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DRAFT ENVIRONMENTAL IMPACT REPORT / ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE WATERVAL RETROFIT E FEED PROJECT (DEDECT REF NO. NWP/EIA/73/2012) (DMR REF NO. R20130514)

Rustenburg Platinum Mines Limited

Volume I

2013/10/21

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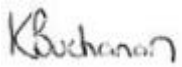
Signature				
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DRAFT ENVIRONMENTAL IMPACT REPORT / ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE WATERVAL RETROFIT E FEED PROJECT (LEDET REF NO. NWP/EIA/73/2012) (DMR REF NO. R20130514)

Rustenburg Platinum Mines Limited

2013/10/21

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Undertaking

I, _____, the undersigned and duly authorized thereto, by Anglo American Platinum Limited, have studied the contents of the Environmental Management Programme (EMP) Amendment Report for the Waterval Retrofit E Feed Project and signed by me under today's date, duly undertake to adhere to the conditions as set out herein, unless otherwise agreed to.

Signed at the _____ on this the _____ day of_____ 2013

_____

SIGNATURE OF APPLICANT

Approved in terms of Section 102 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)

Signed at _____on this_____ day of _____2013

_____.

REGIONAL MANAGER: MINERAL DEVELOPMENT NORTH WEST REGION

Abbreviations and Acronyms

Abbreviation / Acronym	Description
AAP	Anglo American Platinum
ADMS	Atmospheric Dispersion Modelling System
APPA	Atmospheric Pollution Prevention (No. Act of 1965)
AQIA	Air Quality Impact Assessment
BA	Basic Assessment
BGG	Burial Grounds and Graves Unit
CARA	Conservation of Agricultural Resources Act (No. 43 of 1983)
CBD	Convention on Biological Diversity
CED	Community engagement department
DEDECT	North West Economic Development, Environment and Tourism
DM	District Municipality
DMR	Department of Mineral Resources
EC	Electrical conductivity
EIA	Environmental impact assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
EMPR	Environmental Management Programme Report
EMS	Environmental Management System
ENE	East north east
FEPA	Freshwater Ecosystem Priority Areas
g/t	Grams per ton
GDP	Gross Domestic Product
GHS	Globally Harmonised System
GNR	Government Notice Regulation
GPS	Global Positioning System
ha	Hectare
HAS	Hazardous Substance Act (No. 15 of 1973)
HGM	Hydro geomorphic
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
IUCN	International Union for Conservation of Nature
IWUL	Integrated water use licence
IWWMP	Integrated water and waste management plan
kt/m	Kilo ton per month
kW	Kilowatt

Abbreviation / Acronym	Description
LDV	Light duty vehicles
LOS	Level of service
LM	Local Municipality
MAR	Mean Annual Runoff
masl	Metres above sea level
MHSA	Mine Health and Safety Act (No. 29 of 1996)
MIG	Main Stream Inert Grind
MPRDA	Minerals and Petroleum Resources Development Act (No. 28 of 2002)
MSDS	Material safety data sheets
Mt	Million tons
NEM:AQA	National Environmental Management Air Quality Act (No. 39 of 2004)
NEM:BA	National Environmental Management Biodiversity Act (No. 10 of 2004)
NEM:WA	National Environmental Management Waste Act (No. 59 of 2008)
NEMA	National Environmental Management Act (No. 107 of 1998)
NHRA	The National Heritage Resources Act (No. 25 of 1999)
NNW	North northwest
NWA	National Water Act (No. 36 of 1998)
OHSA	Occupational Health and Safety Act (No. 85 of 1993)
PAIA	Promotion of Access to Information Act (No. 2 of 2000)
PAJA	Promotion of Administrative Justice Act (No. 3 of 2000)
PCD	Pollution control dam
PPE	Personal protective equipment
PGE	Platinum group elements
PGM	Platinum group metals
RBA	Royal Bafokeng Administration
RBN	Royal Bafokeng Nation
PM	Particulate matter
PMR	Precious Metals Refinery
RBMR	Rustenburg Base Metals Refinery
RPM	Rustenburg Platinum Mines
RWD	Return water dam
RWQO	Resource Water Quality Objectives
S&EIR	Scoping and Environmental Impact Reporting
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SAR	Sodium adsorption ration

Abbreviation / Acronym	Description
SAWS	South African Weather Service
SDF	Spatial Development Framework
SHEQ	Safety, Health, Environment, and Quality
SIA	Social Impact Assessment
SLP	Social and Labour Plan
SMME	Small, Medium and Micro Enterprises
t	Tons
TDS	Total dissolved solids
TIA	Traffic Impact Assessment
TLB	Tractor loader backhoes
TSF	Tailings storage facilities
TSP	Total suspended particulates
TLB	Tractor loader backhoes
UG2	Under Ground 2
v/c	Volume/capacity
VSP	Vertical spindle pump
WLTR	Western Limb Tailings Retreatment
WMA	Water management area
WSP	WSP Environmental (Pty) Ltd

1 Introduction

1.1 Project Background

1.1.1 Background to Rustenburg Platinum Mines

Anglo American Platinum Limited (AAP): Rustenburg Platinum Mines Limited (RPM), through its Rustenburg operations mines, processes, refines and markets platinum and other platinum group metals (PGMs), as well as base metals. The intent to maintain the production of PGMs at its Rustenberg operations is aligned with AAP's objective of remaining the leading producer of primary PGMs in the world.

RPM comprises the following mining, processing and reclamation operations:

- Mining
  - Khuseleka Mine;
  - Thembelani Mine;
  - Khomanani Mine;
  - Siphumelele Mine; and
  - Bathopele Mine.
- Processing and refining
  - Waterval Concentrator and Underground 2 (UG2) Concentrator;
  - Waterval Smelter and ACP;
  - Rustenburg Base Metals Refinery; and
  - Precious Metals Refinery.
- Tailings storage facilities (TSFs)
  - Paardekraal TSF;
  - Klipfontein TSF (undergoing re-mining);
  - Waterval East TSF (dormant);
  - Waterval West TSF (dormant); and
  - Hoedspruit TSF.

The two platinum bearing ore bodies currently being exploited by RPM are the Merensky Reef and the UG2 Chromitite. The Merensky Reef comprises of feldspathic pegmatoidal pyroxenite, bounded by thin Chromitite bands.

1.1.2 The Proposed Project

RPM commenced with the re-mining of the Klipfontein TSF at the Western Limb Tailings Retreatment (WLTR) Plant in December 2003, following the necessary environmental authorisation (Department of Mineral Resources (DMR) Reference Number: RNW(KL) 6/2/2/3164, Environmental Management Programme Report (EMPR), Envirolink, 2002) . The initial authorisation included the reclamation and re-mining of the Waterval East and West TSFs. However, the Waterval component of the project was put on hold at the time. The WLTR Plant is currently processing reclaimed material from the Klipfontein TSF only, at a rate of 450kt/m. The Klipfontein TSF will be depleted by mid-2015. RPM now intends to implement the Waterval re-mining phase (this Project), namely the Waterval Retrofit E-Feed Project, as was previously intended.

The Project comprises the reclamation of the East and West TSFs of the Waterval TSF and conveyance of the material to either the existing Waterval Retrofit Concentrator for re-mining, including associated infrastructure (**Option A, Figure 1**), or to the WLTR Plant, including associated infrastructure (**Option B, Figure 1)**.

The **Option A** will involve:

- Hydraulic re-mining;
- A pump station;
- Overland slurry and return water pipes;
- Processing of tailings at the existing Waterval Retrofit Concentrator; and
- Storage of resulting tailings at the existing Paardekraal TSF.

The **Option B** will involve:

- Hydraulic re-mining;
- A pre-treatment station;
- Overland slurry and return water pipes;
- A booster station;
- Processing of tailings at the existing WLTR Plant; and
- Storage of resulting tailings at the existing Hoedspruit TSF.

The material at the East and West TSFs was deposited between the 1960s and 1980s, a period during which the RPM operations treated only Merensky reef. As a result, there is still significant opportunity for metal recovery from these dormant TSFs through improved grinding (and liberation) and additional residence time during flotation to target slower floating mineral species such as pyrrhotite and pentlandite.

1.1.3 Project Location

The Project will be situated on the RPM lease area in the Rustenburg Local Municipality (LM). **Table 1** provides information on the project site in relation to surrounding towns.

Table 1: Details of Location Setting

Aspect	Detail
Magisterial district and local municipality	Rustenburg Local Municipality
	Bojanala Platinum District Municipality
Directions and distances to surrounding towns	Rustenburg: 20km west
	Brits: 60km west
	Pretoria: 110km east
	Johannesburg: 140km southeast
	Thabazimbi: 150km north
Roads, railway lines and power lines in vicinity	Roads: R108, R27, R30, R510, R24
	Railways: SATS to Pretoria and Thabazimbi
Surface Water in Crocodile Catchment Area	Hex River
	Elandsrivier
	Klipfonteinspruit
	Hoedspruit
	Klipgatspruit

1.2 Land Ownership

RPM is the holder of the mining right for the properties within the mine lease area (**Figure 4**). Surface ownership and information pertaining to the properties (i.e. portion number, title deed number and landowner) are presented in **Table 2** below.

Table 2: Land Ownership

Farm Name	Portion	SG 21	Land Owner
Waterval 303 JQ	19	T0JQ00000000030300019	RPM
Waterval 303 JQ	Remainder	T0JQ00000000030300000	RPM
Waterval 303 JQ	10	T0JQ00000000030300010	RPM
Waterval 303 JQ	13	T0JQ00000000030300013	RPM
Waterval 303 JQ	50	T0JQ00000000030300050	RPM
Waterval 303 JQ	15	T0JQ00000000030300015	RPM
Waterval 303 JQ	47	T0JQ00000000030300047	RPM/RLM
Klipfontein 300 JQ	6	T0JQ00000000030000006	Makhatle Tribe (RBH)
Klipgat 279 JQ	27	T0JQ00000000027900027	RPM
Klipgat 281 JQ	0	T0JQ00000000028100000	RPM
Hoedspruit 298 JQ	19	T0JQ00000000029800019	RPM
Hoedspruit 298 JQ	5	T0JQ00000000029800000	RBH
Hoedspruit 298 JQ	Remainder (formerly Portion 4)	T0JQ00000000029800000	Fike Trust (RBH)
Turfontein 302 JQ	0	T0JQ00000000030200000	RBH
Brackspruit 299 JQ	7	T0JQ00000000029900007	RPM
Anglo Tailings 942 JQ	Formerly Portion 18 of Hoedspruit 298	T0JQ00000000029800018	RPM

1.3 Terms of Reference

Prior to the commencement of the Project, environmental authorisation will need to be obtained in accordance with the National Environmental Management Act (No. 107 of 1998) as amended (NEMA), and the Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA). In terms of these Acts and their regulations, RPM must undertake an EMP Amendment process, which involves a scoping and environmental impact reporting process (**Figure 5**).

WSP Environmental (Pty) Ltd (WSP) was appointed by RPM to undertake the environmental authorisation process for the Project that includes the compilation of this, the environmental impact report (EIR) and EMPR. This report includes the following project elements:

Option A (**Figure 2**)**:**

- Re-mining of the East and West Waterval TSFs on the farm Waterval 303 JQ.
- Construction of an above ground slurry pipe across farm Waterval 303 JQ.
- Construction of an above ground return water pipe across farms Waterval 303 JQ.
- Processing at the Waterval Retrofit Concentrator farm Waterval 303 JQ
- Disposal of waste tailings on Paardekraal TSF and its expansion to accommodate the increased volume of tailings on the farms Klipgat 279 JQ and Klipgat 281 JQ.

Option B (**Figure 3**)**:**

- Re-mining of the East and West Waterval TSFs farm Waterval 303 JQ.

- Construction of an above ground slurry pipe across farms Waterval 303 JQ, Turfontein 302 JQ, Klipfontein 300 JQ and Hoedspruit 298 JQ.
- Construction of an above ground return water pipe across farms Waterval 303 JQ, Turfontein 302 JQ, Klipfontein 300 JQ and Hoedspruit 298 JQ .
- Processing at the WLTR Plant on the farm Hoedspruit 298 JQ.
- Disposal of waste tailings on Hoedspruit TSF and its expansion to accommodate the increased volume of tailings on the farm Hoedspruit 298 JQ.

1.4 Decision Making Authority

The North West DMR is the delegated lead authority responsible for the decision-making process in accordance with the MPRDA. The North West Economic Development, Environment and Tourism Department (DEDECT) will be the delegated lead authority responsible for the decision-making process in accordance with the NEMA.

1.5 Project Proponent

The proponent, RPM, is owned by AAP, the world's leading primary producer of PGMs and accounts for approximately 40% of the world's newly mined platinum. The company is listed on the Johannesburg Stock Exchange and has its headquarters in Johannesburg, South Africa. One of AAPs' main operating mines is the RPM (http://www.angloplatinum.com/default.asp, date accessed: 22 May 2013).

Relevant contact details of the Project proponent are included in **Table 3** below.

Table 3: Project Applicant Details

Detail	Rustenburg Platinum Mines Limited
DMR Reference Number	RNW(KL) 6/2/2/3164
Contact Person	Mr Danie Vermaak
Postal Address:	PO Box 8208, Rustenburg, 0300
Telephone:	014 598 3422
Fax:	014 598 1153
E-mail:	danie.vermaak@angloamerican.com
Mine Owner	Anglo American Platinum Limited
Project Manager	Mr Pierre Malan

Contact details for the responsible person at RPM are provided in **Table 4** below:

Table 4: Details of the Responsible Person for the Project

Detail	Rustenburg Platinum Mines Limited
Responsible Person:	Gerrit van de Linde
Physical Address:	Corporate Office 60 Main Street Johannesburg, 2001
Telephone:	+27 (0) 11 373 6999
Fax:	None
E-mail:	Gerrit.vandelinde@angloamerican.com

1.6 Environmental Assessment Practitioner

WSP Environmental (Pty) Ltd (WSP) is a subsidiary of global consulting group Genivar-WSP Group, one of the world's leading engineering professional services firms. Genivar-WSP Group has 14,500 employees, including engineers, scientists, planners, project managers, technicians, environmental experts and other specialists, based in more than 300 offices, across 35 countries.

WSP is a leading South African environmental consultancy with a broad range of expertise and over 20 years' experience in the regional environmental market. WSP is committed to transformation in its operational region, with 26% Broad Based Black Economic Empowerment ownership and having achieved Level 3 Broad Based Black Economic Empowerment in South Africa. As part of a global business, WSP provides the regional marketplace with a dynamic blend of local and global expertise.

Table 5 provides the details of the environmental assessment practitioner.

Table 5: Environmental Assessment Practitioner Details

Environmental Assessment Practitioner	**WSP Environmental (Pty) Ltd**
Contact person:	Kim Allan
Physical address:	199 Bryanston Drive, Bryanston, 2021
Postal address:	PO Box 5384, Rivonia, 2128
Telephone:	+ 27 (0) 11 361 1376
Fax:	+ 27 (0) 86 532 8686
E-mail:	Kim.Allan@WSPGroup.co.za

Neither WSP nor its employees has, had or will have any financial or other interest in the RPM, or in AAP or its parent company, other than the payment of our normal consulting fees as agreed with the Client, prior to commencement of this project. Payments of WSPs consulting fees are not dependent on the receipt of an environmental authorisation (positive or negative) from the DEDECT or the DMR or any other government agency involved in the Project. Revenue derived from this project constitutes less than 50% of WSP' total annual revenue.

1.7 Report Structure

This draft environmental impact report (EIR) / EMPR has been compiled in accordance with the NEMA EIA Regulations (Government Notice Regulation (GNR) 543 of 2010) and the MPRDA Regulations (GNR 527 of 2004).

The draft EIR / EMPR has been compiled in a diligent and independent manner, and includes the following:

- An introduction to the Project, the Project proponent, and the environmental assessment practitioner (**Section 1**);
- Summary of relevant environmental legislation applicable to the Project (**Section 2**);
- Approach and methodology applied (**Section 3**);
- Motivation for the Project (**Section 4**);
- Detailed Project description (**Section 5**);
- Assessment of Project alternatives including 'no-go' alternatives (**Section 6**);
- Description of the pre-project environmental baseline in the Project area (**Section 7**);
- Summaries of specialist studies completed for the Project (**Section 8**);
- Description of the stakeholder engagement process undertaken for the Project and issues arising therefrom (**Section 9**);
- Environmental and socio-economic impact assessment (**Section 10**);

- Environmental management programme (EMP) for the Project (**Section 11**);
- Implementation plan for the EMP for the Project (**Section 12**);
- Closure and rehabilitation plan for the Project (**Section 13**);
- Knowledge gaps and adequacy of the predictive methods (**Section 14**); and
- Conclusion (**Section 15**).

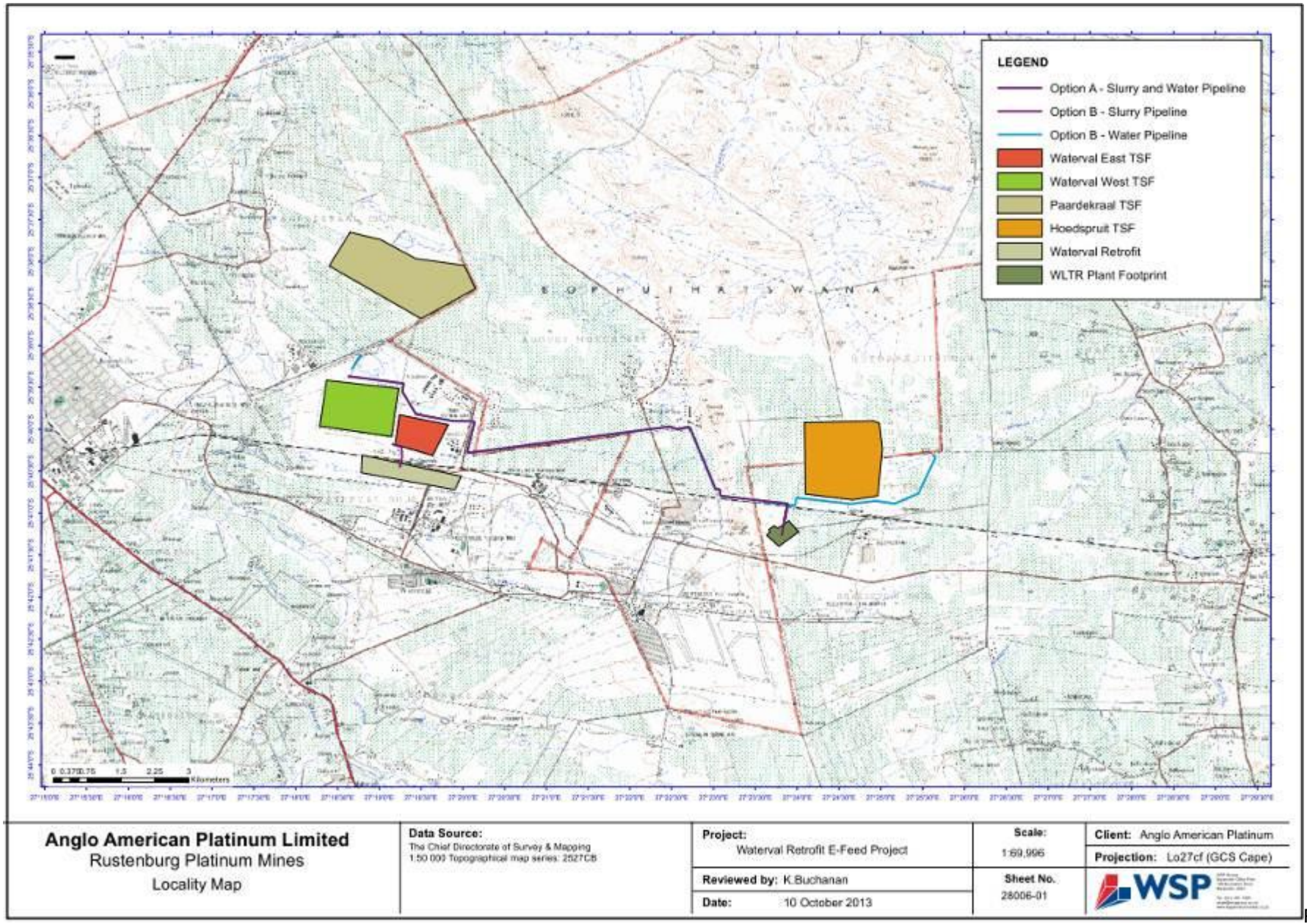


Figure 1: Locality Map - Waterval Retrofit E-Feed Project

Figure 2: Waterval Retrofit E-Feed Project - Option A

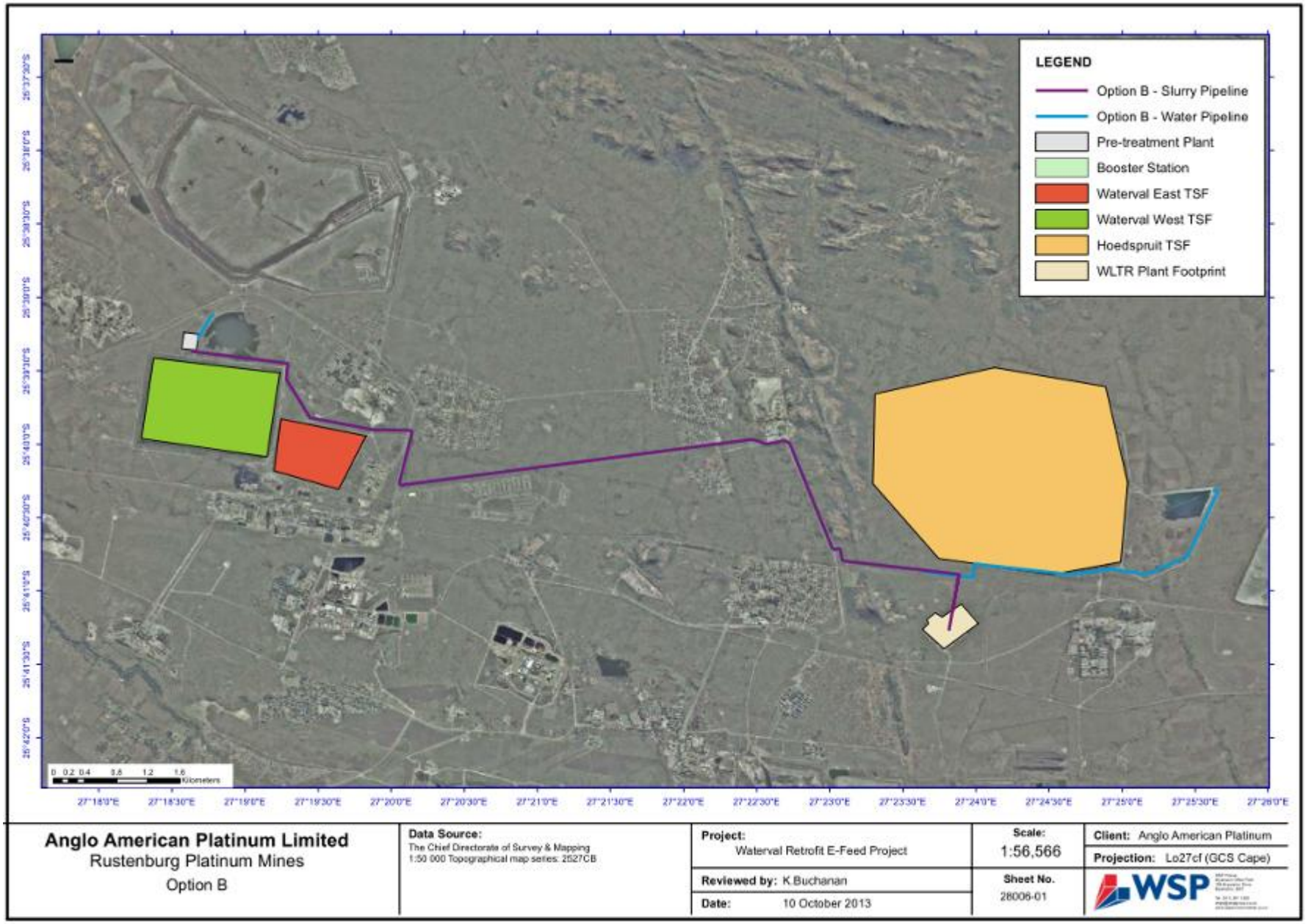


Figure 3: Waterval Retrofit E-Feed Project - Option B

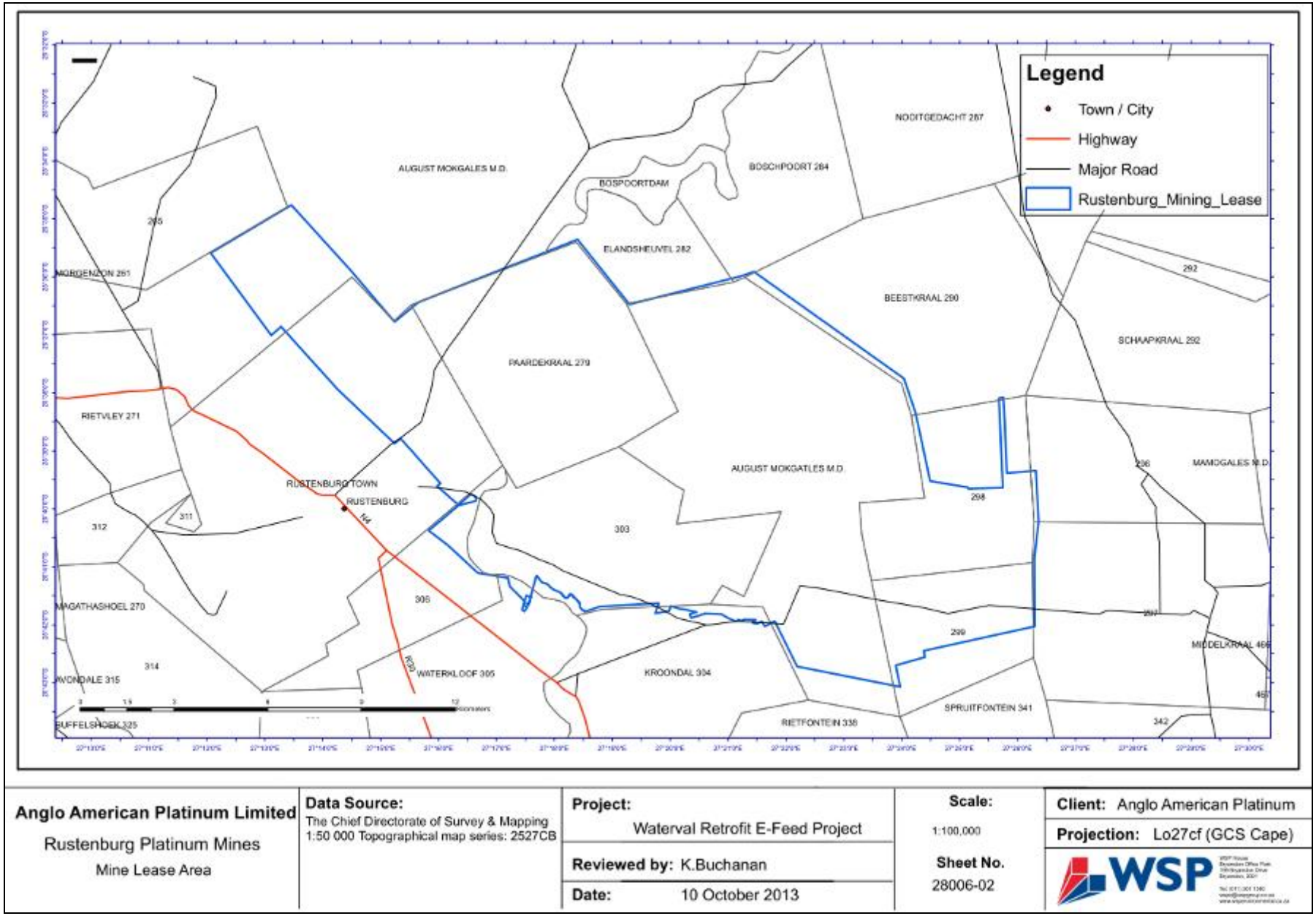


Figure 4: RPM Lease Area

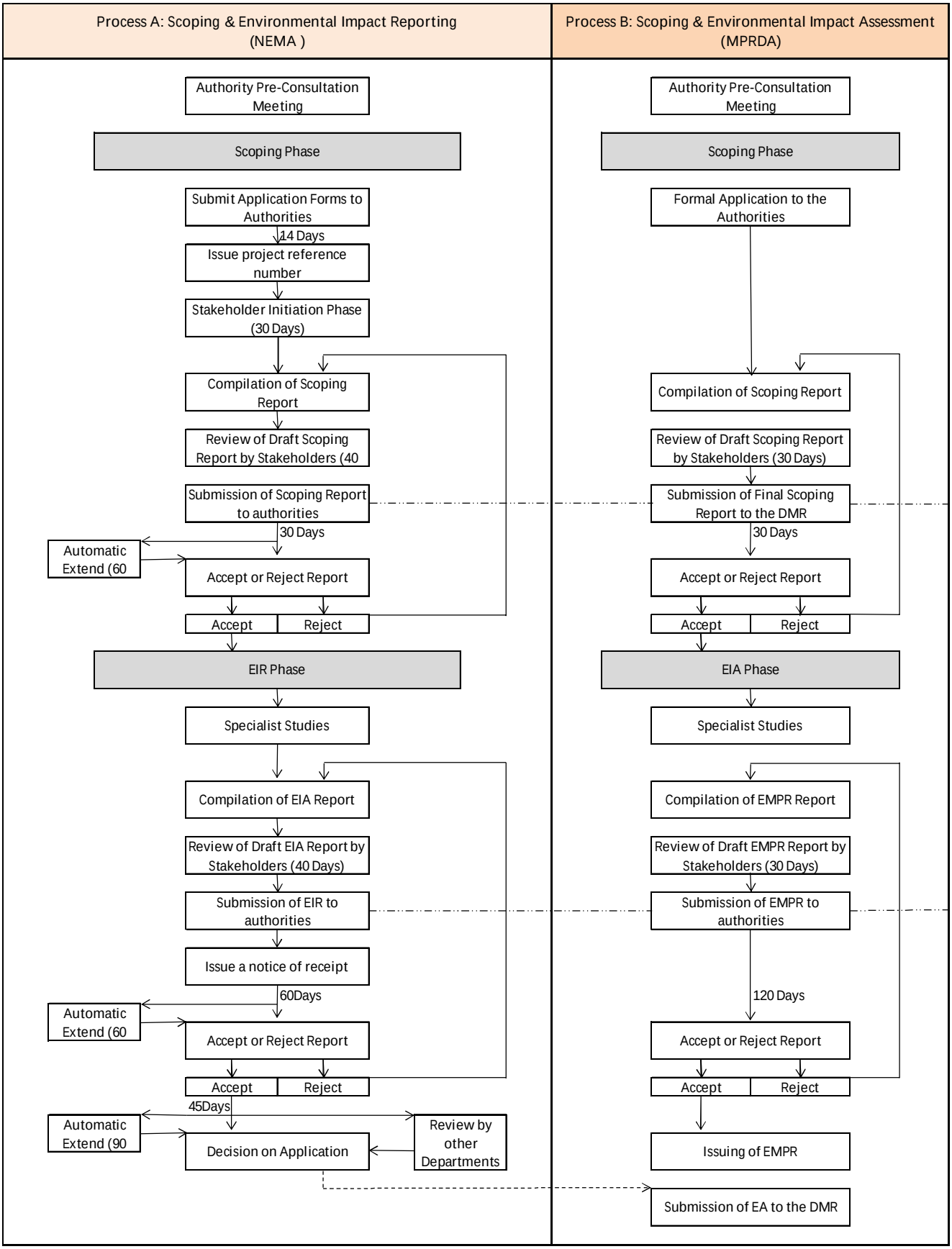


Figure 5: Authorisation processes

2 Governance Framework

The environmental legislation applicable to the Project includes, but is not limited to, the following:

- The Constitution of the Republic of South Africa (No. 108 of 1996);
- Minerals and Petroleum Resources Development Act (No. 28 of 2002);
- National Environmental Management Act (No. 107 of 1998);
- National Water Act (No. 36 of 1998) (NWA);
- Mine Health and Safety Act (No. 29 of 1996) (MHSA);
- National Environmental Management Biodiversity Act (No. 10 of 2004) (NEM:BA);
- National Environmental Management Air Quality Act (No. 39 of 2004) (NEM:AQA);
- National Environmental Management Waste Act (No. 59 of 2008) (NEM:WA);
- The National Heritage Resources Act (No. 25 of 1999) (NHRA);
- Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA);
- Hazardous Substance Act (No. 15 of 1973) (HSA);
- Occupational Health and Safety Act (No. 85 of 1993) (OHSA);
- Promotion of Access to Information Act (No. 2 of 2000) (PAIA);
- Promotion of Administrative Justice Act (No. 3 of 2000) (PAJA); and
- Other guideline documentation.

2.1 The Constitution of South African (No. 108 of 1996)

The Constitution of South Africa provides for an environmental right (contained in the Bill of Rights, Chapter 2) and includes implications for environmental management. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental right. The environmental right states that:

"*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*."

2.2 Minerals and Petroleum Resources Development Act (No. 28 of 2002)

The main objective of the MPRDA is to recognise the sovereignty of the State over all the mineral and petroleum resources in South Africa and to promote equitable access to the country's mineral and petroleum resources. The MPRDA specifically allows for previously disadvantaged persons to enter the minerals and petroleum industry and to benefit from the exploitation of the country's minerals.

The Act ensures that holders of existing and new mining and production rights contribute towards the social and economic development of the areas in which they operate, promoting economic growth, employment and the advance the social and economic welfare of all South Africans.

Although RPM has a mining right under the MPRDA and an approved EMPR, certain activities of the re-mining, that is, the Waterval Retrofit E-Feed Project, are not included therein. The re-mining of the Waterval TSFs and Klipfontein TSF and associated infrastructure (pipelines, WLTR, Hoedspruit TSF) were authorised by the DMR as part of an amendment to the existing EMPR in 2002 (Envirolink, 2002). Although authorised, the re-mining of the Waterval tailings has not yet commenced. Recent changes to infrastructure and the layout of the Waterval component of the project dictate that the EMPR is to be amended again.

In accordance with section 102 (amendment of rights, permits, programmes and plans) of the MPRDA, an EMPR amendment is required. The process leading to approval of such EMPR Amendment includes description of the project area environmental baseline, the identification of environmental and socio-economic impacts and the development of mitigation measures to alleviate negative impacts associated with the project. This is all compiled into reports that are submitted for approval (Scoping Report and the EIR/EMPR) to the competent authority. Part 3, Sections 49 – 52 of the MPRDA further defines the reporting requirements when undertaking and EMPR amendment process. To ensure a diligent environmental authorisation process is completed, the said statutory requirements have been included and incorporated into the EMPR Amendment process and all resulting reports.

In Section 37, the MPRDA confirms that the principles set out in the NEMA apply to all prospecting and mining operations and that these operations must be carried out in accordance with the generally accepted principles of sustainable development. This is further supported by the stated objective of the MPRDA being *to "give effect to Section 24 of the Constitution by ensuring that the nation's mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development"*.

Section 38 of the MPRDA, stipulates that the general objectives of integrated environmental management must be applied in accordance with NEMA and this will include the assessment and management of impacts identified as part of the EMP process laid out in Section 39 of the MPRDA. GNR 527 specifies that the EMP must include environmental objectives and specific goals for mine closure. The applicant for a mining right must make prescribed financial provision for the rehabilitation or management of negative environmental impacts, which must be reviewed annually Section 41 of the MPRDA. GNR 527 provides principles for mine closure (Section 56 and Section 60 of the MPRDA), which state that the holder of a mining right must ensure:

- The closure of its mining operation incorporates a process which starts at the commencement of operation and continues throughout the life of mine;
- Risks pertaining to environmental impact are quantified and managed proactively, which includes gathering relevant information throughout the mine's operations;
- Health and safety requirements of the MHSA are complied with;
- Residual and possible latent environmental impacts are identified and quantified;
- The land is rehabilitated, as far as practicable, to its natural state, or to a predetermined and agreed standard or land use which conforms with the concept of sustainable development;
- Mining operations are closed efficiently and cost effectively;
- Key objectives for mine closure to guide project design development and management of environmental impacts are included in the EMPR;
- The EMPR includes broad future land use objectives; and
- The EMPR includes proposed closure costs.

As with NEMA and the NWA, there is a provision in the MPRDA (Section 45) for the DMR to direct an operation to investigate, evaluate, assess and report on the impact of any pollution or environmental degradation and take such measures as may be specified within a specified time period. If the operation fails to carry out such a directive, the DMR can initiate the necessary actions and recover the costs from RPM. In addition, Section 38 makes directors of AAP jointly and severally liable for any unacceptable negative impact on the environment.

RPM will remain responsible for any environmental liability and the management thereof, until it has been issued with a closure certificate by the DMR (Section 43). An application for closure must be made to the DMR's Regional Manager within 180 days of closure and must be accompanied by an environmental risk report. The DMR cannot issue the closure certificate unless the Chief Inspector (of Mines) and DWA have confirmed in writing that the provisions pertaining to health and safety and management of potential pollution of water resources have been adequately addressed.

2.3 National Environmental Management Act (No. 107 of 1998)

The NEMA is South Africa's framework environmental Act and has, as its primary objective, to provide for co-operative governance by establishing principles for decision making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith (Government Gazette, 1998).

The Act provides for the right to an environment that is not harmful to the health and well-being of South African citizens; the equitable distribution of natural resources, sustainable development, environmental protection and the formulation of environmental management frameworks (Government Gazette, 1998).

The NEMA ensures that specific activities are designed and implemented in a sustainable and environmentally friendly manner, thereby assisting in achieving South Africa's constitutional goal for a better quality of life for all, now and in the future. Therefore, it is essential that industries (including mines) improve the efficiency and use of resources, and improve on the level of integration of social, economic and governance systems.

The amended NEMA EIA regulations were published on 18 December 2010 in Government Gazette No. 33306, GNR 543, GNR 544, GNR 545 and GNR 546.

The EIA Regulations establish three categories of listed activities that require environmental authorisation prior to construction:

- GNR 544 identifies activities that would require environmental authorisation in the form of a Basic Assessment (BA) process prior to the commencement of that activity. BA activities pose fewer and less severe potential impacts than the next category.
- GNR 545 identifies activities that would require environmental authorisation by means of a 'full' EIA process, that is, scoping followed by detailed impact assessment, prior to the commencement of the activity.
- GNR 546 lists identified activities that require environmental authorisation in specific, identified geographical areas only.

*It should be noted that no NEMA-listed activities have been triggered with **Option A**. However, **Option B** triggers several NEMA listed activities, as detailed in the table below.*

Table 6: NEMA Listed Activities

Listed Activity	Activity description	Relevance to the Project
GNR. 544 **Activity 9 (i) (ii)**	The construction of facilities or infrastructure exceeding 1,000 metres in length for the bulk transportation of water, sewerage or stormwater- ■ With an internal diameter of 0.36 metres or more; or ■ With a peak throughput of 120 litres per second or more, Excluding where: ■ Such facilities or infrastructure are for bulk transportation of water, sewerage or stormwater or stormwater drainage inside a road reserve; or	The slurry pipeline, which will be routed between the Waterval TSF and the WLTR Plant, will be approximately 12km in length thus exceeding the threshold length of 1km stipulated in legislated listed activity.

Listed Activity	Activity description	Relevance to the Project
	Where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.	
GNR. 544 **Activity 10**	The construction of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 kV but less than 275 kV; or (ii) inside urban areas or industrial complexes with a capacity of 275 kV or more.	Power lines are to be relocated / constructed in order to bring power to a pre-treatment facility.
GNR. 544 **Activity 11 (iii)**	The construction of bridges where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	The slurry pipeline will cross a river at three different points en route to the WLTR Plant. The pipeline will cross the river by means of a bridge which will be constructed within 32m of the said watercourse. Note that the pipeline will cross the river at points where an existing air pipeline crosses the river (existing crossings).
GNR. 544 **Activity 18**	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 cubic metres from watercourse.	As above.
GNR. 544 **Activity 22**	The construction of a road, outside urban areas, ■ With a road reserve wider than 13.5 metres or, ■ Where no reserve exists where the road is wider than 8 metres.	The project will include the lay down / excavation of roads (not tarred) as supporting infrastructure to the pre-treatment plant, the booster station and the pipeline.
GNR. 544 **Activity 23**	The transformation of undeveloped, vacant or derelict land to- ■ Residential, retail, commercial, recreational, industrial or institutional use, inside an urban area, and where the total area to be transformed is 5 hectares or more, but less than 20 hectares, or ■ Residential, retail, commercial, recreational, industrial or institutional use, outside an urban area, and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares.	The mine is situated outside of an urban area. The project will involve the development of an area greater than 1 hectare.
GNR. 544 **Activity 47**	The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometre – ■ Where the existing reserve is wider than 13.5 meters; or ■ Where no reserve exists, where the existing road is wider than 8 meters – excluding widening or lengthening occurring inside urban areas.	Supporting roads which service the various existing facilities at RPM will require expansion / upgrading in order to cope with the increased traffic expected during the operational phase of the project.
GNR. 544 **Activity 6**	The construction of facilities or infrastructure for the bulk transportation of dangerous goods – ■ In gas form, outside an industrial complex, using pipelines, exceeding 1,000 metres in length, with a throughput capacity of more than 700 tons per day; ■ In liquid form, outside an industrial complex, using pipelines, exceeding 1,000 metres in length, with a throughput capacity of more than 50 cubic metres per day; or	The composition of the slurry which will be transferred by means of the approximately 12km pipeline, will contain substances which will have a negative impact on the environment should the slurry come into contact with the natural environment. Certain additives which are incorporated into the slurry are considered hazardous / dangerous according to classification in terms of SANS 10228.

Listed Activity	Activity description	Relevance to the Project
	■ In solid form, outside an industrial complex, using funiculars or conveyors with a throughput capacity of more than 50 tons per day.	

The tabulated activities trigger a full, two-stage EIA process in order to obtain environmental authorisation for the Waterval Retrofit E-Feed Project.

2.4 National Water Act (No. 36 of 1998)

The NWA fundamentally reformed legislation relating to water resources and use. The preamble to the Act recognises that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users. The purpose of the Act is stated in Section 5 as, *inter alia*:

- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources; and
- Meeting international obligations.

The Act presents strategies to facilitate sound management of water resources, provides for the protection of water resources, and regulates use of water by means of Catchment Management Agencies, Water User Associations, Advisory Committees and International Water Management.

As this Act is founded on the principle the government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, an industry (including mines) is entitled to use water only if the use is permissible under the NWA.

Specified water uses must be licensed unless it is listed in Schedule 1 (of the NWA), is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a license.

*It should be noted that no NWA listed activities have been triggered with **Option A**. However, the NWA listed activities associated with **Option B** are listed in the table below*.

Table 7: NWA Listed Activities (NWA, 1998)

Legislation and Notice Number	Activity description	Relevance to the Project
NWA, Chapter 4: 21 (g)	Disposing of waste in a manner which may detrimentally impact on a water resource.	The Project will involve the construction of a pollution control dam (PCD), for collecting dirty stormwater from the pre-treatment plant. The water is considered contaminated / dirty, therefore it could have a detrimental impact on a water resource if released.
NWA, Chapter 4: 21 (c)	Impeding or diverting the flow of water in a watercourse.	The Project will include the installation of a pipeline between the Waterval TSFs and the WLTR Plant. The pipeline will cross a watercourse at three different locations. It should be noted that the pipeline will follow an existing compressed air pipeline route for which an integrated water use licence (IWUL) exists.
NWA, Chapter 4: 21 (i)	Altering the banks of a water course.	As above.

An IWUL in terms of the NWA was obtained by RPM for all its existing water uses in March 2012. This license covers existing river crossings and water storage. Consultation with the DWA was undertaken to determine if the existing water use license could accommodate the inclusion of the new slurry pipeline at existing licenced crossings. A final decision on this permit has not been handed down yet.

2.4.1 Government Notice Regulation 704

The Regulation deals with the control and use of water for mining and related activities aimed at the protection of water resources. It specifically deals with clean and dirty water in a mining environment. The regulation is relevant to the Project due to the construction of clean and dirty water separation systems in the form of TSF drainage systems and the construction of the PCD at the pre-treatment plant.

2.5 Mine Health and Safety Act (No. 29 of 1996)

The MHSA as amended in 2008 aims to provide for protection of the health and safety of employees and other persons at mines. The Act provides and / or promotes:

- A culture of health and safety;
- The enforcement of health and safety measures;
- For appropriate systems of employee, employer and State participation in health and safety matters;
- The establishment of representative tripartite institutions to review legislation, promote health and enhance properly targeted research;
- For effective monitoring systems and inspections, investigations and inquiries to improve health and safety;
- Promotion of training and human resources development;
- Regulation of employers' and employees' duties to identify hazards and eliminate, control and minimise the risk to health and safety;
- Entrenchment of the right to refuse to work in dangerous conditions;
- To give effect to the public international law obligations of the Republic relating to mining health and safety;
- To provide for matters connected therewith.

More specifically the objectives of this Act are stipulated as follows:

"(a) To protect the health and safety of persons at mines;

(b) To require employers and _key employees to identify hazards and eliminate, control and minimise the risks relating to health and safety at mines;

(c) To give effect to the public international law obligations of the Republic that concern health and safety at mines;

(d) To provide for employee participation in matters of health and safety through health and safety representatives and the health and safety committees at mines;

(e) To provide for effective monitoring of health and safety conditions at mines;

(f) To provide for enforcement of health and safety measures at mines;

(g) To provide for investigations and inquiries to improve health and safety at mines; and

(h) To promote-

(i) A culture of health and safety in the mining industry;

(ii) Training in health and safety in the mining industry; and

(iii) Co-operation and consultation on health and safety between the State, employers, employees and their representatives"

A significant portion of the Project activities and infrastructure will be taking place within the mine lease area at RPM. It is assumed that RPM will ensure that this Act and subsequent amendments to its regulations will be adhered to on the Project site by employees, contractors, sub-contractors and visiting personnel during both the construction and operational phase of the Project. Occupational health and safety issues fall beyond the scope of this report.

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

In line with the Convention on Biological Diversity, the Act aims to legally provide for biodiversity conservation, sustainable use and equitable access and benefit sharing. The Act establishes the South African National Biodiversity Institute. NEM:BA creates a basic legal framework for the formation of a national biodiversity strategy and action plan and the identification of biodiversity hotspots and bio-regions which will then be given legal recognition. It imposes obligations on landowners (state or private) governing alien invasive species as well as regulates the introduction of genetically modified organisms. Furthermore, the Act serves to regulate bio-prospecting, making provision for communities to share the profits of any exploitation of natural materials involving indigenous knowledge.

During the Scoping, EIA and EMPR process biodiversity hotspots and bio-regions were investigated to determine the potential effect which the project may have on the receiving environment. The establishment of alien invasive species on the impacted areas during all the phases of the project will be governed by the Act. The Act ensures that provision is made by the site developer to remove any aliens which have been introduced to the site or are present on the site.

2.7 National Environmental Management Air Quality Act (No. 39 of 2004)

The new NEM:AQA, which repeals the Atmospheric Pollution Prevention (No. Act of 1965) (APPA), came into effect on 11 September 2005, with the promulgation of regulations in terms of certain sections resulting in the APPA being repealed entirely on 01 April 2010. Key features of the current legislation include:

- A decentralisation of air quality management responsibilities;
- The identification and quantification of significant emission sources that then need to be addressed;
- The development of ambient air quality targets as goals for driving emission reductions;
- The use of source-based (command-and-control) measures in addition to alternative measures, including market incentives and disincentives, voluntary programmes, and education and awareness;
- The promotion of cost-optimised mitigation and management measures;
- Air quality management planning by authorities, and emission reduction and management planning by sources; and
- Access to information and public consultation.

The NEM:AQA introduced a management system based on ambient air quality standards and corresponding emission limits to achieve them. Two significant regulations stemming from NEM:AQA have been promulgated recently, which are:

- **GNR 1210** on 24 December 2009 (Government Gazette 32816) National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) National Ambient Air Quality Standards.
- **GNR 248** on 31 June 2010 (Government Gazette 33064) National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) List of Activities which result in Atmospheric Emissions which have or may

have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage.

Option B, involves the installation of 4 IsaMills™ at the WLTR plant. The role of the IsaMills™ is to grind the reclaimed material obtained from the Waterval TSFs to a finer grade. The finer grade material will be transferred to the smelter and the material which cannot be processed further will be transferred to the Hoedspruit TSF. The material, being a finer grade in comparison to the current output of the WLTR Plant, is more easily disturbed and transferred into the atmosphere leading to an overall increase of dust / particulate matter. In addition, the construction of additional dust roads to ensure access to the project infrastructure will lead to a further increase in dust generation. The construction phase on site will inherently generate dust due to the nature of earthworks (including earth material transportation). An air quality specialist study has been conducted as a component of the project in order to investigate the primary, secondary and cumulative impacts to the air quality with respect to the above statute, however no NEM:AQA listed activities have been identified at this point.

2.8 National Environmental Management Waste Act (No. 59 of 2008)

The NEM:WA serves to reform the law regulating waste management in order to protect human health and the environment. This is managed by providing reasonable measures for the prevention of pollution and ecological degradation. The NEM:WA aims to secure ecologically sustainable development while promoting justifiable economic and social development. The NEM:WA provides national norms and standards for regulating the management of waste by all spheres of government, for specific waste management measures and for matters incidental thereto.

Furthermore, the Act protects the health, well-being and the environment by:

- Providing reasonable measures for minimisation of consumption of a natural resource;
- Minimising general waste;
- Reducing, re-using, recycling and recovering waste;
- Safely treating or disposing waste;
- Preventing pollution and ecological degradation; and
- Securing ecological sustainable development.

The Act also promotes:

- Economic and sustainable development;
- Effective delivery of waste services;
- Remediation of contaminated land; and
- Integrated waste management.

No activities under Category A & B of the NEM:WA GNR 718 have been identified thus far. RPM should however comply with the NEM:WA in terms of the NEM:WA objectives, the waste hierarchy and the general measures which are promoted by the Act. It should be noted that all activities relating to the mine lease are primarily regulated by the MPRDA and not the NEM:WA. However, cognisance has been taken of the occurrence of project activities outside of the mine lease area.

2.9 National Heritage Resources Act (No. 25 of 1999)

The NHRA provides for an integrated and interactive system for the management of the national heritage resources and empowers civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations. Furthermore, the Act established the South African Heritage Resources Agency (SAHRA) in 1999. SAHRA is tasked with protecting heritage resources of national significance. Heritage sites include any subject of historical and / or cultural value. During the Scoping and EIA process

provision should was made to assess the site proposed for development to ensure the site is not considered valuable by the SAHRA or any other influential party, such as a governmental department.

2.10 Conservation of Agricultural Resources Act (No. 43 of 1983)

The Conservation of Agricultural Resources Act (CARA) includes the use and protection of land, soil, wetlands and vegetation and the control of weeds and invader plants. The CARA is primarily aimed at the conservation of South Africa's agricultural land resources.

The main applicability of the CARA to mining and mineral processing projects lies in its regulations concerning the control of alien plant species. Regulations to the CARA establish a comprehensive list of species that are declared weeds and invader plants, dividing them into three categories. These categories are as follows:

- Category 1: Declared weeds that are prohibited on any land or water surface in South Africa. These species must be controlled, or eradicated where possible.
- Category 2: Declared invader species that are only allowed in demarcated areas under controlled conditions and prohibited within 30 m of the 1:50 year floodline of any watercourse or wetland.
- Category 3: Declared invader species that may remain, but must be prevented from spreading. No further planting of these species are allowed.

In terms of the amendments to the regulations under the CARA, landowners are legally responsible for the control of alien species on their properties. Various Acts administered by the DEA and DWA, as well as other laws (including local by-laws), spell out the fines, terms of imprisonment and other penalties for contravening the law. Although no fines have yet been placed against landowners who do not remove invasive species, the authorities may clear their land of invasive alien plants and other alien species entirely at the landowner's cost and risk. Measures oriented to the control of alien species on the mine property are included in the EMP.

2.11 Hazardous Substances Act (No. 15 of 1979)

The object of the Act is inter alia to 'provide for the control of substances which may cause injury or ill health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature or the generation of pressure thereby in certain circumstances; for the control of electronic products; for the division of such substances or products into groups in relation to the degree of danger; for the prohibition and control of such substances.'

In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity, and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule.

Dangerous substances contained on-site during the construction and operational phases of the Project will need to be managed in accordance with the Act. Material safety data sheets will need to be drawn up for all dangerous goods (hydrocarbon fuels, cleaning chemicals, paints, etc.).

2.12 Occupational Health and Safety Act (No. 85 of 1993)

The OHSA addresses the health and safety of persons working on the site. The OHSA addresses amongst others the:

- Safety requirements for the operation of plant machinery;
- Protection of persons other than persons at work against hazards to health and safety, arising out of or in connection with the activities of persons at work;
- Establishment of an advisory council for occupational health and safety; and
- Provision for matters connected therewith.

The OHSA will be applicable during the construction phase as well as the operational phase, and states that any person:

- Undertaking work on any premises shall ensure as far as is reasonably practicable that nothing about the manner in which the work is conducted makes it unsafe or creates a risk to health; and
- Undertaking upgrades or developments for use at work or on any premises shall ensure as far as is reasonably practicable that nothing about the manner in which it is erected or installed makes it unsafe or creates a risk to health when properly used.

2.13 Promotion of Access to Information Act (No. 2 of 2000)

The PAIA recognises that everyone has a right of access to any information held by the State and by another person when that information is required to exercise or protect any right. The purpose of Act is to promote transparency and accountability in public and private bodies and to promote a society in which people have access to information that enables them to exercise and protect their rights.

The environmental authorisation process, particularly the stakeholder consultation component, must be aligned with the Act in the sense that all stakeholders must be provided a fair opportunity to review and comment on any reports submitted to the authorising authority for decision making.

Public participation has been undertaken in terms of the EIA Regulations, as detailed in **Section 9** of this report.

2.14 Promotion of Administrative Justice Act (No. 3 of 2000)

The purpose of the PAJA is to govern the actions of the administration and to ensure good administrative practice, by laying down the minimum procedural requirements related to decision-making. As such, the Act applies to all actions of state administrators, in particular environmental administrators.

Section 1 deals with procedures to be followed in the granting, suspending or revoking of permissions (licences, grants, permits). Sections 3 and 4 deal with fair procedure which requires the administrator to act in a fair manner when making a decision. Section 5 governs the provision of reasons by the administrator and stipulates that an administrator provide reasons after a decision has been taken (or whilst taking it), to justify the decision.

2.15 Guidelines

2.15.1 National Environmental Management Act Guidelines

The following guidelines were used to assist with the effective undertaking of the EIR / EMPR Amendment process:

- The Gauteng Department of Agriculture and Rural Development Mining and Environmental Impact Guide;
- The Need and Desirability Guideline; and
- The EIA Guideline and Information Document Series- Guideline on Public Participation.

2.15.2 Department of Mineral Resources Guidelines

The following guidelines were used to assist with the effective undertaking of the EIR / EMPR Amendment process:

- The guideline for consultation with communities and Interested and Affected parties (I&APs);

- The guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision provided by a mine;
- Environmental Impact Assessment and Environmental Management Programme guideline; and
- The guideline for the compilation of an Environmental Impact Assessment and an Environmental Management Programme.

2.15.3 Department of Water Affairs Best Practice Guidelines

The Best Practice Guidelines are applicable to the EIR / EMPR Amendment process. These guidelines are administered by the DWA and provide technical and non-technical management actions for water resources on mines and ancillary operations related to mining.

- A2 Mine Residue Deposits;
- G1 Stormwater Management;
- G3 Water Monitoring Systems;
- G4 Impact Prediction; and
- H2 Pollution Prevention and Minimisation of Impacts.

2.15.4 South African Bureau of Standards

With regard to the South African Bureau of Standards (SABS) there are SANS that are considered relevant to the Project. These include:

- SANS 10228:2006- The identification and classification of dangerous goods for transport;
- SANS 10234:2007- Globally Harmonised System (GHS) of classification and labelling of chemicals;
- SANS 1929:2009 – Ambient air quality (limits for common pollutants);
- SANS 10103:2008 –The measurement and rating of environmental noise with respect to annoyance and to speech communication;
- The SANS 10328:2008 - Methods for environmental noise impact assessments; and
- SANS 10286: 1998 – Code of Practise for Mine Residues.

2.15.5 Anglo American Guidelines

The following Anglo American documents were used to assist with the effective undertaking of the EIR / EMPR Amendment process and the correct undertaking of the process in terms of the Anglo American's internal guidelines and procedures:

- The Anglo Environmental Way;
- The Anglo Social Way;
- Community Engagement Plan;
- Anglo EMPRs and EIAs guideline procedure; and
- The Anglo American Projects Way.

3 Approach and Methodology

3.1 Scoping Phase

Scoping is the process that defines the scope of subsequent investigations necessary for a proper understanding of the nature of the issues and concerns related to the Project. It involves consultation with all stakeholders including authorities. The Scoping Report details the plan of study for the detailed EIA.

The Scoping Report must include the following information:

- The details and expertise of the environmental assessment practitioner responsible for preparing the report and carrying out the Scoping procedures;
- The identification of the most applicable legislation and guidelines that were considered in the preparation of the Scoping Report;
- A description of the existing and proposed activities and reasonable alternatives, including the advantages and disadvantages of the alternatives;
- A description of the property on which the activities are to take place;
- A description of the need and desirability of the activities;
- A description of the environment (at a screening level) that may be affected by the activities and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the activities;
- A description of the environmental issues and potential impacts, including cumulative impacts that have been identified;
- A description of the impacts rating methodology that is to be used in the EIR Phase to assess the potential impacts that have been identified during the Scoping Phase, including any specialist studies or specialised processes that will be undertaken during the EIR Phase;
- A detailed description of the public participation undertaken; and
- A plan of study which sets out the proposed approach to the EIR Phase including the scope of work of the specialist studies required. The following specialist studies were deemed appropriate to this Project:
    - A heritage assessment;
    - An air quality assessment;
    - A surface and groundwater assessment;
    - An aquatic assessment;
    - A traffic assessment; and
    - A socio-economic assessment.

The scoping phase was undertaken in the second half of 2012. The Scoping Report was accepted by DEDECT on 15 April 2013. The letter of acceptance is attached in **Appendix A**.

3.2 Environmental Impact Assessment

The purpose of the EIA phase is as follows:

- To ensure that a the process continues to be open and transparent via the consultation with the authorities and stakeholders;

- To address issues that have been raised during the preceding scoping phase;
- To assess the alternatives in a comparative manner;
- To undertake the required specialist studies;
- To assess all identified impacts and to determine the significance of each impact; and
- To formulate mitigation and management measures.

The EIA is the final phase of the environmental authorisation process. The EIA began following the acceptance of the Final Scoping Report by the competent authorities. The Draft EIR / EMPR has been compiled as a combined report aimed at satisfying the requirements of both the NEMA and the MPRDA and includes the following information:

- Details of the environmental assessment practitioner who prepared the report and the expertise of the environmental assessment practitioner to carry out the S&EIR process **(Section 1**);
- A description of the need for, and desirability of, the Project (**Section 4**).
- A description of any identified alternatives that are feasible and reasonable, including the advantages and disadvantages that the activities or alternatives will have on the environment and on the community that may be affected by the activities (**Section 6**);
- A description and comparative assessment of all feasible alternatives identified (**Section 6**);
- A detailed description of the existing and proposed activities (**Section 5**);
- A description and a map of the property on which the activities are undertaken and the location of the activities on the property (**Section 6**);
- A description of the environment that may be affected by the activities and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by such (**Section 7**);
- A summary of the findings of the specialist studies (**Section 8**);
- Details of the public participation process conducted, including (**Section 9**):
  - Steps undertaken in accordance with the plan of study;
  - Lists of persons, organisations and organs of state that were registered as stakeholders;
  - A summary of comments received, issues raised by stakeholders, the date of receipt of these comments and the response of the environmental assessment practitioner and AAP to those comments; and
  - Copies of any representation and comments received from stakeholders.
- A summary of the methodology used in determining the significance of potential impacts (**Section 10**);
- A description of all environmental issues that were identified during the S&EIR process, and assessment of significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures (**Section 10**);
- A Draft EMP (**Section 11**);
- A description of any assumptions, uncertainties and gaps in knowledge (**Section 14)**;
- A reasoned opinion as to whether the activities should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation (**Section 15**);
- An environmental impact statement containing the key findings and a comparative assessment of the positive and negative implications of the activities (that it should be authorised, any conditions that should be made in respect of that authorisation (**Section 15**);
- Copies of all specialist reports (**Appendix B**);
- Any specific information required by the competent authority and any other matters required in terms of section 24(4)(a) and (b) of the NEMA); and

- Details of the methodologies of the specialist studies are provided in each specialist study report contained in **Appendix B**.

3.3 Environmental Management Programme

The EMP incorporates the requirements of the MPRDA and NEMA, as detailed below.

3.3.1 Minerals and Petroleum Resources Development Act (No. 28 of 2002)

Section 52 of the MPRDA Regulations sets out the content requirements for an EMPR as follows:

- Description of the environment likely to be affected by the Project (**Section 7**);
- Assessment of the potential impacts of the Project on the environment, socio-economic conditions and cultural heritage, if any (**Section 10**);
- Summary of the assessment of the significance of the potential impacts and the proposed mitigation and management measures to minimise adverse impacts and benefits (**Section 10** and **Section 11**);
- Financial provision which must include the determination of the quantum of the financial provision contemplated in regulation 54 and details of the method providing for the financial provision contemplated in regulation 53 (**Section 13**);
- Planned monitoring and performance assessment of the EMPR (**Section 11**);
- Closure and environmental objectives (**Section 13**);
- Record of the public participation undertaken and the results thereof (**Section 9**); and
- Undertaking by the applicant regarding the execution of the EMPR (**page 18**).

3.3.2 National Environmental Management Act (No. 107 of 1998)

The EMPR contemplated in regulation 33 of the EIA Regulations will contain the following information:

- Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by the EIA Regulations, including environmental impacts or objectives in respect of (**Section 11**):
  - Planning and design;
  - Pre-construction and construction activities;
  - Operation or undertaking of the activities;
  - Rehabilitation of the environment; and
  - Closure, where relevant.
- A detailed description of the aspects of the activities that are covered by the Draft EMP (**Section 11**);
- An identification of the persons who will be responsible for the implementation of the measures (**Section 11**);
- Proposed mechanisms for monitoring compliance with and performance assessment against the EMP and reporting thereon (**Section 11**);
- As far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures (**Section 11**);
- A description of the manner in which it intends to (**Section 11**):

- Modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
- Remedy the cause of pollution or degradation and migration of pollutants;
- Comply with any applicable provisions of the NEMA regarding closure, where applicable; and
- Comply with any provisions of the NEMA regarding financial provisions for rehabilitation, where applicable.

- Time periods within which the measures contemplated in the EMPR must be implemented (**Section 11**);
- The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity (**Section 11**);
- An environmental awareness plan describing the manner in which (**Section 12**):
  - The Proponent intends to inform his or her employees of any environmental risk which may result from their work; and
  - Risks must be dealt with in order to avoid pollution or the degradation of the environment.
- Where appropriate, closure plans, including closure objectives (**Section 11**).

4 Project Motivation

Geological investigations undertaken in 2008, using sonic drilling, estimated the available resource concentrations at the East and West TSFs (TWP, 2012).

Table 8: Waterval TSFs recoverable resources (TWP, 2012)

TSF	Density (t/m^3)	Volume of Material (m^3)	Tonnes of Material (t)	PGE[1] (g/t)
East	1.67	8,117,320	13,518,829	1.05
West	1.62	46,101,456[2]	74,541,208	1.08

The Project has the potential to unlock approximately 88 million tons (Mt) of recoverable resource (74.5Mt West TSF and 13.5Mt East TSF), at an average grade of 1.08 grams per tons (g/t) with a recovery of 48%. It is estimated that it will take 15 years to deplete both resources. Current indications are that this recovery could return a net profit (over life of mine) of some R 374 million.

The Waterval Retrofit E-Feed Project is required for the following main reasons:

- 88 million tons of recoverable resource is available at Waterval East and West TSFs.
- Should the tailings not be reclaimed and re-mined, this resource will otherwise remain unutilised.
- Should the tailings not be reclaimed and re-mined the TSFs will be dealt with as a risk / liability in terms of current rehabilitation and mine closure requirements.
- Platinum demand is expected to grow about 4% per year (2010 – 2020) over the long-term. Demand will be driven by the use in the following sectors (TWP, 2012):
    - Auto-catalysts (3% per year): Broadening scope of emissions legislation to include new pollutants, heavy trucks and non-road vehicles supported by car production growth of 4% will more than offset continued thrifting and substitution to palladium. Growing hybrid market share will have minor positive impact on loadings, with all other alternative auto technologies together expected to secure less than 10% market share by 2020.
    - Jewellery (5% per year from 2010 - 2020): Demand driven by continued market penetration in China.
    - Industrial (4% per year: Stable demand from chemical and petroleum complimented by new applications including gas-to-liquids, bio-fuels production and waste treatment, etc.
    - Fuel cells (38% per year off a low base): Growing momentum specifically in residential power generation and portable application (e.g. mobile phones, laptops, etc.) will see fuel cells starting to materially contribute to demand after 2015.

The Project, if approved, will provide a small number of new employment opportunities, and access to previously unreachable resources that will ultimately increase the life of RPM operations. Being able to extract resources from the Waterval TSFs provides a sustainable business opportunity for RPM to meet future product needs, as well as to prolong the contribution of the mine to the local economy.

[1] Platinum Group Elements (PGE), containing platinum, palladium, rhodium and gold. Although not PGEs, copper and nickel comprise a percentage of the potential value in the tailings.

[2] It was noted by Fraser Alexander that approximately 718,531 m^3 of the calculated 46,101,456m^3 have been previously removed from the West Dam and used as backfill material by RPM.

5 Project Description

During the scoping phase the Waterval Retrofit E-Feed Project was described as the reclamation of the East and West TSFs of the Waterval TSF and conveyance of the slurry to the existing WLTR Plant (**Option B, Figure 3**). The slurry will be pumped from the pre-treatment plant via overland pipelines through a booster station over a distance of approximately 12km to the WLTR Plant. The return water pipeline will bring process water from the Hoedspruit RWD to the pre-treatment plant, over a distance of approximately 15km.

Subsequently, an alternative processing option was identified (Fraser Alexander, 2012) whereby the slurry would be conveyed to the existing Waterval Retrofit Concentrator for processing (**Option A, Figure 2**). The slurry will be pumped to a pump station via overland pipelines over a distance of approximately 500m (East TSF) and 750m (West TSF) to the Waterval Retrofit Concentrator. The return water pipeline will bring water via a tie-off from the existing water line running between the 250 Area and Frank Concentrator.

The project description includes both options, and although one option may be more expensive than the other, both are economically, socially and environmentally feasible. AAP therefore seeks authorisation for both options.

5.1 Process description

The Project will involve:

- Hydraulic re-mining;
- Pump / pre-treatment / booster stations;
- Overland slurry and return water pipes;
- Processing of tailing; and
- Storage of resulting tailings.

Refer to **Appendix C** for detailed design drawings of the above.

5.1.1 Hydraulic re-mining

Tailings material will be hydraulically sluiced from the mining 'face' and then transferred in a slurry form to a collection sump via a system of pumps or launders. The slurry will then be transferred by satellite pumps to the main pump station where it will be pumped away to the existing Waterval Retrofit Concentrator (**Option A**) or WLTR Plant (**Option B**). The mining process will consist of the following:

- The re-mining face;
- The launders and screening; and
- The pump station.

5.1.1.1 The mining plan

The 'herring bone' technique is to be implemented in reclaiming the TSFs (**Figure 6** and **Figure 7**). For this technique, each TSF is subdivided into two benches, namely an upper and lower bench, each 16m in height. These benches correspond to the operational depths to which the TSFs will be re-mined. Each bench will be operated in two halves namely an eastern and western half to maximise the production rate and utilise efficiency of the pipes re-mining equipment.

The final bench on ground level will be cut from a collection sump in the lowest position on the ground contour at the northern side of the TSF and cut the main launder towards the southwest end of the TSF. The same mining method will then follow as the first cut.

