



**THE ENVIRONMENTAL IMPACT  
ASSESSMENT REPORT AND  
ENVIRONMENTAL MANAGEMENT PLAN  
FOR THE PROPOSED PLATREEF  
UNDERGROUND MINE**

**PLATREEF RESOURCES (PTY) LTD**

**JANUARY 2014**

NEMA REF NO's:

PROJECT REF NO. 12/1/9/2-W32

NEAS REF NO. LIM/EIA/0000538/2013

NEMWA REF NO:

12/9/11/L1224/5



DIGBY WELLS  
ENVIRONMENTAL

This document has been prepared by Digby Wells Environmental.

Report Title: THE PROPOSED PLATREEF UNDERGROUND MINE  
EIA/EMP

Project Number: PLA1677

Name	Responsibility	Signature	Date
Casper Joubert	Report Writer		January 2014
Barbara Wessels	Report Reviewer		January 2014
Michael Hennessy	Report Reviewer		December 2013
Grant Beringer	Report Reviewer		December 2013

*This report is provided solely for the purposes set out in it and may not, in whole or in part, be used for any other purpose without Digby Wells Environmental prior written consent.*

## EXECUTIVE SUMMARY

Digby Wells Environmental (hereafter Digby Wells) has been appointed by Platreef Resources (Pty) Ltd (hereafter Platreef), as the independent Environmental Assessment Practitioner (EAP) to conduct an Environmental and Social Impact Assessment (ESIA) and associated specialist studies for the proposed Platreef Underground Mining Project (hereafter the Project). Platreef is investigating the construction and operation of an underground platinum mine on the farms of Turfspruit 241 KR; Macalacaskop 243 KR; and Rietfontein 2 KS (see Plan 1, Appendix A). The Project will be conducted in conformance with the framework provided in the World Bank Group (WBG), the International Finance Corporation (IFC) policies and guidelines for Environmental Assessment (EA) and the Equator Principles used for conformance with the IFC policies and guideline.

Furthermore, Platreef is currently following the necessary processes to obtain environmental authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) for associated listed activities as stipulated in the NEMA Regulations. In conjunction with the NEMA application, Platreef has submitted a Mining Right Application (MRA) in terms of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). As part of this Project, Platreef also intends to apply for an Integrated Water Use Licence (IWUL) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) and a Waste Management Licence (WML) in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA).

This report is being prepared in support of the NEMA application to be submitted to the Limpopo Department of Economic Development and Environmental Tourism (LDEDET) and in support of the WML application to be submitted to the Department of Environmental Affairs (DEA).

### **Project Location and Description**

The Project site is located approximately 8 km northwest of the town of Mokopane (previously known as Potgietersrus), which is situated in the magisterial district of the Mogalakwena Local Municipality and within the Waterberg District Municipality. Platreef plans to mine Platinum and other Platinum Group Metals (PGMs) such as Palladium (Pd); Rhodium (Rh); Iridium (Ir); Ruthenium (Ru); and Osmium (Os) with the Life of Mine (LoM) expected to be 30 years with the potential to extend this period by another 30 years.

An underground mine is planned and the Project aims to make use of the sublevel blast hole stoping method for mining the target Platinum Group Metals (PGMs).

Platreef which is a subsidiary of Ivanhoe Mines Limited (formerly Ivanplats Limited) holds exclusive prospecting rights for base and precious metals on the Turfspruit and Macalacaskop Farms. Platreef acquired a prospecting right for both Turfspruit and Macalacaskop farms in February 1998 and was granted a five-year Prospecting Right for Turfspruit and Macalacaskop in 2006 (Prospecting Right LP30/5/111/2/872PR). Platreef recently renewed the prospecting right, which now expires 31 May 2014. Platreef has

submitted a MRA in accordance with section 22 of the MPRDA to the Limpopo Region of the Department of Mineral Resources on 06 June 2013 (DMR Ref No. LP30/5/1/2/2/10067MR).

