities could lead to erosion, which will reduce the fertility of soils and the subsequent establishment of vegetation. Contaminated run-off from the demolition activities as a result of the utilisation of hydrocarbons, chemicals etc. may reduce vegetation growth and impact on the natural habitat and health of the fauna in the area.

An increase in personnel on-site could lead to an increase in the harvesting of natural vegetation for fuel as well as trapping and poaching of fauna. Uncontrolled fires caused by decommissioning personnel may destroy the natural vegetation in the area and in the surrounding areas.

Following the cessation of the demolition and rehabilitation activities during the decommissioning and closure phases respectively, the flora and fauna of the area are not expected to be impacted upon if rehabilitation is successful and revegetation is successive.

The highest significance rating of an impact on biodiversity during the decommissioning and closure phase is significant, prior to and medium after the implementation of mitigation measures.

Mitigation Measures

- Monitor and implement an alien invasive species control and eradication programme;
- No fires should be permitted on site;
- A waste management plan should be implemented;
- Erosion control measures should be implemented;
- Implement dust suppression methods to control and minimise dust generation;
- The harvesting of natural vegetation for fuel or any other purposes should be strictly prohibited;
- Vegetation rehabilitation should be conducted by a suitably qualified botanist to ensure maximum representation of biodiversity within the rehabilitated area;
- A rehabilitation plan should be implemented to rehabilitate the CRP and associated infrastructure, road and railway extension area to grazing potential; and
- AAP should monitor the re-vegetation process for at least one year post-closure.

(iv) Cumulative Impact

Numerous platinum mines are located in the region and the cumulative effect of habitat destruction as well as heavy metal pollution through air and water generated by all the surrounding mines have a significant impact on the regional biodiversity. The activities associated with the CRP project that may decrease the ambient air quality or contaminate water resources would have a cumulative impact on the regional biodiversity.

8.2.3 Surface Water

The following information was obtained from the hydrology assessment conducted by AEL in 2013 for the proposed CRP project. The Bierspruit is the more likely of the nearby rivers to be impacted upon by the proposed CRP project, as spillages from the proposed new chromite plant will drain towards this river. However, as the Bierspruit is a tributary of the Crocodile River, pollution from proposed CRP project could reach the Crocodile River via the Bierspruit.

The CRP and associated infrastructure, road and railway extension be located outside of the 1 in 50 and 1 in 100 year floodlines and will therefore not have a direct impact on the rivers. Possible

impacts on the surface water of the Bierspruit would thus be indirect, through impacts on the drainage channel near the Mine Hostel.

(i) Construction Phase

Impact Assessment

The incorrect disposal of waste (hazardous and non-hazardous) generated during construction, hydrocarbons and construction materials could have a detrimental impact on surface water quality if the Bierspruit becomes contaminated by polluted run-off. However, the risk of contamination other than an increased silt load is low during the construction phase of the project.

Presently, the area where the Amandelbult CRP is to be constructed is already used as a stockpiling site for various materials. These materials must first be removed before actual construction can begin. The movement of this powdery material could lead to contamination of, the Bierspruit should this cleaning-up be carried out during the rainy season and the materials become mobilised.

The clearing and levelling of land and the construction of the CRP, associated infrastructure, road and railway extension will cause the liberation of silt/soil. Should this silt be mobilised by rainfall run-off during the rainy season, the siltation and subsequent sunlight penetration of the Bierspruit could deteriorate temporarily while construction is underway.

The significance rating of the impact on surface water during the construction phase is considered to be significant prior to the implementation of mitigation measures but low after the implementation of mitigation measures.

Mitigation Measures

- All waste should be disposed of correctly;
- Ensure that the bulk batching of cement is undertaken in a bunded impermeable surface area connected to the dirty stormwater system;
- Cement mixing undertaken outside of the central batching area must be undertaken in a mixing plant/ bin or on an impermeable surface;
- Cement should be delivered in bags and should be stored on pallets in a dry covered area within the storm water bunded area;
- To prevent diesel and oil spills, all vehicles and equipment should be kept in good working condition and all leaks repaired immediately;
- All mine and contractor-owned generators should be placed on drip trays to catch all spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. should be done over a plastic tarpaulin or steel drip trays;
- A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times; and

- Implement the intended clean and dirty water managemnet system correctly, including the construction of berms on the upgradient side of the CRP and railway siding to divert clean surface run-off around the northern side of the CRP and Mine Hostel into the drainage channel leading away from the Mine Hostel to the Bierspruit, as well as the construction of a trench network intended to direct surface run-off from contaminated areas towards a sump where it should be used as process water.

(ii) Operational Phase

Impact Assessment

It is estimated that the volume of water intercepted by the entire project area will be approximately 1 125 m³/annum. In comparison with to the average annual flow in the Bierspruit in the vicinity of the proposed CRP project area, this volume is negligible. The run-off from the CRP, associated infrastructure, road and railway extension during a storm with a 50-year return period will be 8 683 m³. All surface run-off will be directed toward a sump via the water diversion system and used as process water for the CRP.

The increase in surface run-off from surface infrastructure could result in an increase in erosion and the associated transportation of silt to the Bierspruit River, which could result in sedimentation of the watercourse. However, due to the flat topography of the land surrounding the project area during the construction phase the potential for erosion will be limited and the likelihood of surface run-off carrying silt, reaching the Bierspruit, will be very low.

The incorrect disposal of waste (hazardous and non-hazardous) generated during operation, the spillage of hydrocarbons, run-off from the stockpiles containing chromite particles and the mixing of clean and dirty stormwater at the CRP and stockpiles could result in the contamination of the watercourse.

The significance rating of the impact on surface water during the operational phase is considered to be significant prior to the implementation of mitigation measures but low after the implementation of mitigation measures.

Mitigation Measures

- All waste should be disposed of correctly;
- To prevent diesel and oil spills, all vehicles and equipment should be kept in good working condition and all leaks repaired immediately;
- All generators should be placed on drip trays to catch all spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. should be done over a plastic tarpaulin or steel drip trays;
- A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times;
- Any concentrate spillages are to be cleaned up and remediated as soon as possible;

- In the event of a large spillage occurring, there should be a proper written procedure at the plant that should dictate the methods to be used in the clean-up, the sampling of contamination and the closeout procedure (including the taking of samples, if needed) to declare that the risk as being ameliorated. These records should be kept for at least the life of the plant;
- If a storm with a return period of up to 50 years occurs, all surface run-off from areas within the plant and stockpile areas should be intercepted and stored. Adequate storage capacity should always available to store the volume of water that would run-off from the areas (8 683 m^3);
- Correctly implement the intended clean and dirty water managemnet system to prevent the mixing of clean and dirty water and to contain run-off from the CRP and the stockpiles, including rainfall and other water falling or being spilled within the CRP and stockpile areas being collected in concrete or HDPE-lined trenches and diverted to the sump where it should be used as process water; and
- All these trenches should be cleaned and maintained in an operational condition on a pre-determined scheduled routine for the life of the CRP and when required.

(iii) Decommissioning and Closure Phase

Impact Assessment

The incorrect disposal of waste generated by decommissioning activities (hazardous and non-hazardous and the spillage of hydrocarbons could contaminate the Bierspruit.

The significance rating of the impact on surface water during the decommissioning phase is considered to be significant prior to the implementation of mitigation measures but low after the implementation of mitigation measures.

The use of the water management system for the CRP and associated infrastructure will cease at mine closure. Once the CRP, associated infrastructure, road and railway have been removed, there should not be any residual release of contamination from the area.

Mitigation Measures

- All waste should be disposed of correctly;
- To prevent diesel and oil spills, all vehicles and equipment should be kept in good working condition and all leaks repaired immediately;
- A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times; and
- The storm water diversion structures and the contaminated water interception structures should be left in place till the end of decommissioning activities, ensuring that any contamination release during the decommissioning phase is intercepted.

(iv) Cumulative Impact

Upstream mining activities have had an impact on the water quality of the Bierspruit. Any contaminated run-off from the CRP project area will compound the impact on the water quality of

this surface resource.

8.2.4 Groundwater

(i) Construction Phase

Impact Assessment

The incorrect disposal of waste (hazardous and non-hazardous), hydrocarbons and construction materials generated during construction could have a detrimental impact on groundwater quality through seepage of polluted run-off.

The significance rating of the impact on ground water during the construction phase is considered to be medium prior to the implementation of mitigation measures but low after the implementation of mitigation measures

Mitigation Measures

- All waste should be disposed of correctly;
- Ensure that the bulk batching of cement is undertaken in a bunded impermeable surface area connected to the dirty stormwater system;
- Cement mixing undertaken outside of the central batching area must be undertaken in a mixing plant/ bin or on an impermeable surface;
- Cement should be delivered in bags and should be stored on pallets in a dry covered area within the storm water bunded area;
- To prevent diesel and oil spills, all vehicles and equipment should be kept in good working condition and all leaks repaired immediately;
- All mine and contractor-owned generators should be placed on drip trays to catch all spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. should be done over a plastic tarpaulin or steel drip trays; and
- A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times.

(ii) Operational Phase

Impact Assessment

The incorrect disposal of waste (hazardous and non-hazardous) generated during operation, the spillage of hydrocarbons, run-off from the stockpiles containing chromite particles and the mixing of clean and dirty stormwater at the CRP and stockpiles could result in the contamination of groundwater resources through the seepage of contaminated run-off.

The significance rating of the impact on groundwater during the operational phase is considered to be medium prior to the implementation of mitigation measures but low after the implementation of mitigation measures.

Mitigation Measures

- All waste should be disposed of correctly;

- Implement a clean and dirty water managemnet system to prevent the mixing of clean and dirty water and to contain run-off from the CRP and the stockpiles;
- To prevent diesel and oil spills, all vehicles and equipment should be kept in good working condition and all leaks repaired immediately;
- All mine and contractor-owned generators should be placed on drip trays to catch all spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. should be done over a plastic tarpaulin or steel drip trays;
- A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times;
- Concentrate spillages are to be cleaned up and remediated as soon as possible; and
- The chromite stockpile should be bunded to ensure that chromite is deposited and stored on an impermeable surface.

(iii) Decommissioning Phase

Impact Assessment

The incorrect disposal of waste generated by decommissioning activities (hazardous and non-hazardous and the spillage of hydrocarbons could contaminate the groundwater resources through seepage of contaminated run-off.

The significance rating of the impact on groundwater during the decommissioning phase is considered to be medium prior to the implementation of mitigation measures but low after the implementation of mitigation measures. No residual impact on groundwater is expected during the closure phase.

Mitigation Measures

- All waste should be disposed of correctly;
- To prevent diesel and oil spills, all vehicles and equipment should be kept in good working condition and all leaks repaired immediately;
- A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times.

(iv) Cumulative Impact

Currently the groundwater quality in the vicinity of the Amandelbult Concentrator Plant is being impacted on by the tailings dam. Any seepage of contaminated run-off from the CRP project area will compound the impact on groundwater quality in the area.

8.2.5 Air Quality

The following information was obtained from the air quality assessment conducted by Royal HaskoningDHV in 2013 for the proposed CRP project.

(i) Construction Phase

Impact Assessment

During the construction phase there is the potential for dust generation. The possible sources of increased dust during construction include wind erosion on exposed surfaces cleared for the proposed CRP, associated infrastructure, road and railway extension as well as heavy construction activity such as vehicle entrainment and material and debris handling.

Using the dispersion model (refer to Appendix 3.2 for the modelling methodology) the annual average PM10 concentrations for each specified receptor point (Figure 20) were calculated. According to the predictions generated from the model used, the annual average PM10 concentrations may be slightly elevated at the receptors in close proximity to the construction activity (<300 m), with concentrations exceeding the annual PM10 standard (50 µg/m^3) at five receptors, Hostel 01, Hostel 02, Hostel 03, Village 02 and the Environmental Offices (Figure 26). With the highest annual average concentration predicted at the Environmental Offices, which are located south from the proposed CRP project area. The predicted daily average PM10 concentrations indicate that the same five receptors may exceed the daily standard (120 µg/m^3) (Figure 27). If mitigation measures are implemented, no receptors will exceed any national standard.

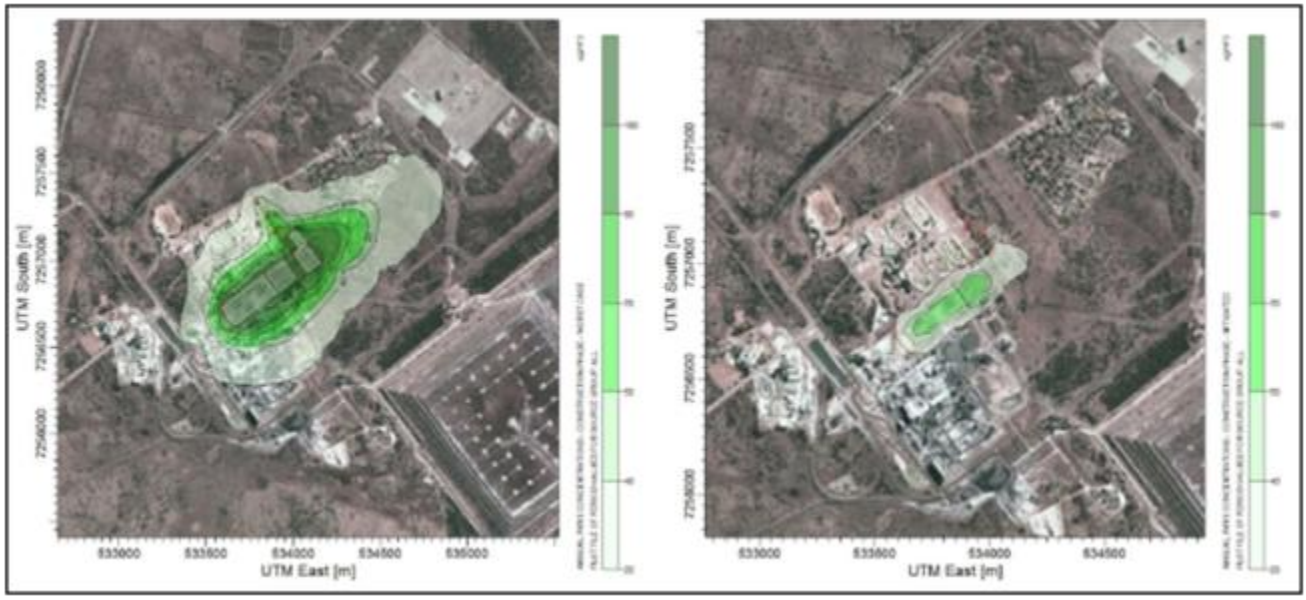

Figure 26: PM10 emissions from the CRP project indicating the annual concentrations for the worst case scenario (left) and mitigated scenario (right) – Construction Phase.

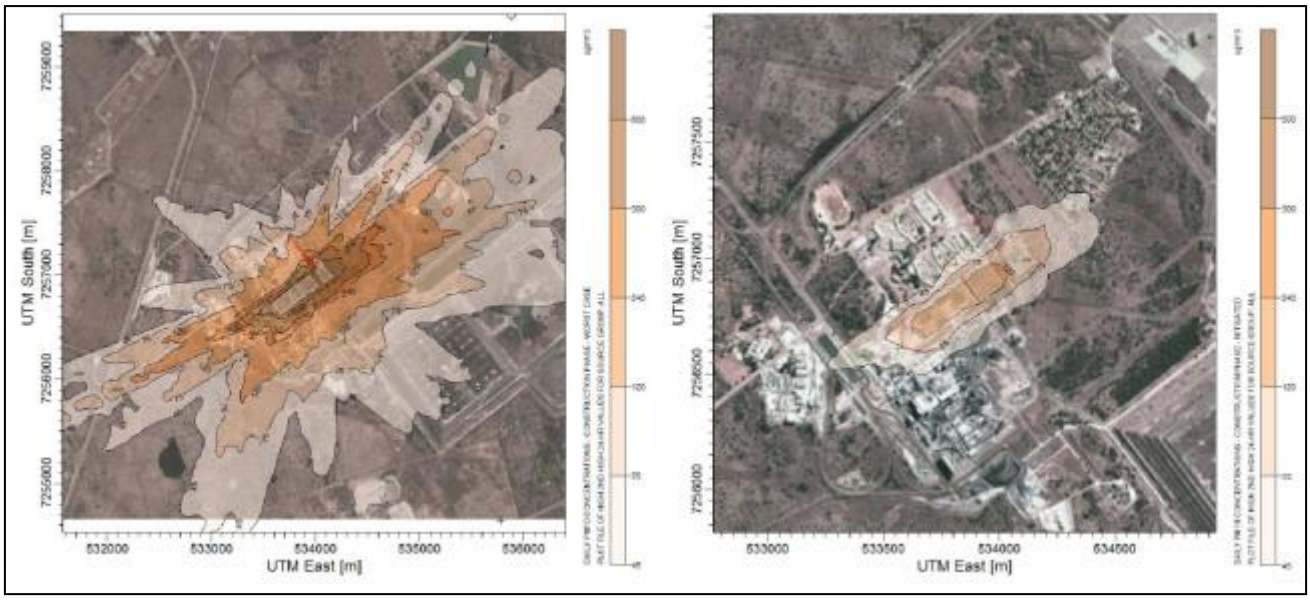

Figure 27: PM10 emissions from the CRP project indicating the daily concentrations for the worst case scenario (left) and mitigated scenario (right) – Construction Phase.

Using the dispersion model the annual and daily average PM2.5 concentrations for each specified receptor point (Figure 20) were predicted. According to the predictions generated from the model used, the annual average PM2.5 concentrations may be slightly elevated at the receptors close to the construction activity (<300m), the highest annual average concentration is predicted at the boundary fence of the Mine Hostel (Hostel 01), located 50 m from the construction area. No receptors however will exceed the current PM2.5 national annual standard (25 µg/m3) (Figure 28). It is predicted that the average daily PM2.5 concentrations (65 µg/m3) however may be exceeded at the Environmental Office and Village 02 if mitigation measures are not implemented (Figure 20).

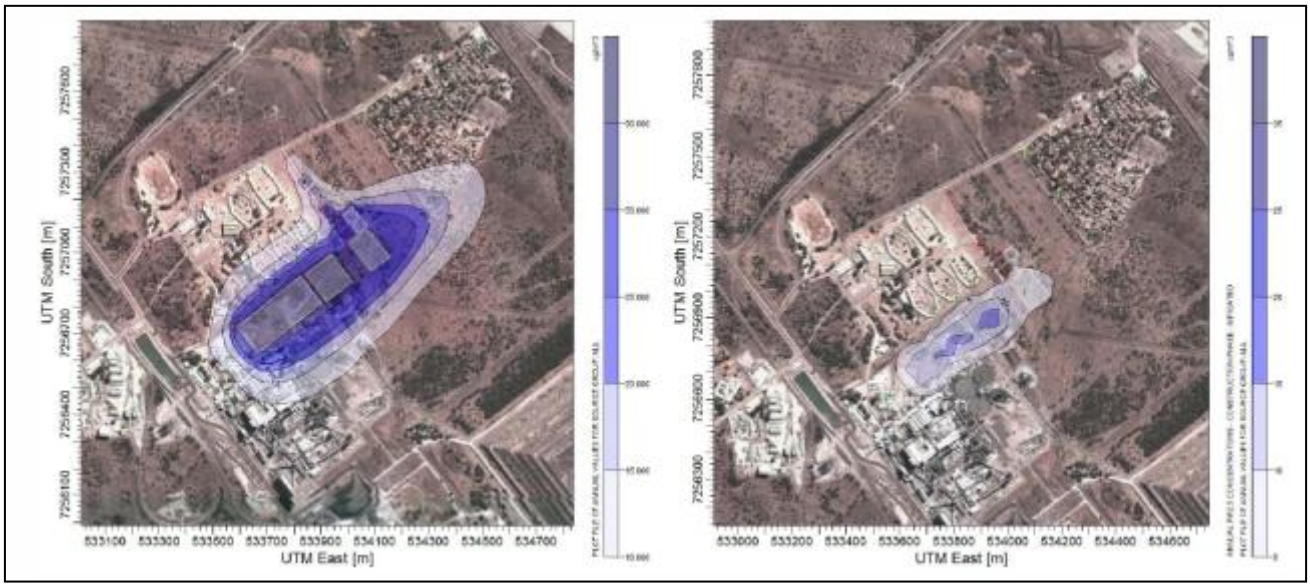

Figure 28: PM2.5 emissions from the CRP project indicating the annual concentrations for the worst case scenario (left) and mitigated scenario (right) – Construction Phase.

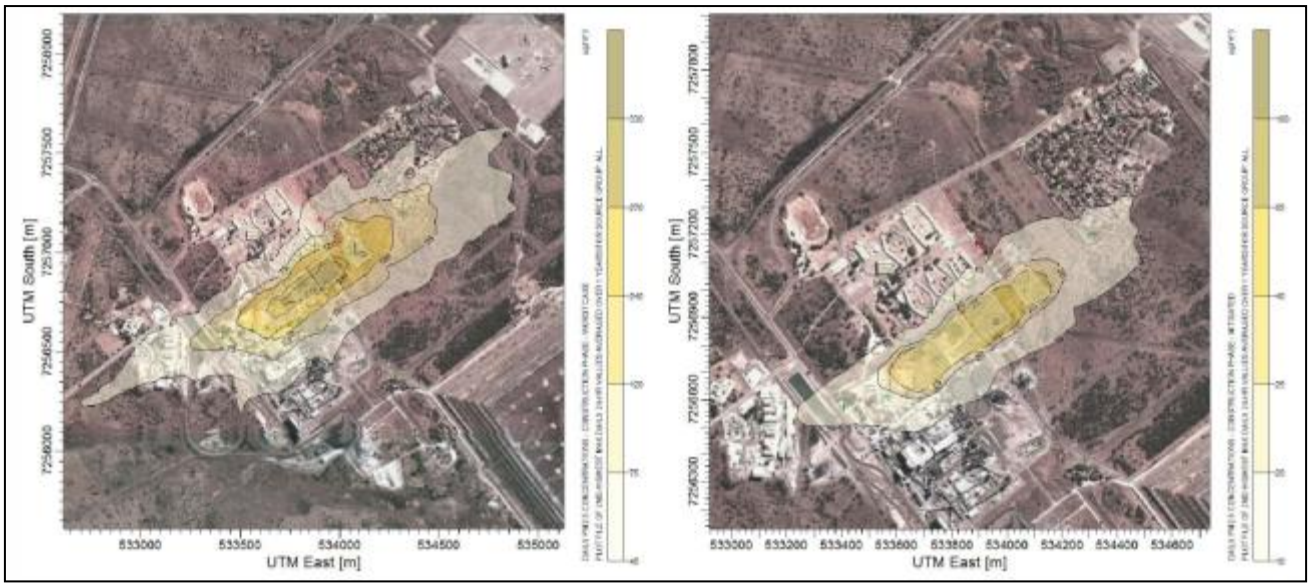

Figure 29: PM2.5 emissions from the CRP project indicating the daily concentrations for the worst case scenario (left) and mitigated scenario (right) – Construction Phase.

The construction phase will be limited to 12 months at the start of the project. According to the predictions generated from the model used, the dispersion plume (daily PM10 and PM2.5 concentrations) may spread over a long distance from the construction area. Efficient and applicable emission control strategies should be implemented and in place from the commencement of the construction phase. The significance rating of the impact on air quality during the construction phase is considered to be medium prior to the implementation of mitigation measures and low after their implementation.

Mitigation Measures

- Additional installation of dust fallout units at the impact sensitive receptors (refer to the air quality monitoring programme in section 12.1 of the EMP for the description of the propose;
- Investigation into implementing a permanent windscreen (trees) between the Hostel buildings and CRP as it will reduce the wind speed blowing over the CRP process and also capture some dust that would blow over to the hostel buildings;
- All access roads should be adequately maintained so as to minimise dust. Methods such as wet suppression, paving or chemical stabilisation should be implemented;
- AAP should stabilise all surface areas which are exposed for longer than two weeks. During the construction phase, it is recommended that wet suppression be utilized to stabilize the exposed areas;
- All stockpiles should be maintained for as short a time as possible and a water spray system should be operated at any gravel stockpile, or stockpiles should be enclosed within berms to shield the material from wind;
- Topsoil stockpiles should be re-vegetated to prevent erosion;
- Stockpiles should be disturbed as little as possible;
- During the transfer of material to piles, drop heights should be minimised to control dispersion of materials being transferred;

- Dust and mud should be controlled at vehicle entry and exit points to prevent the dispersion of dust and mud beyond the site boundary; and
- The speed of trucks should be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads to avoid excessive dust being generated or deterioration of the road surface.

(ii) Operational Phase

Impact Assessment

During the operational phase the sources of emissions are predicted to be particulate matter generation from the transport of chromite to and from the stockpiling area, windblown dust from exposed areas as well as dust from vehicle entrainment on unpaved roads.

The CRP will receive 100% wet material from the Amandelbult Concentrator Plant, which will then be processed. There is no airborne pollutant sources associated with the operations at the CRP, only the transport of the final product will result in the generation of particulate matter (PM10 and PM2.5) through the handling and wind erosion.

The predicted daily average PM10 concentrations within the CRP project area may exceed current national standard and several of the future standards if mitigation measures are not implemented. The predicted annual average PM10 concentrations are all well below the current and future standards for PM10, with the exception of Village 01 which exceeds both current and future standards during the worst case scenario, without the implementation of mitigation measures.

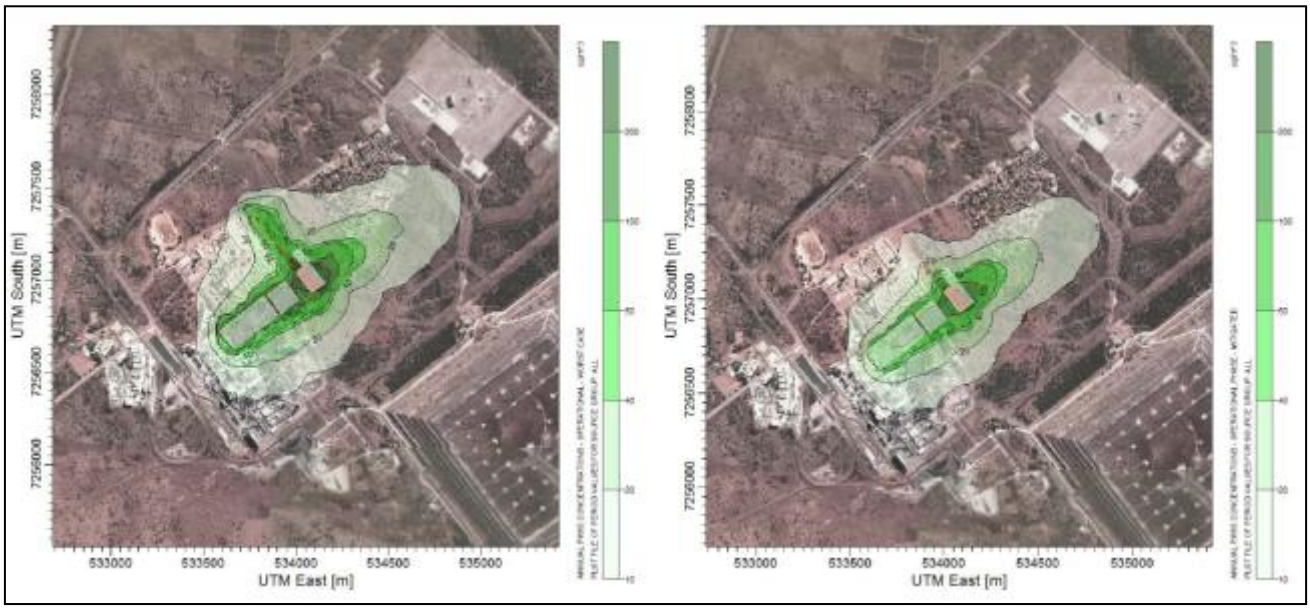

Figure 30: PM10 emissions from the CRP project indicating the annual concentrations for the worst case scenario (left) and mitigated scenario (right) – Operational Phase.