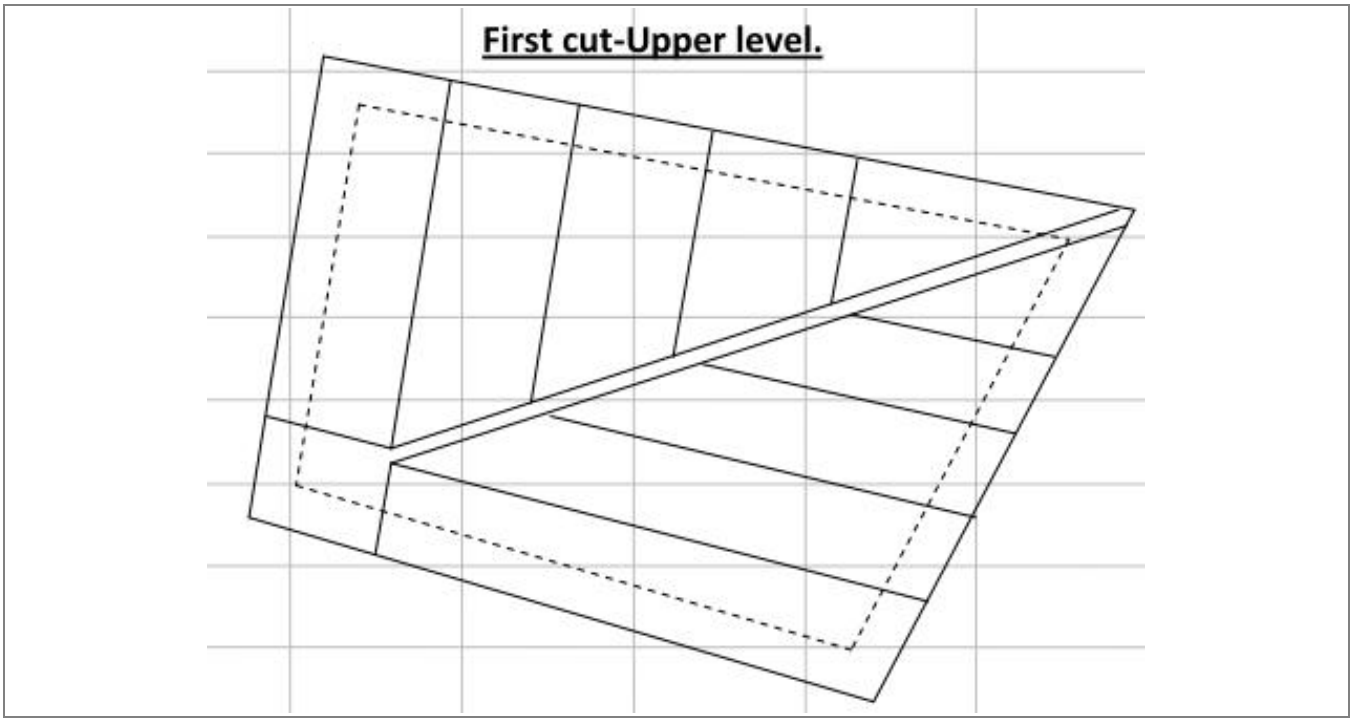


Figure 6: First cut-Upper level (Fraser Alexander, 2012)

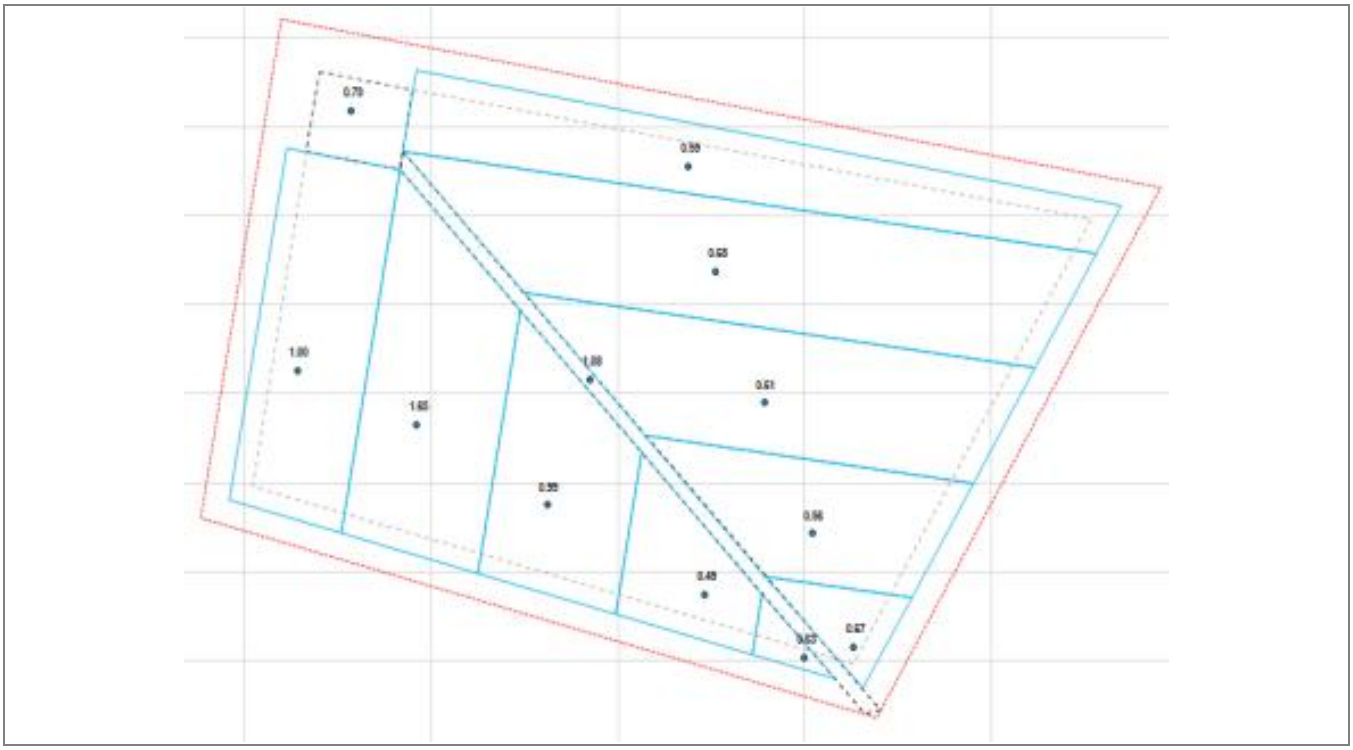


Figure 7: Final cut Lower level (Fraser Alexander,2012)

5.1.1.2 The re-mining face

Material at the working 'face' of the TSFs will be hydraulically reclaimed by two 150mm mobile or one-track-high pressure water guns (monitor guns). These guns will be positioned, each at its own 'face' at a distance

from each other. The guns will operate on 12 to16m high benches, using a top-down method[3] at 35 degree angles and 26 bar water pressure at the gun. (**Figure 8**)

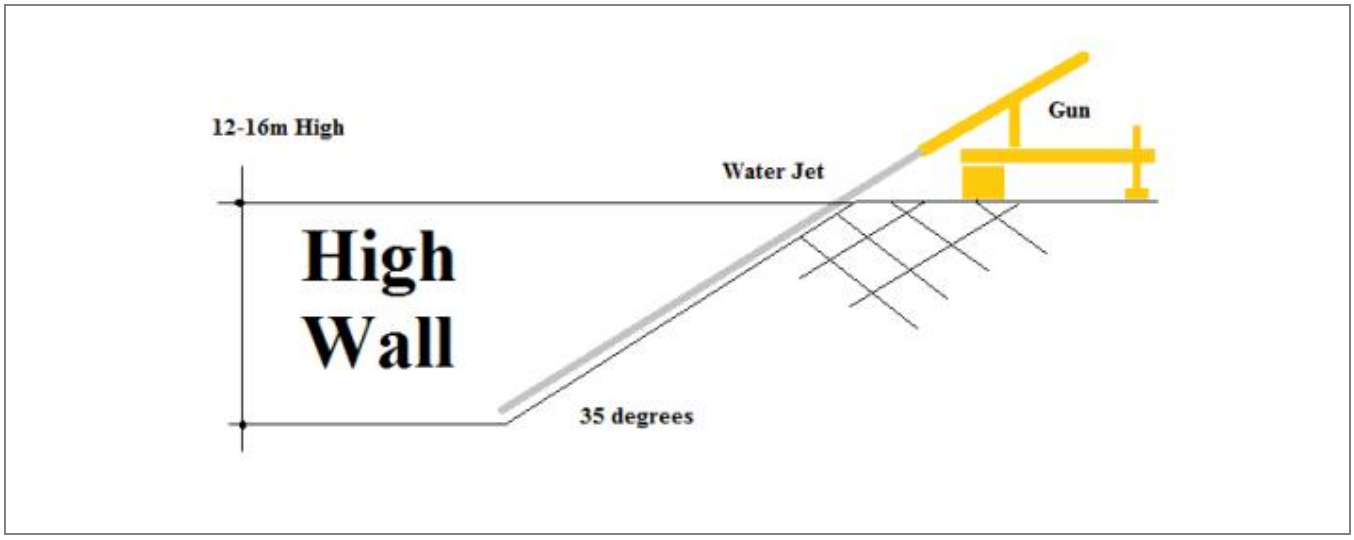


Figure 8: Top down method (Fraser Alexander, 2012)

The jet stream has a high cutting energy and cuts into the tailings causing the slopes to collapse. With help from the water jets, the fragmented tailings slide to the toe of the TSF. Here the water jets are used to pulverize and stir up the slurry like a mixing rod.

The high pressure water will be generated by running low pressure water, obtained from onsite water tanks supplied by the existing Frank Concentrator water line, through a series of pumps that will increase pressure to 40 bar water pressure. Approximately 16,400t of slurry material, including water from the water jets, will be reclaimed per day, with each monitor gun sluicing 8,200t/day of tailing material from the TSF. This slurry stream is then pumped to the launders for filtration of debris.

5.1.1.3 The launders (drains)

The slurry will undergo a filtration / screening process at the launders to remove coarse material prior to being pumped to the plant for processing via **Option A** or **B**. This process involves moving the slurry through a launder (washing) system, assisted by 110kW pumps, to a collection sump. A barge will be used to pump the slurry from the bottom of the collection sump to the pump station situated at the foot of the TSF.

A launder will then be mined, away from the sump area, diagonally toward the furthest corners of the TSF. As the mining progresses, the launder will act as a channel for the re-mined slurry to flow towards the barge pump. An in-dam static screen will be installed approximately 30m away from the barge, inside the launder, so as to screen out larger debris (e.g. organic material) before the slurry reaches the barge pump. As the guns operate further away from the sump area and the height of the high faces decreases accordingly, a secondary satellite barge pump system will be utilised on the second and final cut installed at the lowest ground position and pumped to the first barge VSP system.

Once the material is laundered and coarse debris is removed, the material will be ready for processing according to the two options available, namely **Option A** and **Option B**.

The eroded slurry material will be collected in a sump. The eroded material will be moved to the toe of the TSF and removed in accordance with the procedure described in Section 5.1.5 below.

[3] Top down method: The gun is placed at the top of the slope, mining the tailings below and in front of it. The mining removes the tailings in regular parallelograms of set width, height and slope. The slope of the mining face can be defined and controlled by the distance of the gun from the edge of the slope and the downward inclination of the barrel which can be limited by stops on the swivel. As the moisture content of the tailings increase and right up to intersecting the phreatic surface, the slope angle will be reduced to avoid slope failure which also reduces the slope height which further reduces the possibility of slope failure.

5.1.2 Option A

Reclamation includes the following activities and infrastructure, namely:

- Pump station;
- Overland slurry pipeline;
- Overland return water pipeline;
- Re-mining of Tailings (Waterval Retrofit Concentrator);
- Waterval Smelter; and
- Storage of Resultant Tailings.

A process flow diagram for **Option A** is provided in **Figure 9**.

5.1.2.1 Pump station

The re-mined slurry will be pumped from the TSF to the pump station, which will be operated and managed by Fraser Alexander (**Figure 10**). At the pump station, the material will flow onto a vibrating trash removal screen, equipped with 10mm aperture panels. The screen overflow will be collected in a concrete bund from which it will be appropriately disposed of (see Section 5.1.5). The screen underflow will report to a sump from which it will be pumped across to the Waterval Retrofit Concentrator via overland slurry pipelines.

Administration Buildings

The contractor's yard, for use by reclamation staff will be constructed adjacent to the pump station in a fenced off yard of approximately 40m x 60m (**Figure 10**). The contractor's yard will consist of the following components:

- 3 x 6m offices;
- 12m ablution block;
- 18m carport;
- A laydown / storage area of approximately 10m x 10m;
- A concrete slab of about 20m x 20m for high pressure pumps platform; and
- Waste facilities.

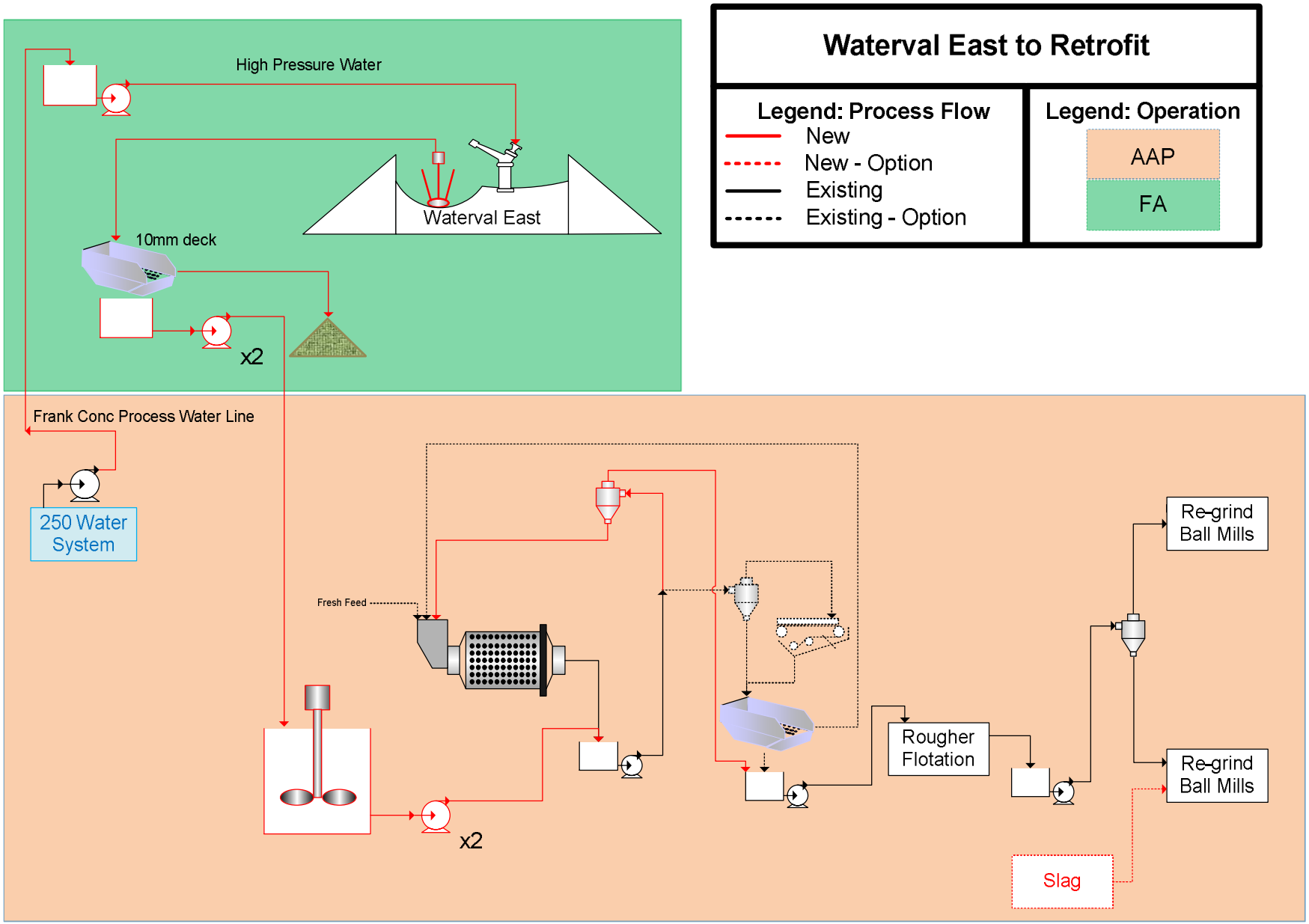


Figure 9: Process Flow for Option A (AAP, 2012)

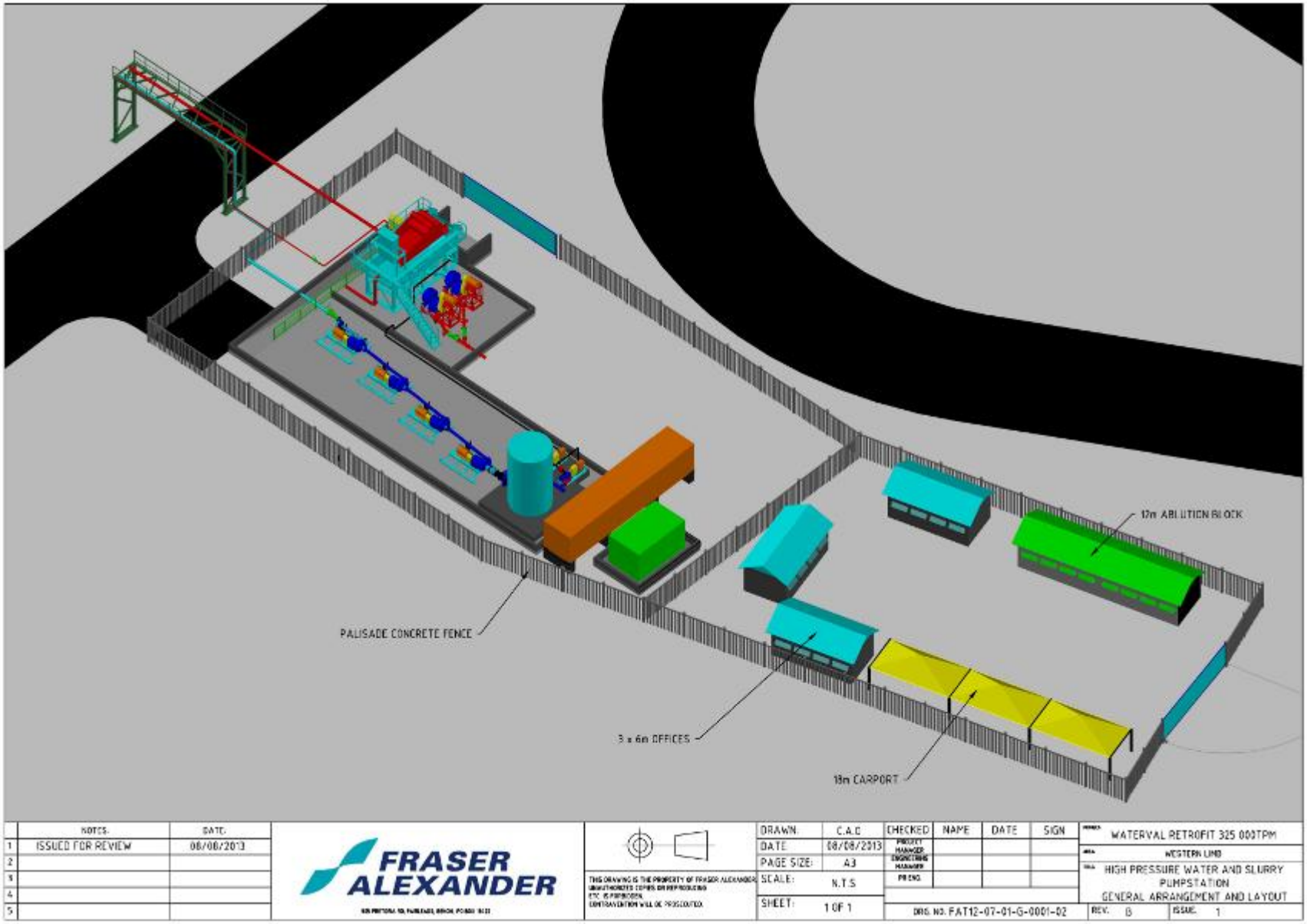


Figure 10: High pressure and slurry pump station and general arrangement layout (Fraser Alexander, 2012)

5.1.2.2 Overland slurry pipeline

Four slurry pumps are required (two in operation, two on standby) that will utilise the existing pipe rack located between the East TSF and Waterval Retrofit Concentrator (**Figure 11**). These pumps will be used to pump the slurry to the Waterval Retrofit Concentrator for processing.

Figure 11: Existing pipe rack structure – Option A

5.1.2.3 Overland return water pipeline;

Water for re-mining will be supplied via a tie-off from the existing water line running between the 250 Area and Frank Concentrator. The water will be kept in a reasonably sized tank adjacent to the pump station to ensure maximum monitor gun water availability. High pressure water pump trains in a duty / standby configuration will withdraw water from the tank and supply it to the reticulation system on the TSF at the required flow rate and pressure.

5.1.2.4 Re-mining of Tailings

Surge tank and Tie-in at Retrofit

The re-mined slurry will be pumped from the pump station via an overland slurry pipeline into a 500m^3 surge tank located to the north of the primary milling area inside the Waterval Retrofit Concentrator. A flow meter and densitometer will be installed in an appropriate location on the delivery line of the pumps. The material will be pumped from the surge tank into the existing mill feed hopper for further processing.

The mills consist of primary, secondary and mainstream inert grinding (MIG) milling and operate in a closed circuit with screens. Coarse material from the slurry is re-grinded in the mills and inert material is screened out and discharged accordingly.

Reagents are added to the wet concentrate (slurry) for flotation to occur before the material flows to the Waterval Smelter for refining. The concentrate output of this plant is then transferred to the Waterval Smelter for generation of matte ore from which a suite a metals is refined in the Rustenberg Base Metals Refinery. The annual percentage through-put of the Smelter will not increase as the Project will be sustaining the available capacity for the Smelter.

5.1.2.5 Storage of Resultant Tailings

The underflow suspension from the Waterval Smelter will be piped to the Paardekraal TSF.

The overall footprint of the Paardekraal TSF is approximately 336ha excluding the return water dams. The TSF is approximately 52m high, with a planned final height of 69m. The Project will increase tailings deposition on Paardekraal TSF to 3.9Mtpa, but no specific modifications to this TSF will be needed to accommodate this load.

The TSF includes a perimeter fence, stormwater cut-off trenches, an access road, solution trenches and catchment paddocks around the external perimeter of the TSF. Internal toe and elevated drains have also been built to ensure stability. The slurry is pumped from the Waterval Smelter to the TSF via a 350mm pipeline.

5.1.3 Option B

Reclamation includes the following activities and infrastructure, namely:

- Pre-treatment plant;
- Overland pipelines;
- Booster station;
- Re-mining of tailings; and
- Storage of resultant tailings.

A process flow diagram for **Option B** is provided in **Figure 12** and **Figure 13**.

5.1.3.1 Pre-Treatment Plant

Tailings material will be gravitated to a holding sump ahead of the pre-treatment plant (**Figure 14)**. A static grizzly will be installed in the main trench to remove large objects such as penstock poles. A hydraulic arm (or other suitable means) will be utilised to clear any debris from the grizzly.

Primary Vibrating Screens and Transfer Sumps

The slurry will enter the pump station from the holding sump through one suitably sized primary vibrating screen with 10mm apertures at the entrance to the pump station for the removal of tramp material, with provision made for an additional primary screen as a future option. Screen spray water will be provided. The oversize will fall from the screen onto a conveyor which will deposit the tramp material onto a stockpile for final disposal. The undersize will gravitate to the primary transfer sump.

Secondary Vibrating Screens

The primary transfer sump will transfer the slurry to a distribution box above the secondary vibrating screen with 2mm apertures for the removal of further tramp material from where it will be pumped to the surge tank.

Surge Tanks

Sufficient surge capacity will be installed to mitigate process fluctuations caused by re-mining.

Water Reclamation

Water will be reclaimed through cyclones, thickening and clarification.

Final Transfer Sump and Pump Train

The slurry will be pumped from the pre-treatment plant to the WLTR Plant at a suitable flow and density with a high pressure pump train.

Klipgat Dam

Klipgat Dam currently supplies water to the WLTR Plant, as well as various other AAP operations in the adjacent area. The existing line form the Klipgat Dam to the WLTR Plant will not be decommissioned for the Project. New pipelines will tie-into the existing line to supply water to the pre-treatment station as well as the booster station.

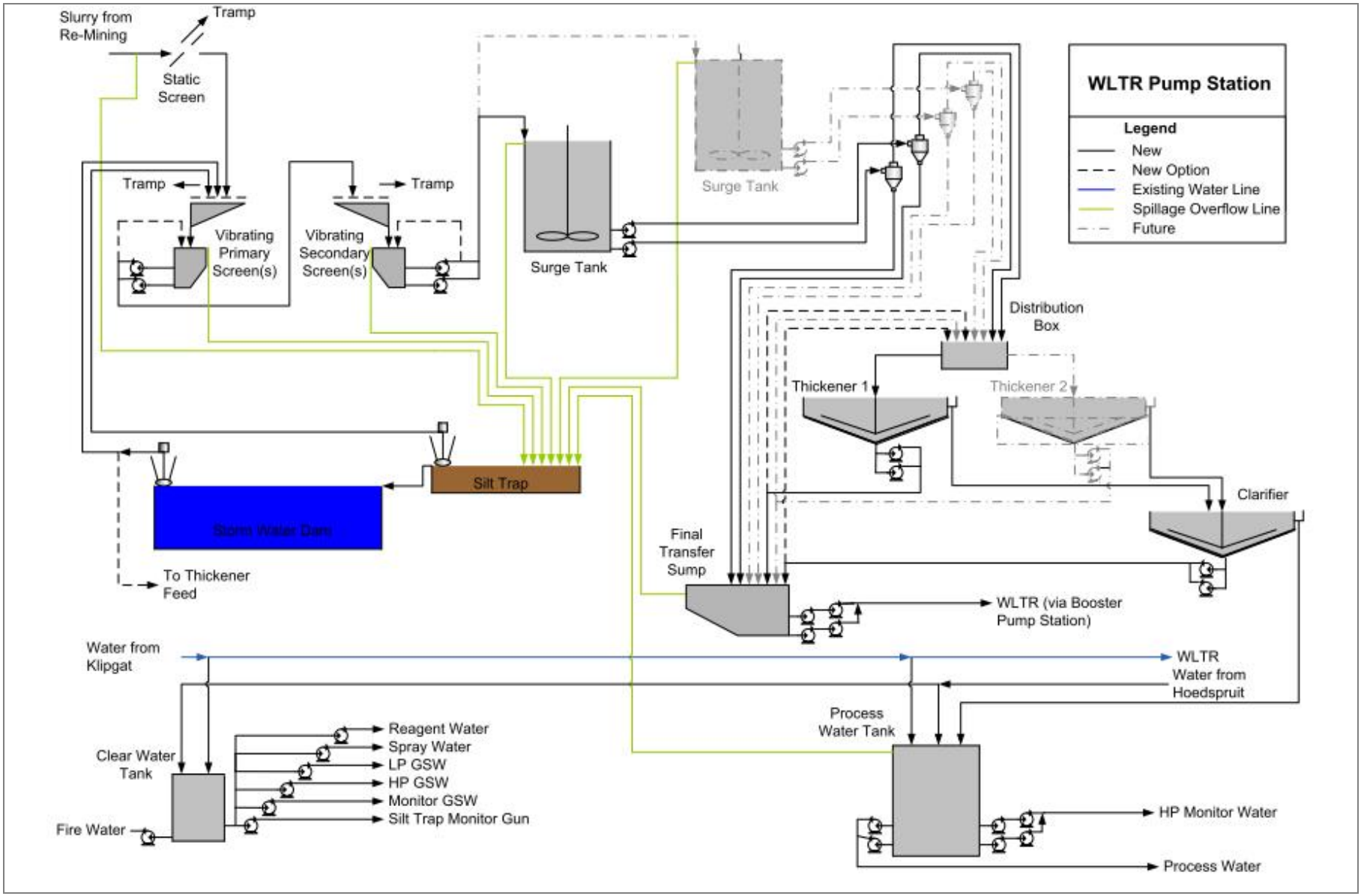


Figure 12: Process flow for re-mining and pump station for Option B (AAP, 2012)

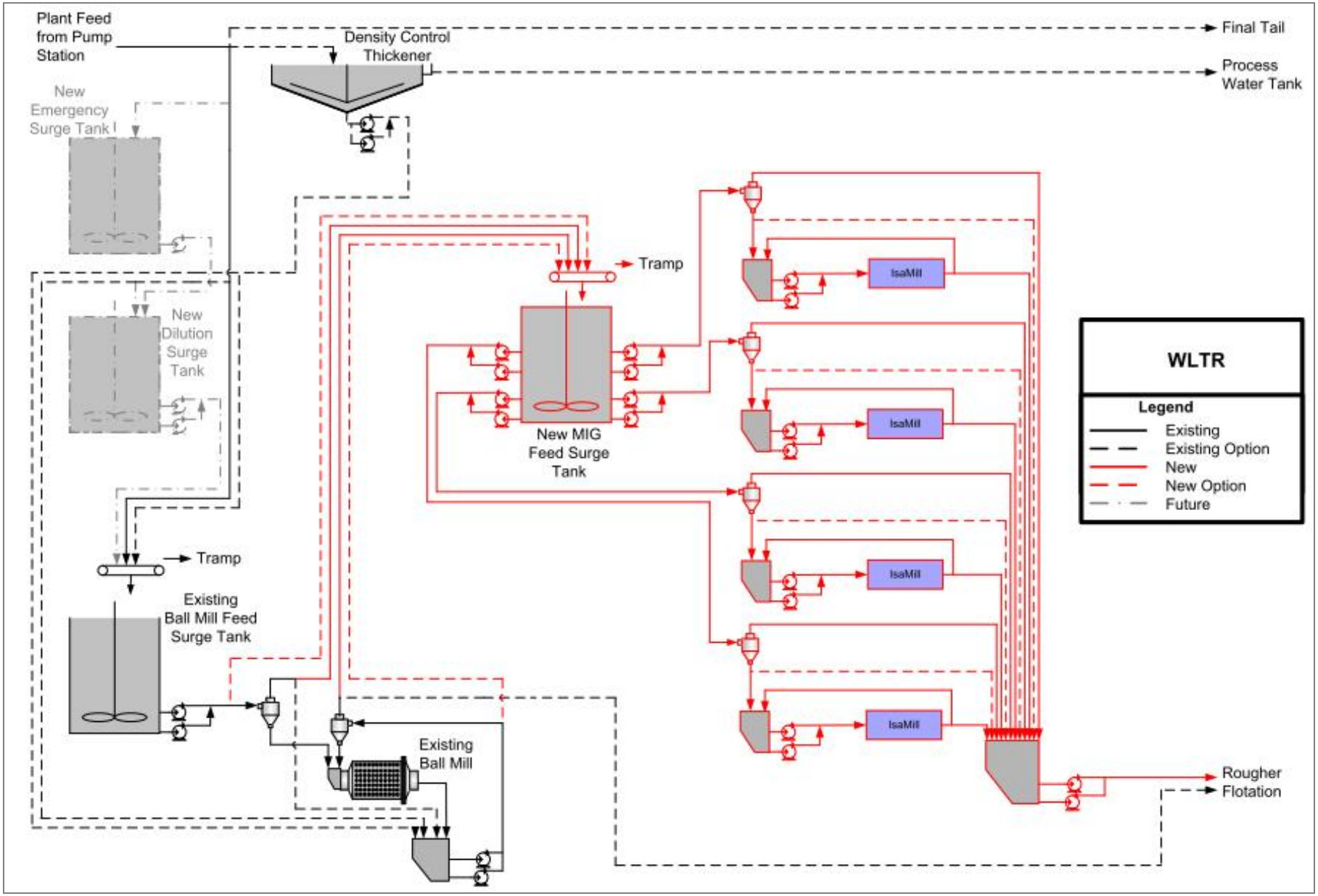
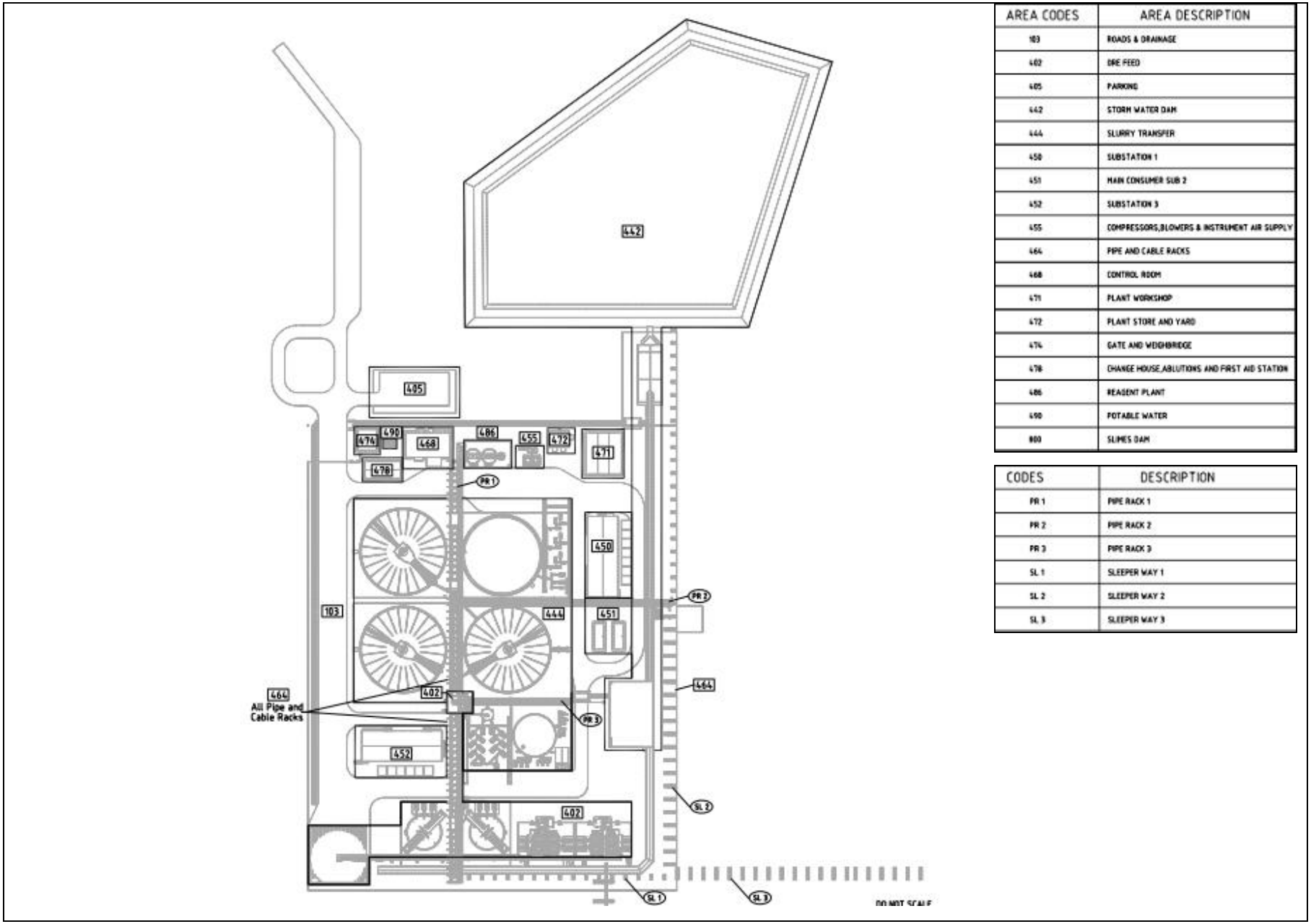


Figure 13: Process flow for WLTR Plant for Option B (AAP, 2012)



AREA CODES	AREA DESCRIPTION
103	ROADS & DRAINAGE
402	ORE FEED
405	PARKING
442	STORM WATER DAM
444	SLURRY TRANSFER
450	SUBSTATION 1
451	MAIN CONSUMER SUB 2
452	SUBSTATION 3
455	COMPRESSORS,BLOWERS & INSTRUMENT AIR SUPPLY
464	PIPE AND CABLE RACKS
468	CONTROL ROOM
471	PLANT WORKSHOP
472	PLANT STORE AND YARD
474	GATE AND WEIGHBRIDGE
478	CHANGE HOUSE,ABLUTIONS AND FIRST AID STATION
486	REAGENT PLANT
490	POTABLE WATER
800	SLIMES DAM

CODES	DESCRIPTION
PR 1	PIPE RACK 1
PR 2	PIPE RACK 2
PR 3	PIPE RACK 3
SL 1	SLEEPER WAY 1
SL 2	SLEEPER WAY 2
SL 3	SLEEPER WAY 3

Figure 14: Pre-treatment Plant (AAP, 2012)

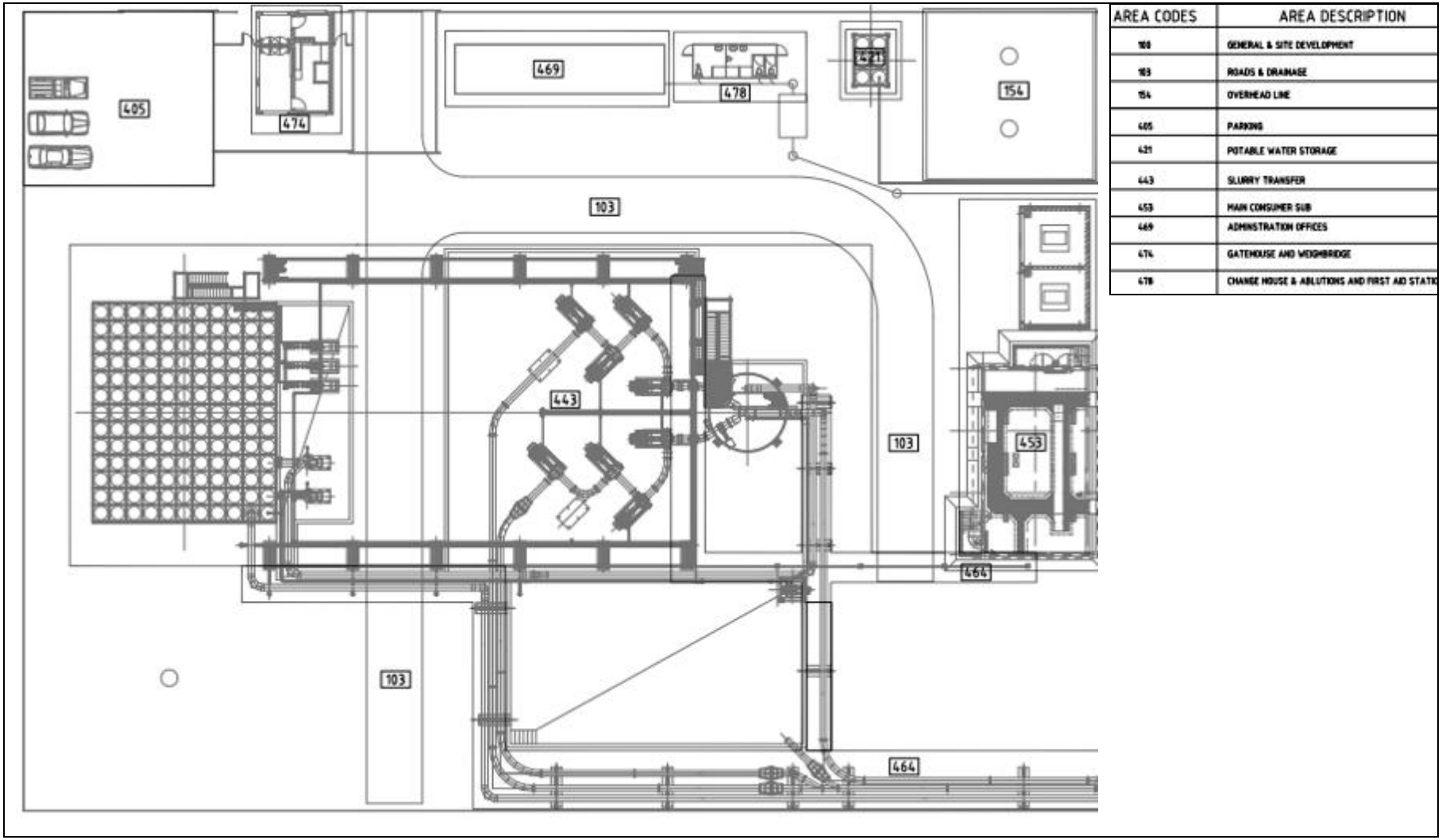


Figure 15: Booster station (AAP, 2012)

5.1.3.2 Overland Pipelines

The slurry material will be pumped from the pre-treatment plant via overland pipelines with a diameter of 400mm over a distance of approximately 12km to the WLTR Plant. The return water overland pipeline will bring process water from the Hoedspruit RWD to the pre-treatment plant, in a 300mm diameter pipeline over a total length of approximately 15km. The slurry and return water pipelines will follow an existing pipeline corridor (compressed air pipeline) (**Figure 16**).

Figure 16: Existing pipe rack structure – Option B

Three river crossings will be required as the pipeline crosses the Klipgatspruit River in three different locations. It is estimated that a maximum throughput capacity of 500kt/m of slurry material (approximately 1,000m^3/hr) will be transferred via the pipeline.

The pipelines will be constructed overland so that any failures can be easily identified and repaired timeously. It would also be environmentally beneficial for the pipeline to be constructed above ground as the slurry pipeline lends a risk of contaminating the ground, should there be any leakages on an underground pipeline construction.

5.1.3.3 Booster Station

A booster station will be used to assist with the transportation of slurry material from the pre-treatment plant to the WLTR Plant (**Figure 15**). The booster station will house a water storage facility (500m^3), a sump for slurry spillage (approximately 80m^3) and booster pumps that will feed into an overland pipeline to the WLTR Plant. The booster station is required in order to increase the pressure of the slurry flowing through the pipeline as a result of the continual loss of pressure along the length of the pipeline due to the gradient of the land. This will ensure that the slurry reaches the WLTR Plant at a sufficient rate.

5.1.3.4 Re-mining of Tailings

The pre-treated slurry material will be received at the existing WLTR Plant (**Figure 17**). As the slurry will have been pre-treated, the material will bypass the laundering and screening phases of the WLTR Plant and report directly to the milling surge tanks where primary and MIG milling are done. Once the material is milled, the slurry flows through a series of cyclones to be thickened. The overflow from the cyclones will gravitate to a common final product sump where it will be combined with the discharge from each of the mills. The final product sump and pumps (one duty and one standby) will transfer the combined product to the plant feed metal accounting sampler ahead of the rougher flotation bank.

Figure 17: Existing Western Limb Tailings Retreatment facility showing flotation cells (middle) and ball mill (right). In the foreground is the proposed site for the four IsaMills™

The rougher flotation feed will be sampled for metal accounting purposes prior to flotation. The fine slurry will be transported to the existing flotation plant where the PGEs will be removed through the existing technology (grinding, flotation and concentrating). The annual percentage through-put of the WLTR Plant will not increase as the Project will be sustaining the available capacity for the WLTR Plant.

5.1.3.5 Storage of Resultant Tailings

The resultant tailings from the WLTR Plant will be piped to the Hoedspruit TSF.

Hoedspruit TSF Design

The present footprint of the Hoedspruit TSF is approximately 750ha excluding the return water dam. The TSF is approximately 45m high, but may reach a height of 120m if future RPM deposition is catered for in this TSF. The Project will increase tailings deposition on Hoedspruit TSF to 6.0Mtpa. The WLTR plant will continue to make use of compartment B of the Hoedspruit TSF, for deposition of plant tailings. A capacity review of compartment B was conducted as part of the FEL2 study. The report indicated that Compartment B could safety accommodate deposition of tailings from the WLTR complex at a deposition rate of 500ktpm until the completion of the reclamation process in 2030. An elevated drain would need to be installed on top of the tailings facility to maintain the factor of safety of the outer face of the facility at an acceptable level prior to deposition of tailings from the Waterval West and East TSF's.

The TSF includes a perimeter fence, stormwater cut-off trenches, an access road, solution trenches and catchment paddocks around the external perimeter of the TSF. Internal toe and elevated drains have also been built to ensure stability. Tailings slurry is pumped from the WLTR Plant to the TSF via a 450mm PVC / rubber lined mild steel pipeline.

Hoedspruit TSF Pumpstation

The Hoedspruit RWD currently pumps water to the WLTR Plant process water ponds utilising two return water pumps (one duty, one standby). To accommodate relocation of re-mining activities to Waterval, the majority of the water requirements for the pre-treatment plant will be derived from Hoedspruit Dam as well as Klipgat Dam.

5.1.4 Stormwater management

The existing stormwater control facilities around the East and West TSFs, namely the solution trenches, toe paddocks and stormwater cut-off trenches should be upgraded (or maintained) for use during the re-mining process. Currently the solution trench for both the East and West facilities channel the 'dirty' water via gravity

flow to the Klipgat RWD. It is reported that the existing penstock decant system for the West TSF is no longer functional (possibly decommissioned) while the penstock system for the East TSF is still in working order. Water contained in the TSFs will be contained, creating 2m of freeboard during reclamation. The contained water will either percolate into the tailings material or will run off into the launder system.

5.1.5 Waste Management

Waste from the pump stations will be handled as follows:

5.1.5.1 Domestic waste

Domestic waste will be generated as a result of workers on site as the site is operational for 24 hours. General waste bins will be provided to contractors and will be disposed as required at an approved landfill site. Sorting and recycling will not be done on site as the volumes of waste generated are minimal.

5.1.5.2 Steel

Steel will be generated as a result of mechanical failure of machinery or general maintenance conducted on site. This will be transported to the RPM Salvage Yard for recycling.

5.1.5.3 Wood

Wood can be found on site due to packaging and pallets that goods are delivered in. This material will be transported to the RPM Salvage Yard for disposal.

5.1.5.4 Dirty water

All dirty water from site is returned to the water recycling system and reused in the process according.

5.1.5.5 Tailings

Tailing material resulting from spillages will be re-mined.

5.1.5.6 Building rubble (West TSF only)

A large amount of building rubble exists on the West TSFs. Due to the quantity of the material; a mobile crusher will be installed on site to crush the rubble. The crushed rubble will then form part of the slurry stream to be processed.

5.1.5.7 Non-mineral waste streams (West TSF only)

A Non-mineral Waste Management Plan for the Waterval Retrofit E Feed Project, Rustenburg was developed by WSP Environmental (Pty) Ltd during 2013, and is attached in **Appendix B**. This sub-section is based on the contents of that document.

5.1.5.7.1 Preliminary Clearance

Fraser Alexander proposes to remove the non-mineral waste streams using mechanical techniques as part of a ‘clear and grub’ operation. The preliminary clearance will allow the required access to the tailings. Preliminary clearance will be undertaken to ensure that all recoverable material will be temporarily relocated to the toe of the TSFs.

5.1.5.7.2 Screens

In order to assist with the management of the non-mineral waste static screens are to be positioned in the launders at the satellite pumps to assist with the capture of oversized debris and vegetative material. As a secondary measure, during the re-processing oversized debris including vegetation will be removed from the screens and transferred to the RPM Salvage Yard for disposal. It is further expected that additional screens are to be positioned upstream of the penstock decant system to prevent additional ingress of unwanted material.

5.1.5.7.3 Temporary Storage

The mixing of the wastes with tailings has occurred to an extent that it is not be feasible to achieve segregation of non-mineral and mineral waste. In this regard, the use of screens, as proposed, is to allow the segregation after the material has been eroded by the water guns.

Following this, the waste material will be temporarily relocated to the toe of the West TSF. The re-mining contractor is to ensure that the temporary storage is within the footprint of the existing tailings so to limit transfer of potential risks elsewhere.

5.1.5.7.4 Transport and Disposal

Once stored and in line with proceedings of the work plan, the material will be collected by waste management contractors and transferred to the RPM Salvage Yard. For clarity, the proposed relocation and flow of waste is depicted on **Figure 18**. To minimise uncontrolled dumping of wastes, consignors and transporters should observe the packaging and transportation requirements.

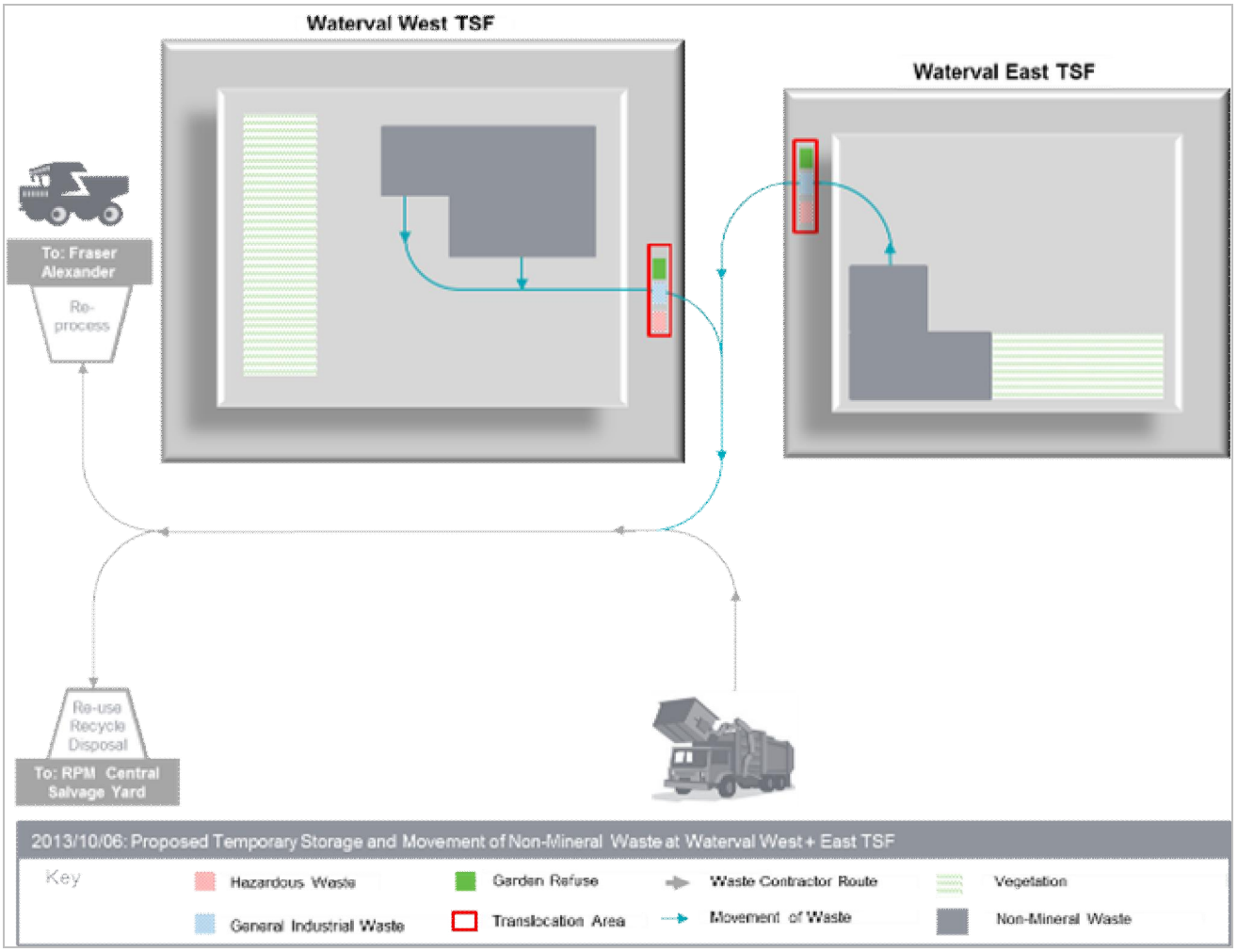


Figure 18: Proposed translocation and flow of waste

5.1.5.7.5 Off-Site Management

It remains important that even after removal, that the off-site management includes the recording of all wastes as per the waste accounting system and manifest document. To ensure good management practices with regards to hazardous waste, waste contractors must observe and comply with the relevant norms and standards when transporting and managing the removed wastes.

5.1.5.8 Hydrocarbons

Hydrocarbons will be generated on site as a result of degreasers and oils kept on site for maintenance. As a result oily rags, absorbent material and empty oil tins will need to be disposed. This will be disposed of in a separate waste reciprocal for hazardous waste and will be transferred to the RPM Salvage Yard for disposal.

5.2 Pre-Construction Activities

The pre-construction phase comprised a pre-feasibility engineering study of the Project (TWP, 2012), as well as environmental authorisation process.

5.3 Construction Phase

5.3.1 Option A

The construction of the east pump station and associated infrastructure will take about five months and will commence in the second quarter of 2014. The East TSF will take approximately three years to be completely re-mined, and once re-mining has ceased, the infrastructure for the east pump station will be relocated to the west pump station for commencement of re-mining of the West TSF.

The construction phase will involve the following aspects:

- Site preparation and clearance;
- Installation of services;
- Construction of of a temporary contractor's yard;
- Stormwater management;
- Waste management;
- Manpower; and
- Construction of infrastructure.

5.3.1.1 Site preparation and clearance

During the construction phase the pre-treatment plant and the booster station will be constructed, the sites will be cleared of all vegetation and topsoil will be stripped to a depth of 300mm or refusal. The topsoil will be stockpiled for future use in a demarcated area.

5.3.1.2 Installation of services

5.3.1.2.1 Potable Water

Potable water used for the construction crew during the construction of the pump station will be obtainable through mobile water tankers / bottled water.

5.3.1.2.2 Sewerage

No municipal sewerage services are situated in close proximity to the pump station locations, thus, septic tanks systems with conservancy tanks are proposed for ablution facilities at the pump stations during construction of the pump station.

5.3.1.2.3 Power

Electricity will be taken off the Klipgat pump station feeder (Eskom). This will involve the upgrade and extension of the existing 11kV overhead lines from 6th Point substation to Klipgat pump station (this does not form part of the Project scope).

5.3.1.2.4 Access roads

Existing access roads will be used to access the pump station and administration buildings.

5.3.1.3 Construction of a temporary contractor's yard

A temporary fenced off contractor's yard of approximately 40m x 60m will be adjacent to the pump station. The contractor's yard will consist of the following components:

- Two 6m x 3m office containers;
- Two 6m x 3m storage containers;
- One 3m x 12m ablution container;
- Carports;
- A laydown / storage area of approximately 10m x 10m;
- A concrete slab of about 20m x 20m for high pressure pumps platform; and
- Three portable toilets on site.

The temporary contractor's yard will be required for the duration of the construction period, after which it will be used by the reclamation operations staff (See Section 5.1.2.1 above).

5.3.1.4 Stormwater management

Stormwater during the construction phase will be managed by the installation of a portion of the permanent clean and dirty water facilities. The design of stormwater containment dams has been calculated to comply with Regulation 704 (GN704), of the National Water Act (No. 36 of 1998). In terms of GN704, clean stormwater runoff must not spill into the polluted water system more than once in 50 years and *vice versa* for polluted water. .

5.3.1.5 Waste management

An area for waste collection and storage will be demarcated, including a temporary storage facility during the construction phase. The waste will be stored, handled, transported and disposed of as detailed in Section 5.1.5.

5.3.1.6 Manpower

Temporary construction engineers, management and artisans will be employed for the construction phase. The numbers employed will vary throughout the construction period, peaking at 50 in total. However, no accommodation camp will be provided; given the presence of existing mine towns, all construction personnel will reside therein.

5.3.1.7 Construction of infrastructure

The main components required for the pump station include the installation of:

- Launders (drains);
- Slurry feed pumps;
- Screens;
- Water feed pipes;
- Motors;
- Spillage pumps;
- Sub-station inclusive of transformer;
- Water storage tank;

- Piping network; and
- Bund facility.

5.3.2 Option B

The construction of the pre-treatment plant and booster station and associated infrastructure would be undertaken over a period of eighteen months commencing during the second quarter of 2014.

The construction phase will involve the following aspects:

- Site preparation and clearance;
- Construction of the pre-treatment plant;
- Construction of the booster station;
- Modifications at the WLTR Plant;
- Stormwater management;
- Waste management; and
- Manpower.

5.3.2.1 Site preparation and clearance

During the construction phase the pre-treatment plant and the booster station will be constructed, the sites will be cleared of all vegetation and topsoil will be stripped to a depth of 300mm or refusal. The topsoil will be stockpiled for future use in a demarcated area.

5.3.2.2 Construction of the Pre-treatment Plant

A temporary laydown area will be required for the storage of material and equipment during construction.

Components required for the pre-treatment plant and pump station include the installation of:

- Vibrating screens;
- Surge tanks;
- Distribution box;
- Thickeners;
- Clarifiers;
- Transfer sump;
- Process water tank;
- Clear water tank;
- Stormwater dam;
- Silt trap;
- Pumps and motors;
- Sub-station; and
- Piping network

Bund walls will be installed during construction to protect the pre-treatment plant and divert excess water from rainfall to a PCD. A main earth launder (trench) will be established from the mining face to the PCD. The PCD will be developed at the bottom / downslope end of the pre-treatment plant. The PCD will have an approximate storage capacity of 40,000m³ although the storage requirement is approximately 20,000m³ only.

5.3.2.2.1 Installation of services

Potable Water

Potable water used for the construction crew during the construction of the pump station will be obtainable through mobile water tankers / bottled water.

Sewerage

No municipal sewerage services are situated in close proximity to the pump station locations, thus, septic tanks systems with conservancy tanks are proposed for ablution facilities at the pump stations during construction of the pump station.

Power

Electricity will be taken off the Klipgat pump station feeder (Eskom). This will involve the upgrade and extension of the existing 11kV overhead lines from 6th Point substation to Klipgat pump station (this does not form part of the Project scope).

Access roads

Existing access roads will be used to access the pump station and administration buildings.

5.3.2.3 Construction of the Booster Station

A temporary laydown area will be required for the storage of material and equipment during construction.

Components required for the pre-treatment plant and pump station include the installation of:

- Pumps and motors;
- Sub-station; and
- Piping network.

5.3.2.3.1 Installation of services

Potable Water

Potable water for the pre-treatment plant will be obtained from the feed line at the Siphumelele Plant (Shaft 1) located immediately next to the booster station.

Sewage

No existing municipal sewage services are situated in close proximity to the booster station, thus, septic tanks systems with conservancy tanks are proposed for ablution facilities at the station during the construction phase.

Power

Electricity will be acquired from the Siphumelele Plant feeder (Eskom). This will involve the upgrade and extension of the existing 11kV overhead line. The line extension will need to be constructed over a length of approximately 1km.

Access roads

Existing access roads will be used to access the booster station and administration buildings.

5.3.2.4 Modification of the WLTR Plant

A temporary laydown area adjacent to the WLTR Plant for the storage of machinery and equipment during construction will be constructed.

5.3.2.4.1 Installation of services

Existing services will be used from the WLTR Plant during construction.

5.3.2.5 Stormwater management

Stormwater during the construction phase will be managed by the installation of a portion of the permanent clean and dirty water facilities.

5.3.2.6 Waste management

An area for waste collection and storage will be demarcated, including a temporary storage facility during the construction phase. The waste will be stored, handled, transported and disposed of as detailed in Section 5.1.5.

5.3.2.7 Manpower

Temporary construction engineers, management and artisans will be employed for construction phase. The numbers employed will vary throughout the construction period, peaking at 550 in total. No new or temporary accommodation will be provided for the construction phase, it is being assumed that all construction personnel will be accommodated in existing housing in the area.

5.4 Closure Phase

The closure phase will be aligned with existing EMP commitments and closure planning. The approach to closure will be to undertake closure activities that will result in a stable landform consistent with the post closure land use. The following closure activities are expected:

- Tailings will be recovered to ground level and no residual tails will be left on the surface of the footprint at the completion of the mining activities;
- The removal of hydraulic mining equipment and the closure of any launders required to affect recovery of the tails will be the responsibility of the mining contractor;
- Geochemical and geotechnical testing of the substrate material in the basement of the reclaimed TSFs will be undertaken to determine if there are any residual risks and to establish what treatment regime will be necessary for creating a suitable growing medium in the substrates.
- Soil with the appropriate geochemical and geotechnical characteristics will be made available to utilise as growth medium on the exposed footprints, following the removal of contaminated basement material below the TSFs;
- The pump station (if **Option A** is selected), pre-treatment plant (if **Option B** is selected), and booster station (if **Option B** is selected) are to be demolished and the rubble is to be crushed and used for levelling on the TSF footprints.
- Specific demolition actions include:
  - All power and water services to be disconnected and certified as safe prior to commencement of any demolition works;
  - All non-hazardous fittings, fixtures and equipment within buildings will be dismantled and removed to designated temporary disposal yards; hazardous / contaminated fittings, fixtures etc. will be handled according to appropriate procedures and disposed separately to hazardous landfill or appropriate recycling entities;
  - All tanks, pipes and sumps containing hydrocarbons to be flushed or emptied prior to removal to ensure no hydrocarbon/chemical residues remain; the wash water will be appropriately disposed to a water treatment facility;
  - All electrical, water and other service infrastructure and equipment will be removed and placed in the designated temporary salvage yards; and
  - All excavations resulting from demolition of the pump station and buildings will be left in a safe manner.
- The various pipelines (slurry, and water) associated with the Project will be removed to designated temporary disposal yards; and

- The new infrastructure at the Waterval Retrofit Concentrator (if **Option A** is selected) and the WLTR Plant (if **Option B** is selected) will be constructed within the existing footprints of the current plants. As the liability for the entire plant footprint is already covered by the existing provision for the RPM Concentrators, this infrastructure has not been included in the closure assessment for the Project.

For additional information refer to **Section 13.**

6 Project Alternatives

6.1 Introduction

During the pre-feasibility phase of the Project, various options relating to different aspects of the process were evaluated and the most suitable selected. Options that were considered as part of the pre-feasibility phase included:

- Re-mining alternatives;
- Pipeline route alternatives; and
- The no-go alternative.

These alternatives were discussed in Section 3 of the Waterval Retrofit E-Feed Scoping Report[4] and have not been duplicated in this section.

6.2 Re-mining Alternatives

The Waterval Retrofit E-Feed Project is considering two alternatives for the reclamation of the East and West TSFs of the Waterval complex, namely **Option A** and **Option B**.

The feasibility of the two options are tabled below:

Table 9: Economically, Social, and Environmental feasibility of Option A and Option B

	Option A	Option B
Financial Cost	R 51 711 564	R 53 926 000
Ownership	Anglo American Platinum Share = 100%	Anglo American Platinum Share = 100%
Additional lifespan	Lifespan of Waterval Retrofit (without this option): Rustenburg Concentrators receive feed from adjacent underground mines in the surrounding area. The project will act as a replacement for reduced underground ore production. Thus the life of Retrofit would be sustained for this option.	Lifespan of WLTR Plant (without this option) Without this project the future, WLTR capacity will make itself available for an alternative feed source. Should there be no alternative feed sources WLTR will be forced to shut down.
Impact on TSF	No additional span will be added to the Paardekraal TSF as this is a replacement project	Increase in height of Hoedspruit TSF (120m).
Key environmental impacts	■ Transformation of land for east and west pump stations (negative) ■ Construction of a 500m (east) and 750m (west) pipeline (negative) ■ Transformation of the sites where the Waterval TSFs are located (positive).	■ Transformation of land for pre-treatment plant and PCD (negative) ■ Transformation of land for booster station and PCD (negative) ■ Construction of a 12km slurry pipeline and 15km return water pipeline (negative) ■ Transformation of the sites where the Waterval TSFs are located (positive).

[4] Holme B et al. (2013). Final Scoping Report: the Re-processing of the Waterval West and East Tailings Storage Facilities - Rustenburg Platinum Mines. WSP Environmental (Pty) Ltd

	Option A	Option B
Key social impacts	■ Employment of 50 skilled and non-skilled employees over a ten month period during construction for both the east and west pump stations (positive)	■ Employment of 550 skilled and non-skilled employees over an eighteen month period during construction (positive) ■ Employment of 74 skilled employees over the life of the project (positive)

The project description includes both options, and although one option may be more expensive than the other, both are economically, socially and environmentally feasible.

6.3 No-Go Alternative

Should the Project not proceed, and if **Option A** is selected, the WLTR Plant will be closed, as a consequence of which loss of employment and a decrease in the overall contribution of RPM to the local economy will occur.

Regardless of whether **Option A** or **Option B** is chosen, the Project also presents an opportunity to efficiently and sustainably utilise the mineral resources in the tailings dormant material, which will otherwise remain as a TSF with associated liabilities and rehabilitation requirements.

7 Environmental Setting

A concise description of the baseline environment at the RPM mine lease area, relative to the environment of the surrounding area, is provided in this section of the report. This section has been compiled using the following information:

- Available information from original EMPR and subsequent EMPR Amendments and associated specialist studies (in particular: RDNW(KL) 6/2/2/378, RDNW(KL) 6/2/2/782, RDNW(KL) 6/2/2/195(4) and RDNW(KL) 6/2/2/195);
- The Final Scoping Report: The Re-processing of the Waterval West and East Tailings Storage Facilities (WSP, 2013); and
- Previous studies undertaken in the area including the following:
  - Archaetnos Culture & Cultural Resource Consultants (2013). A Report on a Cultural Heritage Impact Assessment for the Proposed Waterval Retrofit E-Feed Project at the Rustenburg Platinum Mines Limited (RPM) located in the Northwest Province - Report No.: AE01350V (specialist report to this, the WSP EMPR Amendment)
  - WSP (2013). Waterval Retrofit E-Feed Project: Draft Social Impact Assessment - Proposed Waterval Tailing Storage Re-processing Project
  - Clean Stream (2005). Biodiversity Management Plan for Anglo Platinum Mines, Rustenburg Section
  - Anglo American Platinum (2006). Anglo American Platinum Regional Air Quality Plan;
  - Bojanala Platinum District Municipality (2010-2013). Revised Integrated Development Plan
  - SRK (2011). Anglo American Platinum Rustenburg Operations Integrated Water and Waste Management Plan; and
  - Aquatico (2012). Rustenburg Platinum Mines – Rustenburg Section Annual DWA Compliance Report. .

The broader regional environmental context was thoroughly described in the Project Scoping Report (WSP, 2013). Where impacts will not have a regional aspect (e.g. Geology) this report focuses on site characteristics, the regional context being available in the Scoping Report.

7.1 Climate and Air Quality

7.1.1 Climate

The Rustenburg region has a sub-tropical climate that experiences hot, wet summers and mild dry winters. Due to its location at a high altitude, temperatures during winter nights can drop substantially. The amount of rainfall received can be fairly erratic with large differences from one year to the next. Rainfall events are sometimes associated with severe thunderstorms (SAWS, 2009).

7.1.1.1 Temperature

Figure 19 represents the average, minimum and maximum temperatures for Rustenburg, calculated from hourly average temperature readings, recorded at the South African Weather Service (SAWS) Rustenburg meteorological station from 2009 to 2011. The maximum recorded temperature was 30.3°C in January 2009 and November 2011 and the minimum temperature was 5.4°C recorded during June 2010. Average temperatures range quite considerably between summer and winter months, with an average summer temperature of 23°C and an average winter temperature of about 10°C.

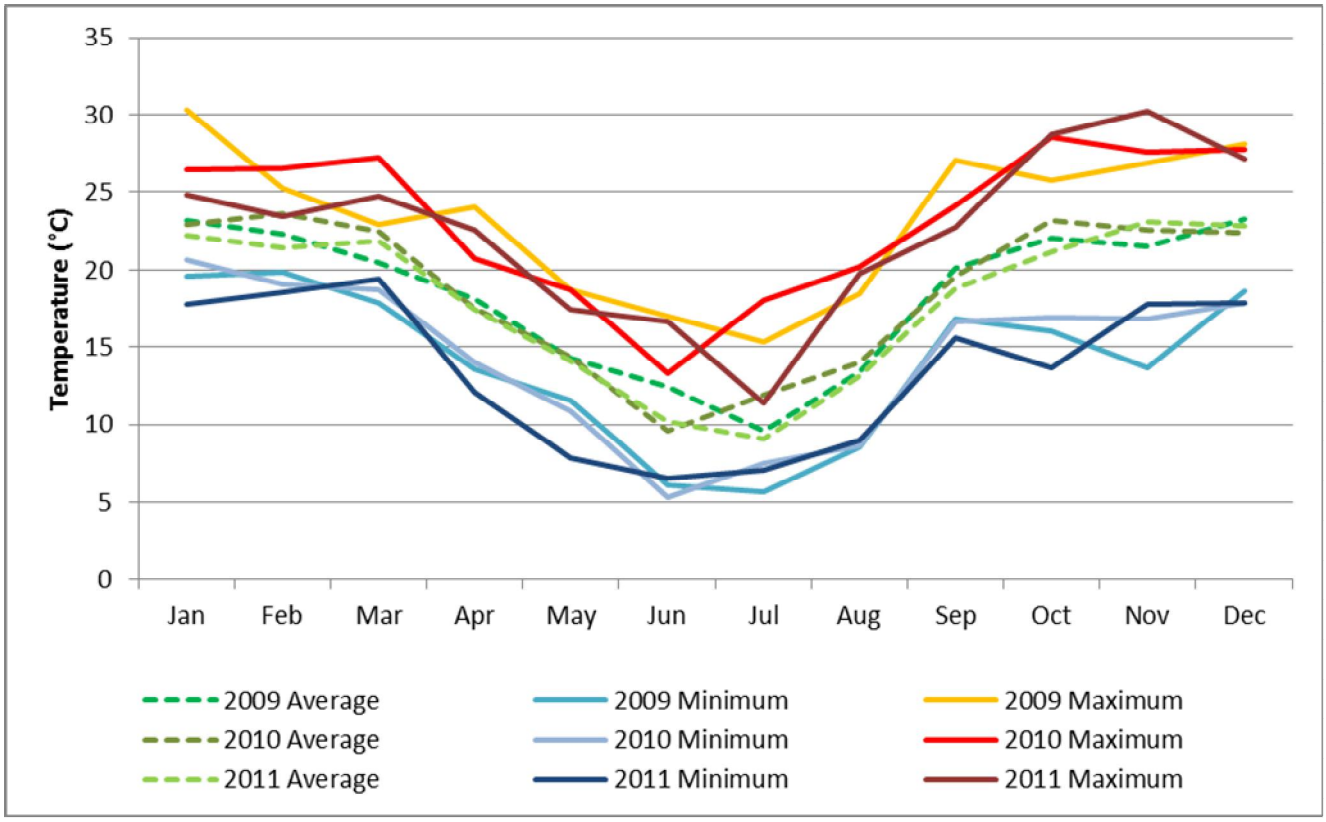


Figure 19: Average, maximum and minimum temperatures for Rustenburg, calculated from hourly average measurements at the Rustenburg SAWS meteorological station

7.1.1.2 Rainfall

Monthly rainfall figures for Rustenburg from 2009, 2010 and 2011 are plotted in **Figure 20**. The highest rainfall is experienced during the summer and autumn months. The lowest rainfall occurs during July, August and September. Rainfall has the potential to remove pollutants from the air, especially particulates, thereby improving the air quality situation in high rainfall areas. During the summer months, air quality in the Rustenburg area may improve due to the high rainfall experienced. Drier conditions, together with increased domestic fuel combustion in the region, may augment the concentration of ambient pollutants during winter.

7.1.1.3 Atmospheric Dispersion

In the Rustenburg region, atmospheric transport associated with continental high pressure systems occurs all year round, but with greater frequency during winter. These anticyclonic circulations are associated with subsidence of air resulting in clear, dry and stable atmospheric conditions. Such stable conditions are conducive to the accumulation of atmospheric pollutants, hence limiting the dispersion potential of the atmosphere. Easterly waves exhibit an annual cycle, peaking in summer, with extremely seldom occurrences in winter. These waves are responsible for transporting moisture into the region, creating rainfall. Transport associated with ridging highs and westerly waves dominates during winter (Garstang *et al.,* 1996; Tyson and Preston-Whyte, 2000).

Recirculation is also important in the transport of pollutants and occurs frequently over southern Africa due to the high frequency of anticyclonic circulations (Garstang *et al.,* 1996; Freiman and Piketh, 2003). Recirculation occurs when air is transported away from its source and returns in the opposite direction after rotating cyclonically or anticyclonically. Recirculation can occur at a number of scales from sub-continental to regional, and an interaction between different scales of wind systems results in further recirculation (Tyson *et al.*, 1996; Tyson and Preston-Whyte, 2000; Freiman and Piketh, 2003).

7.1.1.4 Local Wind Field

Meteorological data was sourced from the SAWS Rustenburg station for 2009 to 2011. This station is located approximately 7km west-north-west of the Waterval TSF and is positioned at a similar altitude, representing a good comparative data set.