Prospecting on the Project site dates back to the 1960s, after which Rustenburg Platinum Holdings Limited (now a wholly-owned subsidiary of Anglo American Platinum Corporation) began exploration over the Platreef in the 1970s (AMEC, 2013).

The initial exploration focus was on the delineation of mineralisation amenable to open-pit mining. Ivanplats contracted a series of consultants to provide various studies involving concentrator/smelter options (Hatch in 2003), metallurgical test work (Mineral Development Services Ltd. in 2003), and conceptual mining studies, to assess reasonable prospects of developing an open-pit operation (African Minerals and AMEC in 2004). Mining cost assumptions were also updated to the end of 2006, and capital and operating costs were updated in 2007 to support the mineral resource assessments (AMEC, 2013).

In 2007, Platreef commenced a deep drilling program to investigate the continuity and grade in an area targeted as having underground mining potential. This resulted in a series of unpublished Mineral Resource estimates assuming underground mining methods and updates being prepared at various times between September 2010 and January 2011. A March 2011 resource update was published in September 2012 (AMEC, 2013).

According to the Technical Report on Updated Mineral Resource Estimate, work completed on the Project to date includes geological mapping, airborne and ground geophysical surveys, limited trenching, percussion drilling over the Platreef sub-crop, core drilling, petrography, density determinations, metallurgical test work, preliminary mineralogical studies, and Mineral Resource estimation. Preliminary mining and supporting studies have commenced (AMEC, 2013).

The Project is accessible all year round by the N11 national highway, and a developed rail network goes through Mokopane, the closest railhead to the Project.

A large, unskilled labour force lives in urban areas and farms around the Project area. Local town facilities and infrastructure exist to handle an influx of personnel.

The list of activities for which environmental authorisations in terms of NEMA and NEM:WA are required, are set out in Sections 3.2 (Table 3-1) and 3.3 (Table 3-2) of this report.

### **Purpose of this report**

The overarching objectives of this EIA/EMP report are to:

- Prepare integrated sensitivity maps for the Project area based on the findings of environmental, socio-economic and cultural assessments as input into the Project design process;
- Identify and assess the significance of potential impacts associated with the all the listed activities in terms of NEMA and waste management activities in terms of NEM:WA (Table 3-1 and Table 3-2); and to

- Recommend mitigation and management measures to ensure that the development is undertaken in such a way as to promote the positive impacts and to minimise the negative impacts.

This report also describes the current environment of the Project area and evaluates all the impacts (Sections 9, 10 and 11) that have been identified during the specialist studies undertaken. Furthermore an Environmental Management plan has been developed (Sections 13.1, 13.2 and 13.3) to mitigate and manage all environmental impacts associated with each Project activity.

**Specialist Studies conducted as part of this EIA Report**

The following specialist studies have been conducted as part of this EIA/EMP report:

- Terrestrial Ecology Assessment;
- Topographical and Visual Assessment;
- Wetlands and Aquatic Assessments;
- Geohydrological (Groundwater) Assessment;
- Hydrological (Surface water) Assessment;
- Air Quality Assessment;
- Noise Assessment;
- Health Impact Assessment;
- Social-economic Impact Assessment; and
- Heritage Impact Assessment; and
- Traffic Impact Assessment.

**Potential Impacts identified during the Various Specialist Studies**

The table below is a summary of the significant environmental impacts that have been identified during the specialist studies conducted on the Project site:

Aspect	Impact Description
<b>Topography</b>	
Change in the Project surface area due to site clearing activities for the preparation of construction of infrastructure.	The removal of vegetation and topsoil will change the surface of the Project area and will therefore change the topography. The areas to be cleared include the infrastructure area, Tailings Storage Facility (TSF) Site 2 and the tailings pipeline servitude.
Change to topography due to construction of surface infrastructure.	The construction of surface infrastructure will add features to the topography thereby changing it.
Changes to the topography due to drilling,	The development of surface infrastructure will add