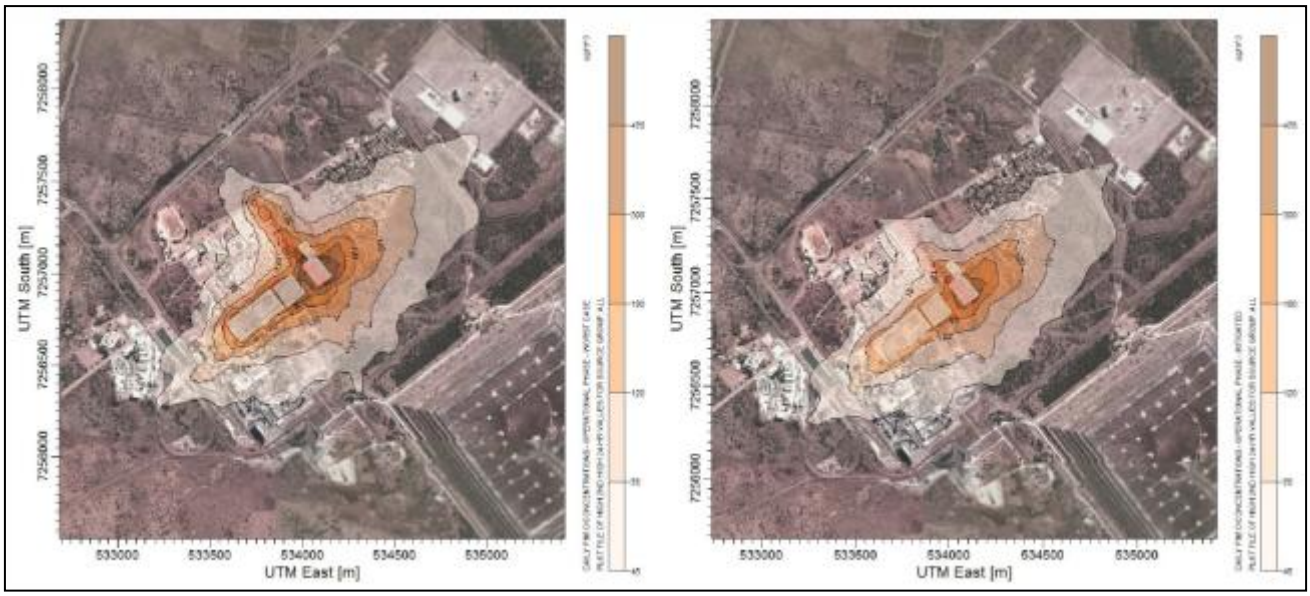

Figure 31: PM10 emissions from the CRP project indicating the daily concentrations for the worst case scenario (left) and mitigated scenario (right) – Operational Phase.

The predicted daily and annual average PM2.5 concentrations will not exceed the current standards if mitigation measures are implemented (Figure 32 and Figure 33). If mitigation measures are not implemented however it is predicted that the daily average PM2.5 concentrations at Village 02 may exceed future standards.

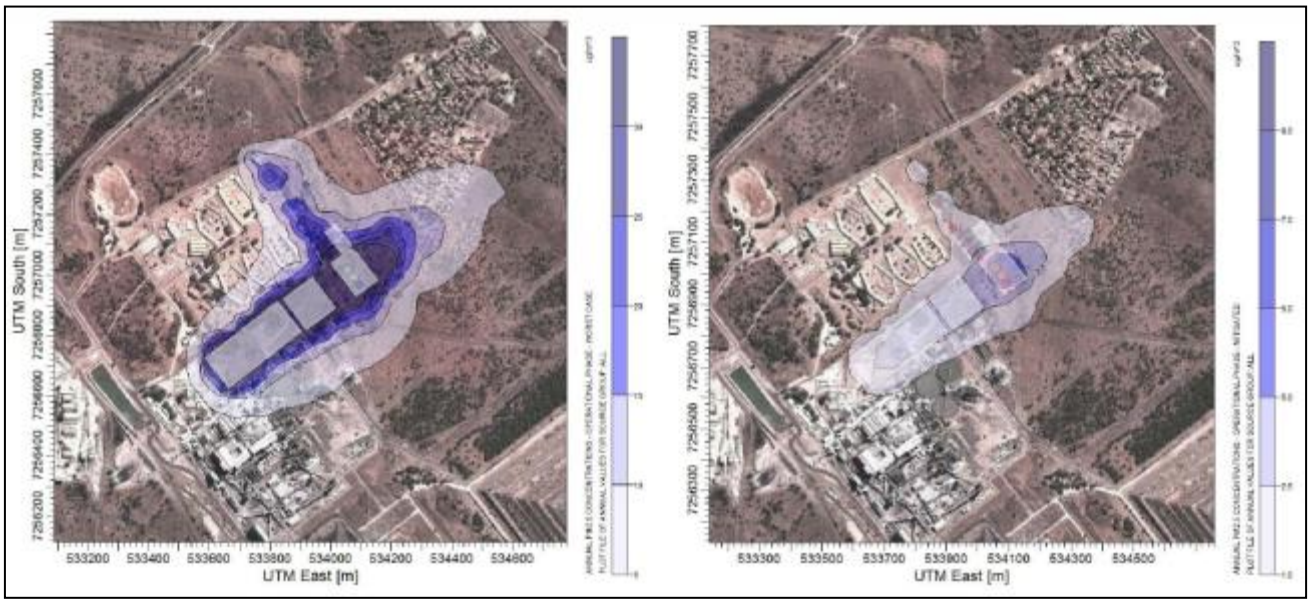

Figure 32: PM2.5 emissions from the CRP project indicating the annual concentrations for the worst case scenario (left) and mitigated scenario (right – Operational Phase.

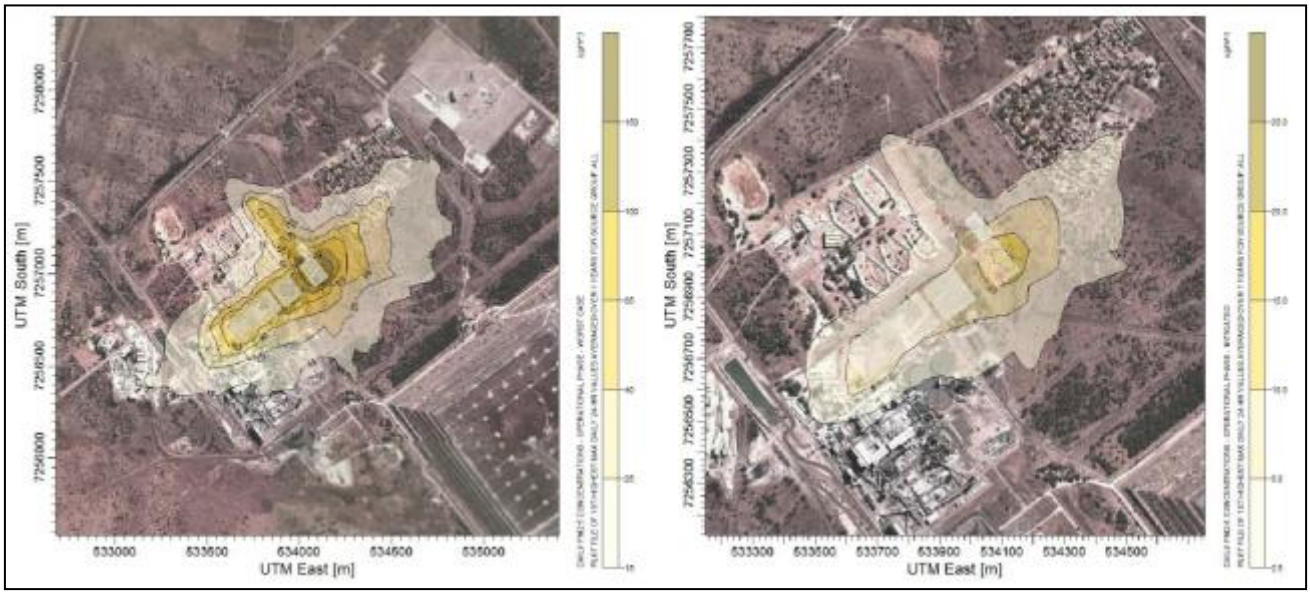

Figure 33: PM2.5 emissions from the CRP project indicating the daily concentrations for the worst case scenario (left) and mitigated scenario (right) – Operational Phase.

The operational phase will commence directly after the construction phase and carry on until mine closure. Thus, mitigation measures should be in place during the construction phase to minimise the effect on the ambient air quality. The major source of particulate matter is the stockpiling area and transport of the chromite to and from the stockpiling area. The significance rating of the impact on air quality during the operational phase is considered to be medium prior to the implementation of mitigation measures and low after their implementation.

Mitigation Measures

- AAP should implement a good housekeeping system which will include clearing the chrome product which has been blown off the stockpile;
- During the transfer of material to stockpiles, drop heights should be minimised to control dispersion of materials being transferred;
- While being transported, by either road or rail, the concentrates should be covered to prevent the spread of dust;
- Stockpiles should be maintained for as short a time as possible and a water spray system implemented to contain windblown particles;
- Wind breaks should be used in close proximity of the stockpiles to reduce the erosive forces of the wind;
- All access roads should be adequately maintained so as to minimise dust, erosion or undue surface damage. Methods such as wet suppression, paving or chemical stabilisation should be implemented;
- Dust and mud should be controlled at vehicle entry and exit points to prevent the dispersion of dust and mud beyond the site boundary;
- Any complaints relating to dust should be recorded. Should dust from the stockpile and roads become a nuisance, management measures, including the establishment of screens or berms, should be investigated to address these; and

- The speed of trucks should be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads to avoid excessive dust being generated or deterioration of the road surface.

(iii) Decommissioning and Closure Phase

Impact Assessment

During the decommissioning, closure and post- closure phases the following possible sources of dust were identified:

- Grading of sites;
- Infrastructure demolition;
- Infrastructure rubble piles;
- Transport and dumping of building rubble; and
- Preparation of soil for revegetation- ploughing and addition of fertiliser, compost etc.

The above activities may potentially increase dust levels and decrease ambient air quality during the decommissioning phase. However, the decreased ambient air quality levels will be temporary and are therefore considered to be of a low significance rating prior to as well as after the implementation of mitigation measures.

Mitigation Measures

- AAP should implement dust suppression measures to contain dust created during demolition, grading and the transport of rubble and topsoil.

(iv) Cumulative Impact

In the cumulative scenario the mitigated operational phase scenario was ran with an ambient background concentration for each of the pollutants that were calculated using the 2012 dust fallout results (refer to Appendix 3.2 for the modelling methodology). The average background daily PM10 and PM2.5 concentrations for the CRP project will be 71.1 µg/m3 and 43.1 µg/m3 respectively, which is below the national standards. Village 02 and Hostel 03, receptor points, were identified as the two locations that will be most affected by the operations of the CRP. The concentrations however will not exceed the national standard. Therefore, impact of the CRP project on the surrounding environment will be minimal if effective mitigation measures are implemented.

8.2.6 Ambient Noise

(i) Construction Phase

Impact Assessment

The earth moving activities and the construction of the CRP and associated infrastructure, road and railway extension may result in an increase in ambient noise levels and be a nuisance to the residents of the Mine Hostel and Rethabile Mine Village due to their close proximity. The significance rating of the impact on ambient noise during the construction phase is medium prior to and low after the implementation of mitigation measures.

Mitigation Measures

- Construction operations should be limited to daylight (working) hours;
- Any complaints relating to noise should be recorded and AAP should respond to complaints appropriately;
- Extend the existing occupational noise monitoring to incorporate the CRP and the sensitive receptors (Mine Hostel and Rethabile Mine Village) to ensure that noise levels are within the acceptable SANS guideline limits for residential areas. Where levels are of concern the necessary management measures should be implemented;
- Screens (i.e. screening methods, enclosed equipment etc) should be implemented to reduce the noise generated in areas of concern;
- All vehicles and heavy equipment should be fitted with exhaust silencers; and
- Unnecessary noise generated from machinery should be avoided through ensuring that all machinery is regularly serviced and well maintained, with records of maintenance being kept on-site.

(ii) Operational Phase

Impact Assessment

The CRP will not generate high levels of noise as the spiral technology works on gravitational force there will be noise generated from the pumps. However, noise will mainly be intermittent from the loading of product into the trucks or wagons. The noise generated will not exceed that which is currently being experienced at the existing concentrator plant but due to the close proximity of the Mine Hostels and Rethabile Mine Village the cumulative impact of the CRP operation and concentrator plant operation may be a nuisance to the residents. The significance rating of the impact on ambient noise during the operational phase is medium prior to as well as after the implementation of mitigation measures.

Mitigation Measures

- The operation of the railway line and siding should be limited to daylight hours (07h00 to 17h00);
- Any complaints received should be responded to and if necessary management measures put in place;
- Maintain the extended occupational noise monitoring programme, which incorporates the CRP and sensitive receptors (Mine Hostel and Rethabile Mine Village) to ensure that noise levels are within the acceptable levels. Where levels are of concern the necessary management measures should be implemented;
- Screens (i.e. screening methods, enclosed equipment etc) should be implemented to reduce the noise generated in areas of concern;
- All vehicles and heavy equipment should be fitted with exhaust silencers; and
- Unnecessary noise generated from equipment should be avoided by ensuring that all machinery is regularly services and well maintained, with records of maintenance being kept on-site.

(iii) Decommissioning and Closure Phase

Impact Assessment

During the decommissioning phase, the earth moving activities and the demolition of the CRP and associated infrastructure, road and railway extension could result in a temporary increase in ambient noise levels which may be a nuisance to the residents of the Mine Hostels and Rethabile Mine Village. All noise producing activities will cease during the decommissioning phase and no residual noise impacts are expected during the closure phase. The significance rating of the impact on ambient noise during the decommissioning phase is low prior to as well as after the implementation of mitigation measures. No residual impact on ambient noise is expected during the closure phase.

Mitigation Measures

- Decommissioning activities such as disassembly/ destruction of structures and buildings should take place during daylight hours;
- Screens (i.e. screening methods, enclosed equipment etc) should be implemented to reduce the noise generated in areas of concern; and
- All vehicles and heavy equipment should be fitted with exhaust silencers.

(iv) Cumulative Impact

The ambient noise character at the proposed CRP project area is industrial in nature due to the noise generated by the existing adjacent Amandelbult Concentrator Plant. Noise generated by the CRP project may result in an increase in the ambient noise levels which may result in the noise levels at the sensitive receptors (Mine Hostel and Rethabile Mine Village) exceeding the SANS guideline limits for residential areas (55 dBA during the day and 45 dBA at night). However with the implementation of the mitigation measures proposed the impact is considered to be low in significance due to the nature of the potential noise pollution.

8.2.7 Archaeological, Heritage and Cultural Resources

(i) Construction Phase

Impact Assessment

A heritage assessment conducted for the establishment of the nearby 4 Shaft in 2007 (van Schalkwyk 2007) indicated that although heritage sites were present within the Amandelbult surface right area, none were located in the vicinity of the area proposed for the CRP and associated infrastructure, road and railway extension. However, given that many heritage or cultural artefacts are located underground, there is a possibility that artefacts may be unearthed during construction. The significance rating of the potential impact on archaeological, heritage and cultural resources is low prior to as well as after the implementation of mitigation measures.

Mitigation Measures

- If any archaeological, heritage or cultural resources are unearthed during construction, construction activities should be halted and the ENVIRONMENTAL CO-ORDINATOR notified; and

- SAHRA should be notified and a heritage specialist should be appointed to assess the resources and propose mitigation and management measures.

8.2.8 Traffic

The following information was obtained from a traffic assessment conducted by UWP in 2013 for the proposed CRP project.

(i) Construction Phase

Impact Assessment

During construction the amount of traffic on site will increase due to the construction vehicles. Construction will mostly happen away from existing operational activities and provided that the necessary traffic accommodation and demarcation of the construction activities are planned and monitored, no significant safety hazard is anticipated in this mine-controlled environment. The significance rating of the impact on traffic during the construction phase is low prior to as well as after the implementation of mitigation measures.

Mitigation Measures

- Appropriate safety signage should be erected for road users;
- Fit heavy vehicles with reverse sirens;
- All drivers must drive with the headlights on at all times;
- The speed of construction vehicles should be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads. The speed limit on national roads should also be adhered to; and
- AAP should not permit the drivers to deviate from the designated access roads on-site or from the proposed national route.

(ii) Operational Phase

Impact Assessment

During operation trucks will be used to transport chrome to Pretoria using the national road network. Transport operations would not be on a 24-hour 7-day per week basis, but on a 12-hour per day 5 day per week basis.

The proposed CRP project will result in the doubling of traffic volumes on the surrounding road network. The increase in traffic caused by the haul trucks may be a nuisance to the surrounding road users and increase the road safety risks. However, if law enforcement is applied to ensure that drivers obey the rules of the road, safety should not be an above average concern. The increase in heavy vehicles may also result in degradation of the surface conditions of the surrounding road networks. The R510 is in a good condition but the addition traffic will result in the road requiring a strengthening exercise in 7 to 9 years time rather than 10 to 12 years time. R556 up to the intersection with the N4 Platinum Highway approximately half way between Marikana and Brits is in a fairly poor condition.

The significance ratings of the impact of increased traffic during the operational phase ratings vary between Medium and Significant but by being pro-active, management can reduce all the

significant risks to medium and the medium risks to low.

Mitigation Measures

- Appropriate safety signage should be maintained for road users;
- Fit heavy vehicles with reverse sirens;
- All drivers must drive with the headlights on at all times;
- The speed of haul trucks should be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads. The speed limit on national roads should also be adhered to;
- AAP should not permit the drivers to deviate from the designated access roads on-site or from the proposed national route;
- Investigate "competency" of existing road pavement on site, maintain roads regularly and rehabilitate timeously; and
- Alert roads authority to maintain the road structure associated with the R510 and R556 and to budget for rehabilitation.

(iii) Decommissioning and Closure Phase

Impact Assessment

During decommissioning the amount of traffic on site will increase due to the decommissioning vehicles. During the closure phase rehabilitation vehicles and equipment will also be on site. The increase in traffic may increase the road safety risks. The significance rating of the impact of traffic during the decommissioning and closure phases is low prior to as well as after the implementation of mitigation measures.

Mitigation Measures

- Fit heavy vehicles with reverse sirens;
- All drivers must drive with the headlights on at all times;
- The speed of vehicles used in decommisioning should be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads. The speed limit on national roads should also be adhered to; and
- AAP should not permit the drivers to deviate from the designated access roads on-site or from the proposed national route.

(iv) Cumulative Impact

The existing traffic volume on the internal mine roads from mining activities as well as on the existing road networks will be increased due to the CRP project. The impact on these roads will be compounded by the increase in traffic volumes (especially heavy vehicles). Degradation of the surface conditions will be accelerated leading to increased maintenance requirements and shorter intervals between strengthening exercises. The road safety risks on the internal mine roads and national road network will increase due to the increase in traffic due to the CRP project. With the implementation of the mitigation measures detailed above the potential cumulative impact is considered to be medium in significance.

8.2.9 Socio-Economic Conditions

The following information was obtained form the Social Impact Assessment conducted by Prime Resources in 2013 for the proposed CRP project.

(i) Construction Phase

Impact Assessment

The construction of the CRP and associated infrastructure, road and railway extension will provide additional employment opportunities. Contractors will make up the bulk of the new employees during the construction phase. Therefore, the job opportunities during this phase will be temporary (12 month period).

According to the project Engineers a maximum of 300 employment opportunities will be created during the construction phase. Of the 300 employment opportunities 80% of the opportunities will be available to skilled and or semiskilled personnel (engineers, land surveyors, project managers, equipment operators etc.) and 20% by unskilled (drivers, security, cleaners, etc.).

It is anticipated that the majority of unskilled or semiskilled employment opportunities associated with the project will benefit the local community. The majority of the skilled and semi-skilled opportunities are likely to be associated with the contactors appointed to construct the proposed CRP, associated infrastructure, road and railway.

Based on the existing approved Amandelbult Social and Labour Plan (SLP), the mine tends to employ its unskilled workforce within a 50 km radius of the mine. The SLP also commits to ensuring that its workers, inclusive of contractor employees, are given the opportunity to acquire skills and competencies to achieve both individual and organisational goals in the context of the mine's operational and Local Economic Development (LED) objectives.

The capital expenditure on completion is anticipated to be in the region of R 400 million. The capital expenditure during the construction phase will create procurement opportunities for local companies. It should however be noted that due to the technical nature of the project and high import content associated with the CRP the opportunities for the local economy are likely to be limited.

The provision of employment and local procurement opportunities will have a positive impact on the municipal area due to the multiplier factor as it will not only be the employees / contractors / local businesses that benefit but also their families and the local economy in the municipal area. The significance rating of the positive impact on the socio-economic conditions during the construction phase is medium prior to as well as after the implementation of mitigation measures.

The presence of construction workers could influence the social dynamics of the surrounding communities by potentially resulting in an:

- Increase in alcohol and drug use;
- Increase in noise;
- Increase in crime levels;
- Increase in prostitution; and

- Increase in sexually transmitted diseases.

Given the fact that the proposed contractor camp and laydown area lies adjacent to the existing Mine Hostel and Rethabile Mine Village, the potential impact on local social dynamics is considered to be is medium prior to as well as after the implementation of mitigation measures.

The presence of construction personnel on site as well as the construction activities may result in impacts on the surrounding environment which will negatively affect local residents such as veld fires, land degradation (detailed in Section 8.2.1 above), pollution of water resources (detailed in Section 8.2.3 above), reduction in air quality (detailed in Section 8.2.5 above), increase in ambient noise (detailed in Section 8.2.6 above) and an increase in traffic (detailed in Section 8.2.8 above).

Mitigation Measures

- Employment opportunities should be prioritised for residents from local communities surrounding Amandelbult;
- Implement a 'locals first' policy, especially for semi and low-skilled job categories;
- The employment percentage (in terms of HDSA and women) should be in line with the commitments made in the SLP;
- Where feasible, training and skills development programmes for locals should be initiated prior to the construction phase;
- Recruitment philosophy as well as the rules and requirements should be included in the contractors' contracts;
- Contractors must procure products from local entrepreneurs during construction;
- Where feasible, efforts should be made to employ local contactors that are compliant with Black Economic Empowerment (BEE) criteria;
- Compile and enforce a Contractors Code of Conduct; and
- Implement the mitigation measures as detailed in the sections above regarding impacts of the construction activities on the surrounding environment.

(ii) Operational Phase

Impact Assessment

The operation of the CRP will provide additional permanent employment opportunities. According to the project Engineers a maximum of 60 employment opportunities will be created during the construction period which should extend over at least a 20 year period. Of the 60 employment opportunities 80% is considered skilled (CRP operators, engineers, etc.) and 20% is considered unskilled or semiskilled (drivers, security, cleaners, equipment operators etc.) employment opportunities.

As mentioned above, based on the existing approved Amandelbult SLP, the mine intends to employ its unskilled workforce from within a 50 km radius of the mine. The SLP also commits to ensuring that its workers are given the opportunity to acquire skills and competencies to achieve both individual and organisational goals in the context of the mine's operational and LED objectives. The provision of employment will have a positive impact on the municipal area due to the multiplier factor as it will not only be the employees / contractors that benefit but also their

families and the local economy.

From a procurement perspective, the potential opportunities are associated with the provision of services such as cleaning, transport and security, etc. Other than the associated mining sector, there are three major sectors within the Thabazimbi Municipality, which benefit from the existing procurement at the Amandelbult Concentrator Section. These include wholesale and retail, machinery and equipment, building construction and civil engineering. It can therefore be expected that the CRP would access these sectors for the relevant services and equipment.

In addition, the Mining Charter of 2010 requires that Mines' commit to the following procurement targets.

- Procure a minimum of 40% of capital goods from BEE entities by 2014; and
- Procure 70% of services and 50% of consumer goods from BEE entities by 2014.

These targets would extend to the proposed CRP. The significance rating of the positive impact on the socio-economic conditions during the operational phase is medium prior to as well as after the implementation of mitigation measures.

Activities during the operation of the CRP may result in impacts on the surrounding environment which will negatively affect local residents such as land degradation (detailed in Section 8.2.1 above), pollution of water resources (detailed in Section 8.2.3 above), reduction in air quality (detailed in Section 8.2.5 above), increase in ambient noise (detailed in Section 8.2.6 above) and an increase in traffic (detailed in Section 8.2.8 above).

Mitigation Measures

- Employment opportunities should be prioritised for residents from local communities surrounding Amandelbult;
- Implement a 'locals first' policy, especially for semi and low-skilled job categories;
- The employment percentage (in terms of HDSA and women) should be in line with the commitments made in the SLP;
- Update the SLP to incorporate the Human Resources Development component of the CRP. Local economic development and managing downscaling and retrenchment aspects associated with the CRP. Submit the revised SLP to the Limpopo Department of Mineral Resources for approval. The commitments laid out in the SLP must be adhered to;
- Recruitment rules and requirements should be included in the CRP operation contractors' contract;
- The recruitment philosophy as part of the SLP should be provided to the operation contractors;
- Ensure that the procurement targets as detailed in the Mining Charter of 2012 and SLP are implemented;
- Implement the mitigation measures as detailed in the sections above regarding impacts of on the surrounding environment.

(iii) Decommissioning and Closure Phase

Impact Assessment

The closure of the mining operations will result in a loss of employment, which in turn will have a negative impact on the socio-economic conditions. The significance rating of the impact on the socio-economic conditions during the decommissioning and closure phase is significant prior to and medium after the implementation of mitigation measures.

Mitigation Measures

- The commitments laid out in the SLP regarding closure and downscaling must be adhered to.

8.2.10 Impact Rating

Table 14 reflects the rating of the above mentioned impacts anticipated for all environmental aspects at every phase of the project. All impacts are negative unless the rating has a (+) indicating that the impact is positive. The impact ratings without square brackets represent the significance rating prior to the implementation of any mitigation measures and those within the square brackets represent the significance rating after implementing mitigation measures.

Table 14: Impact assessment summary table for the proposed Amandelbult CRP

Construction Phase

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Soil, Land Use and Land Capability	▪ The stripping, handling and storage of topsoil during construction. ▪ Construction activities e.g. mixing of cement and the presence of construction vehicles on site. ▪ Incorrect waste disposal.	▪ The loss of soil through erosion or compaction.	4 [2]	3 [2]	Medium [Low]	12 [4]	Soil mitigation measures associated with the construction phase in Section 8.2.1. Refer to Section 9.1 in the EMP for the soil management programme.	Implement and maintain the soil monitoring programme in Section 12.5 of the EMP.
			▪ The contamination of the soil.	4 [2]	3 [2]	Medium [Low]	12 [4]		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Biodiversity (Flora and Fauna)	▪ The clearance of land for the construction of the CRP and associated infrastructure, road and railway extension. ▪ Erosion resulting in the loss of soil. ▪ Fires caused by personnel on site. ▪ Harvesting of vegetation by personnel.	▪ Loss of vegetation and habitat	4 [4]	4 [3]	Significant [Medium]	16 [12]	Biodiversity mitigation measures associated with the construction phase in Section 8.2.2. Refer to Section 9.2 in the EMP for the biodiversity management programme.	No monitoring programme required.

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
		▪ Trapping and poaching of fauna. ▪ Vehicle collisions. ▪ Contamination of the environment by waste and spills.	▪ Mortality of fauna	4 [2]	3 [2]	Medium [Low]	12 [4]		
		▪ Presence of vegetation and seeds on construction vehicles.	▪ Increase in alien invasive vegetation	4 [2]	3 [2]	Medium [Low]	12 [4]		
		▪ Vehicle entrainment and construction activities.	▪ Settling of dust on leaves impacting photosynthesis and the presence of pollinators.	4 [2]	3 [2]	Medium [Low]	12 [4]		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway	Surface Water	▪ Incorrect waste disposal, hydrocarbon and chemical spills, mobilisation of current tailings material within the CRP area.	▪ Potential reduction in water quality of the Bierspruit.	3 [2]	5 [2]	Significant [Low]	15 [4]	Surface water mitigation measures associated with the construction phase in Section 8.2.3. Refer to Section 9.3	Implement and maintain the surface water monitoring programme in Section 12.3 of the EMP.

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
extension		▪ Clearing and levelling of land for the construction of the CRP, associated infrastructure, road and railway extension.	▪ Increased erosion potential and increased silt loads entering the Bierspruit.	3 [2]	5 [2]	Significant [Low]	15 [4]	in the EMP for the surface water management programme.	
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Groundwater	▪ Incorrect waste disposal, hydrocarbon and chemical spills, contaminated run-off.	▪ Potential seepage of contaminated run-off polluting groundwater resources.	2 [2]	4 [2]	Medium [Low]	8 [4]	Groundwater mitigation measures associated with the construction phase in Section 8.2.4. Refer to Section 9.3 in the EMP for the groundwater management programme.	Implement and maintain the groundwater monitoring programme in Section 12.2 of the EMP.
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Air Quality	▪ Windblown dust from exposed areas, vehicle entrainment, material and debris handling.	▪ Nuisance dust and particulate matter generated from construction activities may negatively affect the surrounding air quality.	3 [1]	4 [2]	Medium [Low]	12 [2]	Air quality mitigation measures associated with the construction phase in Section 8.2.5. Refer to Section 9.4 in the EMP for the air quality management programme.	Implement and maintain the air quality monitoring programme in Section 12.1 of the EMP.