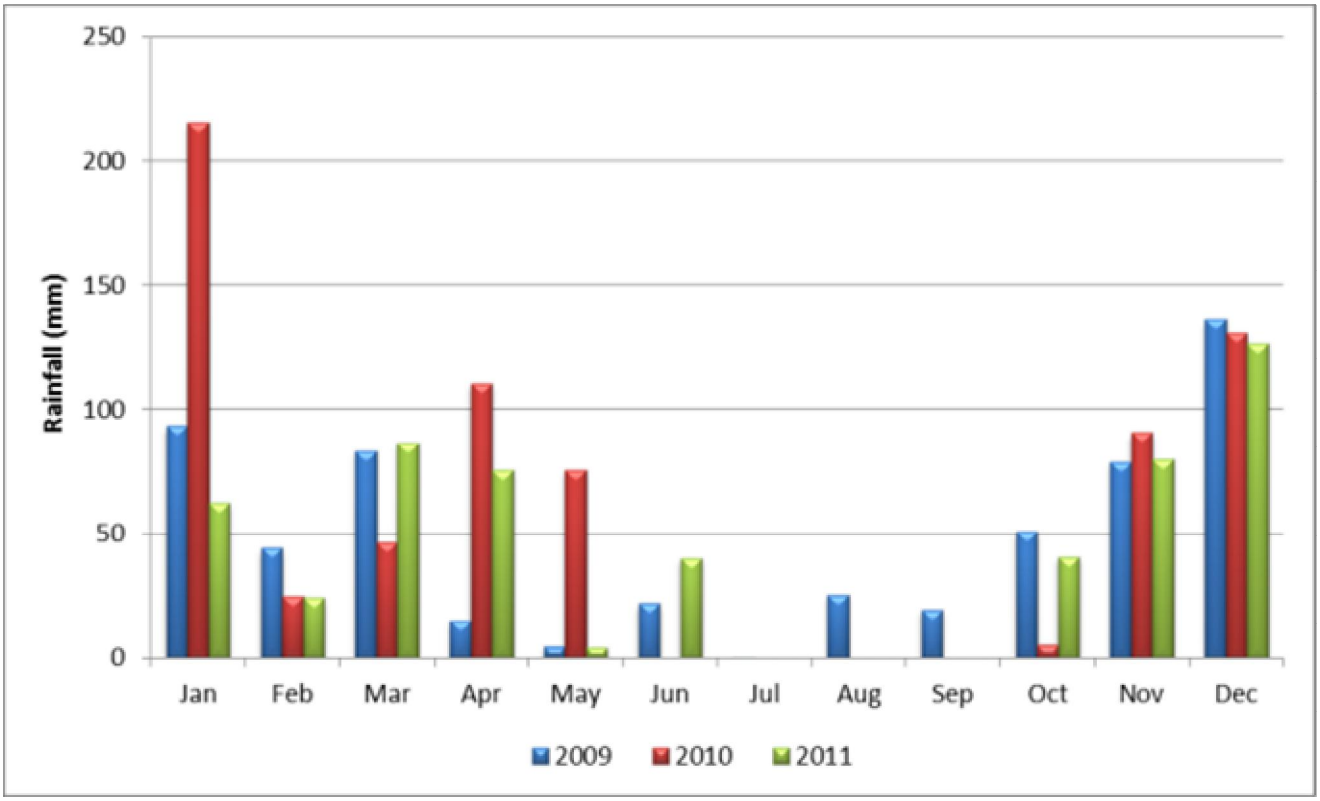


Figure 20: Total monthly rainfall for 2009, 2010 and 2011 recorded at the Rustenburg SAWS meteorological station

Wind roses are useful for illustrating the prevailing meteorological conditions of an area, indicating wind speeds and directional frequency distributions. In the following wind roses, the colour of the bar indicates the wind speed whilst the length of the bar represents the frequency of winds blowing from a certain direction (as a percentage).

In the Rustenburg area (according to **Figure 26**), winds are predominantly from the south-west (16% of the time) and the west-south-west (9% of the time). A small northerly and north-easterly wind component is also evident. Winds are generally weak to moderate, with wind speeds ranging from 0.5 to 5.7m/s. Calm conditions are experienced for approximately 20% of the time.

Seasonal variations in winds at Rustenburg are represented in **Figure 22**. During summer (December to February) wind direction varies quite considerably, with winds experienced from all directions. Winds from the north, north-east, south-west and west-south-west dominate. Winds are calm to moderate with wind speeds of up to 5.7m/s. During autumn (March to May), winds from the south-west (13.5% of the time) and north-east (10% of the time) are predominant. Smaller west-south-westerly, northerly and east-north-easterly components are also evident. As in summer, wind speeds remain calm to moderate. During winter, south-westerly flow dominates, with winds from this direction blowing for 26% of the time. This flow is a result of westerly waves, in the form of cold fronts that pass over the region at this time. A very small, yet stronger southerly wind component is also evident. Winds remain calm to moderate. During spring, winds are similar to those experienced during winter; however, a northerly wind component is introduced.

Diurnal variations in winds at Rustenburg are presented in **Figure 23**. At night (18:00 to 06:00) winds from the south-west dominate, with a smaller west-south-westerly component. Winds are relatively calm at this time. After sunrise, the south-westerly winds weaken slightly and northerly, north-easterly and easterly winds dominate. After midday, the north-westerly component disappears and winds from the north dominate. Wind

speeds are greatest during the afternoon, when convective mixing is at its greatest as a result of surface heating.

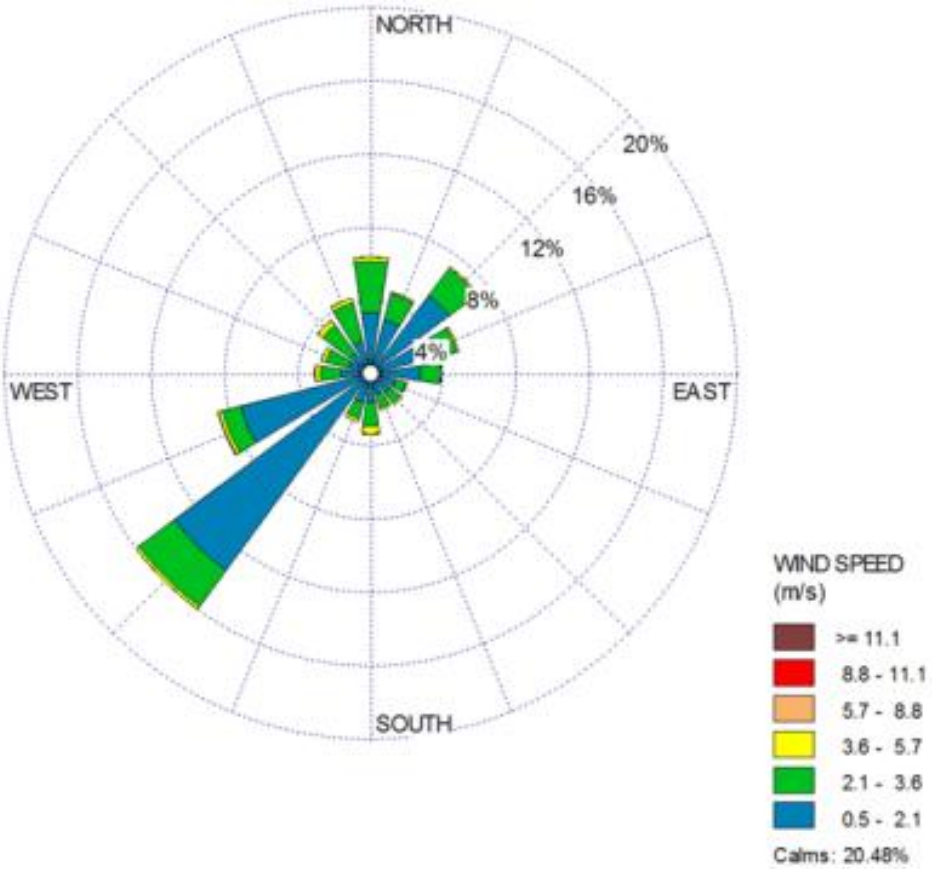
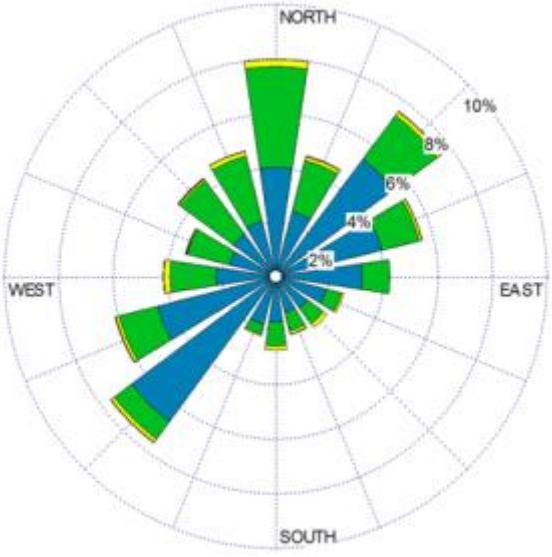
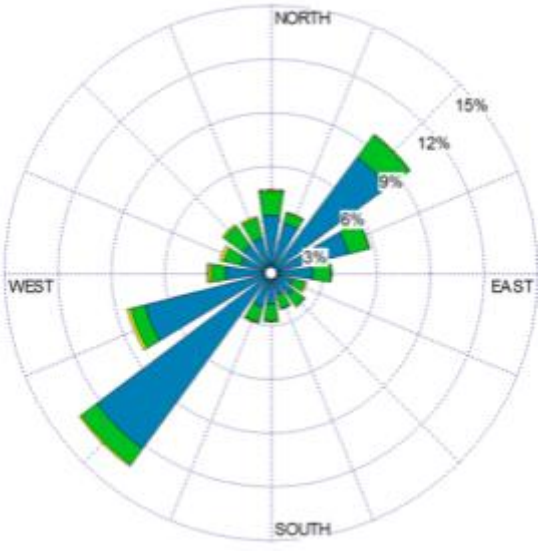


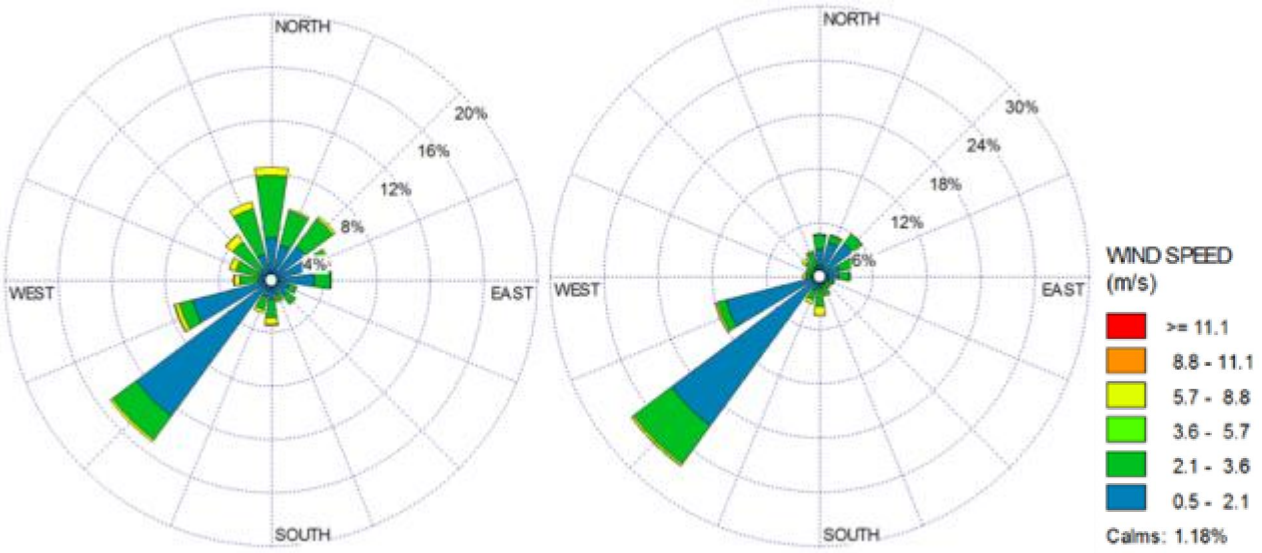
Figure 21: Surface wind rose plot for Rustenburg for 2009 to 2011



SUMMER (Dec – Feb)

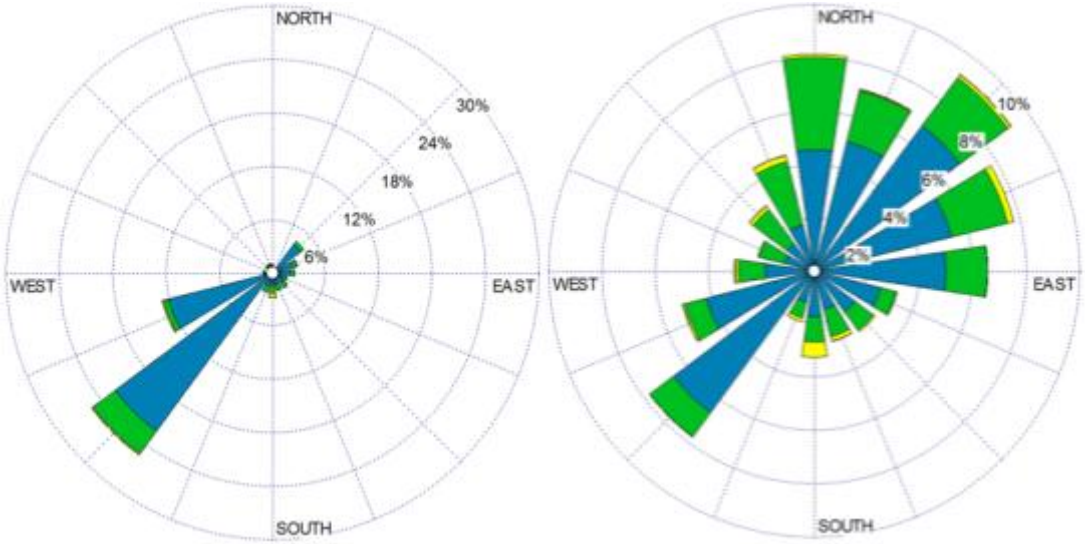


AUTUMN (Mar – May)



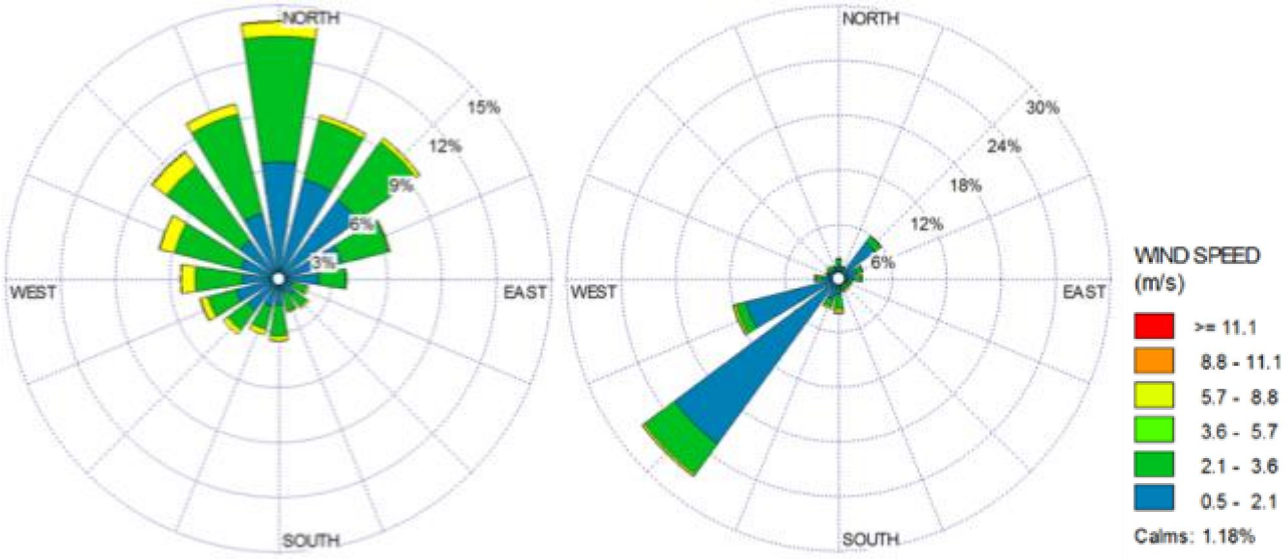
WINTER (Jun – Aug) SPRING (Sep – Oct)

Figure 22: Seasonal surface wind rose plots for Rustenburg for 2009 to 2011



00:00 to 06:00 06:00 to 12:00

The dispersion of emissions is much lower during the early morning hours as a result of calmer wind speeds. During winter the concentrations of pollutants experienced at the surface are frequently elevated by the formation of surface inversions, which trap pollutants and prevent them from being dispersed higher into the atmosphere. Surface temperature inversions dissipate during the day, however, due to the warming of the land surface.



12:00 to 18:00 18:00 to 24:00

Figure 23: Diurnal surface wind rose plots for Rustenburg for 2009 to 2011

7.1.2 Regional Air Quality

Rustenburg forms part of the newly declared Waterberg Priority Area, an air pollution hotspot area prioritised as a region associated with poor air quality and elevated concentrations of criteria pollutants (such as nitrogen oxides, sulphur dioxide and particulate matter). Major emissions sources in the Rustenburg area include mining activities, manufacturing industries, agricultural activities, domestic fuel burning, biomass burning, waste treatment and disposal, and vehicular activities (Gondwana, 2011). Primary emissions from these sources include sulphur dioxide, nitrogen oxides, carbon monoxide, particulate matter and volatile organic compounds. Suspended particulates are of greatest concern in the Rustenburg area as a result of mining activity. The heavy metal loading (in the form of chromium, vanadium and nickel) of these particulates creates greater concern, such that the Rustenburg area has been identified as an area high in chromium and nickel emissions (Rustenburg LM, 2011).

7.2 Geology

7.2.1 Regional and Local Setting

The geology of the Rustenburg area is stable and dominated by formations of the Pretoria Group of the Transvaal sequence. This group consists of different geology types such as quartzite, norite, hybrid rocks, diabase, epidiorite, slate, shale, hornfels and gabbro. RPM mines platinum and chrome bearing reefs of the western limb of the Bushveld Igneous Complex. **Figure 24** below represents the position of Rustenburg in relation to the Bushveld Complex.

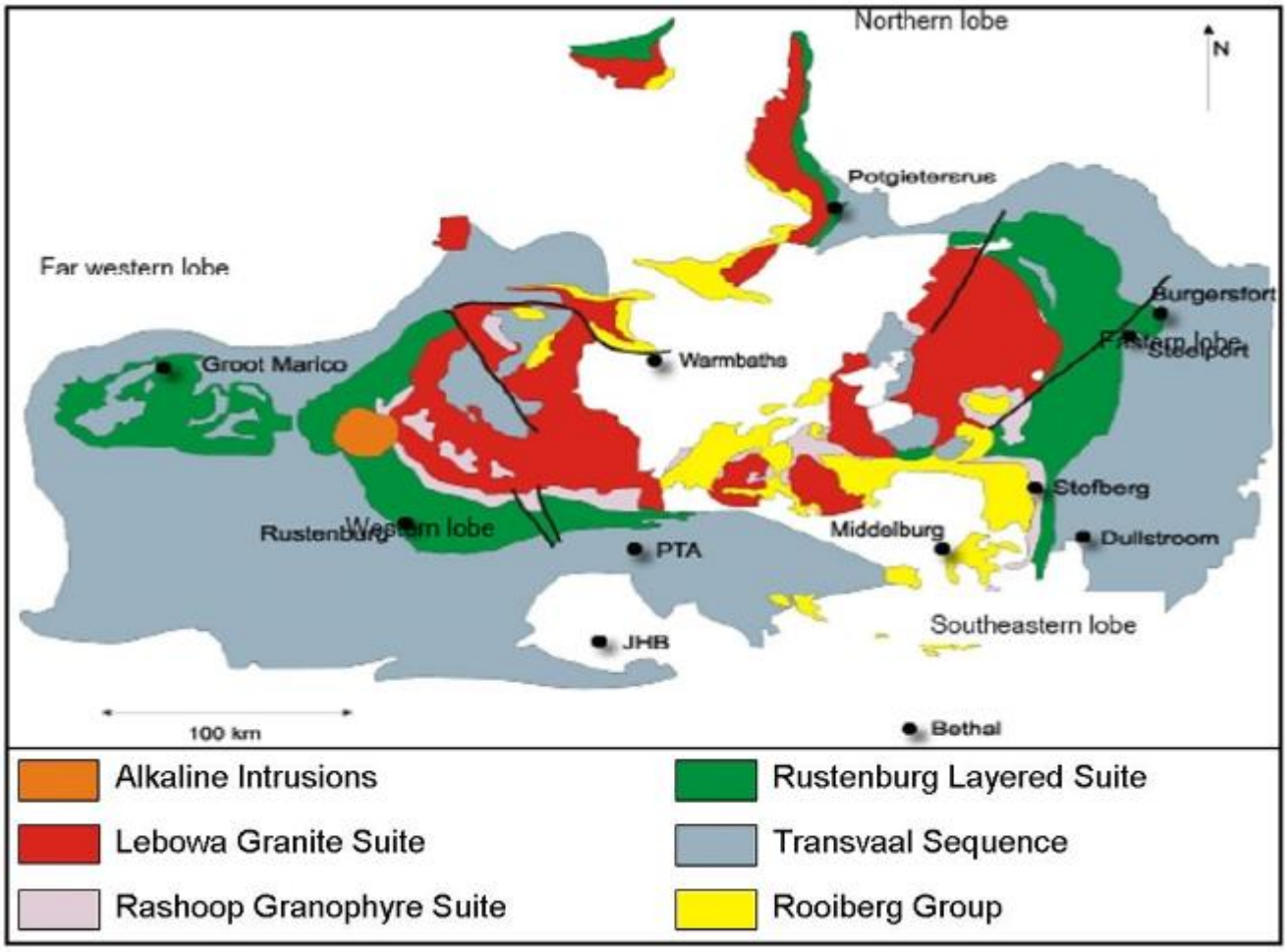


Figure 24: Rustenburg Section of the Bushveld Complex

7.2.2 Site Description

The mining, reclamation and re-mining operations of RPM occur in the Rustenberg Layered Suite of the Bushveld Igneous Complex (**Figure 24**). **Figure 25** illustrates the Merensky and UG2 Reef workings in the RPM mining lease area. The Merensky and UG2 reefs consist mainly of norite rock types that vary from light-coloured leuco-norite with a low percentage of pyroxene minerals, to dark coloured norite with an abundance of pyroxene. Norite is a medium to coarse grained basic igneous rock (K6 Shaft project EIA, 2009).

The in situ geology of the East and West TSF sites is relevant to the re-mining of these old tailings only insofar as it might affect the stability of the site and groundwater dynamics. More relevant are the characteristics of the tailings itself. During the 2002 geotechnical investigation, various test pits were excavated in order to determine the soil profile as well as the localised geological structures at the sites of the east and west pump stations (**Option A**), at the site of the pre-treatment plant, along the pipeline and the WLTR Plant (**Option B**). A geo-technical investigation is currently underway at the site for the PCD as well as any areas which have yet to be investigated in terms of underlying geology.

The tailings consist of predominantly of silty sand (= sand with >12% fines), with significant components of silt with high plasticity and inorganic clay and inorganic silt (Anglo Platinum, 2010). There were zones of both TSFs with moisture content above 30%. This represents a high risk for liquefaction and mud rush events under mining conditions (Anglo Platinum, 2010)

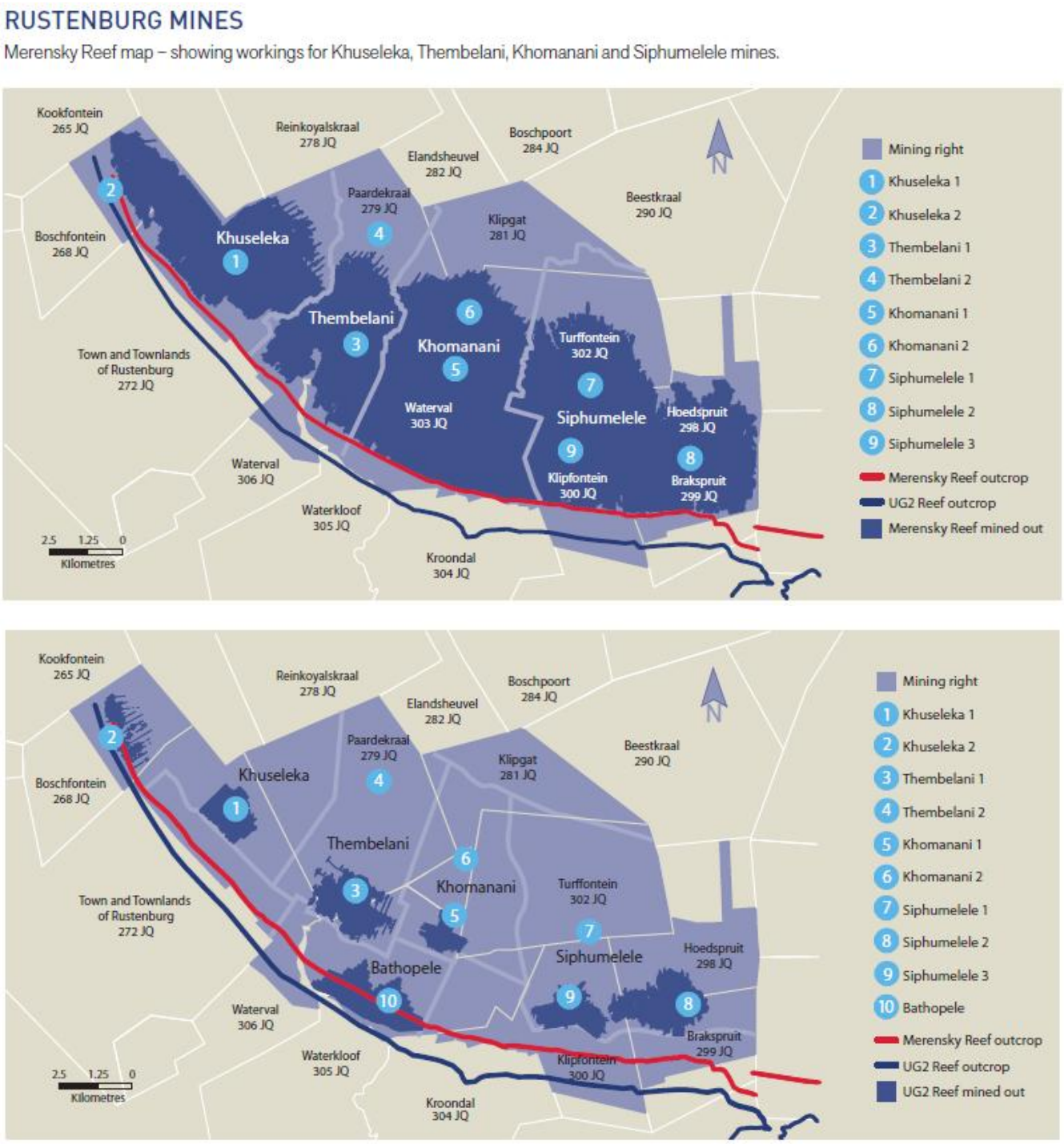


Figure 25: Merensky and UG2 Reef Outcrops (Anglo American Platinum, 2013)

7.3 Topography

7.3.1 Regional and Local Setting

The North West Province is said to have the most uniform terrain of all the provinces, with an altitude ranging from 920-1,782masl (State of the Environment Report- North West, 2002).The Rustenberg LM area consists of sequences of undulating plains and hills, with slopes ranging from 0 to 9%, bounded to the south and east by the sharp ridge of the Magaliesberg. In the vicinity of the range, slopes are steeper, ranging from 9 to 25%.

7.3.2 Site Description

7.3.2.1 Option A

The general topography of the pipeline route dips gently southwards away from the Waterval TSFs. The natural drainage of the site is towards the ENE. The topography of the project area for **Option A** is illustrated in **Figure 26**.

Figure 26: The Elevation profile of the pipeline route – Option A (Google Earth, 2012)

7.3.2.2 Option B

The general topography of the pipeline route dips gently east- and westwards away from the prominent line of north-south oriented hills. The WLTR Plant is situated on a gentle (1:50) easterly slope. The natural drainage of the site is towards the ENE. The topography of the project area for **Option B** is illustrated in **Figure 27**.

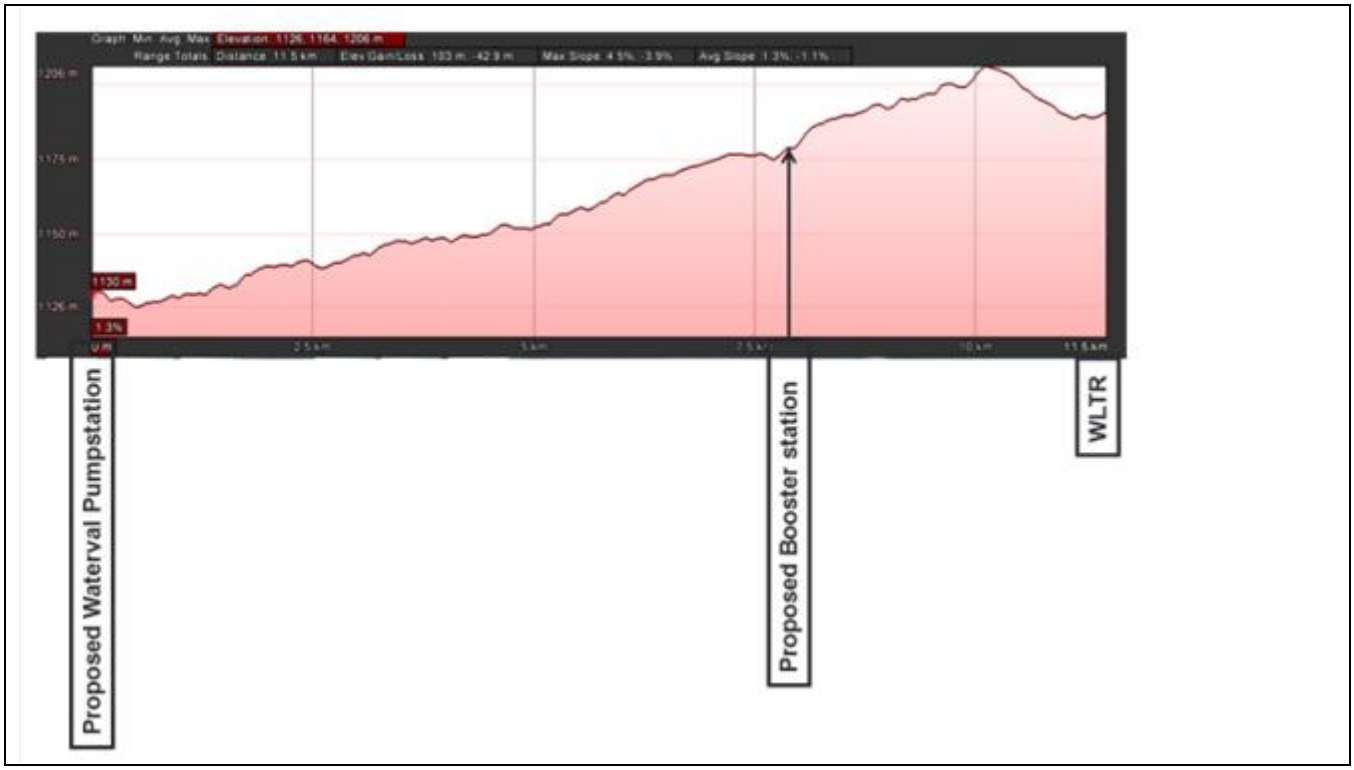


Figure 27: The Elevation profile of the pipeline route – Option B (Google Earth, 2012)

7.4 Soils

7.4.1 Regional and Local Setting

In the Rustenburg area, in proximity to the sites assessed, the regional soil environment is typified by shallow soils on rocky ridges and gentle to flat mid slopes where Arcadia, Mispah and Hutton soils are found (2002 EMPR [ref no. RNW (KL) 6/2/2/3164]). **Figure 28** illustrates soil type distribution in the RPM lease area. The Waterval TSF lies in an area of deep Arcadia (Ar1 soil type) soils, dark grey to black soils with a high clay content and shrinking/ expansion properties (Clean Stream, 2005).

7.4.2 Site Description

7.4.2.1 Option A

7.4.2.1.1 Pump Station

A detailed soil profile of the site for the pump station is provided in the 2002 EMPR (ref no. RNW (KL) 6/2/2/3164): the site consists of “made” ground (that is, artificial or disturbed substrate) overlying silty clay. The uppermost layer of fill (1.3m) of the test pit consists of loose sand and boulders, underlain by 0.2m of fine tailings sand. Soft silty clay underlies the “made” ground.

7.4.2.2 Option B

7.4.2.2.1 Pre-treatment Plant

A detailed soil profile of the site for the pre-treatment plant is provided in the 2002 EMPR (ref no. RNW (KL) 6/2/2/3164). The site consists of “made” ground overlying silty clay. The uppermost layer of fill (1.3m) of the test pit (2002) consists of loose sand and boulders, underlain by 0.2m of fine tailings sand. Soft silty clay underlies the made ground.

7.4.2.2.2 Pipeline Route

A generalised soil profile consists of brackish brown, stiff silty clay (reworked residual norite, commonly called black turf / turfs) that has expansive properties. This overlies a layer of residual norite sand. Underlying this is highly weathered very soft norite, which grades into soft rock norite. In a few of the test pits (particularly close to rock outcrops) the black turf was found to directly overlie hard rock norite (2002 EMPR (ref no. RNW (KL) 6/2/2/3164).

7.5 Land Use and Land Capability

7.5.1 Regional and Local Setting

The economic driver has changed in Rustenburg from being agriculturally dominated to being mining dominated. The wealth and development of Rustenburg was dependent on the agricultural sector, of which citrus farming was a large component however, increased interest on the platinum market has shifted economic reliance to the mining industry (Rustenburg Draft IDP, 2012-2017).

Most of the Rustenburg LM is occupied by soils that are classed as low to moderate potential agricultural soils, limiting the range of crops that can be grown. These soils consist of dominantly dark, swelling clay soils, which although inherently fertile, are difficult to cultivate with their very narrow range of available moisture. The soils of the area follow the concept of the catena where they are shallow and rocky in the mountainous areas with a lower fertility than the lower lying and clay rich soils at the base. Further down slope, and typically in association with rivers, dams and floodplains are the vertic, melanic and un-differentiated red structured soils. Agricultural areas are therefore located on the fertile soils associated with water availability.

Agricultural land however, is being threatened by the shift in economy from reliance on agriculture to mining in the Rustenburg LM. Small-scale agriculture is the most active economic agriculture in the area and this normally involves high produce irrigation farming. Small scale agriculture is found in the local rural population

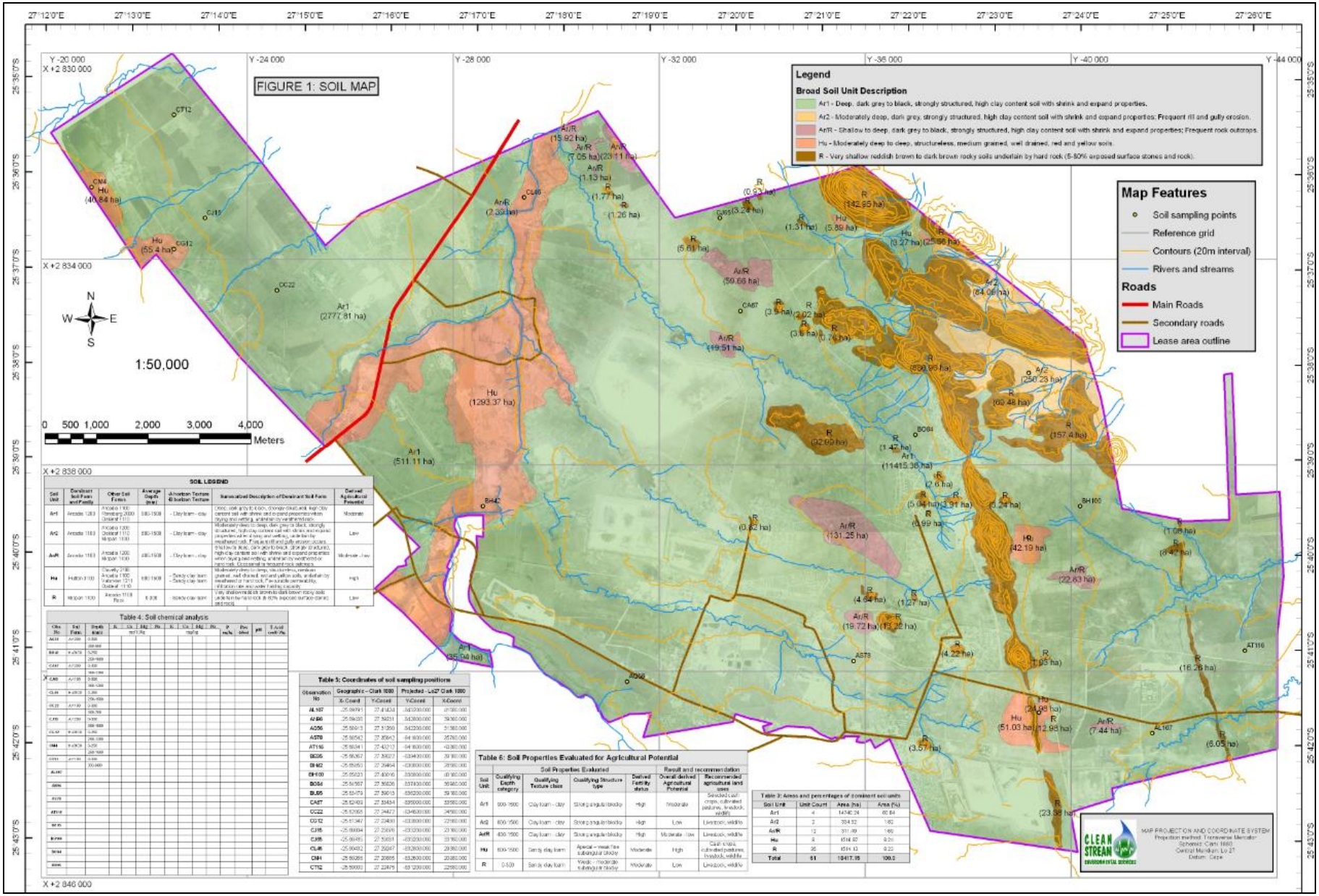


Figure 28: Soil types in the RPM-RS area (Clean Stream, 2005)

where municipal services are limited with poor access to water supply. As a result, agricultural activities have become costly and difficult to maintain since it is individuals that must ensure that such activities are sustainable. This pressure is part of the cause to loss of agricultural land as people opt to sell their land for alternative uses such as development and mining (Rustenburg Draft IDP, 2012-2017).

7.5.2 Site Description

The Waterval TSF is currently being utilised for the storage of mineral residue. However, the Waterval TSF once reclaimed will be rehabilitated as part of the RPM rehabilitation plan. Once the site is rehabilitated the land can be utilised by the mine for other land use activities.

7.5.2.1 Option A

The east and west pump stations will be placed in areas already disturbed by mining activities: no change in land use is required. The land will undergo remediation and rehabilitation once the Project has been concluded.

The slurry pipeline will be routed along an existing pipe rack, thus the land use will not be altered from its current land use allocation.

The addition of a surge tank at the existing Waterval Concentrator will not involve the development of any land. The surge tank will not impact on the land use and land capability of the area.

7.5.2.2 Option B

Development of the pre-treatment plant will occur on presently undeveloped natural veld to the north of the West TSF, resulting in a change in land use. This land will undergo remediation and rehabilitation once the life of the mine is reached, as part of the mine rehabilitation plan.

The slurry pipeline will be routed along an existing pipeline corridor and along a portion of a road reserve, thus the land use will not be altered from its current land use allocation. The environment along the road reserve is considered disturbed; further environmental degradation due to the, will result in a land use will change from natural land to developed land. The addition of four IsaMills^{TM} at the existing WLTR Plant will not involve the development of any land. The IsaMills^{TM} will be located within the WLTR Plant adjacent to other associated processing infrastructure. The IsaMills^{TM} will not impact on the land use and land capability of the area.

7.6 Water Management Area

The catchments within which the Project options fall (**Option A** and **B**) are situated within the Crocodile (West) Marico Water Management Area (WMA). This WMA is highly developed and contributes approximately 25% of the Gross Domestic Product of South Africa from the mining, industrial and agricultural sectors. Large scale platinum, chrome and vanadium mining occurs in the WMA, in addition to large scale commercial agriculture and industrial production which are highly dependent on the water resources within the WMA. The natural mean annual runoff (MAR) of the Crocodile (West) Marico WMA is 855 million m^3/annum, of this approximately 75% of the total surface runoff from the WMA flows down the Crocodile River, while 20% originates in the Marico catchment and the remaining 5% in the Upper Molopo catchment. Urban, industrial and mining uses account for more than 50% of the total water use in the WMA, approximately a third is used by small and large scale irrigation, while the remainder of the water requirements in the WMA are for power generation and rural water supplies. The current water resources do not meet what is required in the WMA and a fair amount of water utilised in the WMA is imported from the Vaal River system, mainly for domestic and industrial uses. Rand Water, the largest water board in South Africa, Magalies Water and Botshelo Water (the North West water supply authority), are the three water boards that supply water in this WMA.

7.7 Quaternary Catchments

The Project lies within two quaternary catchments, namely A22H and A21 k (**Figure 29**). Three watercourses are located close to the Project, namely the Klipgatspruit (A22H), Paardekraalspruit (A22H) and Hoedspruit (A21K).

7.7.1 Quaternary A22H (Klipgatspruit)

The non-perennial Klipgatspruit flows in a westerly to north-westerly direction along a flat to moderate slope. Due to the relatively flat topography the floodplain is wide, and the watercourse meandering.

The Klipgat return water dam, which has a capacity of 836,000m^3 and a surface area of 36ha, is located along the Klipgatspruit. The Waterval TSFs are located adjacent to the Klipgat return water dam.

The Klipgatspruit contributes to the perennial Hex River located 4km north-west of the Klipgat return water dam. The non-perennial Paardekraalspruit flows in a north-westerly direction, and discharges to the Hex River. The Hex River contributes to the Bospoort Dam located 6.9km and 2km downstream of the confluences with the Klipgatspruit and Paardekraalspruit, respectively.

7.7.2 Quaternary A21H

The non-perennial Hoedspruit begins adjacent to the eastern portion of the WLTR Plant. The river drains east via flat to moderate topography and contributes to the perennial Sterkstroom 8km east of the site.

7.7.3 Climate and Catchment Hydrology

Typical climatic conditions, rainfall and runoff volumes for each of the quaternary catchments are represented in **Table 10**, which indicates the catchment area, mean annual precipitation (MAP), mean annual evaporation (MAE), and mean annual runoff (MAR).

The average monthly rainfall for each of the catchments is represented in **Table 11**. This indicates that the wet season runs from October through March. The average monthly evaporation (A-Pan) for each of the quaternary catchments is given in **Table 12**. The evaporation demand is highest from October to March and this corresponds to the wet season.

Based on the 2012 SRK Water Balance Report the average temperatures are expected to range from 13°C to 30°C in summer and 2°C to 24°C in winter.

Table 10: Quaternary catchment information (Midgley *et al*., 1994)

Catchment	Area (km2)	MAP (mm)	MAE (mm)	MAR (mm)	MAR (m3)
A22H	865	658	1,700	37	13,700,000
A21 k	579	651	1,700	24	31,900,000

Table 11: Monthly average rainfall (Midgley *et al*., 1994)

Catchment	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
A22H (mm)	58.1	96.7	107.6	119.3	94.9	80.5	46.0	17.8	7.5	5.7	5.9	17.2
A21 k (mm)	51.2	84.6	108.0	114.3	96.7	89.4	49.3	17.3	10.0	5.2	9.8	21.1

Table 12: Monthly Averages of A-Pan Evaporation for Quaternary A22H and A21 k (Midgley *et al*., 1994)

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
185.6	176.3	191.8	181.9	151.8	147.2	116.1	98.8	81.3	90.1	119.3	159.8

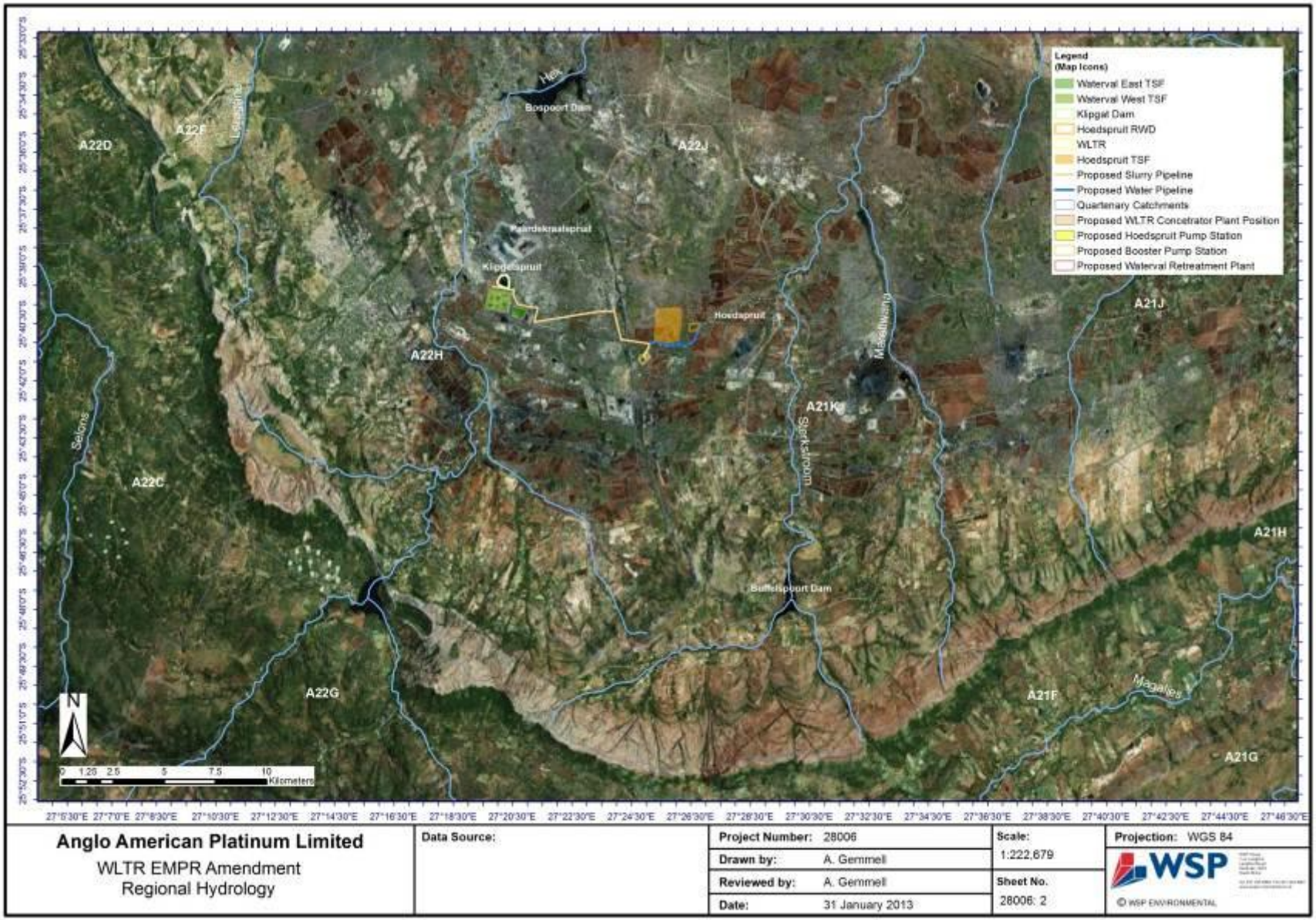


Figure 29: Regional Hydrology

7.8 Eco-Region and Eco-status

The pipeline routes for **Options A** and **B**, fall within the Level 1 Eco-region 8 (Eastern Bankenveld) and the Level 2 Eco-region 5 (Eco-region 8.05) according to the South African River Health Programme. The WMA is heavily impacted by mining, industry, sewerage pollution from non-functioning sewerage treatment plants of towns and informal settlements, large scale commercial agriculture and to a lesser extent power generation (Du Plessis, 2006; Gumede, 2012; DWA, 2005). The overall eco-status of the Crocodile (West) Marico WMA is poor, with 13 of the 23 units surveyed in 2003 being classified as poor, while only 10 were classified as fair or good. Only isolated parts of the WMA were still in good to natural condition in 2003. The eco-status of the tributaries of the Hex River, namely Klipgatspruit and Paardekraalspruit, have not been determined by DWA, however the eco-status of the Hex River is Class C: Moderately Modified and the two feeding tributaries, Sandspruit and Rooikloofspruit, are Class D: Largely Modified (SANBI, 2011).

7.9 Ecological Sensitivity

In accordance with DWA, the quaternary catchments A21K and A22H both have Moderate ecological sensitivity (http://www.dwaf.gov.za/WAR/systems.html). Quaternary catchments with a Moderate sensitivity are considered unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually not very sensitive to flow modifications and often have a substantial capacity for use.

7.10 National Freshwater Ecosystem Priority Areas

According to the classification of freshwater ecosystem priority areas for the country, rivers and wetlands crossed by the pipeline options A and B, are not considered to be freshwater ecosystem priority areas (SANBI, 2011).

7.11 Geohydrology

Based on the 2002 EMPR (Envirolink, 2002), the aquifer system is expected to be geologically controlled with groundwater intercepted in the zones of deeper weathering adjacent to dykes or faults in the area. The aquifer system comprises a low yielding semi-confined to confined weathered and/or fractured rock aquifer occurring at the base of the weathered zone, with higher yielding fracture zones associated with the faulting and/or dyke contacts.

The 2002 study by SRK indicated that the area has low groundwater potential. Groundwater depth is expected to be between 3m and 26m below ground level. It is noted that groundwater is generally of a poor quality unacceptable for domestic use.

7.12 Flora

The Project site falls within the Savanna Biome, which is the largest biome in Southern Africa (46% by area). The Savannah Biome consists of 25 vegetation types, two of which are of relevance to this study, namely, Clay Thorn Bushveld and Mixed Bushveld (detailed below).

7.12.1 Clay Thorn Bushveld

This vegetation type is widely distributed on the flat plains with black to red vertic clay soils in the northern parts of the North West Province. The key environmental parameter determining the distribution of this vegetation type is extreme clayey soils. Land bearing this vegetation type has economic value due to its suitability for

cultivated crops such as wheat, maize and sunflowers. Approximately 0.9% of this vegetation type is conserved in various nature reserves, primarily in the Northern Province.

7.12.2 Mixed Bushveld

This vegetation type represents a great variety of plant communities, where vegetation varies from dense, short bushveld to open tree savannah. Mixed Bushveld is characterised by coarse, sandy and shallow soil overlying granite quartzite, sandstone or shale. Mixed Bushveld is conserved in various nature reserves, game farms and conservation areas throughout South Africa, including the Rustenburg Nature Reserve.

Figure 30 represents the various land uses of the Rustenburg area. All the infrastructural components associated with the RPM are highlighted in grey.

No rare, endemic or threatened species are known to occur on any sites involved in the Project.

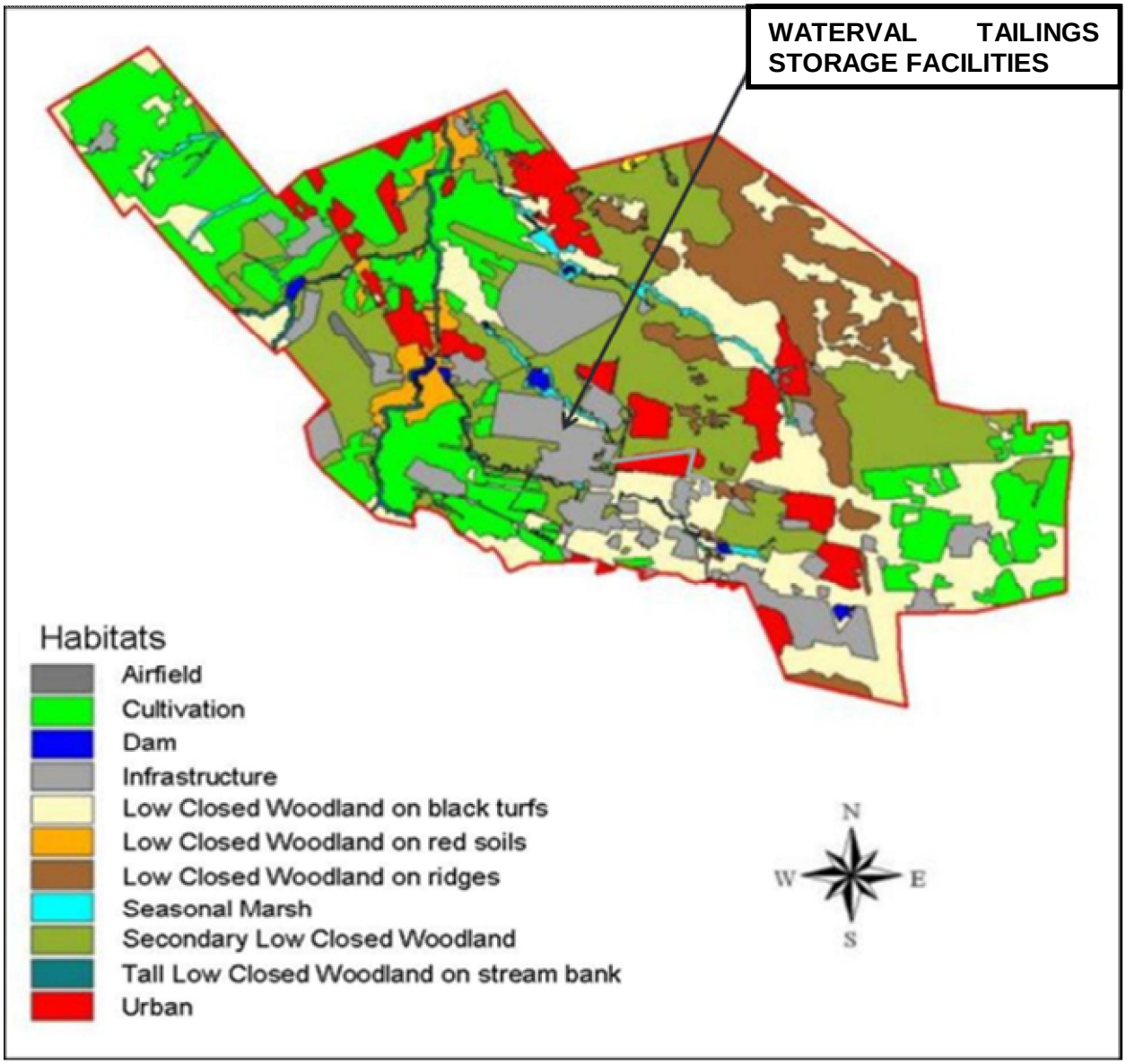


Figure 30: Natural Biotopes and Habitats of the Rustenburg Area (Anonymous, 2012)

7.13 Fauna

7.13.1 Avifauna

A total of 39 bird species were recorded during the ecological study conducted in 2002 (WMB, 2002). Six species are common water birds associated with aquatic habitats. These include the Reed Cormorant, Grey Heron, Egyptian Goose, Spurwinged Goose, Harmerkop and the Blacksmith Plover. Thirteen species are associated with grassland and bushveld habitats. These include the Common Quail, Swainson's Francolin, Helmeted Guineafowl, Crowned Plover, Forktailed Drongo, Lilac-breasted Roller, Chinspot Batis, Clapper Lark, Rufousnaped Lark, Neddicky, Crested Barbet, Southern Boubou and Redbilled Quelea. The Crowned Plover particularly favours recently burnt grassland areas. Bird species such as the Blackshouldered Kite, Hadeda, Sacred Ibis, European Bee-eater, Cattle Egret, Doves, Blackeyed Bulbul, Lesser Striped Swallow, Grey Lourie, Blackcrowned Tchagra, Olive Thrush, Redwinged Starling, Southern Red Bishop, Tawnflanked Prinia, Indian Myna, House Sparrow, Southern Masked Weaver and Fiscal Shrike are all common in rural suburbia and / or plantations. None of the bird species observed during the 2002 site visit are red data species (2002 EMPR (ref no. RNW (KL)6/2/2/3164)) for detailed description of the Avifauna habitat.

7.13.2 Mammals

A comprehensive study was conducted in 2002 (WMB, 2002) in order to determine the mammals which are present in and around the mining lease area. The study confirmed the presence of six red data species: the short-eared Trident Bat (*Cloeotis percivali)*, the Dwarf Shrew (*Suncus infinitesimus chriseos)*, the Honey Badger (*Mellivora capensis)*, the Antbear (*Orycteropus afer)*, Southern African Hedgehog (*Atelerix frontalis)* and the Pangolin (*Manis temminckii)*. Scrub hare droppings, Black-backed Jackal and domestic cattle tracks were the only evidence of mammals that were observed during the site visit to the study area during the 2002 avifauna study.

The fauna in the area appears to have been impacted on by the mining activities, as well as the continual heavy vehicle movements, in the surroundings. In addition, the presence of communities and informal settlers living in the surrounding area has impacted the habitat around the mine. Although no snares were detected during the field surveys, poaching should not be ruled out as a further limitation to the fauna in the area.

7.14 Sensitive Landscapes

Sensitive habitats include archaeological landscapes, visual resources at the site, flora, wetlands, and fauna. According to the North West Biodiversity Conservation Assessment Report (2008), granite koppies also referred to as norite koppies are characterised by a Bushveld type that is considered to be endemic in Rustenburg as it provides habitat for special red data invertebrate species of the Order Lepidoptera (butterflies). The current mining of the said koppies (not by RPM) is not only causing loss of biodiversity but also leading to the degradation of the visual aspect of the area (Draft Rustenburg IDP, 2012-2017). The general landscape of the Rustenburg mining lease area and the surrounding residential, industrial and mining activities are viewed as contributing to a distinct sense of place in the Rustenburg area.

7.15 Noise

The area around Rustenburg is characterised by the presence of a large number of mining related activities. Industrial noise forms part of the present ambient noise climate in the environment. The result of the industrial character of the present ambient noise climate in the pre-mining environment is, that any new mining related developments will probably have an impact localised to the immediate vicinity of the development (Environlink, 2002).

7.16 Visual Aspects

The project site is located within a “mining belt”. The mining / processing activities along with the infrastructure, which support the mines, such as the proposed infrastructure, dominate the landscape characteristics of the immediate area around the project sites. Beyond the mining belt, a series of koppies and hills associated with the Magaliesberg, protrude predominantly above the flat plain with savannah type vegetation and farmland. The said topographical features add to an aesthetically pleasing natural dimension to the scene. These factors when viewed together give the region a strong sense of place.

The visual impact attributed to the Project can be considered minimal as the infrastructure will be located alongside other mining related infrastructure.

7.16.1 Option A

The east and west pump stations will be located directly adjacent to the Waterval TSFs. The pump stations will be dwarfed by the Waterval TSFs. The pipeline route is proposed along an existing pipe rack. The associated visual impact can therefore be considered extremely minimal or non-existent. The surge tank which will be installed at the existing Waterval Concentrator will be positioned within an existing matrix of infrastructure. The surge tank will not contribute to the visual disturbance of the site.

7.16.2 Option B

The pre-treatment plant will be located directly adjacent to the west Waterval TSF. The pre-treatment plant will be dwarfed by the west Waterval TSF. The pipeline route will be along an existing servitude parallel to an existing compressed air pipeline. The associated visual impact can therefore be considered extremely minimal or non-existent. The booster station is to be located adjacent to the Siphumelele Shaft and will therefore fit in with the sense of place however; the location is relatively close to a community meaning the visual impact will be of a greater significance when compared to the other infrastructure. The IsaMills^{TM}, which will be installed at the existing WLTR Plant, will be positioned within an existing matrix of infrastructure. The IsaMills^{TM} will not contribute to the visual disturbance of the site.

7.17 Archaeological, Cultural and Heritage Significance

7.17.1 Regional and Local Setting

During the EMPR conducted in 2002 (ref no. RNW (KL) 6/2/2/3164), an Archaeological study was undertaken, by Professor Huffman from the University of the Witwatersrand, in which various findings were noted. Fifty sites and occurrences of archaeological, cultural and heritage importance were discovered on the RPM mine lease area, in and around the current project area.

The findings of the study were categorised into the following groups:

7.17.1.1 Middle Stone Age

- Materials discovered on the site which result from human activity dating back to ca 250 000 to 25 000 years are considered to be articles which form part of the Middle Stone age period.

7.17.1.2 Iron Age

- Includes material remains related to the last 2,000 years, which are associated with the Bantu-speaking people. The Iron Age way of life was characterised by the farming of sorghum and millets, the raising of domestic livestock and the creation of metal items (Envirolink, 2002).
- Articles discovered during the 2002 study include inter alia:
- Stone Age flakes;

- Pottery;
- Rock engravings;
- Village boundary wall; and
- Metal items.

7.17.1.3 Historic

- Materials which remain on-site which result from human activity dating back to AD 1850, including artefacts, human skeletons and structures (Envirolink, 2002).

7.17.2 Site Description

A large portion of the areas on which the survey was carried out, have already been disturbed. This is to a large extent the result of recent human activities, mainly mining infrastructure as well as former agricultural activities.

7.17.2.1 Option A

The environment of **Option A** has been disturbed totally by mining infrastructure. This consists of existing roads and pipelines already installed for other purposes. No natural vegetation is left. The topography of the area is of no consequence as the natural slope does not exist anymore.

7.17.2.2 Option B

The environment of **Option B** is also almost entirely disturbed by recent human activities. The area where the pre-treatment plant will be placed has been used for agriculture in the past. The grass cover here is very short, making archaeological visibility good. Other plants are clearly pioneer species, such as weeds and grass with the occasional small thorn tree such as sickle bush.

The pipeline route runs parallel to an existing compressed air pipeline. Accordingly the route has also been recreated into a man-made landscape. The pipeline ends to the east of the existing Hoedspruit TSF. Here again former agricultural activities, followed by mining activities has recreated a disturbed landscape now dominated by pioneer plant species.

Should this option be chosen, the Hoedspruit TSF will be expanded. The environment of the extension is similar to what has been described above with pioneer species dominating. The topography of the entire area is reasonably flat. Some hills do occur to the north, but these do not form part of the Project.

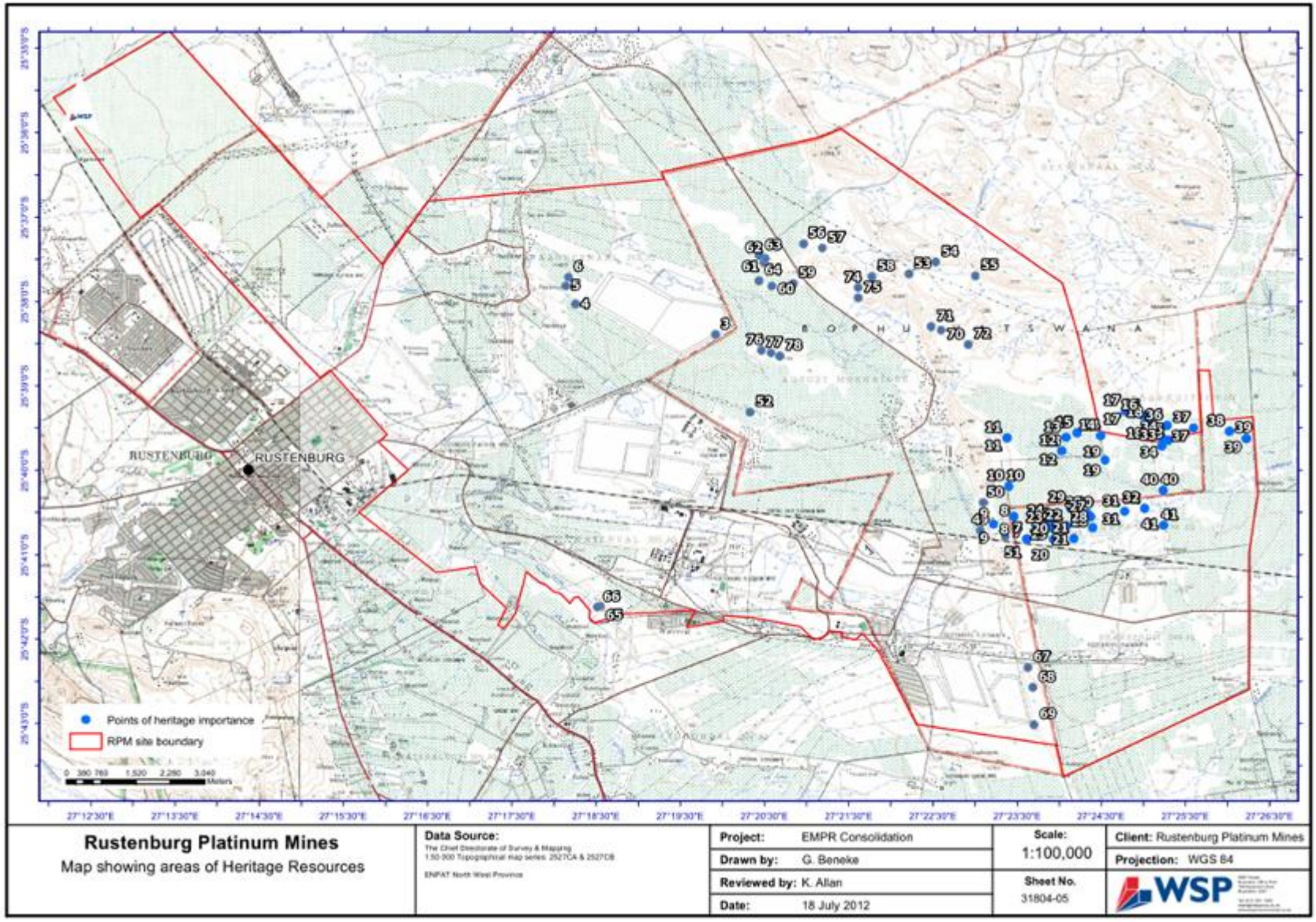


Figure 31: Location of Archaeological sites (Envirolink, 2002)

7.18 Socio-Economic Profile

7.18.1 Regional Context

The North West Province was created in 1994 by the merger of the former homeland, Bophuthatswana, and the former Western Transvaal region. The largest centres within the province include Potchefstroom (Capital), Orkney, Klerksdorp, Brits, and Rustenburg, which are key mining and economic centres for the province.

The key economic activity, and main contributor to the provincial economy, is mining and mining related activities agriculture, including platinum, gold, uranium, and diamonds. The second largest contributor to the local economy is sheep, cattle and game farms in the northern regions, and maize, sunflowers, tobacco, cotton and citrus crops in the southern and eastern regions. The key development priorities for the province have been identified as (North West Provincial Growth and Development Strategy 2004 to 2014):

- Growth and Investment,
- Agricultural and Rural Development,
- Mining and Energy,
- Manufacturing,
- Tourism,
- Construction and Infrastructure,
- Small, Medium and Micro Enterprises (SMME), and
- Training and Skills Development.

The vision for the province (in accordance with the North West Provincial Growth and Development Strategy 2004 to 2014) is “To build a truly united, non-racial, non-sexist, democratic and prosperous society that is jointly focused to deliver on key priorities aimed at growing a vibrant economy”. AAP and RPM has the potential to be a part of this vision through the development of sustainable mining activities and related opportunities.

The North West Province is an economic hub for the country in terms of mining activities, with some of the largest platinum mines in the world. Key mining companies in the area include the AAP, Royal Bafokeng Platinum, Impala Platinum and Lonmin mining groups. These mining activities are concentrated around the Rustenburg area, which has created a centre for economic development within the province, but also a concentration of migrant labour, resulting in a mixed centre of cultures and communities, and a sometimes volatile socio-economic landscape.

The Bojanala Platinum District Municipality (DM) is located in the north-eastern side of the province, and shares a boundary with the Waterberg and West Rand DMs (north and south-east respectively), the City of Tshwane to the east, and the Dr Kenneth Kaunda and Ngaka Modiri DMs, to the south and west respectively.

The total population of the Bojanala Platinum DM is approximately 1,507,505 (Statistics SA, 2011), which is approximately 43% of the population of the North West Province (10% increase since 2007 indicating growth). Approximately 91% of the DM population fall within the Black African population group, and 7% in the White population group. The home language for the majority of the population is Setswana (54%), followed by Afrikaans (7%), Xitsonga (8%), Sepedi (5%) and IsiXhosa (5%) (Statistics SA, 2011).

7.18.2 Local Context

The Rustenburg LM is located the western side of the DM, approximately 150km from the political capital city of South Africa, Pretoria, and the economic capital of Johannesburg. Rustenburg is located within a valley surrounded by the Magaliesberg Mountains. The small city of Rustenburg is a centre for agriculture and mining activities in the area and serves as the head of the Rustenburg LM.

7.18.2.1 Population

The population of the Rustenburg LM in 2011 was 549,575, comprising 55% males and 45% females (Statistics SA, Census 2011). 89% of the population is Black African, and 9% are White, indicating a slightly higher concentration of white people in this region, when compared with the provincial average (7%). This may be a result of the intense mining activities in the Rustenburg area, and a result of the pre-1994 government's policies.

7.18.2.2 Age and Employment

The population in the Rustenburg LM appears to be dominated by a relatively high percentage (69%) of people between the ages of 18 and 65 (38% between 18 and 35), when compared with 28% of the population is under 18 years of age (Stats SA, 2011). This may be indicative of the labour demands of the platinum mines, as a large portion of the population is likely to be employed by the mining sector (36% of the population and 74% of the labour force) was employed in the mining sector in 2007(Stats SA), 89% of which are Black African and 9% are White. This is also reflected by the increasing levels of in-migration, as over 270,000 people have moved to the local municipality since 2001 (50% of the total Rustenburg LM population). It is also noted, however, that this is a migrant population reliant on employment opportunities, and so these are likely to fluctuate annually.

Poverty levels are reported to have been at 25.25% (BPDM Socio-economic and service level database, 2003, Rustenburg LM IDP, 2011/2012, no calculations provided) in the Rustenburg area, and unemployment levels are high in many rural areas. Only 22% of the total population of the Rustenburg LM are registered as employed, however, in accordance with the 2011 Census, the current unemployment rate of the Rustenburg LM is 26% (Statistics SA, 2011 Census Data).

7.18.2.3 Education and skills

The education levels within wards 29, 33 and 34 of the Rustenburg LM indicate that there are similar levels of schooling throughout the three wards. While there is a moderate percentage of the population with schooling, there is very low tertiary education within these wards (**Figure 32**).