<b>Aspect</b>	<b>Impact Description</b>
blasting and development of infrastructure for mining.	features to the topography while drilling and blasting will create voids thus changing the topography.
Change in local topography due to the operation of surface infrastructure.	Operation of the stockpiles, waste rock dumps and the TSF will add to the surface and thereby change the topography of the Project area.
<b>Visual</b>	
Site clearing activities influencing the visual Environment.	The removal of topsoil and vegetation will have a negative visual impact on the receiving environment. Furthermore, the infrastructure (especially the TSF) will become noticeable to the surrounding receptors.
Construction of surface infrastructure influencing the visual environment.	The construction of the mine's surface infrastructure will have a negative visual impact on the receiving environment.
Drilling, blasting and development of infrastructure and shafts for mining will Influence the visual aspects of the project area.	The drilling, blasting (generation of dust) and development of infrastructure and shafts for mining will have a negative visual impact on the receiving environment.
Adding material to the waste rock dumps, stock piles and TSF.	Operation of the ore stockpile, waste rock dumps and TSF will have a negative visual impact on the receiving environment. This will be as a result of continuously adding material to these waste rock dumps and stockpiles.
<b>Flora and Fauna</b>	
Loss of Ridges, Bushveld and Impacted Ridge Bushveld Vegetation due to construction activities.	Mine construction activities will lead to the loss of Ridge Bushveld and impacted Ridge Bushveld vegetation thus impacting the biodiversity value of the areas affected.
Loss of Degraded Mixed Bushveld.	Mine construction activities will lead to the loss of Mixed Bushveld vegetation thus impacting the biodiversity value of the areas affected
Loss of general biodiversity.	The construction and operation of the mining infrastructure will lead to the potential loss of general biodiversity within the Project Area, thus decreasing the biodiversity value of the areas

Aspect	Impact Description
	affected.
Loss of flora and fauna Species of Special Concern.	The construction and operation of the mining infrastructure will lead to the potential loss of flora and fauna Species of Special Concern (SCC).
Influx of alien invasive species.	Construction , operation and decommissioning activities may cause the uncontrolled influx of alien invasive species within and around the Project area
<b>Aquatic Impact Assessment</b>	
Surface water run-off from mining activities.	Increased run-off due to large concrete terraces and roads and poor quality run-off from mining activities could impact the surface water quality.
<b>Surface Water</b>	
Surface water run-off	Refer to the impact described in the aquatics section above on surface water run-off.
<b>Soil</b>	
Soil compaction and topsoil loss due to erosion	Activities during early works, construction and operational phase in the Project area could lead compaction of soils and soil erosion.
Impact of site rehabilitation on soil and land capability	During the decommissioning activities, impacts to soil resources may include compaction and contamination which may be significant only in the short term.
<b>Air Quality</b>	
The crushing of ore	The crushing process releases fugitive dust, especially if there is no enclosure and are no water sprays.

The table below is a summary of the potential social impacts identified and anticipated for the Project:

Receiving Environment	Receiving Potential Impact description
Construction phase	Job creation during construction
	Multiplier effects on the local economy

Receiving Environment	Receiving Potential Impact description
	Economic empowerment of communities
	Skills transfer and development
	Community development induced by Local Economic Development (LED) and Corporate Social Initiatives (CSI) projects
	Economic displacement
	Disruption of movement patterns
	Construction-related health and safety impacts
	Visual/acoustic/vibration and air quality impacts
	Increase in spread of communicable diseases and social pathologies
	Conflict/competition between newcomers and incumbent population
	Increased pressure on local services/ resources
	Establishment and growth of informal settlements
	Opposition because of perceived negative impacts
Operational phase	Job creation during operation
	Regional economic development
	Dependency on mine for sustaining local economy
	Operation-related health and safety impacts
Decommissioning phase	Impacts on the work force
	Impacts on the local community
	Impacts on the wider community
	Job creation