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Ambient Noise	▪ Construction activities e.g. infrastructure establishment and the presence of construction vehicles on site.	▪ Generation of noise may disturb residents of the Mine Hostels and Rethabile Mine Village.	3 [3]	2 [1]	Medium [Low]	6 [3]	Noise mitigation measures associated with the construction phase in Section 8.2.6.	It may be necessary to compile, implement and maintain a noise monitoring programme. Refer to Section 12.6 of the EMP.
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Archaeological/ Cultural / Heritage	▪ Clearing of vegetation and excavating for the establishment of hardstanding areas.	▪ Uncovering and damaging of potential heritage resources.	3 [3]	1 [1]	Low [Low]	3 [3]	Cultural/ heritage mitigation measures associated with the construction phase in Section 8.2.7.	No monitoring programme required.
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Traffic	▪ The presence of construction vehicles on site transporting personnel and materials.	▪ Increase in traffic which may result in an increase in road safety risks on site.	3 [3]	2 [1]	Medium [Low]	6 [3]	Traffic mitigation measures associated with the construction phase in Section 8.2.8. Refer to Section 9.5 in the EMP for the traffic management programme.	No monitoring programme required.

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Socio-Economic Conditions	▪ Procurement and employment associated with the construction phase.	▪ Job opportunities. ▪ Opportunities for local businesses.	2 [3]	4 [4]	Medium + [Medium +]	+8 [+12]	Socio-economic mitigation measures associated with the construction phase in Section 8.2.9. Refer to Section 9.8 in the EMP for the socio-economic management programme.	No monitoring programme required.
		▪ Construction workers and camp on site.	▪ Impact on the social dynamics of the local communities.	3 [2]	4 [3]	Medium + [Medium +]	12 [6]		
			▪ Impact on the environment of the local communities, such as veld fires.	3 [2]	4 [4]	Medium [Medium]	12 [8]		

Operational Phase

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles	Soil, Land Use and Land Capability	▪ The handling and storage of topsoil during operation. ▪ Incorrect waste	▪ The loss of soil through erosion or compaction.	4 [3]	3 [2]	Medium [Medium]	12 [6]	Soil mitigation measures associated with the construction phase	Implement and maintain the soil monitoring programme in

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ Access and haul road ▪ Railway extension		disposal. ▪ The presence of vehicles, machinery and personnel on site.	▪ The contamination of the soil.	4 [3]	3 [2]	Medium [Low]	12 [6]	in Section 8.2.1. Refer to Section 9.1 in the EMP for the soil management programme.	Section 12.5 of the EMP.
▪ Railway extension	Biodiversity (Flora and Fauna)	▪ The presence of the railway line extension in the game camp.	▪ Habitat fragmentation.	4 [3]	3 [2]	Medium [Low]	12 [6]	Biodiversity mitigation measures associated with the construction phase in Section 8.2.2. Refer to Section 9.2 in the EMP for the biodiversity management programme.	No monitoring programme required.
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension		▪ Vehicles on site transporting chromite may collide with fauna. ▪ Personnel on site which may trap and poach fauna. ▪ Trains may collide with fauna.	▪ Mortality of fauna	4 [3]	3 [2]	Medium [Low]	12 [6]		
▪ Stockpiles ▪ Access and haul road		▪ Vehicles on site transporting chromite may contain seeds and remnants of alien invasive vegetation.	▪ Increase in alien invasive vegetation	4 [3]	3 [2]	Medium [Low]	12 [6]		

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ Stockpiles ▪ Access and haul road ▪ Railway extension		▪ Dust generated from vehicle entrainment, windblown dust from stockpiles, trucks or wagons.	▪ Settling of dust on leaves impacting photosynthesis and the presence of pollinators.	3 [2]	3 [2]	Medium [Low]	6 [4]		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Surface Water	▪ Incorrect waste disposal, hydrocarbon and chemical spills and contaminated run-off from the CRP project area.	▪ Potential reduction in water quality of the Bierspruit.	3 [2]	5 [2]	Significant [Low]	15 [4]	Surface water mitigation measures associated with the construction phase in Section 8.2.3. Refer to Section 9.3 in the EMP for the surface water management programme.	Implement and maintain the surface water monitoring programme in Section 12.3of the EMP.
		▪ Change in surface run-off volumes due to the presence of the CRP, associated infrastructure, road and railway extension.	▪ Flow Reduction of the Bierspruit.	5 [5]	1 [1]	Low [Low]	5 [5]		
▪ Stockpiles		▪ Run-off from chromite stockpile area.	▪ Run-off from chromite stockpiles may contaminate the Bierspruit.	4 [4]	1 [1]	Low [Low]	4 [4]		

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Groundwater	▪ Incorrect waste disposal, hydrocarbon and chemical spills and contaminated run-off from CRP project area.	▪ Potential seepage of contaminated run-off polluting groundwater resources.	2 [2]	4 [2]	Medium [Low]	8 [4]	Groundwater mitigation measures associated with the construction phase in Section 8.2.4. Refer to Section 9.3 in the EMP for the groundwater management programme.	Implement and maintain the groundwater monitoring programme in Section 12.2 of the EMP.
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Air Quality	▪ The transport of chromite from the stockpiling area, windblown dust from exposed surfaces and dust generated from vehicle entrainment.	▪ Nuisance dust and particulate matter generated from operational activities may negatively affect the surrounding air quality.	3 [1]	3 [2]	Medium [Low]	9 [2]	Air quality mitigation measures associated with the construction phase in Section 8.2.5. Refer to Section 9.4in the EMP for the air quality management programme.	Implement and maintain the air quality monitoring programme in Section 12.1 of the EMP.

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Ambient Noise	▪ Operation activities e.g. processing of chromite at the CRP, loading of trucks and wagons.	▪ Generation of noise may disturb residents of the Mine Hostel and Rethabile Mine Village.	4 [4]	2 [1]	Medium [Low]	8 [4]	Noise mitigation measures associated with the construction phase in Section 8.2.6.	It may be necessary to compile, implement and maintain a noise monitoring programme. Refer to Section 12.6 of the EMP.
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Traffic	▪ The transport of chromite from the stockpiling area to Pretoria via existing road network.	▪ Increase in traffic which may result in an increase in road safety risks on site.	3 [3]	2 [1]	Medium [Low]	6 [3]	Traffic mitigation measures associated with the construction phase in Section 8.2.8. Refer to Section 9.5 in the EMP for the traffic management programme.	No monitoring programme required.
			▪ Increase in traffic which may result in an increase in road safety risks on national roads.	4 [4]	2 [1]	Medium [Low]	8 [4]		

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
			▪ Increase in traffic which may result in degradation of internal mine roads.	3 [3]	5 [2]	Significant [Medium]	15 [6]		
			▪ Increase in traffic which may result in degradation of mine and national roads.	3 [3]	3 [1]	Medium [Low]	9 [3]		
▪ CRP ▪ Associated infrastructure	Socio-Economic Conditions	▪ Procurement and employment associated with the operational phase	▪ Job opportunities. ▪ Opportunities for local businesses.	2 [3]	4 [4]	Medium+ [Medium+]	+8 [+12]	Socio-economic mitigation measures associated with the construction phase in Section 8.2.9. Refer to Section 9.8 in the EMP for the socio-economic management programme.	No monitoring programme required.
		▪ Implementation of the SLP and Local Economic Development.	▪ Positive impact on the socio-economic aspects of the local community.	2 [3]	4 [4]	Medium+ [Medium+]	8 [12]		

Decommissioning / Closure Phase

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Soil, Land Use and Land Capability	▪ The handling of topsoil during rehabilitation. ▪ Incorrect waste disposal. ▪ The presence of vehicles, machinery and personnel on site.	▪ The loss of soil through erosion or compaction.	2 [2]	2 [2]	Low [Low]	4 [4]	Soil mitigation measures associated with the construction phase in Section 8.2.1. Refer to Section 9.1 in the EMP for the soil management programme.	Implement and maintain the soil monitoring programme in Section 12.5 of the EMP.
			▪ The contamination of the soil.	2 [2]	2 [2]	Low [Low]	4 [4]		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Biodiversity (Flora and Fauna)	▪ Erosion resulting in the loss of soil. ▪ Fires caused by personnel on site. ▪ Harvesting of vegetation by personnel.	▪ Loss of vegetation and habitat	4 [4]	4 [3]	Significant [Medium]	16 [12]	Biodiversity mitigation measures associated with the construction phase in Section 8.2.2. Refer to Section 9.2 in the EMP for the biodiversity management programme.	No monitoring programme required.
		▪ Trapping and poaching of fauna. ▪ Vehicle collisions. ▪ Contamination of the environment by waste and spills.	▪ Mortality of fauna	4 [2]	3 [2]	Medium [Low]	12 [4]		
		▪ Presence of vegetation and seeds on decommissioning vehicles.	▪ Increase in alien invasive vegetation	4 [2]	3 [2]	Medium [Low]	12 [4]		

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Surface Water	▪ Incorrect waste disposal, hydrocarbon and chemical spills, contaminated run-off.	▪ Potential reduction in water quality of the Bierspruit.	3 [2]	5 [2]	Significant [Low]	15 [4]	Surface water mitigation measures associated with the construction phase in Section 8.2.3. Refer to Section 9.3 in the EMP for the surface water management programme.	Implement and maintain the surface water monitoring programme in Section 12.3 of the EMP.
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Groundwater	▪ Incorrect waste disposal, hydrocarbon and chemical spills, contaminated run-off.	▪ Potential seepage of contaminated run-off polluting groundwater resources.	2 [2]	4 [2]	Medium [Low]	8 [4]	Groundwater mitigation measures associated with the construction phase in Section 8.2.4. Refer to Section 9.3 in the EMP for the groundwater management programme.	Implement and maintain the groundwater monitoring programme in Section 12.2 of the EMP.
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Air Quality	▪ Windblown dust from exposed areas, vehicle entrainment, material and debris handling.	▪ Nuisance dust and particulate matter generated from decommissioning activities may negatively affect the surrounding air quality.	2 [1]	1 [1]	Low [Low]	2 [1]	Air quality mitigation measures associated with the construction phase in Section 8.2.5. Refer to Section 9.4 in the EMP for the air quality management programme.	Implement and maintain the air quality monitoring programme in Section 12.1 of the EMP.

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Ambient Noise	▪ Decommissioning activities e.g. dismantling of infrastructure and the presence of vehicles on site.	▪ Generation of noise may disturb residents of the Mine Hostels and Rethabile Mine Village.	2 [2]	2 [1]	Low [Low]	4 [2]	Noise mitigation measures associated with the construction phase in Section 8.2.6.	It may be necessary to compile, implement and maintain a noise monitoring programme. Refer to Section 12.6 of the EMP.
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Traffic	▪ The presence of vehicles on site for decommissioning and rehabilitation activities.	▪ Increase in traffic which may result in an increase in road safety risks on site.	3 [3]	2 [1]	Medium [Low]	6 [3]	Traffic mitigation measures associated with the construction phase in Section 8.2.8. Refer to Section 9.5 in the EMP for the traffic management programme.	No monitoring programme required.
▪ CRP	Socio-Economic Conditions	▪ The decommissioning and closure of the CRP.	▪ Loss of job opportunities. ▪ Loss of opportunities for local businesses.	4 [3]	4 [4]	Significant [Medium]	16 [12]	Socio-economic mitigation measures associated with the construction phase in Section 8.2.9. Refer to Section 9.8 in the EMP for the socio-economic management programme.	No monitoring programme required.

Post-Closure Phase

MINING ACTIVITY (COMPONENT)	RECEPTOR	PROCESS	IMPACT	CONSEQUENCE	PROBABILITY	SIGNIFICANCE		MITIGATION AND MANAGEMENT MEASURES	MONITORING
						RATING	VALUE		
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Soil, Land Use and Land Capability	▪ Rehabilitation of the CRP, associated infrastructure, road and railway extension footprint.	▪ The loss of soil through erosion from ineffective rehabilitation.	1 [1]	2 [1]	Low [Low]	24 [10]	Soil mitigation measures associated with the construction phase in Section 8.2.1. Refer to Section 9.1 in the EMP for the rehabilitation management programme.	No monitoring programme required.
▪ CRP ▪ Associated infrastructure ▪ Stockpiles ▪ Access and haul road ▪ Railway extension	Biodiversity (Flora and Fauna)	▪ Rehabilitation of the CRP, associated infrastructure, road and railway extension footprint.	▪ The loss of habitat due to ineffective rehabilitation.	4 [3]	3 [2]	Medium [Low]	12 [6]	Biodiversity mitigation measures associated with the construction phase in Section 8.2.2. Refer to Section 9.2 in the EMP for the rehabilitation management programme.	No monitoring programme required.

9 GENERAL MANAGEMENT MEASURES

This Section details the management programmes to be implemented to manage the impacts of the CRP project on the environment.

9.1 Soil Management Programme

The soil management programme was informed by the Soil Quality Assessment that was undertaken by Earth Science Solution in 2013.

9.1.1 Objectives

The objective for the proposed CRP project includes causing as minimal an impact as possible to soil quality and land capability in the area.

9.1.2 Goals

The goals to accomplish the above objective are to:

- Ensure that soil resources are not lost through contamination, sterilisation compaction, incorrect handling during stockpiling or erosion; and
- Ensure the land use can be restored to meet grazing potential.

9.1.3 Management Measures

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 as well as the timeframe for the implementation of these commitments (prior to a phase or during a phase).

Table 15: Soil management measures

MANAGEMENT MEASURE REF NO.	SOIL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
Construction Phase					
SM 1	Soil fertility.	• Some vegetation should be left and the soil fertilized with super phosphate prior to being stripped. This will ensure that the fertilizer is well mixed into the soil during the stripping operation, it will reduce the amount of fertilizer required during rehabilitation and will maintain the soils viability during storage. A standard commercial fertilizer is to be added to the soil before revegetation. The fertilizer should be added to the soil in a slow release granular form at a rate of approximately 200 kg/ha.	Commissioning Contractor	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Construction Phase
SM 2	Soil stripping.	• All the soils should be stripped to a depth of approximately 450mm or until hard rock where applicable. The base to the structures to be constructed should be founded on stabilized material, the soils having been stripped to below the topsoil contact (250mm). Soils should not be stripped when wet as this can lead to compaction and loss of the structure of the soil. Soil stripping should be done during the winter month as it will help maintain the structural integrity of the soils.	Commissioning Contractor		Construction Phase
SM 3		• The topsoil should be removed as per the double strip method in order to preserve the seeds,	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	SOIL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		nutrients and micro-organisms that are found within the top 15cm of topsoil. The double strip method entails the following: • Remove the top 150mm of topsoil and place on a dedicated stockpile. • Remove the remaining 150 to 300 mm of topsoil and place on a separate stockpile. • An average topsoil depth of 250 mm should be stockpiled separately from the lower 400-500 mm of subsoil where present. Remove topsoil by utilising the clear and grub method: ○ Remove upper vegetation of the site with a grader if it is grassland and potentially a dozer if there are signs of larger vegetation. Pushed to one side and then load.			
SM 4	Soil stockpiling.	• Draw up a topsoil stockpile procedure, indicating the preferred stockpile areas. Brief contractors on the topsoil stockpile procedure and areas and enforce the implementation thereof.	Environmental Co-ordinator / Project Manager		Construction Phase
SM 5		• The soils removed from the servitudes, haulage routes etc. must be stored as close as possible to the relevant structures and separately managed in stockpiles that can be easily used for rehabilitation of the infrastructure at closure.	Commissioning Contractor		Construction Phase
SM 6		• The topsoil removed to a depth of 250mm to be	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	SOIL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		stockpiled separately from the lower 400 to 500mm of subsoil where present.			
SM 7		• Stockpiles should be re-vegetated and slopes kept to less than 1:3 to protect the topsoil from erosion, to discourage weed growth and to maintain the active populations of beneficial microorganisms.	Commissioning Contractor		Construction Phase
SM 8		• The stockpiles should be located where they will not be disturbed by future activities or future development of buildings or infrastructure and where possible upstream of the CRP's natural stormwater flow path.	Commissioning Contractor		Construction Phase
SM 9		• The stockpiles are to be clearly demarcated. No vehicle, personnel or wildlife should be permitted on the topsoil stockpiles.	Commissioning Contractor		Construction Phase
SM 10		• Stockpiles should be no more than 2.5m high to best retain the organic components of the topsoil.	Commissioning Contractor		Construction Phase
SM 11		• Stockpiles should be provided with retaining- and stormwater diversion berms and silt traps to prevent the erosion of topsoil and contamination of water sources due to run-off in the wet season.	Commissioning Contractor		Construction Phase
SM 12		• Construct either screens, berms, benches, cut-off drains or plant Vetiver Grass hedges around	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	SOIL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		stockpiles that are not re-vegetated to shield against wind erosion.			
SM 13	Soil contamination.	• To prevent diesel and oil spills, all vehicles and equipment should be kept in good working condition and all leaks repaired immediately.	Commissioning Contractor		Construction Phase
SM 14		• A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times.	Commissioning Contractor		Construction Phase
SM 15		• Cement mixing undertaken outside of the central batching area must be undertaken in a mixing plant/ bin or on an impermeable surface (bunded area). Ensure that the bunded impermeable surface where the bulk batching of cement is undertaken is connected to the dirty stormwater system. Cement should be delivered in bags and stored on pallets in a dry covered area within the storm water bunded area.	Commissioning Contractor		Construction Phase
SM 16		• All non-hazardous waste should be handled and disposed of as stated in the waste management programme detailed in Section 9.9 below.	Commissioning Contractor		Construction Phase
SM 17		• All hazardous waste should be handled and disposed of as stated in the hazardous waste management programme detailed in Section	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	SOIL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		9.10 below.			
Operational Phase					
SM 18	Soil monitoring.	• The existing soil monitoring programmes detailed in Section 12.5 should be maintained.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Operational Phase
SM 19	Soil fertility.	• The initial application of fertilizer and lime to the disturbed soils is necessary to establish a healthy plant cover as soon as possible. This will prevent erosion. Maintenance dressings are applied for the purpose of keeping up nutrient levels. These applications will be undertaken only if required, and only after additional sample analysis has been undertaken.	Environmental Co-ordinator		Operational Phase
SM 20	Erosion.	• Ensure stockpiles are re- vegetated. Plants should be watered and weeded regularly as well as checked for pests and diseases. Replace unhealthy or dead plant material. Repair any damage caused by erosion.	Environmental Co-ordinator		Operational Phase
SM 21		• Maintain the erosion control structures constructed during the construction phase if stockpiles are not adequately re-vegetated.	Environmental Co-ordinator		Operational Phase
SM 22		• Diverting of all surface water in a controlled manner along protected channels, and on the upslope side of the dirty water areas.	Environmental Co-ordinator		Operational Phase

MANAGEMENT MEASURE REF NO.	SOIL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
SM 23		• Restriction of movement of vehicles, personnel or livestock on, or over soil stockpiles.	Environmental Co-ordinator		Operational Phase
SM 24	Contamination of soil.	• All non-hazardous waste should be handled and disposed of as stated in the waste management programme detailed in Section 9.9 below.	Environmental Co-ordinator		Operational Phase
SM 25		• All hazardous waste should be handled and disposed of as stated in the hazardous waste management programme detailed in Section 9.10 below.	Environmental Co-ordinator		Operational Phase
SM 26		• To prevent diesel and oil spills, all vehicles and equipment will be kept in good working condition and all leaks repaired immediately.	Environmental Co-ordinator		Operational Phase
SM 27		• All generators will be placed on drip trays to catch all spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. will be done over a plastic tarpaulin or steel drip trays.	Environmental Co-ordinator		Operational Phase
SM 28		• A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times.	Environmental Co-ordinator		Operational Phase
SM 29		• Any spillages are to be cleaned up and remediated as soon as possible;	Environmental Co-ordinator		Operational Phase

MANAGEMENT MEASURE REF NO.	SOIL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
SM 30		• In the event of a large spillage occurring, there should be a proper written procedure at the plant that will dictate the methods to be used in the clean-up, the sampling of contamination and the closeout procedure (including the taking of samples, if needed) to declare that the risk as being ameliorated. These records should be kept for at least the life of the plant.	Environmental Co-ordinator		Operational Phase
SM 31		• The chromite stockpile should be bunded to ensure that chromite is deposited and stored on an impermeable surface.	Environmental Co-ordinator		Operational Phase
Decommissioning / Closure Phase					
SM 32	Soil monitoring.	• Chemical testing of the topsoil, as detailed in detailed in Section 12.5, should be carried out prior to replacing the topsoil.	Specialist Consultant	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Decommissioning / Closure Phase
SM 33	Soil fertility.	• Topsoil should be fertilized according to the requirements identified through chemical testing.	Decommissioning Contractor		Decommissioning / Closure Phase
SM 34	Soil replacement.	• Before placing or re-spreading topsoil AAP should consider whether the locations for the spreading of the available topsoil are chemically compatible with the available topsoil and whether there is sufficient stockpiled topsoil to complete the planned task.	Decommissioning Contractor		Decommissioning / Closure Phase
SM 35		• Soil replacement should take place with the preparation of a seed bed to facilitate re-	Decommissioning Contractor		Decommissioning / Closure Phase

MANAGEMENT MEASURE REF NO.	SOIL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		vegetation and to limit potential erosion potential during rehabilitation.			
SM 36		• Soils should be replaced to a similar depth as was encountered prior to the construction operation, but at least to a depth that will sustain grazing (400mm) land capability. Replace overburden from stockpiles, followed by the subsoils. Spread the soils evenly over the rehabilitated area to achieve pre-construction topography and compacted.	Decommissioning Contractor		Decommissioning / Closure Phase
SM 37		• Where topsoil supply is limited the following should be considered: ○ Topsoil and the vegetation should be laid in strips alternating with areas on which there has been no placement of topsoil as this will increase the coverage; and ○ An underlying layer of subsoil will commonly produce better results than a thin layer of topsoil alone. This will serve to "stretch" the supply of topsoil. Also, in the application of topsoil, even if there is very little available, the smallest quantities will commonly introduce essential micro-organisms and	Decommissioning Contractor		Decommissioning / Closure Phase

MANAGEMENT MEASURE REF NO.	SOIL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		seeds into the growth region.			
SM 38		• The areas to be rehabilitated should be levelled so as to emulate the pre-construction contours, and soils should ideally not be placed on slopes with a gradient greater than 6 % to limit the potential for erosion.	Decommissioning Contractor		Decommissioning / Closure Phase
SM 39	Soil re-vegetation.	• Add fertilizer using a standard fertilizer spreader in small quantities at regular intervals. Ripping of the topsoil should be done. Re-vegetation must be allowed to take place naturally.	Decommissioning Contractor		Decommissioning / Closure Phase
SM 40		• Vehicles access onto the rehabilitated land should be restricted until re-vegetation is established.	Decommissioning Contractor		Decommissioning / Closure Phase
SM 41		• Erosion control measures should be implemented prior to the establishment of vegetation, such as contour ridges or planting of Vetiver grass.	Decommissioning Contractor		Decommissioning / Closure Phase
Post Closure Phase					
SM 42	Soil re-vegetation.	• Erosion control measures implemented in the decommissioning / closure phase should be maintained until vegetation is established.	Environmental Co-ordinator	Annual compliance audit as per the requirements of the MPRDA.	Post Closure Phase
SM 43		• Re-vegetation should be monitored for at least one year post-closure.	Environmental Co-ordinator		Post Closure Phase
SM 44		• Vehicles access onto the rehabilitated land should be restricted until vegetation is	Environmental Co-ordinator		Post Closure Phase

MANAGEMENT MEASURE REF NO.	SOIL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		established.			
SM 45	Soil monitoring.	• Additional soil sampling should be carried out annually until the levels of nutrients, specifically phosphorus and potassium, are at the required level (approximately 20 and 120 mg/kg respectively). If growth problems develop, ad hoc, sampling should be carried out to determine the problem. Sampling should always be carried out at the same time of the year and at least six weeks after the last application of fertilizer.	Specialist Consultant		Post Closure Phase

9.2 Biodiversity Management Programme

9.2.1 Objectives

The objective for the proposed CRP project includes causing as minimal an impact as possible to biodiversity in the area.

9.2.2 Goals

The goal to accomplish the above objective is to:

- Ensure that fauna and flora in the area is impacted on as little as possible.

9.2.3 Management Measures

The following table contains biodiversity management (BM) measures to meet the above goal. The table indicates the person responsible to ensure that these commitments are adhered to and implemented as well as the timeframe for the implementation of these commitments (prior to a phase or during a phase).