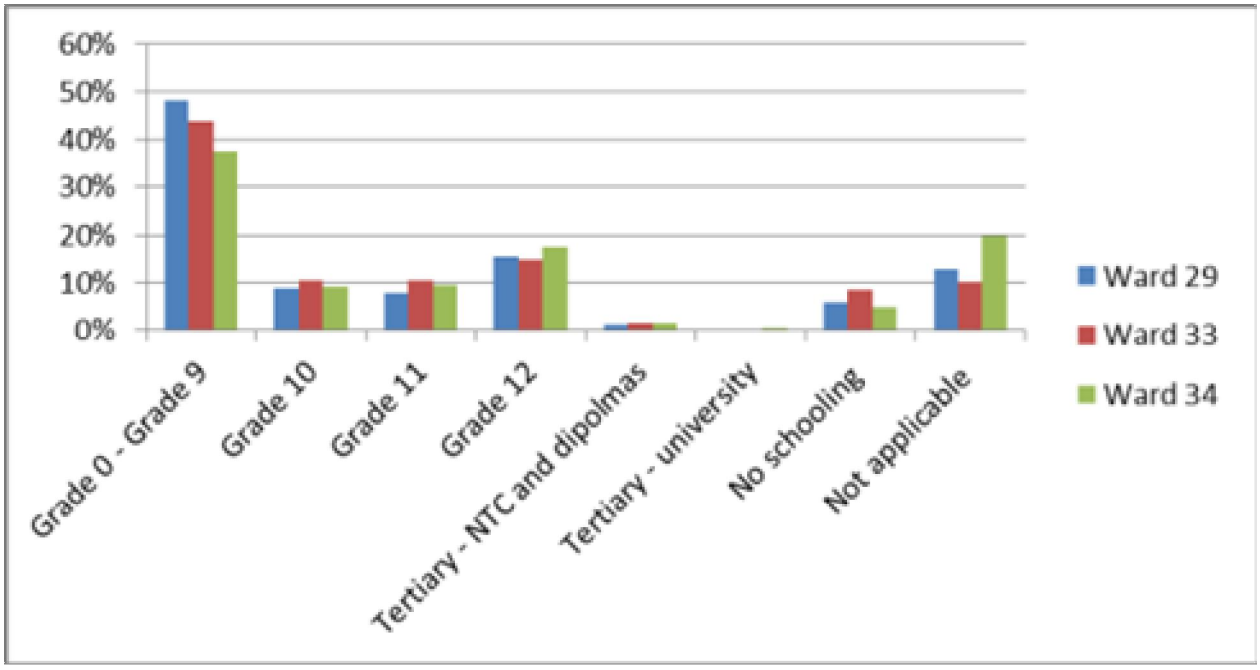


Figure 32: Educational breakdown for wards 29, 33 and 34 (Statistics SA, 2011)

The breakdown of economically active population by occupations (**Figure 33**) reflects the low level of tertiary education, with high numbers of office clerks, personal and protective services workers, Extraction and building trades workers, Drivers and mobile-plant operators, and Mining; construction; manufacturing and transport

labourers. These statistics are form 2001, and the mining sector may have increased significantly, given the growth in mining in the Rustenburg area over the past six years.

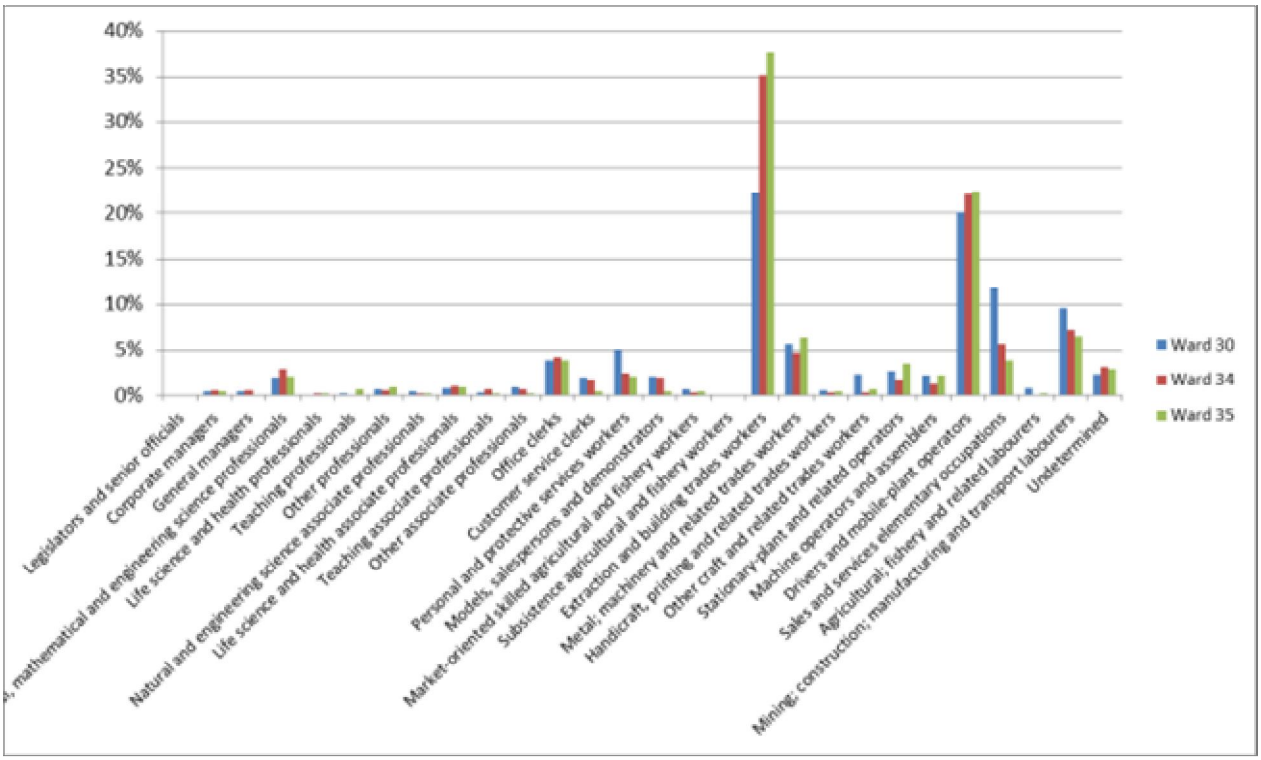


Figure 33: Occupation breakdown for wards 29, 33 and 34 (Statistics SA, 2001)

7.18.2.4 Grants and Benefits

There is little information available for the immediate community; however, Statistics South Africa provides information for the Rustenburg LM in terms of the social grants and benefits received by population. **Table 13** provides a breakdown of the social grants for the Rustenburg LM.

Table 13: Grant for Rustenburg LM (Source: Stats SA, 2007)

Type of Grant	No. of Grants	%
Not Applicable	365,566	81%
Old age pension	15,547	3%
Disability grant	5,184	1%
Child support grant	35,924	8%
Care dependency grant	1,239	0%
Foster care grant	55	0%
Grant in aid	138	0%
Social relief	164	0%
Multiple social grants	56	0%
Institutions	25,903	6%
Total	**449,776**	**100%**

7.18.2.5 Land Use

The Rustenburg Spatial Development Framework (SDF) (Rustenburg Municipality, 2010) provides an overview of the current land use footprint for the area associated with the Project, namely the Photsaneng & Thekwane Cluster (which includes the settlements of Photsaneng & Thekwane and the land between them) (**Table 14**).

Table 14: Land use for Photsaneng & Thekwane Cluster (Rustenburg Municipality, 2010)

Land use	Hectares	% land use
Cultivated	1.0	0.4
Degradation	7.2	3.0
Natural	122.6	50.7
Succession (to a natural state)	83.4	34.5
Urban	24.2	10.0
Wetlands/waterbodies	2.3	1.0
Mining	1.3	0.5
Plantation	0.2	0.1
TOTAL	**242.2**	**100%**

The SDF indicates that there is a large percentage of natural land and land under a state of succession (85%) within this area. These are primarily comprised of open areas of veld, which are used for subsistence grazing by the local communities, and there is no protected land within the site or immediate area.

The urban areas are comprised of predominantly formal housing (mainly low-income and low-cost housing), with limited commercial and social facilities. This area is also characterised by mining activities, as well as degraded areas, which have resulted from past mining and other activities.

The pipeline route falls predominantly within RPM land, and crosses small sections of Royal Bafokeng land and Rustenburg LM-owned land.

Mining in Rustenburg

The economic landscape of the Rustenburg LM has been shaped by the mining industry, and therefore the layout and socio-economic characteristics of the areas surrounding the city are largely defined by these activities. Three mining companies are dominant in this area, namely Impala Platinum (on Bafokeng tribal land through concessions), Anglo Platinum (northeast of Rustenburg) and Lonmin Platinum (west of Thekwane) (Rustenburg LM IDP, 2011/2012).

Figure 34 illustrates the key settlements related to platinum mining in the Rustenburg area. This area provides 35.7% of the RPM labour force, with other labour sending areas including the rest of the North West Province (17.7%) and South Africa (39.2%) (Rustenburg LM IDP, 2011/2012). These areas are varied in socio-economic characteristics and settlement type, ranging from formal towns and townships, informal settlements under the administration of the Rustenburg LM and the Royal Bafokeng Administration.

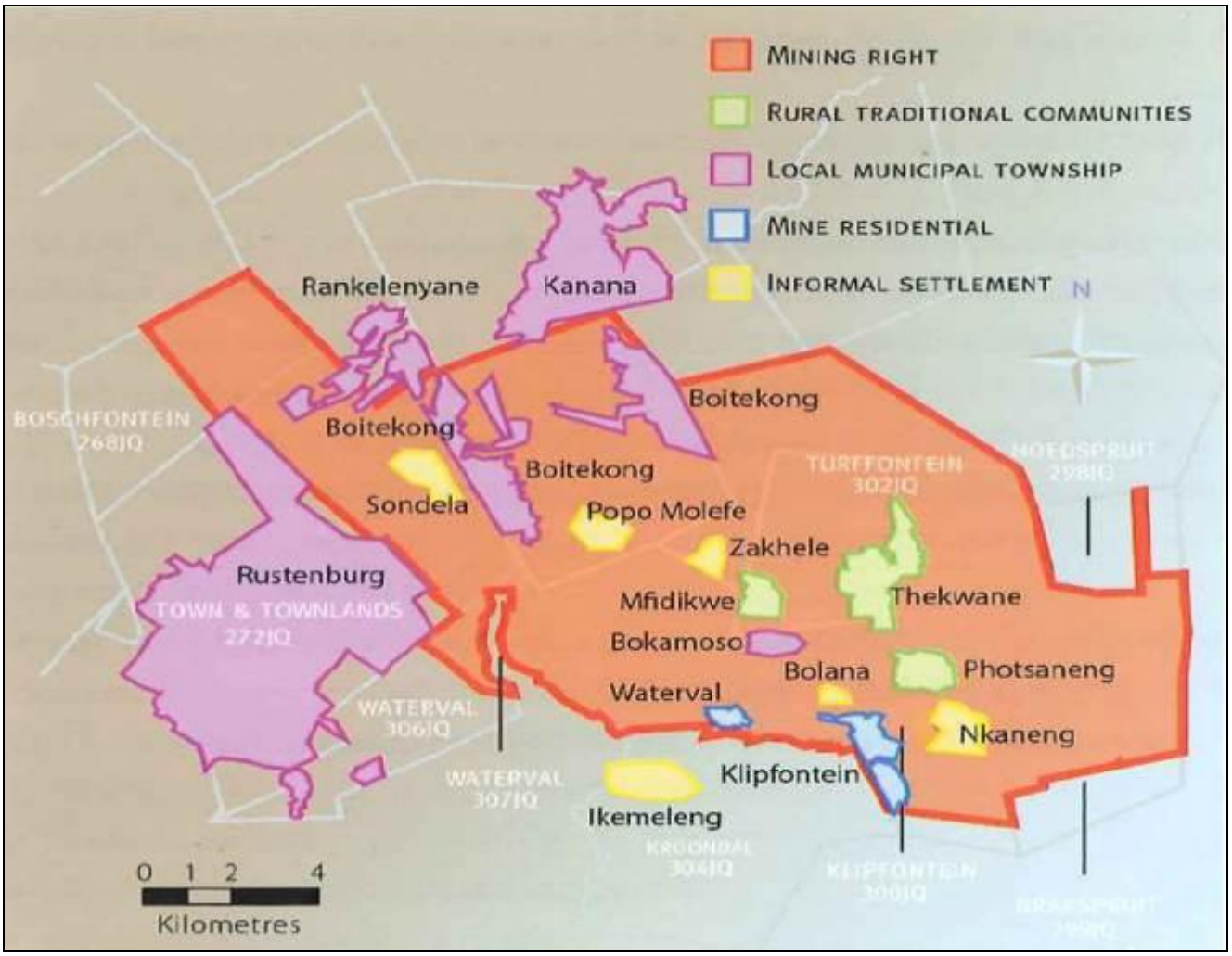


Figure 34: Settlements near AAP operations (angloplatinum.investoreports.com)

Services Provision

Despite the growing population and potential for economic development, the service levels within the Rustenburg LM remain low to moderate, with inequitable distribution of resources and services, which typifies the South African municipal services landscape. The population is distributed between municipal settlements (60%), mining hostels (5%), Royal Bafokeng tribal settlements (24%) and rural areas (11%). The level of service provision is reflected by the following statistics (Rustenburg LM IDP 2011 / 12):

- 21% of households have piped water into the dwelling, 41% having piped water into their yard, and 10% receiving water from a vendor, leaving only 28% with piped water into their houses.
- 41% of households have flush toilet facilities, whereas 45% of households rely on pit latrine systems and 13% have no toilet facilities.
- Refuse removal services appear to be limited, as 44% of households have refuse removed by the Rustenburg LM, 48% rely on their own dumps (which also includes RBA waste removal), and 8% have no rubbish disposal.
- 70% have access to electricity for lighting, and 30% of households rely on candles or paraffin.

There does not appear to be any police stations within the immediate vicinity of the Project site. The closest is likely to be in Rustenburg. The Rustenburg LM has the following community services in place, with non within the study area unless indicated (Rustenburg LM, 2011):

- Regional Community Centres – 6;
- Community halls – 12;
- Community Libraries – 6;
- Swimming pools – 6;
- Sports Facilities – 16; and
- Clinics - 4 (two in study area - Mfidikwe and Thekwane Clinic).

In addition, AAP has a private hospital for mining staff and family members, located near Mfidikwe and Photsaneng, and there is a public hospital in Rustenburg (20 minute drive form site).

In terms of education facilities, there is an FET colleges located in Rustenburg, Brits and Mankwe. In addition, there are Damlin campuses (Education Academic, business, computer and management schools) located in Rustenburg, and a University of South Africa (Distance learning).

Local Governing Structure

- Local Municipality.

The political governance structure for the Rustenburg LM is comprised of:

- The Council;
- The Mayoral Committee; and
- Committees set up in terms of the Municipal Structures Act (LED, Public Safety, etc.).

A ward councillor is elected for each of the wards within the LM, who sit on the ward committee, which falls under the Speaker and the Municipal Manager.

- Traditional Authorities

The Royal Bafokeng Nation (RBN) comprises approximately 300,000 people, and is presided over by Kgosi Leruo Molotlegi (RBN, Masterplan overview, no date). The area demarcated for this traditional authority covers approximately 1,200 square kilometres of land in the Rustenburg Valley.

The RBN has a strong administrative and political role in the Rustenburg area. The RBN is made up of approximately 29 villages, which are divided into 72 dikgoro (wards) regulated by hereditary kgosana (headman) and a Bo-mmadikgosana (headmen's wives). Two councillors, or bannakgotla, are elected for each ward, who assists the headman with carrying out his duties. The RBN is represented by the Executive Council consisting of 39 members (29 elected by villages, and 10 appointed by the Kgosi). The Executive Council meet four times per year; however any member of the RBN has an opportunity to meet at least twice a year at the Kgotha Kgothe to discuss key issues affecting them.

The Royal Bafokeng Administration (RBA) is a legal entity that administers the RBN land, of which a portion falls within the Rustenburg LM. RBA performs certain municipal roles for the communities within this land. The RBA receives royalty payments from platinum mining activities, which are used to provide social and municipal infrastructure (e.g. schools, clinics, roads, water and sewer).

The RBN communicate with the local mining companies within the Rustenburg area through forums set up to facilitate discussions on key issues regarding the mining activities and the local communities. There is a Memorandum of Understanding set up between RBA and the Rustenburg LM and the Bojanala Platinum DM, which assists with facilitating integrated governance. The LM IDP and SDF are currently not integrated with the Royal Bafokeng Masterplan. The LM and the RBA are however moving towards integrating these plans to provide holistic development plan for the area.

7.18.3 RPM Context

The Waterval Retrofit E-Feed Project is located at the RPM, near the town of Rustenburg. The communities in this area are generally peri-urban in nature with the town of Rustenburg area provides a centralised urban environment, with services and housing for the majority of people living around the mining operations. The Rustenburg LM, however, does not meet all the basic needs of the local population in terms of water provision

and housing. The Rustenburg LM therefore is likely to partially rely on the local mining companies for a portion of the service provision and partnerships in education and social development.

The Project is located approximately 6.5km east of the city of Rustenburg. The communities which lie in proximity to the Project site are generally peri-urban in nature. Rustenburg provides a central urban environment, with services and housing for the majority of higher income communities living in the Rustenburg area. The surrounding communities are scattered between the mining (and agricultural) activities, and are generally lower-income communities.

The pipeline route for **Option A**, falls within Rustenburg LM -owned land.

The pipeline route for **Option B**, falls within Royal Bafokeng land and within Rustenburg LM-owned land. This land has been assessed by the project team to ensure no housing or other development types are proposed on the Royal Bafokeng Nation and Rustenburg LM Masterplans. Areas identified for future alternative land were avoided by the project.

The Waterval TSF's, Waterval Retrofit Concentrator, WLTR Plant, Hoedspruit TSF, Paardekraal TSF and pipeline route are in close proximity to Mfidikoe, Thekwane, Photshaneng and Nkaneng communities. According to the Rustenburg Socio-Economic Assessment Toolbox Report (2009) Thekwane, Mfidikwe / Mfidikoe and Photsaneng fall under the RBN whilst Bokamoso is a 'Local Municipal Township' and Nkaneng as an 'Informal Settlement'. Refer to **Figure 35** and **Figure 36** below for local communities.

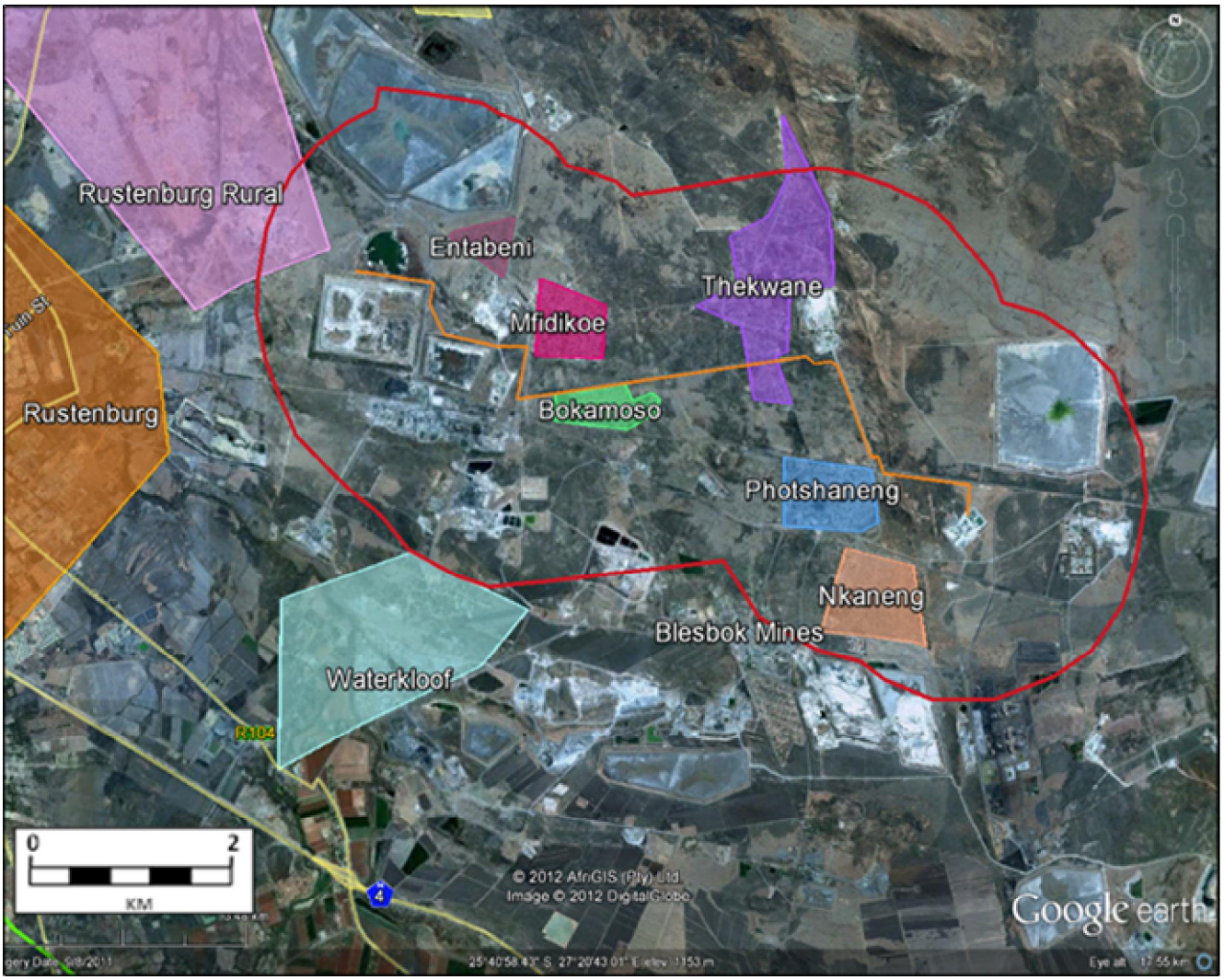


Figure 35: Communities within 5km of the Project site

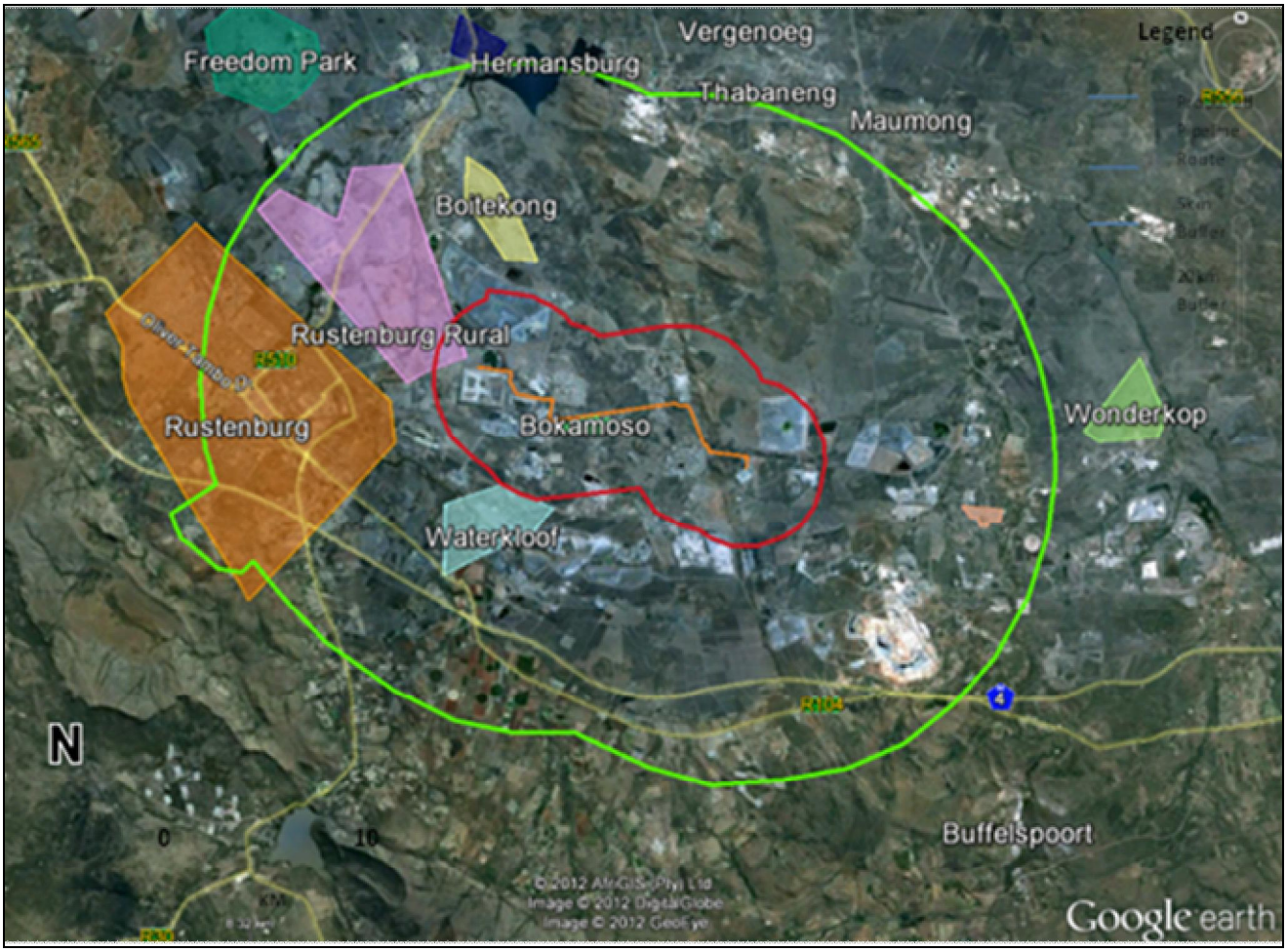


Figure 36: Communities within 20km of the Project Site

7.18.4 Legacy Issues

The planning phase of the Waterval Retrofit E-Feed Project raised a number of legacy issues with regards to RPM and perceptions of the community. There are a number of issues that the local communities perceive to have not been resolved by RPM relating to previous and existing projects. These issues were raised through the EIA process; during community leadership meetings and a public meeting (see the **Table 15** below and the Socio-Economic Specialist Report for more details).

Table 15: Summary of Legacy Issues raised

Legacy Issue	Brief Description
Employment Opportunities & Skills Development	■ Lack of local skills development
	■ Employment of people from outside the local area
	■ Involvement of local community in projects
Equity & Economic Opportunities	■ Lack of meaningful opportunities for the communities
	■ Beneficiation
	■ Dominance of White ownership and opportunities
Health & Safety	■ Security with regards with blasting operations near villages
	■ Safety & security of the local community

Legacy Issue	Brief Description
	■ Health impacts caused by RPM mining operations
Access to resources	■ Cracking of Houses
	■ Traffic disturbance and road degradation
	■ Influx of people from outside areas
Education & Awareness	■ Lack of understanding of the local community of EIA process and technical understanding of projects

8 Specialist Studies

Following a gap analysis, as well as the consideration of best practice guidelines WSP undertook specified specialist studies. The studies were commissioned in order to supplement the existing baseline information at the Waterval TSFs in an effort to understand the receiving environment, which may be impacted by the Project.

Furthermore, WSP required specialist opinions in terms of the possible impacts which may arise as a result of the Project and the mitigation measures which can be applied during the various phases of the Project in order to avoid or reduce the impact on the social and natural environment.

The following specialist studies have been undertaken in order to achieve the said objectives and as such ensure a comprehensive EIA:

- Air Quality Assessment;
- Aquatic Ecological Assessment;
- Heritage Assessment;
- Hydrological Assessment;
- Social Impact Assessment; and
- Traffic Impact Assessment.

All specialist study reports have been summarised in the following sections. Furthermore, the specialist study impact ratings have been consolidated into the WSP project impacts rating table (**Section 10**) and all specialist recommendations have been transferred to a consolidated EMP table contained within **Section 11**. All specialists were required to sign a specialist declaration form provided by the DEDECT in order to authenticate the information contained within the formal specialist reports. For the full specialist study reports refer to **Appendix B**.

8.1 Air Quality

The Air Quality Impact Assessment (AQIA) for the Project was undertaken by Bradley Keiser of WSP Environmental (Pty) Ltd. The full report has been included in **Appendix B**.

8.1.1 Methodology

WSP have undertaken an AQIA in order to identify and assess the air quality impacts associated with the Project. A description of the AQIA methodology is provided below:

- Baseline Assessment

The baseline ambient air quality in the region was characterised with the use of the ambient monitoring data obtained from the Mfidikwe continuous monitoring station, located in the Mfidikwe residential area. The meteorological data, extracted for the 2010 period, was utilised in the dispersion model, and the ambient monitoring data (PM_{10}) extracted for the periods 2011 and 2012 was used to provide an indication of the current PM_{10} concentrations in the area.

Air Quality Impact Assessment

- Modelling Software

Version 4.2 of the Atmospheric Dispersion Modelling System (ADMS) dispersion model was used for this assessment. ADMS is a practical dispersion model that simulates a wide range of buoyant and passive releases to the atmosphere, whether individually or in combination. The model handles multiple point, line, area and volume sources to produce long- and short-term scenarios for comparison with measured values (in the case of an existing plant), guidelines, standards and objectives. The interface requires detailed geographic

data, sequential meteorological data, efflux and emission parameters to produce optimal output; the preparation of which for the AQIA investigation is described in the following sections.

- GIS Input

Topography has the potential to impact the dispersion of air pollutants. Due to the complex terrain of the Project site, a complex terrain file was created as input into the dispersion model, which allows the model to calculate pollutant dispersion accounting for the area. **Figure 37** illustrates the complex terrain surrounding the Project site.

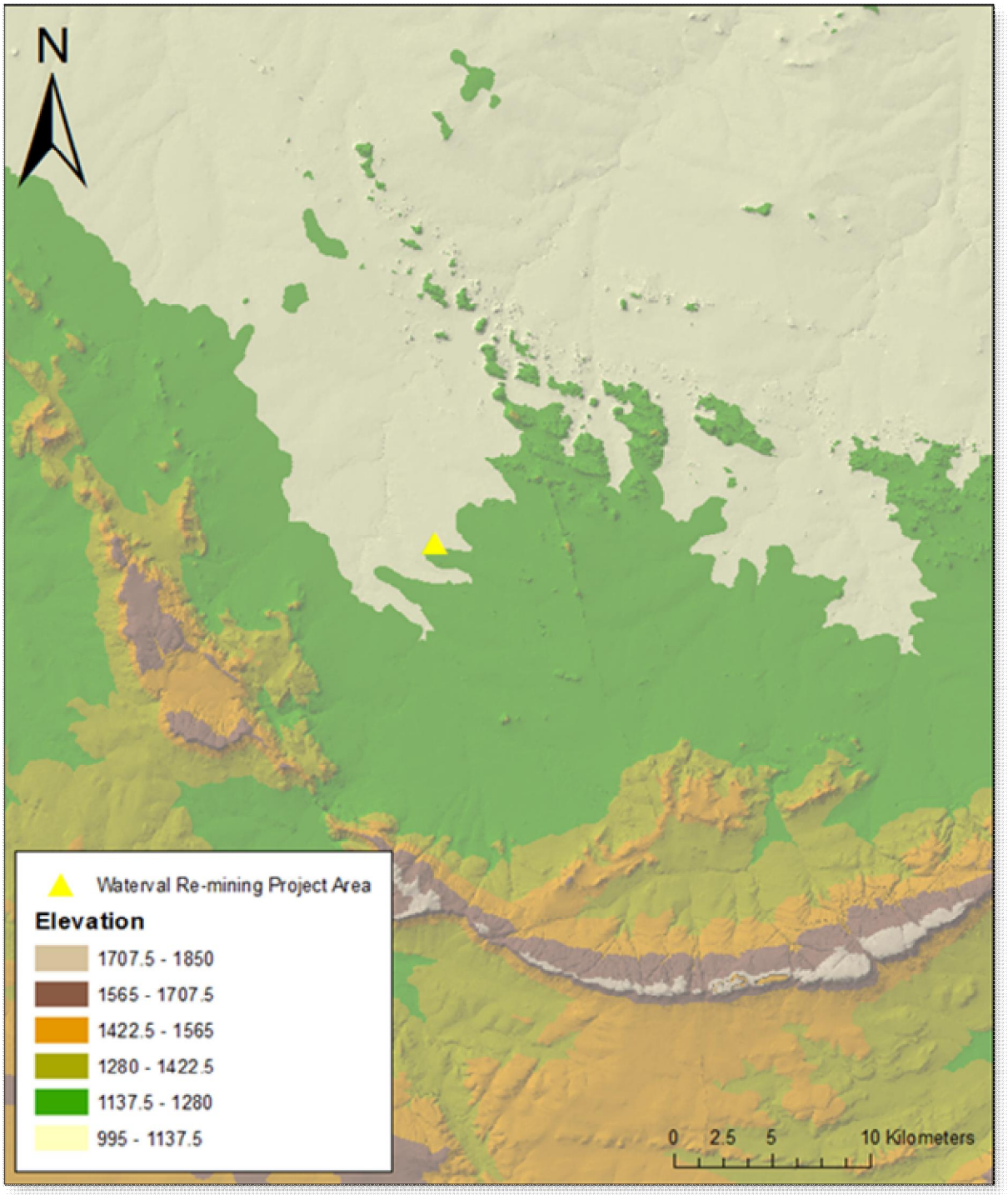


Figure 37: Complex terrain in the vicinity of the Project

- Meteorological Input

Meteorological conditions affect how pollutants emitted into the air are directed, diluted and dispersed within the atmosphere, and therefore incorporation of reliable data into an AQIA is of the utmost importance. **Figure 38** illustrates the meteorological data path.

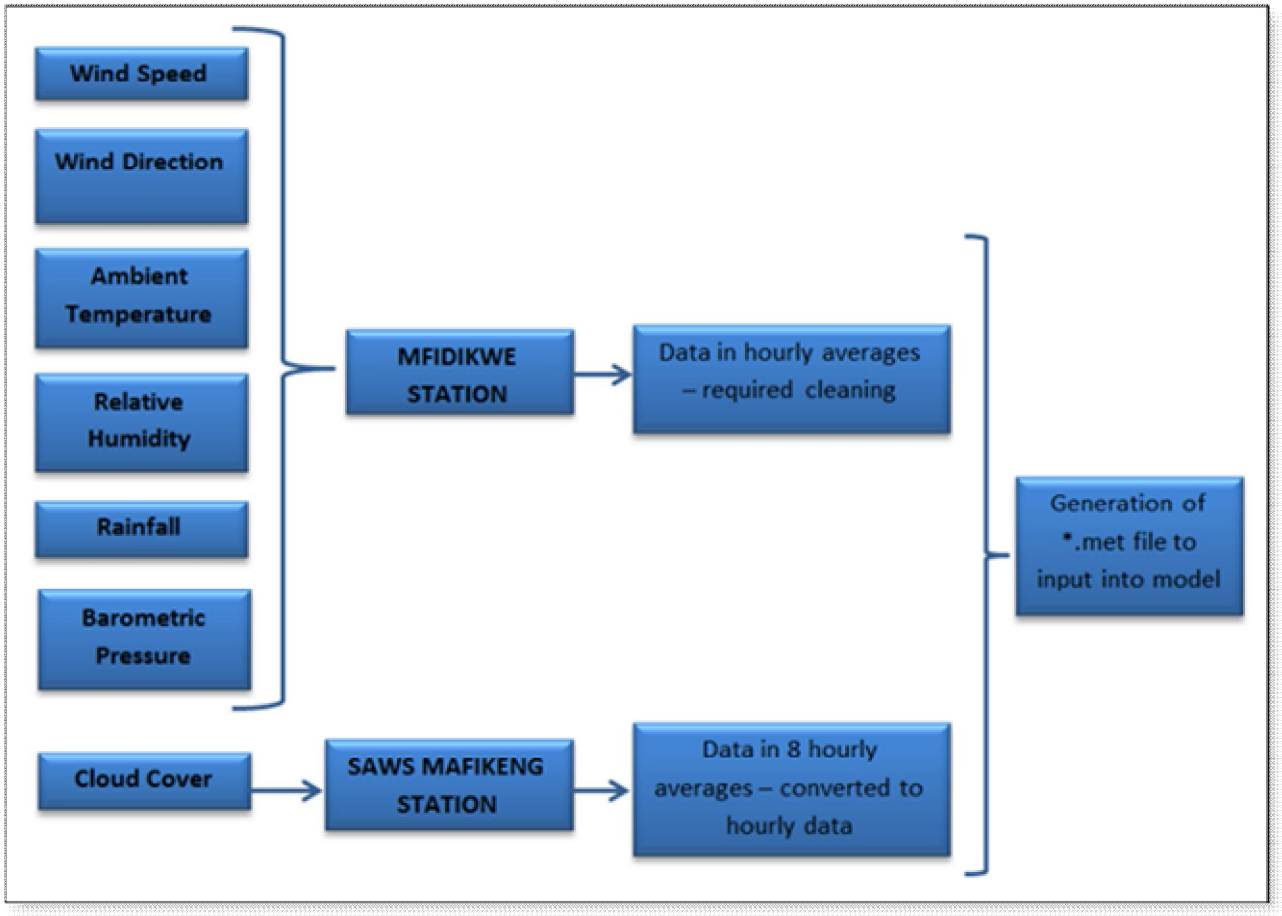


Figure 38: Meteorological data path

- Pollutant Source Input: Emissions Inventory

Emissions from the Project activities were calculated using the US EPA's AP42 emission factors. Emissions estimates for the Project were based on the AP42 sections: 11.9: Western Surface Coal Mining; 13.2.4: Aggregate Handling and Storage Piles, 31.2: Construction Activities and 13.2.2 Unpaved Roads. Calculations were applied to individual processes to obtain an emission to air estimate.

Emissions of total suspended particulates (TSP) and PM_{10} (where calculations were available) were calculated for each operational location. Where calculations of PM_{10} were not available, a factor of 50% was applied to the calculated TSP emission rates according to best international practice.

8.1.1.1 Option A: Re-mining at the Waterval Retrofit Concentrator

Figure 39 presents the layout of the Waterval Retrofit E-Feed Project, specifically identifying the key sources of emissions.

The specialist used the US EPAs AP42 emission factors to determine the emission rates from the following Project activities:

- Land Clearing and Levelling Operations;
- Material Truck Loading and Unloading;

- Construction Activities;
- Light Vehicles on Unpaved Roads (Operational);
- Wind Erosion; and
- Crushing and Screening of Rubble.

8.1.1.2 Option B: Re-mining at the WLTR Plant

The images presented below represent each of the identified source locations associated with the **Option B**, with **Figure 39** illustrating the general project area overview, while **Figure 40** and **Figure 41** illustrate each area of emissions.

The specialist used the US EPA's AP42 emission factors to determine the emission rates from the following Project activities:

- Land clearing Operations (Land Clearing);
- Material Truck Loading and Unloading;
- Construction Activities;
- Trucks on Unpaved Roads (Construction);
- Light Vehicles on Unpaved Roads (Operational); and
- Wind Erosion.

Modelling Scenarios

- In order to calculate the impact of emissions associated with the Project (**Option A** and **Option B**), various scenarios were modelled:

Scenario	Description
Option A:	
Scenario 1	Included emissions associated with construction of the east pump station, Waterval Retrofit Concentrator and east pipeline (both the slurry and Frank Concentrator Pipeline), as well as the land clearing and material removal of the East TSF.
Scenario 2	Represents a typical operational year, which includes emissions from the unpaved pipeline maintenance road. No other sources are included as the entire process will be handling slurry, which will not result in emissions.
Scenario 3	Represents the land preparation (bulldozing of cleared material, including rubble) of the West TSF, construction of the west pipeline (both the slurry and FA pipeline) and west pump station, as well as a typical operational year retreating tails from the West TSF.
Scenario 4	Represents Scenario 3, with the exception that crushing and screening of the rubble will take place on the TSF.
Option B:	
Scenario 1	Land clearing of West TSF and land clearing and construction of the pump stations and pipeline.
Scenario 2	Construction of the IsaMill™ at the WLTR Plant.
Scenario 3	General operations of the re-mining process, particularly focusing on unpaved roads.
Scenario 4	Scenario 3, including emissions associated with the land preparation of the East TSF.

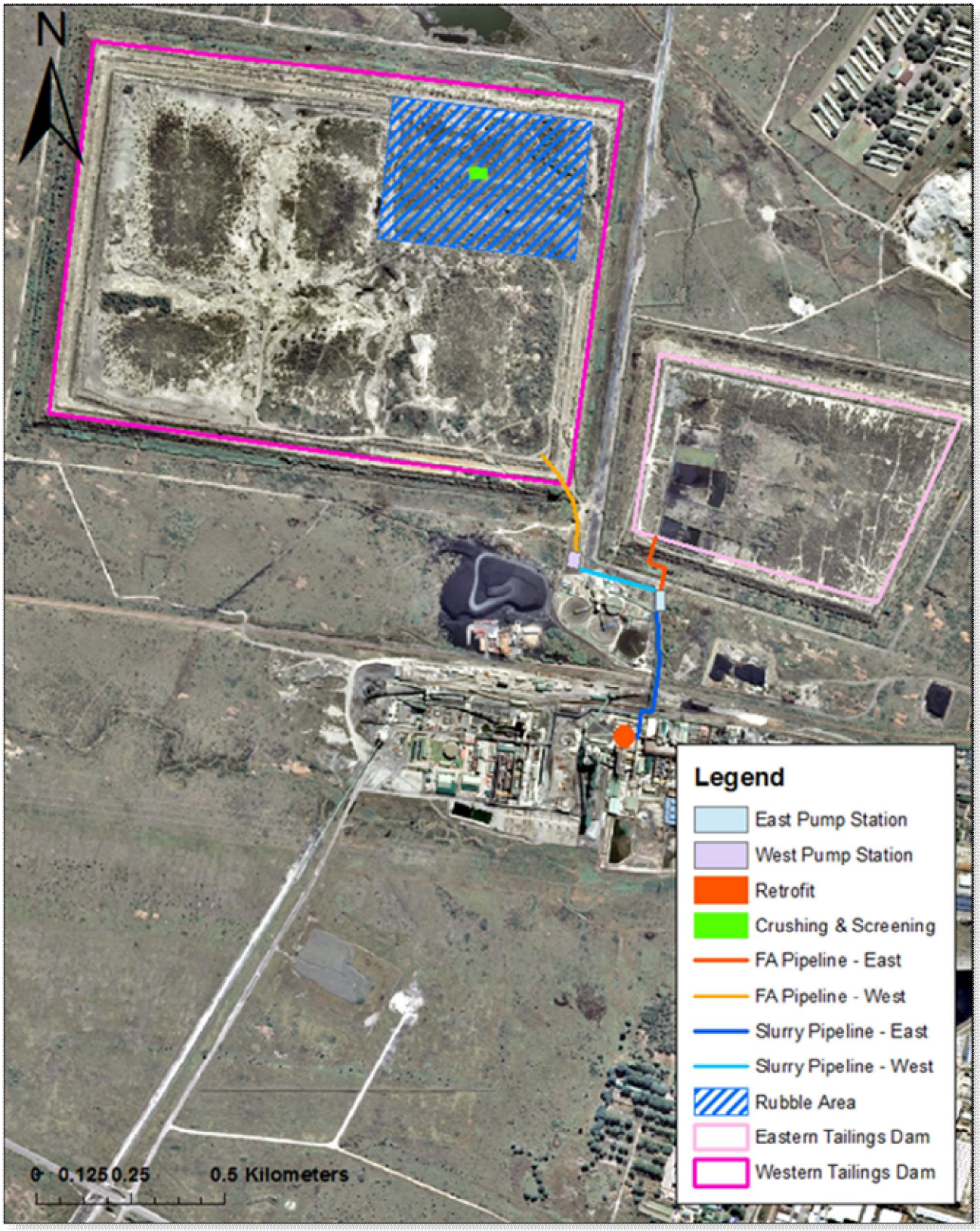


Figure 39: Waterval retreatment at Retrofit layout

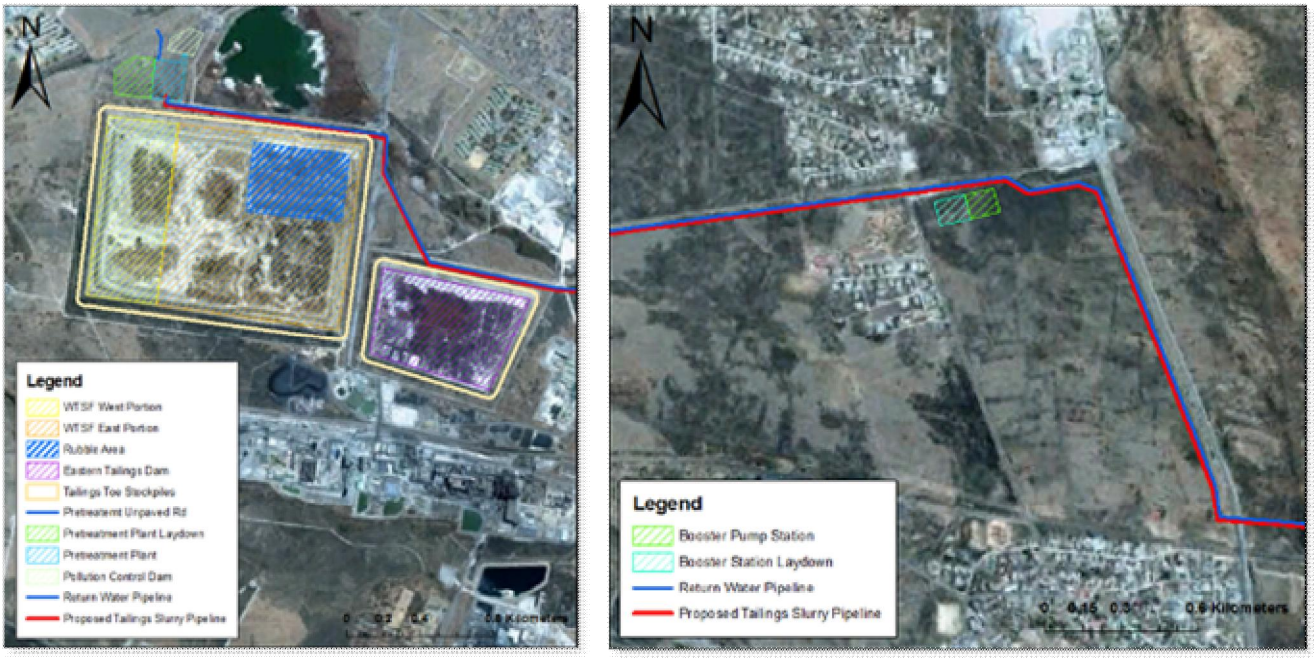


Figure 40: TSFs and Pre-treatment Station locations (left) and Booster Station location (right)

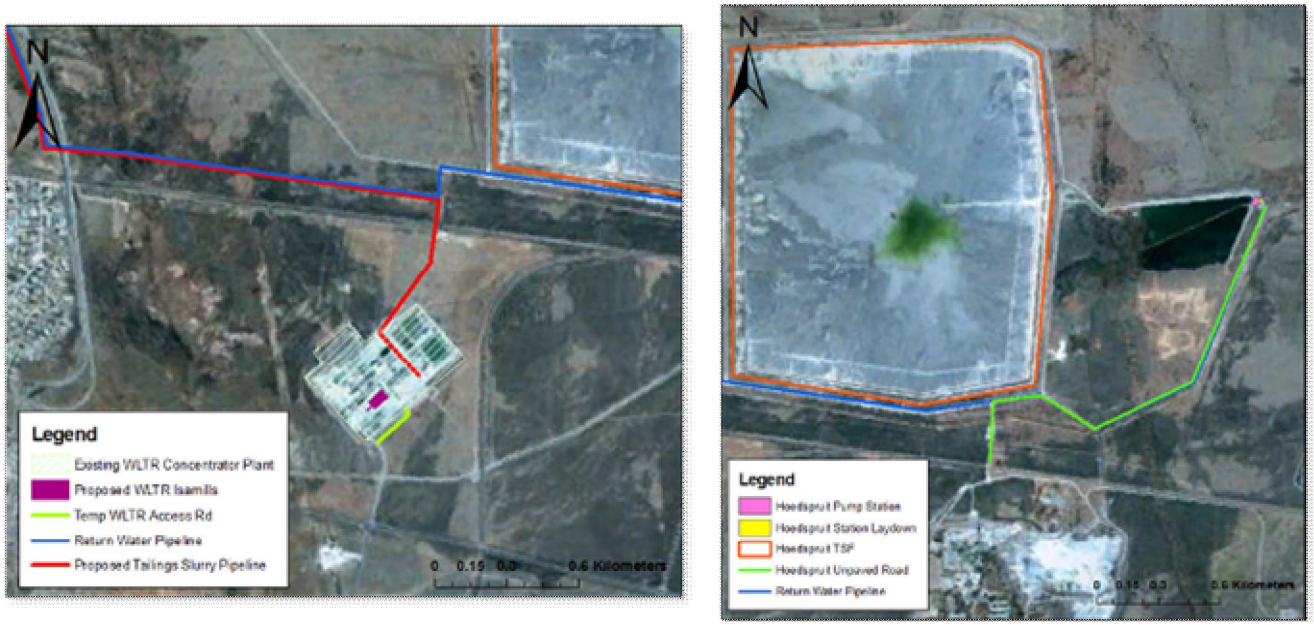


Figure 41: WLTR Plant and IsaMills™ location (left) and Hoedspruit Pump Station (right)

- Receptor Identification

Receptors were identified as areas that may be negatively impacted on due to the emissions associated with the Project. Typically, receptors may be identified as schools, shopping centres, hospitals, office blocks and residential areas. For the purposes of the AQIA, the receptors selected were those residential areas closest to the activities, while receptors were also selected at the furthest point away from the activity in each residential area, which will indicate the extent that each residential area will be impacted upon. The receptors selected for the AQIA differed between each option as the impact areas of the options differed significantly.

8.1.2 Assumptions and Limitations

Various assumptions were made during the AQIA, as indicated below:

- It is assumed that the emissions inventory, as approved by RPM, is representative of reality. The following assumptions were made within the inventory:
  - All rubble removed from the West TSF will be bulldozed over the edge of the facility, as opposed to being trucked to the bottom of the tailings facility. This was indicated to WSP as the preferred method of rubble removal. Note, Scenario 4 of the preferred option accounts for the material being crushed and screened on the tailings as opposed to being bulldozed over the edge of the facility;
  - All rubble removed from West TSF will be stored around the toe of the tailings facility, with the exception of Scenario 4 in the preferred option, where the rubble will be crushed and screened;
  - During construction, only heavy construction vehicles were included, as these will contribute highest road emissions;
  - Unpaved road emissions associated with the booster station were excluded as this infrastructure is located alongside the tar road; and
  - During operations, only emissions associated with light vehicles travelling on unpaved roads were included as these trips will be routine. Heavy vehicle traffic is not envisaged to be a regular occurrence.
- It was assumed that 50% of TSF emissions were PM_{10}, as is a widely accepted methodology in the modelling community, as well as having been proved accurate through particle size analysis in previous studies, unless stipulated otherwise in the US-EPA AP42 documents;
- It was assumed the meteorological data obtained from the Mfidikwe station is accurate and representative of meteorological conditions in the area of the WLTR Plant.

8.1.3 Findings

For the purpose of the AQIA, both the **Option A** and **Option B** were modelled, with four scenarios modelled in each option. Long-term scenarios were run to predict the annual average concentrations of criteria pollutants, as health risks are primarily based on long-term exposure to pollutants. In addition, the long-term run also collates and calculates statistics for worst-case short-term concentrations, to assess the potential exceedence of standards over intervals of 1-hour and 24-hours, as applicable for various criteria pollutants.

The cumulative impact of the emissions associated with the Project was considered by including a background concentration for PM_{10} of 52.5µg/m^3. The background PM_{10} concentration is in exceedence of the annual standard due to the influence of the elevated concentrations monitored in 2012.

8.1.3.1 Option A: Re-mining at the Waterval Retrofit Concentrator

- Scenario 1

The highest PM_{10} concentration contribution from this scenario occurs at the Entabeni W receptor (refer to **Figure 42**), with a long-term concentration contribution of 0.55µg/m^3 and a 24 hourly average worst case (short-term) contribution of 3.49µg/m^3. All remaining receptors indicated an average long-term PM_{10} contribution of 0.03µg/m^3 and an average worst-case PM_{10} contribution of 0.43µg/m^3.

The PM_{10} concentration contributions from the land preparation of the East TSF and the construction of the associated infrastructure will have a negligible impact on the existing situation.

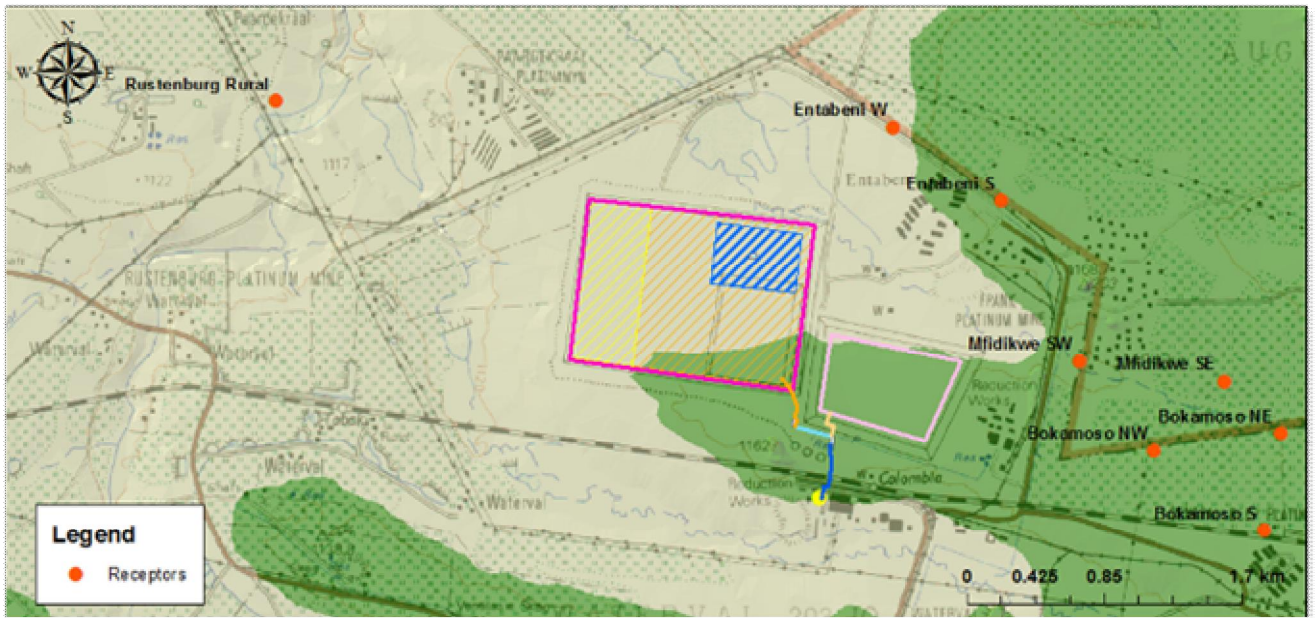


Figure 42: Map indicating location of sensitive receptors applied in Option A

- Scenario 2

The highest PM_{10} concentration contribution from this scenario occurs at the Entabeni W receptor (refer to **Figure 42**), with a long-term concentration contribution of 0.03µg/m^3 and a 24 hourly average worst case (short-term) contribution of 0.19µg/m^3. All remaining receptors indicated an average long-term PM_{10} contribution of 0.002µg/m^3 and an average worst-case PM_{10} contribution of 0.03µg/m^3.

The PM_{10} concentration contributions from the typical operations while re-mining the East TSF will have a negligible impact on the existing situation.

- Scenario 3

PM_{10} emissions associated with the land preparation of the West TSF, the rubble removal, construction of the west infrastructure and the typical operations while re-mining the West TSF were modelled to predict the air quality impact of these activities on the receiving environment.

Particulate Matter Concentrations

Table 16 presents the results for PM_{10} concentrations, distinguishing between the cumulative concentrations and the contribution concentrations from the Project, for each specified receptor point, while **Figure 43**, **Figure 44** and **Figure 45** present the graphical outputs of the model results.

Additionally, **Table 16** presents the cumulative PM_{10} concentrations, which is the existing PM_{10} concentrations combined with the contributions from the Project.

Table 16: PM_{10} concentrations at sensitive receptors

Receptor Point	Project		Cumulative			
	PM_{10} LT (µg/m^3)	PM_{10} P100 24Hr Avg. (µg/m^3)	PM_{10} LT (µg/m^3)	PM_{10} P100 24Hr Avg. (µg/m^3)	Predicted 24Hr Avg. Exceedences	Compliant (Permitted 4 Exceedences / annum)
Bokamoso NE	0.07	1.46	52.57	53.96	0	Yes
Bokamoso S	0.08	1.45	52.58	53.95	0	Yes
Bokamoso NW	0.12	1.97	52.62	54.47	0	Yes
Rustenburg Rural	0.65	4.20	53.15	56.70	0	Yes
Entabeni W	0.28	2.84	52.78	55.34	0	Yes

Receptor Point	Project		Cumulative			
	PM_{10} LT ($\mu g/m^3$)	PM_{10} P100 24Hr Avg. ($\mu g/m^3$)	PM_{10} LT ($\mu g/m^3$)	PM_{10} P100 24Hr Avg. ($\mu g/m^3$)	Predicted 24Hr Avg. Exceedences	Compliant (Permitted 4 Exceedences / annum)
Entabeni S	0.12	2.19	52.62	54.69	0	Yes
Mfidikwe SW	0.15	3.23	52.65	55.73	0	Yes
Mfidikwe SE	0.08	1.80	52.58	54.30	0	Yes
LT Denotes Long-Term (Annual Average), **P100** Denotes Worst Case 24 Hourly Average Concentration (100th Percentile)						
Long-Term Exceedence: All Long-Term Concentrations exceed Annual Standard (50µg/m³), due to Background Concentration						
Short-Term Exceedences: No Exceedences of the 24 Hourly Average Standard are Predicted						

Figure 43 presents the cumulative long-term concentrations while **Figure 44** presents the worst case cumulative 24 hourly average concentrations. **Figure 45** presents the predicted number of exceedences of the 24 hourly average standard.

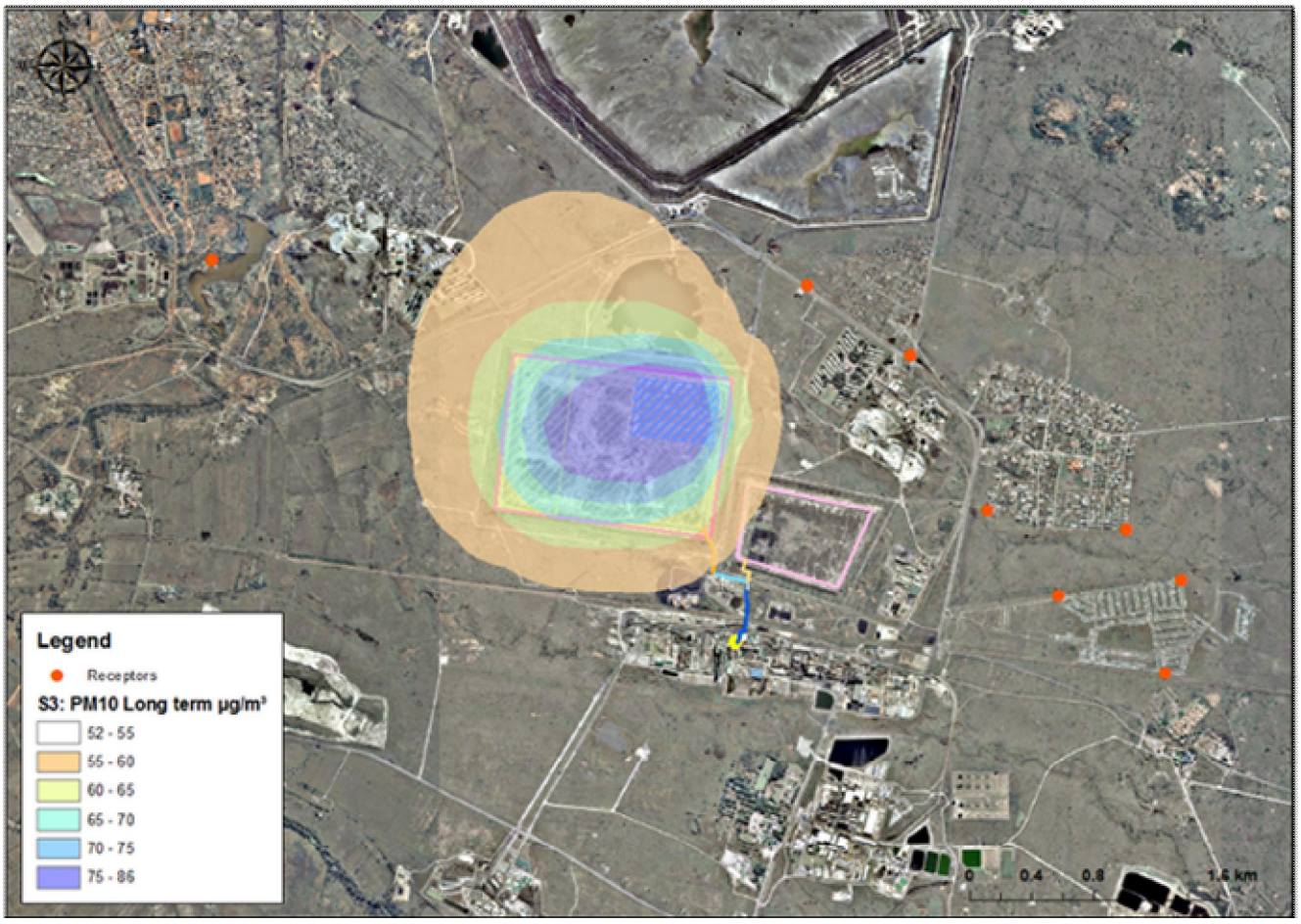


Figure 43: Cumulative PM_{10} emissions indicating long-term concentrations

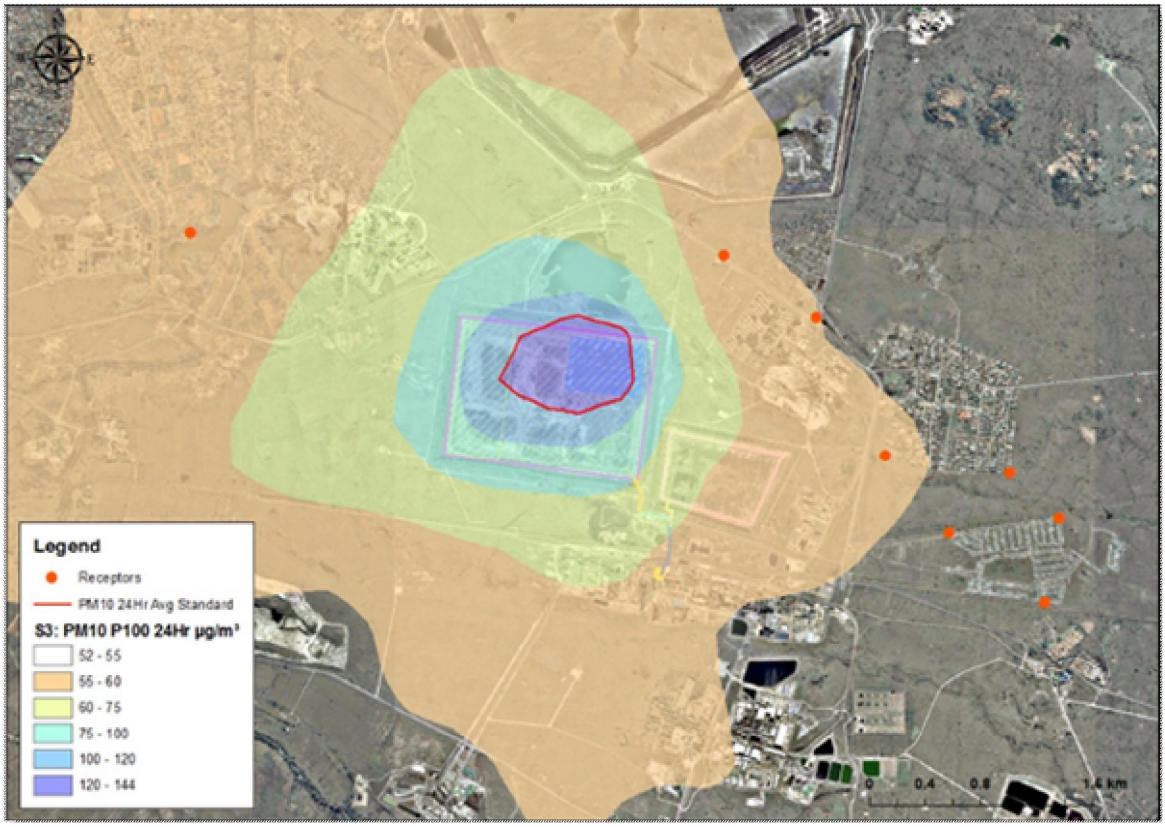


Figure 44: Cumulative PM_{10} emissions indicating worst case 24 hourly average concentrations

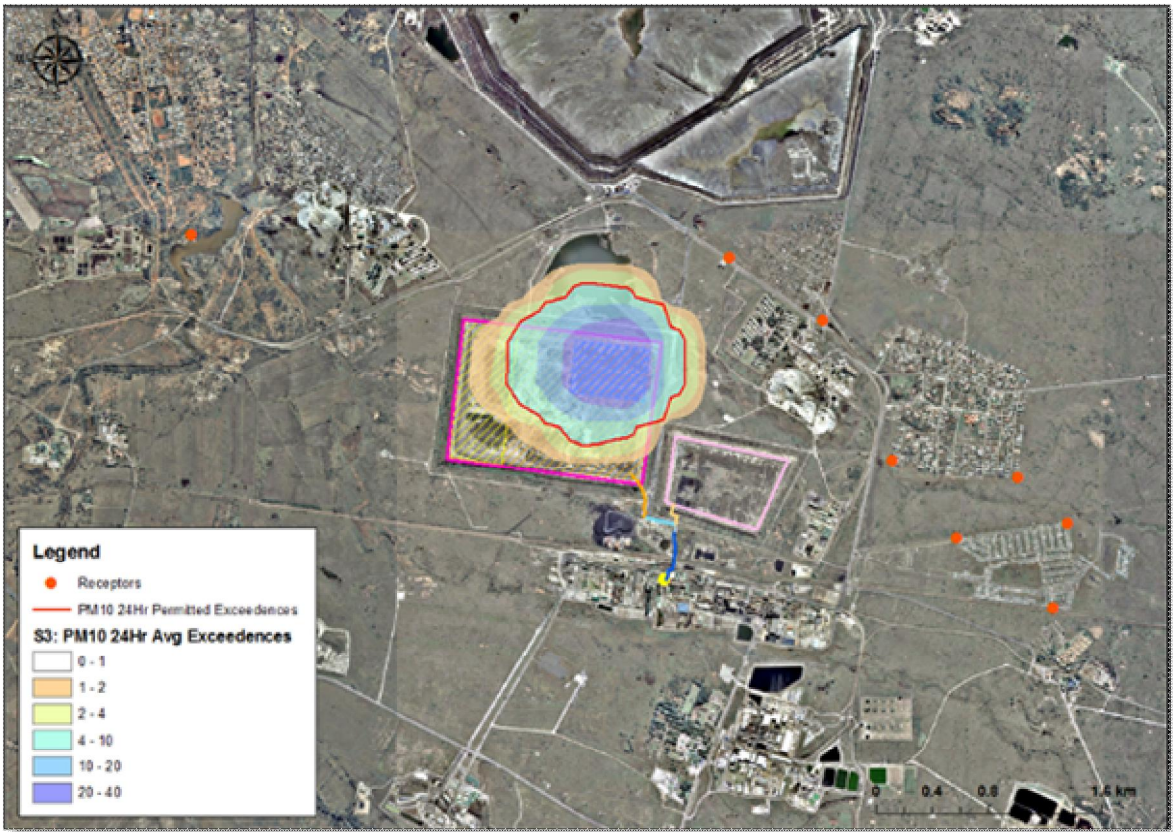


Figure 45: Predicted PM_{10} exceedences

- Scenario 4

Scenario 4 includes those sources included in Scenario 3, with the exclusion of bulldozing the material over the edge, with this activity being replaced with the crushing and screening of the rubble on the tailings.

Particulate Matter Concentrations

Table 17 presents the results for PM_{10} concentrations, distinguishing between the cumulative concentrations and the contribution concentrations from the Project, for each specified receptor point, while **Figure 46, Figure 47** and **Figure 48** present the graphical outputs of the model results.

Additionally, **Table 17** presents the cumulative PM_{10} concentrations, which is the existing PM_{10} concentrations combined with the contributions from the Project.

Table 17: PM_{10} concentrations at sensitive receptors

Receptor Point	Project		Cumulative			
	PM_{10} LT ($\mu g/m^3$)	PM_{10} P100 24Hr Avg. ($\mu g/m^3$)	PM_{10} LT ($\mu g/m^3$)	PM_{10} P100 24Hr Avg. ($\mu g/m^3$)	Predicted 24Hr Avg. Exceedences	Compliant (Permitted 4 Exceedences / annum)
Bokamoso NE	0.07	1.46	52.57	53.96	0	Yes
Bokamoso S	0.08	1.45	52.58	53.95	0	Yes
Bokamoso NW	0.12	1.97	52.62	54.47	0	Yes
Rustenburg Rural	0.65	4.20	53.15	56.70	0	Yes
Entabeni W	0.28	2.84	52.78	55.34	0	Yes
Entabeni S	0.12	2.19	52.62	54.69	0	Yes
Mfidikwe SW	0.15	3.23	52.65	55.73	0	Yes
Mfidikwe SE	0.08	1.80	52.58	54.30	0	Yes
LT Denotes Long-Term (Annual Average), **P100** Denotes Worst Case 24 Hourly Average Concentration (100th Percentile)						
Long-Term Exceedence: All Long-Term Concentrations exceed Annual Standard (50$\mu g/m^3$), due to Background Concentration						
Short-Term Exceedences: No Exceedences of the 24 Hourly Average Standard are Predicted						

Figure 46 presents the cumulative long-term concentration, while **Figure 47** presents the worst case cumulative 24 hourly average concentrations. Exceedences of the 24 hourly average standard are predicted to occur within the tailings re-mining area, although these elevated concentrations will not impact on neighbouring receptors (**Figure 48**).