The table below is a summary of the potential heritage impacts identified anticipated for the Project:

Receiving Environment	Potential Impact Description
Burial Ground / single graves	Immediate threats or risks include ground and vegetation clearance for the construction of infrastructure in the Operational Area. Potential sources of threats and risk include vandalism by workers

<b>Receiving Environment</b>	<b>Potential Impact Description</b>
	on site, accidental destruction or alteration of burial site by construction workers on site.
Isolated occurrences (Refer to Table 10-1)	The construction of the proposed mine infrastructure will destroy these sites known as isolated occurrences of heritage significance.

## TABLE OF CONTENTS

1	INTRODUCTION .....	1
1.1	Applicant Details .....	2
1.2	Details of the Environmental Assessment Practitioner .....	2
2	ENVIRONMENTAL IMPACT ASSESSMENT PROCESS .....	3
2.1	Scoping Process .....	3
2.2	Environmental Management Plan .....	4
2.3	Decision-Making Authority .....	5
3	LEGAL AND STATUTORY REQUIREMENTS .....	6
3.1	Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) .....	6
3.2	National Environmental Management Act, 1998 (Act No. 107 of 1998) .....	6
3.3	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) .....	8
3.4	National Water Act, 1998 (Act No. 36 of 1998) .....	10
3.5	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) ..	11
3.6	International Finance Corporation’s Performance Standards and the Equator Principles .....	12
3.7	Additional Legislation .....	13
4	PROJECT DESCRIPTION .....	15
4.1	Project Location .....	15
4.2	Project Details .....	16
4.3	Waste Management .....	25
4.4	Project Activities .....	48
5	ALTERNATIVES CONSIDERED .....	50
5.1	Mining Method .....	50
5.2	Land-Use Alternatives .....	50
5.3	Infrastructure Alternatives .....	50
5.4	No-Mining Option .....	62
6	PUBLIC PARTICIPATION PROCESS .....	64
6.1	Introduction .....	64
6.2	Public Participation Methodology .....	65
6.3	Scoping Phase .....	65

6.4	Public Participation during the Impact Assessment Phase .....	68
6.5	Summary of PPP Activities and Consultations .....	70
6.6	Summary of Comments Raised during the Consultations .....	73
6.7	Announce the Authorities Decision on Environmental Authorisation .....	75
7	THE RECEIVING ENVIRONMENT FOR THE PROJECT AREA.....	76
7.1	Geology .....	76
7.2	Topography and Visual Aspects.....	76
7.3	Climate and Meteorological Overview .....	78
7.4	Flora and Fauna .....	87
7.5	Aquatic Ecology and Wetlands.....	96
7.6	Wetlands.....	104
7.7	Air Quality .....	108
7.8	Noise .....	119
7.9	Soils.....	124
7.10	Land Capability and Land Use .....	128
7.11	Surface Water.....	129
7.12	Groundwater .....	140
7.13	Archaeology and Heritage.....	157
7.14	Social.....	162
7.15	Community Health Impact Assessment.....	192
7.16	Traffic Assessment .....	198
8	EIA METHODOLOGY .....	200
8.1	Impact Identification .....	200
8.2	Impact Rating.....	200
9	IMPACT ASSESSMENT .....	203
9.1	Topography.....	203
9.2	Visual Impact Assessment .....	208
9.3	Flora and Fauna .....	213
9.4	Aquatic Impact Assessment.....	221
9.5	Wetlands.....	223
9.6	Surface Water Impact Assessment .....	225
9.7	Groundwater Impact Assessment .....	229