Table 16: Biodiversity management measures

MANAGEMENT MEASURE REF NO.	BIODIVERSITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
Construction Phase					
BM 1	Environmental awareness.	• An induction programme should be compiled for all contractors, subcontractors and workers to ensure compliance to all aspects of the EMP as well as educating personnel in the safe and proper conduct within areas of natural habitat.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre-Construction
BM 2	Further specialist investigations.	• An updated ecological assessment should be conducted in the summer months.	Specialist Consultant		Pre-Construction

BM 3	Control of alien invasive vegetation species.	• Draw up and implement an alien invasive species control and eradication programme, which should state that:
		  • All alien seedlings and saplings must be removed as they become evident for the duration of construction and operational phase. Manual / mechanical removal is preferred to chemical control.
		  • Monitoring should be conducted by a suitably qualified botanist.
			Specialist Consultant		Construction Phase

BM 4	Loss of habitat.	• No open fires should be permitted on site to prevent loss of habitat and risks to fauna. A fire action plan must be in place. All contractors will be informed on the fire fighting strategy.	Commissioning Contractor		Construction Phase
BM 5		• The harvesting of natural vegetation for fuel or any other purposes should be strictly prohibited.	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	BIODIVERSITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
BM 6		• Erosion control measures, detailed in Section 9.1, should be implemented to prevent loss of soil and subsequent loss of habitat for flora.	Commissioning Contractor		Construction Phase
BM 7	Contamination of the environment.	• Dust suppression methods, detailed in Section 9.4, should be implemented to control and minimise dust generation to minimise impacts of dust on fauna and flora.	Commissioning Contractor		Construction Phase
BM 8		• All non-hazardous waste should be handled and disposed of as stated in the waste management programme detailed in Section 9.9 below to prevent contamination of the environment and risks to fauna.	Commissioning Contractor		Construction Phase
BM 9		• All hazardous waste should be handled and disposed of as stated in the hazardous waste management programme detailed in Section 9.10 below to prevent contamination of the environment and risks to fauna.	Commissioning Contractor		Construction Phase
BM 10		• Ensure that the bulk batching of cement is undertaken in a bunded impermeable surface area connected to the dirty stormwater system. Cement mixing should be undertaken outside of the central batching area must be undertaken in a mixing plant/ bin or on an impermeable surface. Cement should be delivered in bags and will be stored on pallets in a dry covered area within a bunded area to prevent contamination of	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	BIODIVERSITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		the environment and risks to fauna.			
BM 11		• To prevent diesel and oil spills, all vehicles and equipment will be kept in good working condition and all leaks repaired immediately.	Commissioning Contractor		Construction Phase
BM 12		• All mine and Commissioning Contractor-owned generators will be placed on drip trays to catch all spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. will be done over a plastic tarpaulin or steel drip trays to prevent contamination of the environment and risks to fauna.	Commissioning Contractor		Construction Phase
BM 13		• A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks to prevent contamination of the environment and risks to fauna.	Commissioning Contractor		Construction Phase
BM 14	Loss of fauna.	• The poaching and hunting of wildlife should be strictly prohibited.	Commissioning Contractor		Construction Phase
BM 15		• Drivers should be vigilant and adhere to the speed limit to avoid collisions with fauna.	Commissioning Contractor		Construction Phase
Operational Phase					
BM 16	Environmental awareness.	• An induction programme should be implemented for all workers to ensure compliance to all aspects of the EMP as well as educating personnel in the safe and proper conduct within	Environmental Co-ordinator		Pre-Operation

MANAGEMENT MEASURE REF NO.	BIODIVERSITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		areas of natural habitat.			
BM 17	Control of alien invasive vegetation species.	• Maintain the alien invasive species control and eradication programme.	Environmental Co-ordinator		Operational Phase
BM 18	Loss of habitat.	• No open fires should be permitted on site to prevent loss of habitat and risks to fauna. A fire action plan must be in place. All employees will be informed on the fire fighting strategy.	Environmental Co-ordinator		Operational Phase
BM 19		• The harvesting of natural vegetation for fuel or any other purposes should be strictly prohibited.	Environmental Co-ordinator		Operational Phase
BM 20		• Erosion control measures, detailed in Section 9.1, should be implemented to prevent loss of soil and subsequent loss of habitat for flora.	Environmental Co-ordinator		Operational Phase
BM 21	Contamination of the environment.	• Dust suppression methods, detailed in Section 9.4, should be implemented to control and minimise dust generation to minimise impacts of dust on fauna and flora.	Environmental Co-ordinator		Operational Phase
BM 22		• All non-hazardous waste should be handled and disposed of as stated in the waste management programme detailed in Section 9.9 below to prevent contamination of the environment and risks to fauna.	Environmental Co-ordinator		Operational Phase
BM 23		• All hazardous waste should be handled and disposed of as stated in the hazardous waste	Environmental Co-ordinator		Operational Phase

MANAGEMENT MEASURE REF NO.	BIODIVERSITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		management programme detailed in Section 9.10 below to prevent contamination of the environment and risks to fauna.			
BM 24		• Any spillages or chromite blown from the stockpiles are to be cleaned up and remediated as soon as possible to prevent contamination of the environment and risks to fauna.	Environmental Co-ordinator		Operational Phase
BM 25		• In the event of a large spillage occurring, there should be a proper written procedure at the plant that will dictate the methods to be used in the clean-up, the sampling of contamination and the closeout procedure (including the taking of samples, if needed) to declare that the risk as being ameliorated. These records should be kept for at least the life of the plant.	Environmental Co-ordinator		Operational Phase
BM 26		• All generators will be placed on drip trays to catch all spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. will be done over a plastic tarpaulin or steel drip trays to prevent contamination of the environment and risks to fauna.	Environmental Co-ordinator		Operational Phase
BM 27		• A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks to prevent contamination of the environment and risks to fauna.	Environmental Co-ordinator		Operational Phase

MANAGEMENT MEASURE REF NO.	BIODIVERSITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
BM 28	Loss of fauna.	• The poaching and hunting of wildlife should be strictly prohibited.	Environmental Co-ordinator		Operational Phase
BM 29		• Drivers should be vigilant and adhere to the speed limit to avoid collisions with fauna.	Environmental Co-ordinator		Operational Phase
Decommissioning / Closure Phase					
BM 30	Environmental awareness.	• An induction programme should be compiled for all contractors, subcontractors and workers to ensure compliance to all aspects of the EMP as well as educating personnel in the safe and proper conduct within areas of natural habitat.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre Decommissioning / Closure
BM 31	Control of alien invasive vegetation species.	• Maintain an alien invasive species control and eradication programme.	Environmental Co-ordinator		Decommissioning / Closure Phase
BM 32	Loss of habitat.	• No open fires should be permitted on site to prevent loss of habitat and risks to fauna. A fire action plan must be in place. All contractors will be informed on the fire fighting strategy.	Decommissioning Contractor		Decommissioning / Closure Phase
BM 33		• The harvesting of natural vegetation for fuel or any other purposes should be strictly prohibited.	Decommissioning Contractor		Decommissioning / Closure Phase
BM 34		• Erosion control measures, detailed in Section 9.1, should be implemented to prevent loss of soil and subsequent loss of habitat for flora.	Decommissioning Contractor		Decommissioning / Closure Phase
BM 35	Contamination of the environment.	• Dust suppression methods, detailed in Section 9.4, should be implemented to control and minimise dust generation to minimise impacts of	Decommissioning Contractor		Decommissioning / Closure Phase

MANAGEMENT MEASURE REF NO.	BIODIVERSITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		dust on fauna and flora.			
BM 36		• All non-hazardous waste should be handled and disposed of as stated in the waste management programme detailed in Section 9.9 below to prevent contamination of the environment and risks to fauna.	Decommissioning Contractor		Decommissioning / Closure Phase
BM 37		• All hazardous waste should be handled and disposed of as stated in the hazardous waste management programme detailed in Section 9.10 below to prevent contamination of the environment and risks to fauna.	Decommissioning Contractor		Decommissioning / Closure Phase
BM 38		• To prevent diesel and oil spills, all vehicles and equipment will be kept in good working condition and all leaks repaired immediately.	Decommissioning Contractor		Decommissioning / Closure Phase
BM 39		• All mine and contractor-owned generators will be placed on drip trays to catch all spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. will be done over a plastic tarpaulin or steel drip trays to prevent contamination of the environment and risks to fauna.	Decommissioning Contractor		Decommissioning / Closure Phase
BM 40		• A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks to prevent contamination of the environment and risks to fauna.	Decommissioning Contractor		Decommissioning / Closure Phase

MANAGEMENT MEASURE REF NO.	BIODIVERSITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
BM 41	Loss of fauna.	• The poaching and hunting of wildlife should be strictly prohibited.	Decommissioning Contractor		Decommissioning / Closure Phase
BM 42		• Drivers should be vigilant and adhere to the speed limit to avoid collisions with fauna.	Decommissioning Contractor		Decommissioning / Closure Phase
BM 43	Rehabilitation.	• A rehabilitation plan to be implemented to rehabilitate the CRP, associated infrastructure, road and railway extension area to grazing potential. Vegetation rehabilitation should be conducted by a suitably qualified botanist to ensure maximum representation of biodiversity within the rehabilitated area.	Specialist Consultant / Environmental Co-ordinator		Decommissioning / Closure Phase
Post Closure Phase					
BM 44	Rehabilitation.	• The re-vegetation process to be monitored for at least one year post-closure.	Environmental Co-ordinator	Annual compliance audit as per the requirements of the MPRDA.	Post Closure Phase
BM 45	Control of alien invasive vegetation species.	• Maintain the alien invasive species control and eradication programme during post-closure re-vegetation monitoring.	Environmental Co-ordinator		Post Closure Phase

9.3 Surface Water and Groundwater Management Programme

9.3.1 Objectives

The objective for the proposed CRP project includes causing as minimal an impact as possible to surface water and groundwater resources.

9.3.2 Goals

The goals to accomplish the above objective are to:

- Ensure limited impacts on the the hydrology of surface and groundwater resources by the proposed development; and
- Ensure contaminated run-off does not come into contact with surface water or groundwater resources.

9.3.3 Management Measures

The following table contains groundwater and surface water management (GSWM) measures to meet the above goal. The table indicates the person responsible to ensure that these commitments are adhered to and implemented as well as the timeframe for the implementation of these commitments (prior to a phase or during a phase).

Table 17: Surface water and groundwater management measures

MANAGEMENT MEASURE REF NO.	WATER ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
Construction Phase					
GSWM 1	Clean and dirty water management.	• Dirty and clean water should be separated by implementing clean and dirty water systems/structures prior to construction to prevent pollution of clean water run-off. • Design all structures to ensure clean dirty water separation as stipulated in Regulation 704 of the National Water Act. Maintain and monitor the implementation of clean dirty water separation. • Implement the intended clean and dirty water management system correctly, including the construction of berms on the up-gradient side of the CRP and railway siding to divert clean surface run-off around the northern side of the CRP and Mine Hostel into the drainage channel leading away from the Mine Hostel to the Bierspruit, as well as the construction of a trench network intended to direct surface run-off from contaminated areas towards a sump where it will be used as process water.	Project Manager	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre-Construction
GSWM 2	Contamination of surface and groundwater resources by incorrect waste handling and disposal.	• All non-hazardous waste should be handled and disposed of as stated in the waste management programme detailed in Section 9.9 below.	Commissioning Contractor		Construction Phase
GSWM 3		• All hazardous waste should be handled and disposed of as stated in the hazardous waste	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	WATER ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		management programme detailed in Section 9.10 below.			
GSWM 4	Contamination of surface and groundwater resources by silt.	• Maintain the required erosion protection measures, stated in the Soil Management Programme detailed in Section 9.1, to ensure that siltation of the surface water resources does not occur.	Commissioning Contractor		Construction Phase
GSWM 5		• Temporary berms/trenches should be constructed to temporary silt traps before water is released into the hostel drainage channel as storm water.	Project Manager		Construction Phase
GSWM 6	Contamination of surface and groundwater resources by cement.	• Ensure that the bulk batching of cement is undertaken in a bunded impermeable surface area connected to the dirty stormwater system.	Commissioning Contractor		Construction Phase
GSWM 7		• Cement mixing should be undertaken outside of the central batching area must be undertaken in a mixing plant/ bin or on an impermeable surface.	Commissioning Contractor		Construction Phase
GSWM 8		• Cement should be delivered in bags and will be stored on pallets in a dry covered area within a bunded area.	Commissioning Contractor		Construction Phase
GSWM 9	Contamination of surface and groundwater resources by	• To prevent diesel and oil spills, all vehicles and equipment will be kept in good working condition and all leaks repaired immediately.	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	WATER ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
GSWM 10	hydrocarbons.	• All mine and contractor-owned generators will be placed on drip trays to catch all spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. will be done over a plastic tarpaulin or steel drip trays.	Commissioning Contractor		Construction Phase
GSWM 11		• A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times.	Commissioning Contractor		Construction Phase
GSWM 12	Water quality monitoring	• The existing groundwater and surface water monitoring programmes detailed in Section 12.2 and Section 12.3 respectively should be maintained.	Specialist Consultant		Construction Phase
Operational Phase					
GSWM 13	WULA	• The mine must ensure that the necessary water licenses are in place. An integrated water management plan must be developed to manage all excess water. Ensure that the water uses for the CRP project are incorporated into the IWULA and that required monitoring reports are submitted to the DWA.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre-Operation
GSWM 14	Clean and dirty water management.	• Dirty water and process water will be recycled as far as practically possible.	Project Manager		Operational Phase

MANAGEMENT MEASURE REF NO.	WATER ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
GSWM 15		• Correctly implement the intended clean and dirty water management system to prevent the mixing of clean and dirty water and to contain run-off from the CRP and the stockpiles, including rainfall and other water falling or being spilled within the CRP and stockpile areas being collected in concrete or HDPE-lined trenches and diverted to the sump where it will be used as process water.	Project Manager		Operational Phase
GSWM 16		• All the trenches should be cleaned and maintained in an operational condition on a pre-determined scheduled routine for the life of the CRP and when required.	Project Manager		Operational Phase
GSWM 17		• If a storm with a return period of up to 50 years occurs, all surface run-off from areas within the plant and stockpile areas should be intercepted and stored. Adequate storage capacity should always available to store the volume of water that would run-off from the areas (8 683 m^3).	Project Manager		Operational Phase
GSWM 18	Contamination of surface and groundwater resources by incorrect waste handling and disposal.	• All non-hazardous waste should be handled and disposed of as stated in the waste management programme detailed in Section 9.9 below.	Environmental Co-ordinator		Operational Phase
GSWM 19		• All hazardous waste should be handled and disposed of as stated in the hazardous waste management programme detailed in Section	Environmental Co-ordinator		Operational Phase

MANAGEMENT MEASURE REF NO.	WATER ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		9.10 below.			
GSWM 20	Contamination of surface and groundwater resources by silt.	• Maintain the required erosion protection measures, stated in the Soil Management Programme detailed in Section 9.1, to ensure that siltation of the surface water resources does not occur.	Environmental Co-ordinator		Operational Phase
GSWM 21	Contamination of surface and groundwater resources by hydrocarbons.	• To prevent diesel and oil spills, all vehicles and equipment will be kept in good working condition and all leaks repaired immediately.	Environmental Co-ordinator		Operational Phase
GSWM 22		• All generators will be placed on drip trays to catch all spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. will be done over a plastic tarpaulin or steel drip trays.	Environmental Co-ordinator		Operational Phase
GSWM 23		• A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times.	Environmental Co-ordinator		Operational Phase
GSWM 24	Contamination of surface and groundwater resources by tailings spills.	• Any spillages are to be cleaned up and remediated as soon as possible;	Environmental Co-ordinator		Operational Phase
GSWM 25		• In the event of a large spillage occurring, there should be a proper written procedure at the plant that will dictate the methods to be used in the clean-up, the sampling of contamination and	Environmental Co-ordinator		Operational Phase

MANAGEMENT MEASURE REF NO.	WATER ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		the closeout procedure (including the taking of samples, if needed) to declare that the risk as being ameliorated. These records should be kept for at least the life of the plant.			
GSWM 26	Water quality monitoring	• The existing groundwater and surface water monitoring programmes detailed in Section 12.2 and Section 12.3 respectively should be maintained.	Specialist Consultant		Operational Phase
Decommissioning / Closure Phase					
GSWM 27	Clean and dirty water management.	• The storm water diversion structures and the contaminated water interception structures should be left in place till the end of decommissioning activities, ensuring that any contamination release during the decommissioning phase is intercepted.	Project Manager	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Decommissioning / Closure Phase
GSWM 28	Contamination of surface and groundwater resources by incorrect waste handling and disposal.	• All non-hazardous waste should be handled and disposed of as stated in the waste management programme detailed in Section 9.9 below.	Decommissioning Contractor		Decommissioning / Closure Phase
GSWM 29		• All hazardous waste should be handled and disposed of as stated in the hazardous waste management programme detailed in Section 9.10 below.	Decommissioning Contractor		Decommissioning / Closure Phase
GSWM 30	Contamination of surface and groundwater resources by	• To prevent diesel and oil spills, all vehicles and equipment will be kept in good working condition and all leaks repaired immediately.	Decommissioning Contractor		Decommissioning / Closure Phase

MANAGEMENT MEASURE REF NO.	WATER ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
GSWM 31	hydrocarbons.	• A 210 litre drum for the collection of spilled oils and fuels, together with a plastic tarpaulin to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times.	Decommissioning Contractor		Decommissioning / Closure Phase
GSWM 32	Contamination of surface and groundwater resources by silt.	• Maintain the required erosion protection measures, stated in the Soil Management Programme detailed in Section 9.1, to ensure that siltation of the surface water resources does not occur.	Decommissioning Contractor		Decommissioning / Closure Phase
GSWM 33		• Temporary berms/trenches should be constructed to temporary silt traps before water is released into the hostel drainage channel as storm water.	Project Manager		Decommissioning / Closure Phase
GSWM 34	Water quality monitoring	• The existing groundwater and surface water monitoring programmes detailed in Section 12.2 and Section 12.3 respectively should be maintained.	Specialist Consultant		Decommissioning / Closure Phase

9.4 Air Quality Management Programme

9.4.1 Objectives

The objective for the proposed CRP project includes causing as minimal an impact to air quality as possible.

9.4.2 Goals

The goals to accomplish the above objective are to:

- Reduce the amount of dust and particulate matter generated by the CRP project activities;
- Ensure the generated dust and particulate matter concentrations fall within the applicable national standards; and
- Mitigate the impact on the surrounding sensitive receptors.

9.4.3 Management Measures

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 well as the timeframe for the implementation of these commitments (prior to a phase or during a phase).

Table 18: Air quality management measures

MANAGEMENT MEASURE REF NO.	AIR QUALITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
Construction Phase					
AQM 1	Dust and Particulate Matter Generation	• Draw up a dust management plan, including all the management measures in this programme, in consultation with the Project Manager. Include dust suppression as part of the contractors' responsibility. Monitor and ensure that dust suppression is well managed.	Project Manager / Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre -Construction
AQM 2		• All access roads should be adequately maintained so as to minimise dust. Methods such as wet suppression, paving or chemical stabilisation should be implemented.	Commissioning Contractor	Compliance audits to be undertaken by the Project Manager to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Construction Phase
AQM 3		• AAP should stabilise all surface areas which are exposed for longer than two weeks. During the construction phase, it is recommended that wet suppression be utilized to stabilize the exposed areas.	Commissioning Contractor		Construction Phase
AQM 4		• All stockpiles should be maintained for as short a time as possible and a water spray system should be operated at any gravel stockpile, or stockpiles should be enclosed within berms to shield the material from wind. Topsoil stockpiles should be re-vegetated to prevent erosion.	Commissioning Contractor / Project Manager	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation.	Construction Phase

MANAGEMENT MEASURE REF NO.	AIR QUALITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		Stockpiles should be disturbed as little as possible.		Annual compliance audit as per the requirements of the MPRDA.	
AQM 5		• During the transfer of material to piles, drop heights should be minimised to control dispersion of materials being transferred.	Commissioning Contractor	Compliance audits to be undertaken by the Project Manager to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Construction Phase
AQM 6		• Dust and mud should be controlled at vehicle entry and exit points to prevent the dispersion of dust and mud beyond the site boundary.	Commissioning Contractor		Construction Phase
AQM 7		• The speed of trucks should be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads to avoid excessive dust being generated or deterioration of the road surface.	Central Logistic Manager		Construction Phase
AQM 8		• Additional installation of dust fallout units at the sensitive receptors (Mine Hostel and Rethabile Mine Village). Refer to the air quality monitoring programme in Section 12.1 of the EMP for the recommended monitoring sites.			Construction Phase
AQM 9		• Implement the air quality monitoring programme detailed in Section 12.1 of the EMP.			Construction Phase
AQM 10	Impact on Sensitive Receptors.	• Investigation into implementing a permanent windscreen (trees) between the Hostel buildings and CRP as it will reduce the wind speed blowing over the CRP process and also capture some dust	Project Manager / Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor	Construction Phase

MANAGEMENT MEASURE REF NO.	AIR QUALITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		that would blow over to the hostel buildings.		implementation. Annual compliance audit as per the requirements of the MPRDA.	
Operational Phase					
AQM 11	Dust and Particulate Matter Generation	• Draw up and implement a dust management plan for the operational phase, including the management measures in this management programme. The dust management plan should be reviewed annually and updated where relevant. Monitor and ensure that dust suppression is well managed.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Operational Phase
AQM 12		• AAP should implement a good housekeeping system which will include clearing the chrome product which has been blown off the stockpile.	Project Manager		Operational Phase
AQM 13		• During the transfer of material to stockpiles, drop heights should be minimised to control dispersion of materials being transferred. Stockpiles should be maintained for as short a time as possible and a water spray system implemented to contain windblown particles. Wind breaks could also be used at stockpiles to reduce the erosive forces of the wind.	Project Manager		Operational Phase
AQM 14		• While being transported, by either road or rail the concentrates should be covered to prevent	Central Logistic		Operational Phase

MANAGEMENT MEASURE REF NO.	AIR QUALITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		the spread of dust and particulate matter.	Manager		
AQM 15		• Dust and mud should be controlled at vehicle entry and exit points to prevent the dispersion of dust and mud beyond the site boundary.	Project Manager		Operational Phase
AQM 16		• All access roads should be adequately maintained so as to minimise dust, erosion or undue surface damage. Methods such as wet suppression, paving or chemical stabilisation should be implemented.	Central Logistic Manager		Operational Phase
AQM 17		• The speed of trucks should be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads to avoid excessive dust being generated or deterioration of the road surface.	Central Logistic Manager		Operational Phase
AQM 18	Compliance with National Standards.	• Undertake air quality monitoring detailed in Section 12.1 of the EMP.	Specialist Consultant		Operational Phase
AQM 19	Impact on Sensitive Receptors.	• Any complaints relating to dust should be recorded. Should dust from the stockpile and roads become a nuisance, management measures should be investigated to address these.	CED Manager / Environmental Co-ordinator		Operational Phase
Decommissioning / Closure Phase					
AQM 20	Dust and Particulate Matter Generation	• Draw up a dust management plan, including all the management measures in this programme, in consultation with the Project Manager. Include	Project Manager / Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-	Pre - Decommissioning / Closure

MANAGEMENT MEASURE REF NO.	AIR QUALITY ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		dust suppression as part of the contractors' responsibility. Monitor and ensure that dust suppression is well managed.		ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	
AQM 21		• AAP should implement dust suppression measures, such as wet suppression, to control dust created during demolition, grading and the transport of rubble and topsoil.	Decommissioning Contractor		Decommissioning / Closure Phase

9.5 Noise Management Programme

9.5.1 Objectives

The objective relating to noise for the proposed CRP project includes minimising the impact of noise on the surrounding sensitive receptors (Mine Hostel and Rethabile Mine Village).

9.5.2 Goals

The goals to accomplish the above objectives are to:

- Minimise the amount of noise generated by the CRP project activities; and
- Comply with SANS guideline limits for residential areas of 55 dBA during the day and 45 dBA at night.

9.5.3 Management Measures

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 as well as the timeframe for the implementation of these commitments (prior to a phase or during a phase).

Table 19: Noise management measures

MANAGEMENT MEASURE REF NO.	AMBIENT NOISE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
Construction Phase					
NM 1	Noise Generation	• Construction operations should be limited to daylight (working) hours.	Commissioning Contractor	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre -Construction
NM 2		• Screens (i.e. screening methods, enclosed equipment etc) should be implemented to reduce the noise generated in areas of concern.	Commissioning Contractor	Compliance audits to be undertaken by the Project Manager to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Construction Phase
NM 3		• All vehicles and heavy equipment should be fitted with exhaust silencers.	Commissioning Contractor		Construction Phase
NM 8	Compliance with National Standards.	• Extend the existing occupational noise monitoring to incorporate the CRP and the sensitive receptors (Mine Hostel and Rethabile Mine Village) to ensure that noise levels are	Specialist Consultant	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor	Construction Phase

MANAGEMENT MEASURE REF NO.	AMBIENT NOISE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		within the acceptable SANS guideline limits for residential areas. Where levels are of concern the necessary management measures should be implemented.		implementation. Annual compliance audit as per the requirements of the MPRDA.	
NM 9	Impact on Sensitive Receptors.	• Any complaints received should be responded to and if necessary management measures put in place.	Project Manager / Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Construction Phase
Operational Phase					
NM 10	Noise Generation	• The operation of the railway line and siding should be limited to daylight hours (07h00 to 17h00).	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Operational Phase
NM 11		• Screens (i.e. screening methods, enclosed equipment etc) should be implemented to reduce the noise generated in areas of concern.	Project Manager		Operational Phase
NM 12		• Unnecessary noise generated from machinery should be avoided through ensuring that all machinery is regularly serviced and well maintained, with records of maintenance being kept on-site.	Project Manager		Operational Phase

MANAGEMENT MEASURE REF NO.	AMBIENT NOISE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
NM 13	Compliance with National Standards.	• Maintain the extended occupational noise monitoring programme, which incorporates the CRP and sensitive receptors (Mine Hostel and Rethabile Mine Village) to ensure that noise levels are within the acceptable levels. Where levels are of concern the necessary management measures should be implemented.	Specialist Consultant		Operational Phase
NM 14	Impact on Sensitive Receptors.	• Any complaints received should be responded to and if necessary management measures put in place.	CED Manager / Environmental Co-ordinator		Operational Phase
Decommissioning / Closure Phase					
NM 15	Noise Generation	• Decommissioning activities such as disassembly/ destruction of structures and buildings should take place during daylight hours.	Commissioning Contractor	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre - Decommissioning / Closure
NM 16		• Screens (i.e. screening methods, enclosed equipment etc) should be implemented to reduce the noise generated in areas of concern.	Commissioning Contractor		Decommissioning / Closure Phase
NM 17		• All vehicles and heavy equipment should be fitted with exhaust silencers.	Commissioning Contractor		Decommissioning / Closure Phase

9.6 Archaeological, Heritage and Cultural Resources Management Measures

9.6.1 Objectives

The objective regarding cultural and heritage aspects is to ensure that the integrity of any heritage and cultural resources remain intact as far as practically possible. However, there are no known heritage and cultural resources in close proximity to the Amandelbult CRP project but there may be unknown unearthed resources.

9.6.2 Goals

The goals to accomplish the above objectives are to:

- Ensure compliance with the aspects of the National Heritage Resources Act, Act 25 of 1999.

9.6.3 Management Measures

- If any archaeological, heritage or cultural resources are unearthed during construction, construction activities should be halted and the Environmental Co-ordinator notified; and
- SAHRA should be notified and a heritage specialist should be appointed to assess the resources and propose mitigation and management measures.

9.7 Traffic Management Programme

9.7.1 Objectives

The objective relating to traffic for the proposed CRP project includes minimising the traffic impact on the internal mine roads, national road network and road users.

9.7.2 Goals

The goals to accomplish the above objectives are to:

- Encourage road safety;
- Continually liaise with Roads Officials regarding the upgrade of the affected national roads; and
- Mitigate road surface degradation.

9.7.3 Management Measures

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 as well as the timeframe for the implementation of these commitments (prior to a phase or during a phase).

Table 20: Traffic management measures

MANAGEMENT MEASURE REF NO.	TRAFFIC ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
Construction Phase					
TM 1	Road Safety	• Appropriate safety signage will be erected for road users.	Mine Safety Officer	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre-Construction
TM 2		• Fit heavy vehicles with reverse sirens.	Central Logistic Manager		Pre-Construction
TM 3		• Contractors will undergo stringent induction regarding road safety procedures prior to being appointed.	Environmental Co-ordinator		Pre-Construction
TM 4		• The speed of construction vehicles will be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads. The speed limit on national roads will also be adhered to.	Commissioning Contractor	Compliance audits to be undertaken by the Project Manager to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Construction Phase
TM 5		• All drivers must drive with the headlights on at all times.	Commissioning Contractor		Construction Phase
TM 6		• AAP will not permit the drivers to deviate from the designated routes on-site or from the proposed national route. Draw up a plan clearly defining the access routes and allowable lay-down and construction areas to be utilised. Brief contractors on the routes to be used and enforce implementation thereof.	Project Manager		Construction initiation and monthly during Construction Phase
TM 7	Road Surface	• The mine will ensure effective operation of	Human Resource	Compliance audits to be	Construction Phase

MANAGEMENT MEASURE REF NO.	TRAFFIC ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
	Degradation	existing transportation systems to reduce the potential impact on the internal mine roads.	Manager / Project Manager	undertaken by the HR Manager / Engineering Manager Manger to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	
Operational Phase					
TM 8	Road Safety	• Appropriate safety signage will be maintained for road users.	Mine Safety Officer	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Operational Phase
TM 9		• Fit heavy vehicles with reverse sirens.	Central Logistic Manager		
TM 10		• Employees will undergo stringent induction regarding road safety procedures prior to being appointed.	Environmental Co-ordinator		
TM 11		• The speed of haul vehicles will be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads. The speed limit on national roads will also be adhered to.	Central Logistic Manager	Compliance audits to be undertaken by the Project Manager to monitor implementation. Annual compliance audit as per the requirements	Operational Phase
TM 12		• All drivers must drive with the headlights on at all times.	Central Logistic Manager		Operational Phase

MANAGEMENT MEASURE REF NO.	TRAFFIC ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
TM 13		• AAP will not permit the drivers to deviate from the designated routes on-site or from the proposed national route. Draw up a plan clearly defining the access routes. Brief employees on the routes to be used and enforce implementation thereof.	Central Logistic Manager	of the MPRDA.	Pre-Operation
TM 14	Road Surface Degradation	• Maintain roads on site regularly and rehabilitate timeously.	Central Logistic Manager		Operational Phase
TM 15		• Alert roads authority to maintain road surfaces and to budget for rehabilitation.	Central Logistic Manager		Operational Phase
Decommissioning / Closure Phase					
TM 16	Road Safety	• Contractors will undergo stringent induction regarding road safety procedures prior to being appointed.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre - Decommissioning / Closure
TM 17		• The speed of vehicles used for decommissioning will be restricted to a maximum speed of 40 km/h on the access road and 20 km/h on internal roads. The speed limit on national roads will also be adhered to.	Decommissioning Contractor	Compliance audits to be undertaken by the Project Manager to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Decommissioning / Closure Phase
TM 18		• All drivers must drive with the headlights on at	Decommissioning Contractor		Decommissioning / Closure Phase

MANAGEMENT MEASURE REF NO.	TRAFFIC ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		all times.			
TM 19		• AAP will not permit the drivers to deviate from the designated routes on-site or from the proposed national route. Draw up a plan clearly defining the access routes. Brief contractors on the routes to be used and enforce implementation thereof.	Project Manager		Decommissioning / Closure Phase
TM 20		• Fit heavy vehicles with reverse sirens.	Central Logistic Manager		Decommissioning / Closure Phase

9.8 Social Management Programme

The Social Management Plan for the CRP project has been compiled as per the requirements of the Anglo Social Way as well as the Government & Social Affairs FEL requirements**.**

9.8.1 Objectives

The socio-economic objectives for the proposed CRP project are as per the objectives as detailed in the approved SLP:

- To provide employment opportunities;
- To promote gender equity;
- To establish and implement a workplace skills plan and career path to expand the skills base of the workforce;
- To enhance the social and economic welfare of the community;
- To meet human capital development requirements through effective human resource development systems and processes to ensure fluent roll out of skills and developmental programmes;
- To support poverty alleviation; and
- To minimise the effect of HIV/AIDS pandemic on the mine and surrounding communities.

9.8.2 Goals

The goals to accomplish the above objectives are detailed in the paragraphs which follow:

Employment

To work towards- and meet the stipulated Historically Disadvantaged South Africans (HDSA's) targets regarding employment and management participation by means of talent management, career path, leadership development, mentorship programmes and other appropriate measures. Future focus should be on employing local labour as far as practically possible.