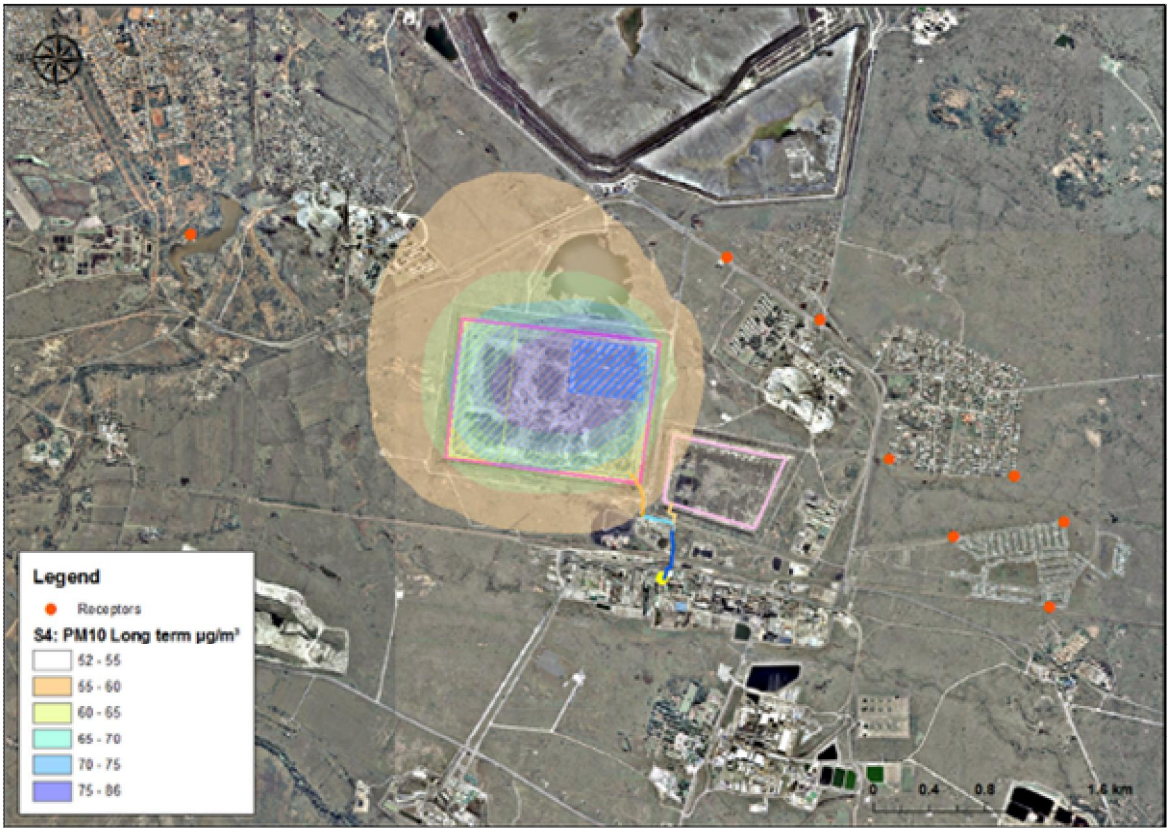


Figure 46: Cumulative PM_{10} emissions indicating long-term concentrations

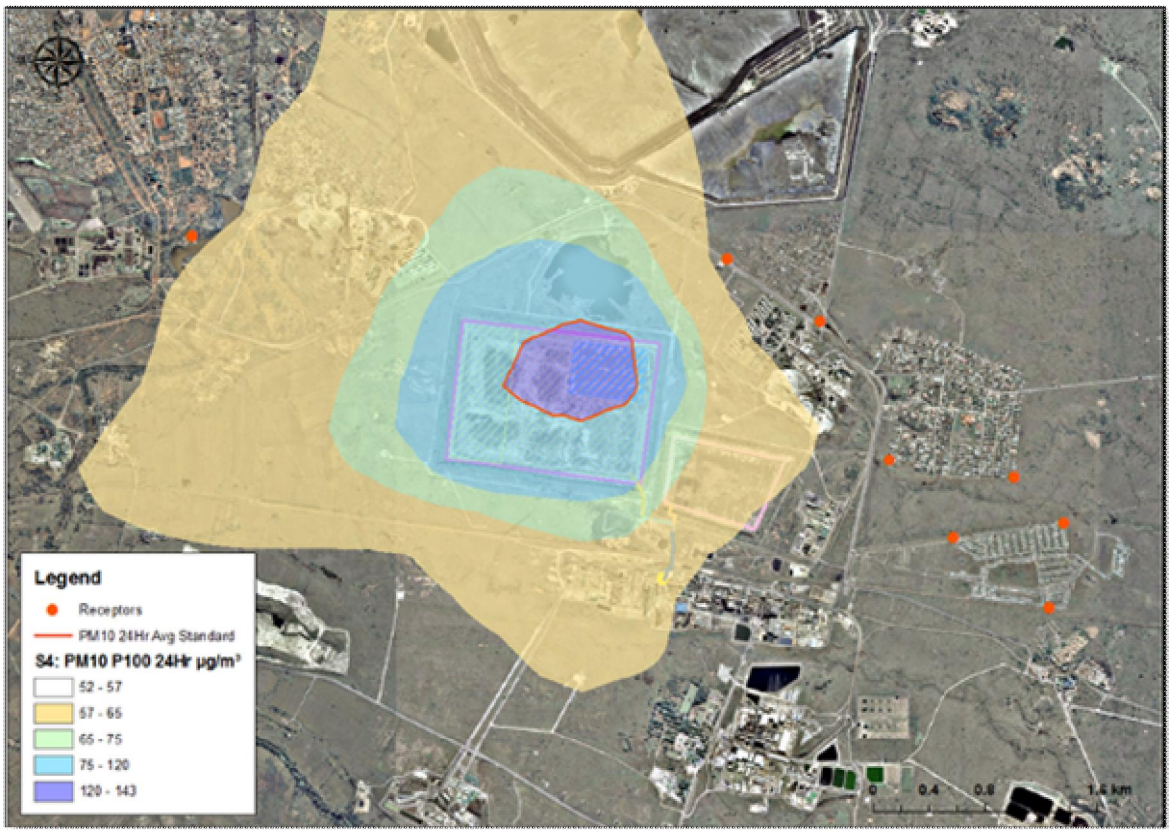


Figure 47: Cumulative PM_{10} emissions indicating worst case 24 hourly average concentrations (right)

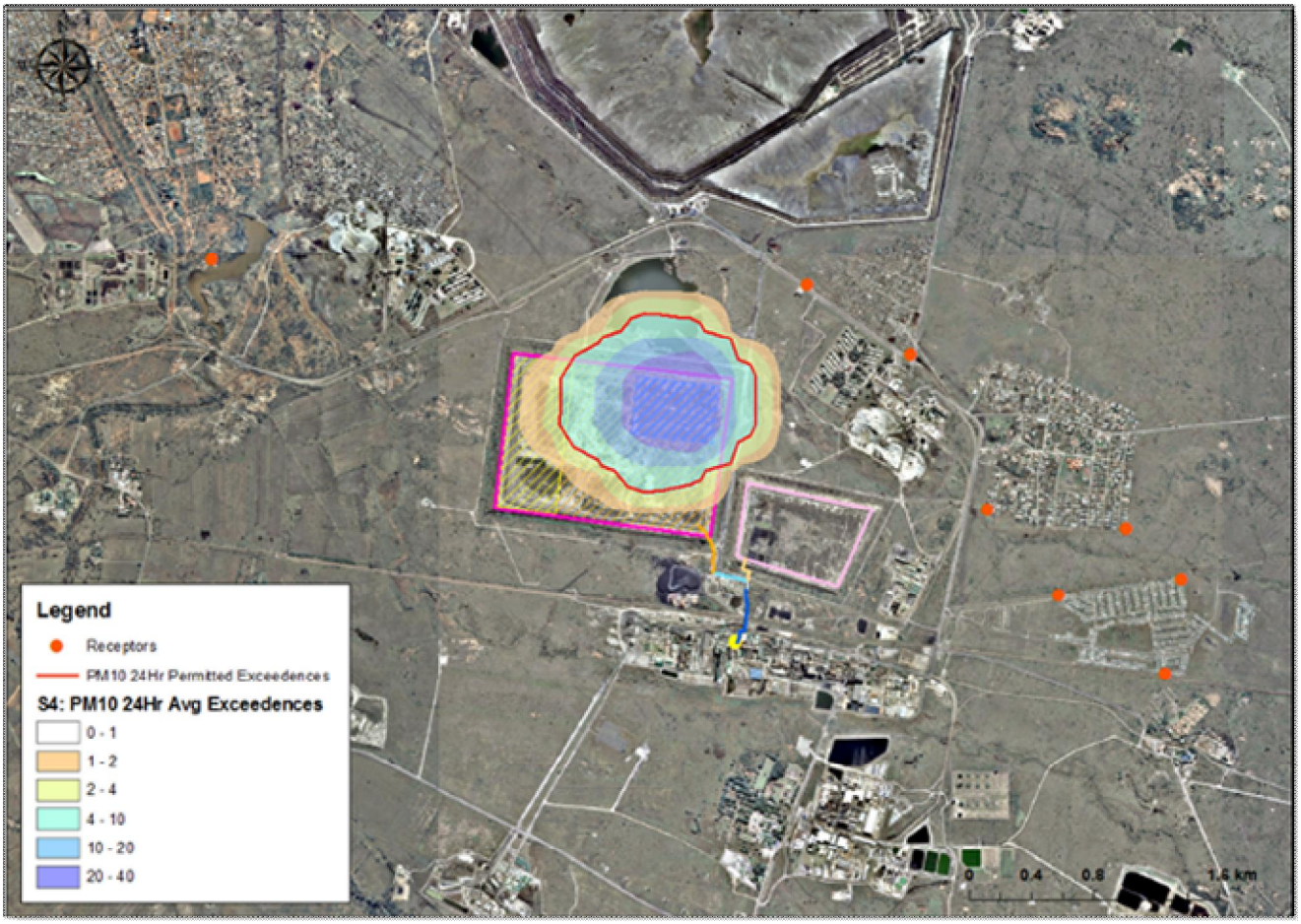


Figure 48: Predicted PM_{10} exceedences

8.1.3.2 Option B: Re-mining at the WLTR Plant

- Scenario 1

PM_{10} emissions associated with the land preparation and construction activities were modelled to predict the air quality impact of these activities on the receiving environment.

Particulate Matter Concentrations

Table 18 presents the tabular results for PM_{10} concentrations, distinguishing between the cumulative concentrations and the contribution concentrations from the Project, for each specified receptor point (**Figure 49**), while **Figure 50**, **Figure 51** and **Figure 52** present the graphical outputs of the model results.

Additionally, **Table 18** presents the cumulative PM_{10} concentrations, which is the existing PM_{10} concentrations combined with the contributions from the Project.

Table 18: PM_{10} concentrations at sensitive receptors

Receptor Point	Project		Cumulative			
	PM_{10} LT ($\mu g/m^3$)	PM_{10} P100 24Hr Avg. ($\mu g/m^3$)	PM_{10} LT ($\mu g/m^3$)	PM_{10} P100 24Hr Avg. ($\mu g/m^3$)	Predicted 24Hr Avg. Exceedences	Compliant (Permitted 4 Exceedences / annum)
Rustenburg	0.95	13.06	53.45	65.56	0	Yes
Rustenburg Rural	4.50	27.76	57.00	80.26	0	Yes

Receptor Point	Project		Cumulative			
	PM_{10} LT ($\mu g/m^3$)	PM_{10} P100 24Hr Avg. ($\mu g/m^3$)	PM_{10} LT ($\mu g/m^3$)	PM_{10} P100 24Hr Avg. ($\mu g/m^3$)	Predicted 24Hr Avg. Exceedences	Compliant (Permitted 4 Exceedences / annum)
Entabeni NW	1.57	16.83	54.07	69.33	0	Yes
Entabeni S	1.12	12.89	53.62	65.39	0	Yes
Mfidikwe SW	1.12	10.58	53.62	63.08	0	Yes
Mfidikwe SE	1.07	6.57	53.57	59.07	0	Yes
Bokomaso NE	4.99	15.71	57.49	68.21	0	Yes
Bokomaso NW	8.98	28.85	61.48	81.35	0	Yes
Bokomaso S	0.75	6.63	53.25	59.13	0	Yes
Thekwane W	0.92	5.05	53.42	57.55	0	Yes
Thekwane N of Pipeline	4.00	17.46	56.50	69.96	0	Yes
Thekwane S of Pipeline	3.66	29.02	56.16	81.52	0	Yes
Photshaneng NW	0.93	6.80	53.43	59.30	0	Yes
Photshaneng NE	1.55	9.86	54.05	62.36	0	Yes
Photshaneng SE	1.93	7.11	54.43	59.61	0	Yes
Nkaneng NE	3.64	24.62	56.14	77.12	0	Yes
LT Denotes Long-Term (Annual Average), **P100** Denotes Worst Case 24 Hourly Average Concentration (100th Percentile)						
Long-Term Exceedence: All Long-Term Concentrations exceed Annual Standard (50µg/m3), due to Background Concentration						
Short-Term Exceedences: No Exceedences of the 24 Hourly Average Standard are Predicted						

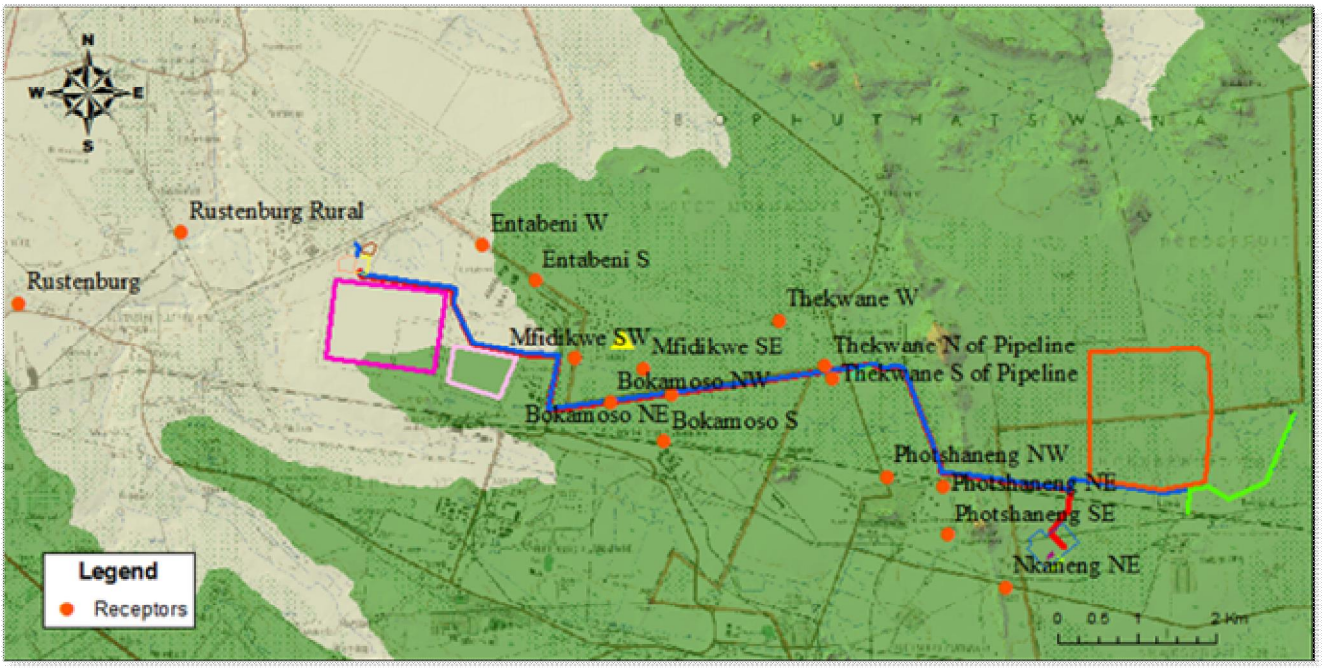


Figure 49: Map indicating location of sensitive receptors applied in Option B

Figure 50 presents the cumulative long-term concentrations while **Figure 51** presents the worst case cumulative 24 hourly average concentrations. **Figure 52** presents the predicted number of exceedences.

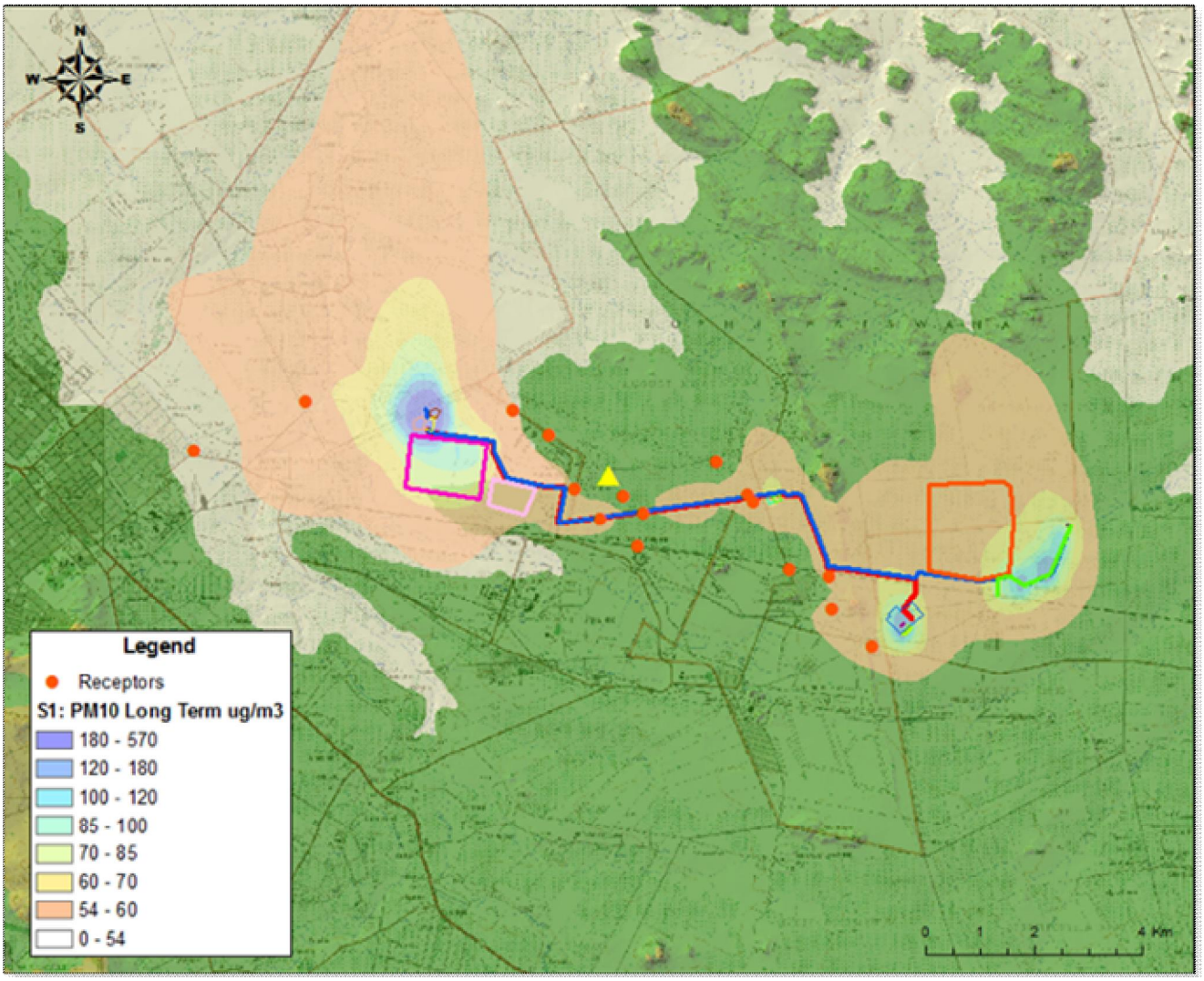


Figure 50: Cumulative PM_{10} emissions indicating long-term concentrations

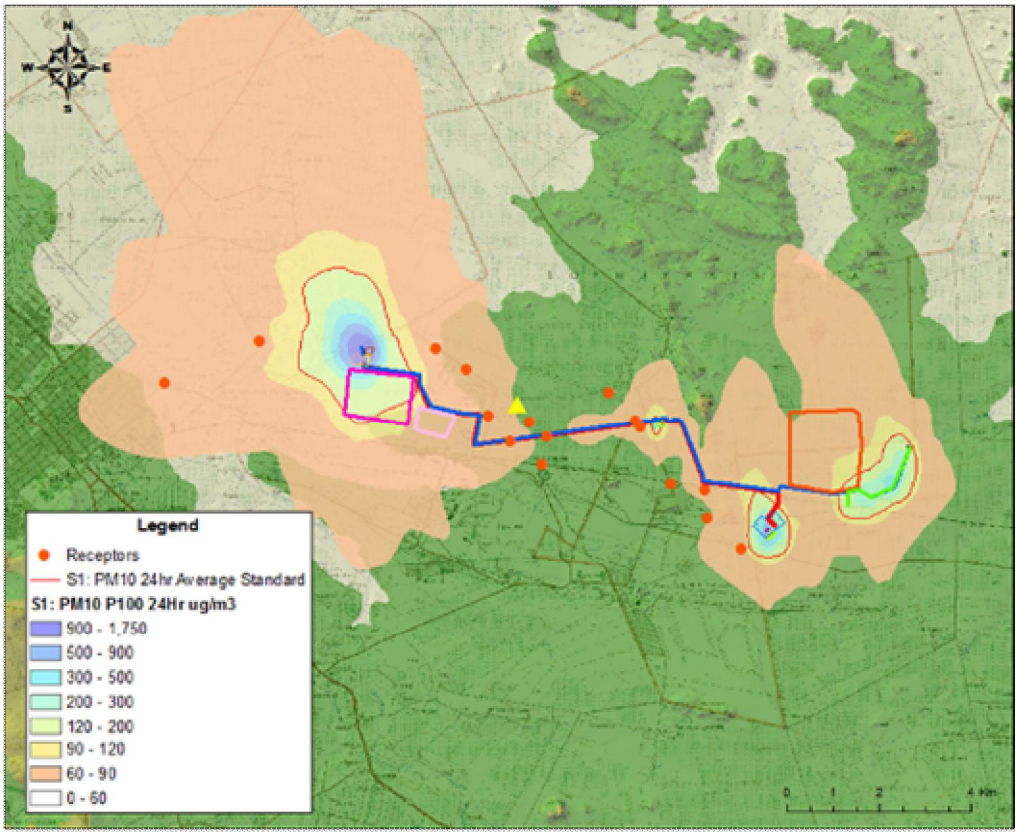


Figure 51: Cumulative PM_{10} emissions indicating worst case 24 hourly average concentrations

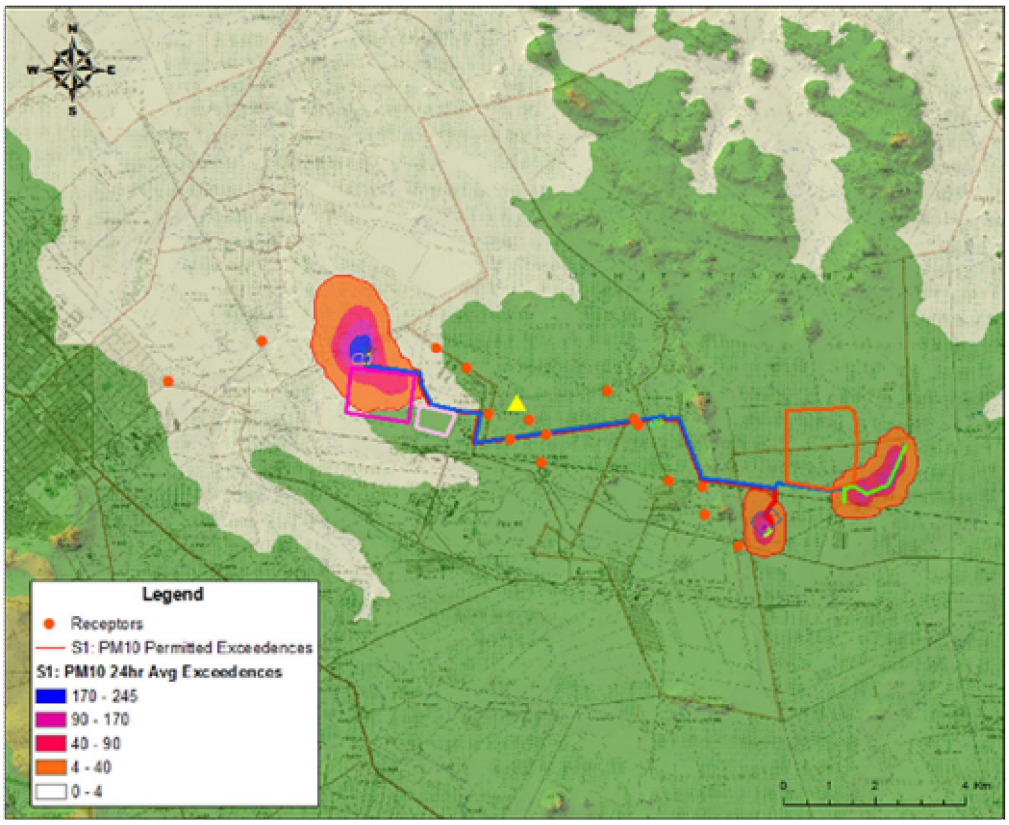


Figure 52: Predicted PM_{10} exceedences

- Scenario 2

PM_{10} emissions associated with the IsaMill™ construction completion were modelled to predict the air quality impact of these activities on the receiving environment.

Particulate Matter Concentrations

Table 19 presents the tabular results for PM_{10} concentrations, distinguishing between the cumulative concentrations and the contribution concentrations from the Project, for each specified receptor point, while **Figure 53, Figure 54** and **Figure 55** present the graphical outputs of the model results.

Additionally, **Table 19** presents the cumulative PM_{10} concentrations. The contribution from the Project to ambient air quality is low at all receptors.

Table 19: PM_{10} concentrations at sensitive receptors

Receptor Point	Project		Cumulative			
	PM_{10} LT ($\mu g/m^3$)	PM_{10} P100 24Hr Avg. ($\mu g/m^3$)	PM_{10} LT ($\mu g/m^3$)	PM_{10} P100 24Hr Avg. ($\mu g/m^3$)	Predicted 24Hr Avg. Exceedences	Compliant (Permitted 4 Exceedences / annum)
Rustenburg	0.05	0.28	52.55	52.78	0	Yes
Rustenburg Rural	0.06	0.47	52.56	52.97	0	Yes
Entabeni NW	0.05	0.44	52.55	52.94	0	Yes
Entabeni S	0.05	0.54	52.55	53.04	0	Yes
Mfidikwe SW	0.06	0.92	52.56	53.42	0	Yes
Mfidikwe SE	0.07	1.05	52.57	53.55	0	Yes
Bokomaso NE	0.07	1.30	52.57	53.80	0	Yes
Bokomaso NW	0.07	1.08	52.57	53.58	0	Yes
Bokomaso S	0.11	1.16	52.61	53.66	0	Yes
Thekwane W	0.15	0.89	52.65	53.39	0	Yes
Thekwane N of Pipeline	0.20	1.46	52.70	53.96	0	Yes
Thekwane S of Pipeline	0.20	1.66	52.70	54.16	0	Yes
Photshaneng NW	0.28	3.54	52.78	56.04	0	Yes
Photshaneng NE	0.59	6.75	53.09	59.25	0	Yes
Photshaneng SE	1.42	6.54	53.92	59.04	0	Yes
Nkaneng NE	3.35	22.39	55.85	74.89	0	Yes
LT Denotes Long-Term (Annual Average), **P100** Denotes Worst Case 24 Hourly Average Concentration (100th Percentile)						
Long-Term Exceedence: All Long-Term Concentrations exceed Annual Standard ($50\mu g/m^3$), due to Background Concentration						
Short-Term Exceedences: No Exceedences of the 24 Hourly Average Standard are Predicted						

Figure 53 presents the cumulative long-term concentrations while **Figure 54** presents the worst case cumulative 24 hourly average concentrations, while **Figure 55** presents the predicted number of exceedences.

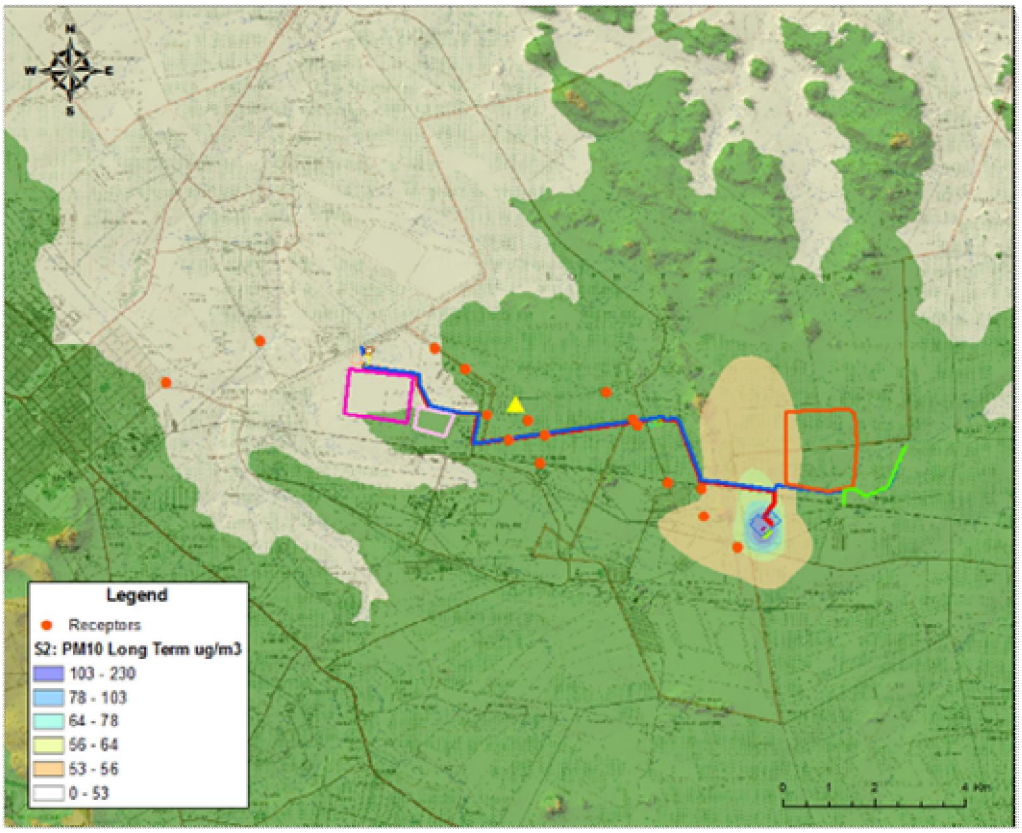


Figure 53: Cumulative PM_{10} emissions indicating long-term concentrations

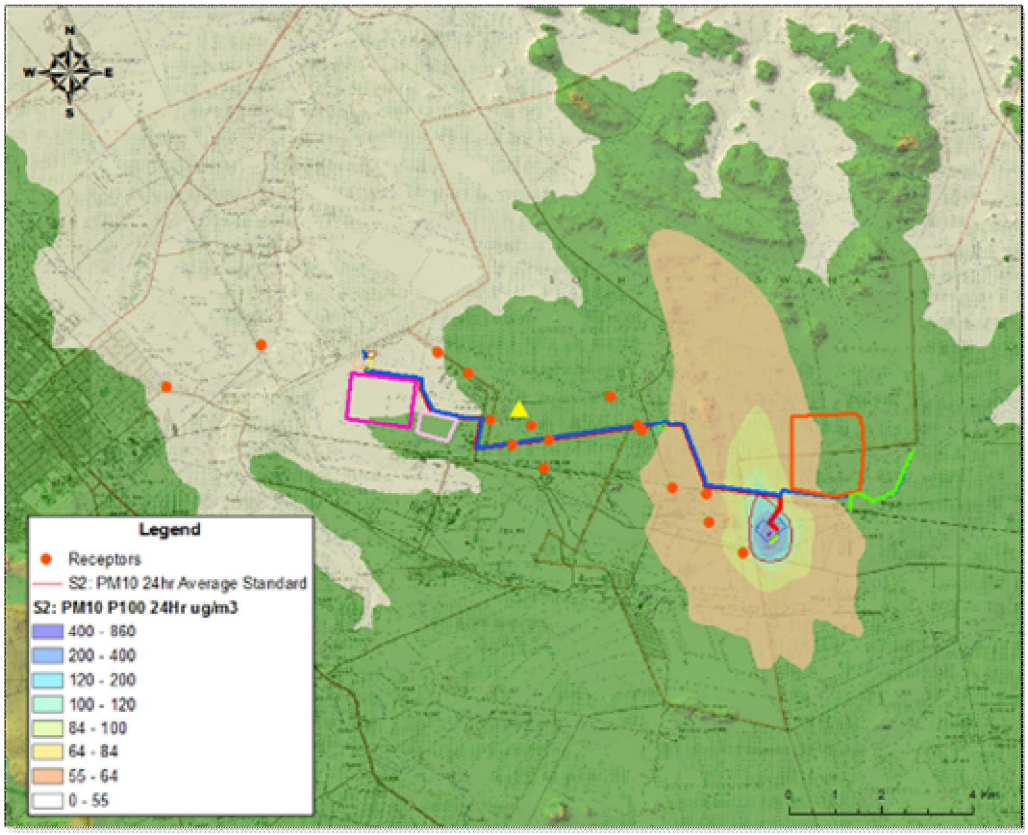


Figure 54: Cumulative PM_{10} emissions indicating worst case 24 hourly average concentrations

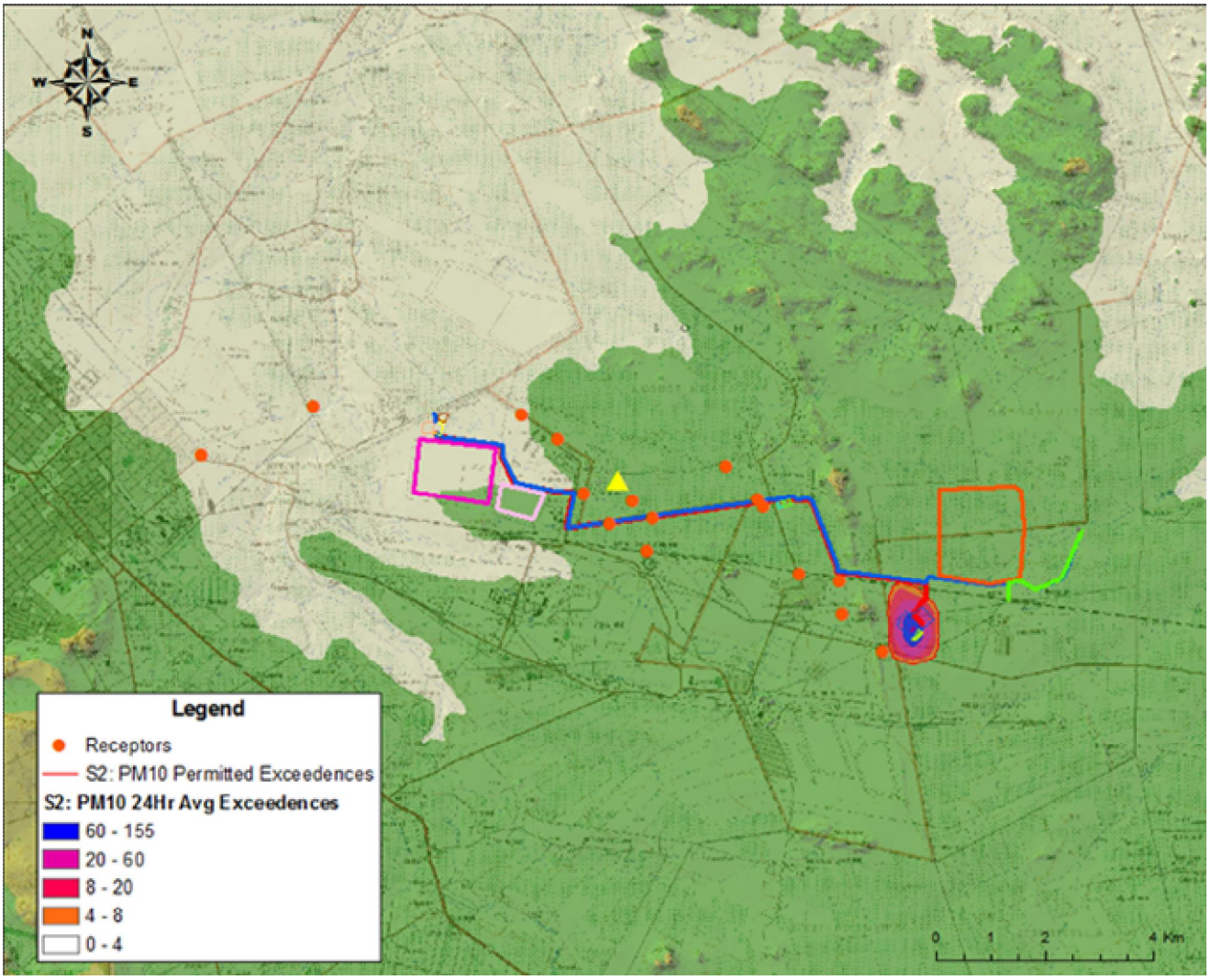


Figure 55: Predicted PM_{10}0 exceedences

- Scenario 3

The highest PM_{10} concentration contribution from the unpaved roads during operations occurs at the Bokamaso NE receptor, with a long-term concentration contribution of 0.001µg/m^3 and a 24 hourly average worst case (short-term) contribution of 0.003µg/m^3.

It must be noted that the long-term (annual average) PM_{10} concentration in this area is already in exceedence of the annual standard, although the PM_{10} concentration contributions from the unpaved road are significantly low, and will not have an impact on the existing situation.

- Scenario 4

The highest PM_{10} concentration contribution from the typical operations and land preparation of the East TSF occurs at the Entabeni NW receptor, with a long-term concentration contribution of 0.7µg/m^3 and a 24 hourly average worst case (short-term) contribution of 3.5µg/m^3. All remaining receptors indicated an average long-term PM_{10} contribution of 0.03µg/m^3 and an average worst-case PM_{10} contribution of 0.4µg/m^3.

It must be noted that the long-term (annual average) PM_{10} concentration in this area is already in exceedence of the annual standard, although the PM_{10} concentration contributions from typical operations combined with the land preparation of East TSF are significantly low, and will not have an impact on the existing situation.

8.1.4 Conclusions and Recommendations

The AQIA aimed to assess the impacts associated with both the options (**A** and **B**) for the Project. In terms of the key findings, the following is noted:

8.1.4.1 Option A: Re-mining at the Waterval Retrofit Concentrator

PM_{10} concentrations associated with the land preparation of the East TSF and construction of the eastern infrastructure remain extremely low, with negligible impact predicted on the receiving environment.

Highest PM_{10} concentrations are associated with the land preparation of the West TSF, particularly regarding the rubble removal, although concentrations are predicted to remain compliant at all neighbouring receptors, with the PM_{10} contributions from the Project being low at all sensitive receptors;

PM_{10} concentrations indicate little change should the option of crushing and screening of the rubble be preferred over the original method of bulldozing the rubble over the edge of the tailings.

8.1.4.2 Option B: Re-mining at the WLTR Plant

Highest PM_{10} concentrations are associated with the construction phase (Scenario 1), with highest concentrations predicted in the area of the pre-treatment plant, land clearing activities at West TSF and the unpaved access road to the Hoedspruit booster station;

PM_{10} contributions from the typical operations of the Project are significantly low, with only the unpaved roads being a possible emission source;

In terms of typical re-mining operations of each option, PM_{10} concentrations remain relatively similar, although an improvement in PM_{10} is predicted in the preferred option due to the decrease in the length of the maintenance road along the pipeline. Furthermore, the maintenance road along the pipeline in **Option A** is not located in close proximity of sensitive receptors, which is not the case in **Option B**. When considering impacts on air quality, WSP recommends the **Option A** be commissioned, as this alternative has fewer roads and therefore a smaller area of impact.

In terms of the construction and land preparation both options (**Option A** and **B**) indicate potential impacts, although the majority of these are localised in each construction area. However, PM_{10} concentrations are improved in **Option A**, as the length of the pipeline and associated maintenance road is significantly reduced, less land clearing is required for pump stations and there are less unpaved roads associated with this option, resulting in an improvement in emissions. Based on emissions associated with the construction of each option, WSP recommends that the **Option A** be selected, as there is a definite improvement in emissions predicted.

Based on the findings of the AQIA, the Project should be authorised.

8.2 Aquatic

The Aquatic Ecological Assessment was undertaken by Kathy Taggart of Natural Scientific Services CC for the Project. The full report has been included in **Appendix B**.

The objective of the aquatic ecological assessment was to assess the aquatic present ecological status using biomonitoring techniques, to determine current impacts on the Klipgatspruit and Paardekraal due to either natural (non-perennial nature of the system) or anthropogenic (e.g. river diversions) influences.

8.2.1 Methodology

The following methodology was utilised during the assessment:

- **Desktop review**

An initial desktop review of available literature including:

- Review of the fish species and macro-invertebrate families expected to occur within the study area;

- Review of the potential presence of rare/endangered fish species and/or of exotic fish species;
- Review of historical biomonitoring and water quality surveys conducted within the catchment; and
- Review of available literature on the status of the systems within the area.

- **Field Work**

In accordance with the DWA Section 21(i) and (c) supplementary water use license requirements, the present ecological state of the water quality, habitat, aquatic macro-invertebrates and fish assemblages must be assessed for any development that may impact on the flow of water in a watercourse or that may alter the beds, banks or characteristics of a watercourse.

As such all these facets will be assessed in this assessment, and follow the DWA approved River Health Programme methodologies. Six sampling sites were selected, based on the proposed pipeline route, including upstream and downstream points. The aquatic assessment was done in the summer season (November 2012).

8.2.2 Assumptions and Limitations

Even though all attempts were made to take samples under optimal conditions certain limitations were encountered. The limitations to this study included:

- The techniques used for assessing habitat integrity were subjective.
- Three of the proposed sampling sites, namely PL1, PL3 and PL5 (**Figure 56**), had no water and therefore no aquatic sampling could be undertaken at these sites.
- No flow was observed at the remaining three sites, i.e. PL2, PL4 and PL6 (**Figure 56**), due to non-perennial nature of the Klipgatspruit and/or limited rainfall received at the start of the rainy season.
- Due to the limited flow, in the systems that had water, none of the biomonitoring indices could be used and the sites are only discussed qualitatively in terms of aquatic biodiversity.
- The water level at PL2 was so limited that only water quality (WQ) could be assessed. No macroinvertebrates or fish assessments were undertaken.
- The presence of stones was extremely limited at PL4 and PL6 and lower (South African Scoring System, version 5 and Average Score per Taxon scores are therefore expected.
- Electro-narcosis was the only technique used for sampling fish, and the high electrical conductivity (EC) at PL4 interfered with the electro-shockers. No cast netting could be done in the shallow pools.
- No aquatic assessment was done in the system downstream of the proposed slurry pipeline route for **Option A**. If a major spill occurs, the Klipfonteinspruit, for which no baseline data is available, will be impacted.

8.2.3 Findings

The aquatic present ecological state of the affected streams could not be properly assessed, because biomonitoring could not be fully implemented due to absence of water at some sites. However, the water quality (Sites PL2, PL4 and PL6), habitat and biodiversity of macro-invertebrates and fish (Sites PL 4 and PL6) were assessed where possible. No aquatic assessments were done on the Klipfonteinspruit.

Water quality deterioration at the sampling sites is mainly due to anthropogenic activities, namely the surrounding platinum mine and townships. These impacts are caused by elevated levels of EC, TDS, salinity, Ca, Mn, alkalinity, hardness, Cl, Mg, Na, NH_4, NO_3, SO_4, COD, SS and turbidity.

Instream habitat integrity is more impacted than riparian habitat integrity. The overall habitat integrity at most of the sites has been modified due to bed modifications from high algal content and sedimentation, channel and flow modifications, and water quality deterioration. These changes from natural conditions are the result of platinum mining and townships in the stream catchments.

The lowest number of macro-invertebrates families was observed at PL6 (immediately below a return water dam), with only one family, namely Corixidae, present. A very low diversity of species was also observed at

PL4 (close to Waterval East TSF). Only seven families were sampled with very low abundances. With the absence of the “stones”-habitat, no flowing water and deteriorated water quality conditions, no sensitive species were found at PL4 and PL6. The occurrence of pollution tolerant species highlighted the poor habitat and water quality conditions at these sites. Five indigenous fish species were sampled included *Barbus trimaculatus, B. paludinosus, Clarias gariepinus, Pseudocrenilabrus philander* and *Tilapia sparmanii* at PL6. These species have a habitat preference for slow pools with aquatic and marginal vegetation and these habitats are present at PL4 and PL6. For this reason, together with their lack of sensitivity to flow and water quality changes, these species are present at PL6 even though this site is largely modified. However, none of these species were sampled at PL4; and this is a matter for concern. The exotic, *Cyprinus carpio*, was not found at the sampling sites, and this is a good sign. The remaining species, namely *Labeo cylindricus, L. molybdinus* and *Labeobarbus marequensis*, prefer flowing waters of perennial rivers and were therefore not found in the non-perennial Klipgatspruit. However, the absence of the species *B. unitaeniatus*, which is found in a wide variety of habitats, cannot be explained.

8.2.4 Conclusions and Recommendations

The results for the aquatic assessment indicate that the aquatic integrity of affected streams is largely to critically modified. This is a consequence of severe water quality deterioration, impacts to the instream and riparian habitats, and decreases in abundances and diversity of sensitive species, with only tolerant macro-invertebrate and fish species remaining. This indicates that the aquatic ecosystems of the Klipgatspruit and Paardekraalspruit are currently under severe pressure from mining and other anthropogenic activities.

No aquatic sampling was done on the artificial / storm water canal or Klipfonteinspruit. The current impacts on these aquatic systems are provided in previous reports done by Aquatic (2012). Therefore, regardless of which option is chosen (**Option A** or **Option B**), it is NSSs recommendation that the mitigation measures from the aquatic report (Taggart, 2013) be adhered to and monitored during the construction and operation of the proposed pipeline crossings, to prevent further deterioration of these highly impacted systems.

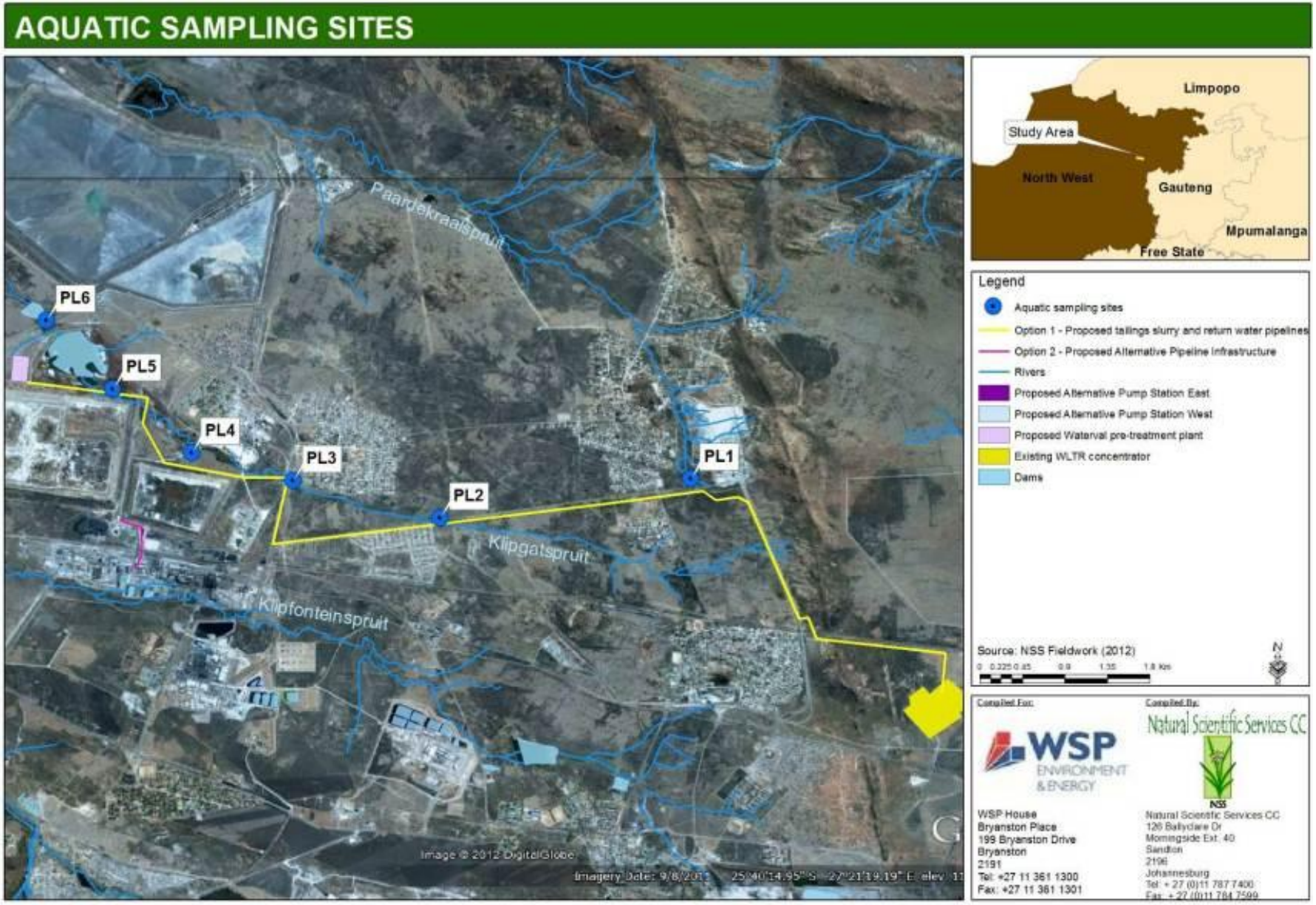


Figure 56: Aquatic Sampling Sites (NSS, 2013)

8.3 Hydrology and Geohydrology

The hydrological and geohydrological assessment was undertaken by Andrew Gemmel of WSP Environmental (Pty) Ltd for the Project. The full report has been included in **Appendix B**.

8.3.1 Methodology

The following methodology was utilised during the assessment:

- **Desktop Review (Option A and B)**
  - An initial desktop review was conducted taking cognisance of all relevant information available with respect to the surface water and groundwater. This included existing aerial imagery and mapping, as well as reporting for the area.
- **Watercourse and Wetland Assessment (Option B only)**
  - Wetland Delineation

    The wetlands were delineated based on the DWA document '*A Practical Field Procedure for Identification and Delineation of Wetland and Riparian Areas*' (DWA, 2005). The DWA methodology utilises four specific indicators to determine the outer edge of the temporary zone, namely:

    a. **The Soil Wetness Indicator**: Identifies the morphological "signatures" developed in the upper 0.5 m of the soil profile as a result of prolonged and frequent saturation;

    b. **The Vegetation Indicator**: Identifies hydrophilic vegetation associated with frequently saturated soils;

    c. **The Terrain Unit Indicator**: Identifies those parts of the landscape where wetlands are more likely to occur; and,

    d. **The Soil Form Indicator**: Identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.

  - **Wetland Functional Assessment**

    In addition to delineating the boundary of the wetland, the goods and services supplied by the wetland were quantified through a functional assessment. The assessment of the goods and services provided by the wetland was done using a tool called WET-EcoServices. The tool provides guidelines for scoring the importance of a wetland in delivering regulatory and supporting benefits (e.g. toxicant removal, sediment trapping, erosion control and flood attenuation) and cultural and provisioning benefits (e.g. tourism and recreation, provision of water and natural resources). It is designed for a class of wetlands known as palustrine wetlands (i.e. marshes, floodplains, vleis or seeps) that is applicable to the wetland conditions occurring in the study area.
- **Water Balance Revision (Option A and B)**

  The water balance assessment for Option A (Klipgat and Hoedspruit RWDs and TSF) was undertaken in November 2012 for Option B (Klipgat RWD and Paardekraal TSF) in October 2013 by SRK. These reports included both the calculations and methodology associated with developing the water balance for the associated facilities.
- **Floodline Assessment (Option A and B)**

  A floodline assessment was conducted for the **Option B** area by SRK in 2002 and includes the watercourses expected to be impacted by the Project. WSP utilised the existing SRK floodline to assess flood risk associated with the Project. The assessment took into account the location of the infrastructure in relation to the delineated floodline. The floodline assessment served to determine if the Project will significantly alter the calculated floodlines. In addition, the floodline assessment served to determine the potential impacts of the identified floodlines on the infrastructure.

- **Surface Water and Groundwater Quality Assessment (Option A and B)**

  There is currently an extensive water monitoring programme in place at the AAP operations. Surface water and groundwater has been monitored previously by Clean Stream Scientific Services and Groundwater Complete respectively. As part of the assessment, WSP reviewed existing results to determine the baseline water quality of the water resources in the vicinity of the project.

  In addition, a hydrocensus of documented boreholes and monitoring wells within the area was undertaken to determine regional groundwater use and associated potential sensitive receptors, and to assess the completeness of the groundwater monitoring network associated with the Anglo operations.

  As part of the assessment the current surface water and groundwater monitoring plan was reviewed to assess the analytical determinants, sampling locations, and sampling frequency. Where necessary, the monitoring plan was updated to ensure that future monitoring would allow for expected project impacts to be determined.

- **Impact Assessment and Mitigation Measures (Option A and B)**

  The impacts of the Project were assessed based on the methodology specified by AAP. The impact assessment took into account mitigation measures proposed in order to limit the impacts identified.

8.3.2 Assumptions and Limitations

- The water balance compiled for the Project by SRK was used as input to the hydrological assessment. It has been assumed that the water balance is accurate.
- The re-mining project is a replacement project; hence, it has been assumed that there will be no additional slimes volumes added to the Hoedspruit and Paardekraal TSFs. Furthermore, it has been assumed that these facilities are appropriately operated and maintained and that will continue with the Project; hence, it has been assumed that there is no increase in spillage and seepage amounts from this facility.
- The water quality results are described in percentiles (5^{th}, 50^{th} and 95^{th}) within the supplied historical reporting; however, the number of records ranges from four to twelve samples. This is considered insufficient with regards to calculating statistical percentile ranges, and this needs to be acknowledged.
- The wetland boundary comprises a gradually changing gradient of wetland indicators; therefore, the wetland delineation occurs within a certain degree of tolerance.
- Based on the desktop study and subsequent site walkover, only two wetlands of any significance may be impacted directly by the Project (**Option B**). However, should any additional wetlands be identified during the course of the project, a wetland assessment should be undertaken to assess the potential impacts.
- The functionality assessment tool, WET-EcoServices, is a relatively new rapid assessment tool that has not yet been extensively tested in all wetland contexts. It has however been developed based on international best practice; and is specifically designed for a South African context, and is commonly applied by wetland specialists. Hence it is regarded as being appropriate for this assessment.

8.3.3 Findings

8.3.3.1 Water Course and Wetland Assessment (Option B)

8.3.3.1.1 Watercourse Identification

The watercourses in the vicinity of the Project include the Klipgatspruit, Hoedspruit and Paardekraalspruit watercourses. The potential impacts to these watercourses associated with the Project are summarised as follows:

- The pipeline route runs parallel and within 32 m of a clean stormwater diversion channel. This channel discharges directly to the Hoedspruit. The stormwater channel is located south of the Hoedspruit TSF and east of the Hoedspruit RWD. The pipeline route crosses this stormwater channel at an existing road culvert.

- The slurry and water pipeline route crosses the upper reaches of the Paardekraalspruit via a road culvert.
- The slurry and water pipeline route crosses a wetland located on the Klipgatspruit in the vicinity of the Bokamoso Township.
- The slurry and water pipelines pass within a culvert associated with the Klipgatspruit beneath the roadway and railway in the vicinity of the Waterval TSF. As a result the capacity of the culvert to convey stormwater will be altered by the pipeline pipe. The pipeline continues parallel to the Klipgatspruit towards the Klipgat Dam.
- The slurry and water pipelines cross a dirty water trench north of the Waterval East TSF. This watercourse carries seepage originating from the Waterval East TSF to the Klipgat Dam.

8.3.3.1.2 Wetland Assessment

Based on the site walkover, two wetlands (**Figure 57**) were identified within the 32 m buffers associated with the Project, one near the Bokamoso Township, as well as east of the Waterval West TSF.

A. Bokamoso Wetland

Wetland Delineation

The wetland identified at Bokomoso is associated with the Klipgatspruit. Due to the terrain factors, the extent of the wetland was limited as the slope allowed for sufficient drainage.

The soils within the wetland had minimal development of temporarily and seasonally waterlogged soils, with permanently waterlogged soils dominating. These soils had a grey soil matrix, with minimal development of coloured mottles. Vegetation present within the permanent wetland zones was dominated by bulrushes (*Typha capensis*).

Functional Assessment

The hydro geomorphic (HGM) type of the wetland was characterised as a valley bottom wetland with a channel. Using the WET-EcoServices technique, the importance of the goods and services supplied by the wetland is summarised in **Table 20**. The wetland functionality ranges from low to intermediate.

Due to the relatively small size of the wetland and limited functionality, the opportunity to enhance the effectiveness of the wetland or to significantly increase the current level of direct use is low. The threats to the wetland are considered moderately low.

Should Project occur within the wetland, it is expected that the functionality will be impacted. In addition, transformation of the surrounding landscape will occur through the activities associated with the pipeline development (i.e. placement of plinths and pipeline, road development etc.).

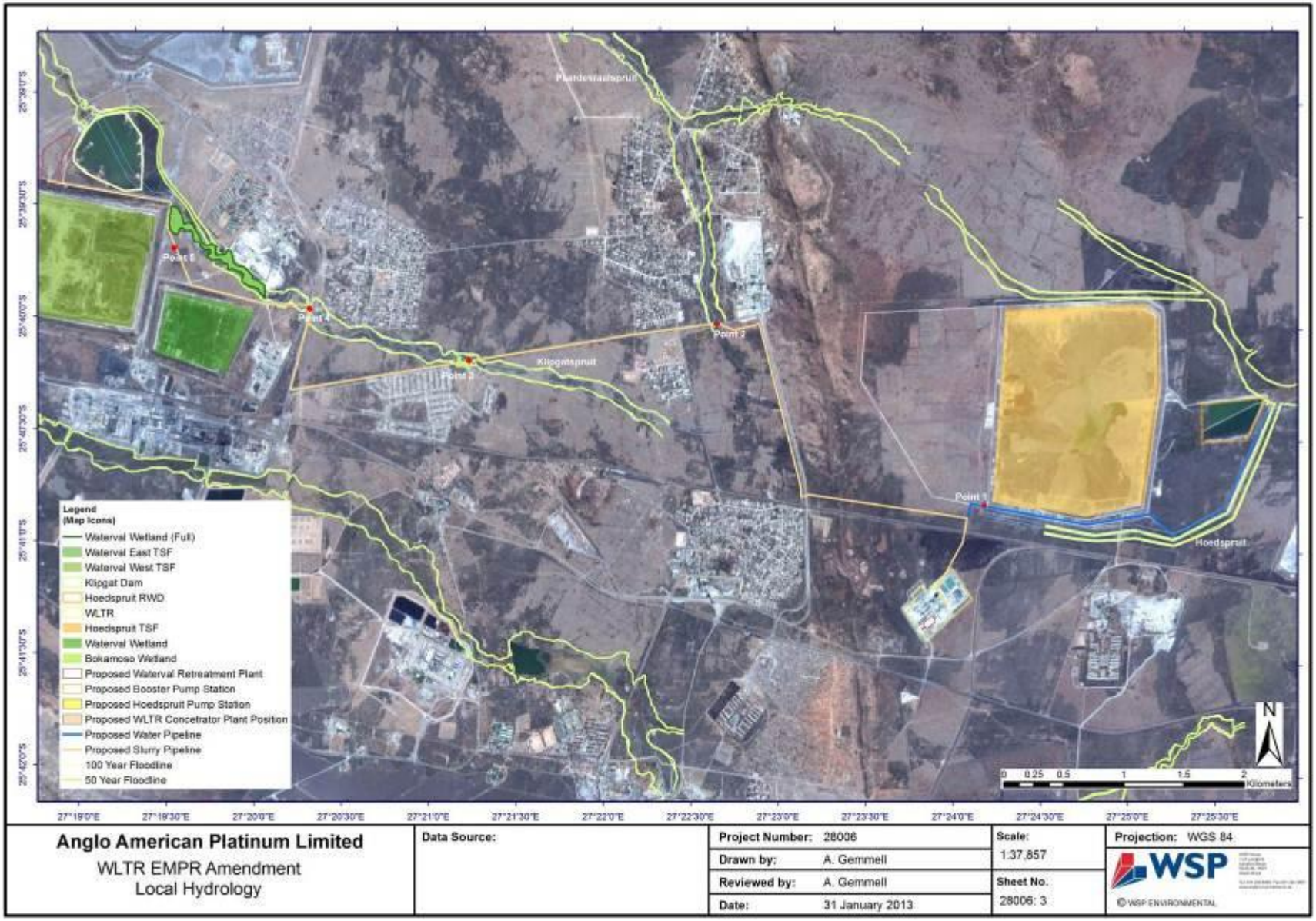


Figure 57: Local Hydrology

Table 20: Ecosystem Services Scores – Bokamoso Wetland

Ecosystem Service	Score
Flood attenuation	Intermediate
Streamflow regulation	Moderately low
Sediment trapping	Intermediate
Phosphate trapping	Intermediate
Nitrate removal	Intermediate
Toxicant removal	Intermediate
Erosion control	Intermediate
Carbon storage	Intermediate
Maintenance of biodiversity	Intermediate
Water supply for human use	Moderately low
Natural resources	Low
Cultivated foods	Low
Cultural significance	Low
Tourism and recreation	Moderately Low
Education and research	Low
Threats	Moderately low
Opportunities	Low

B. Waterval Wetland

Wetland Delineation

The wetland identified is associated with the Klipgatspruit, and located 2 km downstream of the Bokamoso wetland identified in the previous section.

A process water channel originating from the Frank Concentrator, located north-east of the Waterval East TSF, runs between the pipeline route and the identified wetland, which is expected to limit runoff impacts originating from the pipeline development.

As with the Bokamoso wetland, the soils within the wetland had minimal development of temporarily and seasonally waterlogged soils, with permanently waterlogged soils dominating; soils had a grey soil matrix, with minimal development of coloured mottles. Bulrushes (*Typha capensis*) dominated within the permanent wetland zones.

Functional Assessment

The HGM type of the wetland was characterised as a valley bottom wetland without a channel. The importance of the goods and services supplied by the wetland ranges from low to moderately high. The highest functionality is for sediment trapping, phosphate trapping, toxicant removal, erosion control and carbon storage (**Table 21**). This is expected to be associated with contamination load associated with mining activities entering the wetland, and the role that the wetland is expected to play in attenuating these contaminants.

Due to the relatively small size of the wetland and limited overall functionality, the opportunity to enhance the effectiveness of the wetland or to significantly increase the current level of direct use is low. The threats to the wetland are considered moderately low.

Should Project occur within the wetland or within close proximity, it is expected that the functionality will be impacted. In addition, transformation of the surrounding landscape will occur through the activities associated with the pipeline development (i.e. placement of plinths and pipeline, road development etc.).

Table 21: Ecosystem Services Scores – Waterval TSF Wetland

Ecosystem Service	Score
Flood attenuation	Intermediate
Streamflow regulation	Intermediate
Sediment trapping	Moderately high
Phosphate trapping	Moderately high
Nitrate removal	Intermediate
Toxicant removal	Moderately high
Erosion control	Moderately high
Carbon storage	Moderately high
Maintenance of biodiversity	Moderately low
Water supply for human use	Moderately low
Natural resources	Moderately low
Cultivated foods	Low
Cultural significance	Low
Tourism and recreation	Low
Education and research	Moderately low
Threats	Moderately low
Opportunities	Low

8.3.3.2 Water Balance Revision

Option A

The objective of SRK's water balance was to update the Klipgat and Hoedspruit water balance to include the re-mining of the Waterval East and West TSF, and disposal of the remaining tailings to the Paardekraal TSF.

Based on the water balance for the Klipgat RWD (SRK, October 2013), water within the dam is obtained from various sources including the Paardekraal RWDs, Khomanani Shaft, Khuseleka Shaft, Rustenburg Sewage Works and runoff from the Waterval TSFs. As a result, based on the already impacted nature of this dam, any abstractions are not expected to have a significant impact on the Klipgatspruit.

The SRK water balance (October, 2013) indicates no spillage from the Paardekraal TSF. As a result, the potential impacts of the Paardekraal TSF to the Hex River flows will be limited.

Based on the water balance for the Hoedspruit RWD (SRK, November 2012), water is transferred from the Klipgat RWD to this dam when capacity is limited at the Klipgat RWD. As a result, given the already impacted nature of the Hoedspruit RWD, the transfers from this dam are unlikely to lead to any significant additional impacts to the Hoedspruit watercourse flows.

A summary of the water balances for the average and wet conditions for **Option A** is shown in **Figure 58**.

Option B

The SRK water balance (November 2012) was undertaken to assess the opportunities to reduce water consumption associated with the Hoedspruit and Waterval operations. A monthly water balance was set up incorporating long term rainfall, evaporation, actual water usage and internal transfers (where data was available). The objective of SRK's water balance was to determine what transfers between the Klipgat Dam and Hoedspruit RWD would be optimal to limit the overall spillage from the RWDs to the receiving environment. The water balance also factored in the balances compiled separately for the Klipgat Dam and Hoedspruit RWD as well as the potential water use during reclamation of the Waterval TSF.

The water balances were assessed and updated by WSP, taking into account the latest AAP plans associated with the Project. Based on this review, the only changes made within the water balances was that water for use at the Waterval TSF reclamation is sourced directly from the Hoedspruit RWD, rather than the WLTR. The updated water balances for the average, wet and dry climatic conditions are included in **Figure 59**.

It should be noted that the review of the water balance also indicated that there is possibly over-accounting of water transferred from Klipgat Dam. This is transferred both to the WLTR as well as to the Hoedspruit TSF. This influences the amount of water available to the Waterval TSF reclamation activities and potentially the spillage from the Hoedspruit RWD; hence is considered significant. A detailed GoldSim Water Balance is under development for the RPM Rustenburg Section. Once completed, an improved understanding of the water balance will then be available for the site.

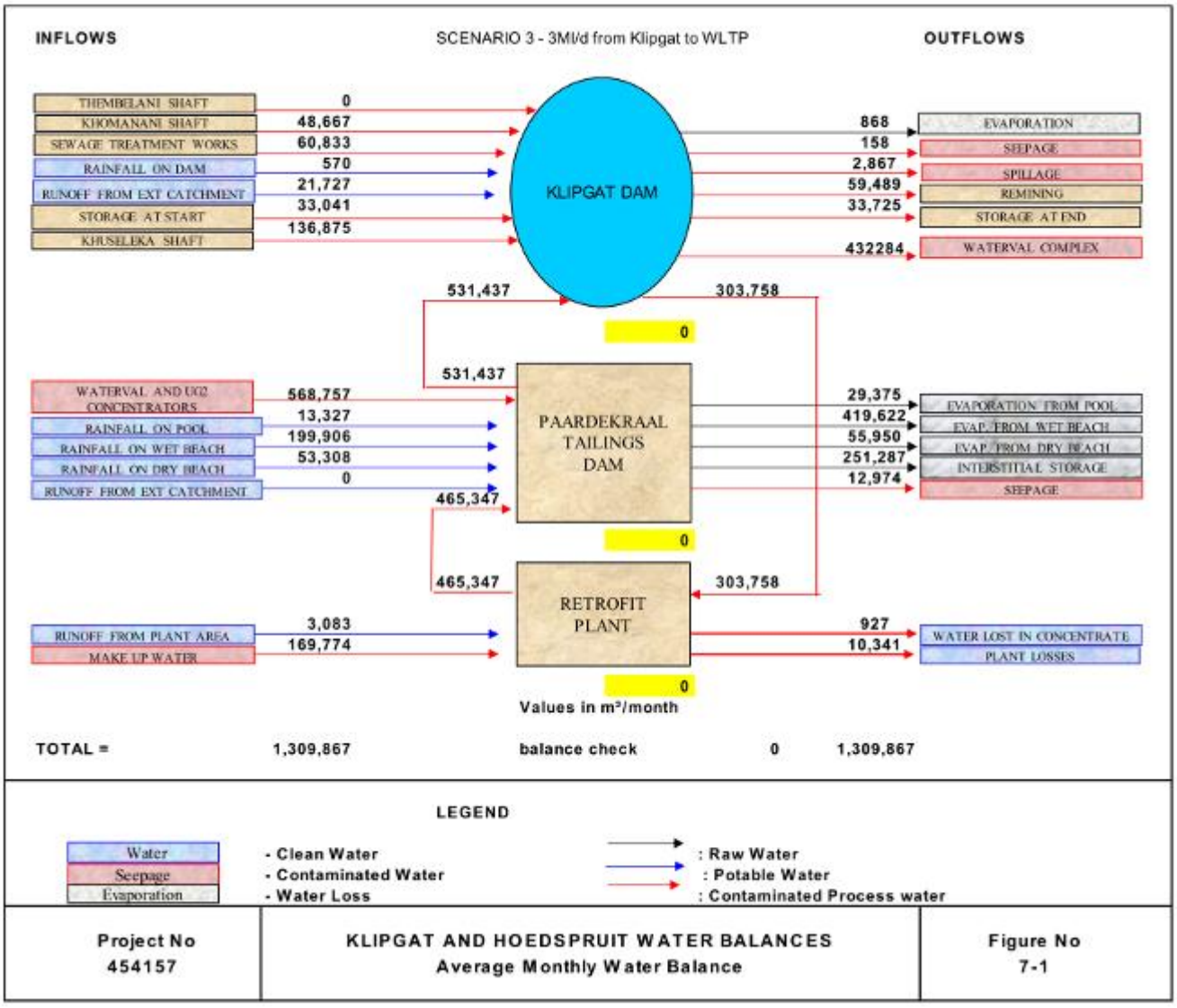


Figure 58: Average Rainfall Water Balance over an 84 year period (SRK, 2013)

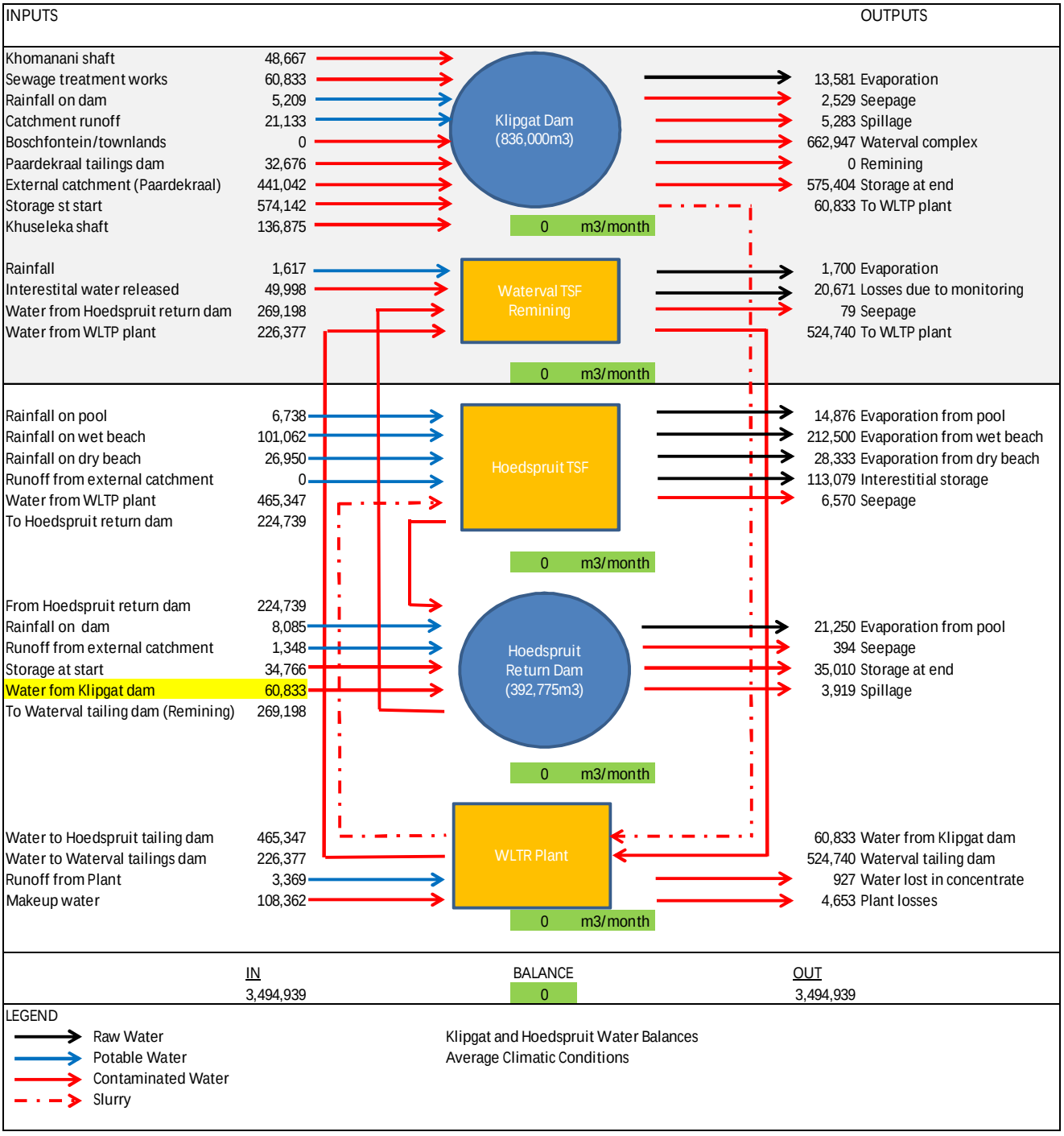


Figure 59: Klipgat and Hoedspruit Water Balance – Average Climatic Conditions (WSP, 2013)

8.3.3.3 Floodline Assessment

Option A

A floodline assessment was conducted for the area by SRK in 2002[5], and includes the watercourses likely to be impacted by the Project. WSP utilised the existing SRK floodline to assess the flood risk associated with the

[5] Report 305291/2

Project. The assessment included the risk of flooding based on the location of the proposed infrastructure, as well as the potential for the Project to alter the calculated floodlines.