9.8	Soil Impact Assessment.....	234
9.9	Air Quality Impact Assessment .....	239
9.10	Noise Impact Assessment.....	243
10	HERITAGE IMPACTS.....	244
10.1	Evaluation of Significance .....	244
10.2	Impact Assessment.....	244
11	SOCIAL IMPACTS.....	256
11.1	Construction Phase.....	256
11.2	Operational Phase .....	270
12	CUMULATIVE IMPACTS.....	276
12.1	Cumulative impacts on Topography and Visual aspects .....	276
12.2	Cumulative Impacts on Biodiversity (flora and fauna).....	276
12.3	Cumulative Impacts on Soil.....	276
12.4	Cumulative Impacts on Surface Water the Aquatic Environment and Wetlands ..	277
12.5	Cumulative Impacts on Surface Water .....	277
12.6	Cumulative Impacts on Groundwater .....	277
12.7	Cumulative Impacts on Ambient Air Quality .....	278
12.8	Cumulative Impacts on Ambient Noise Levels .....	278
13	ENVIRONMENTAL MANAGEMENT PLAN.....	281
13.1	EMP Table.....	281
13.2	Social Management Plan .....	307
13.3	Heritage Mitigation Measures.....	310
13.4	Emergency Response Plan.....	312
14	MONITORING PROGRAMME.....	314
15	CLOSURE FRAMEWORK AND COSTING.....	319
15.1	Closure Objectives.....	319
15.2	Financial Provision.....	319
16	UNDERTAKING.....	322
17	REFERENCES .....	323

## LIST OF FIGURES

Figure 2-1: The South African legislative framework for EIA .....	3
Figure 4-1: Waste management hierarchy.....	26
Figure 4-2: Elements of the IWMP .....	27
Figure 4-3: STP process flow diagram.....	40
Figure 4-4: Class C barrier protection design (NEM:WA).....	46
Figure 7-1: Surface wind rose modelled data (01 January 2009 – 31 December 2011).....	80
Figure 7-2: Diurnal variation of winds between Night time 00:00 – 06:00 (Top left), Morning 06:00 – 12:00 (top right), Afternoon 12:00 – 18:00 (Bottom left), Evening 18:00 – 24:00 (bottom right) and (modelled data 01 January 2009 – 31 December 2011) .....	81
Figure 7-3: Seasonal variation of winds in spring season (September – November) (top left), summer season (December - February) (top right), autumn season (March – May) (bottom left) and winter season (June – August) (bottom right) (modelled data 01 January 2009 – 31 December 2011).....	82
Figure 7-4: Wind Class Frequency Distribution for Platreef modelled data, 01 January 2009 – 31 December 2011.....	82
Figure 7-5: Average monthly temperature derived from the Platreef modelled data (2009-2011) .....	84
Figure 7-6: Average Monthly Relative Humidity derived from the Platreef modelled data (2009-2011) .....	85
Figure 7-7: Average Monthly Precipitation derived from the Platreef modelled data (2009-2011).....	86
Figure 7-8: Average Monthly Evaporation for Potgietersrus S-Pan Evaporation Station (1957 – 1987) (Source: South African Weather Service).....	87
Figure 7-9: Identified impacts and the resulting affects to IHI for the Project area .....	100
Figure 7-10: Radial plots of functions performed by the floodplain system .....	107
Figure 7-11: PM <sub>10</sub> concentrations from the WBPA air quality monitoring station in Mokopane .....	109
Figure 7-12: PM <sub>10</sub> concentration measured in the Project Area (April 2003 - April 2004).....	110
Figure 7-13: PM <sub>2.5</sub> concentrations from the WBPA air quality monitoring station in Mokopane.....	110
Figure 7-14: PM <sub>2.5</sub> concentration measured in the Project area (April 2003 - April 2004).....	111
Figure 7-15: Carbon Monoxide from the WBPA air quality monitoring station in Mokopane (8 hourly average).....	112
Figure 7-16: Carbon Monoxide concentrations from the WBPA air quality monitoring station in Mokopane (Hourly average).....	112
Figure 7-17: Nitrogen dioxide concentrations from the WBPA air quality monitoring station in Mokopane (Hourly average).....	113
Figure 7-18: SO <sub>2</sub> concentrations from the WBPA air quality monitoring station in Mokopane (daily average).....	114
Figure 7-19: SO <sub>2</sub> concentrations from the WBPA air quality monitoring station in Mokopane (10 minute averages) .....	114