Gender Equity

According to the Mining Charter as well as the approved SLP 10% of the employment opportunities at the CRP should be earmarked for women.

Workplace Skills Plan (WSP)

A WSP should be developed for the CRP and included in the SLP. The purpose of the Skills Development Plan will be to assess and formally record the current levels of skills and education of all incumbent employees, and to use the results as a basis for future Skills Development Plans. These plans address the current skills and competency gaps at the CRP and also provide for the training needs of HDSA's, the fast-tracking of individuals within the talent pool, and the various career path and mentoring programmes. According to the Mining Charter, by 2014, 5% of the annual payroll associated with the CRP should be invested into skills development.

Human Resource Development

In order to meet the objectives associated with the development of employees, the following strategies as detailed in the SLP needs to be implemented:

- Determination of career paths for all employees. The career path will identify opportunities for employees to excel and explain what is required to move forward in the company, based on the company's strategy. Career paths will be used to create short-term and long-term career plans for individuals, or to prepare for transitional changes or career crises that might occur in the future. The paths will also be used during selection and recruitment, training and development, and talent management. The process will involve determining both the role potential and capacity requirements to enable delivery against key performance areas; and
- Establishing of a talent pool and mentoring programme in order to meet the CRP employee skills requirements.

Local Economic Development

The contributions that AAP makes towards infrastructure provision and poverty eradication within the mine community is a function of the mine's Local Economic Development (LED) programme. This in turn is as far as possible aligned with the Integrated Development Plans (IDPs) of the Thabazimbi and Moses Kotane Local Municipalities. The existing LED programme is comprised of over 30 projects, directed towards poverty alleviation, basic infrastructure, education, health and social development, informal settlements. The existing LED programme needs to be extended to include the proposed CRP project.

HIV/AIDS

AAP signed an HIV/AIDS agreement with representative trade unions in November 2002; this was reviewed and revised in 2006. The negotiated agreement encourages a partnership between AAP and its stakeholders to develop and maintain responsible and effective programmes that minimise the impact of HIV/AIDS in the workplace. AAP are also committed to providing information, education and training in the workplace to all job categories to ensure adequate understanding of the complexities of HIV/AIDS and to facilitate good working relationships with colleagues who are infected and/or affected. The HIV/AIDs programme needs to be extended to the employees associated with the proposed CRP project.

9.8.3 Management Measures

The following table contains socio-economic management (SM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented as well as the timeframe for the implementation of these commitments (prior to a phase or during a phase).

Table 21: Social management measures

MANAGEMENT MEASURE REF NO.	SOCIAL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
Construction Phase					
SM 1	Employment and procurement	• Employment opportunities should be prioritised for residents from local communities surrounding the Amandelbult Concentrator Section. • Implement a 'locals first' policy, specifically for semi and low-skilled job categories.	Commissioning Contractor	LED Manager to verify the employment on a monthly basis.	Construction Phase
SM 2		• The employment percentage (in terms of HDSA and women) should be in line with the commitments made in the SLP.	Commissioning Contractor		Construction Phase
SM 3		• The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project, the potential job opportunities for locals and the employment procedures that AAP intends following for the construction phase of the project.	Project Manager	LED Manger to monitor implementation.	Pre-Construction
SM 4		• Where feasible, training and skills development programmes for locals should be initiated prior to the construction phase.	Commissioning Contractor		Pre-Construction
SM 5	Employment and procurement	• Recruitment rules and requirements should be included in the contractors' contract.	Project Manager	Procurement department to ensure that requirements are included in tender documentation.	Construction Phase
SM 6		• The recruitment philosophy as part of the SLP will be provided to the contractors.			Construction Phase
SM 7		• Encourage contractors to utilise local	Project Manager	Procurement department	Construction Phase

MANAGEMENT MEASURE REF NO.	SOCIAL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		employment, services and consumables. • Where feasible, efforts should be made to employ local contactors that are compliant with Black Economic Empowerment (BEE) criteria.		to ensure that requirements are included in all tender documentation.	
SM 8	Impacts associated with the presence of construction workers on site	• Compile and enforce a Contractors Code of Conduct, which would as a minimum cover the following aspects: o Security; o Prohibition of alcohol and other controlled substances; o Prohibition of firearms and weapons; o Behaviour of workforce; o Deignated smoking areas; o Enforment of fire/ evacuation procedure; o Non-business access to surrounding communities and villages; o Adherence to driving procedure; and o Housekeeping and maintenance.	Project Manager	Compliance audits to be undertaken by the Environmental Co-ordinator.	Construction Phase
SM 9	Impact of construction related activities	• Implement the mitigation, management and monitoring measures detailed in the EMP.	Commissioning Contractor	Compliance audits to be undertaken by the Environmental Co-ordinator.	Construction Phase
Operational Phase					
SM 10	Employment and	• Employment opportunities should be prioritised	Human Resource	Annual compliance audit	Operational Phase

MANAGEMENT MEASURE REF NO.	SOCIAL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
	procurement	for residents from local communities surrounding the Amandelbult Concentrator Section. • Implement a 'locals first' policy, specifically for semi and low-skilled job categories.	Manager	as per the SLP requirements.	
SM 11		• The employment percentage (in terms of HDSA and women) should be in line with the commitments made in the SLP.			
SM 12		• Update the SLP to incorporate the Human Resources Development component of the CRP.			
SM 13		• Recruitment rules and requirements will be included in the CRP operation contractors' contract.	Procurement Department	Procurement department to ensure that requirements are included in all tender documentation.	Operational Phase
SM 14	Employment and procurement	• The recruitment philosophy as part of the SLP will be provided to the operation contractors.	Procurement Department	Procurement department to ensure that requirements are included in all tender documentation.	Pre-Operation
SM 15		• Ensure that the procurement targets as detailed in the Mining Charter of 2012 and SLP are implemented.	Procurement Department	Annual compliance audit as per the SLP requirements.	Pre-Operation
SM 16	Benefits associated with the implementation of the Social and Labour Plan and Local Economic	• Update the SLP in order to incorporate the local economic development and managing downscaling and retrenchment aspects associated with the CRP.	LED Manager	Annual compliance audit as per the SLP requirements.	Pre-Operation

MANAGEMENT MEASURE REF NO.	SOCIAL ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
	Development	• Submit the revised SLP to the Limpopo Department of Mineral Resources for approval.			
SM 17	Increase in ambient noise levels	• All vehicles will be equipped with mufflers where necessary.	Central Logistic Manager	Annual compliance audit as per the requirements of the MPRDA.	Operational Phase
SM 18		• Extend the existing occupational noise monitoring to incorporate the CRP to ensure that it is well within the acceptable levels, where levels are of concern the necessary management measures will be implemented.	Environmental Co-ordinator	Annual compliance audit as per the requirements of the MPRDA.	Operational Phase
SM 19		• Screens (i.e. screening methods, enclosed equipment etc) should be implemented to reduce the noise in areas of concern. These measures must take into account noise generated during night time conditions.	Environmental Co-ordinator	Annual compliance audit as per the requirements of the MPRDA.	Operational Phase
SM 20		• Implement the mitigation, management and monitoring measures detailed in the EMP relating to noise.	Environmental Co-ordinator	Annual compliance audit as per the requirements of the MPRDA.	Operational Phase
SM 21	Impact on ambient air quality	• Implement the mitigation, management and monitoring measures detailed in the EMP relating to air quality.	Environmental Co-ordinator	Annual compliance audit as per the requirements of the MPRDA.	Operational Phase
Decommissioning / Closure Phase					
SM 22	Decommissioning and downscaling	• Implement the procedures relating to downscaling and closure detailed in the SLP.	LED Manager	Annual compliance audit as per the SLP requirements.	Decommissioning / Closure Phase

9.9 Non-Mineral Waste Management Programme

The following information was obtained from the Anglo American Platinum, 2012 Operational Standard Procedure for Waste Management at the Amandelbult Concentrator Plant (attached as Appendix 4).

9.9.1 Objectives

The objective relating to waste management for the proposed CRP project is to reduce the impact of waste generated on the environment.

9.9.2 Goals

The goal to accomplish the above objectives is to:

- Establish, implement and maintain an effective waste management system, which will contribute to the control of waste and prevention of pollution through reduction, recovering, re-using, recycling and safe legal disposal as a last resort.

9.9.3 Management Measures

The following table contains waste management (WM) measures to meet the above goal. The table indicates the person responsible to ensure that these commitments are adhered to and implemented as well as the timeframe for the implementation of these commitments (prior to a phase or during a phase).

Table 22: General waste management measures

MANAGEMENT MEASURE REF NO.	GENERAL WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
Construction Phase					
WM 1	Induction.	• Contractors will undergo stringent induction regarding waste management procedures prior to being appointed.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre-Construction
WM 2		• Explain and enforce site rules for contractors to ensure good housekeeping practices.	Project Manager		Pre-Construction
WM 3	Waste removal.	• All general (non-hazardous) waste generated from the CRP project activities, products or services are to be placed in the designated skips and wheelie bins. Domestic waste is to be collected by licensed contractors. This waste is to be disposed at a licensed landfill site.	Commissioning Contractor		Construction Phase
WM 4	Industrial waste.	• All industrial waste generated from the CRP project activities, products, or services will be placed in the designated industrial waste containers. This waste consists of scrap steel metals that are no longer in use.	Commissioning Contractor		Construction Phase
WM 5		• Other waste such as timber / wood is to be collected by central services tractor to the salvage yard. Ensure that wood is placed inside the skip not on the ground.	Commissioning Contractor		Construction Phase
WM 6	Electronic waste.	• All electronic waste is taken to the salvage yard.	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	GENERAL WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
WM 7	Recycling.	• All the salvageable materials should be recycled or re-used or sold.	Commissioning Contractor		Construction Phase
WM 8		• All volumes of recycled and/or reused material are to be recorded in the AAplc SHE database.	SHE Manager		Construction Phase
WM 9		• All recyclable waste should be taken to the designated waste sorting area. Licensed contractors will be responsible for separating the waste. Non-hazardous waste will be separated to ensure that recyclable materials are recovered.	Commissioning Contractor		Construction Phase
WM 10	Record maintenance.	• A copy of the latest waste management programme should be kept on site.	Environmental Co-ordinator		Construction Phase
Operational Phase					
WM 11	Induction.	• Employees will undergo stringent induction regarding waste management procedures.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre-Operation
WM 12		• Explain and enforce site rules for employees to ensure good housekeeping practices.	Project manager		Pre-Operation
WM 13	Programme reviewing.	• Reviewing this waste mangement programme will be done on a four year cycle or as and when changes are required.	Environmental Co-ordinator		Operational Phase
WM 14	Recycling.	• All the salvageable materials should be recycled or re-used or sold.	Environmental Co-ordinator		
WM 15		• All volumes of recycled and/or reused material are to be recorded in the AAplc SHE database.	SHE Manager		

MANAGEMENT MEASURE REF NO.	GENERAL WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
WM 16		• All recyclable waste should be taken to the designated waste sorting area. Licensed contractors will be responsible for separating the waste. Non-hazardous waste will be separated to ensure that recyclable materials are recovered.	Environmental Co-ordinator		Operational Phase
WM 17		• Paper recycling bins are to be placed in offices for paper recycling. The paper recycling bins should be emptied on regular basis into paper recycling cages which are placed outside the office area. Licensed contractors to collect the paper from the paper recycling cages and transport the paper to the salvage yard for weighing and payment purposes.	Environmental Co-ordinator		Operational Phase
WM 18	Waste removal.	• All general (non-hazardous) waste generated from the CRP project activities, products or services are to be placed in the designated skips and wheelie bins. Domestic waste is collected by licensed contractors. This waste is to be disposed of at a licensed landfill site.	Environmental Co-ordinator		Operational Phase
WM 19	Industrial waste.	• All industrial waste generated from the CRP project activities, products, or services will be placed in the designated industrial waste containers. This waste consists of scrap steel metals that are no longer in use.	Environmental Co-ordinator		Operational Phase
WM 20		• Other waste such as timber / wood is to be collected by central services tractor to the	Environmental Co-ordinator		Operational Phase

MANAGEMENT MEASURE REF NO.	GENERAL WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		salvage yard. Ensure that wood is placed inside the skip not on the ground.			
WM 21	Electronic waste.	• All electronic waste is taken to the salvage yard.	Environmental Co-ordinator		Operational Phase
WM 22	Record maintenance.	• A copy of the latest waste management programme should be kept on site.	Environmental Co-ordinator / Project Manager		Operational Phase
Decommissioning / Closure Phase					
WM 23	Induction.	• Contractors will undergo stringent induction regarding waste management procedures prior to being appointed.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre - Decommissioning / Closure
WM 24		• Explain and enforce site rules for contractors to ensure good housekeeping practices.	Project Manager		Decommissioning / Closure Phase
WM 25	Waste removal.	• All general (non-hazardous) waste generated from the CRP project activities, products or services are to be placed in the designated skips and wheelie bins. Domestic waste is to be collected by licensed contractors. This waste is to be disposed of at a licensed landfill site.	Decommissioning Contractor		Decommissioning / Closure Phase
WM 26	Industrial waste.	• All industrial waste generated from the CRP project activities, products, or services will be placed in the designated industrial waste containers. This waste consists of scrap steel metals that are no longer in use.	Decommissioning Contractor		Decommissioning / Closure Phase
WM 27		• Other waste such as timber / wood is to be	Decommissioning		Decommissioning /

MANAGEMENT MEASURE REF NO.	GENERAL WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		collected by central services tractor to the salvage yard. Ensure that wood is placed inside the skip not on the ground.	Contractor		Closure Phase
WM 28	Electronic waste.	• All electronic waste is taken to the salvage yard.	Decommissioning Contractor		Decommissioning / Closure Phase
WM 29	Recycling.	• All the salvageable materials should be recycled or re-used or sold.	Decommissioning Contractor		Decommissioning / Closure Phase
WM 30		• All volumes of recycled and/or reused material are to be recorded in the AAplc SHE database.	SHE Manager		Decommissioning / Closure Phase
WM 31		• All recyclable waste should be taken to the designated waste sorting area. Licensed contractors will be responsible for separating the waste. Non-hazardous waste will be separated to ensure that recyclable materials are recovered.	Decommissioning Contractor		Decommissioning / Closure Phase
WM 32	Record maintenance.	• A copy of the latest waste management programme should be kept on site.	Environmental Co-ordinator		Decommissioning / Closure Phase

9.10 Hazardous Waste Management Programme

The following information was obtained from the Anglo American Platinum, 2012 Operational Standard Procedure for Waste Management at the Amandelbult Concentrator Plant (attached as Appendix 4).

9.10.1 Objectives

The objective relating to hazardous waste for the proposed CRP project is to ensure that persons and the environment are not exposed to hazardous materials to such an extent as to cause unacceptable risk.

9.10.2 Goals

The goal to accomplish the above objectives is to:

- Employ procedures to effectively handle and dispose of hazardous waste in such a manner as to avoid environmental contamination and employee safetyty risks.

9.10.3 Management Measures

The following table contains hazardous waste management (HWM) measures to meet the above goal. The table indicates the person responsible to ensure that these commitments are adhered to and implemented as well as the timeframe for the implementation of these commitments (prior to a phase or during a phase).

Table 23: Hazardous waste management measures

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
Construction Phase					
HWM 1	Induction.	• Contractors will undergo stringent induction regarding hazardous waste management procedures prior to being appointed.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator / Project manager to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre-Construction
HWM 2		• Explain and enforce site rules for contractors to ensure good housekeeping practices.	Project Manager		Pre-Construction / Construction Phase
HWM 3	MSDS.	• Draw up a comprehensive Material Safety Data Sheet (MSDS) obtained from the suppliers for all hydrocarbons and chemicals stored and/or utilised on site. All MSDS's must be displayed where hydrocarbons and/or chemicals are stored and utilised.	Materials Manager		Pre-Construction
HWM 4		• Brief all contractors on the location of the MSDS and how they should be utilised.	Project Manager / Environmental Co-ordinator		Pre-Construction
HWM 5	Emergency Preparedness and Response.	• Ensure the Emergency Preparedness and Response Programme is up to date which includes hazardous materials / waste.	Environmental Co-ordinator		Pre-Construction
HWM 6	Hazardous waste removal.	• All hazardous waste generated from generated from the CRP project activities, products, or services are placed in the designated hazardous waste containers. This waste is to be disposed at a licensed hazardous landfill site.	Commissioning Contractor		Construction Phase
HWM 7		• Permit of the hazardous waste landfill site and	Environmental Co-ordinator		Construction Phase

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		safe disposal certificate and registration certificates for waste contractor are to be kept on site for at least 2 years.			
HWM 8	Disposal of fluorescent tubes.	• All fluorescent tubes - it important to separate these away from other waste streams at the point of generation. At the time an Electrician replaces defective tube with a new one, the following shall be strictly adhered to: ○ On completion of the task, the Electrician shall ensure the defective lamp / tube is kept intact. ○ The defective fluorescent tubes shall be placed in a specific (for that purpose) boxes, each Electrical Foreman is responsible to ensure boxes are available. ○ Under no circumstance will the used / defective fluorescent tubes dumped into the normal waste system. ○ When the defective fluorescent tubes need to be disposed, the Electrical Foreman shall inform the Environmental Co-ordinator to arrange for disposal at a licensed hazardous landfill site.	Commissioning Contractor		Construction Phase
HWM 9	Disposal of medical	• Medical waste sanitary bins are to be managed	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
	waste.	by a licensed company. This waste is regarded medical and the bins are to be collected by the licensed contractors and disposed of appropriately.			
HWM 10		• The incineration permit of medical waste is to be kept on file at the SHE Environmental Department for at least 2 years.	SHE Manager		Construction Phase
HWM 11	Disposal of paint and thinners.	• Segregate paint and paint thinners from other waste/materials. Further segregate paints by paint type (e.g., latex, oil-based, epoxy-based, spray paint).	Commissioning Contractor		Construction Phase
HWM 12		• Paints should remain in their original containers. Consolidate used or unwanted paint thinner in a closed-head plastic container. All containers must be in good condition with no visible signs, corrosion or physical damage. Label the container and attach MSDS.	Commissioning Contractor		Construction Phase
HWM 13		• Collect all rags that have been soiled with paint thinner in an open-head plastic container or metal waste can, contact the Environmental Co-ordinator for assistance. Before placing solvent contaminated rags into the container, apply one label that states "solvent contaminated rags".	Commissioning Contractor		Construction Phase
HWM 14		• Contact the Environmental Co-ordinator to schedule disposal or if you require assistance in	Commissioning Contractor		Construction Phase

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		labelling your containers or need additional / replacement containers.			
HWM 15	Used oil disposal.	• All used oil should be stored at the oil store in a bunded area and collected for recycling by a licensed company.	Commissioning Contractor		Construction Phase
HWM 16		• A Safe Disposal Certificate for used oil should be obtained from the licensed company and filed and kept on site for at least 2 years	Environmental Co-ordinator		Construction Phase
HWM 17		• A spill kit should be kept on site near the used oil storage area.	Environmental Co-ordinator		Construction Phase
HWM 18	Record maintenance.	• A copy of the latest waste management programme should be kept on site.	Environmental Co-ordinator / Project Manager		Construction Phase
Operational Phase					
HWM 19	Induction.	• Employees should undergo stringent induction regarding hazardous waste management procedures.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre-Operation
HWM 20		• Explain and enforce site rules for employees to ensure good housekeeping practices.	Project Manager		Pre-Operation / Operational Phase
HWM 21	MSDS.	• MSDS's for all hydrocarbons and chemicals utilised on site must be displayed where hydrocarbons and/or chemicals are stored and utilised.	Project Manager / Environmental Co-ordinator		Pre-Operation
HWM 22		• Brief all employees on the location of the MSDS and how they should be utilised.	Project Manager		Pre-Operation

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
HWM 23	Emergency Preparedness and Response.	• Ensure the Emergency Preparedness and Response Programme is up to date which includes hazardous materials / waste.	Environmental Co-ordinator		Pre-Operation
HWM 24	Hazardous waste removal.	• All hazardous waste generated from generated from the CRP project activities, products, or services are placed in the designated hazardous waste containers. This waste is to be disposed at a licensed hazardous landfill site.	Environmental Co-ordinator		Operational Phase
HWM 25		• Permit of the hazardous waste landfill site and safe disposal certificate and registration certificates for waste contractor are to be kept on site for at least 2 years.	Environmental Co-ordinator		Operational Phase
HWM 26	Disposal of fluorescent tubes.	• All fluorescent tubes - it important to separate these away from other waste streams at the point of generation. At the time an Electrician replaces defective tube with a new one, the following shall be strictly adhered to: o On completion of the task, the Electrician shall ensure the defective lamp / tube is kept intact. o The defective fluorescent tubes shall be placed in a specific (for that purpose) boxes, each Electrical Foreman is responsible to ensure boxes are available. o Under no circumstance will the	Environmental Co-ordinator		Operational Phase

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		used / defective fluorescent tubes dumped into the normal waste system. • When the defective fluorescent tubes need to be disposed, the Electrical Foreman shall inform the Environmental Co-ordinator to arrange for disposal at a licensed hazardous landfill site.			
HWM 27	Disposal of medical waste.	• Medical waste sanitary bins are to be managed by a licensed company. This waste is regarded medical and the bins are to be collected by the licensed contractors and disposed of appropriately.	SHE Manager		Operational Phase
HWM 28		• The incineration permit of medical waste is to be kept on file at the SHE Environmental Department for at least 2 years.	SHE Manager		Operational Phase
HWM 29	Disposal of paint and thinners.	• Segregate paint and paint thinners from other waste/materials. Further segregate paints by paint type (e.g., latex, oil-based, epoxy-based, spray paint).	Environmental Co-ordinator		Operational Phase
HWM 30		• Paints should remain in their original containers. Consolidate used or unwanted paint thinner in a closed-head plastic container. All containers must be in good condition with no visible signs, corrosion or physical damage. Label the container and attach MSDS.	Environmental Co-ordinator		Operational Phase
HWM 31		• Collect all rags that have been soiled with paint	Environmental Co-ordinator		Operational Phase

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		thinner in an open-head plastic container or metal waste can, contact the Environmental Co-ordinator for assistance. Before placing solvent contaminated rags into the container, apply one label that states "solvent contaminated rags".			
HWM 32		• Contact the Environmental Co-ordinator to schedule disposal or if you require assistance in labelling your containers or need additional / replacement containers.	Environmental Co-ordinator		Operational Phase
HWM 33	Used oil disposal.	• All used oil should be stored at the oil store in a bunded area and collected for recycling by a licensed company.	Environmental Co-ordinator		Operational Phase
HWM 34		• A Safe Disposal Certificate for used oil should be obtained from the licensed company and filed and kept on site for at least 2 years	Environmental Co-ordinator		Operational Phase
HWM 35		• A spill kit should be kept on site near the used oil storage area.	Project Manager / Environmental Co-ordinator		Operational Phase
HWM 36	Printer cartridge disposal.	• Printer cartridges should be stored at the offices. Licensed contractors should collect the printer cartridges from the offices for recycling.	Environmental Co-ordinator		Operational Phase
HWM 37	Disposal of hazardous waste generated at the laboratory.	• Waste from the laboratory should be sealed in air tight containers and correctly labelled according to the contents of the waste. The Environmental Co-ordinator should then be informed to arrange for disposal at a licensed	Environmental Co-ordinator		Operational Phase

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		hazardous landfill site.			
HWM 38	Record maintenance.	• A copy of the latest waste management programme should be kept on site.	Project Manager / Environmental Co-ordinator		Operational Phase
Decommissioning / Closure Phase					
HWM 39	Induction.	• Contractors will undergo stringent induction regarding hazardous waste management procedures prior to being appointed.	Environmental Co-ordinator	Compliance audits to be undertaken by the Environmental Co-ordinator / Project Manager to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Pre - Decommissioning / Closure
HWM 40		• Explain and enforce site rules for contractors to ensure good housekeeping practices.	Project Manager		Pre - Decommissioning / Closure
HWM 41	MSDS.	• Draw up a comprehensive Material Safety Data Sheet (MSDS) obtained from the suppliers for all hydrocarbons and chemicals stored and/or utilised on site. All MSDS's must be displayed where hydrocarbons and/or chemicals are stored and utilised.	Materials Manager		Pre - Decommissioning / Closure
HWM 42		• Brief all contractors on the location of the MSDS and how they should be utilised.	Project Manager / Environmental Co-ordinator		Pre - Decommissioning / Closure
HWM 43	Emergency Preparedness and Response.	• Ensure the Emergency Preparedness and Response Programme is up to date which includes hazardous materials / waste.	Environmental Co-ordinator		Decommissioning / Closure Phase
HWM 44	Hazardous waste removal.	• All hazardous waste generated from generated from the CRP project activities, products, or services are placed in the designated hazardous waste containers. This waste is to be disposed at	Decommissioning Contractor		Decommissioning / Closure Phase

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		a licensed hazardous landfill site.			
HWM 45		• Permit of the hazardous waste landfill site and safe disposal certificate and registration certificates for waste contractor are to be kept on site for at least 2 years.	Environmental Co-ordinator		Decommissioning / Closure Phase
HWM 46	Disposal of fluorescent tubes.	• All fluorescent tubes - it important to separate these away from other waste streams at the point of generation. At the time an Electrician replaces defective tube with a new one, the following shall be strictly adhered to: o On completion of the task, the Electrician shall ensure the defective lamp / tube is kept intact. o The defective fluorescent tubes shall be placed in a specific (for that purpose) boxes, each Electrical Foreman is responsible to ensure boxes are available. o Under no circumstance will the used / defective fluorescent tubes dumped into the normal waste system. • When the defective fluorescent tubes need to be disposed, the Electrical Foreman shall inform the Environmental Co-ordinator to arrange for disposal at a licensed hazardous landfill site.	Decommissioning Contractor		Decommissioning / Closure Phase

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
HWM 47	Disposal of medical waste.	• Medical waste sanitary bins are to be managed by a licensed company. This waste is regarded medical and the bins are to be collected by the licensed contractors and disposed of appropriately.	Decommissioning Contractor		Decommissioning / Closure Phase
HWM 48		• The incineration permit of medical waste is to be kept on file at the SHE Environmental Department for at least 2 years.	SHE Manager		Decommissioning / Closure Phase
HWM 49	Disposal of paint and thinners.	• Segregate paint and paint thinners from other waste/materials. Further segregate paints by paint type (e.g., latex, oil-based, epoxy-based, spray paint).	Decommissioning Contractor		Decommissioning / Closure Phase
HWM 50		• Paints should remain in their original containers. Consolidate used or unwanted paint thinner in a closed-head plastic container. All containers must be in good condition with no visible signs, corrosion or physical damage. Label the container and attach MSDS.	Decommissioning Contractor		Decommissioning / Closure Phase
HWM 51		• Collect all rags that have been soiled with paint thinner in an open-head plastic container or metal waste can, contact the Environmental Co-ordinator for assistance. Before placing solvent contaminated rags into the container, apply one label that states "solvent contaminated rags".	Decommissioning Contractor		Decommissioning / Closure Phase
HWM 52		• Contact the Environmental Co-ordinator to schedule disposal or if you require assistance in	Decommissioning Contractor		Decommissioning / Closure Phase

MANAGEMENT MEASURE REF NO.	HAZARDOUS WASTE ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		labelling your containers or need additional / replacement containers.			
HWM 53	Used oil disposal.	• All used oil should be stored at the oil store in a bunded area and collected for recycling by a licensed company.	Decommissioning Contractor		Decommissioning / Closure Phase
HWM 54		• A Safe Disposal Certificate for used oil should be obtained from the licensed company and filed and kept on site for at least 2 years	Environmental Co-ordinator		Decommissioning / Closure Phase
HWM 55		• A spill kit should be kept on site near the used oil storage area.	Environmental Co-ordinator		Decommissioning / Closure Phase
HWM 56	Record maintenance.	• A copy of the latest waste management programme should be kept on site.	Environmental Co-ordinator		Decommissioning / Closure Phase

9.11 Closure / Rehabilitation Management Programme

9.11.1 Objectives

The objective for the proposed CRP project is to sustainably rehabilitate the footprint of the CRP, associated infrastructure, road and railway extension to facilitate grazing.

9.11.2 Goals

The goals to accomplish the above objective are to:

- Ensure areas are rehabilitated to be free draining to allow for the improvement of the natural watercourses and groundwater systems;
- Be inconspicuous to the surrounding landscape;
- Allow for self-succession of plants and the associated return of natural wildlife; and
- Ensure the area is safe for both humans and wildlife.

9.11.3 Management Measures

The following table contains rehabilitation management (RM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented as well as the timeframe for the implementation of these commitments (prior to a phase or during a phase).