Based on the floodline mapping conducted by SRK (2002), as well as the Project layout, the following floodline impacts can be noted:

- No new infrastructure is proposed within the delineated 50 and 100 year recurrence floodlines on the Klipfonteinspruit and Klipgatspruit.
- The slurry pipeline crosses the man-made drainage channel between the pump stations and the Waterval Retrofit Concentrator. Although no floodline mapping is available for this channel, it has been assumed to have been sized to contain the expected flood volumes, hence has been assumed to pose limited flood risk to the infrastructure.
- Since no significant areas of impervious areas are proposed for the Project, the runoff from the site will not result in any significant increase in flood risk.

Option B

Based on the floodline mapping conducted by SRK (2002) and the Project layout, the following floodline impacts can be noted:

- The pipeline will cross the upper reaches of the Paardekraalspruit within a new culvert. It has been assumed that this culvert will be suitably sized; hence the impacts to the watercourse and associated floodline are considered insignificant.
- The water pipeline will pass beneath the road and railway line located west of the Waterval TSFs. This has the potential to impact the floodlines due to a reduction in the capacity of the culverts. An assessment of the impacts to the culvert was undertaken by SRK, and the conclusion was that the 1:50 year event would not overtop the road under the proposed scenario. The flow depth upstream of the culvert will be 100 mm for the 1:50 year event. However, for the 1:100 year event, the road will be “marginally” overtopped, with depths not specified. To limit the potential for flooding, it was recommended that the downstream area be cleared to increase the flow of water downstream of the culvert.
- The pipeline crosses the Klipgat between the Waterval TSF and Hoedspruit TSF. In addition, the pipeline is routed within the 50 and 100 year floodlines to the north-east of the Waterval East TSF.
- Based on the water balance, the seepage from the Hoedspruit TSF and spillage and seepage from the Hoedspruit RWD have the potential to increase the downstream flood risk due to increased baseline river flow conditions. However, given the lack of historical spillage and seepage data, the influence of the re-mining activities on increasing the flow cannot be quantified. Nonetheless, owing to the expected proportional increases in flow volume, the change in flood risk is considered to be nominal.

8.3.3.4 Surface Water Quality Assessment

Monthly surface water quality monitoring has historically been conducted by Clean Stream, and includes the watercourses likely to be impacted by the Project (i.e. Klipgatspruit, Waterval Retrofit, WLTR, Hoedspruit and Paardekraalspruit) (**Figure 60**). Duration of the surface water data made available extended over the period from September 2010 to August 2011. As part of the surface water monitoring programme, various determinants were analysed, including:

- pH;
- TDS;
- EC;
- Total hardness;
- Cations (calcium, magnesium, sodium, potassium);
- Chloride;
- Sulphate;
- Fluoride;

- Metals (iron, manganese, aluminium, copper, nickel);
- Phosphate;
- Nitrate;
- Ammonium; and,
- Sodium adsorption ratio (SAR).

In order to determine “baseline” water quality, prior to the Project, WSP undertook an appraisal of the analytical results provided for the water courses at the various sampling locations at a catchment scale. Results were compared to Resource Water Quality Objectives (RWQOs) specified by DWA to establish the degree of impact to the water courses. The associated approach and outcomes are defined in the sections that follow.

Klipgatspruit Catchment

The sampling points within the Klipgatspruit in the vicinity of the Project include the Klipgatspruit upstream of the expected impacts associated with the Waterval TSFs, pump stations, pre-treatment, and downstream of the tailings influence. Samples also include the water quality of the Klipgat Dam and overflow.

The assessment by Clean Stream indicates that upstream of the pre-treatment plant there is elevated salinity and nitrate, attributed to seepage from the rock dumps at the Khomani I Mine. Salinity, nitrate and nickel levels increase in a downstream direction in the vicinity of the Waterval TSFs, likely due to the influence of these facilities.

Based on an assessment of the water quality upstream of the contributions from the Waterval, the following exceedances of the RWQOs were noted:

- TDS, EC, SAR, total hardness, cations (calcium, magnesium and sodium), chloride and sulphate exceed the RWQOs in at least 95% of the samples tested;
- Copper exceed the RWQO in at least 50% of the samples tested;
- Phosphate, nitrate, manganese and nickel exceed the RWQO in at least 5% of the samples tested.

At the outflow from the Klipgat Dam which includes the influence of the Waterval TSFs, the exceedances of the RWQO are similar to those conditions occurring upstream of the TSFs, with the following notable reductions in water quality in comparison to the upstream sample:

- A reduction in pH below the specified RWQO range in at least 5% of the samples.
- Manganese and nickel is elevated above the RWQO in at least 95% of samples.
- Ammonia is elevated above the RWQO in at least 50% of the samples.

It is expected that this reduction in water quality is as a result of the activities that contribute runoff to the Klipgatspruit between these sampling points. This includes the potential influence of the Waterval TSFs. However, based on the water balance for the Klipgat RWD (SRK, October 2013), water in the dam is obtained from the Paardekraal RWDs, Khomanani Shaft, Khuseleka Shaft, Rustenburg Sewage Works, rainfall on the dam and through runoff from the contributing catchment, including the Waterval TSFs. Since water quality of the various contributions is unknown, the specific influence of the Waterval TSFs cannot be concluded.

Klipfonteinspruit Catchment

Based on a review of the Clean Stream reporting, sampling points are located on the Klipfonteinspruit both upstream and downstream of the potential impacts associated with the Waterval TSFs reclamation and Waterval Retrofit.

Based on an assessment of the Clean Stream results for the Klipfonteinspruit upstream of the Waterval Retrofit concentrator, the following variables are elevated above the RWQOs:

- TDS, EC, total hardness, calcium, magnesium and chloride exceed the RWQOs in at least 95% of the samples tested.
- Sodium, sulphate, copper, nitrate and the SAR exceed the RWQO in at least 50% of the samples tested.
- pH, fluoride, manganese, nickel and phosphate exceed the RWQO in at least 5% of the samples tested.

Based on a comparison of the results, the following notable reductions in water quality within the sample downstream of the Project can be noted:

- Iron and ammonium increase to above the RWQOs in at least 5% of the samples.
- Nickel and phosphate increase to above the RWQOs in at least 50% of the samples.

There is the potential that this reduction in water quality is as a result of the activities that contribute runoff to the Klipfonteinspruit between these sampling points, including the influence of the Waterval TSFs and the Waterval Smelter. However, since water quality of the various contributions is unknown, the specific influence of these areas cannot be concluded at this stage.

Hoedspruit Catchment

The water quality of the Hoedspruit, downstream of the Hoedspruit RWD indicated that the water quality is impacted. The Clean Stream sampling indicated the following exceedances of the RWQOs at this sampling point:

- TDS, EC, total hardness, calcium, magnesium chloride and sulphate elevated above the RWQOs in at least 95% of the samples tested.
- SAR, manganese and copper elevated above the RWQOs in at least 50% of the samples tested.
- Nitrate elevated above the RWQOs in at least 5% of the samples tested.

The deterioration of the Hoedspruit is expected to be due to:

- Residual and background impacts;
- Seepage and spillage from the Hoedspruit RWD;
- Seepage from the Hoedspruit TSF;
- The WLTR bypass trench that directs water from the WLTR to the Hoedspruit;
- Brakspruit excess water channel (that receives water from the Siphumelele 2 Shaft and flows towards the Hoedspruit Tailings RWD; and
- Seepage from the Brakspruit Waste Rock Dump.

Paardekraalspruit Catchment

The water in the upper reaches of the Paardekraalspruit is impacted by the activities within the Siphumelele I Mine, located at the catchment headwaters. The sampling point within the watercourse downstream of this mine is extremely saline and extremely hard (primarily due to the calcium concentration). The Clean Stream sampling indicated the following exceedances of the RWQOs:

- TDS, EC, total hardness, calcium, chloride and copper elevated above the RWQOs in at least 95% of the samples tested;
- Nitrate, SAR and manganese are elevated above the RWQOs in at least 50% of the samples tested; and,
- Magnesium, sodium, sulphate, iron, nickel, phosphate and ammonium elevated above the RWQOs in at least 5% of the samples tested.

8.3.3.5 Groundwater Quality Assessment

Groundwater quality and depth monitoring has been conducted by Groundwater Complete between June 2010 and June 2011 for the Anglo Platinum's Rustenburg Section. The groundwater monitoring network incorporates the following (**Figure 61**):

- Waterval TSFs;
- Waterval Retrofit Concentrator;
- WLTR Plant; and
- Hoedspruit TSF and Pump Station.

As there are no monitoring wells along the **Option B** pipeline route, no groundwater results were available to be included in the assessment[6]. Limited impacts along the pipeline are likely, hence the lack of data is not considered critical.

The groundwater analytical suite includes the following as indicators of the specific type of contamination commonly identified at the mine area:

- TDS;
- Nitrate;
- Sulphate;
- Sodium;
- Chloride; and
- Iron.

As part of the Groundwater Complete reporting, analytical results were compared to the SANS 241:2005 guidelines for drinking water. Although these guidelines have since been superseded, and the groundwater is unlikely to be used as a drinking water resource, they serve as an indication of the relative significance of the measurements. These guidelines class water into the following ranges in terms of potability:

- Class I: Ideal range, representing the recommended operational limit; and
- Class II: Maximum permissible limit, representing the maximum allowable concentration for limited duration.

Waterval TSFs (West and East)

Based on the Groundwater Complete reporting, the Waterval TSFs straddle a north-west trending groundwater divide area and seepage from the tailings will be south and westwards to the Klipfonteinspruit and northwards to the Klipgatspruit. As a result no up gradient groundwater conditions can be measured. Significant groundwater pollution occurs in both the downstream directions of the TSFs with magnesium and sulphate/chloride being the dominant pollutants.

- Average TDS concentrations vary between 830 and 3,030mg/l within the wells tested. The average TDS concentrations in groundwater exceed the limits for drinking water by an order of magnitude.
- Nitrate concentrations are well within the standard ranges in both drainage directions with no significant concentration trends. Average nitrate concentration varies between 0.26 and 1.9mg/l.
- Average sulphate concentrations vary between 150 and 1,140mg/l and exceed the maximum permissible limits for domestic water quality.
- Average sodium concentrations vary between 85 and 430mg/l and exceed the standard and maximum permissible limits for domestic water in most of the boreholes.
- Chloride concentrations exceed the standard and maximum permissible limits for domestic water in all the boreholes except one.
- Iron concentrations in both drainage directions are well within the standard and recommended ranges for domestic use.

Waterval Retrofit Concentrator

The 2010/2011 monitoring has been performed at fifteen boreholes representative of the groundwater conditions with the potential to be impacted by the Waterval Retrofit Concentrator.

Based on the Groundwater Complete reporting, this concluded that significant groundwater pollution occurs in the downstream directions of both TSFs (i.e. towards the Klipgatspruit and Klipfonteinspruit) with magnesium, sulphate and chloride being the dominant pollutants.

[6] Option B is however in close proximity to the borehole monitoring network around Paardekraal and Klipgat RWD and some areas fall within the monitoring zone.

The elevations may be due, in part, to the influence of the Waterval TSFs and Waterval Smelter; however, given the potential influence of the surrounding land uses, the degree of impact cannot be definitively concluded.

WLTR Plant

During the 2010/2011 monitoring year a total of four monitoring boreholes were sampled at quarterly intervals.

- Groundwater TDS concentrations are within standard and recommended ranges with averages varying between 600 and 1,800mg/l. No distinction could be made between concentrations up-gradient and down-gradient of the plant.
- Both up-gradient and down-gradient groundwater nitrate concentrations are well within standard ranges for domestic use with no significant increasing or decreasing concentration trends observed for the monitoring year. Groundwater iron concentrations are within the limits for domestic use.
- Average groundwater sulphate concentrations measured in both the up-gradient and down-gradient monitoring boreholes are within recommended ranges for domestic use. Average concentrations vary between 110 and 450mg/l.
- Both up-gradient and down-gradient groundwater sodium concentrations are within standard ranges for domestic use with averages varying between 80 and 170mg/l.
- Overall groundwater chloride concentrations are within recommended ranges for domestic use with averages varying between 470 and 540mg/l.

Hoedspruit TSF and Pump Station

Monitoring was conducted by Groundwater Complete at three monitoring boreholes during the 2010/2011 monitoring year. Groundwater monitoring information indicates clear impacts from the tailings facilities.

- The average TDS concentration in the Hoedspruit Tailings area varies between 1,500 and 2,480mg/l. The TDS concentration in groundwater exceeded the maximum permissible limits for domestic water in all of the boreholes.
- The average sulphate concentration in the area varies between 295 and 1,250mg/l, with the average sulphate concentration exceeding the maximum permissible limits for drinking water at most boreholes.
- Sodium and nitrate concentrations are within the limits in groundwater from all three boreholes.
- The chloride concentration in groundwater from all the boreholes exceeded the limits for drinking water. The average chloride concentration varied between 350 and 540mg/l.

8.3.3.6 Hydrocensus

A desktop hydrocensus based on the DWA National Groundwater Archive, accessed in December 2012, identified no abstraction wells within a 2km radius of the Project. However, the groundwater study by SRK (2002) identified historical use of borehole water in the townships of KwaPhotsaneng and Thekwane located directly between the Waterval TSF and the WLTR Plant. However, based on the municipal water supply to these townships it is unlikely that groundwater is now used for potable purposes.

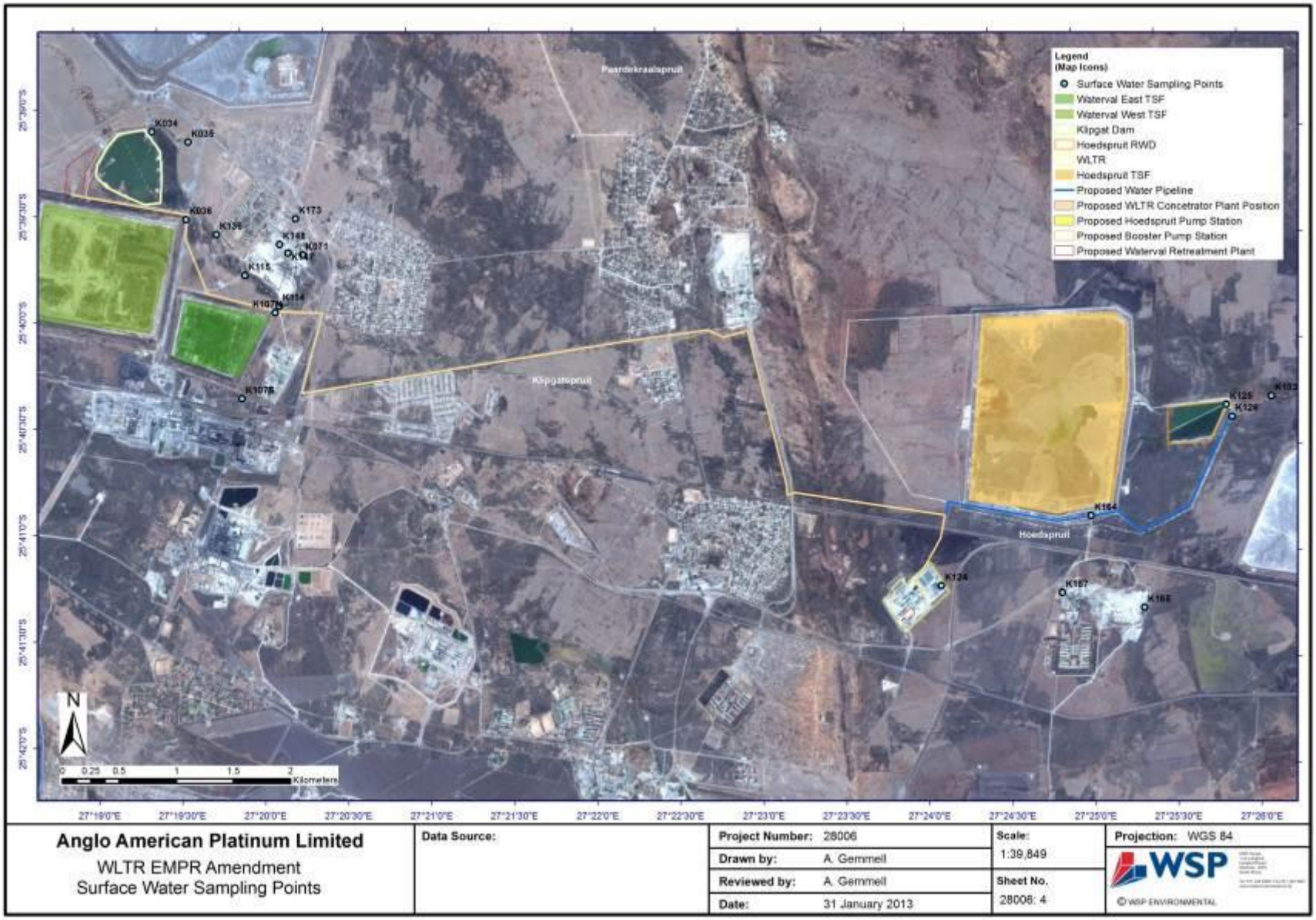


Figure 60: Surface Water Monitoring Network

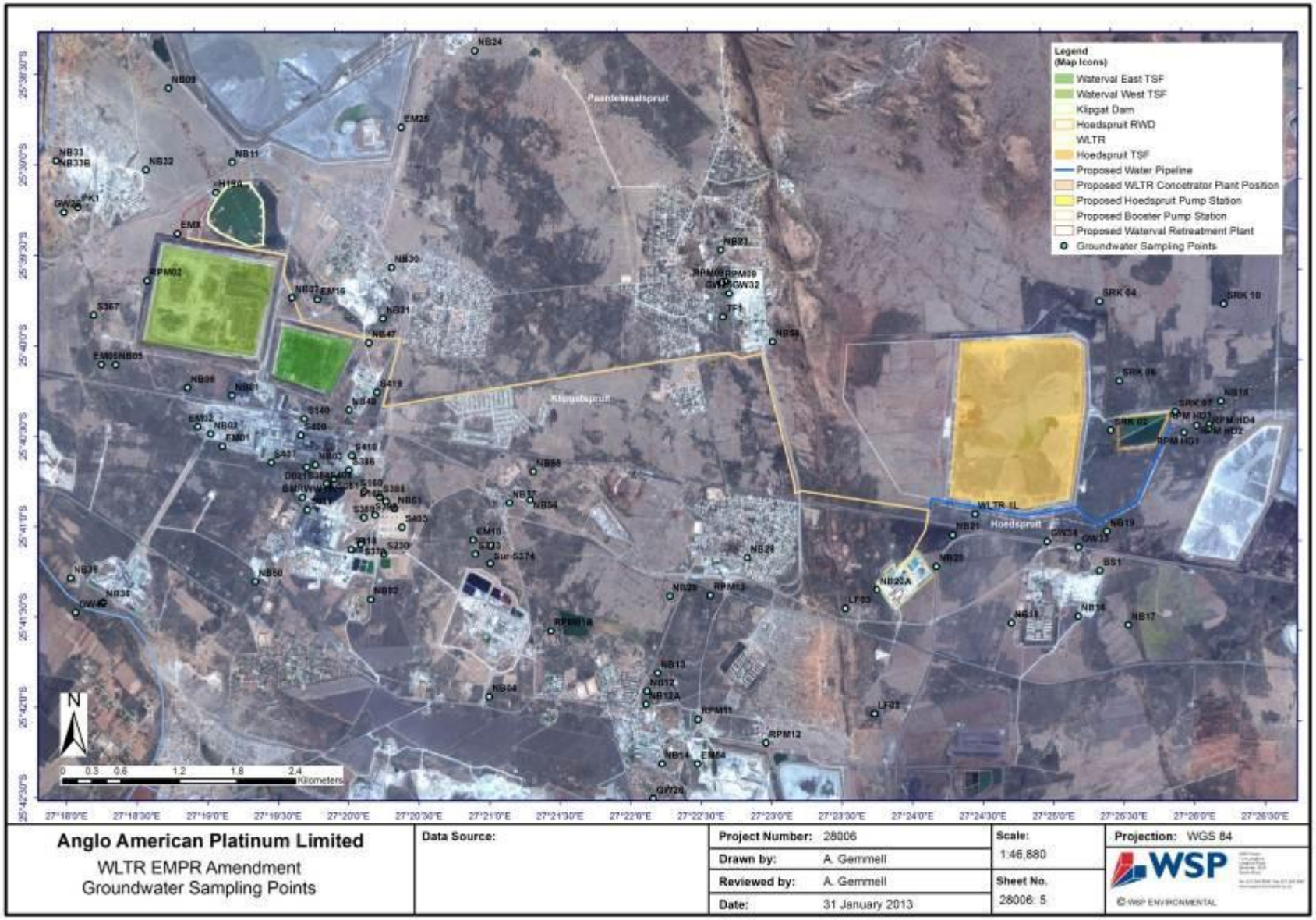


Figure 61: Groundwater Monitoring Network

Project number: 39354
Dated: 2013/10/22
Revised:

8.4 Heritage

The Heritage Impact Assessment (HIA) for the Project was undertaken by Dr. A.C. van Vollenhoven of Archaetnos cc. The full report has been included in **Appendix B**.

8.4.1 Methodology

The following methodology was utilised during the assessment:

8.4.1.1 Survey of literature

A review of literature was undertaken in order to obtain background information regarding the area.

8.4.1.2 Field survey

A field survey was conducted according to generally accepted HIA practices and was aimed at locating all possible objects, sites and features of cultural significance in the area in which the Project is proposed. Where required, the location / position of any objects, sites and features of cultural significance was determined by means of a Global Positioning System (GPS), while photographs were also taken where needed. The site survey was undertaken by means of an off-road vehicle and on foot. **Figure 62** indicates the GPS track of the surveyed area.

8.4.1.3 Oral histories

People from local communities are interviewed in order to obtain information relating to the surveyed area. However, it should be understood that this activity is not required under all circumstances as it only comes to the fore once a specific community is directly involved. When applicable, this information obtained is included in the report write-up and linked to the information sources.

8.4.1.4 Documentation

All sites, objects features and structures identified were documented according to the general minimum standards accepted by the archaeological profession.

8.4.1.5 Evaluation of Heritage sites

The evaluation of heritage sites is undertaken by applying a field rating to each using the following criteria:

- The unique nature of a site;
- The integrity of the archaeological deposit;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined or is known);
- The preservation condition of the site;
- Uniqueness of the site; and
- Potential to answer present research questions.

Figure 62: GPS track of the surveyed area[7]

8.4.2 Assumptions and Limitations

The following conditions and assumptions have a direct bearing on the HIA:

- Cultural Resources are all non-physical and physical man-made occurrences, as well as natural occurrences associated with human activity. These include all sites, structure and artefacts of importance, either individually or in groups, in the history, architecture and archaeology of human (cultural) development (including graves and cemeteries);
- The significance of the sites, structures and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the evaluation of any site is undertaken with reference to any number of these aspects;
- Cultural significance is site-specific and relates to the content and context of the site. Sites regarded as having low cultural significance have already been recorded in full and require no further mitigation. Sites with medium cultural significance may or may not require mitigation depending on other factors such as the significance of impact on the site. Sites with a high cultural significance require further mitigation;
- The latitude and longitude of any archaeological or historical site or feature, is to be treated as sensitive information by the developer and should not be disclosed to members of the public;
- All recommendations are made with full cognisance of the relevant legislation; and
- It should be noted that it is almost impossible to locate all the cultural resources in a given area during a single project specific survey. Developers should however, be aware of the fact that this report outlines how to handle any finds which may take place after the commissioning of the site.

8.4.3 Findings

8.4.3.1 Option A: Re-mining at the Waterval Retrofit Concentrator

The natural environment along this route has been entirely disturbed by mining infrastructure, including existing roads and pipelines. No cultural heritage resources were identified and the chances of finding such sites are reasonable small. No cultural heritage impacts are anticipated for both the pipeline and pump station. It should

[7] Large parts of the surveyed areas include existing infrastructure at the mine, which therefore needed no intensive survey.

be noted that although unlikely, activities on site (in all phases) may impact unknown archaeological material contained under the surface of the soil or vegetation.

8.4.3.2 Option B: Re-mining at the WLTR Plant

The environment this option has also been disturbed to a great extent. One cultural heritage resource was identified, but since this is located more than 20m from the pipeline route, no direct impact is expected. An indirect or secondary impact may however be expected.

The cultural heritage resource identified is a graveyard consisting of a large number of recent graves meaning they are all younger than 60 years (**Figure 63** and **Figure 64**). The grave yard is still in use and is fenced in with a concrete fence. Graves are always given a rating of **high** cultural significance due to it being a sensitive matter. Graves with an unknown date are always handled as if older than 60 years. Graves older than 60 years are regarded as heritage graves. The graves receive a field rating of Local grade III B.

Figure 63: Graves identified along Option B

Figure 64: Location of the site identified along the pipeline route

Usually there are two options when dealing with graves. The first option is to leave the graves *in situ*. This would be possible should there be no direct impact on the graves. However, there always is a secondary impact as descendants may find it difficult to visit the site once mining has commenced. In principle, it means that sites should be fenced and a management plan should be written for the preservation and maintenance thereof.

The management plan would detail aspects such as the fence and site management and maintenance. In addition, the plan would provide details on how to grant access to descendants. The fence and site will need to be managed and maintained. The management plan includes *inter alia* arrangements for security and safety measures. Other measures would include the preservation and maintenance of the site where aspects such as cleaning and upkeep will be dealt with. Such a plan should be written and then monitored annually by an independent heritage specialist. The plan will have to be approved by the Burial Grounds and Graves Unit (BGG) of the SAHRA. SAHRA has specific guidelines for management plans and these will have to be followed.

The second option is to exhume the graves and have the bodies reburied. This usually is only allowed if there is a direct impact on the site. Such a process has to be motivated to SAHRA and permits needs to be applied for. It is a lengthy process and includes social consultation in accordance with legislation in order to obtain permission from descendants or at least proof that a concerted effort has been made to do such consultation.

Graves younger than 60 years are handled by a registered undertaker. Graves older than 60 years and those of an unknown date is regarded as heritage graves. In such a case an archaeologist is also involved in the process. In this case there will be no direct impact as the site is more than 20m from the development. Therefore Option 1 is recommended. However, since the site is already fenced in it would only be necessary to draft a management plan.

The main cultural heritage impact identified for the pipeline along this option is the possible indirect impact on the grave site due to the dumping of construction material or the dust created by activities. No cultural heritage impacts are anticipated for the pre-treatment station, PCD and booster station. It should be noted that although unlikely, activities on site (in all phases) may impact unknown archaeological material contained under the surface of the soil or vegetation.

8.4.4 Conclusions and Recommendations

Although only one site of cultural importance was identified during the survey, there will be no specific impacts resultant of the Project. The site will however be impacted on indirectly and this needs to be mitigated. The following is recommended:

- It is the opinion of the heritage specialist that the Project may continue;
- From a cultural historical perspective, **Option A** would be the best option, since no sites of cultural heritage importance were identified here;
- Although one site of cultural heritage significance (a grave yard along the pipeline route) was identified at **Option B**, it would be possible to use this option as the impact on the grave site will only be secondary and could be mitigated easily;
- Should **Option B** be chosen, the fence around the grave yard should be secured and a management plan for the preservation of the site be written by a heritage expert;
- Contractors should be inducted to understand how to deal with this site; and
- It should be noted that the subterranean presence of archaeological and/or historical sites, features or artefacts is always a possibility. Care should be taken when development commences that if any of the mentioned are discovered, a qualified archaeologist be called in to investigate the occurrence.

8.5 Traffic

The Traffic Impact Assessment (TIA) for the Project was undertaken by WSP Civil and Structural Engineers (Pty) Ltd. The full report has been included in **Appendix B**.

8.5.1 Methodology

The assessment methodology entailed the baseline assessment, traffic impact assessment and recommendation on mitigation measures. The potential traffic impact associated with the Project was evaluated considering the two project options (**A** and **B**). The steps followed are illustrated in **Figure 65**.

8.5.1.1 Baseline Assessment:

The baseline assessment was done considering both re-mining options. The baseline assessment included the following:

- Identification of transport requirements for both options, during the construction and operation phases of the Project.
- Identification of the affected road network due to the construction activities and operation activities of the Project.
- Status quo investigation of the existing road network (existing traffic volumes and existing road geometric characteristics).
- Investigation of transport requirements for the Project during the construction and operational phases.

A traffic survey was carried out on 15 January 2013, as part of the data collection process. The baseline investigation further includes the identification of the assessment variables given the envisaged traffic impacts.

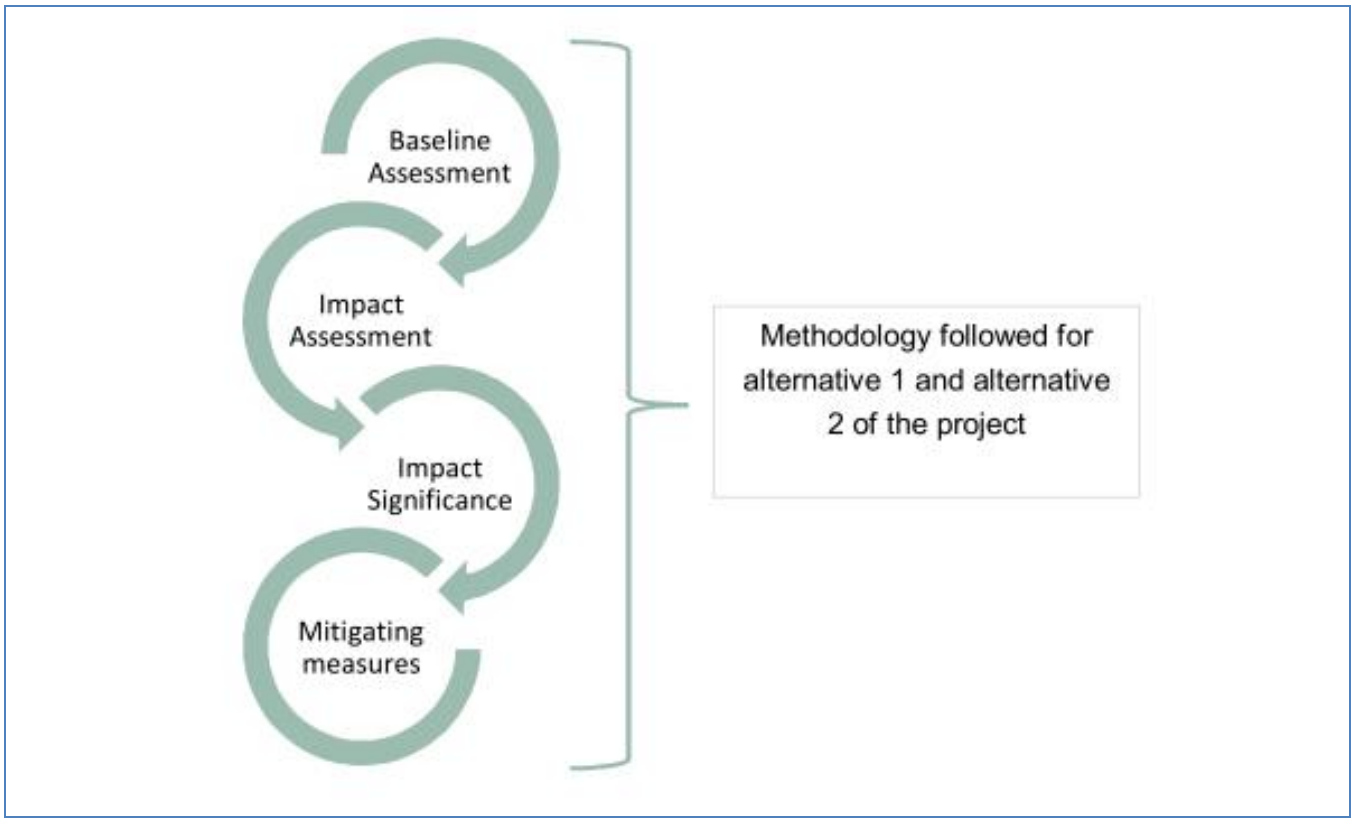


Figure 65: Traffic Impact Assessment Methodology

8.5.1.2 Impact Assessment

Following the baseline assessment phase, a detailed traffic impact assessment was conducted for both project options. The impact assessment entailed the evaluation of the future traffic demand as well as the assessment of road safety aspects related to the construction and operation phases of the project. The expected additional trips on the road network were determined based on the transport requirements during the construction phase and operational phases of the project, considering both design options. The impact on the affected transport network was quantified based on intersection and roadway performances, as well as the transport network capacities. Considering that tailings will be transported by pipelines, a general assessment was also done for the points where the pipeline crosses the road infrastructure.

8.5.1.3 Impact significance

The significance of the impact was then quantified by rating each variable numerically according to a criteria provided by RPM. The purpose of the rating was to develop a clear understanding of influences and processes associated with each impact.

8.5.1.4 Mitigating measures

Mitigating measures were proposed to reduce the traffic impact identified in the traffic assessment stage. These mitigating measures included road / intersection upgrades and road safety measures which should be considered for implementation.

8.5.2 Assumptions and Limitations

The expected trip generation during the AM and PM Peak hour was determined based on a number of assumptions as outlined in **Table 22** and **Table 23**, for **Option A** and **Option B** respectively.

Table 22: Option A - Trip Generation Assumptions

Parameter	Trip Generation Assumptions
During the Construction Period	
Number of people per day	25
Number of people during the peak hour	20
Public transport vehicle occupancy	16 people per minibus
Number of mini-bus required	2
Directional split	80:20
Traffic growth rate	2.5%
During the Operational Period	
Maintenance vehicles required	5 light duty vehicles (LDV)
Trip generation rate for offices	2.3 vehicles/100m^2

Table 23: Option B - Trip Generation Assumptions

Parameter	Trip Generation Assumptions
Construction and operations requirements	Requirements of the following disciplines: ■ Earthworks, Civil works, Structural Steel Work, Mechanical, Piping, Electrical, Instrumentation, Import of Fill Material for earthworks Requirements of Commuters: ■ Personnel Light Vehicles and busses
Monthly and daily trip generation	As per the flows projected by the project developer.
Hourly trip generation	Daily to hourly conversion rate: 1.0* *It should be noted that the typical rate is of 0.09; however, the conversion rate of 1.0 is a conservative approach.
Traffic growth rate	2.5%
Directional split (IN and OUT of the accesses)	75:25
Heavy vehicle : light vehicle split	30:70

8.5.3 Findings

8.5.3.1 Expected Trip Generation

8.5.3.1.1 Option A: Re-mining at the Waterval Retrofit Concentrator

A total of 16 trips are expected to be generated during the AM and PM peak hours while the Project is under construction. With the start of the operational phase, it is anticipated that approximately 33 and 30 vehicles trips will be generated during the AM and PM peak hours respectively. Only the most critical scenario, the operational period, was evaluated for this option.

8.5.3.1.2 Option B: Re-mining at the WLTR Plant

It is expected that a total of approximately 50 vehicles will be generated during the AM and PM peak hours in 2015 when the construction and operational phases overlap. Once the construction phase ends it is anticipated that the trip generation will decrease to approximately 35 vehicles during the peak hours.

8.5.3.2 Future Traffic Flows

8.5.3.2.1 Option A: Re-mining at the Waterval Retrofit Concentrator

Currently the intersections within the influence area operate at acceptable level of service (LOS). With relatively low traffic volumes expected in 2015, the capacity analysis shows that the v/c ratio will still be well below the maximum acceptable thresholds of 0.95 during the operational phase of the project. Therefore, no road upgrades are required if option is selected.

8.5.3.2.2 Option B: Re-mining at the WLTR Plant

For this option, it was found that the volume/capacity (v/c) ratio will be well below the maximum acceptable thresholds of 0.95 during the construction and operational phases of the project. The existing road network can accommodate the traffic demand resulting from the Project. No additional road upgrades are required.

8.5.3.3 Road Safety Assessment

The road safety aspect of the surrounding environment was assessed based on visual inspection of the road expected to be impacted by the Project. The proposed accesses to the different project component are adequately spaced in relation to existing intersections.

Sufficient stopping sight distance is available from the proposed access intersections. The minimum sight distance on a roadway should be sufficient to enable a vehicle travelling at the design speed on a wet pavement to stop before reaching a stationary object in its path. The stopping sight distance is the sum of two distances: the distance traversed by the vehicle from the instant the breaks are applied and the distance required to stop the vehicle from the instant the breaks are applied. The recommended stopping sight distance for the design speed of 120km/h is 270m according to the Geometric Design Guidelines (SANRAL, 2008).

Maintenance of the public road's shoulder lanes (in the vicinity of the proposed access to the project components) is regarded as a critical road safety aspect. The shoulder lanes are currently maintained, however, the lanes require continuous attention in future.

In terms of the vertical and horizontal alignment, no critical sight distance obstructions were detected. The terrain is fairly flat and the road alignment does not impose any hazardous locations along the public roads which provide access to the project components, for both project options.

Pedestrian safety within the study area can be improved by enforcing speed limits and by maintaining exiting measures for instance that of not allowing heavy vehicles on the road after sunset or before sun rise.

8.5.3.4 Pipeline Road Crossings

For **Option A** the pipeline does not cross a public road. For **Option B**, the pipeline network crosses the road network at eight locations. The road crossing does not impose any hazard to the road user. The crossings are done at grade as well as grade separated (with sufficient height distance for heavy vehicles). Guardrails have been installed (to protect the pipe in the event of an accident) at positions where the pipeline is exposed, within the shoulder lane. It be noted that the new pipelines proposed for **Option B** are already following the existing overland pipeline routes at all crossings.

8.5.3.5 Public Transport Provision

There is an existing informal taxi rank which serves the community around the area (in the vicinity of the pre-treatment station). At this stage it is unclear the number of destinations served by this informal taxi rank, however, it was found that this informal taxi rank has sufficient capacity to accommodate the future public transport demand. Furthermore, the informal taxi rank is located relatively close to the project components, for **Option A** and **Option B**. A dedicated public transport service will most likely be implemented for the project. It is still uncertain, whether the dedicated public transport service will run from the existing informal taxi rank.

8.5.3.6 Traffic Impact Ratings

For both options, the potential traffic impact associated with the transportation requirements of the project i.e. transportation of people, materials and goods, were identified as follows:

- Intersection capacity considering future traffic flows i.e. congestion levels;

- Road safety taking into account the interaction between vehicles (light and heavy) and pedestrians; and
- Intersection of the pipeline network with the road network i.e. hazardous locations.

8.5.4 Conclusions and Recommendations

The following key conclusions and recommendations are relevant:

- For **Option A**, the operational period was considered more critical than the construction period in terms of the additional traffic demand. It is anticipated that approximately 33 and 30 vehicles trips will be generated during the AM and PM peak hours respectively
- If **Option B** is considered for implementation, the highest peak in traffic demand will most likely occurred in 2015 when the construction and operational periods of the project overlap. It is estimated that approximately 50 vehicles will be generated during the AM and PM peak hours
- The potential traffic impacts associated with the transportation requirements considering both project options were identified as follows:
  - The intersection's capacity to sustain increased congestion levels (increased traffic demand);
  - Road safety on the affected road network; and
  - Hazardous locations where the pipeline network intersects with the road network.
- The capacity analysis results for both project options show that the intersections under investigation as well as the affected external road link are expected to operate at acceptable LOS provided that the following mitigating measure is implemented:
  - The accesses to the project components should be controlled by stop signs on the side.
- From the subjective road safety assessment it was found the following mitigating measure should be implemented:
  - Continuous maintenance of the shoulder lanes.

Given the recommended mitigating measures, the traffic impact of the Project on the external transport network is expected to be of low significance. It is therefore recommended that the Project be supported from a traffic engineering perspective.

8.6 Socio-economic

The Social Impact Assessment (SIA) for the Project was undertaken by Danielle Michelle of WSP Environmental (Pty) Ltd. The full report has been included in **Appendix B**.

8.6.1 Methodology

WSP have undertaken an SIA investigation in order to identify and assess the socio-economic impacts associated with the Project. A description of the SIA methodology is provided below:

8.6.1.1 Development of a Social Profile

In order to develop a social profile of the Project area, WSP undertook a desktop review of existing information on the Rustenburg / Waterval area. The review included consideration of various documents (refer to study report contained within **Appendix B**).

8.6.1.2 Data Collection

Primary data collection is deemed necessary to contribute to the evaluation of the potential impacts of the Project. Primary data was collected through a process of interviews with key local stakeholders so as to determine the magnitude and extent of the socio-economic impact at a local level. The aim was to obtain data which will assist with the identification and description of the key socio-economic issues and impacts associated with the Project.

WSP developed a range of formal, open-ended questionnaires which were implemented through an interview process with the representatives of local organisations, authorities, and communities and other key stakeholders. All interviews and discussions were documented and kept on record for assessment and identification of the key socio-economic issues.

The questionnaires developed were aimed at determining site-specific information including relationships between organisations and the community, and establishing the management protocols and engagements followed. These questionnaires can be found in the main study report.

The SIA specialist attended the public meeting (scoping phase) and meetings with community leadership (ward councillors, traditional authorities and community representatives) to gain insight into the issues and concerns of the local communities.

8.6.1.3 Data Analysis

The socio-economic issues were analysed by reviewing the information collected through the primary data collection and desktop phases. The issues were considered in two streams. The first of these was the potential negative issues associated with the Project and associated infrastructure. The second was to look at the potential positive issues associated with the Project.

8.6.2 Assumptions and Limitations

The following limitations to the SIA study are identified within the context of the EIA process:

- There was limited direct access to local communities so as to not raise community expectations, as well as due to the social unrest experienced in the area over the past year, and the resulting sensitivity of local communities. Community leadership was consulted to provide local knowledge and issues of concern.
- No noise or light studies were conducted, preventing potential impacts of noise emissions to be determined, and therefore the SIA made certain assumptions related to the potential for noise and light impacts on the local communities, assuming low risk.
- Legacy issues were raised at all leadership and public meetings often prevent/limited project-specific discussions. Coupled with this is the apparent distrust of AAP operations by local communities, this appears to be an obstacle to any community engagement.
- It is assumed that staff from the WLTR Plant will be relocated to the Waterval Retrofit Concentrator following the closure of the Klipfontein TSF, and as such no jobs will be lost or gained in the process.

8.6.3 Findings

8.6.3.1 Area of Influence

The SIA study area is defined as the area over which the Project is likely to have influence. This area is therefore limited to a 10km radius of the site[8]. As indicated in **Figure 66** and **Figure 67**, the key areas encompassed within the study area therefore include:

- *Communities*:- Bokamoso; Thekwane, Mfidikwe, Photsaneng, Zakhele, Nkaneng, Boitekong, Waterkloof, Kroondal, Chachalaza, Marikana, Kanana, Hermansburg.
- *Towns*:- Rustenburg

An assessment of the site and surrounding areas has indicated that there are potentially a number of communities that may be affected by the Project.

Figure 66 provides an indication of the communities that may be indirectly affected by the development within a 5km of the broader project site (including both options).

Table 24 provides an overview of the potentially affected communities within the 5km radius of the preferred site only, which is indicated in **Figure 67**. These communities comprise predominantly formal and informal, low-

[8] The area of influence has been limited to 10km of the site, as although there are likely to be positive benefits on a national scale (economic, employment, etc.); the immediate area of impact is limited to the communities likely to benefit from the project.

income housing with limited services and reliance on mining activities for employment, with the exception of Rustenburg. Only these communities are detailed within this report, although all communities shown within **Figure 67** were investigated.

Table 24: Potentially affected communities within 5km of the Project

Community	Distance From Option A	Distance From Option B	Preliminary Characterisation*
Mfidikwe	0.2km	0.7km	Formal residential, rural Traditional (RBN)
Entabeni	0.8km	0.8km	Large mixed formal and informal housing, managed by Local Municipality (township)
Bokamoso	<0.1km	2km	Low-cost Housing, managed by LM (township)
Boitekong	0.8km	2.3km	Large mixed formal and informal housing, managed by Local Municipality (township)
Thekwane	<0.1km	4.4m	Low-density, rural Traditional (RBN)
Waterkloof	3.6km	3.3km	Mixed formal and informal residential
Rustenburg	4.5km	3.6km	Minor city consisting of a number of large formal residential areas and moderately sized central business district. Centre of Local Municipality.

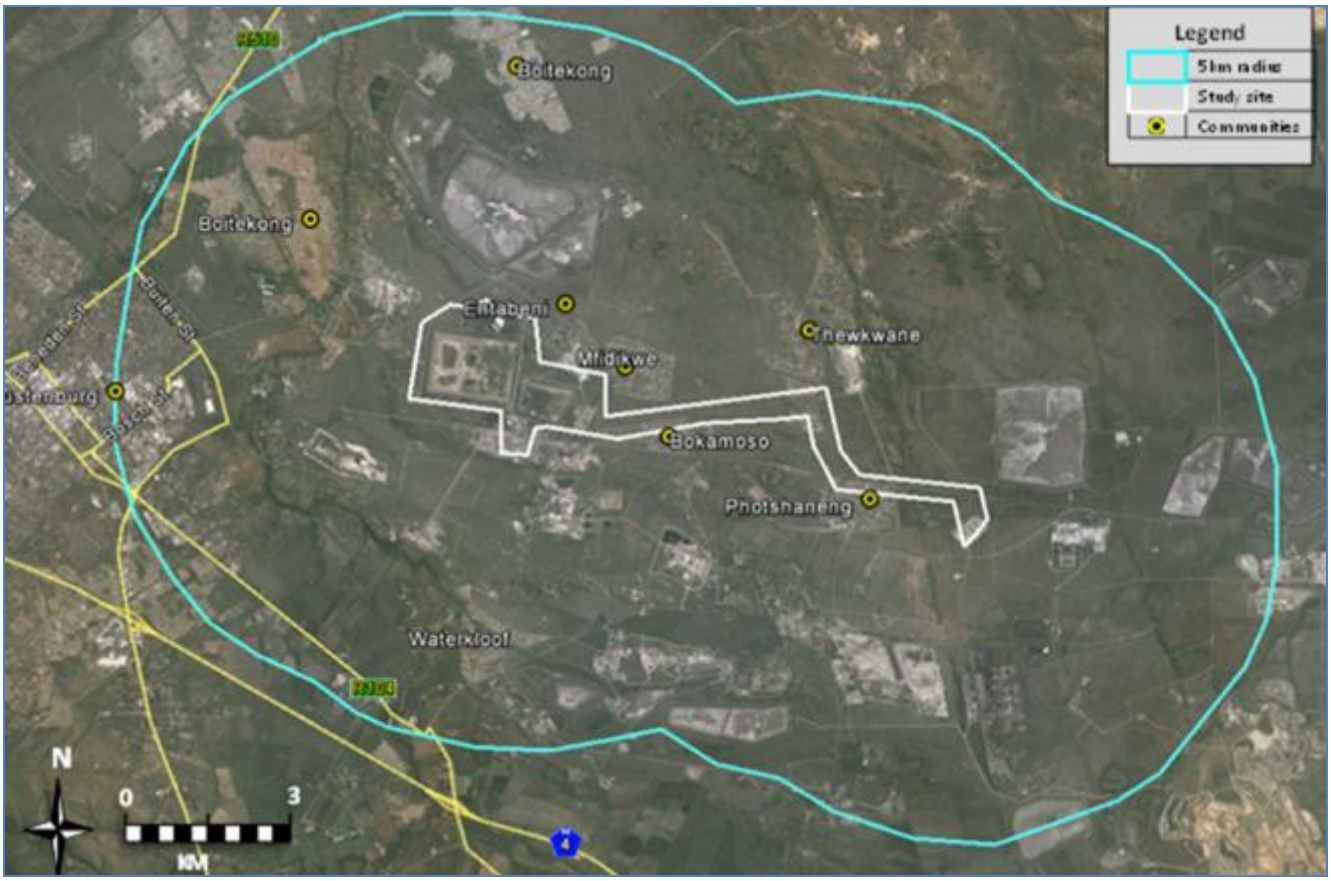


Figure 66: Communities within 5km of Option B (Adapted from Google Earth, 2012, imagery 01/25/2013)

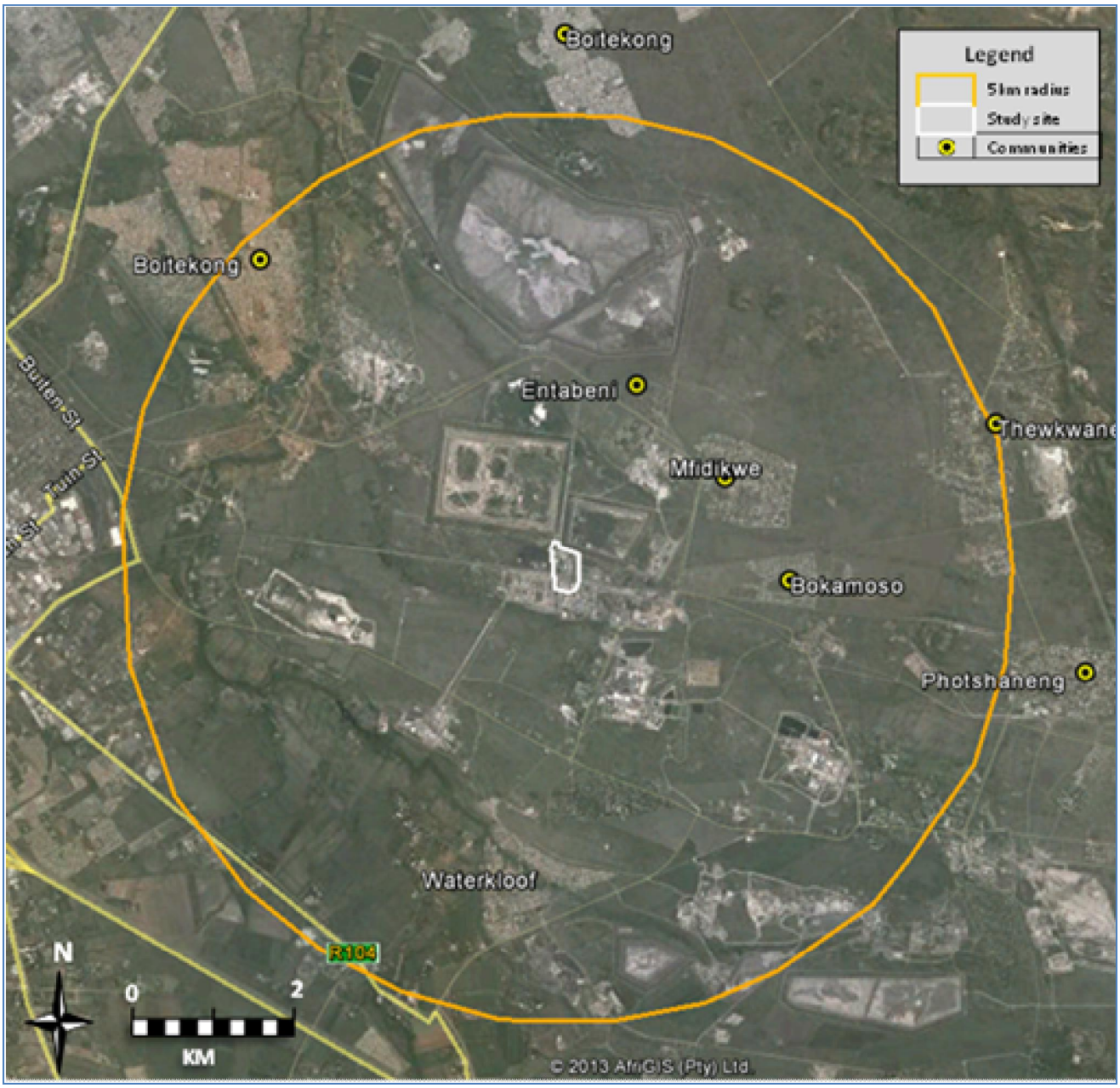


Figure 67: Communities within 5km of Option A (Adapted from Google Earth, 2012, imagery 01/25/2013)

8.6.3.2 RPM Community Engagement Structures

RPM has developed a series of communication, management and operational procedures which provide support to the organisation with regards to communicating with local communities and promoting sustainable socio-economic development. These seek to develop productive and positive relationships with stakeholders and communities neighbouring, and potentially affected by, the RPM operations. These tools will be used for the Project to further develop the relationship between RPM and the local communities. It will also form part of the management and mitigation toolkit for the Project in terms of managing socio-economic impacts.

Figure 68 provides an overview of RPM's socio-economic management structures, plans and programmes, and their interrelationship with each other as well as the external (governmental) structures:

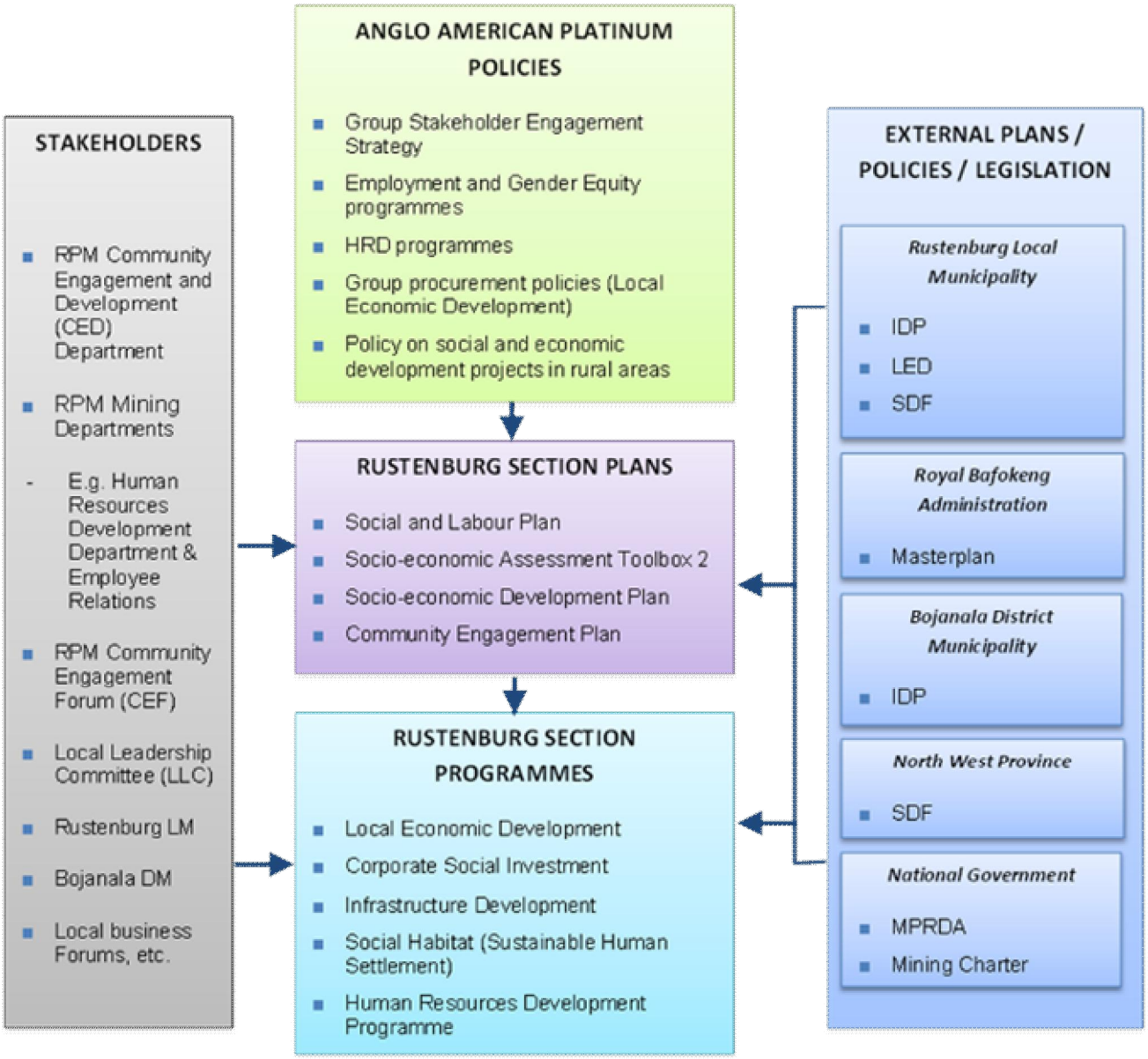


Figure 68: Schematic representation of the socio-economic structures within RPM

Refer to the SIA study report contained within **Appendix B** for further detail regarding the socio-economic structures within RPM.

8.6.3.3 Potential Socio-Economic Impacts

It is anticipated that both the **Option A** and the **Option B** have the potential to have an impact on the socio-economic landscape of the Project site, surrounding communities, and the socio-economic environment has the potential to impact on the Project.

The following section discusses the potential impacts of both options.

8.6.3.3.1 Option A: Re-mining at the Waterval Retrofit Concentrator

Construction Phase

- Employment Opportunities

The degree to which labour opportunities impact on the local communities and associated downstream economic impacts provide local stimulus to the economy is based on, among other things:

- The number of construction workers recruited locally; and

- The timeframe of the construction phase.

Employment associated with the construction phase of the Project is limited to a period of five months. It has been indicated that the highest peak of employment during the construction phase is likely to be approximately 50 jobs (with numbers varying throughout the construction process). During the tender process, the prospective contractors will be required to illustrate that local employment has been maximised, preferably with the likely percentage of local labour needed. Employment will be undertaken through the existing structures as arranged with the RPM Community Engagement and Development department.

This option is likely to provide a very limited number of job opportunities to the local communities, as there are limited skills available at the local level and a limited number of jobs available. Labour is likely, therefore, to be sourced from outside Rustenburg and the North West Province. In addition, a large number of these jobs are likely to be sourced through contractors.

Based on current percentage of local communities employed within RPM operations, it is only likely that up to 10% of the labour force required for the construction phase will be sourced from the immediately surrounding communities (determined through current labour statistics in the Social and Labour Plan (SLP)). This is also dependent on the availability of skills within these communities. This could mean up to five people from the immediate communities may be employed during the construction phase.

- Expansion of local skills

The availability of skills required for the Project within the local area (especially within the local historically disadvantaged communities) is likely to be low. Skills development associated with the construction phase of the Project is likely to be limited, due to the relatively small number of local employment opportunities, the lack of skills development programmes in place, and the short construction phase. Potential benefits may however be experienced outside of the area, should labour be brought into the area for the purposes of the Project.

- Local Procurement Opportunities

The degree to which downstream economic impacts provide local stimulus to the economy is based on the degree to which value added services can be locally sourced. Currently, it is the opinion of the local community that there is insufficient local procurement. The size of the Project is not significant when compared to the size of underground mining (operational) activities. There may, however, be opportunities for local procurement of services.

- Dust intrusion

The construction phase is likely to create dust through the movement of machinery on unpaved roads and the use of materials, such as chipped stone, which could result in emissions during construction of the pipeline and other operational areas. There is the potential for the communities within a few kilometres of the construction sites to be impacted by the dust generated during the construction phase (refer to **Section 8.1** above).

- Influx of people

Mining-related projects generally result in an influx of work seekers and labourers from outside an area to the area/s surrounding the Project. This could result in a number of impacts including:

- Change in sense of place;
- Increased pressure on facilities and utilities;
- Expansion of informal settlements; and
- Pressure on local resources.

There is the potential for the local population to be affected by an influx of outsiders should the Project be perceived as a potential source of employment. As there are only 50 potential employment opportunities during the construction phase, and the site is within the confines of RPM's operations (i.e. not within public domain), it is unlikely to occur.

<u>Operational Phase</u>

- Economic Development Opportunities

As a result of employment, skills and procurement opportunities, there may be a secondary impact of local economic development. In addition, there may be regional economic impacts in terms of employment and investment.

The degree to which labour and procurement opportunities and associated downstream economic impacts provide local stimulus to the economy is based on, among other things the following:

- The degree to which value added services can be locally sourced; and
- The existence of sufficient accommodation and related facilities for additional people moving into the area.

Closure Phase

At the point of closure of the Waterval Retrofit E-Feed Project, it is proposed that the following impacts are likely to occur:

- Future land use

Once the East and West TSFs have been completely reclaimed, the re-mined tailings will be placed on the Paardekraal TSF. This will leave the East and West TSF footprints vacant. RPM are currently investigating alternative uses for the land. The East and West TSFs are situated upon RPM land. There is the potential for the following positive benefits to result:

- Opportunity for communities to have access to natural resources (although under RPM so may be limited);
- Reduced potential for environmental pollution from stormwater run-off and dust emissions; and
- Increased value of land (inside the urban edge).

- Refer to **Section 13** below regarding the closure and rehabilitation of the Project footprint.

8.6.3.3.2 Option B: Re-mining at the WLTR Plant

Construction Phase

- Employment Opportunities

It is likely that this option will provide a limited number of job opportunities to the local communities, as there are limited skills available at the local level. A large number of these jobs are likely to be sourced through contractors.

It has been indicated that the highest peak of employment during the construction phase is likely to be approximately 550 jobs (with numbers varying throughout the construction process). During the tender process, the prospective contractors will be required to illustrate that local employment has been maximised. Employment will be undertaken through the existing structures as arranged with the RPM operations. This could mean up to 50 people from the immediate communities may be employed during the construction phase (refer to Section 6.1.1 (I). of the SIA for rationale).

- Expansion of local skills

The availability of skills required for the Project within the local area (especially within the local historically disadvantaged communities) is likely to be low. Skills development associated with the construction phase of the Project is likely to be limited, due to the relatively small number of local employment opportunities, the lack of skills development programmes in place, and the short construction phase. Potential benefits may however be experienced outside of the area, should labour be brought into the area for the purposes of the Project.

- Local Procurement Opportunities

The degree to which downstream economic impacts provide local stimulus to the economy is based on the degree to which value added services can be locally sourced. Currently, it is the opinion of the local community that there is insufficient local procurement. The size of the Project is not significant when compared to the size of underground mining (operational) activities. There may, however, be opportunities for local procurement of services.

- Noise intrusion

There are a number of communities within close proximity (<1km) from the Project site (areas of operation and pipelines). These include: Zakhele, Mfidikwe, Bokamoso, Thekwane and Photsaneng. These communities may be exposed to noise generated from the construction phase.

Activities that could generate noise could include: assembling of pipeline (machinery such as cranes, joining, welding, etc.), as well as general construction vehicles and labour on site.

The EIA did not incorporate a noise impact assessment, and therefore it is assumed that the overall potential noise impacts of the construction phase are considered to be of no or minor impact to the local communities.

Any potential noise impacts during construction are likely to affect the Bokamoso community directly, as the pipeline runs immediately adjacent to the community (within 5m).

- Dust intrusion

The construction phase is likely to create dust through the movement of machinery on unpaved roads and the use of materials, such as chipped stone, which could result in emissions during construction of the pipeline and other operational areas. There is the potential for the communities within 1km of the construction sites to be impacted by the dust generated during the construction phase.

An AQIA has been undertaken for the EIA. The findings were as follows:

- Highest PM_{10} concentrations are associated with the construction phase of the Project, with highest concentrations predicted in the area of the pre-treatment plant, clear and grub activities at the East and West TSFs and the unpaved access road to the Hoedspruit booster station.
- In terms of the cumulative impact of the construction phase, that is the contribution from the Project to the existing PM_{10} situation, it should be noted that no exceedences of PM_{10} standards are predicted during the construction phase, although PM_{10} concentrations associated with the construction activities are being contributed to already high PM_{10} levels, which are in exceedence of the annual standard.

- Restriction of Access to Resources

The local communities access a variety of natural (e.g. domestic fire wood, subsistence grazing land) and social resources (schools, clinics, grave yards, and other communities within asocial networks) in the area. The above-ground pipeline site is traversed by roads (formal and informal) and footpaths, which are used by the communities to access these resources.

The construction phase may have an impact on the level of access of the local communities to these resources, due to interference with local footpaths and roads.

- Safety Risks of Construction Activities

The risk to exposure to injury, theft and other negative impacts during construction phase to the public includes impacts on pedestrians, grazing cattle and people commuting on foot near the pipeline, due to presence of heavy machinery and construction vehicles on the site.

- Security Risks of Construction Activities

The security risk during construction phase to the public includes the risk to local residents and people commuting on foot near the construction site (specifically the Bokamoso, Mfidikwe and Thekwane communities) due to the presence of labour working in close proximity to these communities. Labour on sites, although unlikely to be a direct threat to communities, have the potential to disrupt local communities (especially if they are from outside the area and are not managed effectively). The presence of construction activities often lead to an increase in crime (such as theft) in nearby communities.

In addition, the accommodation of outside workers, either within local communities or separately (it is not known at this stage if accommodation will be necessary) could disrupt communities.

- Influx of people

Mining-related projects generally result in an influx of work seekers and labourers from outside an area to the area/s surrounding the project. This could result in a number of impacts including:

- Change in sense of place;
- Increased pressure on facilities and utilities;
- Expansion of informal settlements; and
- Pressure on local resources.

There is the potential for the local population to be affected by an influx of outsiders should the project be perceived as a potential source of employment. As there are up to 550 employment opportunities during the construction phase and the site is located within a mining area (with the possibility of further opportunities), this is a possibility.

The Rustenburg area is a centre for numerous mining activities regionally and nationally, thus attracting numerous migrant labourers and job-seekers into the Rustenburg area from other areas of South Africa, and surrounds. In general, the population of the Rustenburg area is increasing due to the in-migration of people to the area in search of job opportunities (over the past six years).

Operational Phase

- Employment Opportunities and Skills Development

The continued operation of the WLTR Plant will retain up to 75 jobs within the facility. In addition, the overall operational phase is to employ 29 new people to fulfil the operational needs for the transitional phase between the handover from the Klipfontein to the Waterval reclamation. The opportunities to local communities may be limited to approximately 15 labourer positions (note: this is only an indicative figure). The operational phase is likely to extend for 16 years, which will maintain existing positions at the WLTR Plant and provide jobs for new employees for the 16 years of the operational phase. This time frame could also provide an opportunity for skills transfer and development within the local communities.

RPM have agreed to source labour locally prior to sourcing from the Rustenburg area and other outlying areas. However, it is unknown at this stage if the skilled labour is available locally due to poor databases and statistics on available local skills.

- Economic Development Opportunities

As a result of employment, skills and procurement opportunities, there may be a secondary impact of local economic development. In addition, there may be regional economic impacts in terms of employment and investment.

The degree to which labour and procurement opportunities and associated downstream economic impacts provide local stimulus to the economy is based on, among other things the following:

- The degree to which value added services can be locally sourced; and
- The existence of sufficient accommodation and related facilities for additional people moving into the area.

- Impact on Access to Resources and Livelihoods

Communities access various resources via means of informal footpaths and roads that cross over the existing pipeline and proposed pipeline route. These resources include – grazing land, wood and other natural resources, and access to community and social resources such as schools and clinics.

The operational phase of the Project could impact on the accessibility to grazing land, and therefore could have a negative impact on the livelihoods of certain local communities. The pipeline also has the potential to prevent communities accessing natural and social resources, should footpaths be cut off or the pipeline form a physical barrier, thereby impacting on the livelihoods of the local communities. It should also be noted that during stakeholder engagement, community leadership expressed that this was not likely to be an issue, due to the presence of the existing air pipeline along the majority of the route. Sensitivity to the local issues has however, been shown in the form of management and mitigation strategies which have been included in Section 11 below.

The SIA study did not show a significant reliance on the Project site for intensive grazing. The use of the land for the pipeline is unlikely to have a significant impact on local grazing. Access to grazing areas may, however, be limited by the presence of the pipeline.

The impact from the change in land use for the pre-treatment station and PCD is not known. Although not confirmed, observation and discussions during the SIA indicated that there is not extensive use of this land, although it may be used from time-to-time for grazing or collection of fire wood, there are other significant tracts of open land available for grazing immediately adjacent to the site, and adjacent to the communities.