Figure 7-20: Benzene concentrations from the WBPA air quality monitoring station in Mokopane (daily average) .....	115
Figure 7-21: Ozone concentrations from the WBPA air quality monitoring station in Mokopane (8-hourly average) .....	116
Figure 7-22: Monthly dust fallout rates observed in the Project area (April 2003 - April 2004) .....	117
Figure 7-23: Seasonal average dust fallout rate per monitoring site (April 2003 - April 2004) .....	117
Figure 7-24: Average daily flow recorded at A6H032 .....	131
Figure 7-25: Average daily flow recorded at A6H033 .....	131
Figure 7-26: Measured flow in the Dorps River .....	132
Figure 7-27: Illustrating retarded water table response in low yielding borehole on Rietfontein 2KS (200m from TSF) .....	143
Figure 7-28: Groundwater level curve for PSA monitoring site GPR-23 (March 2012 – August 2013) .....	152
Figure 7-29: Groundwater level curve for PSA monitoring site GPR-18 (March 2012 – August 2013) .....	152
Figure 7-30: Groundwater level curve for PSA monitoring site GPR-12 (March 2012 – August 2013) .....	153
Figure 7-31: Groundwater level curve for PSA monitoring site BH-04 (March 2012 – August 2013) .....	153
Figure 7-32: Groundwater level curve for PSA monitoring site GPR-01 (March 2012 – August 2013) .....	154
Figure 7-33: Groundwater level curve for DWA monitoring site MO3-3539 / A6N0083 (October 1984 – April 2013) .....	154
Figure 7-34: Groundwater level curve for DWA monitoring site MO3-2939 / A6N0587 (October 2005 – April 2013) .....	155
Figure 7-35: Age distribution .....	166
Figure 7-36: Sector contribution to Waterberg and Mogalakwena economy, 2004 (Source: Urban-Econ, 2006 (taken from Quantec Research, 2006 and Urban-Econ, 2006) .....	173
Figure 7-37: Monthly income by gender, 2007 .....	178
Figure 7-38: HH energy sources for Heating and Cooking, 2011 (Source: StatsSA, 2013) .....	181
Figure 7-39: Access to piped water, 2011 (Source: StatsSA, 2013) .....	183
Figure 7-40: Access to Sanitation facilities, 2011 (Source: StatsSA, 2013) .....	184
Figure 7-41: Crimes reported to the Mahwelereng police station (2003 to 2011) (Source: South Africa Police, 2011) .....	188
Figure 7-42: Number of times TB and asthma were mentioned during the household survey .....	193

**LIST OF TABLES**

Table 1-1: Particulars of the Applicant ..... 2

Table 1-2: Particulars of the EAP ..... 2

Table 3-1: The listed activities Platreef intends to apply for in terms of NEMA ..... 7

Table 3-2: A summary of the waste management activities for the Project that might require a Waste Management Licence ..... 9

Table 3-3: Additional National Legislation, Associated Regulations and guidelines applicable to the Project area ..... 13

Table 4-1: Directly affected village and wards ..... 15

Table 4-2: Particulars of the resource to be mined ..... 16

Table 4-3: Mineral Resources estimation recorded in the Mine Works Programme ..... 17

Table 4-4: Waste inventory for the Project ..... 29

Table 4-5: Project activities occurring at the various phases of the life of the mine ..... 48

Table 5-1: Alternative waste management strategies considered ..... 52

Table 6-1 Landowners and properties ..... 66

Table 6-2: Summary of the public participation and consultations ..... 70

Table 6-3: Comments raised by I&APs ..... 73

Table 7-1: Wind Class Frequency Distribution per Direction for Platreef modelled data, 01 January 2009 – 31 December 2011 ..... 83