Table 24: Closure and rehabilitation management measures

MANAGEMENT MEASURE REF NO.	REHABILITATION ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
Operational Phase					
RM 1	Closure plan	• A closure plan for the CRP should be compiled and incorporated into the overall mine closure plan. the closure plan should be reviewed annually. The following activities should be included in the closure plan: o The closure costs (demolition, removal, re-shaping and rehabilitation quotes per key quantity) for each facility must be calculated so that the total closure cost can be determined; o All facilities that become redundant during the life of the mine must be rehabilitated concurrently to lighten the rehabilitation process at the end of the mine's life; o Attention must be paid to the latest developments in the mine rehabilitation sciences; o Rehabilitation should be done as soon as possible, and be on-going to ensure that the rehabilitation work required is kept to a minimum at the end of the life of the mine; o Ensure that the area is free	Environmental Co-ordinator	Annual compliance audit as per the requirements of the MPRDA.	Operational Phase

MANAGEMENT MEASURE REF NO.	REHABILITATION ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		draining; ○ Ensure that self-succession / sustainability of flora has been implemented; ○ Ensure that all slopes are safe in the long term; and ○ Environmental monitoring and maintenance plan for three years after closure.			
RM 2	Financial provision	• Incorporate the financial provision for the CRP detailed in Section 16 into the overall financial provision for the mine.	Environmental Co-ordinator	Annual compliance audit as per the requirements of the MPRDA.	Operational Phase
Decommissioning / Closure Phase					
RM 3	Closure plan	• Implement the closure plan that was compiled during the operational phase.	Project Manager	Compliance audits to be undertaken by the Environmental Co-ordinator to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Decommissioning / Closure Phase
RM 4	Rehabilitation of infrastructure CRP, workshop, offices, laboratory, stockpile area, dispatch area, railway line and siding.	• All vehicles, plant and workshop equipment will be removed for salvage or resale.	Project Manager		Decommissioning / Closure Phase
RM 5		• All fixed assets that can be profitably removed will be removed for salvage or resale.	Project Manager		Decommissioning / Closure Phase
RM 6		• Any item that has no salvage value to the mine but could be of value to individuals will be treated as waste.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 7		• All structures will be demolished, terracing removed and foundations demolished to 0.5 m below the original ground level.	Decommissioning Contractor		Decommissioning / Closure Phase

MANAGEMENT MEASURE REF NO.	REHABILITATION ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
RM 8		• The excavations will be filled in with soil, the top 0.15 m being topsoil (from existing stockpiles on site).	Decommissioning Contractor		Decommissioning / Closure Phase
RM 9		• Inert ceramics such as bricks, concrete, gravel etc. will be used as backfill or disposed of in a permitted waste disposal site.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 10		• Inert waste, which is more than 0.5 m underground, such as pipes will be left in place.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 11		• Inert ceramic and buried waste with a salvage value to individuals such as scrap metal, building materials, etc. will be removed and disposed of at a proper facility.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 12		• All disturbed and exposed surfaces will be covered with at least 0.15 m of topsoil and re-vegetation must be allowed to take place naturally.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 13		• Dismantle and remove redundant fencing for salvage.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 14		• Demolish all concrete fence foundations to 0.5 m below the original ground level.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 15		• Cover the fence line with topsoil.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 16		• All services like the water supply line and the power line will be demolished.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 17		• The contractor laydown area will be demolished and rehabilitated.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 18	Rehabilitation of mine	• Paved roads will be ripped up, the wearing course	Decommissioning		Decommissioning /

MANAGEMENT MEASURE REF NO.	REHABILITATION ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
	roads.	treated as waste and the sub-base ripped or ploughed and covered with 0.15 m topsoil.	Contractor		Closure Phase
RM 19		• All excavations, including old foundations, cut lines, pitting sites, excavations, quarries and borrow areas, are to be filled with rubble and/or inert waste. The final profile of the fill must be convex so that drainage is radially outwards.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 20		• Soil must be scraped from the immediate vicinity and used to cover the rock and rubble, where after re-vegetation must be allowed to take place naturally.	Decommissioning Contractor		Decommissioning / Closure Phase
RM 21	Socio-economic commitments	• Implement the procedures relating to downscaling and closure detailed in the SLP.	LED Manager	Annual compliance audit as per the SLP requirements.	Decommissioning / Closure Phase
Post Closure Phase					
RM 22	Maintenance	• All natural physical, chemical and biological processes for which a closure condition has been specified must be monitored until they reach a steady state, or for three years after closure or as long as deemed necessary at the time. Such processes include erosion of the rehabilitated surfaces, surface water drainage, surface water quality, groundwater quality, vegetative re-growth, weed encroachment and colonization by wildlife.	Specialist Consultant	Compliance audits to be undertaken by the Project Manager to monitor implementation. Annual compliance audit as per the requirements of the MPRDA.	Post Closure Phase
RM 23	Closure certificate	• Submission of closure report and application for closure to the authorities to obtain closure	Project Manager	Annual compliance audit as per the requirements	Post Closure Phase

MANAGEMENT MEASURE REF NO.	REHABILITATION ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY	MONITORING	TIMEFRAME
		certificate		of the MPRDA.	

10 PUBLIC CONSULTATION PROCESS

10.1 Introduction

A public participation process was undertaken during the environmental process in 2008. However, to ascertain the current concerns or issues regarding the proposed Amandelbult CRP an additional public involvement process will be undertaken.

10.2 Previous Public Participation Process

10.2.1 Identification of Landowners and Stakeholders

As the proposed CRP project is located within the existing RPM surface tenure and mineral right area, the landowner identified is RPM and no land claim disputes apply. The interested and affected parties were identified through information provided by the mine, as well as through past environmental processes conducted for AAP.

10.2.2 Identification of Authorities

The authorities as listed below were notified of the proposed CRP project and invited to become involved in the process;

- Department of Mineral Resources (DMR) previously referred to as DME;
- Department of Water Affairs (DWA) previously referred to as Department of land Affairs and Forestry (DWAF);
- Limpopo Department of Economic Development, Environment and Tourism (LEDET);
- South African Heritage Resource Agency (SAHRA) - Limpopo Office; and
- Transnet; and
- Eskom.

10.2.3 Summary of the 2008 Public Involvement Process

Consultation with interested and affected parties (IAPs), authorities and other stakeholders was undertaken in terms of Government Notice No. R. 527, Regulations for the Minerals and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA), Regulation 3, as well as MPRDA section 40. The key components of the public consultation processes were as follows:

<u>Authority Consultation</u>

A meeting was held on 19th August 2008 with Mr Azwihangwisi Mulaudzi of the Limpopo DMR in Polokwane. The purpose of the meeting was to introduce the project to the DMR and to establish and agree on the required scope of public consultation. Further authorities including the Department of Water Affairs and Forestry (DWAF), South African Heritage Resource Association (SAHRA) and the relevant ward councillors and municipal authorities from the Rustenburg Municipality were informed of the project in the form of a Background Information Document (BID) (discussed below) sent via registered letter.

Community Consultation

The communities impacted upon by the proposed development at RPM - AS were made aware of the proposed CRP project initially through a media notice (discussed below). In addition a focus group meeting was held with the tribal authorities and community leaders of the Baphalane-Ba-Mantserre community on 13 October 2008 at the Mantserre Tribal Authority Hall. The project was presented to the community leaders and BID's and copies of the presentation distributed.

Open House Meeting

An invitation to attend an Open House was advertised in a media notice (discussed below) and on the site notices placed in the area. The Open House was held at the Northam Comprehensive School on the 22 October 2008 between 2 pm and 6 pm and was open to all Interested and Affected Parties that would like to comment, raise any issues, or find out further information about the project.

Media Notices

Two media notices were placed in a local newspaper to inform the public of the details of the proposed CRP project and of the public participation process. The first media notice was placed in the Kwëvoel newspaper on 22 August 2008. The first notice served as a notification the proposed CRP project and provided a description of the project, the proposed infrastructure, the location and extent of the proposed CRP project and contact details. The second media notice was placed in the Kwëvoel newspaper on 10 October 2008. This media notice provided further information about the project and provided information on the public participation process, including an invitation to attend an Open Day and notification that the draft scoping report had been lodged in public places for comment.

Site Notices

Site notices were erected on four sites within the mining area and the surrounding communities to inform the public about the proposed CRP project, details and an invitation to attend the Open Day, and notification that the draft scoping report had been lodged in several public locations. The site notices were A2 in size and detailed the proposed CRP project and associated infrastructure, the location and maps, and the contact details and final date for registering as an IAP.

Background Information Document (BID)

A BID was compiled which provided a brief description of the project, the regulatory requirements, the location and map of the area, potential environmental impacts and contact details and final date for comment in the public participation process. The BID was the sent to the relevant authorities and made available at the public meeting as well as the community consultation.

Commenting Period

The public consultation process undertaken during the scoping phase included a 30 day commenting period during which any comments, concerns, issues and requests for more information could be raised through registration on the IAP database. The 30 day period for commenting commenced when the secondary media notice (which indicated the availability of the

draft scoping report at the various locations in the community) was published in the Kwëvoel on the 10th October 2008. This allowed IAPs the opportunity to peruse the draft scoping report before the open-house. The two weeks prior to the open-house and the two weeks following it were open for the reception of comments, concerns or requests for more information, with this period concluding on the 13th of November 2008.

10.2.4 Issues Trail

The main issues raised during the previous public participation process relating to the environmental process related to how the community would benefit from the project, unresolved issues with the mine and concerns about the lack of feedback from previous environmental processes.

10.3 2013 Scoping Phase Public Participation Process for the Proposed Amandelbult CRP

10.3.1 Updating IAP Database

The 2008 IAP database was updated through information provided by the mine, as well as through recent environmental processes conducted for AAP. The updated IAP database is attached as Appendix 2.1.

The relevant authorities identified as stakeholders included:

- Department of Mineral Resources (DMR);
- Department of Water Affairs (DWA);
- Limpopo Department of Economic Development, Environment and Tourism (LEDET);
- South African Heritage Resource Agency (SAHRA) - Limpopo Office;
- Waterberg District Municipality;
- Thabazimbi Local Municipality;
- Moses Kotane Municipality; and
- Transnet.

The following surrounding communities were identified as stakeholders:

- Sebilong;
- Setaria;
- Mantserre;
- Northam;
- Rethabile Mine Village ;
- Thabazimbi; and
- Smash Block.

10.3.2 Background Information Document

A BID, in both English and Setswana (Copies of which are attached as Appendix 2.2), which briefly

described the background to the project, the proposal in brief, the environmental process, the time and location of where the public meeting will be held, where the draft Scoping Report can be viewed and the contact details of whom to contact should queries arise were distributed to the to all IAPs as well as to the authorities via email and registered mail on 8 April 2013 (Refer to Appendix 2.2 for proof of distribution.

10.3.3 Media Notice

A media notice, published in both English and Setswana (Copies of which are attached as Appendix 2.3), which provided a brief description of the proposed CRP project, the environmental process to be followed, details of applicable legislation, as well as contact details for the Environmental Assessment Practitioner (EAP), where further information could be obtained, the time and location of where the public meeting will be held, the locations where the draft Scoping Report can be viewed and commenting periods was published on 12 April 2013 in the Kwëvoel and Platinum Weekly local newspapers.

10.3.4 Site Notice

Site notices (Copies of which, as well as a map showing the locations where the notices were posted and photographs of the posted notices can be seen in Appendix 2.4) describing the proposed CRP project were published in both English and Setswana and will be posted up for display at the Moses Kotane Municipal Library, the Thabazimbi Municipal Library, the Northam Library, the Mantserre Tribal Offices, the Amandelbult Concentrator Plant Security Offices and at the proposed CRP project site on 8 April 2013. The site notices provided contact details allowing all IAPs the opportunity to raise queries and concerns, the time and location of where the public meeting will be held, where the draft Scoping Report can be viewed and where to obtain further information regarding the proposed CRP project. Details concerning the environmental processes to be followed are also included in the site notice, which notifies IAPs of the deadlines for the submission of comments.

10.3.5 Community Engagement Forum Meeting

The Amplats' CED at the Mine and the local Community Engagement Forum (CEF) were engaged and notified of the proposed CRP project during the forum's quarterly meeting held on 8 March 2013 where a presentation providing an overview of the project was given. The overview included a brief project description, the proposed CRP project area and potential impacts. An opportunity for any concerns or comments to be raised to the Environmental Assessment Practitioner was provided after the presentation. BIDs were also distributed at the meeting. Please refer to Appendix 2.5 for copies of the meeting minutes, attendance register and the presentation given.

10.3.6 Community Meetings

A public meeting was held on 17 April 2013 at the Amandelbult Recreational Centre between 16:00 and 17:30 during which a presentation was given. The presentation provided an overview of the project including the project description, the proposed CRP project area and potential impacts. An

opportunity was provided for IAPs to raise any concerns or make comments to the Environmental Assessment Practitioner (EAP). Buses were available to transport any IAPs to and from the venue for the meeting. Departure venues included the Mantserre Community Tribal Hall, the Thabazimbi Library, Smash Block Primary School and Northam Library. Buses departed at 15:30. Refer to Appendix 2.6 for a copy of the meeting minutes, attendance register, response forms received and presentation given.

A community meeting was held in Mantserre on 25 April 2013 at the Mantserre Community Hall between 11:00 and 12:00 during which a presentation was given. The presentation provided an overview of the project including the project description, the proposed CRP project area and potential impacts. An opportunity was provided for IAPs to raise any concerns or make comments to the EAP. Refer to Appendix 2.6 for a copy of the meeting minutes, attendance register and presentation given.

10.3.7 Commenting Period

The commenting period commenced once the site notices were posted on 8 April 2013 and ended on 9 May 2013. The media notices, site notices and BIDs all provided information on how to contact the independent environmental consultants and indicate that comments should be submitted before the end of the commenting period. The commenting period provided IAPs with 30 days during which any comments, concerns, issues and requests for more information could be raised and for registration on the IAP database.

10.3.8 Comments and Issues Trail

All comments, issues and queries noted during the scoping phase consultation were captured in the issues trail as well as any responses made (refer to Appendix 2.7 for a copy of the comments received and the issues trail). The major concerns raised during the scoping phase public consultation process were as follows:

Concern: Potential groundwater and/ or surface water impacts.

Response: The proposed development's impact on ground and surface water has been assessed and the impact is considered to be low with the implementation of mitigation measures (refer to Sections 8.2.3 and 8.2.4 of the EMP for the detailed impact assessment and mitigation measures).

Concern: Potential impact on the ambient air quality.

Response: The proposed development impact on the ambient air conditions has been assessed and the impact is considered to be low with the implementation of mitigation measures (refer to Section 8.2.5 for the detailed impact assessment and mitigation measures).

Concern: Rehabilitation of disturbed areas once the mine is closed.

Response: As part of the requirements of the MPRDA, a rehabilitation plan (refer to Sections 1.1 and 15.5 for the rehabilitation plan) and financial provision (refer to Section 16 of the EMP for the financial provision) has been developed for this project.

Concern: Potential social impact.

Response: The social impact of the proposed development was assessed and a Social Impact Assessment undertaken. The significance of the potential impact with the implementation of mitigation measures is considered to be medium (positive) (refer to Section 8.2.9 of the EMP for the detailed impact assessment and mitigation measures).

After the IAPs had an opportunity to comment the Scoping Report was revised with the feedback obtained. The final report was then submitted to the DMR for consideration.

10.4 Assessment Phase Public Participation Process for the Proposed Amandelbult CRP

Below is a summary of the consultation which will be undertaken as part of the Assessment Phase. This process is in line with the MPRDA, the DMR Consultation Guidelines, and Anglo's/Amplats' internal stakeholder consultation criteria. The process is also in line with NEMA requirements as a the public participation for a Basic Assessment in terms of NEMA will be undertaken concurrently with the public participation process in terms of MPRDA.

10.4.1 Background Information Document

A BID which briefly describes the background to the project, the proposal in brief, the environmental process, the time and location where the feedback meeting will be held, where the draft EIA / EMP and Draft Basic Assessment Report can be viewed and the contact details of whom to contact should queries arise will be distributed to all IAPs as well as to the authorities via email and registered mail.

10.4.2 Media Notice

A media notice, which provides a brief description of the proposed CRP project, the environmental process to be followed, details of applicable legislation, as well as contact details for the EAP, where further information could be obtained, the time and location where the feedback meeting will be held where the draft EIA / EMP and Draft Basic Assessment Report can be viewed, details of community meetings and commenting periods will be published.

10.4.3 Site Notice

Site notices describing the proposed CRP project will be published in both English and Setswana and posted up for display at the entrance gate to the mine and at the site. The site notices will provide contact details allowing all IAPs the opportunity to raise queries and concerns, the time and location where the feedback meeting will be held, where the draft EIA / EMP and Draft Basic Assessment Report can be viewed and where to obtain further information regarding the proposed CRP project. Details concerning the environmental processes to be followed will also be included in the site notice, which will notify IAPs of the deadlines for the submission of comments.

10.4.4 Community Meeting

A meeting will be held at the Amandelbult Recreational Centre where a presentation will be given providing feedback regarding the findings of the Environmental Impact Assessment and any issues raised regarding the proposed CRP project.

10.4.5 Commenting Period

The commenting period will commence once the Draft EIA/EMP and BA are made available. The media notice, site notices and BID will all provide information on how to contact the independent environmental consultants and indicate that comments should be submitted before the end of the commenting period. The commenting period provides IAPs with 30 days for the Draft EIA/EMP and 40 days for the Draft BA during which any comments, concerns, issues and requests for more information can be raised through registration on the IAP database. The final BA will be made available to registered IAPs for a further 21-day commenting period.

10.4.6 Comments and Issues Trail

All comments, issues and queries noted during the assessment phase consultation will be captured in the issues trail as well as any responses made. After the IAPs have had an opportunity to comment the EIA / EMP and BA will be revised with the feedback obtained and the revised report will be submitted to the DMR and LEDET respectively for consideration

11 KNOWLEDGE GAPS

This section identifies the gaps in the knowledge as well as the underlying assumptions relating to the Amandelbult CRP project as per Regulation 50(g) of the MPRDA.

11.1 Description of Underlying Assumptions

- As no ambient air quality monitoring is carried out at the Amandelbult Concentrator Section. Therefore, the PM10 and PM2.5 concentrations currently generated within the proposed CRP project area were calculated using a model and the dust fallout monitoring results (refer to Appendix 3.2).

11.2 Description of Gaps

- Although the cummulaive impact on the ambient noise environment is considered low, it is recommended that a noise specialist be employed to conduct noise monitoring at the sensitive receptors during operation to assess the extent of the cumulative impact and advise a noise management programme if required.
- There was a lack of information regarding the ownership structure of the CRP to inform recommendations from a social impact view point.

12 MONITORING AND MANAGEMENT OF IMPACTS

Environmental Monitoring Systems (EMS) and performance assessments are implemented in order to ensure that the environmental management programme is effectively implemented. Suitable documentation and external checks are important to ensure compliance and methods to achieve this are also presented in this section. The objective of the monitoring programme is to ensure that the CRP project have a systematic approach for monitoring its compliance. In addition, this section will focus on the requirements for the performance assessment of the EMP.

12.1 Air Quality

According to the air quality assessment conducted by Royal HaskoningDHV in 2013 for the proposed CRP project, sensitive receptors in terms of air quality in the vicinity of the proposed CRP project area are the adjacent Mine Hostel and Rethabile Mine Village. The installation of additional dust fallout units at the sensitive receptors was proposed. Six additional monitoring sites were proposed (Figure 20) to be incorporated into the existing monitoring programme detailed in this section below. These monitoring points are detailed in the following table:

Table 25: GPS co-ordinates of the sensitive receptor locations

SITE	CLASSIFICATION	GPS CO-ORDINATES	
		LATITUDE (SOUTH)	LONGITUDE (EAST)
Hostel 01	Residential	24°48'7.77"	27°20'1.094"
Hostel 02	Residential	24°48'5.441"	27°20'4.479"
Hostel 03	Residential	24°48'3.499"	27°20'7.441"
Village 01	Residential	24°47'47.621"	27°20'13.333"
Village 02	Residential	24°47'58.435"	27°20'22.264
Village 03	Residential	24°47'52.641"	27°20'18.01"

As part of the existing air quality monitoring programme at the Amandelbult Concentrator Section, dust fallout monitoring is conducted across the mine operations using the American Society of Testing and Materials standard method for collection and analysis of dust fall (ASTM D1739), with certain modifications. Single bucket monitoring units are used.

Emission monitoring is facilitated by the quarterly measurement of the air quality index and the presence of SO_2, NO_2 and CO in the air. The measurements are taken at various positions and at the discharge ends of the surface fans. The results are reported to the DMR on an annual basis.

There are eleven dust fallout monitoring sites at Tumela and Dishaba Mines, the Amandelbult Concentrator Plant and the services supporting each of the aforementioned sections. Nine of the sites are classified as industrial and two of the sites are classified as residential. The monitoring is undertaken on a monthly basis and the results are compared SANS 1929:2005 dustfall standards. The GPS co-ordinates and classification of the dust fallout monitoring localities are given in Table 26 and the localities are depicted in Figure 34.

Table 26: GPS co-ordinates and classifications of the dust fallout monitoring sites

SITE	CLASSIFICATION	GPS CO-ORDINATES	
		LATITUDE (SOUTH)	LONGITUDE (EAST)
Village	Residential	24° 47′ 47.2″	27° 23′ 51.3″
Lapa	Industrial	24° 49′ 06.4″	27° 21′ 29.3″
Northam tailings	Industrial	24° 48′ 53.97″	27° 22′ 42.25″
Tailing 3B NW	Industrial	24° 47′ 19.7″	27° 22′ 03.4″
Tailings 2	Industrial	24° 47′ 48.0″	27° 21′ 22.7″
Return Water Dam	Industrial	24°46′ 55.3″	27° 20′ 59.7″
Contract dam	Industrial	24° 48″ 35.2″	27° 20′ 00.5″
Tailings A	Industrial	24° 49′ 21.6″	27° 21′ 14.4″
Hostels	Industrial	24° 48′ 05.2″	27° 20′ 13.2″
Tailings offices	Residential	24°48′ 25.1″	27° 20′ 21.1″
Pump house	Industrial	24° 47′ 35.5″	27° 22′ 46.7″

12.1.1 Monitoring Objectives

Dust Fallout

- The monitoring objective is that dust fallout rates at the surrounding sensitive receptors should not exceed 600 mg/m²-day averaged over 30 days in residential areas.

PM_{10} and $PM_{2.5}$ Concentrations

- Monitoring objectives are that measured particulate matter concentrations at the mine and surrounding sensitive receptors should not exceed SA National Ambient Air Quality Standards (NAAQS) limit values for PM10 and PM2.5 (Table 27 and Table 28).

Table 27: National air quality standard for inhalable particulates (PM10)

AVERAGING PERIOD	CONCENTRATION (MG/M³)	FREQUENCY OF EXCEEDENCE	COMPLIANCE DATE
24 hours	120	4	Immediate
	75	4	1 January 2015
1 Year	50	0	Immediate
	40	0	1 January 2015

The NAAQS for inhalable particulates (PM_{10}) are given in Table 27. A margin of tolerance of 45 µg/m³ has initially been given to the daily average limit value of 75 µg/m³ for PM_{10}. This margin of tolerance allows existing operations time to develop measures to reduce emissions in those areas already above the limit value. The margin of tolerance is only valid unto the end of 2014, after which the limit value applies. The standard allows 4 exceedances per year of the limit value plus the margin of tolerance. The margin of tolerance for the annual average PM_{10} concentration is 10 µg/m³ and is also valid until end 2014.

Table 28: National air quality standard for fine particulates (PM2.5) (reference method for PM2.5 as fraction of suspended particulate matter: EN 14907)

AVERAGING PERIOD	CONCENTRATION (MG/M³)	FREQUENCY OF EXCEEDENCE	COMPLIANCE DATE
24 hours	65	4	Immediate to 31 December 2015
	40	4	1 January 2016 to 31 December 2029
	25	4	1 January 2030
1 Year	25	0	Immediate to 31 December 2015
	20	0	1 January 2016 to 31 December 2029
	15	0	1 January 2030

South African $PM_{2.5}$ standards have recently also been published (Government Gazette No. 35463, 29 June 2012). This is shown in Table 28. The margin of tolerance of for the daily average is 40 µg/m³ until end 2015 and 15 µg/m³ until end 2029. From 2030, the limit value of 25 µg/m³ applies. As for PM_{10}, the standard allows 4 exceedances per year of the limit value plus the margin of tolerance. Similarly, the margin of tolerance of for the annual average is 10 µg/m³ until end 2015 and 5 µg/m³ until end 2029. From 2030, the annual average limit value of 15 µg/m³ applies.

If the number of exceedances measured at the proposed monitoring sites are higher than that allowed by the National Standards, the mine must take urgent measures to further mitigate emissions until ambient air quality particulate concentrations are brought back into line with the National Standards.

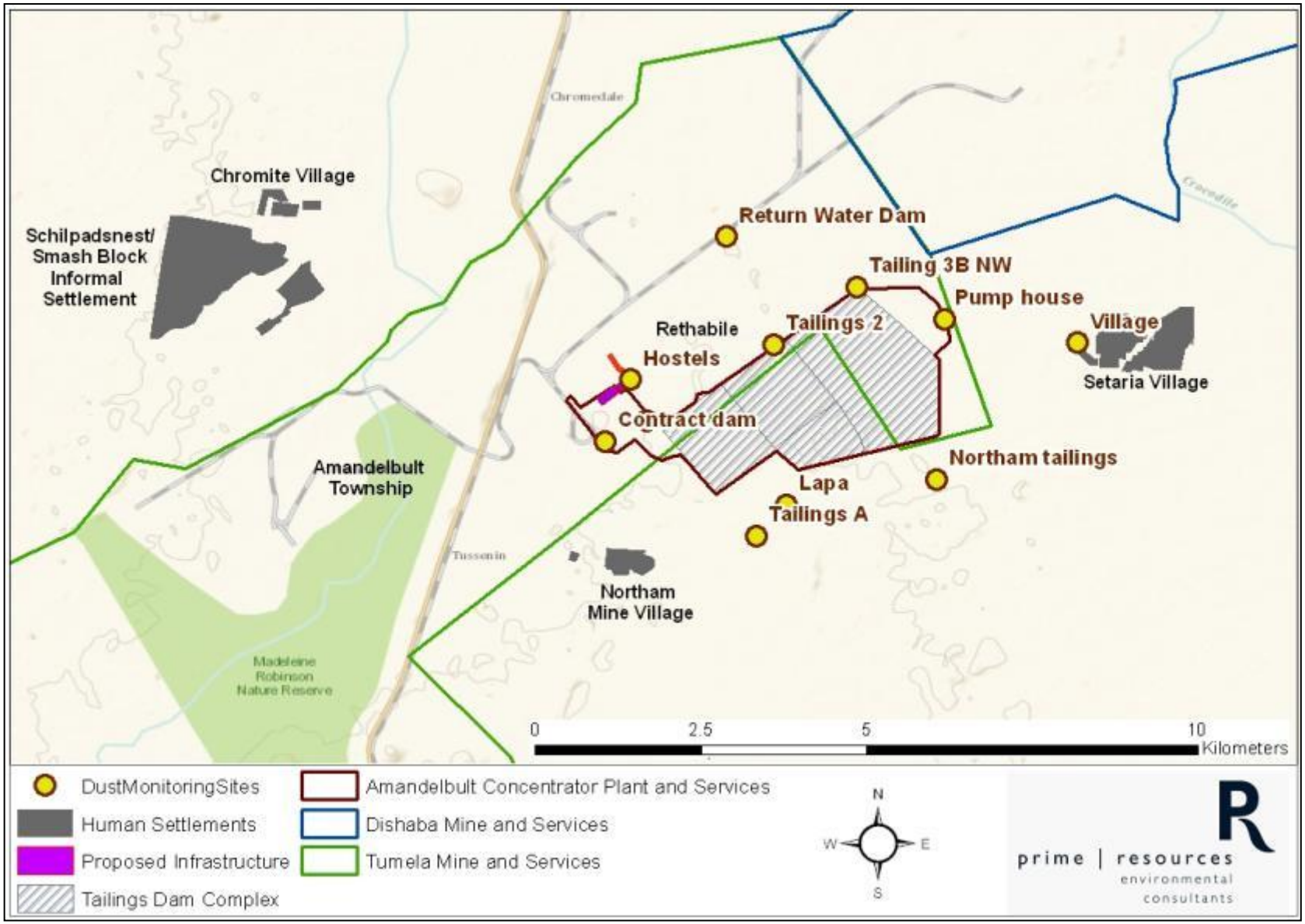

Figure 34: Dust fallout monitoring sites.

12.2 Groundwater Quality

Due to the location of the project, it falls within the Amandelbult Concentrator Plant Section in the existing groundwater quality monitoring programme which is detailed below. Therefore, no additional monitoring sites are required.