- Safety and security risks to the public

Pipeline

There is a potential risk which could result from breaches in the pipeline and subsequent discharge of pressurised (40 bar water pressure) slurry into the immediate environment. There is the potential for a breach to cause injury to nearby pedestrians (walking along or over the pipeline) and residents (specifically Bokamoso which is within 5m of the pipeline), and attract cattle to drink the water however, the slurry will not be palatable to the cattle. In response to the risk, the engineering team have proposed the use of covers over the flanges. With the addition of the covers, the high pressure slurry/return water exiting the pipeline in an emergency scenario will be deflected back towards the pipeline resulting in no risk to by-standers.

According to project risk assessment the risk to communities is likely to be medium. Bokamoso is likely to be the community at most risk, however a number of mitigation measures are proposed, including:

1) For the stretch adjacent to the Bokamoso community, the pipeline has been located on the northern side of the existing air pipeline, furthest away from the community;
2) Design compliance;
3) Preventative maintenance programmes and plans;
4) Monitoring and controlling - Regular visual inspections;
5) Upgrading of material specifications especially at crossings/sensitive areas; and
6) Following of existing spillage procedures.

Tailings Storage Facilities and Dams

The risk in terms of safety to the local community was also considered in terms of the potential failure of the TSF and PCD. A risk assessment has been undertaken for the potential side wall failure of East and West TSFs.

Potential for failure is based on:

- Moisture levels on the TSFs;
- Re-mining Methodology;
- Potential instability during re-mining;
- Flooding; and
- Incorrect design application.

In the event of failure, the proximity of the TSFs to public roads (650m) and to the RPM processing facility (250m – 500m) could result in a potentially high consequence. The following mitigation measures have been identified by the project engineers:

1) Compliance to policies and procedures
2) Selection of correct mining methodology
3) Mining planning
4) Detailed geotechnical / geological analysis including slope stability analysis and moisture levels
5) Review of moisture content
6) Selection of appropriate consultants compliance with design standards and FEL 3
7) Compliance to design
8) Berm wall to be constructed from rubble
9) Review and implement emergency response plan
10) Re-establish continuous monitoring
11) Awareness programmes for communities
12) Investigate putting sand over sections of piping where piping is amongst the communities

- Noise intrusion

The potential for noise intrusion as a result of the operational phase is presumed to be low, as no noise study has been undertaken. As a result, the potential sources of noise and receptors have not been formally determined. It is the assumption of the SIA, however, that the following sources of noise could occur:

- Pre-treatment station (the facility could produce noise emissions, although the magnitude is unknown).
- Pipeline (sound of slurry moving through pipeline – although this is assumed to be minimal under normal circumstances); and
- WLTR Plant (expansion of processing activities could create additional noise emissions);

It is likely, however that only the pipeline could effect on the Bokamoso community, as it is close proximity. The other two sources are unlikely to affect local communities due to distance from these facilities.

- Light Intrusion

There could be the potential for the operational phase to result in the light pollution as the key operational areas are likely to be lit with spotlights for 24 hour operation. The cumulative impact of these additional lights on neighbouring communities and other potential receptors (e.g. roads) is unlikely to affect local communities. Key operational areas (i.e. the WLTR Plant and the pre-treatment station) are more than 1.5km from the nearest communities.

<u>Closure Phase</u>

At the point of closure of the Project (approximately 2030), the following impacts are likely to occur:

- Future land use

Once the Waterval TSFs have been completely reclaimed, the re-mined tailings will be placed on the Hoedspruit TSF (Mega TSF). This will leave the TSFs footprint on which the Waterval TSFs is situated vacant. RPM are currently investigating alternative uses for the land. The Waterval TSFs site is situated upon RPM land. There is the potential for the following positive benefits to result:

- Opportunity for communities to have access to natural resources (although under RPM so may be limited);
- Reduced potential for environmental pollution from stormwater run-off and dust emissions; and
- Increased value of land (inside the urban edge).

- Loss of employment

As the Waterval TSFs will maintain the WLTR Plant for an additional 16 years, following the closure of the Waterval Retrofit E-Feed Project, there is a high possibility that the WLTR Plant will close (as it relies on RPMs tailings stocks to remain operational). This is likely to result in the loss of approximately 75 direct jobs and approximately 200 jobs through contractors (AngloPlats, Operating Statistics, 2007). It is, however, likely that the majority of people working within the WLTR Plant and the Waterval Retrofit E-Feed Project could be redeployed to other operational areas of RPM. There is still the potential for a loss of employment, where skills and positions are not transferable.

8.6.4 Conclusions and Recommendations

The SIA study has indicated that the Project is not likely to have a significant direct or indirect impact on the socio-economic environment of the site or immediately surrounding areas.

The following key issues of concern were identified the with regards to **Option A**:

- Dust intrusion;
- Legacy issues;
- Influx of job-seekers.

The following key potential positive impacts of the Project include:

- Opportunity to improve local social and economic development though employment, skills development and transfer;
- Opportunity to improve engagement with local communities through internal mechanisms; and
- Rehabilitation of Waterval TSFs for beneficial future land use.

Option B is likely to have a higher impact on the socio-economic landscape of the project area. This is likely to be due to the size and location of the site footprint (adjacent to communities), but also in that a substantial labour force would be required to construct the pipeline and processing facilities (requiring local employment and skills development). The negative impact of this option could be managed, however the number of socio-economic opportunities (including employment and procurement) made available to local communities, would need to be maximised where possible.

The socio-economic impact of **Option A** is likely to be lower than **Option B** in terms of both the positive and negative impacts of the Project. Although there is a need for employment and skills development within the local area, it may be preferential for RPM to make use of **Option A** as this could prevent any unforeseen or potentially negative social consequences of the longer pipeline and construction-related activities.

9 Public Participation Process

Public participation seeks and facilitates the involvement of those potentially affected by or interested in a decision. The principle of public participation holds that those who are affected by a decision have a right to be involved in the decision-making process.

9.1 Approach to Public Participation

Our approach to public participation is based on the following principals:

- Undertake meaningful and timely participation with stakeholders;
- Focus on important issues during the scoping and impact assessment process;
- Give due consideration to reasonable alternatives;
- Take accountability for information shared;
- Encourage co-regulation, shared responsibility and a sense of ownership over the Project lifecycle;
- Apply "due process" with regard to public participation as provided for in the EIA and DMR Regulations; and
- Consider the needs, interests and values of stakeholders.

9.2 Methodology

The following activities were undertaken as part of the scoping phase:

- Stakeholder analysis and identification and distribution of project information;
- Stakeholder notification;
- Stakeholder and public meetings;
- Compilation of a Project Issues Trail; and
- Public review of the Draft Scoping Report.

The following activities were undertaken as part of the EIA phase:

- Stakeholder notification of the commencement of the EIA phase and the upcoming public meeting;
- Project issues trail update following scoping phase completion; and
- Notification of submission of the Draft EMPR for public and authority review.

The following activities will be undertaken during the EIR public review period:

- Stakeholder meetings; and
- Issues Trail update (on-going).

9.2.1 Stakeholder Identification and Analysis

In order to identify stakeholders the following groupings were identified based on requirements of NEMA and the MPRDA, as well as stakeholder analyses conducted in the community engagement plan and Socio-Economic Assessment Toolbox reports:

- National and provincial government (organs of state with jurisdiction over any activity);
- Local government;
- Landowners;
- Local leadership (including ward councillors) and traditional authorities;
- Potentially affected communities;
- Non-government Organisations; and
- Organised business.

Existing WSP and RPM databases were used to develop a project specific database (**Appendix D**) representative of the above groupings for initial stakeholder notification. The project stakeholder database is however a dynamic tool and will be updated throughout the process to included additional stakeholders that may indicate their interest in the Project.

The table below **Table 25** presents a breakdown of stakeholders registered on the Project database, whereas **Figure 69** illustrates the proportional representation of stakeholder groups. The stakeholder analysis will be updated following the public review period and submitted to the competent authorities as the Final EIR / EMPR.

Table 25: Analysis of stakeholders currently registered on the Project database

Representative sector	Further explanation	No. of stakeholders
Government departments	All tiers of government, namely, national, provincial, and local government. Also inclusive of Parastatal organisations such as Transnet and Eskom.	14
Business and consultants	Angloplats representatives, local and neighbouring businesses, representatives of consulting organisations that provide services in the area.	20
Non-governmental organisations (NGOs) and community based organisations	Agricultural unions, churches, and environmental NGOs.	0
General public	Local communities, farmers, and other such individuals who may have an interest in the project.	283

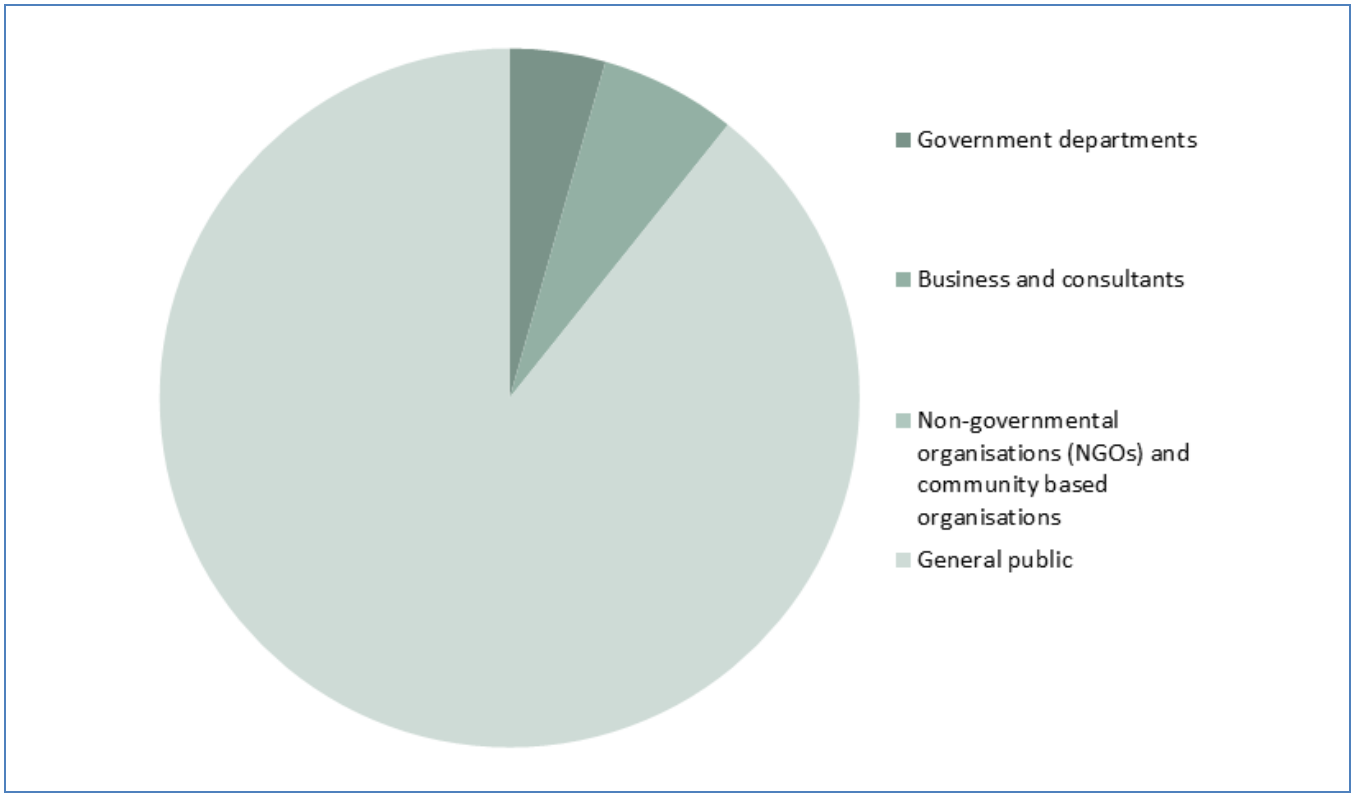


Figure 69: Pie chart showing the latest breakdown of the Stakeholders currently registered on the database

9.2.2 Stakeholder Notification

9.2.2.1 Site Notices

The NEMA EIA Regulations require that a site notice be fixed at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates is to be undertaken; and on any alternative sites. Site notices (English and Tswana) were placed at the following locations in and around the project area:

- Existing entrance / access road to the Waterval TSF (coordinates : 25°39'06.65" S 27°18'39.71" E);
- WLTR Plant entrance / access road (coordinates : 25° 41' 24.16"S 27° 23' 47.53"E);
- RPM Sports and Recreation Club (coordinates : 25° 42' 01.37"S 27° 21' 22.21"E);
- Rustenburg Public Library (coordinates : 25° 40' 10.25"S 27° 14' 10.70"E);
- Rustenburg Local Municipality (coordinates : 25° 40' 21.48"S 27° 14' 35.02"E);
- Mfidikwe Primary School (coordinates : 25° 39' 48.24"S 27° 20' 31.75"E); and
- Platinum Health Medical Centre (coordinates: 25° 41' 54.47"S 27° 21' 21.99"E).

The purpose of the site notices was to notify the public of the Project, and to invite the public to register as stakeholders. Refer to **Appendix D** for a copy of the site notice.

9.2.2.2 Background Information Document

The purpose of the background information document (BID) is to provide background information on the Project, outlining the environmental process, notifying stakeholders of the date and venue for the public

meeting and providing an opportunity for registration of other stakeholders. A copy of the BID is contained in **Appendix D**.

A letter of invitation and accompanying BIDs were emailed, faxed and posted to existing stakeholders where their contact details were available. This mechanism of notification is suitable for all groupings, except for "local communities", many of whom do not have access to such forms of communication. In order to ensure an encompassing notification, sms notifications were sent to stakeholders in local communities for whom cell phone numbers were available. Copies of the BID were also distributed as handouts to the local communities by WSP and the local ward councillors and traditional leaders as well as left at the following locations:

- Fraser-Alexander site office (coordinates : 25°40' 11.85"S 27° 19' 08.65"E);
- WLTR Plant entrance (coordinates : 25° 41' 24.16"S 27° 23' 47.53"E);
- RPM Sports and Recreation Club (coordinates : 25° 42' 01.37"S 27° 21' 22.21"E);
- Rustenburg Public Library (coordinates : 25° 40' 10.25"S 27° 14' 10.70"E);
- Rustenburg Local Municipality (coordinates : 25° 40' 21.48"S 27° 14' 35.02"E);
- Mfidikwe Primary School (coordinates : 25° 39' 48.24"S 27° 20' 31.75"E); and
- Platinum Health Medical Centre (coordinates: 25° 41' 54.47"S 27° 21' 21.99"E).

9.2.2.3 Newspaper Adverts

The NEMA EIA Regulations dictate that a newspaper advertisement be placed in either a local newspaper or a Government Gazette. Should the Project have a potential impact that extends beyond the boundaries of the metropolitan or local municipality, the Project should be advertised within at least one provincial or national newspaper. To ensure that the public participation process is/was comprehensive, an was placed in a provincial newspaper and in a local newspaper, as follows:

- A provincial newspaper, namely the Daily Sun on 29 November 2012; and
- A local newspaper, namely the Rustenburg Herald, on 30 November 2012.

Refer to **Appendix D** for a copy of the newspaper advertisements and proof of publication.

9.2.3 Public Meeting

Stakeholder meetings were held to outline the details of the Project and provide an opportunity for stakeholders to raise issues, concerns and queries. The meetings also establish the lines of communication between stakeholders and the project team.

The following three stakeholder meetings were conducted:

- Authorities meetings – local and provincial government (13 September 2012, Vaal University of Technology \ Building);
- Local leadership – ward councillors, traditional authorities (10 January 2013, AAP Recreation Club); and
- Local community – potentially affected communities and receptors (such and schools, clinics etc.), local labour (14 February 2013, Tshukudu High School).

All meetings were facilitated by WSP's EIA team and were attended by Project representatives. The TWP engineers responsible for project management and design contributed in terms of project technical detail and presented the specific activities that would be undertaken. For the local community meeting a facilitator was utilised who could translate (from English into Tswana) the information presented, as well as comments made by attendees. Invitations to these meetings were sent out in the form of sms, BIDs, faxs, telephone calls, and emails.

9.2.4 Public Review

The draft EIR / EMPR will be placed on public review for a period of 40 days from 30 October 2013 to 11 December 2013, at the following venues:

- WLTR Plant entrance (coordinates: 25° 41' 24.16"S 27° 23' 47.53"E);
- Fraser Alexander Offices at Waterval TSFs (coordinates: 25°40' 11.85"S 27° 19' 08.65"E);
- Rustenburg Public Library (coordinates: 25° 40' 10.25"S 27° 14' 10.70"E);
- Rustenburg Local Municipality (coordinates: 25° 40' 21.48"S 27° 14' 35.02"E);
- Mfidikwe Primary School (coordinates: 25° 39' 48.24"S 27° 20' 31.75"E);
- Thekwane Thlage Primary School (coordinates: 25° 39' 29.15"S 27° 22' 00.81"E);
- WSP Environmental website (www.wspenvironmental.co.za).

All registered stakeholders and commenting state departments will be notified of the public review period as well as the locations of the draft EIR / EMPR via fax and email, post, sms and handouts.

9.2.5 Issues Trail

All concerns, comments, viewpoints and questions (collectively referred to as 'issues') have been documented, and will continue to be documented throughout the project and responded to adequately in the Issues Trail. The Issues Trail records the following, as listed below, and is provided in **Appendix D**:

- List of all issues raised;
- Record of who raised the issues;
- Record of where the issues were raised; and
- Response to the issues (given by the project team).

9.2.6 Main Issues and Concerns

The following list summarises the most significant issues raised by stakeholders during the scoping phase:

1. The communities surrounding the Mine raised unemployment as a significant issue in the communities. They requested that the employment opportunities resulting from the Project be made available to the surrounding communities.
2. A lack of training opportunities was raised as a significant limiting factor to the communities in terms of applying for and successfully obtaining jobs that are advertised by the Mine.
3. The use of external contractors was raised as a community frustration. The community requested that labour primarily be sourced from the surrounding communities and not from outlying areas.
4. The community requested local small businesses be given priority in terms of procurement opportunities created by the Project.
5. Royal Bafokeng Nation (RBN; landowners of a portion of the Project area for **Option B**) indicated that lease agreements between AAP and RBN need to be formalised before the project commences, otherwise RBN would oppose the Project until the negotiations were resolved.

It must be noted that issues 1 – 4 were the most frequent issues raised during the stakeholder engagement meetings and relate to the existing situation at RPM and are not specifically to the Project as such. Please refer to **Appendix D** for a detailed breakdown of all issues raised and responses issued by the EIA and Project team.

10 Environmental Impact Assessment

The environmental impact rating has been undertaken according AAP's 5x5 Impact Rating Matrix utilised to determine the significance of the potential impact as a result of the Project. This entailed:

- The identification of different environmental aspects, impacts, receptors and resources for construction and operational phases and, where relevant, for decommissioning;
- The identification of receptors and resources to provide an indication of the areas sensitivity to impact; and
- The identification of the significance of impacts, including the probability of occurrence; the intensity or severity of the change to the environment; the timing of the impact; duration over which an impact will be experienced; and the spatial extent of the impact.

Table 26: Environmental Significance Determination

Aspect	Consequence				
	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
Schedule	Less than 1% impact on overall project timeline	May result in overall project timeline overrun equal to or more than 1% and less than 5%	May result in overall project timeline overrun of equal to or more than 5% and less than 20%	May result in overall project timeline overrun of equal to or more than 20% and less than 50%	May result in overall project timeline overrun of 50% or more
Cost	Less than 1% impact on the budget of the project	May result in overall project budget overrun equal to or more than 1% and less than 5%	May result in overall project budget overrun of equal to or more than 5% and less than 20%	May result in overall project budget overrun of equal to or more than 20% and less than 50%	May result in overall project budget overrun of 50% or more
Quality of Deliverables	No significant impact on quality of deliverables	Quality issues that can be addressed prior to handover	Quality issues that can be addressed during ramp-up	Quality issues that require significant intervention to maintain performance	Quality issues that require significant intervention to achieve performance
Safety/ Health	First aid case / Exposure to minor health risk	Medical treatment case / Exposure to major health risk	Lost time injury / Reversible impact on health	Single fatality or loss of quality of life / Irreversible impact on health	Multiple fatalities / Impact on health ultimately fatal
Legal & Regulatory	Low level legal issue	Minor legal issue; non-compliance and breaches of the law	Serious breach of law; investigation/report to authority, prosecution and or moderate penalty possible	Major breach of the law; considerable prosecution and penalties	Very considerable penalties and prosecutions. Multiple law suits and jail terms
Reputation / Social / Community	Slight impact - public awareness may exist but no public	Limited impact - local public concern	Considerable impact - regional public concern	National impact - national public concern	International impact - international public attention

Aspect	Consequence				
	concern				
Environment	Minimal environmental harm – L1 incident	Material environmental harm – L2 incident remediable short term	Serious environmental harm – L2 incident remediable within LOM	Major environmental harm – L2 incident remediable post LOM	Extreme environmental harm – L3 incident irreversible

Likelihood		Risk Level				
5 – Almost Certain	90% and higher probability of occurring	11 (M)	16 (H)	20 (H)	23 (H)	25 (H)
4 – Likely	Between 60% and less than 90% of occurring	7 (M)	12 (M)	17 (H)	21 (H)	24 (H)
3 – Possible	Between 30% and less than 60% of occurring	4 (L)	8 (M)	13 (H)	18 (H)	22 (H)
2 – Unlikely	Between 1% and less than 30% of occurring	2 (L)	5 (L)	9 (M)	14 (H)	19 (H)
1 – Rare	Less than 1% of occurring	1 (L)	3 (L)	6 (M)	10 (M)	15 (H)

Table 27: Interpretation of the Risk Level

Risk Rating	Guideline for Matrix
21 to 25 Extreme (EX)	**Eliminate, avoid, implement specific action plans/procedures to manage and monitor**
13 to 20 High (H)	**Proactive Management**
6 to 12 Medium (M)	**Actively manage**
1 to 5 Low (L)	**Monitor and manage as appropriate**

The potential environmental impacts associated with the Project have been evaluated according to their significance, which is determined as a result of the consequence and likelihood. Consequence is a function of schedule, cost, quality, safety / health, legal and regulatory, reputation and environmental impact, whereas the likelihood of the impact is a function of the frequency of the activity and frequency of the incident/ impact. The consequence multiplied by the likelihood gives the significance of the potential impact. All impacts were assessed with and without management measures in place.

10.1 Environmental Impacts identified

10.1.1 Geology

During construction the surface infrastructure required as part of the Project will involve the removal of overburden layers for infrastructure development. The permanent removal of geology to lay foundation results in permanent loss of a natural resource over a limited surface area for the location of the pump stations (**Option A**), pre-treatment plant and booster station (**Option B**). No further impacts will be associated with geology during the operational, decommissioning and closure phases of the Project.

10.1.1.1 Option A:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 28**), the predicted impacts on geology during the construction phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

10.1.1.2 Option B:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 28**), the predicted impacts on geology during the construction phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

Table 28: Impact Assessment on geology

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					
Construction	Construction of new infrastructure	**Loss of natural resources:** Removal of overburden layers for infrastructure development.	4 (L)	2 (L)	Refer to C5
Operation	Re-mining of tailings	N/A			N/A
Decommissioning and Closure	Decommissioning of infrastructure	N/A			N/A
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	**Loss of natural resources:** Removal of overburden layers for infrastructure development.	4 (L)	2 (L)	Refer to C5
Operation	Re-mining of tailings	N/A			N/A
Decommissioning and Closure	Decommissioning of infrastructure	N/A			N/A

The reference numbers indicated for the recommended management measure in the table are discussed in **Section 11. The reference numbers refer to each individual management measure.*

10.1.2 Topography

The construction of new infrastructure, namely the pump stations and overland pipes (**Option A**), pre-treatment plant, overland pipes and booster station (**Option B**) create a visible, artificial landscape for the duration of the

project. The surface infrastructure is likely to disturb the natural and / or existing flow of the topography and free drainage of the area.

The establishment of surface infrastructure will lead to a change in the natural topography of the area for the duration of the Project over a limited surface area. The surface infrastructure may also include the disturbance to the natural and / or existing flow and free drainage of the area.

The demolition of the surface infrastructure and the removal of the Waterval TSFs, will return the topography to its pre-project state (dependent on the mine's closure and rehabilitation objectives).

10.1.2.1 Option A:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 29**), the predicted impacts on topography during the construction phase are low (with and without mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

The predicted impacts on topography during the operational phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

The predicted impacts on topography during the decommissioning and closure phases are medium (without mitigation) and low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is almost certain to be unlikely.

10.1.2.2 Option B:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 29**), the predicted impacts on topography during the construction phase are medium (without mitigation) and low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

The predicted impacts on topography during the operational phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

The predicted impacts on topography during the decommissioning and closure phases are medium (without mitigation) and low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is almost certain to be unlikely.

Table 29: Impact Assessment on topography

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					
Construction	Construction of new infrastructure	**Land transformation:** Construction of new infrastructure	5 (L)	4 (L)	Refer to C6 & C7
		Low and peak flow: Alternation of flow characteristics and free drainage of the area	5 (L)	2 (L)	
Operation	Re-mining of tailings	**Land transformation:** Establishment of the surface infrastructure	4 (L)	2 (L)	Refer to O5
		Low and peak flow: Alteration of flow characteristics and free drainage of the area	2 (L)	2 (L)	
Decommissioning and Closure	Decommissioning of infrastructure	**Land transformation:** Demolition of surface infrastructure	4 (L)	2 (L)	Refer to D5 & D6

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
		Low and peak flow: Alteration of flow characteristics and free drainage of the area	2 (L)	2 (L)	
		Land transformation: Removal of Waterval TSFs	+7 (M)	+11 (M)	
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	**Land transformation:** Construction of new infrastructure	7 (M)	4 (L)	Refer to C6 & C7
		Low and peak flow: Alternation of flow characteristics and free drainage of the area	8 (M)	2 (L)	
Operation	Re-mining of tailings	**Land transformation:** Establishment of the surface infrastructure	4 (L)	2 (L)	Refer to O5
		Low and peak flow: Alteration of flow characteristics and free drainage of the area	2 (L)	2 (L)	
Decommissioning and Closure	Decommissioning of infrastructure	**Land transformation:** Demolition of surface infrastructure	4 (L)	2 (L)	Refer to D5 & D6
		Low and peak flow: Alteration of flow characteristics and free drainage of the area	2 (L)	2 (L)	
		Land transformation: Removal of Waterval TSFs	+7 (M)	+11 (M)	

The reference numbers indicated for the recommended management measure in the table are discussed in **Section 11. The reference numbers refer to each individual management measure. The + symbol denotes a positive impact.*

10.1.3 Soils, Land Use and Land Capability

The clearing of vegetation and removal of topsoil, subsoil and weathered rock constitute the overburden and will be removed and stockpiled separately for the duration of the project. .

The on-going runoff from the TSFs during the operational phase could have an effect on the natural drainage of the area which could lead to an increase in soil erosion which will also reduce the fertility of soils and result in a loss of soils for rehabilitation purposes.

The demolition of infrastructure and the rehabilitation of the disturbed land will reduce the negative impact on the environment previously disturbed as the aim would be to return land to its pre-mining state where possible (dependent on the mine's closure and rehabilitation objectives) and where not possible ensure that rehabilitated areas are self-sustaining.

During the construction, operational, decommissioning and closure phases, the potential spillage of hydrocarbons, other chemicals, and spillages from pipelines may result in the contamination of soil resources. The loss of soil resources and the associated increase in erosion could alter the fertility of the area with respect to the rehabilitation potential and natural ecology.

10.1.3.1 Option A:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 35**), the predicted impacts on soils, land use and land capability during the construction phase are medium (without mitigation) to low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to possible.

The predicted impacts on soils, land use and land capability during the operational phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

The predicted impacts on soils, land use and land capability during the decommissioning and closure phases are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

10.1.3.2 Option B:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 35**), the predicted impacts on soils, land use and land capability during the construction phase are medium (without mitigation) to low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to possible.

The predicted impacts on soils, land use and land capability during the operational phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

The predicted impacts on soils, land use and land capability during the decommissioning and closure phases are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

Table 30: Impact Assessment on soils, land use and land capability

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					
Construction	Construction of new infrastructure	**Loss of natural resources:** The loss of topsoils, subsoil and weathered rock during the construction of the surface infrastructure	12 (M)	4 (L)	Refer to C8 – C30
		Incidents: Spillage of hydrocarbons or other chemicals during the construction phase	7 (M)	4 (L)	
Operation	Re-mining of tailings	**Incidents:** Spillage of hydrocarbons, other chemicals and spillages from conveyors	4 (L)	2 (L)	Refer to O6 – O21
Decommissioning and Closure	Decommissioning of infrastructure	**Incidents:** Spillage of hydrocarbons or other chemicals during the decommissioning and closure phases	4 (L)	2 (L)	Refer to D7 - D28
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	**Loss of natural resources:** The loss of topsoils, subsoil and weathered rock during the construction of the surface infrastructure	12 (M)	4 (L)	Refer to C8 – C30

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
		Incidents: Spillage of hydrocarbons or other chemicals during the construction phase	7 (M)	4 (L)	
Operation	Re-mining of tailings	**Incidents:** Spillage of hydrocarbons, other chemicals and spillages from conveyors	4 (L)	2 (L)	Refer to O6 – O21
Decommissioning and Closure	Decommissioning of infrastructure	**Incidents:** Spillage of hydrocarbons or other chemicals during the decommissioning and closure phases	4 (L)	2 (L)	Refer to D7 - D28

The reference numbers indicated for the recommended management measure in the table are discussed in **Section 11. The reference numbers refer to each individual management measure.*

10.1.4 Aquatic Assessment

The current and surrounding areas are already heavily impacted by anthropogenic activity due to both platinum mining and townships. The addition of the proposed slurry pipeline and associated infrastructure is likely to have a number of additional direct and indirect impacts on the aquatic biodiversity in the surrounding area for both **Option A** and **B**.

10.1.4.1 Increase in Sedimentation

In terms of **Option B**, the sediment loads are already high within the systems assessed, specifically site PL4 (**Figure 56**). Therefore, the crossing of a watercourse, and the construction of the associated infrastructure, has the potential to cause erosion and further increase the sediment loading of the systems. If the pipeline fails and a spill occurs, a significant increase in sedimentation will occur, impacting sediment levels downstream of the spill.

An increase in sedimentation will most like occur during the construction phase where the activities will include the clearing of vegetation, increased vehicular activities on the roads, storage of topsoil, digging foundations etc. Unmitigated, these activities may result in an increase in erosion and dust, therefore resulting in increased sedimentation within the river system. Based on the fact that the systems are already highly modified, any additional impact will result in accumulative effects downstream.

Although the Klipgatspruit is a non-perennial river, sediment will build up in the construction areas and will be flushed down the system during high flow events. As flow is intermittent, this sediment will be deposited as the flow ceases. The potential deposition of sediment can lead to further barriers and increase the already existing loss of connectivity within the system. This could cause changes in in-stream conditions, loss of available habitat types downstream and further fragmentation of the system resulting in further isolation of populations, failed migration during flow events, increased crowding in available pools, increased competition and local extinction of species.

Should a spill event occur, in an unmitigated scenario, the increase in sedimentation will result in an increase in turbidity and suspended sediment concentration downstream from site PL6 and may end up impacting on the moderately modified Hex River (3.3km downstream). The specific gravity of the slurry (3.19 gm/cc) and the chemical composition would result in the complete cover of the stream bed and resultant loss of available habitat and destruction of the aquatic communities present.

Regarding **Option A**, the associated impacts will mainly be observed in the artificial channel / storm water canal. It is highly unlikely that sedimentation will affect the Klipfonteinspruit further downstream of the proposed pipeline.

10.1.4.2 Deterioration in Water Quality

The water quality within the systems assessed is already highly deteriorated. The construction, operation and closure of the pipeline will therefore result in accumulative impacts from a water quality perspective.

Changes to water quality may arise during the construction, operational and closure phases of the Project for both **Option A** and **B**. During the construction and closure phase the main activities affecting the water quality include diesel, petrol and oil leaks from machinery used on site. During the operational phase, the largest impact will be from any leaks, spills or pipeline breakages. All of these substances and their constituents are potentially toxic to aquatic ecosystems resulting in acute as well as chronic effects on flora and fauna within the systems resulting in the potential loss of biota. Regarding **Option B**, spillage of slurry, oil and fuel into the Klipgatspruit could lead to a further reduction in organisms that already have very low abundances. In case of a major leakage, it is possible that the slurry could wipe out the entire aquatic ecosystem in the Klipgatspruit and impact on the aquatic ecosystem of the Hex River (located 3.3km downstream from site PL6) (**Figure 56**). Regarding **Option A**, if a minor spill occurs, only the artificial channel / storm water canal will be affected. However, if a major spill occurs, the Klipfonteinspruit, for which no baseline data is available, will be impacted.

10.1.4.3 Destruction of vegetation associated with the stream beds and banks (Option B only)

Riparian-specific vegetation was not present at all of the sites; however all of the sites were covered in vegetation. This vegetation will play a role in controlling river and bank stability. At site PL6, riparian vegetation was present with stands of *Typha capensis* and *Phragmites sp* visible. These species are both very useful plants, acting as a filter and for food and cover for wildlife and many waterfowl. They also have a number of resource qualities, for example *T. capensis* is edible and it is used as thatch for roofing, woven into mats etc. In addition, riparian vegetation is a source of energy and nutrients that provides the organic matter needed to drive the stream food web; it also provides cover for macro-invertebrates and fish populations (Tabacchi et al. 1998).

The main impact on the riparian vegetation and the vegetation associated with the stream beds and banks will take place during the construction phase when vegetation is removed for the construction of the roads, laydown areas and pipeline supporting infrastructure. Impacts during the operational phases may occur if there is a spill, in which case the vegetation and soil may need to be removed and clean soil laid down and indigenous vegetation seeded. During the closure phase it is anticipated that indigenous vegetation will need to be seeded or planted in areas where infrastructure is removed.

10.1.4.4 Changes of the flow regime (Option B only)

Although these systems are non-perennial in nature, the pipeline crossings may alter the flow regime during construction and operational phases should in-stream support structures be constructed; this, however, can easily be avoided, since these are small streams. The majority of fish species present usually have preferences to slow-deep or slow-shallow conditions with a high percentage of vegetation for cover (Kleynhans 2008; Skelton, 2001). A decrease in flow rate will therefore have limited impacts. In addition, a decrease in flow could also lead to an increase in chemical constituents causing water deterioration

10.1.4.5 Option A

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 31**), the predicted impacts on aquatic ecology during the construction phase are low (with and without mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is unlikely.

The predicted impacts on aquatic ecology during the operational phase are medium (without mitigation) and low (with mitigation). The consequence is minor in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

The predicted impacts on aquatic ecology during the decommissioning and closure phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

10.1.4.6 Option B

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 31**), the predicted impacts on aquatic ecology during the construction phase are low (with and without mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

The predicted impacts on aquatic ecology during the operational phase are medium (without mitigation) and low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

The predicted impacts on aquatic ecology during the decommissioning and closure phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

Table 31: Impact Assessment on aquatic ecology

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					
Construction	Construction of new infrastructure	Deterioration in Water Quality	5 (L)	2 (L)	Refer to C57 – C71
Operation	Re-mining of tailings	Deterioration in Water Quality	8 (M)	5 (L)	Refer to O49 – O58
Decommissioning and Closure	Decommissioning of infrastructure	Deterioration in Water Quality	4 (L)	2 (L)	
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	Sedimentation on aquatic ecosystem	4 (L)	2 (L)	Refer to C57 – C71
		Deterioration in Water Quality	5 (L)	2 (L)	
		Destruction of riparian vegetation	4 (L)	2 (L)	
		Change in flow on aquatic ecosystem	2 (L)	2 (L)	
Operation	Re-mining of tailings	Sedimentation on aquatic ecosystem	8 (M)	2 (L)	Refer to O49 – O58
		Deterioration in Water Quality	8 (M)	5 (L)	
		Destruction of riparian vegetation	4 (L)	2 (L)	
		Change in flow on aquatic ecosystem	8 (M)	5 (L)	
Decommissioning and Closure	Decommissioning of infrastructure	Sedimentation on aquatic ecosystem	4 (L)	2 (L)	
		Deterioration in Water Quality	4 (L)	2 (L)	
		Destruction of riparian vegetation	4 (L)	2 (L)	
		Change in flow on aquatic ecosystem	2 (L)	2 (L)	

The reference numbers indicated for the recommended management measure in the table are discussed in **Section 11. The reference numbers refer to each individual management measure.*

10.1.5 Hydrology and Geohydrology

During construction and decommissioning impacts are expected to the surface water quality of the Klipgatspruit and Klipfonteinspruit watercourses, as well as the groundwater underlying the development areas. This includes the following impacts:

- Earthworks and associated erosion during the construction and decommissioning phases has the potential to lead increased turbidity and suspended solids within the watercourses. The impacts to the groundwater are expected to be limited.
- Due to the operation of machinery during the construction and decommissioning phases there is the potential for hydrocarbons spills due to machinery faults which has the potential to contaminate the surface water and groundwater resources.
- During decommissioning, the potential for spills of residual slurry from the containment facilities and pipes is considered likely, which has the potential to contaminate both the surface water and groundwater.

10.1.5.1 Option A:

During the operational phase, there is the potential for the following impacts:

- During the re-mining operations there is the potential for spills directly into the Klipgatspruit and Klipfonteinspruit due to spillages or poor integrity of the containment infrastructure at the re-mining operations and concentrator.
- There is the potential for leaks or spills from the pipeline carrying re-mined slurry from the Waterval TSFs to the Waterval Retrofit concentrator, and from the pipeline carrying treated slurry to the Paardekraal TSF. This has the potential to contaminate the watercourses, as well as the underlying groundwater.
- There is the potential for machinery faults (including leaks of fuels and oils from vehicles and equipment) that may contaminate the surface water and groundwater resources in the vicinity of the re-mining operations and concentrator.

Surface Water

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 32**), the predicted impacts on hydrology during the construction phase and decommissioning phases are low (with and without mitigation. The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

The predicted impacts on hydrology during the operational phases are medium (without mitigation) and low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

Groundwater

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 33**), the predicted impacts on geohydrology during the construction, operational and closure phases, are low (with and without mitigation. The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

10.1.5.2 Option B:

- During the reclamation, there is the potential for spills directly into the Klipgatspruit due to failure of the drainage infrastructure, pre-treatment plant and PCD. The addition of water to the TSFs has the potential to increase the driving hydraulic head, leading to potential groundwater and surface water impacts. Based on the water quality results, this is expected to lead to increased metals, ammonium, chloride and sulphate within the surface water and groundwater environment.
- Based on the Water Balance, there is expected to be increased seepage from the TSF and additional spillage from the Hoedspruit RWD. The water quality of the seepage and spillage is unknown until the water transfer is underway; however, based on the water quality assessment of the Hoedspruit, the water quality downstream of the Hoedspruit tailings is impacted, with TDS, EC, total hardness, calcium, magnesium, chloride and sulphate exceeding the RWQOs in at least 95% of the samples tested. As a

result, the impact is expected to be lessened somewhat, but can only be assessed once the Project is underway.

- There is the potential for leaks or spills from the slurry pipeline route which has the potential to contaminate the watercourses, as well as the underlying groundwater.
- At the Waterval TSF treatment plant, Booster Station, Hoedspruit Pump Station and WLTR, there is the potential for machinery faults (including vehicles and equipment) that have the potential to contaminate the surface water and groundwater resources. This includes contamination through hydrocarbons (i.e. fuels and lubricating oils) as well as slurry and slimes material.

Surface Water

- In accordance with AAP's 5x5 Impact Rating Matrix (**Table 32**), the predicted impacts on hydrology during the construction phase and decommissioning phases are low (with and without mitigation. The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.
- The predicted impacts on hydrology during the operational phases are medium (without mitigation) and low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to rare.

Groundwater

- In accordance with AAP's 5x5 Impact Rating Matrix (**Table 33**), the predicted impacts on geohydrology during the construction, operational and closure phases, are low (with and without mitigation. The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

Table 32: Impact Assessment on surface hydrology

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					
Construction	Construction of new infrastructure	**Water quality**: Increased turbidity and suspended solids in watercourses	4 (L)	2 (L)	Refer to C48 – C55
Operation	Re-mining of tailings	**Water quality**: Increased turbidity and suspended solids in watercourses	8 (M)	5 (L)	Refer to O33 – O44
Decommissioning and Closure	Decommissioning of infrastructure	**Water quality**: Increased turbidity and suspended solids in watercourses	4 (L)	2 (L)	Refer to D46 – D51
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	**Water quality**: Increased turbidity and suspended solids in watercourses	4 (L)	2 (L)	Refer to C48 – C55
		Wetland and watercourse impacts: Excluding water quality	2 (L)	1 (L)	
Operation	Re-mining of tailings	**Water quality**: Increased turbidity and suspended solids in watercourses	7 (M)	4 (L)	Refer to O33 – O44
		Wetland and watercourse impacts: Excluding water quality	7 (M)	4 (L)	
		Floodline: Klipgatspruit	2 (L)	1 (L)	

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
		Floodline: Hoedspruit	4 (L)	1 (L)	
Decommissioning and Closure	Decommissioning of infrastructure	**Water quality**: Increased turbidity and suspended solids in watercourses	4 (L)	2 (L)	Refer to D46 – D51
		Wetland and watercourse impacts: Excluding water quality	2 (L)	1 (L)	

The reference numbers indicated for the recommended management measure in the table are discussed in **Section 11. The reference numbers refer to each individual management measure.*

Table 33: Impact Assessment on groundwater

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					
Construction	Construction of new infrastructure	**Contamination of Groundwater**: Spillages of hydrocarbons and chemicals	4 (L)	2 (L)	Refer to C56
Operation	Re-mining of tailings	**Contamination of Groundwater**: Leaks or spills from the slurry pipeline	4 (L)	2 (L)	Refer to O45 – O48
Decommissioning and Closure	Decommissioning of infrastructure	**Contamination of Groundwater**: Demolishing of infrastructure and potential hydrocarbon or other chemical spills	4 (L)	2 (L)	Refer to D52 – D54
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	**Contamination of Groundwater**: Spillages of hydrocarbons and chemicals	4 (L)	2 (L)	Refer to C56
Operation	Re-mining of tailings	**Contamination of Groundwater**: Leaks or spills from the slurry pipeline	4 (L)	2 (L)	Refer to O45 – O48
Decommissioning and Closure	Decommissioning of infrastructure	**Contamination of Groundwater**: Demolishing of infrastructure and potential hydrocarbon or other chemical spills	4 (L)	2 (L)	Refer to D52 – D54

10.1.6 Flora and Fauna

The establishment of infrastructure during the construction phase will necessitate the removal of vegetation and the destruction of habitat. This may allow for the spreading of weeds and alien vegetation in the newly cleared areas. However, all the areas sited for infrastructure (**Option A** and **Option B**) are already highly disturbed by the extensive mining activities. Contamination of soil from hydrocarbons (i.e. oils, greases, diesel, etc.), other chemical, and spillages from conveyors spills could result in a loss of plant life.

During the operational phase of the Project, unless controlled, weeds and alien vegetation may continue to be established in disturbed areas. Spillage of hydrocarbons, and other chemicals could lead to the contamination of soil resources and impacts on the growth yield of the surrounding vegetation and could also negatively impact on the health of the fauna in the area.

During the construction and operational phases, changes to the water regime will result in changed vegetation dynamics. The potential increase in erosion as a result of increased runoff from surface infrastructure and the TSFs will reduce the fertility of soils and the subsequent establishment of flora. The settlement of dust from vehicle movement and re-mining operations on the surrounding vegetation covers (mostly the leaves) reduces plants productivity. Noise and lighting associated with the mining activities will result in any remaining fauna in the mining area being displaced.

Demolition of infrastructure and the rehabilitation of disturbed land during the decommissioning and closure phases will reduce negative impacts on the environment previously disturbed.

10.1.6.1 Option A:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 35**), the predicted impacts on flora and fauna during the construction phase are medium (without mitigation) to low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is almost certain to rare.

The predicted impacts on flora and fauna during the operational phase are medium (without mitigation) to low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

The predicted impacts on flora and fauna during the decommissioning and closure phases are medium (without mitigation) to low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

10.1.6.2 Option B:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 35**), the predicted impacts on flora and fauna during the construction phase are medium (without mitigation) to low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is almost certain to rare.

The predicted impacts on flora and fauna during the operational phase are medium (without mitigation) to low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

The predicted impacts on flora and fauna during the decommissioning and closure phases are medium (without mitigation) to low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

Table 34: Impact Assessment on flora and fauna

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Construction	Construction of new infrastructure	**Land transformation:** Destruction of habitats	4 (L)	1 (L)	Refer C31 – C47
		Changes in vegetation dynamics: Spreading of weeds and alien vegetation and water	11 (M)	7 (M)	
		Fragmentation of habitats: Degradation of the areas or changes of dynamics between populations	4 (L)	1 (L)	
		Incidents: Contaminated run-off, and the spillages of hydrocarbons	7 (M)	4 (L)	
		Fugitive emissions: ■ The release and settling of dust ■ Light pollution during the night ■ Noise from vehicles and construction activities	7 (M)	4 (L)	
Operation	Re-mining of tailings	**Changes in vegetation dynamics:** Spreading of weeds and alien vegetation and water	7 (M)	4 (L)	Refer O22 – O32
		Incidents: Spillage of hydrocarbons, other chemicals and spillages from conveyors	4 (L)	2 (L)	
		Fugitive emissions: ■ The release and settling of dust ■ Light pollution during the night ■ Noise from vehicles and operational activities	4 (L)	2 (L)	
Decommissioning and Closure	Decommissioning of infrastructure	**Land transformation:** Demolition of infrastructure and the rehabilitation of the disturbed land	8 (M)	5 (L)	Refer D29 – D45
		Incidents: Contaminated run-off, and the spillages of hydrocarbons	4 (L)	2 (L)	
		Fugitive emissions: ■ The release and settling of dust	4 (L)	4 (L)	
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	**Land transformation:** Destruction of habitats	4 (L)	1 (L)	Refer C31 – C47
		Changes in vegetation dynamics: Spreading of weeds and alien vegetation and water	11 (M)	7 (M)	
		Fragmentation of habitats:	4 (L)	1 (L)	

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
		Degradation of the areas or changes of dynamics between populations			
		Incidents: Contaminated run-off, and the spillages of hydrocarbons	7 (M)	4 (L)	Refer C31 – C47
		Fugitive emissions: ■ The release and settling of dust ■ Light pollution during the night ■ Noise from vehicles and construction activities	7 (M)	4 (L)	
Operation	Re-mining of tailings	**Changes in vegetation dynamics:** Spreading of weeds and alien vegetation and water	7 (M)	4 (L)	Refer O22 – O32
		Incidents: Spillage of hydrocarbons, other chemicals and spillages from conveyors	4 (L)	2 (L)	
		Fugitive emissions: ■ The release and settling of dust ■ Light pollution during the night ■ Noise from vehicles and operational activities	4 (L)	2 (L)	
Decommissioning and Closure	Decommissioning of infrastructure	**Land transformation:** Demolition of infrastructure and the rehabilitation of the disturbed land	8 (M)	5 (L)	Refer D29 – D45
		Incidents: Contaminated run-off, and the spillages of hydrocarbons	4 (L)	2 (L)	
		Fugitive emissions: ■ The release and settling of dust	4 (L)	4 (L)	

The reference numbers indicated for the recommended management measure in the table are discussed in **Section 11. The reference numbers refer to each individual management measure.*

10.1.7 Air Quality

Due to the proximity of sensitive receptors to the project area, the potential for an increase of dust generation from truck loading and unloading, land clearing, unpaved roads, heavy construction operations and wind erosion of exposed areas during construction and pipeline maintenance road and wind erosion of exposed areas during operation, could create a nuisance and health hazard to nearby receptors.

10.1.7.1 Option A:

- PM_{10} concentrations associated with the land preparation of the East TSF and construction of the eastern infrastructure remain extremely low, with negligible impact predicted on the receiving environment;

- Highest PM_{10} concentrations are associated with the land preparation of the West TSF, particularly regarding rubble removal, although concentrations are predicted to remain compliant at all neighbouring receptors, with the PM_{10} contributions from the re-mining project being low at all sensitive receptors;
- PM_{10} concentrations indicate little change should the option of crushing and screening of the rubble be preferred over the original method of bulldozing the rubble over the edge of the tailings.

10.1.7.2 Option B:

- Highest PM_{10} concentrations are associated with the construction phase (Scenario 1), with highest concentrations predicted in the area of the pre-treatment plant, land clearing activities at West TSF and the unpaved access road to the Hoedspruit Booster Pump Station;
- PM_{10} contributions from the typical operations of the re-mining project are significantly low, with only the unpaved roads being a possible emission source;

Based on the findings of the air quality impact assessment, highest PM_{10} concentrations are those associated with the construction phase. During the operational phase, particulate concentrations do not pose a significant threat to the surrounding environment and sensitive receptors.

No exceedences of PM_{10} standards are predicted during the construction phase, although PM_{10} concentrations will contribute to already high PM_{10} levels that are in exceedence of the annual standard. It is therefore important to minimise all PM_{10} contributions from construction activities to ensure impacts on the receiving environment are kept to a minimum.

10.1.7.3 Option A:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 35**), the predicted impacts from particulate emissions during the construction phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

The predicted impacts from particulate emissions during the operational phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is unlikely.

The predicted impacts from particulate emissions during the decommissioning and closure phases are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is unlikely.

10.1.7.4 Option B:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 35**), the predicted impacts from particulate emissions during the construction phase are medium (without mitigation) and low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to possible.

The predicted impacts from particulate emissions during the operational phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is unlikely.

The predicted impacts from particulate emissions during the decommissioning and closure phases are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is unlikely.

Table 35: Impact Assessment on air quality

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					
Construction	Construction of	**Impacts on air quality-**	4 (L)	2 (L)	Refer to C78

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
	new infrastructure	sources include: truck loading and unloading, land clearing, unpaved roads, heavy construction operations and wind erosion of exposed areas.			– C81
Operation	Re-mining of tailings	**Impacts on air quality**- sources include: pipeline maintenance road and wind erosion of exposed areas.	2 (L)	2 (L)	Refer to O65 – O67
Decommissioning and Closure	Decommissioning of infrastructure	**Impacts on air quality**, sources include: truck loading and unloading, truck emissions from unpaved roads, demolition operations, and wind erosion of exposed areas.	2 (L)	2 (L)	
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	**Impacts on air quality**- sources include: truck loading and unloading, land clearing, unpaved roads, heavy construction operations and wind erosion of exposed areas.	7 (M)	4 (L)	Refer to C78 – C81
Operation	Re-mining of tailings	**Impacts on air quality**- sources include: pipeline maintenance road and wind erosion of exposed areas.	2 (L)	2 (L)	Refer to O65 – O67
Decommissioning and Closure	Decommissioning of infrastructure	**Impacts on air quality**, sources include: truck loading and unloading, truck emissions from unpaved roads, demolition operations, and wind erosion of exposed areas.	2 (L)	2 (L)	

The reference numbers indicated for the recommended management measure in the table are discussed in **Section 11. The reference numbers refer to each individual management measure.*

10.1.8 Archaeology and Cultural Heritage

During the HIA survey, no sites of cultural heritage significance were identified at the **Option A** project site, while one site of cultural heritage significance was identified (a grave yard along the pipeline route) at the **Option B** project site. No further impacts will be associated with archaeology and cultural heritage during the operational, decommissioning and closure phases of the Project for **Option A**.

10.1.8.1 Option A:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 36**), the predicted impacts from archaeology and cultural heritage during the construction phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to unlikely.

10.1.8.2 Option B:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 36**), the predicted impacts from archaeology and cultural heritage during the construction phase are low (with and without mitigation). The consequence is minor

to insignificant in terms of environmental impacts and the likelihood of such an event occurring is possible to rare.

The predicted impacts from archaeology and cultural heritage during the operational phase are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is unlikely to rare.

The predicted impacts from archaeology and cultural heritage during the decommissioning and closure phases are low (with and without mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is unlikely to rare.

Table 36: Impact Assessment on archaeology and cultural heritage

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					
Construction	Construction of new infrastructure	**Land transformation-** Uncovering of archaeological material during construction	4 (L)	1 (L)	Refer to C82 – C86
Operation	Re-mining of tailings	N/A			N/A
Decommissioning and Closure	Decommissioning of infrastructure	N/A			N/A
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	**Land transformation-** Uncovering of archaeological material during construction	4 (L)	1 (L)	Refer to C82 – C86
		Secondary impact- Secondary impact on the grave site	5 (L)	1 (L)	
Operation	Re-mining of tailings	**Secondary impact-** Secondary impact on the grave site	2 (L)	1 (L)	Refer to O70 – O72
Decommissioning and Closure	Decommissioning of infrastructure	**Secondary impact-** Secondary impact on the grave site	2 (L)	1 (L)	Refer to D55 – D57

The reference numbers indicated for the recommended management measure in the table are discussed in **Section 11. The reference numbers refer to each individual management measure.*

10.1.9 Hydrological

10.1.10 Traffic

The potential traffic impacts associated with the transportation requirements considering both options were identified as follows:

- The intersection's capacity to sustain increased congestion levels (increased traffic demand);
- Road safety on the affected road network; and
- Hazardous locations where the pipeline network intersects with the road network.

For **Option A**, the operational period was considered more critical than the construction period in terms of the additional traffic generated. It is estimated that 33 and 30 vehicles trips will be generated during the AM and PM peak hours respectively.

If **Option B** is considered for implementation, the highest peak in traffic will most likely occur in 2015 when the construction and operational periods of the Project overlap. It is estimated that approximately 50 vehicles will be generated during the AM and PM peak hours.

10.1.10.1 Option A:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 37**), the predicted impacts from traffic during the construction phase are medium (without mitigation and low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

The predicted impacts from traffic during the operational phase are medium (without mitigation) and low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to rare.

The predicted impacts from traffic during the decommissioning and closure phases are medium (without mitigation) and low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

10.1.10.2 Option B:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 37**), the predicted impacts from traffic during the construction phase are medium (without mitigation and low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

The predicted impacts from traffic during the operational phase are medium (without mitigation) and low (with mitigation). The consequence is minor to insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to rare.

The predicted impacts from traffic during the decommissioning and closure phases are medium (without mitigation) and low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

Table 37: Impact Assessment on traffic

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					
Construction	Construction of new infrastructure	**Traffic increase:** Intersection capacity (congestion)	4 (L)	2 (L)	Refer to C87 – C89
		Traffic increase: Road safety	7 (M)	2 (L)	
Operation	Re-mining of tailings	**Traffic increase:** Intersection capacity (congestion)	5 (L)	3 (L)	Refer to O68 – O69
		Traffic increase: Road safety	12 (M)	3 (L)	
Decommissioning and Closure	Decommissioning of infrastructure	**Traffic increase:** Intersection capacity (congestion)	4 (L)	2 (L)	
		Traffic increase: Road safety	7 (M)	2 (L)	
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	**Traffic increase:** Intersection capacity (congestion)	4 (L)	2 (L)	Refer to C87 – C89
		Traffic increase: Road safety	7 (M)	2 (L)	
Operation	Re-mining of tailings	**Traffic increase:** Intersection capacity (congestion)	5 (L)	3 (L)	Refer to O68 – O69
		Traffic increase: Road safety	12 (M)	3 (L)	

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Decommissioning and Closure	Decommissioning of infrastructure	**Traffic increase:** Intersection capacity (congestion)	4 (L)	2 (L)	
		Traffic increase: Road safety	7 (M)	2 (L)	

The reference numbers indicated for the recommended management measure in the table are discussed in **Section 11. The reference numbers refer to each individual management measure.*

10.1.11 Social

Based on the information obtained through the SIA study, it is anticipated that the Project has the potential to have an impact on the socio-economic landscape and surrounding communities, and the socio-economic environment has the potential to impact on the project.

Table 38 to **Table 39** outline the potential socio-economic impacts of the Project for **Option A** and **Option B** respectively.

Table 38: Summary of key socio-economic impacts of Option A

Phase of Impacts	Positive	Negative
Construction	■ Employment Opportunities	■ Dust intrusion
	■ Local Procurement Opportunities	■ Influx of people
	■ Expansion of local skills	■ Safety Risks of Construction Activities
		■ Security Risks of Construction Activities
Operational	■ Economic Development Opportunities	■ N/A
Closure	■ Future land use	■ Loss of jobs

Table 39: Summary of key socio-economic impacts of Option B

Phase of Impacts	Positive	Negative
Construction	■ Employment Opportunities	■ Noise intrusion
	■ Expansion of local skills	■ Dust intrusion
	■ Local Procurement Opportunities	■ Safety Risks of Construction Activities
		■ Security Risks of Construction Activities
		■ Influx of people
Operational	■ Employment Opportunities and Skills Base Development	■ Safety and security risks to the public
	■ Economic Development Opportunities	■ Noise intrusion
		■ Light Intrusion
Closure	■ Future land use	■ Loss of jobs

The SIA study indicated that there is the potential for a number of negative socio-economic impacts. These may be directly related to the Project, but may also be historical or legacy issues associated with RPMs activities in the area. However, there are opportunities for RPM to maximise positive socio-economic benefits of their mining activities.

- Key issues of concern with regards to the Project:
  - Loss of access natural and social resources (**Option B** only);
  - Noise, light and dust intrusion;
  - Legacy issues;
  - Safety and security risks to the public; and
  - Influx of job-seekers.
- Potential positive impacts of the Project include:
  - Opportunity to improve local social and economic development though employment, skills development and transfer, local procurement;
  - Opportunity to improve engagement with local communities through internal mechanisms; and
  - Rehabilitation of Waterval TSFs for beneficial future land use.

10.1.11.1 Option A:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 40**), the predicted impacts from the socio-economic environment during the construction phase are medium (without mitigation) to low (with mitigation). The consequence is moderate to insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

The predicted impacts from the socio-economic environment during the operational phase are low (without and with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

The predicted impacts from the socio-economic environment during the decommissioning and closure phases are medium (without mitigation) and high (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is almost certain to likely.

10.1.11.2 Option B:

In accordance with AAP's 5x5 Impact Rating Matrix (**Table 40**), the predicted impacts from the socio-economic environment during the construction phase are high (without and with mitigation). The consequence is moderate to insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

The predicted impacts from the socio-economic environment during the operational phase are medium (without mitigation) to low (with mitigation). The consequence is insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

The predicted impacts from the socio-economic environment during the decommissioning and closure phases are medium (without mitigation) to low (with mitigation). The consequence is moderate to insignificant in terms of environmental impacts and the likelihood of such an event occurring is likely to unlikely.

Table 40: Impact Assessment on socio-economy

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
Option A: Re-mining at the Waterval Retrofit Concentrator					
Construction	Construction of new infrastructure	**Increased employment:** Employment opportunities	+2 (L)	+4 (L)	Refer to C90 – C111
		Increased employment: Expansion of local skills	+2 (L)	+4 (L)	

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
		Increased employment: Local procurement opportunities	+2 (L)	+8 (M)	Refer to C90 – C111
		Social ills: ■ Safety risks of construction activities ■ Security risks of construction activities ■ Influx of job seekers and labour	8 (M)	2 (L)	
		Impact on resources and livelihoods: ■ Dust Intrusion ■ Noise Intrusion	4 (L)	2 (L)	
Operation	Re-mining of tailings	**Social ills:** ■ Safety risks of operation activities ■ Security risks of operation activities			Refer to O73 – O89
		Impact on resources and livelihoods: ■ Dust intrusion ■ Noise intrusion	4 (L)	2 (L)	
Decommissioning and Closure	Decommissioning of infrastructure	**Employment:** Loss of employment	4 (L)	2 (L)	Refer to D58 – D64
		Land transformation: Future land use	+4 (L)	+7 (M)	
Option B: Re-mining at the WLTR Plant					
Construction	Construction of new infrastructure	**Increased employment:** Employment opportunities	+2 (L)	+4 (L)	Refer to C90 – C111
		Increased employment: Expansion of local skills	+2 (L)	+4 (L)	
		Increased employment: Local procurement opportunities	+2 (L)	+8 (M)	
		Social ills: ■ Safety risks of construction activities ■ Security risks of construction activities ■ Influx of job seekers and labour	8 (M)	2 (L)	
		Impact on resources and livelihoods: ■ Dust intrusion ■ Noise intrusion	4 (L)	2 (L)	
Operation	Re-mining of tailings	**Increased employment:** Employment opportunities and skills base development	+2 (L)	+8 (M)	Refer to O73 – O89

Project Phase	Activity / Facility	Impacts	Impact Rating (without mitigation)	Impact Rating (with mitigation)	Management Measure*
		Increased economic development: Economic development opportunities	+2 (L)	+8 (M)	
		Social ills: ■ Safety risks of construction activities ■ Security risks of construction activities ■ Influx of job seekers and labour	8 (M)	2 (L)	
		Impact on resources and livelihoods: ■ Dust intrusion ■ Noise intrusion	4 (L)	2 (L)	Refer to O73 – O89
Decommissioning and Closure	Decommissioning of infrastructure	**Employment:** Loss of employment	4 (L)	2 (L)	Refer to D58 – D64
		Land Transformation: Future land use	+4 (L)	+7 (M)	

The reference numbers indicated for the recommended management measure in the table are discussed in **Section 11. The reference numbers refer to each individual management measure. The + symbol denotes a positive impact.*

11 Environmental Management Programme

11.1 Construction Phase

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
General	C1.	Contractors will undergo a suitable induction prior to being allowed on site.	Construction Manager/ Training Manager	Pre-construction, construction
	C2.	The existing environmental awareness programme will be instituted.	Environmental Co-ordinator/ Construction Manager	Pre-construction and construction
	C3.	An open channel of communication will be maintained throughout the construction activities to ensure that all issues are raised and addressed.	Environmental Co-ordinator	Construction
	C4.	All issues / complaints will be managed through existing communication system.	Environmental Co-ordinator	Construction
Geology	C5.	The areas on which new infrastructure will be placed will be clearly demarcated and communicated to contractors.	Project Manager/ Construction Manager	Pre-construction, construction
Topography	C6.	All infrastructure will be designed and operated with the aim of closure in mind.	Project Manager/ Mining Engineer/ Construction Manager	Pre-construction, construction
	C7.	Structures built from steel or concrete may be painted a dark natural tone fitting with the surrounding environment.	Project Manager	Pre-construction
Soils Land Use and Land Capability	C8.	Contractors will be limited to the clearly defined access routes and areas to be constructed in order to ensure that undisturbed areas will not be disturbed.	Project Manager/ Construction Manager	Pre-construction, construction
	C9.	Where possible already disturbed areas will be utilised.	Project Manager	Pre-construction
	C10.	At least 300mm of soils (if the soil cover is more than 300mm deep) will be removed from the area over which infrastructure will be placed.	Project Manager/ Construction Manager	Pre-construction, construction
	C11.	The topsoil will be stockpiled in designated areas and will be allowed to naturally vegetate to minimise erosion in accordance with the relevant	Project Manager/ Construction Manager	Pre-construction, construction

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
		procedures for use in on going rehabilitation purposes.		
	C12.	Sustainable erosion control measures (for wind and water erosion) will be implemented and maintained, where necessary, in areas disturbed by the construction activities.	Project Manager/ Construction Manager/ Environmental Co-ordinator	Pre-construction, construction
	C13.	No clearing of vegetation or removal of borrow material will be undertaken outside of the defined construction areas.	Project Manager/ Construction Manager	Pre-construction, construction
	C14.	Dirty and clean water will be separated by implementing clean and dirty water systems / structures prior to construction to prevent pollution of clean water runoff.	Project Manager/ Construction Manager	Pre-construction, construction
	C15.	The clean and dirty water systems and structures will be properly designed (according to GN 704 of the National Water Act No. 36 of 1998) to prevent erosion.	Project Manager/ Construction Manager	Pre-construction, construction
	C16.	All non-hazardous waste will be disposed of at an authorised Landfill site by licensed personnel. Where possible non-hazardous waste will be recycled.	Environmental Co-ordinator/ Construction Manager	Pre-construction, construction
	C17.	All hazardous waste will be handled in accordance with the waste management plan	Construction Manager/ Environmental Co-ordinator/ Materials Manager	Pre-construction, construction
	C18.	MSDSs will be updated regularly and will be made available on site.	Construction Manager/ Environmental Co-ordinator/ Materials Manager	Pre-construction, construction
	C19.	Oils, greases, diesel and other chemicals will be stored in the prescribed manner and within bunded areas.	Construction Manager/ Environmental Co-ordinator/ Materials Manager	Pre-construction, construction
	C20.	If a major spillage occurs the contractor will be called out to clean the contaminated area and rehabilitate, as appropriate.	Construction Manager/ Environmental Co-ordinator/ Materials Manager	Pre-construction, construction
	C21.	If any minor spillage occurs the spillage will be cleaned immediately and the area will be rehabilitated, as appropriate.	Construction Manager/ Environmental Co-ordinator/ Materials	Pre-construction, construction

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
			Manager	
	C22.	All spills must be reported as indicated on the applicable Environmental Management System procedures.	Construction Manager/ Environmental Co-ordinator/ Materials Manager	Pre-construction, construction
	C23.	Construction contracts will include conditions, which make contractors aware of the Environmental Management System	Construction Manager/ Environmental Co-ordinator/ Materials Manager	Pre-construction, construction
	C24.	A rapid response team will be available on 24-hour notice to deal with hazardous spillages.	Construction Manager/ Environmental Co-ordinator	Pre-construction, construction
	C25.	All vehicles and equipment will be serviced regularly, within designated areas, and will be kept in good working order.	Project Manager/ Construction Manager	Construction
	C26.	Trucks will not be overloaded with building rubble, cement, borrow material etc.	Environmental Co-ordinator/ Construction Manager	Pre-construction, construction
	C27.	Trucks will not be overfilled at the fuelling depots. Re-fuelling will be supervised. Any spillage or accidental discharge of fuel onto soil or vegetation will be reported to the mine's Environmental Co-ordinator and the necessary management measures will be in place for the cleaning of spillages.	Environmental Co-ordinator/ Construction Manager	Pre-construction, construction
	C28.	The supply and maintenance of the chemical toilets will be the responsibility of an external contractor.	Project Manager/ Construction Manager/ Environmental Co-ordinator	Pre-construction, construction
	C29.	No septic tank or French drain systems will be constructed.	Project Manager/ Construction Manager/ Environmental Co-ordinator	Pre-construction, construction
	C30.	Sewage from chemical toilets will be transported to the existing sewage treatment plants and the residues disposed of in a controlled manner.	Project Manager/ Construction Manager/ Environmental Co-ordinator	Pre-construction, construction
Fauna and Flora	C31.	Vegetation will be replaced, or allowed to grow back, as soon as construction activities cease in an area, as part of the on-going	Project Manager/ Construction Manager/ Environmental Co-	Post-construction

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
		rehabilitation process.	ordinator	
	C32.	Where vegetation is established it will be monitored and appropriate remedial measures will be implemented where necessary.	Environmental Co-ordinator	Pre-construction, construction
	C33.	Pipelines and other physical barriers that obstruct wildlife movement will be covered at appropriate intervals to allow animals to traverse the linear infrastructure. Where pipelines are situated adjacent to existing infrastructure, access will not be required.	Construction Manager/ Environmental Co-ordinator	Construction
	C34.	A monitoring programme will be implemented that will ensure that all weeds and alien species will be eradicated in and around the project area. Measures will also be implemented to prevent the spreading of these species throughout the duration of the project.	Environmental Co-ordinator	Pre-construction, construction
	C35.	The area will be surveyed for invader species, as per the Conservation of Agricultural Resources Act (No. 43 of 1983), Regulation 15 and 16.	Environmental Co-ordinator	Pre-construction, construction
	C36.	The harvesting of natural vegetation for fuel wood or any other purposes will be strictly prohibited.	Environmental Co-ordinator/ Construction Manager	Pre-construction, construction
	C37.	The poaching and hunting of animals will be strictly prohibited.	Environmental Co-ordinator/ Construction Manager	Pre-construction, construction
	C38.	Access to construction areas and routes will be restricted.	Environmental Co-ordinator/ Construction Manager	Pre-construction, construction
	C39.	Clear signs will be erected to indicate the potential presence of wildlife.	Construction Manager/ Game Park Personnel	Construction
	C40.	Vehicle speeds will be managed and will not exceed 40km / hr on mine roads.	Environmental Co-ordinator/ Construction Manager/ Safety Officer	Pre-construction, construction
	C41.	Fire fighting equipment will be well maintained.	Environmental Co-ordinator/ Construction Manager	Pre-construction, construction
	C42.	The strategies, and emergency response associated with potential veld fires will be included in the fire fighting strategy.	Environmental Co-ordinator/ Construction Manager	Pre-construction, construction
	C43.	All contractors and employees will be informed of the contents of the fire fighting strategy.	Environmental Co-ordinator/ Construction	Pre-construction, construction

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
			Manager	
	C44.	Dust suppression techniques such as regular water spraying or the utilisation of dust allaying agents will be implemented.	Environmental Co-ordinator/ Construction Manager	Pre-construction, construction
	C45.	Construction vehicles will only be allowed on designated routes.	Construction Manager/ Training Manager	Pre-construction, construction
	C46.	Lights will be strategically placed where necessary and in such a way to ensure the least light spillage / nuisance occurs.	Project Manager	Pre-construction
	C47.	All construction activities will be undertaken during the day	Project Manager	Construction
Surface Water	C48.	Reference to mitigation measures nos. C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C45		
	C49.	All topsoil stockpiles will have stormwater diversion berms for protection against erosion and contamination by dirty water.	Project Manager	Construction
	C50.	Runoff, which is likely to contain suspended solids and sediments, should be routed through a settling pond to enable sediment to settle prior to discharge.	Project Manager/ Environmental Co-ordinator	Pre-construction, construction
	C51.	Where significant pollution potential is identified in terms of the clean and dirty water systems, these areas will be lined.	Environmental Co-ordinator	Construction
	C52.	The existing surface and groundwater monitoring programme will be updated to include the new data, prior to the construction period.	Environmental Co-ordinator	Construction
	C53.	The PCD will be constructed in such a way as to allow for 800mm freeboard above the full supply level. Based on the best practice guidelines for PCDs (BPG - A4) the PCD will be lined if impacts to the groundwater are expected.	Construction Manager	Construction
	C54.	All channels and retention facilities will be designed and maintained at the required capacity to ensure the 50 year storm event can be appropriately contained. This includes culverts used to transfer flow beneath any roadways or railway infrastructure.	Construction Manager	Construction
	C55.	Should significant amounts of hydrocarbon waste be expected to be generated from the storage areas, appropriate oil/ water separators will be considered to prevent contamination of runoff.	Construction Manager	Construction
Groundwater	C56.	Reference to mitigation measures nos. C14 C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C51, C52, C53		
Aquatic	C57.	Any activity undertaken within a watercourse, or associated buffer, should	Environmental Co-	Construction