Table 7-2: Averaged monthly minimum, maximum and average temperature values derived from the Platreef modelled data (2009-2011) ..... 84

Table 7-3: Average Monthly Relative Humidity derived from the Platreef modelled data (2009-2011) ..... 85

Table 7-4: Average Monthly Precipitation derived from the Platreef modelled data (2009-2011) ..... 86

Table 7-5: Maximum, minimum and average monthly evaporation rates for the Potgietersrus (Symon’s Pan) S-Pan evaporation station for 1957-1987 period (South African Weather Service) ..... 87

Table 7-6: Broad communities identified in the study area ..... 88

Table 7-7: Mammal species identified during the field survey ..... 92

Table 7-8: GPS co-ordinates and short descriptions of the various study sites ..... 96

Table 7-9: *In situ* water quality results for the Groot-Sandsloot, Nyl, Mogalakwena, Rooisloot and Dorps Rivers ..... 97

Table 7-10: IHI results for the Groot-Sandsloot, Nyl, Mogalakwena, Rooisloot and Dorps River systems during the 2013 period ..... 98

Table 7-11: FRAI results for the 2013 survey ..... 99

Table 7-12: IHAS results for the Groot-Sandsloot, Nyl, Mogalakwena, Rooisloot and Dorps Rivers systems low flow 2013 ..... 101

Table 7-13: SASS 5 scores for the Groot-Sandsloot, Nyl, Mogalakwena, Rooisloot and Dorps rivers systems high flow 2013.....	102
Table 7-14: Limpopo Plain biological banding (Dallas, 2007).....	102
Table 7-15: The suggested SASS 5 and ASPT interpretations (Chutter, 1998).....	102
Table 7-16: MIRAI results for the 2013 survey .....	103
Table 7-17: The ecological classification of study components and the resulting Eco-status for the low flow 2013 survey .....	103
Table 7-18: A listing and scoring of ecological services offered by the Mogalakwena River floodplain identified for the study area.....	106
Table 7-19: A list of the percentage of each importance class for the provided services .....	107
Table 7-20: Noise measurement locations .....	119
Table 7-21: Results of the baseline noise measurements.....	120
Table 7-22: Summary of noise sources influencing baseline measurements around the proposed site .....	122
Table 7-23: Sound power levels from main continuous noise causing sources .....	123
Table 7-24: Sound power levels from blasting activities.....	123
Table 7-25: Blasting noise levels at the surrounding communities.....	124
Table 7-26: Dominant cultivated soil forms found in the Project area during the soil survey .....	126
Table 7-27: A summary of the land capability and dominating land use of land types present in the Project area.....	128
Table 7-28: Soil laboratory results, chemical and physical analytical data.....	129
Table 7-29: Monthly average, maximum and minimum flows in m <sup>3</sup> /s.....	130
Table 7-30: Flow measurements taken at the Dorps and Rooisloot Rivers .....	132
Table 7-31: DWA water quality monitoring sites .....	133
Table 7-32: DWA water quality data .....	135
Table 7-33: Results of Water Quality Sampling programme .....	136
Table 7-34: Baseline (March 2012) and recent (August 2013) groundwater levels for Platreef monitoring boreholes.....	147
Table 7-35: Groundwater level trends over the 2012-2013 Dry Cycle (May 2013 - October 2013)...	148
Table 7-36: Baseline Groundwater Quality (including Hydrocensus data) .....	155
Table 7-37: Groundwater – Quarterly Monitoring Sites, for the Project Area .....	156
Table 7-38: Existing land claims .....	162
Table 7-39: Population statistics for 2001, 2007 and 2011.....	164
Table 7-40: Ward populations, 2011.....	165
Table 7-41: Gender distribution, 2011 .....	166
Table 7-42: Language distribution, 2011 .....	167