Groundwater quality is monitored on a quarterly basis the Amandelbult Concentrator Plant. Clean Stream Scientific Services (CSSS) carries out the scheduled quarterly monitoring. The Groundwater levels will be monitored on monthly basis and will be presented in the form of piezometric maps, from which changes can be determined through time. An annual groundwater report is submitted to the Department of Water Affairs.

Groundwater monitoring localities the Amandelbult Concentrator Plant and are divided into two types based on their positions relative to the respective mine's infrastructure. Table 29 indicates which boreholes are monitored for groundwater quality purposes. Their locations are depicted in Figure 35.

Variables analysed at these localities include pH, EC, TDS, Ca, Mg, Na, K, total alkalinity, total hardness, Cl, F, SO_4, PO_4, NH_3, NO, Al, Fe, Mn, Cd, Co, Cr, Cu, Ni, Pb and Zn. The constituents levels are compared against the Permit conditions: Exemption 1873 B granted in terms of section 21(4) of the Water Act, 1956 (Act 54 of 1956), Rustenburg Platinum Mines Limited: Amandelbult Section (Condition 3.2) and the DWAF Domestic Use (Tolerated) water quality guidelines.

Table 29: Descriptions of the boreholes used for monitoring

CONCENTRATOR / TAILINGS		ENVIRONMENTAL DEPARTMENT	
BOREHOLE	**DESCRIPTION**	**BOREHOLE**	**DESCRIPTION**
EMPR05	Borehole west of Tailings Dam and Water Care Works	EMPR01	Borehole west of the Koedoeskop dirt road
EMPR07	Borehole north of the Tailings Dam	EMPR09	Borehole next to road at Bierspruit
EMPR08	Borehole north of the Tailings Dam	EMPR10	Borehole at Zero dam
EMPR15	Borehole south of the Tailings Dam	EMPR11	Borehole north of waste disposal site
EMPR19	Borehole north of the new Tailings Dam extension	HT31	Borehole at Crocodile River downstream
EMPR20	Borehole north of the new Tailings Dam extension	HT32	Borehole at Crocodile River upstream
EMPR22	Borehole east of the new Tailings Dam extension		
EMPR23	Borehole south of the new Tailings Dam extension		
WM4	Borehole north of the Tailings Dam		
WM5	Borehole west of the Tailings Dam and		

CONCENTRATOR / TAILINGS		ENVIRONMENTAL DEPARTMENT	
BOREHOLE	**DESCRIPTION**	**BOREHOLE**	**DESCRIPTION**
	Water Care Works		
WM7	Borehole north west of the Return Water Dam		
Total	11	Total	6

12.2.1 Monitoring Objectives

Ensure that variables at sampling locations do not exceed permit conditions of the Exemption 1873 B granted in terms of section 21(4) of the Water Act, 1956 (Act 54 of 1956), Rustenburg Platinum Mines Limited: Amandelbult Section (Condition 3.2) and the DWAF Domestic Use (Tolerated) water quality guidelines.

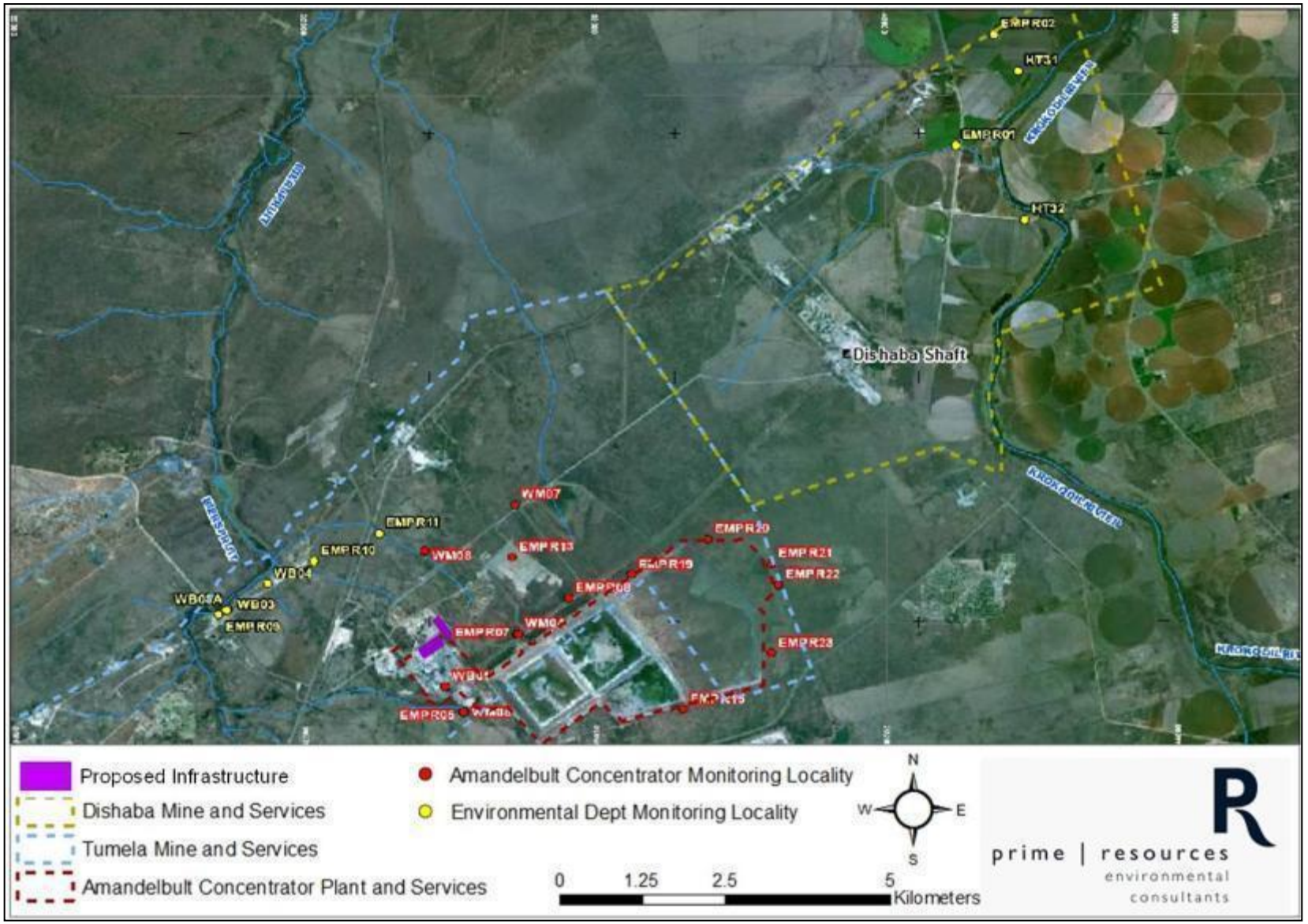

Figure 35: Groundwater monitoring localities.

12.3 Surface Water Quality

Due to the location of the project, it falls within the existing surface water quality monitoring programme which is detailed below. The existing sampling site AMD-P is located in the Bierspruit downstream from the drainage channel at the Mine Hostel, which is most likely to transport contaminants from CRP project area to the Bierspruit. Any spillages from the CRP project area (once constructed) will be detected at this sampling site. Therefore, no additional monitoring sites are required.

Surface water monitoring is undertaken on a monthly by CSSS. Recycled water, which is utilised in the processing activities and on site, will be sampled on a weekly basis. It will be analysed for pH and residual chlorine on a weekly basis and once a month for all the variables analysed for surface water monitoring. Annual reports will be submitted to the DWA and the DMR. Surface water monitoring localities are grouped into the following categories: process water, receiving environment and sewage water. The surface water monitoring localities for each category are described in Table 30. The localities of all the surface water monitoring points are depicted in Figure 36.

Variables analysed (mg/l) at these localities include pH, EC, TDS, Ca, Mg, Na, K, total alkalinity, total hardness, Cl, F, SO_4, PO_4, NH_3, NO, Al, Fe, Mn, Cd, Co, Cr, Cu, Ni, Pb, Zn and SAR (Sodium Absorption Ratio). Instead of SAR, the concentration of E. coli and total coliform count (per 100 ml) are determined for the sewage water monitoring locality. The constituents levels are compared against the Permit conditions: Exemption 1873 B granted in terms of section 21(4) of the Water Act, 1956 (Act 54 of 1956), Rustenburg Platinum Mines Limited: Amandelbult Section (Condition 3.2) and the DWAF Domestic Use (Tolerated) water quality guidelines.

Table 30: Surface water monitoring localities

LOCALITY	DESCRIPTION	MINING SECTION
PROCESS WATER LOCALITIES		
AMD F	Middelaagte tributary from the Return Water Dam	Amandelbult Concentrator Plant and Services
AMD H	62 East discharge stream from the 49 East Area	Dishaba Mine and Services
AMD J	Return Water Dam	Amandelbult Concentrator Plant and Services
AMD K	Zero Water Dam	Tumela Mine and Services
AMD L	Main Office stream discharge from Tumela Shaft	Tumela Mine and Services
AMD M	Water discharge from Dishaba Shaft	Dishaba Mine and Services
AMD Q	1 Shaft fridge plant discharge	Tumela Mine and Services
AMD R	Dishaba Shaft East Upper discharge	Dishaba Mine and Services
AMD S	Dishaba Shaft East Lower discharge	Dishaba Mine and Services
AMD T	49 Turf Settling Dam	Dishaba Mine and Services

LOCALITY	DESCRIPTION	MINING SECTION
AMD U	New Tailings Return Water Dam	Amandelbult Concentrator Plant and Services
AMD V	13West Fan	Tumela Mine and Services
RECEIVING ENVIRONMENT LOCALITIES		
AMD A	Bierspruit after the game farm (before bridge)	Tumela Mine and Services
AMD B	Bierspruit before mine (after bridge)	Tumela Mine and Services
AMD C	Golf course dam below squash courts – Mined out in February 2010	Tumela Mine and Services
AMD D	Canal from Northam Platinum	Tumela Mine and Services
AMD E	Bier Spruit lower at 10w bridge	Tumela Mine and Services
AMD G	Crocodile river upstream	Dishaba Mine and Services
AMD I	Crocodile river downstream	Dishaba Mine and Services
AMD P	Bierspruit further downstream (after Rhino and alusite dam)	Tumela Mine and Services
AMD X	Additional Bierspruit lower locality	Tumela Mine and Services
AMD S1	2 Shaft fridge plant excess water – Sampling commenced in June 2010	Dishaba Mine and Services
SEWAGE WATER		
AMD N	Sewage final treated effluent	Amandelbult Concentrator Plant and Services

12.3.1 Monitoring Objectives

Ensure that variables at sampling locations do not exceed permit conditions of the Exemption 1873 B granted in terms of section 21(4) of the Water Act, 1956 (Act 54 of 1956), Rustenburg Platinum Mines Limited: Amandelbult Section (Condition 3.2) and the DWAF Domestic Use (Tolerated) water quality guidelines.

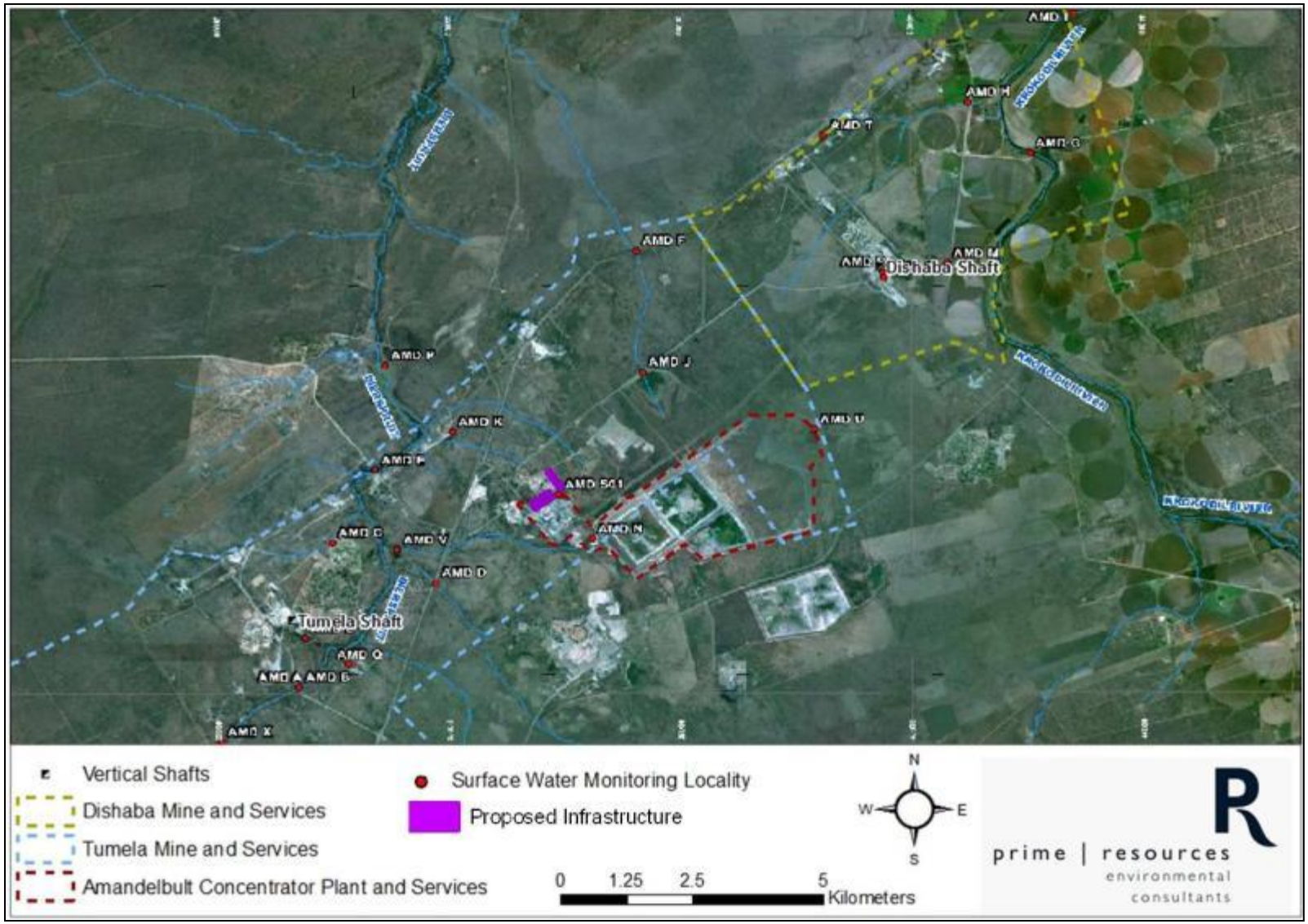

Figure 36: Surface water monitoring localities.

12.4 Bio-monitoring

Due to the location of the project, it falls within the existing bio-monitoring programme which is detailed below. Therefore, no additional monitoring sites are required.

Bio-monitoring surveys are undertaken twice a year. The primary objectives of the bio-monitoring programme are to:

- Conduct bi-annual bio-monitoring assessments of the receiving environment associated with the Crocodile River in the vicinity of the Dishaba Mine and the Bierspruit in the vicinity of Tumela Mine. Toxicity testing is conducted on the return water dam, which forms part of the Amandelbult Concentrator Plant and Services
- Identify potential water quality related declines in biotic integrity of the receiving water bodies and link the relevant biological results to the water quality results.
- Determine the toxicity and hazard classification of selected sites and impoundments.

Bio-monitoring is conducted at seven locations in the receiving environment, the methodology used includes:

- In-situ water quality monitoring;
- Toxicity testing;
- Aquatic invertebrate assessment: South African Scoring System 5 (SASS5); and
- Fish Assemblage Integrity Index (FAII).

The bio-monitoring location descriptions, methodology used and monitoring frequency is detailed in Table 31. The monitoring locations are depicted in Figure 37.

12.4.1 Monitoring Objectives

The baseline biotic indicators will serve as monitoring targets. If during monitoring it is determined that the water quality has deteriorated when compared to the baseline biotic and indicators, action must be taken. It should be determined whether mitigation measures are being implemented correctly and rectified if this is the cause of the deterioration in water quality. If mitigation measures have been implemented correctly and there is still a deterioration in aquatic habitat, new mitigation strategies need to be investigated.

Table 31: Sampling sites, methodology and frequency for bio-monitoring

MONITORING SITE	PREVIOUS NAME	GPS CO-ORDINATES		DESCRIPTION	BIO-MONITORING METHODOLOGY		MINING SECTION
		LATITUDE (SOUTH)	LONGITUDE (EAST)		PROTOCOL	FREQUENCY	
B1	New site since 2010	24° 50′ 21″	27° 17′ 2.4″	Bierspruit, upstream from all potential Tumela Mine impacts	Toxicity testing, In-situ water quality, SASS5, FAII	Twice per annum, except for FAII and toxicity (once per annum)	Tumela Mine and Services
B2	APM1	24° 50′ 9.24″	27° 17′ 26.88″	Bierspruit, upstream from most Tumela Mine potential impacts	Toxicity testing, In-situ water quality, SASS5, FAII	Twice per annum, except for FAII and toxicity (once per annum)	Tumela Mine and Services
B3	APM2	24° 47′ 56.4″	27° 18′ 14.76″	Bierspruit, downstream from all potential Tumela Mine impacts	Toxicity testing, In-situ water quality, SASS5, FAII	Twice per annum, except for FAII and toxicity (once per annum)	Tumela Mine and Services
RWD	n/a	24° 47′ 8.16″	27° 21′ 5.76″	Amandelbult Concentrator Plant Return Water Dam, potentially draining towards the Bierspruit	Toxicity testing	Twice per annum	Amandelbult Concentrator Plant and Services
C1	New site since 2010	24° 46′ 35.04″	27° 24′ 44.28″	Crocodile River, upstream from all potential Dishaba Mine impacts	Toxicity testing, In-situ water quality, SASS5, FAII	Twice per annum, except for FAII and toxicity (once per annum)	Dishaba Mine and Services
C2	APM3	24° 44′ 39.12″	27° 24′ 57.6″	Crocodile River, upstream from most potential Dishaba Mine impacts	Toxicity testing, In-situ water quality, SASS5, FAII	Twice per annum, except for FAII and toxicity (once per annum)	Dishaba Mine and Services

MONITORING SITE	PREVIOUS NAME	GPS CO-ORDINATES		DESCRIPTION	BIO-MONITORING METHODOLOGY		MINING SECTION
		LATITUDE (SOUTH)	LONGITUDE (EAST)		PROTOCOL	FREQUENCY	
C3	APM4	24° 43’ 16.68”	27° 25’ 14.16”	Crocodile River, downstream from all potential Dishaba Mine impacts	Toxicity testing, In-situ water quality, SASS5, FAII	Twice per annum, except for FAII and toxicity (once per annum)	Dishaba Mine and Services

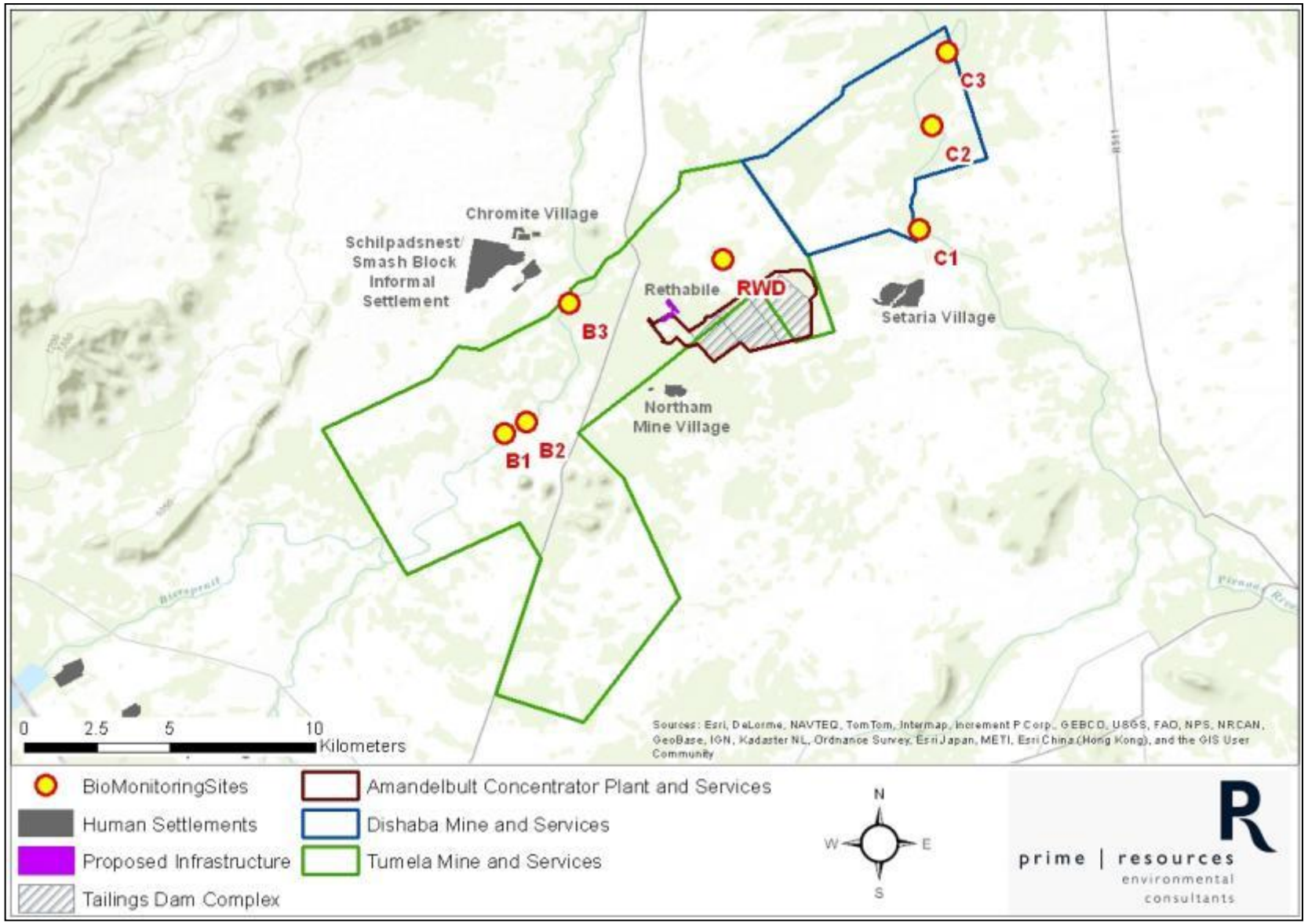

Figure 37: Bio-monitoring localities.

12.5 Soil

Soil sampling of stockpiled topsoil and rehabilitated areas are also to be carried out annually until the levels of nutrients, specifically phosphorous and potassium are at the required concentration (approximately 20 and 120 mg/kg respectively). Sampling should always be carried out at the same time of year and at least six weeks after the last application of fertiliser. All soil samples should be analysed for the following parameters:

- pH (H2O);
- EC;
- Ca mg/kg;
- Mg mg/kg;
- K mg/kg;
- Na mg/kg;
- CEC;
- P (Bray I);
- Z mg/kg;
- Clay% and;
- Organic matter content (C %).

Annual soil sampling should further take into consideration the nutrient requirements for rehabilitation purposes in the latter years of the operational phase.

12.6 Noise

Currently noise readings are only recorded quarterly at four randomly selected positions. The CRP project may have a cumulative impact on the ambient noise impact of the existing Amandelbult Concentrator Plant, which may exceed the SANS guidelines and negatively have affect the sensitive receptors associated with the proposed CRP project area (Mine Hostel and Rethabile Mine Village This noise monitoring programme should be extended to include a reading at the Mine Hostel area.

12.7 Environmental Management Programme Implementation Monitoring

Regular monitoring of the EMP throughout the construction, operation and decommissioning phases is to be undertaken by the Mine Environmental Department. Contractors compliance with the conditions set out in the EMP should be monitored on a weekly basis by means of a checklist, with the results being fed back to the contractors at monthly project meetings. This monitoring checklist will be integrated into the existing monitoring system implemented across the mine operations.

An inspection checklist will also be compiled according to the existing environmental inspection system used by AAP at the Amandelbult Concentrator Section which will be used to monitor the implementation of the EMP at the operational phase on a monthly basis.

Biennial (every second year) auditing of the compliance with the EMP will be undertaken by a suitably qualified, independent, external service provider, with audit reports being compiled as a result. Please refer to Section 10.7 below for information regarding the performance assessment

of the EMP.

During the decommissioning phase, the environmental team will inspect the implementation of the EMP on a weekly basis, as per the construction phase, with the results being fed back to the relevant contractors during the monthly project meetings. The re-vegetation maintenance period will also be monitored so as to ensure that the process is successful, and also to determine whether re-seeding is necessary. Finally, a report will be submitted to the DMR with regard to the status of the mine and its compliance with the decommissioning phase outlined in the EMP when applying for a closure certificate. The closure plan is discussed in Section 11: Objectives and Goals relating to Mine Closure.

12.8 Environmental Management Programme Performance Assessment

MPRDA Regulation 55(1) stipulates the requirements for a bi-annual performance assessment of the EMP (in sub-regulation [3]) so as to ensure compliance with the EMP, and also to assess the continued appropriateness and adequacy of the EMP.

The performance assessment will form part of the environmental auditing activities at the operations. The assessment of the EMP performance must be undertaken as a minimum biannually and will look at the following aspects of the EMP:

- The compliance of the EMP with regard to the current legal and permitting requirements;
- Current environmental performance against the target and objectives set out in the EMP;
- The level of implementation of the mitigation and management measures outlined in the EMP;
- Findings from environmental audits and the reporting of any environmental incidents which may have occurred; and
- The availability of environmental management resources (i.e. manpower and financial resources).

As per Regulation 55(3), the performance assessment report will contain the following information in the DMR-accepted format:

- Information regarding the period applicable to the performance assessment;
- Details with regard to the:
    - Scope of the assessment;
    - Procedure used to conduct the assessment;
    - Interpreted information gained from monitoring the approved EMP;
    - Evaluation criteria employed during the assessment;
    - Results of the assessment; and
    - Recommendations on how and when non-compliances and deficiencies will be rectified.

A performance assessment report will be compiled and submitted to the DMR within three months of the assessment having been compiled.

Submission of Information

- All procedures (emergency, environmental awareness, rehabilitation strategies, etc.) must be included into the mine's Environmental Management System (EMS). The mine's EMS will monitor and assess the performance of the EMP on an on-going basis.
- All information as required by the various government departments should be captured and be readily available for submission when required.
- An AAP annual report will be submitted to the DMR.
- The financial provision for closure (quantum and method) will be updated annually as per the MPRDA Regulations.

13 ENVIRONMENTAL PROCEDURES RELATED TO EMERGENCIES AND REMEDIATION

An effective, comprehensive, well-considered and tested environmental emergency preparedness and response plan has the potential to save lives, prevent unnecessary damage to company and other property and to manage environmental risk in the event of a large chemical spill, oil spill, fuel spill or explosives spill.

The MPRDA requires in the Regulations Section 51(b) iii that the mine implements procedures to environmental related emergencies and remediation. AAP has an ISO 14001:2004 accredited EMS which is an environmental management system that enables AAP to develop and implement policy and objectives regarding legal requirements and other requirements to which AAP subscribes, and information about significant environmental aspects that AAP can control and influence. The EMS is a tool that allows AAP to identify and control their environmental impact and constantly improve their environmental performance. Section 4.4.7 of the EMS standard ISO 14001:2004 requires that AAP establish and maintain procedures to identify potential for and respond to accidents and emergency situations, and for preventing and mitigating the environmental impacts that may be associated with them. AAP shall review and revise, where necessary, its emergency preparedness and response procedures, in particular, after the occurrence of incidents where practicable. AAP shall also periodically test such procedures where practicable. As AAP have an ISO 14001:2004 accredited EMS they therefore comply with the requirements of both the MPRDA and ISO 14001. The Amandelbult CRP project will utilise the existing Emergency Response Procedure utilised at the Tumela Mine, Dishaba Mine and the Amandelbult Concentrator, which is described below.

13.1 Purpose

The Amandelbult CRP project will utilise the existing (Title: Environmental Emergency Response Procedure for Major Chemical, Oil, Fuel and Explosives Spillages; Date 22/5/2006; Ref. No. Env 083-0020; refer to Appendix 5 for a copy) is to provide guidance to mine employees and contractors as to their responsibilities to the mine, fellow employees and colleagues in the event of an environmental emergency or potential environmental emergency at the CRP project area, with regards to chemical, oil, fuel, explosives, spills and other incidents.