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
		only occur after authorisation by the relevant authorities	ordinator	
	C58.	Monthly monitoring of the turbidity as part of the surface water monitoring when and where possible in this non-perennial system, during the construction phase.	Environmental Co-ordinator	Construction
	C59.	Due to the erosive nature of the wet based soils, it is very important that a Soil Management Plan be implemented as part of this project.	Environmental Co-ordinator	Construction
	C60.	For **Option B**, continue bi-annual biomonitoring and water quality monitoring of the three sampling sites	Environmental Co-ordinator	Construction
	C61.	For **Option A**, if sedimentation builds up within the artificial channel / storm water canal due to construction and / or spillage it should be removed and disposed of appropriately. Silt nets could also be used to prevent this during the construction phase.	Environmental Co-ordinator	Construction
	C62.	Pipeline route should ideally be restricted to the existing Compressed Air Pipeline corridor and utilise existing river crossings wherever possible. Should existing crossing not be present, all effort must be made to ensure that the minimal amount of support infrastructure is placed within the 1:100 year floodline or wetland and associated buffer, whichever is the greater	Environmental Co-ordinator	Construction
	C63.	Institute adequate sedimentation control measures at river crossings and when excavation or disturbance within riverbanks or the riverbed takes place. Measures are also required to prevent erosion where a large areas of exposed soils exists and around soil stockpiles. When the ECO detects any erosion, the soil specialist/hydrologist can determine which measures should be implemented i.e. silt fences, sand bags, indigenous vegetation cover and sedimentation ponds.	Environmental Co-ordinator	Construction
	C64.	The construction should be well planned to minimise soil excavation in rainy seasons to prevent soil erosion from exposed soil surfaces. Should this not be possible, avoid access into seasonally wet areas and turf soils during and immediately after rainy periods, until such a time that the soil has dried out.	Environmental Co-ordinator	Construction
	C65.	Impacts on the river channel in the form of sedimentation and reshaping that has occurred should be mitigated in order to return the river to its natural state as far as possible.	Environmental Co-ordinator	Construction
	C66.	No aquatic assessment was done in the system downstream of the slurry pipeline route for Option A. Therefore, it is highly recommended that: ■ A WQ and diatom sample be taken in the artificial channel / storm water canal; and ■ A monitoring point downstream of the proposed pipeline on the	Environmental Co-ordinator	Construction

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
		Klipfonteinspruit prior to construction of the pipeline.		
	C67.	Ensure no waste of any nature, or any foreign material is dumped into any watercourse or associated buffer	Environmental Co-ordinator	Construction
	C68.	No water abstraction from the Klipgatspruit should occur.	Environmental Co-ordinator	Construction
	C69.	The pipeline corridor crossings should be aligned, as far as possible, such that it crosses the river at right angles to the direction of flow.	Environmental Co-ordinator	Construction
	C70.	No further river diversions should be implemented for this Project	Environmental Co-ordinator	Construction
	C71.	The pipeline should preferably not go through the culverts at the river crossing points but rather be constructed on top of plinths.	Environmental Co-ordinator	Construction
Noise	C72.	All construction activities will be undertaken during the day	Project Manager/ Construction Manager	Construction
	C73.	Personal protective equipment (PPE) will be supplied to all personnel working onsite in close proximity to noise sources (particularly during blasting activities).	Environmental Co-ordinator	Construction
	C74.	All vehicles and equipment will be serviced regularly, within designated areas, and will be kept in good working order	Construction Manager	Construction
Visual	C75.	Reference to mitigation measures nos. C6, C7, C31, C44, C45, C46		
	C76.	Natural colours should be used as far as possible to blend the infrastructure with the surrounding environment.	Project Manager/ Construction Manager	Pre-construction, construction
	C77.	The minimum amount of existing vegetation, borrow material and topsoil will be removed from construction areas. Wherever possible, all existing natural vegetation will be retained and incorporated into the site design.	Project Manager/ Environmental Co-ordinator	Pre-construction, construction
Air quality	C78.	Reference to mitigation measures nos. C44, C45		
	C79.	Stockpiles will be covered (with hessian cloth) or wet down to prevent becoming a source of dust entrainment should dust generation be a problem.	Construction Manager	Construction
	C80.	Where vegetation clearance has resulted in large areas of bare soil, wind breaks (e.g. shade cloth) will be evaluated to reduce wind speed across these areas. In addition, vegetation clearance will be pre-planned to prevent soil/ ground exposure to the elements.	Construction Manager	Construction
	C81.	Speed limits will be implemented to reduce dust entrainment from unpaved roads.	Construction Manager	Construction

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
Culture and Heritage	C82.	If any sites of potential heritage significance are uncovered during construction activities, work in the area will be stopped immediately and the occurrence will be reported to the SAHRA within 24 hours.	Construction Manager/ Environmental Co-ordinator	Pre-construction, construction
	C83.	If the removal of a heritage site is required, the necessary permits will be obtained from the SAHRA and the removal of a site will be undertaken by a qualified archaeologist in consultation with the SAHRA.	Construction Manager/ Environmental Co-ordinator	Pre-construction, construction
	C84.	Where necessary, heritage sites will be fenced off in order to protect the sites during construction. Should **Option B** be chosen, the fence around the grave yard will be secured and a management plan for the preservation of the site be written by a heritage expert. Contractors should be inducted to understand how to deal with this site.	Construction Manager/ Environmental Co-ordinator	Pre-construction, construction
	C85.	All construction activities will remain outside the 1:100 year flood line as these may be areas where heritage sites are present due to earlier settlements.	Project Manager	Pre-construction
	C86.	Any measures applied by an Archaeologist, in the sense of excavation and documentation, will be published in order to inform I&APs.	Environmental Co-ordinator	Construction
Traffic	C87.	Appropriate warning signs and road markings will be implemented during construction. The accesses to the project components should be controlled by stop signs on the side roads.	Environmental Co-ordinator/ Construction Manager	Construction
	C88.	All construction activities will be restricted to designated working areas with all work areas and access areas clearly marked and signposted.	Environmental Co-ordinator/ Construction Manager	Construction
	C89.	Continuous maintenance of the shoulder lanes.	Environmental Co-ordinator/ Construction Manager	Construction
Socio-economic	C90.	As far as practically possible, labour will be sourced from the local, nearby formal settlements.	Project Manager/ Human Resources Manager	Pre-construction, construction
	C91.	Non-core activities related to the construction phase of the project will be identified and out-sourcing to local service providers promoted.	Project Manager/ Human Resources Manager	Pre-construction, construction
	C92.	Contractors will make all efforts to obtain services and consumables from local entrepreneurs.	Project Manager/ Human Resources Manager	Pre-construction, construction
	C93.	No recruitment will be allowed on site.	Project Manager	Pre-construction, construction
	C94.	The RPM will comply with their Social and Labour Plan (SLP).	Project Manager/ SHE Manager	Construction

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
	C95.	Contractors will comply with the standards of the mine and AAP as a whole.	Project Manager	Pre-construction
	C96.	No informal settlements will be allowed on RPM properties.	Project Manager	Pre-construction
	C97.	Where necessary housing will be the responsibility of the contractors.	Project Manager	Pre-construction
	C98.	PPE must be made available to all construction workers.	Project Manager/ SHE Manager/ Construction Manager	Pre-construction, construction
	C99.	Strict penalties will be built into tenders to deal with issues such as petty crime, stock theft, fence cutting, trespassing, the closing of farm gates etc.	Construction Manager	Construction
	C100.	RPM will ensure that an HIV / AIDS strategy is in place and effectively implemented at the mine.	Project Manager/ SHE Manager/ Construction Manager	Pre-construction, construction
	C101.	Use of existing RPM structures (community engagement forum, community engagement department (CED), community engagement plan and Socio-Economic Assessment Toolbox) to manage existing and potential impacts of RPM activities on local communities.	Construction Manager/CED Manager	Construction
	C102.	RPM will continue to work with the local leadership, and the Rustenburg LM, to ensure they, and their contractors, have access to a current database of potential labour CV's.	Construction Manager	Construction
	C103.	RPM will continue internal and external mentorship programmes, in line with their SLP, and encourage external organisations to be used to facilitate education and skills development programmes through the CED and human Resources Development.	Construction Manager	Construction
	C104.	RPM will, in line with their SLP, ensure that there is continued promotion of skills transfer to local businesses.	Construction Manager	Construction
	C105.	RPM will continue equitable procurement opportunity development, as per the SLP.	Construction Manager	Construction
	C106.	RPM will notify local leadership and business forums of availability of tenders for appointment.	Construction Manager/CED Manager	Construction
	C107.	Existing grievance mechanisms must be accessible to the relevant communities, to ensure that any unforeseen impacts can be reported as soon as possible.	Construction Manager/CED Manager	Construction
	C108.	Actively investigate opportunities for mentorship and apprenticeship programmes be developed through this and future projects in conjunction with contractors and RPM staff through the community engagement forum and CED.	Construction Manager/CED Manager	Construction

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
	C109.	Should any community access routes across the pipeline be removed (e.g. footpaths over the existing pipeline), measures must be put in place to ensure communities can still access resources.	Construction Manager/CED Manager	Construction
	C110.	Should informal access routes (roads and footpaths) be temporarily cut off, measures must be put in place to ensure communities can still access resources. These should include constructing walkways (using earth/gravel) over the pipeline within 100m of the original pathway (or as close as reasonably possible), and ensuring that communities are not prevented access to their traditional livelihoods in any way.	Construction Manager/CED Manager	Construction
	C111.	Should any community access routes across the pipeline be removed (e.g. footpaths over the existing pipeline), measures must be put in place to ensure communities can still access resources. These should include constructing walkways (using earth/gravel for roads and major cattle paths or metal structures for footpaths) over the new pipeline in a similar position of the original pathway. It is recommended that footpath crossings be formalised to reduce health and safety risks of people climbing over the pipeline.	Construction Manager/CED Manager	Construction

11.2 Operational Phase

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
General	O1.	An open channel of communication will be maintained throughout the duration of the project to ensure that all issues are raised and addressed. The existing issues / grievance mechanism will be applied, where applicable.	Environmental Co-ordinator/ On-site Manager/ SHE Manager	Operation
	O2.	All issues / complaints will be included within the existing environmental management system (EMS). Refer to O1 above.	Environmental Co-ordinator/ SHE Manager	Operation
	O3.	Employees will undergo stringent induction prior to being allowed on site. Refer to O1 above.	Environmental Co-ordinator	Operation
	O4.	The existing environmental awareness programme will be instituted.	Environmental Co-ordinator	Operation
Topography	O5.	All infrastructure will be planned and continuously implemented to such an extent to ensure that all blend into the surrounding topography as far as feasible.	Environmental Co-ordinator	Operation

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
Soils Land Use and Land Capability	O6.	Reference to mitigation measures no. O5		
	O7.	Clean and dirty water systems will be effectively implemented and maintained.	Environmental Co-ordinator	Operation
	O8.	On-going rehabilitation will be undertaken throughout the duration of the project. Areas disturbed during the construction phase will be re-vegetated as soon as practically possible.	Environmental Co-ordinator	Operation
	O9.	A rapid response team will be available on 24-hour notice to deal with hazardous spills.	Environmental Co-ordinator	Operation
	O10.	On-going training will be implemented to inform employees of the various procedures on site.	Environmental Co-ordinator	Operation
	O11.	All non-hazardous waste will be handled in accordance with the waste management plan. Refer to O10 above.	Environmental Co-ordinator/ Materials Manager	Operation
	O12.	All hazardous waste will be handled in accordance with the waste management plan.	Environmental Co-ordinator	Operation
	O13.	All vehicles and equipment will be serviced regularly, within designated areas, and will be kept in good working order.	Environmental Co-ordinator	Operation
	O14.	A procedure for the storage, handling and transportation of the different hazardous materials will be incorporated in the waste management plan and will be strictly enforced.	Environmental Co-ordinator	Operation
	O15.	MSDSs will be updated regularly and will be available on site.	Environmental Co-ordinator/ Materials Manager	Operation
	O16.	Oils, greases, diesel and other chemicals will be stored in the prescribed manner, and within bunded areas, throughout the duration of the project.	Environmental Co-ordinator	Operation
	O17.	If a major spillage occurs the supplying contractor, or area supervisor, will be called out to clean the contaminated area and rehabilitated the soils, as appropriate.	Environmental Co-ordinator/ On-site Manager/ SHE Manager	Operation
	O18.	If any minor spillage occurs the spillage will be cleaned immediately and the contaminated area will be rehabilitated, as appropriate.	Environmental Co-ordinator/ On-site Manager/ SHE Manager	Operation
	O19.	The employees will comply with the emergency response procedure on site.	Environmental Co-ordinator/ On-site Manager/ SHE Manager	Operation

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
	O20.	All spills will be reported as indicated in the emergency response procedure on site.	Environmental Co-ordinator/ On-site Manager/ SHE Manager	Operation
	O21.	Employees will be educated in accordance with the Training and Environmental Awareness Plan to make them aware of the necessity to prevent spillages by the implementation of the good housekeeping practices.	Environmental Co-ordinator/ SHE Manager	Operation
Fauna and Flora	O22.	A monitoring programme will be implemented that will ensure that all weed and alien species will be eradicated in and around the project area. Measures will also be implemented to prevent the spreading of these species throughout the duration of the project.	Environmental Co-ordinator/ On-site Manager	Operation
	O23.	Platforms created to allow animals to traverse linear infrastructure will be maintained throughout the duration of the project.	Environmental Co-ordinator/ On-site Manager	Operation
	O24.	Reference to mitigation measures nos. O7, O8, O9, O10, O11, O12, O13, O14, O15, O16, O17, O20		
	O25.	The harvesting of natural vegetation for fuel wood or any other purposes will be strictly prohibited.	Environmental Co-ordinator	Operation
	O26.	The poaching and hunting of animals will be strictly prohibited.	Environmental Co-ordinator	Construction, Operation, Closure
	O27.	All fences will be maintained by the mine.	Environmental Co-ordinator	Construction, Operation, Closure
	O28.	Clear signs will be maintained to indicate the potential presence of wildlife.	Environmental Co-ordinator	Construction, Operation, Closure
	O29.	Vehicle speed will be managed and will not exceed 40km / hr on mine roads.	Mining Engineer/ SHE Manager/ Safety Officer/ On-site Manager	Construction, Operation, Closure
	O30.	Dust suppression techniques such as regular water spraying or the utilisation of dust allaying agents will be implemented.	Environmental Co-ordinator	Operation
	O31.	Lights will be strategically placed where necessary and in such a way to ensure the least light spillage / nuisance occurs. Security flood lighting and operational lighting will only be used where absolutely necessary and carefully directed, preferably away from sensitive viewing areas. Wherever possible lights will be directed downwards.	Environmental Co-ordinator/ On-site Manager	Operation
	O32.	Where noise becomes a nuisance management measures will be investigated and implemented to address these.	Environmental Co-ordinator	Operation
Surface Water	O33.	Reference to mitigation measures nos. O7, O8, O9, O10, O11, O12, O13, O14, O15, O16, O17, O18, O19, O20		

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
	O34.	All channels and retention facilities will be designed and maintained at the required capacity to ensure the 50-year storm event can be appropriately contained. All channels and culverts will be checked after any major rainfall events to ensure that there are no blockages and that water is not restricted in any way.	Environmental Co-ordinator	Operation
	O35.	Sediment that accumulates within channels needs to be removed directly after storm events to ensure the design capacity is maintained. Should sediments be expected to contain contamination, this sediment will be appropriately handled and disposal of to an appropriate waste disposal facility.	Environmental Co-ordinator	Operation
	O36.	To verify water quality impacts to the watercourse are limited, it is recommended that a monitoring plan be developed and followed.	Environmental Co-ordinator	Operation
	O37.	Runoff, which is likely to contain suspended solids and sediments, will be routed through a settling pond to enable sediment to settle prior to discharge.	Environmental Co-ordinator	Operation
	O38.	The comprehensive surface monitoring programme for quality and quantity management will be maintained.	Environmental Co-ordinator	Operation
	O39.	Dirty water and process water will be recycled as far as practically possible.	Environmental Co-ordinator	Operation
	O40.	Any seepage arising from the Waterval, Hoedspruit or Paardekraal TSFs continue to be captured and appropriately managed to limit contributions to the receiving watercourses	Environmental Co-ordinator	Operation
	O41.	To limit spillage from the Hoedspruit RWD (**Option B** only), options to reduce contributions to this system need to be investigated though water management within the contributing infrastructure. Furthermore, options to re-use or recycled water within the dam need to be investigated.	Environmental Co-ordinator	Operation
	O42.	The pipeline integrity needs to be checked to ensure leaks of water and slurry do not occur.	Environmental Co-ordinator	Operation
	O43.	The sumps at the Booster Station need to be maintained at the design capacity through continued cleaning of any accumulated spilled slurry to ensure that it can hold any slurry leaks (**Option B** only)	Environmental Co-ordinator	Operation
	O44.	Uncontrolled releases of slimes during the re-mining operations needs to be managed through appropriate designs and monitoring during the operations. This includes releases from water control measures in place at the re-mining area, as well as leaks from the water and slurry pipelines	Environmental Co-ordinator	Operation
Groundwater	O45.	The comprehensive groundwater monitoring programme for quality and quantity management will be maintained.	Environmental Co-ordinator	Operation

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
	O46.	Excess water will be disposed of in a legal (necessary licenses in place), acceptable manner (potential for inter-mine transfer).	Environmental Co-ordinator/ Mining Engineer	Operation
	O47.	To limit impacts to groundwater through the creation of a driving water head, where possible the sluicing of the Waterval TSF should be managed to limit water accumulation, with the reclamation focussed on discreet areas.	Environmental Co-ordinator/ Mining Engineer	Operation
	O48.	Reference to mitigation measures nos. O7, O8, O9, O10, O11, O12, O13, O14, O15, O16, O17, O36, O38		
Aquatic	O49.	As per the Anglo American Spillage Clean-Up Procedure (WLTR-ALL-EN-PRO-0001), the following clean-up procedures must be followed if a slurry spillage should occur during the operational phase: ■ Slurry spills must be reported immediately; ■ Pumping along the line must cease; ■ The extent of the spill must be contained by using berms or bund walls; ■ The line must be repaired adequately to prevent further spillage; and ■ The slurry must be allowed to dry sufficiently to be removed or either put back in the process or trucked and deposited on the tailings dam.	Environmental Co-ordinator	Operation
	O50.	An Environmental Incident deemed significant has to be reported immediately to the relevant authority	Environmental Co-ordinator	Operation
	O51.	Reference to mitigation measures no. O42	Environmental Co-ordinator	Operation
	O52.	Maintenance and flushing of the pipeline should be avoided where possible during flood events.	Environmental Co-ordinator	Operation
	O53.	The pipeline should be properly flushed with process water, prior to breaking the line for the maintenance process.	Environmental Co-ordinator	Operation
	O54.	No sumps are to be constructed for the operation and maintenance of the pipeline. It has been assumed that all water and solids within the pipeline will be cleared prior to breaking the pipeline for maintenance purposes.	Environmental Co-ordinator	Operation
	O55.	No process water to enter the receiving environment during the maintenance phase.	Environmental Co-ordinator	Operation
	O56.	Where destruction of vegetation along river banks has occurred and re-establishment of vegetation has not taken place after one season, rehabilitation is vital by planting/seeding indigenous vegetation suitable to the area to fulfil the habitat requirement of the macro-invertebrates, fish	Environmental Co-ordinator	Operation

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
		communities and reduce future soil erosion.		
	O57.	Remove all alien vegetation in the 1:100 year floodlines or wetland and associated buffer, whichever is greater, which can cause competitions for the indigenous species and hinder their growth if such vegetation occurred as a result of the construction activity. This must be determined after at least two seasons growth.	Environmental Co-ordinator	Operation
	O58.	No water abstraction from the Klipgatspruit should occur.	Environmental Co-ordinator	Operation
Noise	O59.	Comprehensive noise monitoring will be undertaken and mitigation measures implemented where required.	Environmental Co-ordinator	Operation
	O60.	Screens (i.e. screening methods, enclosed equipment etc.) will be implemented to reduce the noise in areas of concern. These measures will take into account noise generated during night time conditions.	Environmental Co-ordinator/ SHE Manager	Operation
	O61.	PPE will be worn by personnel working on-site in close proximity to noise sources.	Environmental Co-ordinator/ SHE Manager	Operation
	O62.	Operational activities associated with the Waterval Retrofit E-Feed Project will be limited as far as possible to daylight hours.	Environmental Co-ordinator/ SHE Manager	Operation
	O63.	All vehicles and equipment will be serviced regularly, within designated areas, and will be kept in good working order	Environmental Co-ordinator/ SHE Manager	Operation
Visual	O64.	Reference to mitigation measures nos. O5, O28, O29, O30		
Air Quality	O65.	The dust management plan will be reviewed annually and updated where relevant.	Environmental Co-ordinator/ SHE Manager/ On-site Manager	Operation
	O66.	Vehicle speed will be managed and will not exceed 40km / hr on mine roads.	Environmental Co-ordinator/ SHE Manager/ On-site Manager	Operation
	O67.	Reference to mitigation measures nos. O20, O28, O29		
Traffic	O68.	Continuous maintenance of the shoulder lanes will be performed.	Environmental Co-ordinator/ Mining Engineer/ Logistics Department	Operation
	O69.	Driver's behaviour will be monitored to ensure adherence to operating speed limits.	Environmental Co-ordinator/ SHE Manager/ Logistics Department	Operation
Cultural and	O70.	If any sites of potential heritage significance are uncovered during	Environmental Co-	Operation

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
Heritage		construction activities, work in the area will be stopped immediately and the occurrence will be reported to the SAHRA within 24 hours.	ordinator	
	O71.	If the removal of a heritage site is required, the necessary permits will be obtained from the SAHRA and the removal of a site will be undertaken by a qualified archaeologist in consultation with the SAHRA.	Environmental Co-ordinator	
	O72.	Should **Option B** be chosen, the fence around the grave yard will be maintained and the management plan implemented for the preservation of the site.		
Socio-economic Conditions	O73.	As far as possible, labour will be sourced from the local, nearby formal settlements.	Human Resource Manager/ SHE Manager	Operation
	O74.	Non-core activities related to the mining operation of the project will be identified and out-sourced to local service providers.	Human Resource Manager/ SHE Manager	Operation
	O75.	No recruitment will be allowed on site.	Human Resource Manager	Operation
	O76.	The mine will, in line with their SLP, ensure that there is continued promotion of skills transfer to local businesses.	Human Resource Manager/ SHE Manager	Operation
	O77.	The mine will work together with the Rustenburg LM to implement the housing strategy.	Human Resource Manager/ SHE Manager	Operation
	O78.	Prophylactics will be made available to all staff and workers.	Human Resource Manager/ SHE Manager	Operation
	O79.	The mine will ensure that an HIV / AIDS strategy is in place and effectively implemented.	SHE Manager	Operation
	O80.	Where possible, staff will be accommodated in the existing housing schemes.	Human Resource Manager/ SHE Manager	Operation
	O81.	The existing community engagement forum and community engagement plan will be used as tools to promote open communication channels between the mine and local communities.	Human Resource Manager/ CED Manager/ Environmental Co-ordinator	Operation
	O82.	The mine will continue to work with the local leadership, and the Rustenburg LM, to ensure they, and their contractors, have access to a current database of potential labour CV's.	Human Resource Manager/ CED Manager	Operation
	O83.	The mine will continue internal and external mentorship programmes, in line with their SLP, and encourage external organisations to be used to facilitate education and skills development programmes through the CED and human Resources Development.	Human Resource Manager/ SHE Manager	Operation

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
	O84.	The mine will, in line with their SLP, ensure that there is continued promotion of skills transfer to local businesses.	Human Resource Manager/ SHE Manager	Operation
	O85.	The mine will continue equitable procurement opportunity development, as per the SLP.	Human Resource Manager/ SHE Manager	Operation
	O86.	Existing grievance mechanisms must be accessible to the relevant communities, to ensure that any unforeseen impacts can be reported as soon as possible.	Human Resource Manager/ SHE Manager	Operation
	O87.	Actively investigate opportunities for mentorship and apprenticeship programmes be developed through this and future projects in conjunction with contractors and RPM staff through the community engagement forum and CED.	Human Resource Manager/ SHE Manager	Operation
	O88.	Should any community access routes across the pipeline be removed (e.g. footpaths over the existing pipeline), measures must be put in place to ensure communities can still access resources. These should include constructing walkways (using earth/gravel for roads and major cattle paths or metal structures for footpaths) over the new pipeline in a similar position of the original pathway. It is recommended that footpath crossings be formalised to reduce health and safety risks of people climbing over the pipeline.	Human Resource Manager/ SHE Manager	Operation
	O89.	Reference to mitigation measures nos. O10, O12, O13, O14, O17, O18, O29, O31, O77		

11.3 Decommissioning and Closure Phase

The following management measures are planned for the closure phase; however, a detailed closure plan will be submitted to the DMR once closure is undertaken.

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
General	D1.	An open channel of communication will be maintained throughout the construction activities to ensure that all issues are raised and addressed.	Environmental Co-ordinator/ SHE Manager	Closure
	D2.	All issues / complaints will be included within the existing EMS system.	Environmental Co-ordinator/ SHE Manager	Closure
	D3.	Contractors will undergo stringent induction prior to being allowed on site.	Construction Manager/ Training Manager	Closure

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
	D4.	The existing environmental awareness programme will be instituted.	Environmental Co-ordinator/ Construction Manager	Closure
Topography	D5.	The affected area will be rehabilitated, as close as possible, to its pre-mining land capability.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D6.	All areas where rehabilitation is taking place will be fenced off until the process has been completed and self-succession is in place.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
Soils Land Use and Land Capability	D7.	An appropriately qualified and experienced person will be appointed to sample areas of replaced topsoil to determine the chemical conditions and to ameliorate these areas to a level that will meet the pre-mining soil conditions.	Environmental Co-ordinator/ Mining Engineer/ Qualified and Experienced Person	Closure
	D8.	Areas where rehabilitation is being undertaken will be fenced off.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D9.	Contractors will be limited to the clearly defined access routes and areas to be decommissioned and demolished in order to ensure that undisturbed areas will not be disturbed.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D10.	Erosion control measures will be put into place in the areas where rehabilitation has not been completed.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D11.	All clean and dirty water infrastructure will be maintained up until the completion of demolition and rehabilitation activities.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D12.	All non-hazardous waste will be handled in accordance with the waste management plan.	Environmental Co-ordinator/ SHE Manager	Closure
	D13.	All hazardous waste will be handled in accordance with the waste management plan.	Environmental Co-ordinator/ SHE Manager	Closure
	D14.	A procedure for the storage, handling and transportation of the different hazardous materials will be drawn up for the mine and will be strictly enforced.	Environmental Co-ordinator	Closure

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
	D15.	MSDSs will be updated regularly and will be made available on site.	Environmental Co-ordinator	Closure
	D16.	Oils, greases, diesel and other chemicals will be stored in the prescribed manner and within bunded areas.	Environmental Co-ordinator	Closure
	D17.	If a major spillage occurs the contractor or mine will be called out to clean the contaminated area and rehabilitated the soils, as appropriate.	Environmental Co-ordinator	Closure
	D18.	If any minor spillage occurs the spillage will be cleaned immediately and the contaminated area will be rehabilitated, as appropriate.	Environmental Co-ordinator/ SHE Manager	Closure
	D19.	All spills will be reported as indicated in the emergency response procedure on site.	Environmental Co-ordinator/ SHE Manager	Closure
	D20.	Decommissioning and rehabilitation contracts will include conditions, which make contractors aware of the necessity to prevent spillages by the implementation of good housekeeping practices.	Environmental Co-ordinator/ SHE Manager	Closure
	D21.	A rapid response team will be available on 24-hour notice to deal with hazardous spillages.	Environmental Co-ordinator/ SHE Manager	Closure
	D22.	All vehicles and equipment will be serviced regularly, within designated areas, and will be kept in good working order.	Environmental Co-ordinator/ Logistics Manager	Closure
	D23.	The existing environmental awareness programme will be instituted.	Environmental Co-ordinator/ SHE Manager	Closure
	D24.	Trucks will not be overloaded with building rubble, cement, borrow material etc.	Environmental Co-ordinator/ Logistics Manager	Closure
	D25.	Trucks will not be overfilled at the fuelling depots. Re-fuelling will be supervised. Any spillage or accidental discharge of fuel onto soil or vegetation will be reported to the mine's Environmental Co-ordinator and the necessary management measures will be in place for the cleaning of spillages.	Environmental Co-ordinator/ Logistics Manager	Closure
	D26.	The maintenance of the chemical toilets will be the responsibility of an external contractor.	Environmental Co-ordinator/ SHE Manager	Closure
	D27.	No septic tank or French drain systems will be constructed.	Environmental Co-ordinator/ SHE Manager	Closure
	D28.	Sewage from chemical toilets will be transported to the existing sewage treatment plants and the residues disposed of in a controlled manner.	Environmental Co-ordinator/ SHE Manager	Closure
Fauna and Flora	D29.	Reference to mitigation measures nos. D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25, D26		

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
	D30.	All areas disturbed by mining activities, and where topsoil has been replaced at a thickness of 300mm, will be vegetated with a mix of indigenous grassland species.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D31.	Rehabilitated areas will be monitored and managed until self-succession is in place.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D32.	Weed and alien invader species will be eradicated in and around the project area and will be monitored until a closure certificate has been obtained.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D33.	The harvesting of natural vegetation for fuel wood or any other purposes will be strictly prohibited.	Environmental Co-ordinator/ SHE Manager	Closure
	D34.	The poaching and hunting of animals will be strictly prohibited.	Environmental Co-ordinator/ SHE Manager	Closure
	D35.	Sustainable erosion control measures (for wind and water erosion) will be maintained.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D36.	The demolition and rehabilitation areas and routes will be fenced off.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D37.	Fences will be maintained by the mine.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D38.	Clear signs will be erected to indicate the potential presence of wildlife.	Environmental Co-ordinator/ SHE Manager	Closure
	D39.	Vehicle speed will be managed and will not exceed 40km / hr on mine roads.	Environmental Co-ordinator/ SHE Manager	Closure
	D40.	Fire fighting equipment will be checked regularly and a fire action plan will be in place.	Environmental Co-ordinator/ SHE Manager	Closure
	D41.	The strategies, and emergency response associated with potential veld fires will be included in the fire fighting strategy.	Environmental Co-ordinator/ SHE Manager	Closure

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
	D42.	All contractors and employees will be informed of the contents of the fire fighting strategy.	Environmental Co-ordinator/ SHE Manager	Closure
	D43.	Dust suppression techniques, such as regular water spraying or the utilisation of dust allaying agents, will be implemented.	Environmental Co-ordinator/ SHE Manager	Closure
	D44.	Lights will be strategically placed where necessary and in such a way to ensure the least light spillage/ nuisance occurs.	Environmental Co-ordinator/ SHE Manager	Closure
	D45.	All demolition activities will be undertaken during daylight hours.	Environmental Co-ordinator/ SHE Manager/ Mining Engineer/ Closure Manager	Closure
Surface Water	D46.	Reference to mitigation measures nos. D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25, D26		
	D47.	Monitoring of surface water quality sampling points will continue until the acceptable quality is reached and agreement has been obtained from the DWA.	Environmental Co-ordinator/ SHE Manager/ Mining Engineer/ Closure Manager	Closure
	D48.	During the decommissioning/ closure phase, although there will be a reduction in the extent of hardstanding, there is still the potential for increased runoff due to compaction of the soils. As with the construction phase, during this period heavy machinery will be limited to designated roads and construction areas to limit soil compaction.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D49.	During decommissioning/ closure of the facility, there are expected to be similar impacts to the construction phase due to the exposure of soils and use of heavy machinery. To limit these impacts, it is recommended that the stormwater management infrastructure (channels and PCD) remain to capture dirty runoff.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D50.	To limit erosion it will be ensured that the soils maintain their pre-development characteristics to ensure infiltration and vegetation rooting.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
	D51.	During decommissioning activities, due to the presence of residual slurry within the containment facilities and pipes, any spillages should be limited to prevent impacts to the receiving watercourses.	Environmental Co-ordinator/ Mining Engineer/ Closure Manager	Closure
Groundwater	D52.	Reference to mitigation measures nos. D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25, D26		
	D53.	Monitoring of groundwater (from the existing boreholes) will continue until the acceptable quality and levels are reached and agreement from the DWA has been obtained. Appropriate rehabilitation measures will be taken if the monitoring indicates that contamination of the groundwater has	Environmental Co-ordinator/ SHE Manager/ Mining Engineer/ Closure	Closure

Impacted Environment	Management Measure No.	Mitigation Measures	Responsible Party	Priority
		occurred.	Manager	
	D54.	Reference to mitigation measures nos. D1, D2, D43, D44		
Cultural and Heritage	D55.	If any sites of potential heritage significance are uncovered during construction activities, work in the area will be stopped immediately and the occurrence will be reported to the SAHRA within 24 hours.	Environmental Co-ordinator/ SHE Manager	Closure
	D56.	If the removal of a heritage site is required, the necessary permits will be obtained from the SAHRA and the removal of a site will be undertaken by a qualified archaeologist in consultation with the SAHRA.	Environmental Co-ordinator/ SHE Manager	Closure
	D57.	Should **Option B** be chosen, the fence around the grave yard will be maintained and the management plan implemented for the preservation of the site. Contractors should be inducted to understand how to deal with this site.	Environmental Co-ordinator/ SHE Manager	Closure
Socio-economic Conditions	D58.	The mine will ensure that the SLP has been implemented effectively during the Operational Phase and will continue to do so during the Closure Phase, thereby ensuring the sustainable skills development are implemented and that the employees are equipped for tasks other than mining to sustain them post-closure.	Human Resource Manager/ SHE Manager	Closure
	D59.	No informal settlements will be allowed on mine properties during the Closure Phase.	Human Resource Manager/ SHE Manager	Closure
	D60.	Contractors will comply with the standards of the mine and Anglo American Platinum as a whole.	Human Resource Manager/ SHE Manager	Closure
	D61.	Strict penalties will be built into tenders to deal with issues such as petty crime, stock theft, fence cutting, trespassing, the closing of farm gates etc. during the Closure Phase.	Human Resource Manager/ SHE Manager	Closure
	D62.	The mine will routinely inspect the area where rehabilitation has taken place.	Human Resource Manager/ SHE Manager	Closure
	D63.	PPE will be made available to all contract workers and employees.	Human Resource Manager/ SHE Manager/ Environmental Co-ordinator	Closure
	D64.	The mine will manage this phase in accordance with the SLP, to minimise local impact (within the area of influence). It is, however, likely that there will be a need to provide notice to third-party contractors and service providers of impending decommissioning and closure plans, so as to ensure that alternative opportunities can be sought by these organisations/ individuals.	Human Resource Manager/ SHE Manager/ Environmental Co-ordinator	Operation

12 Implementation of the Environmental Management Programme

Environmental goals and objectives have been determined for various aspects of the Project, these include, as required in regulation 51 (a) of the MPRDA:

- Management of identified environmental impacts;
- Socio-economic aspects, including the requirements of the SLP; and
- Mine closure (refer to **Section 13**).

12.1 Environmental Impact Management

Potential impacts on the environment will be mitigated and managed by implementing the management and mitigation measures as identified in the EMP in **Section 11**.

However, RPM has already developed and implemented an ISO 14001:2004 EMS that has received and maintained certification (refer to **Appendix E** for a copy of the EMS Certificate) and has resulted in all significant environmental aspects being identified and rigorously managed through the following activities:

- Identification and application of applicable legal and other environmental requirements;
- Identification of environmental aspects and associated impacts;
- Determination of environmental aspect and impact significance;
- Development of a management programme (and associated action plans) to address significant aspects and impacts;
- Development of strategic and operational procedures to implement the management programme;
- Development of operational procedures for the development and implementation of environmental awareness;
- Determination of corrective and preventative actions related to environmental incidents;
- Implementation of environmental monitoring and measurement procedures to measure compliance with the EMS and other environmental requirements;
- Identification and management of potential emergency situations and potential incidents that can potentially impact on the environment; and
- Checking and auditing of the suite of EMS requirements to ensure compliance and maintain certification.

12.2 Social and Labour Plan

AAP's SLP has been compiled for each operation as a commitment by the Group to assist in addressing the social and economic impacts that its operations have on the surrounding communities, as well as on rural communities from which migrant labour tends to be drawn. These plans recognise that minerals are non-renewable and focus on managing the impacts of eventual downscaling and closure as part of strategic business planning. These SLPs further make provisions for the development of management, scientific, engineering and a variety of other skills in historically disadvantaged members of the community through learnerships, adult based education and training, portable skills and bursaries.

At an environmental and social level, AAP operations conform to three different safety, health, environment, and quality standards: ISO9001, ISO14001, and OHSAS18001. In addition, the group meets the standards set in corporate governance recommendations proposed by Turnbull and the King III Report.

The principal interventions arising from RPM's SLP are indicated below:

- Human resources development programmes that cover a continuum from adult based education and training 1 (basic literacy and numeracy training) through to post-graduate education. These programmes are consistent with the requirements of the national qualifications forum and the mine qualifications authority;
- A talent pool from which historically disadvantaged South African employees are identified and fast-tracked;
- A mentoring and coaching programme accessible to all employees who wish to take advantage of this facility;
- A bursary scheme that is open to the broader public as well as employees' children and relatives;
- Employment and gender equity programmes, which have specific targets;
- Local economic development, through the group's procurement policy and its business development officer and community engagement and development programmes, as well as the provision of business skills training programmes to community members;
- Housing, through a range of schemes designed to encourage group-subsidized or -supported home ownership and to reduce the dependence on mine-provided accommodation;
- The provision of healthcare, especially access to treatment for HIV/ AIDS and emergency care;
- Participation in and contribution to the development and implementation of local municipalities' IDPs, in line with sustainable development principles; and
- With respect to the remote communities affected by the mine, particularly those providing migrant labour, the contribution by each AAP mine to a group-wide policy for social and economic development projects in these rural areas.

The achievement of all targets and performance requirements discussed in AAP's SLP are integral to the annual performance review of all business unit managers, as well as those managers and personnel directly responsible for these achievements in each operational or departmental area.

12.3 Monitoring and Environmental Performance

The MPRDA states under regulation 55 that to ensure compliance with an EMP and to assess the continued appropriateness and adequacy of the EMP, the holder of a mining right must conduct monitoring on a continuous basis, conduct performance assessments of the EMP and compile and submit a performance assessment report to the Minister in which such compliance is demonstrated. RPM complies with these requirements once every two years. The Project will be incorporated in to the existing EMP performance assessment report that has been developed, with the following objectives:

- Provide documentation concerning EMP performance assessment findings;
- Provide the management of the mine, the DMR and other relevant Government departments with appropriate information;
- Establish compliance with the commitments in the EMP; and
- Supply a basis for the initiation of corrective action, where necessary or appropriate, as identified through the assessment (including the implementation of additional measures where impacts are proven to cause pollution/ degradation even with mitigation measures in place).

On-going monitoring of the biophysical and socio-economic environments will continue throughout the life of the mine as per the existing approved EMPs and the accepted monitoring programmes. The mine's EMS will monitor and assess the performance of the EMS and EMP through checking and auditing on an on-going basis, which will include annual certification of the EMS and compliance to EMS and associated management commitments.

- All procedures (emergency, environmental awareness, rehabilitation strategies, etc.) will be included in the mine's EMS;
- The mine's EMS will monitor and assess the performance of the EMP on an on-going basis. A formal audit of the performance assessment of the EMP will take place once every two years;
- All impacts will be monitored as described by the management measures provided in **Section 11** by utilising the mine's existing monitoring systems;
- All information, as required by the various government departments, will be captured and be readily available for submission when required;
- An AAP annual report will be submitted to the DMR; and
- The financial provision (method and quantum) will be updated annually.

The latest EMP performance assessment report is included in **Appendix E**.

12.3.1 Operational Procedures Relating to Monitoring

All monitoring and performance assessments of health, safety, environment and legal compliance are executed in accordance with the relevant RPM operational procedures. Copies of the operating procedures can be made available on request. It must be noted that although the operating procedures are utilised, requirements contained in the relevant South African statues are also utilised to ensure compliance and best practise.

12.3.2 Monitoring Schedule

RPM shall establish, implement and maintain a procedure(s) for periodically evaluating compliance with applicable legal requirements within each operation. RPM shall also evaluate compliance with other requirements to which it subscribes. Records of findings, observations, etc. of the evaluation shall be maintained.

RPM shall establish, implement and maintain procedures for dealing with actual and potential non-conformities identified and will develop procedures for taking corrective and preventive action. The procedures shall define requirements for the following:

- Identifying and correcting non-conformities and taking actions to mitigate their environmental impact;
- Investigating non-conformities, determining their causes and taking actions in order to avoid their recurrence;
- Evaluating the need for actions to prevent non-conformities and implementing appropriate actions designed to avoid their occurrence;
- Recording the results of corrective actions and preventive actions taken; and
- Reviewing the effectiveness of corrective actions and preventive actions taken.

RPM is to ensure that annual internal audits of the conditions within the EMPR are conducted at planned intervals. Audit procedures shall be established, implemented and maintained and shall address the responsibilities and requirements for planning and conducting audits, reporting results and retaining associated reports. The procured shall also address the determination of the audit criteria, scope, frequency and methods. RPM auditors shall ensure objectivity of the audit process.

12.4 Environmental Awareness Plan

The MPRDA requires that, under regulation 55 (b)(vi), an environmental awareness plan be included as part of the EMP submission. The Project will utilise the existing RPM environmental awareness plan (as attached in **Appendix E**). This environmental awareness plan was developed as part of the development and implementation of the certified ISO 14001:2005 EMS.

To ensure all personnel at the mine, contractors and stakeholders are aware of the environmental consequences of their actions while employed by the mine an environmental awareness plan has been established that is implemented in accordance with the MPRDA, as well as with the existing EMS utilised at the mine. Meetings, environmental topics, internal and external communication, grievance procedures, and training are used to implement and ensure environmental awareness within the organisation.

12.4.1 Internal Communication

Meetings, memos, notice boards, briefs, reports, monthly themes, daily operational bulletins, newsletters, emails, and induction training is used internally to promote environmental awareness within the organisation.

12.4.2 Standard Meetings

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

- Safety, health and environmental meetings are held monthly by 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.

12.4.3 Environmental Topics

Monthly environmental talk topics are compiled and distributed by the environmental section personnel to relevant people and are displayed on notice boards. Environmental topics include topics such as water and air quality, power consumption, waste management, emergency procedures, incident reporting and general environmental awareness (e.g. World Environment Day, National Arbour Day).

12.4.4 External Communication

12.4.4.1 Socio-Economic Assessment Toolbox meeting

The socio-economic assessment toolbox meeting (which is held on a bi-monthly basis) is a forum used to keep stakeholders informed of the significant environmental aspects identified through the EMS. This is also the forum where stakeholders get the opportunity to raise environmental concerns. Records are kept of all decisions and concerns.

12.4.4.2 Publications

Let's Talk newsletters, the annual sustainable development report and the AAP annual report are also used to communicate environmental issues to outside parties

12.4.5 General communications

Any environmental issues will be communicated to and from the head office (in terms of divisional and group communication) by fax or email, news briefs, formal meetings and workshops, quarterly environmental reports, and annual environmental reports.

Communication to community, government, neighbouring mines, farmers, landowners, environmental groups, non-governmental organisations and other stakeholders will be communicated by fax or email, the postal system, telephone, formal meetings, and open days.

12.4.6 Complaints

All environmental related complaints and queries are directed to the relevant environmental co-ordinator for attention. All information regarding complaints reported to the RPM telephone exchange are captured on a complaint form and handed to the relevant environmental co-ordinator. The relevant environmental co-ordinator records all complaints in the complaints register.

The environmental co-ordinator forwards all complaints received onto the community engagement department or as detailed in the relevant complaints procedure (specific for each operation). The Community Engagement department is responsible for capturing the complaints on an EMS system and developing appropriate actions..

12.4.7 Training

The following facets to training form part of the environmental awareness plan:

12.4.7.1 Induction

Environmental awareness training is given at induction when personnel join the company and/ or return from leave. Induction training is also given to visitors entering the site.

12.4.7.2 Job specific training

Job specific training programs are developed for the business areas as and when required. The programs are based on the significant environmental aspects / impacts identified in the development of the mine's ISO140001 EMS. Training material focuses on waste prevention and control, storing and handling of chemicals, incident reporting, and spill management.

This training is not linked to a specific role or task, but rather to the business area as a whole. Supervisory staff are equipped with the necessary knowledge and information to guide their employees on environmental aspects applicable to performing a specific task.

12.4.7.3 Competency training

The environmental co-ordinator(s) is responsible for the environmental competency and awareness training of middle management and supervisors. This training is done both on a one-on-one basis (e.g. the electronic action management system (IRM.net) operation and setting of environmental programmes) and through workshops and presentations.

Competence and the effectiveness of training and development initiatives are determined through trend analysis of incidents reported and analysis of work areas during visits and audits. The process to declare competency of personnel is documented in the ISO9001:2000 procedures at the KDC training centre

12.5 Environmental Process Related to Emergencies and Remediation

The MPRDA regulations Section 51(b) (iii) stipulate that mines implement procedures for environmental related emergencies and remediation. In addition, Section 4.4.7 of the EMS standard ISO 14001:2004 requires that the organisation 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. The organisation shall review and revise, where necessary, its emergency preparedness and response procedures, in particular, after the occurrence of incidents where practicable. The organisation shall also periodically test such procedures where practicable.

The EMS, as briefly mentioned above, identifies and ensures management of environmental emergencies and remediation through an emergency preparedness and response plan. 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 or fuel spill. The mine has an emergency preparedness and response plan (as contained in **Appendix E**), which is certified and therefore complies with the requirements of both the

MPRDA and ISO 14001:2004. Also, note that each operation has an emergency preparedness response that is specific to its needs.

The purpose of the mine emergency preparedness and response plan is to provide guidance to employees and contractors as to their responsibilities in the event of an actual environmental emergency or potential environmental emergency at the mine, concerning chemical, oil, fuel, spills and other incidents.

The emergency preparedness and response plan has been developed to provide guidance to ensure that:

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

13 Closure and Rehabilitation

A Closure Liability Assessment for the RPM operations in the North West Province was undertaken by SRK Consulting (South Africa) (Pty) Ltd during 2013, and is attached in **Appendix B**. This section is based on the contents of that document.

13.1 Methods for financial provision[9]

The DMR is responsible for approving proposed financial provisions and GNR 527 allows for four methods of financial provisioning. These provisions should include a detailed itemisation of all anticipated costs for:

- Premature closure;
- Planned decommissioning and closure; and
- Post closure management of residual and latent environmental impacts.

Calculating the quantum is supported by a guideline issued by the DMR in 2005, *Guideline Document for the Evaluation of the Quantum of Closure Related Financial Provision Provided by a Mine*. The purpose of this guideline is to assist the DMR officials in evaluating financial provisions provided by the mine. The guideline indicates that the risk posed by the mineral being mined / processed must be considered with the risk posed by the location of the mine relative to the environmental sensitivities of the area. Based on the criteria listed in the guideline, it is assumed that RPM would have a medium sensitivity rating. The derivation of this is presented in **Table 41**, which is a copy of the matrix used by the DMR. The criteria relevant to RPM have been emboldened. The guideline indicates that if there is extensive information available (which is the case at RPM) that quantifies the risks, the DMR can:

- Accept the quantum determined by the mine;
- Commission an independent review by a competent person; and
- Follow a rules-based approach as laid out in the guideline (which provides unit rates depending on the class and sensitivity of the mine).

Table 41: DMR's sensitivity matrix for the project footprint

Sensitivity	Sensitivity criteria		
	Biophysical	**Social**	**Economic**
Low	■ Largely disturbed from natural state, ■ Limited natural fauna and flora remains, ■ Exotic plant species evident, ■ Unplanned development, ■ Water resources disturbed and impaired.	■ The local communities are not within sighting distance of the mining operation, ■ Lightly inhabited area (rural).	■ The area is insensitive to development, ■ **The area is not a major source of income to the local communities.**

[9] The legal basis for closure planning is discussed in Section 2.2 above

Sensitivity	Sensitivity criteria		
	Biophysical	**Social**	**Economic**
Medium	■ Mix of natural and exotic fauna and flora, ■ Development is a mix of disturbed and undisturbed areas, within an overall planned framework, ■ Water resources are well controlled.	■ **The local communities are in the proximity of the mining operation (within sighting distance),** ■ Peri-urban area with density aligned with a development framework, ■ Area developed with an established infrastructure.	■ The area has a balanced economic development where a degree of income for the local communities is derived from the area, ■ The economic activity could be influenced by indiscriminate development.
High	■ Largely in natural state, ■ Vibrant fauna and flora, with species diversity and abundance matching the nature of the area, ■ Well planned development, ■ Area forms part of an overall ecological regime of conservation value, ■ Water resources emulate their original state.	■ The local communities are in close proximity of the mining operation (on the boundary of the mine), ■ Densely inhabited area (urban/dense settlements), ■ Developed and well-established communities.	■ The local communities derive the bulk of their income directly from the area, ■ The area is sensitive to development that could compromise the existing economic activity.

13.2 Basis of Closure Design

13.2.1 Closure Objectives

As no approved closure plan has yet been developed for the RPM, SRKs cost assessment is based on generic objectives that are aligned to the commitments that have been made in approved EMPs that have been developed for the different stages of the mine. These objectives are:

- Adhere to all statutory and other legal requirements;
- Ensure health and safety of all stakeholders during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks;
- Ensure that closure supports productive uses considering pre mining conditions and are in agreement with commitments to stakeholders;
- Physically and chemically stabilise remaining structures to minimise residual risks;
- Promote biodiversity and biological sustainability; and
- Utilise closure strategies that promote a self-sustaining condition with little or no need for on-going care and maintenance.

13.2.2 Post closure land use

The post closure land use for the RPM mine lease area has been described in the preliminary mine closure plan (SRK, 2013). This plan was developed taking cognisance of information on soil type, land capability and land use as well as the Spatial Development Framework for Rustenburg.

The plan for the lease area is to have blocks of land rehabilitated to the following post closure land:

- Agricultural use interspersed with residential areas;
- Grazing / wilderness areas interspersed with residential area;
- Greenbelt; and
- Conservation

The Waterval East and West TSFs, the pump station, pre-treatment plant, WLTR plant and associated pipelines and the Waterval Retrofit Concentrator fall within the area identified as having a post closure land use of grazing / wilderness. This will therefore be the standard to which these areas will be rehabilitated.

13.2.3 Assumptions used to support closure costing

The liability assessment was developed based on available information including environmental data, design documents and the other EMPs. Some of the information currently available is preliminary. Therefore, a number of assumptions were made about general conditions and closure and rehabilitation of the facilities at the site in order to develop the closure liability (SRK, 2013). As additional information is collected during operations, these assumptions will be reviewed and revised as appropriate.

The assumptions used to generate the assessment are:

- No third party use of infrastructure will be available at closure and all infrastructure will require decommissioning;
- The removal of hydraulic mining equipment and the closure of any launders required to effect recovery of the tailings will be the responsibility of the mining contractor. No provision has therefore been included in the assessment to undertake these activities;
- Any rubble removed from the top surface of either the west or the east facility will be utilised as temporary water control berms during the re-mining project. Following completion of reclamation of the tailings, the rubble will be used to level the final footprint where the two facilities existed. The excavation of the rubble from the top surface, the construction of the berms, and the placement of the material from the berms onto the footprint to level the footprint is seen as an operational cost and is therefore not included in the closure liability assessment;
- All vegetation waste collected on the screen prior to retreatment of the tailings, will be stockpiled and composted to utilise as a closure cover once the rubble from the berms has been placed onto the footprint. The collection, composting and placement of the compost is seen as an operational cost and is therefore not included in the closure liability assessment;
- Tailings will be recovered to ground level and no residual tailings will be left on the surface of the footprint at the completion of the mining activities;
- Until the soils in the basement of the two tailings facilities are exposed by reclamation activities and can be geochemically and geotechnically tested, it is assumed that these soils do not represent a residual or latent risk. That is, it is assumed that the geochemical characteristics do not represent a risk to vegetation establishment or on-going groundwater contamination. It is further assumed that with the removal of the primary source of contamination, in the form of tailinfs reclaimed during the project, the expected inherent low permeability of the footprint, will limit any further migration to groundwater. It is therefore assumed that the “general surface rehabilitation, including grassing of all denuded areas” considered as Item 10 in the DMR guideline includes the establishment of vegetation to a level at which the site is no longer considered a liability;
- It is assumed that any potential groundwater contamination associated with the tailings facility will be mitigated during the remaining life of mine of RPM, particularly considering that the primary source of contamination, being the tailings in the TSF, is removed as part of this project. Therefore, no groundwater remediation costs are included in this liability assessment;
- The tailings arising from the retreatment process for **Option A** will be disposed of at the existing Paardekraal TSF complex, while the tailings for **Option B** will be disposed of in the existing compartment B of the Hoedspruit TSF. The liability for this facility is already addressed in the provision made for the greater RPM lease area, which includes both the slopes and the top surface of the respective TSFs. Therefore, the

inclusion of the liability for TSF in this assessment will duplicate provisioning for the liability. Therefore no closure provision for the Paardekraal or the Hoedspruit TSF is included in this assessment;

- The new infrastructure at the Waterval Retrofit Concentrator (**Option A**) will be constructed within the existing footprint of the current plant. In addition, the new infrastructure at the WLTR Plant (**Option B**) will be constructed within the existing footprint of the current plant. As the liability for the entire WLTR Plant footprint and the Waterval Retrofit Concentrator footprint is already covered by the existing provisions, WSP (with advice from SRK) is of the opinion that to include the liability for footprint rehabilitation in the current assessment will result in a duplication of liability provisioning. Therefore, no provision is included in the current assessment for the new infrastructure;
- On completion of mining of the East TSF, the pump station will be moved to service the mining of the West TSF (**Option A**). It is assumed that during this process the east pump station will be fully decommissioned and any restoration undertaken once mining is completed, with these costs covered by operational costs. Therefore only a provision for the decommissioning and restoration required at the west pump station position has been included;
- The pump station at Hoedspruit (**Option B**), will be constructed at the existing pump station. However, the area where the footprint on which the pump station will be constructed has not yet been disturbed and there is no provision yet made for the rehabilitation of the footprint. Therefore, a provision is made for the rehabilitation of the footprint associated with the new infrastructure;
- All laydown areas utilised during the construction period will be rehabilitated and closed during the commissioning of the various infrastructure areas, with the costs of this covered by the construction contracts. Therefore, no closure provision is included for any of the laydown areas.
- Quantities used in the assessment are those measured from plans provided to SRK by WSP and TWP; and
- The rates that have been used in the liability assessment are rates that SRK obtained from the DMR: North West Region in October 2012. These rates have been inflated by 4% to account for inflationary pressures expected at the time of approval of this project. These rates have been inserted into the template used by the DMR: North West Region, which is based on the requirements from the *Guideline Document for the Evaluation of the Quantum of Closure Related Financial Provision Provided by a Mine* (DMR, 2005).

13.3 Closure Liability

The liability associated with **Option A** is presented in **Table 42** and **Option B** is presented in **Table 43**. The costs for the rehabilitation of the footprint of the TSFs have been included in both the tables.

Table 42: Liability Assessment – Option A

Number	Main Description	Area	Cost (R)
1	Dismantling of processing plant and related structures (including overland conveyors and power lines).	2,015m^3	23,230.94
2a	Demolition of steel buildings and structures.	162m^2	26,021.90
2b	Demolition of reinforced concrete buildings and structures.	1,016m^2	240,499.39
3	Rehabilitation of access roads.	23,250m^2	668,414.25
4a	Demolition and rehabilitation of electrified railway lines.	-	-
4b	Demolition and rehabilitation of non-electrified railway lines.	-	-
5	Demolition of housing and facilities.	90m^2	28,912.28
6	Opencast rehabilitation including final voids and ramps.	-	-
7	Sealing of shafts, adits and inclines.	-	-
8a	Rehabilitation of overburdens and spoils.	-	-
8b	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing waste).	0.34ha	47,542.63

Number	Main Description	Area	Cost (R)
8c	Rehabilitation of processing waste deposits and evaporation ponds (acid, metal rich waste).	-	-
9	Rehabilitation of subsided areas.	-	-
10	General surface rehabilitation, including grassing of all denuded areas.	260.2ha	23,142,137.94
11	River diversions.	-	-
12	Fencing.	276m	28,000.48
13	Water management.	-	23,230.94
14	2 to 3 years of maintenance and aftercare.	260.2	26,021.90
15	Specialist Study	-	-
		VAT	**4,660,195**
		TOTAL	**37,947,300**

Table 43: Liability Assessment – Option B

Number	Main Description	Area	Cost (R)
1	Dismantling of processing plant and related structures (including overland conveyors and power lines).	28,533m^3	328,956.05
2a	Demolition of steel buildings and structures.	-	-
2b	Demolition of reinforced concrete buildings and structures.	26,419m^2	6,253,734.10
3	Rehabilitation of access roads.	45,060m^2	1,295,429.94
4a	Demolition and rehabilitation of electrified railway lines.	-	-
4b	Demolition and rehabilitation of non-electrified railway lines.	-	-
5	Demolition of housing and facilities.	1,692m^2	543,687.43
6	Opencast rehabilitation including final voids and ramps.	-	-
7	Sealing of shafts, adits and inclines.	-	-
8a	Rehabilitation of overburdens and spoils.	-	-
8b	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing waste).	0.34ha	47,542.63
8c	Rehabilitation of processing waste deposits and evaporation ponds (acid, metal rich waste).	-	-
9	Rehabilitation of subsided areas.	-	-
10	General surface rehabilitation, including grassing of all denuded areas.	260ha	23,138,900.62
11	River diversions.	-	-
12	Fencing.	1,090m	110,581.59
13	Water management.	-	-
14	2 to 3 years of maintenance and aftercare.	260	3,077,302.41
15	Specialist Study.	-	-
		VAT	**5,943,179.82**
		TOTAL	**48,394,464.23**

Table 44 divides the costs into two categories, namely decommissioning and restoration costs.

Table 44: Allocation of liability between decommissioning and restoration

OPTION A	**Decommissioning**	**Restoration**
TOTAL	R 32,668,227.10	R 5,279,072.49
VAT	R 4,011,887.54	R 648,307.15
GRAND TOTAL		**R 37,947,300.00**
OPTION B	**Decommissioning**	**Restoration**
TOTAL	R 42,246,745.79	R 6,147,718.44
VAT	R 5,188,196.85	R 754,982.97
	Decommissioning	**Restoration**
GRAND TOTAL		**R 48,394,464.23**

Decommissioning costs: Are 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) at the shafts, concentrators, offices etc. (DME, 2005).

Restoration costs: Are costs pertaining to the rehabilitation of areas impacted on by mining, outside of infrastructure footprint. Restoration costs would involve groundwater remediation, rehabilitation on tailings dams and waste rock dumps etc. (DME, 2005)

In order to ensure that RPM can commit to closure and undertake the necessary rehabilitation the following amount should be provided for within the Anglo American Platinum Trust Fund.

- **Option A – R 37,947,300.00**
- **Option B – R 48,394,464.23**

14 Knowledge Gaps and Adequacy of Predictive Methods

Sections 6 and 8 list the knowledge gaps and adequacy of predictive methods.

15 Conclusion

RPM commenced with the re-mining of the Klipfontein TSF at the WLTR Plant in December 2003, following the necessary environmental authorisation from the DMR (Reference Number: RNW (KL) 6/2/2/3164). The initial authorisation included the reclamation and re-mining of the Waterval East and West TSFs. However, the Waterval component of the project was put on hold at the time. The WLTR Plant is currently processing reclaimed material from the Klipfontein TSF only, at a rate of 450kt/m. The Klipfontein TSF will be depleted by mid-2015. RPM now intends to implement the Waterval re-mining phase as was previously intended.

The Project comprises the reclamation of the Waterval East and West TSFs and conveyance of the material to either the existing Waterval Retrofit Concentrator for re-mining or to the WLTR Plant, including associated infrastructure.

The anticipated environmental impacts associated with the Project have been evaluated according to their significance, which is determined as a result of the consequence and likelihood. Consequence is a function of schedule, cost, quality, safety / health, legal and regulatory, reputation and environmental impact, whereas the likelihood of the impact is a function of the frequency of the activity and frequency of the incident/ impact. The consequence multiplied by the likelihood gives the significance of the potential impact. All impacts were assessed with and without management measures in place. Where the overall environmental impact significance was determined to be low-medium and higher, these impacts were assess in more detail with the relevant management measures recommended.

This EIR / EMPR has been structured to comply with the requirements of the NEMA and MPRDA. The report provides a description of the Project and details the aspects associated with the construction, operation and closure of the Waterval Retrofit E-Feed Project. The report also includes the methodology followed to undertake the S&EIR process. A detailed description on the existing environment (bio-physical as well as socio-economic) is provided based on findings from the specialist surveys. Two processing alternatives were evaluated as well as the no-go option. Stakeholder engagement was undertaken from the onset of the project in a transparent and comprehensive manner. Outcomes of all meetings and comments received from the public review periods was recorded and responded to in the EIR / EMPR. Based on the environmental description, specialist surveys as well as the PPP a detailed EIA rating has been undertaken and where relevant the necessary management measures have been recommended.

In summary, the S&EIR process assessed both biophysical and socio-economic environments and identified appropriate management and mitigation measures. The biophysical impact assessment revealed that there are no environmental fatal flaws and no significant negative impacts associated with the Project should mitigation and management measures be implemented. In addition, it should be noted that the overall socio-economic impacts associated with the project are positive and include the creation of job opportunities and contributions to the local, regional and national economies.

WSP is of the opinion that should the identified mitigation and management measures be implemented, the Project ought to proceed to provide the following opportunities to AAP:

- A small number of new employment opportunities (predominantly during the construction phase);
- Access to a previously unreachable resource that will ultimately increase the life of RPM operations.

Being able to extract resources from the Waterval TSFs will provide a sustainable business opportunity for RPM to meet future product needs, as well as to prolong the contribution of the mine to the local economy.

16 References

Anglo American Platinum (2006). Anglo American Platinum Regional Air Quality Plan

Anglo American (2011). Anglo American Platinum Integrated Report: 2011.

Anglo American Platinum - Rustenburg Platinum Mines Limited (2013) WLTR Re-Mining of Waterval Project: Feasibility Study. Project Number: FS-110141 Project Study Report Section 10 Document Number FS-110141-900-400-451-0010. 24 January 2013.

Anglo American Platinum (2011): Amandelbult Community Engagement Plan. South Africa.

Anglo American Platinum (2012): Anglo Platinum Management Services, Process Design Criteria: Waterval Tails Retreatment at Retrofit, November 2012

Anglo Platinum (2010), RPM Waterval Tailings Dams Resource Model, March 2010.

Anglo Platinum Limited: Rustenburg Platinum Mines Limited (2011) Community Engagement Plan: 2011.

Anonymous (2011): Community Development Commitments included in Anglo American Platinum Limited's Social and Labour Plans report. Anglo American Platinum Limited. South Africa.

Aquatico (2012). Anglo Platinum Rustenburg Platinum Mine, Rustenburg Section: Annual Integrated Surface and Groundwater Quality, Biomonitoring and Toxicity Testing Assessment Report. September 2011 to August 2012. Volume II & III. Report No. RPM/AP1.2/2012/PXM. Prepared for Anglo Platinum Mine, Rustenburg, South Africa.

Archaetnos Culture & Cultural Resource Consultants (2013). A Report on a Cultural Heritage Impact Assessment for the Proposed Waterval Retrofit E-Feed Project at the Rustenburg Platinum Mines Limited (RPM) located in the Northwest Province - Report No.: AE01350V

ATSDR (1998). Agency for Toxic Substances and Disease Registry, Toxicological Profile for Sulphur Dioxide, U.S. Department of Health and Human Services, Public Health Service, Atlanta, Georgia, December 1998.

Bojanala Platinum District Municipality (2012). 2011/2012 Draft Integrated Development Plan (Final) Bojanala Platinum District Municipality.

CEPA/FPAC Working Group (1998). National Ambient Air Quality Objectives for Particulate Matter. Part 1: Science Assessment Document, A Report by the Canadian Environmental Protection Agency (CEPA) Federal Provincial Advisory Committee on Air Quality Objectives and Guidelines.

Clean Stream (2005). Biodiversity Management Plan for Anglo Platinum Mines, Rustenburg Section

Department of Mineral Resources (2010). Guideline for the submission of a Social and Labour Plan: As required in terms of regulation 46 of the Mineral and Petroleum Resources Development Act (Act 28 of 2002), October 2010.

Department of Minerals and Energy (2005). Guideline Document for the Evaluation of the Quantum of Closure Related Financial Provision Provided by a Mine

Desmet et al. (2008). North West Province Biodiversity Conservation Assessment Technical Report Version 1.2. North West Agriculture, Conservation and Environment

DMR, 2010. Mining Charter - Broad-Based Socio-Economic Empowerment Charter for the South African Mining Industry, Department of Mineral Resources , September 2010.

Envirolink (2002). Environmental Management Programme (Amendment), Western Limb Tailings Retreatment Project Report, Ref no. RNW (KL) 6/2/2/3164, Report No. CED/003/02, July 2002

EPA (1998). Compilation of Air Pollution Emission Factors (AP-42), 6TH Edition, Volume 1, US Environmental Protection Agency, Research Triangle Park, North Carolina.

Fraser Alexander Tailings (2012). WLTR – Re-mining of Waterval Pre-Feasibility Report (FEL 2), February 2012, C. Cross, Fraser Alexander Tailings.

Fraser Alexander Tailings (2012). WLTR RE-Mining of Waterval FEL 3 (Feasibility Study Report), Report Prepared for TWP on behalf of AAP, Doc No. FAT/FEL3/Report/2012NOV/R2, November 2012

Garstang et al. (1996). Tyson and Preston-Whyte, 2000; Freiman and Piketh, 2003[AQ]

Holme B (2013). Final Scoping Report: the Re-processing of the Waterval West and East Tailings Storage Facilities - Rustenburg Platinum Mines. WSP Environmental (Pty) Ltd

K. Idner and A. Hall (2012). Sappi Ngodwana Mill GoCell Project Class-10 Study, Report No.: 167356, January 2012.

K2M Technologies (Pty) Ltd (2010). Spatial Development Framework Review. Rustenburg Local Municipality: Planning Department.

North West Province (2004). North West Provincial Growth and Development Strategy 2004 to 2014

R. G. Thomas and L. W. Burger (2004). Air Dispersion Modelling Study for Sappi Ngodwana near Nelspruit, Project done on behalf of Golder Associates Africa (Pty) Ltd, Report No.: APP/03/GOL-08 Rev2.2, June 2004.

Royal Bafokeng Nation Masterplan: On Target For 2035: Building for a better future for all (no date).

RPM (2009). Rustenburg Operations: Socio-Economic Assessment Toolbox 2 Report, Anglo Platinum.

RPM (2009). Rustenburg Platinum Mines: Social and Labour Plan, November 2009.

Rustenburg Local Municipality (2011/12) Integrated Development Plan: Review 2011/2012.

Rustenburg Local Municipality (2012), Draft Rustenburg IDP, 2012-2017

SANS 1929 (2004). Department of Environmental Affairs (DEA), National Ambient Air Quality Standards, Government Gazette No. 32816, National Environmental Management: Air Quality Act No. 39 of 2004, Republic of South Africa, December 2009.

SRK (2009). K6 Shaft project EIA - Report Number 452452/2, March 2009

SRK (2011). Anglo American Platinum Rustenburg Operations Integrated Water and Waste Management Plan

SRK (2013). Closure Liability Assessment for Waterval Retofit E-Feed Project, located in the North-West Province, September 2013

TWP (2012). Anglo American Platinum (AAP) Rustenburg Platinum Mines Limited, WLTR (Re-mining of Waterval Project) Civil & Structural Engineering Design Report Pre-Feasibility Phase (FEL 2), TWP Doc No. 1110141-310-100-101-0001, February 2012.

TWP (2013). Anglo American Platinum (AAP) Rustenburg Platinum Mines Limited: WLTR Re-mining of Waterval Project: Feasibility study. Project number: fs-110141 Project Study Report: Section 10 Document number fs-110141-900-400-451-0010, January 2013.

Van Vollenhoven, A.C. (1998). Kultuurhulpbronbestuur (KHB) binne die funksionele konteks van museums in Suid-Afrika. (Unpublished M.A.-dissertation, Stellenbosch: University of Stellenbosch).

Van Vollenhoven, A.C. (2000). ‘n Voorgestelde paradigma vir navorsing op histories-argeologiese erfenishulpbronne in Suid-Afrika aan die hand van gevallestudies in noordelike Gauteng. (Unpublished D.Phil. thesis, Pretoria: University of Pretoria).

Walmsley J (2002). State of the Environment Report- North West, Mzuri Consultants

WHO (2011). World Health Organization: Air Quality and Health, September 2011. (http://www.who.int/mediacentre/factsheets/fs313/en/)

Working Group 4 (1991). Indoor Air Quality and Tis Impact on Man, (formerly COST Project 613), Environment and Quality of Life, Report No. 10, Effects of Indoor Air Pollution on Human Health.

WSP Environmental (Pty) Ltd, (2013). Discard Material Assessment, Issue 0 (08 February 2013), WSP Group.

WSP Environmental (Pty) Ltd (2013). Waterval Tails Retreatment At Retrofit: Air Quality Impact Assessment, April 2013 – Revised 2013/09/20

WSP Environmental (Pty) Ltd (2013). Waterval Retrofit E-Feed Project: Draft Social Impact Assessment - Proposed Waterval Tailing Storage Re-processing Project

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RBA, Ernie Keman – Spatial Planner (15 February 2013)

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Rustenburg LM, LED Manager (14 February 2013)

TWP , Alex Kimmont – Project Manager (March, 2013)

Websites:

Royal Bafokeng website: www.bafokeng.com/ (Accessed, Jan – March 2013)

http://www.southafrica.info/about/geography/ (Accessed December 2012).

South African History Online http://www.sahistory.org.za/article/freedom-struggle-0 (Accessed 10 September 2013).

Statistics South Africa, Census 2011, http://interactive.statssa.gov.za/superweb/login.do (Accessed December 2012).

http://www.tourismnorthwest.co.za/regions/index.html (Accessed December 2012).

SANBI and CSIR (2010) National Freshwater Ecosystems Priority Areas (NFEPA) Wetland Types for South Africa. GIS metadata: RSA_wetland_types_2010. Available at: http://196.21.45.151/imf-aims50/sites/BGIS

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