Table 7-43: Racial distribution, 2011 .....	167
Table 7-44: Education Levels, 2011 .....	168
Table 7-45: Occupation categories (15-65 years), 2007 .....	168
Table 7-46: Scarce skills required within the Waterberg District, 2012 .....	169
Table 7-47: Positions outside the mineral sector .....	171
Table 7-48: Mining Activities within Mogalakwena Local Municipality, 2010.....	174
Table 7-49: Employment Status, 2007 (15-65 years), 2007 .....	177
Table 7-50: Industry of employment (15-65 years), 2007.....	177
Table 7-51: Social Grants per person, 2011 .....	179
Table 7-52: Main source of energy for lighting, 2011 .....	180
Table 7-53: Refuse removal, 2011.....	184
Table 7-54: Health facility infrastructure in WDM.....	185
Table 7-55: Service provision at schools within MLM, 2007 .....	185
Table 7-56: Type of housing .....	186
Table 7-57: Tenure status, 2011 .....	186
Table 7-58: Municipal and ward priority areas – directly affected villages .....	190
Table 7-59: Type of housing .....	192
Table 8-1: Impact scoring matrix.....	201
Table 8-2: Impacts significant matrix .....	201
Table 8-3: Severity table .....	202
Table 10-1: Heritage impacts identified within the Project area.....	246
Table 13-1: Environmental Management Plan.....	282
Table 14-1: Monitoring programme.....	315
Table 15-1: Closure Liability Cost Breakdown .....	320

## LIST OF APPENDICES

Appendix A: List of Plans

Appendix B: Geotechnical Report

Appendix C: Waste Impact Assessment Report

Appendix D: Public Participation Process Documents and Information

Appendix E: Specialist Declaration Forms

Appendix F: Topography and Visual Aspects Impact assessment Report

Appendix G: Flora and Fauna Impact Assessment Report

Appendix H: Aquatic Impact Assessment Report

Appendix I: Wetlands Impact Assessment Report

Appendix J: Air Quality Impact Assessment Report

Appendix K: Noise Impact Assessment Report

Appendix L: Soil Impact Assessment Report

Appendix M: Hydrology Impact Assessment Report

Appendix N: Hydrogeology Impact Assessment Report

Appendix O: Heritage Impact Assessment Report

Appendix P: Social Impact Assessment Report

Appendix Q: Health Impact Assessment Report

Appendix R: Traffic Impact Assessment Report

Appendix S: Conceptual Rehabilitation Plan

---

## LIST OF PLANS

- Plan 1: Local Setting of the Mine
- Plan 2: Regional Setting
- Plan 3: Conceptual Infrastructure plan of the proposed mine
- Plan 4: Geology map
- Plan 5: Topography map
- Plan 6: Slope model
- Plan 7: Aspect model
- Plan 8: Theoretical Viewshed Model
- Plan 9: Regional Vegetation
- Plan 10: Vegetation communities
- Plan 11: Vegetation sensitivity and planned infrastructure for the Platreef Project area
- Plan 12: National Protected Area Expansion Strategy focus areas proximity to the Platreef Project area
- Plan 13: Location of sampling sites in relation to the proposed mining area
- Plan 14: Noise Measurement Points
- Plan 15: The Platreef Project site is located within dominating land types Ae, Ah and Ib
- Plan 16: Delineated soil types occupying the proposed Platreef Project site
- Plan 17: Soil types as occurring in the initial proposed infrastructure site
- Plan 18: Map showing locations of DWA water quality and flow sampling sites and water quality and flow sampling sites setup by Golder
- Plan 19: Location and extent of sub-catchments used to calculate the flood peaks
- Plan 20: Groundwater Piezometric Map – August 2013
- Plan 21: Groundwater level trends (March 2012 – August 2013)
- Plan 22: Dust monitoring sampling points
- Plan 23: Map indicating the locations of site notices announcing the project to the public