The Environmental Emergency Response Procedure has been developed to provide guidance to ensure that:

- Actual and potential emergency situations or accidents have been identified;
- Danger to the environment, personnel, contractors and non-employees is minimised;
- Legal liability is managed and minimised;
- Public relations are effectively managed during and following an emergency; and
- Reporting is effective and corrective / follow-up actions are implemented.

13.2 Managing an Emergency Situation

There are six main steps in managing an emergency, from the identification of the situation to final close off. These are as follows:

- Find and identify
- Ensure human safety
- Reporting
- Containment and clean-up
- Corrective action
- Monitoring

In handling any emergency remember to assess the situation. Take into consideration all factors, including:

- Is there a spill or a leak?
- What are the weather conditions?
- What is the terrain like?
- Who / what is at risk: people, property and/or the environment?
- What actions should be taken: Is an evacuation necessary?
- What resources (human and equipment) are required and are they readily available?
- What can be done immediately?

13.3 Responsibilities and Distribution

The environmental co-ordinator is the responsible person for the Environmental Emergency Response Procedure and is responsible for keeping the procedure up to date. S/he must ensure that the relevant persons, who have responsibilities, follow the instructions in this procedure. The following people have responsibilities and each of the persons below should have a copy of the procedure (Table 32).

Table 32: Responsibilities and Distribution according with the Environmental Emergency Response Procedure

DESIGNATION	RESPONSIBILITY
Environmental Co-ordinator	Up-date and review the Environmental Emergency Response Procedure
Safety and Sustainable Development Manager	Responsible for implementing Environmental Emergency Response Procedure on the mine.
Tumela Mine Manager	Approval of the procedure at Tumela Mine
Dishaba Mine Manager	Approval of the procedure at Dishaba Mine
Amandelbult Concentrator Plant Manager	Approval of the procedure at Amandelbult Concentrator Plant
Tumela Mine Production Manager (West Lower)	Responsible for implementing Environmental Emergency Response Procedure in the West Lower area
Tumela Mine Production Manager West Upper	Responsible for implementing Environmental Emergency Response Procedure in the West Upper area
Tumela Mine	Responsible for implementing Environmental Emergency Response Procedure in the

DESIGNATION	RESPONSIBILITY
Production Manager Central	Central area
Dishaba Mine Production Manager	Responsible for implementing Environmental Emergency Response Procedure in the East area
Amandelbult Concentrator Plant Production Manager (CRP Project)	Responsible for implementing Environmental Emergency Response Procedure in the Amandelbult Concentrator Plant area
Manager Engineering	Responsible for implementing Environmental Emergency Response Procedure in the Engineering area
Mine Management	AAP is responsible for the safety and well being of employees working at the Tumela and Dishaba Mines, the Amandelbult Concentrator Plant and the services supporting each of the aforementioned sections as well as the protection of the environment from unnecessary negative impact. The Management of the mine has a responsibility to initiate a warning process should an emergency occur or should something at the mine site deteriorate in an uncontrolled manner presenting a risk to employees, the public or the environment.
Local Government(s)	Local government has the responsibility to warn residents of a hazardous situation, these warnings must be based on information provided by Mine Management. It is important to note that the mine management retains the responsibility of ensuring that the surrounding communities are not placed at unnecessary risk and should the local government be unable to warn residents of an existing or impending emergency, the Mine Management will assume this responsibility.

This procedure will always be issued in a controlled format to the following personnel and at the following locations:

Table 33: Procedure Control (Designation and Location)

DESIGNATION	LOCATION
Electronically	Central information System
Production Manager Tumela Mine (West Lower)	At No. 1 Shaft in the Production Manager West Lower's office.
Production Manager Tumela Mine (West Upper)	At No. 1 Shaft in the Production Manager West Upper's office.
Production Manager Tumela Mine (Central)	At 15 East in the Production Manager Central's office.
Production Manager Dishaba Mine (East)	At No. 2 Shaft in the Production Manager East's office.
Amandelbult Concentrator Plant Manager CRP Manager	At the plant in the Concentrator Manager's office. At the CRP Manager's Office
Manager Engineering	Main office area in the Manager Engineering's office.

13.4 Reference Documents

When using this procedure, reference should be made to the following relevant procedures / documents and/or systems.

Table 34: Reference Documents

TYPE OF PROCEDURE	PROCEDURE NO.	PROCEDURE TITLE
Management procedure	ENV 083-0002	Environmental incidents & non-conformance procedure
Management procedure	ENV 083 0001	Environmental management systems manual
Management procedure	ENV 083-0013	Rehabilitation monitoring
Management procedure	ENV 083-0017	Correct handling and storage of chemical materials and reagent
Management procedure	ENV 083-0019	Clean-up of spilt material (liquid and solid)

13.5 Emergencies and Remediation

Refer to the Environmental Emergency Response Procedure (Appendix 5)

14 ENVIRONMENTAL AWARENESS PLAN

14.1 Introduction

The Amandelbult CRP project will utilise the existing Environmental Awareness Plan, implemented in accordance with the MPRDA as well as the EMS, utilised at the Tumela Mine, Dishaba Mine and the Amandelbult Concentrator. The following was taken from the existing Environmental Awareness Plan. Refer to Appendix 6 for a copy of the Environmental Awareness Plan.

14.2 Objectives of the Environmental Awareness Plan

The objectives of the Environmental Awareness Plan are:

- To ensure all personnel, contractors and IAPs are environmentally aware of the consequences of their actions on the environment while employed by AAP;
- To ensure that all personnel, contractors and IAPs are made aware of the environmental management requirements and commitments;
- To ensure that all personnel, as a minimum, undergo general environmental awareness training, so as to highlight environmental responsibility; and
- To ensure that those personnel with responsibilities or activities that may have a significant impact on the environment receive appropriate training to avoid or minimise their potential impact.

14.3 Methodology

The methodology of the Environmental Awareness Plan involves the following:

- Internal Communication;
- Standard Meetings;
- External Communication;
- Complaints; and
- Training.

14.3.1 Internal Communication

Internal communication of environmental issues to ensure environmental awareness will be done by the following means according to the existing Environmental Awareness Plan:

- Meetings;
- Memos;
- Notice boards;
- Briefs;
- Reports;
- Monthly themes;

- Daily operational bulletin;
  - Newsletter;
  - E-mail;
  - Telephone;

- Induction training; and
- Mines Postal System.

14.3.2 Standard Meetings

The following standard meetings are held at specific times to ensure that environmental awareness; potential problems, complaints etc. are heard and addressed proactively:

- Safety, Health and Environmental Meetings are held monthly by the Senior Management;
- Safety, Health and Environmental Meetings are held daily, weekly and monthly by the different operations and environmental issues are one of the topics on the agenda;
- Monthly EMS meetings are held where environmental issues relating to the EMS are discussed; and
- All Employees can also communicate to Senior Management through their reporting lines or by using complaint forms and incident forms to improve communication.

14.3.3 External Communication

Any environmental issues will be communicated to and from Head Office (in terms of Divisional and Group Communication) by means of the following:

- Fax or E-mail;
- News briefs from Head office;
- Formal meetings and workshops;
- Quarterly environmental report;
- Annual environmental report; and
- Letters mailed to and from the mine.

Communication to community, government, neighbouring mines, farmers, land owners, environmental Groups, NGOs and other IAPs will be communicated to ensure environmental awareness by means of the following:

- Fax or E-mail;
- Postal system;
- Telephone;
- Formal meetings; and
- Open days.

14.3.4 Complaints

All complaints and queries must be directed to the Environmental Co-ordinator for attention. All information regarding complaints reported to the mines telephone exchange will be captured on a complaint form and handed to the Environmental Co-ordinator. The Environmental Co-ordinator will record all complaints in the complaints register. The complaint will be captured as a stakeholder event on the EMS and the Environmental Co-ordinator will add an action to address the complaint.

14.3.5 Training

The following three facets to training form part of the Environmental Awareness Plan:

- Environmental awareness training is given at induction when personnel come back from leave;
- Environmental competency training is to be given to supervisory personnel and contractors; and
- Training programmes for school groups and other IAPs on environmental awareness will be conducted from time to time.

14.3.6 Recommendations

It should be ensured that the environmental awareness training stipulated in the existing Amandelbult Section Environmental Awareness Plan cover the following aspects:

- The Safety, Health and Environment (SHE) policy and its implications, relevant legislation and the basic rules when working in environmentally sensitive areas, incident reporting, identification of responsible people for environmental management as well as the environmental management system;
- Biodiversity principles; and
- The safe transportation, handling, storage, transfer, use and disposal of hazardous substances, as well as the emergency response procedures to be implemented in the event of an unplanned release.

15 ENVIRONMENTAL GOALS AND OBJECTIVES

15.1 Introduction

Regulation 51 (a) of the MPRDA Regulations requires that this EMP describe the goals and objectives specific for:

- The management of identified environmental impacts;
- The cultural and heritage aspects;
- The socio-economic conditions as identified in the Social and Labour Plan (SLP); and
- Mine closure.

15.2 Management of Identified Environmental Impacts

15.2.1 Objectives

AAP intends to minimise the impacts of the proposed Amandelbult CRP on the environment as far as possible.

15.2.2 Goals

The mine's environmental related goals are as follows:

- Implementing the management and mitigation measures stated in the EMP;
- Undertake and implement monitoring programmes stated in the EMP; and
- Comply with the mine's WUL.

15.3 Objectives and Goals relating to Cultural and Heritage Aspects

15.3.1 Objectives

The AAP objective regarding cultural and heritage aspects is to ensure that the integrity of any heritage and cultural resources associated with the Tumela Mine, Dishaba Mine and the Amandelbult Concentrator remain intact as far as practically possible. However, there are no heritage and cultural resources in close proximity to the Amandelbult CRP project area and therefore no potential impacts.

15.3.2 Goals

As there are no heritage and cultural resources in close proximity to the Amandelbult CRP project area the Mine's general goals will be mentioned. The mine's goals relating to cultural and heritage aspects are to:

- Ensure that the management measures proposed in the EMP which relate to heritage resources are implemented.
- Ensure compliance with the aspects of the National Heritage Resources Act, Act 25 of 1999.

15.4 Objectives and Goals Relating to Socio-Economic Conditions

15.4.1 Objectives

The objectives relating to the Socio-Economic conditions are as per the approved SLP and are summarised below:

- To provide employment opportunities;
- To promote gender equity;
- To establish and implement a workplace skills plan and career path to expand the skills base of the workforce
- To enhance the social and economic welfare of the community;
- To meet human capital development requirements through effective human resource development systems and processes to ensure fluent roll out of skills and developmental programmes;
- To support poverty alleviation;
- To minimise the effect of HIV/AIDS pandemic on the mine and surrounding communities.

15.4.2 Goals

The goals to accomplish the above objectives are:

Employment

To work towards- and meet the stipulated Historically Disadvantaged South Africans (HDSA's) targets regarding employment and management participation by means of talent management, career path, leadership development, mentorship programmes and other appropriate measures. Employment is future focus on employing local labour as far as practically possible.

Gender Equity

Mining is a demanding physical activity that has been historically performed with very little mechanization and has been traditionally considered exclusively a male activity. However, due to the advancement of technology, women can increasingly participate in mining activities. Platinum mining in general is becoming increasingly mechanized, and this makes the employment of women and the use of their skills easier to accommodate.

The historical systemic exclusion for women from participation in the mining industry has meant that females are poorly represented in the mining sector. AAP will apply considerable effort to enhancing women's participation in all levels of the mining and processing operations. Not many women have been attracted to furthering their education in mining occupations. There is a lack of qualified women for mining careers and companies are required to compete aggressively for suitably qualified women to fill vacant or newly created positions.

AAP's strategy to encourage women to enter the mining professions will include providing scholarships to promote mining-related educational advancement, especially in the fields of mathematics and science. Management and leadership training, as described under the HDSA fast-tracking plan in the Employment Equity section, will also apply to female employees.

Workplace Skills Plan (WSP)

The WSP will encompass the 'Breakthrough to Literacy' programme through to post-graduate education. These programmes will be consistent with the requirements of the National Qualifications Framework (NQF) and the Mining Qualifications Authority (MQA). The purpose of the Skills Development Plan will be to assess and formally record the current levels of skills and education of all incumbent employees, and to use the results as a basis for future Skills Development Plans. These plans address the current skills and competency gaps on the mine and also provide for the training needs of HDSA's, the fast-tracking of individuals within the talent pool, and the various career path and mentoring programmes.

Career Path

Career pathing will consist of developing a career path, which indicates possible routes to move or change from one role or position to another within a specific discipline. The movement could either be to a position on the same level or a position on a higher level. The career path will identify opportunities for people to excel and explain what is required to move forward in the company, based on the company's strategy. Career paths will be used to create short-term and long-term career plans for individuals, or to prepare for transitional changes or career crises that might occur in the future. The paths will also be used during selection and recruitment, training and development, and talent management. The process will involve determining both the role potential and capacity requirements to enable delivery against key performance areas.

Human Resource Development (HRD)

The AAP HRD strategy takes cognisance of the shortage of critical skills in the mining industry in South Africa. Development of future HDSA leadership is a key strategic focus area. HRD is managed across all levels of employment and is seen as a critical component of achieving the mine's employment equity and gender equity targets. Consequently, the mine's HRD plans are being continuously aligned with the Workplace Skills Plan and integrated with the long-term business plan. In terms of this process, HRD plans are constantly assessed, reviewed and revised to cover the organization's short-, medium- and long-term human capital development requirements. Part of the HRD will be to create an environment for entrepreneurs in the community to satisfy community needs through occupational training.

Poverty Alleviation

The contributions that AAP makes towards infrastructure provision and poverty eradication within the mine community is a function of the mine's Local Economic Development (LED) programme. This in turn is as far as possible aligned with the Integrated Development Plans (IDPs) of the Thabazimbi and Moses Kotane Local Municipalities. The LED programme is comprised of over 30 projects, directed towards poverty alleviation, basic infrastructure, education, health and social development, informal settlements. The LED programme also incorporates physical support, social support, community capacity-building and governance. AAP's LED programme will focus on sustainable development as a means to underpin economic empowerment. The core tenet underlying the programme will be social stability. The programme concentrates on building partnerships, in which the mine and its stakeholders commit jointly to projects that are mutually

beneficial and add value to the provinces and communities in which the LED programme operates. This will require an on-going process of consultation with the communities and Government. One of the major focuses of the LED programme is housing.

HIV/AIDS

AAP signed an HIV/AIDS agreement with representative trade unions in November 2002; this was reviewed and revised in 2006. The negotiated agreement encourages a partnership between AAP and its stakeholders to develop and maintain responsible and effective programmes that minimise the impact of HIV/AIDS in the workplace. AAP are also committed to providing information, education and training in the workplace to all job categories to ensure adequate understanding of the complexities of HIV/AIDS and to facilitate good working relationships with colleagues who are infected and/or affected. AAP will continue to provide workers with access to a comprehensive care, management and treatment support programme for HIV/AIDS as well as related infections.

Housing and Nutrition

The contributions that AAP makes towards infrastructure provision and poverty eradication within the mine community is a function of the mine's LED programme. This in turn is as far as possible aligned with the IDPs of the Thabazimbi and Moses Kotane Local Municipalities.

The LED programme incorporates physical support, social support, community capacity-building and governance. AAP's LED programme will focus on sustainable development as a means to underpin economic empowerment. The housing strategy from National Government is that houses should be built in sustainable towns and not in mine villages. Thabazimbi and Northam were identified by National Government as a growth point in the Area. AAP has adopted the same strategy and that is to build houses in sustainable towns and refrain from building in either new or existing mine villages. However, it would be possible to go against the adopted housing policies and to build houses in existing mine villages if it can be motivated that there are no serviced stands available in the identified towns and that the mine is forced to build on mine for having serviced stands available.

AAP's housing strategy will address housing and living conditions in the context of both mine community development and employee accommodation. AAP's primary strategy in the provision of nutrition to mineworkers is to ensure that the food served to the workforce represents a balanced meal plan according to nationally determined standards. In addition, consumables will be fresh and free from contamination, and the meals will be tasty.

15.5 Objectives and Goals Relating to Mine Closure

All structures erected on the CRP area will be used for the duration of mining activities. Should the necessity reveal itself for partial closure, the relevant rehabilitation measures will be taken and an application will be made in terms of the regulations in force at the time. The aspects discussed in this section will be formalised in a Closure Plan prepared in accordance with the requirements of the MPRDA and in discussion with the DMR which will be compiled and updated on an on-going basis.

15.5.1 Objectives

The closure objectives with regard to the Amandelbult CRP project will be in line with the Mine's closure objectives. The Mine's closure objectives which are aligned with MPRDA principles for closure are as follows:

- The closure of a mining operation incorporates a process which must start at the commencement of the operation and continue throughout the life of the operations;
- Risks pertaining to the environmental impacts must be quantified and management pro-actively, which includes the gathering of relevant information throughout the life of a mining operation;
- The safety and health requirements in terms of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) are complied with;
- Residual and possible latent environmental impacts are identified and quantified;
- The land is rehabilitated, as far as is practicable, to its natural state, or to a potential to meet grazing land use which conforms with the concept of sustainable development; and
- Mine operations are closed efficiently and cost effectively.

15.5.2 Goals

The overall goal for closure is to rehabilitate all of the disturbed land surfaces to a predetermined land capability.

Closure Plan

A closure plan for the CRP should be compiled and incorporated into the overall mine closure plan. the closure plan should be reviewed annually. The following activities should be included in the closure plan:

- The closure costs (demolition, removal, re-shaping and rehabilitation quotes per key quantity) for each facility must be included in the database so that the total closure cost can be determined;
- All facilities that become redundant during the life of the mine must be rehabilitated concurrently to lighten the rehabilitation process at the end of the mine's life;
- Attention must be paid to the latest developments in the mine rehabilitation sciences;
- Rehabilitation should be done as soon as possible, and be on-going to ensure that the rehabilitation work required is kept to a minimum at the end of the life of the mine;
- Ensure that the area is free draining;
- Ensure that self-succession / sustainability of flora has been implemented;
- Ensure that all slopes are safe in the long term;
- Submission of closure report and application for closure to the authorities; and
- Environmental monitoring and maintenance for three years after closure.

Specific goals regarding rehabilitation of components associated with the proposed Amandelbult CRP, which are aligned with the current closure objectives according to the 2012 Closure Liability Assessment prepared for the Amandelbult Section, include the following:

Infrastructure, Railway Line and Siding

- All vehicles, plant and workshop equipment will be removed for salvage or resale;
- All fixed assets that can be profitably removed will be removed for salvage or resale;
- Any item that has no salvage value to the mine but could be of value to individuals will be treated as waste;
- All structures will be demolished, terracing removed and foundations demolished to 0.5 m below the original ground level;
- The excavations will be filled in with soil, the top 0.15 m being topsoil (from existing stockpiles on site);
- Inert ceramics such as bricks, concrete, gravel etc. will be used as backfill or disposed of in a permitted waste disposal site;
- Inert waste, which is more than 0.5 m underground, such as pipes will be left in place;
- Inert ceramic and buried waste with a salvage value to individuals such as scrap metal, building materials, etc. will be removed and disposed of at a proper facility;
- All disturbed and exposed surfaces will be covered with at least 0.15 m of topsoil and re-vegetation must be allowed to take place naturally;
- Dismantle and remove redundant fencing for salvage;
- Demolish all concrete fence foundations to 0.5 m below the original ground level;
- Cover the fence line with topsoil;
- All services like the water supply line and the power line will be demolished only for the section on the mine's property;
- The contractor laydown area will be demolished and rehabilitated

Final Rehabilitation of Mine Roads

- The following activities will take place as part of the final rehabilitation of the mine roads:
    - The gravel haul roads will be ripped, covered with 0.15m of topsoil and re-vegetated;
    - Paved roads will be ripped up, the wearing coarse treated as waste and the sub-base ripped or ploughed and covered with 0.15m topsoil; and
    - All excavations, including old foundations, cut lines, pitting sites, excavations, quarries and borrow areas, are to be filled with rubble and/or inert waste. The final profile of the fill must be convex so that drainage is radially outwards.
    - Soil must be scraped from the immediate vicinity and used to cover the rock and rubble, where after re-vegetation must be allowed to take place naturally.

Maintenance

The aim of the maintenance measures are to ensure that the area affected by the development is rehabilitated according to the closure plan and to apply for closure. The objective is for the area to be rehabilitated sustainability (ensuring self-succession of plants and the associated return of natural wildlife; as well as the improvement of the natural watercourses and groundwater systems). The following maintenance measures will be implemented as part of the closure and post-closure process:

- All natural physical, chemical and biological processes for which a closure condition has been specified must be monitored until they reach a steady state or for three years after closure or as long as deemed necessary at the time. Such processes include erosion of the rehabilitated surfaces, surface water drainage, air quality, surface water quality, groundwater quality, vegetative re-growth, weed encroachment and colonization by wildlife;
- Measures must be implemented to curb environmental impacts and to ensure that they do not worsen/accumulate over time; and
- All rehabilitated areas will be monitored and maintained until such time as required to enable the mine to apply for closure of these different areas.

16 FINANCIAL PROVISION

In order to ensure that AAP provides sufficient funds for the total quantum to cover the rehabilitation, management and remediation of negative environmental impacts associated with the proposed CRP project, the quantum for closure-related financial provision in terms of Section 41 and Regulation 54 of the MPRDA has been determined, which will need to be incorporated into the overall quantum for closure-related financial provision for the mine.

The rates were calculated using the recommended DMR rates for closure cost components (updated as of 2012). The "Rules-Based Approach" for determination of the Quantum for Closure-Related Financial Provision as per the 2005 DMR Guideline was used to determine the Quantum of Financial Provision. As per the guideline the following factors were addressed:

Determination of the primary mineral and saleable by-products - The mineral to be mined is chrome.

Determination of risk class - The Primary Risk or Hazard is Class C (Low Risk).

Determination of the sensitivity of the area - The sensitivity of the area was found to be Low. The following sensitivity criteria apply: the area is largely disturbed from natural state; the local communities are not within sighting distance of the mining operation; the area is peri-urban with density aligned within a development framework; the economic activity will be influenced as the activities associated with the proposed CRP project will result in an increase in income for the existing mine.

Determination of the level of information - The information available for the proposed operations is classed as extensive. As this project is an extension of existing mining operations it is an amendment to an existing EIA.

Determination of the closure components - the following closure components were identified for rehabilitation:

- Rehabilitation of the chrome recovery plant area;
- Demolition of steel buildings and structures;
- Demolition reinforced concrete buildings and structures;
- Rehabilitation of the access road and railway line extension;
- General surface rehabilitation of all denuded areas;
- Demolition of water management structures (trenches, sumps and berms) will be accounted for under concrete structures there will be no residual dirty water at closure;
- Removal of fencing; and
- 2-3 years of maintenance and aftercare of all areas which may be affected by the operations, which includes vegetation succession monitoring.

Determination and application of weighting factors - Two weighting factors relevant to the mine location are applied to the closure costs. The first weighting factor is the nature of the terrain. The nature of the terrain is relatively flat. The first weighting factor is therefore 1.00. The second weighting factor relates to the proximity of the mine to an urban centre. The proposed site is within the existing Amandelbult surface right area and falls within a mining footprint. The proposed

site is located approximately 7 km east of the Setaria Village, 2.5 km South of the Northam Mine Village, 5 km South West of the Amandelbult Township, 6 km north west of Smash Block and 6 km north west of Chromite Village in the Limpopo Province and is therefore classed as peri-urban (less than 150 km from an urban centre), to which a weighting factor of 1.05 applies.

Identification of areas of disturbance - Areas, volumes and lengths of possible disturbances and developments and each applicable closure component were identified and calculated using the mine's plot plan as well as through site visits to assess the local conditions.

Refer to the financial provision Table 35. Sub-Total 1 refers to the cost for final closure of the mine and assumes that the mine will undertake the closure and rehabilitation work themselves, and excludes VAT. The current environmental liability or "Grand Total" specified in the table, assumes that the rehabilitation work will be undertaken by a third party, and therefore includes VAT.

The following values were calculated:

Quantum for 2013

Sub-Total 1 (final closure): **R6 972 101.51** (excl. VAT).

Grand Total (premature closure): **R 9 696 798.78** (incl. VAT).

Table 35: Financial Provision for the Amandelbult CRP

MPRDA Regulation 41(3) Calculation of the Quantum for Closure Related Financial Provision - Base Case	
Site/Facility Name	Amandelbult Crome Recovery Plant
Mineral Mined/Saleable By-product	Chrome
Primary Risk Class	Class C - Low Risk
Area Sensitivity	Low (Determines multiplication factor for 6, 8(C) and 13)
Level of Information Available	Extensive
Closure Components, Closure Costs and Weighting Factors	As below

Closure Component No.	Main Description (as per DME Guideline)	Relevant Component On-site (Description)	Unit	Master Rates as per DMR, 2012	Quantity	Multiplication Factor	Nature of Terrain / Relevant Weighting Factor *Flat = 1*	Amount
1	Processing Plant	Includes provision for dissassembly and removal of chrome recovery plant infrastructure (incl. foundations, structures and conveyors) to ground level. Also incl. breaking down of any concrete buildings / structures at plant (& concrete hard-stand areas between buildings) to ground level and disposal to voids on-site.	m^3	R 10.87	66780.00	1	1	R 725 901.53
2(A)	Demolition of steel buildings and structures	Includes steel elements of offices, laboratory, workshop, change house, control room, railway siding, transformer bay and MCC building.	m^2	R 151.42	8963.28	1	1	R 1 357 180.12
2(B)	Demolition of reinforced concrete buildings and structures	Includes hardstanding areas of the offices, change house, control room, laboratory, workshop, railway siding, transformer bay and MCC building, the concrete bunding of the stockpile area as well as the concrete structures of the water management system (sumps, trenches. etc)	m^2	R 223.14	20143.28	1	1	R 4 494 745.93
3	Rehabilitation of access roads	Includes the access road.	m^2	R 27.10	8000.00	1	1	R 216 763.34
4(A)	Electrified railway lines	Includes the railway extension and the servitude.	m	R 262.98	0.00	1	1	R 0.00
4(B)	Non-electrified railway line extenion and servitude		m	R 143.45	1530.00	1	1	R 219 472.88
5	Demolition of housing and facilities	None	m^2	R 302.83	0.00	1	1	R 0.00
6	Opencast rehabilitation including final voids and ramps	None	ha	R 158 747.27	0.00	0.04	1	R 0.00
7	Sealing of shafts, adits and inclines	Underground mining will occur through the extension of the existing underground workings therefore there will be no shafts, adits or inclines requiring rehabilitation for this project.	m^3	R 81.29	0.00	1	1	R 0.00
8(A)	Rehabilitation of overburden and spoils	None	ha	R 105 831.51	0.00	1	1	R 0.00
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	None	ha	R 131 811.24	0.00	1	1	R 0.00
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	None	ha	R 382 842.31	0.00	1	1	R 0.00
9	Rehabilitation of the potential subsided areas	None	ha	R 88 617.95	0.00	1	1	R 0.00
10	General surface rehabilitation, including grassing of all denuded areas	Includes general surface rehabilitation of all denuded areas where the chrome recovery plant, offices, change house, control room, laboratory, workshop, stockpile area, railway siding, transformer bay and MCC building were located.	ha	R 83 836.41	2.23	1	1	R 186 955.19
11	River diversions	None	ha	R 83 836.41	0.00	1	1	R 0.00
12	Fencing	Fencing around the CRP and stockpile area.	m	R 95.63	1465.00	1	1	R 140 099.25
13	Water management	There will be no residual dirty water at closure. The components of the dirty water management system (berms, trenches, sumps and hardstanding areas, have been accounted for under demolition of concrete	ha	R 31 876.96	0.00	0.17	1	R 0.00
14	2-3 years of maintenance and aftercare	Includes vegetation succession monitoring of rehabilitated areas.	ha	R 11 156.94	2.23	1	1	R 24 879.97
							SUM OF CLOSURE COMPONENT COSTS	R 6 640 096.67
							SUBTOTAL 1 = (SUM OF CLOSURE COMPONENT COSTS) X (WEIGHTING FACTOR 2 = 1.05)	**R 6 972 101.51**
							PRELIMINARY AND GENERAL MANAGEMENT = 12% OF SUBTOTAL 1	R 836 652.18
							CONTINGENCIES = 10% OF SUBTOTAL 1	R 697 210.15
							SUBTOTAL 2 = (SUBTOTAL 1) + (PRELIMINARY AND GENERAL MANAGEMENT) + CONTINGENCY	R 8 505 963.84
							SUBTOTAL 3 = SUBTOTAL 2 EXCLUSIVE OF VAT AT 14%	R 8 505 963.84
							VAT = 14% OF SUBTOTAL 3	R 1 190 834.94
							GRAND TOTAL = SUBTOTAL 3 + VAT	**R 9 696 798.78**

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