

ENVIRONMENTAL AUTHORIZATION
AND ENVIRONMENTAL
MANAGEMENT PROGRAMME
COMPLIANCE AUDIT

ASSMANG BLACK ROCK MINE
OPERATIONS, HOTAZEL, NORTHERN
CAPE

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Audit Report Date: 04 December 2019
EScience Ref: BRMA2019

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ENVIRONMENTAL MANAGEMENT PROGRAMME
COMPLIANCE AUDIT

FOR:

**ASSMANG BLACK ROCK MINE OPERATIONS, HOTAZEL, NORTHERN
CAPE**

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TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	OBJECTIVES OF THE AUDIT	1
1.2	SCOPE OF AUDIT	1
1.2.1	<i>History of the Environmental Authorisation</i>	1
1.3	ASSESSMENT METHODOLOGY	2
2	DETAILS OF THE AUDITORS	4
3	DECLARATION OF INDEPENDENCE	5
4	COMPLIANCE WITH THE ENVIRONMENTAL AUTHORISATION	6
4.1	ENVIRONMENTAL AUTHORISATION	6
5	COMPLIANCE WITH ENVIRONMENTAL MANAGEMENT PLAN (EMPR)	9
5.1	PRE-CONSTRUCTION, PLANNING AND DESIGNING	9
5.2	CONSTRUCTION PHASE	15
5.3	OPERATIONAL PHASE	39
5.4	COMPLIANCE WITH SPECIALISTS RECOMMENDATIONS	60
5.4.1	<i>AIR QUALITY</i>	60
5.4.2	<i>SOIL</i>	62
5.4.3	<i>NOISE</i>	62
5.4.4	<i>BIODIVERSITY</i>	65
5.4.5	<i>HYDROGEOLOGY</i>	72
5.5	CLOSURE PLAN	74
6	PHOTOGRAPHIC EVIDENCE FROM SITE AUDIT	77
7	CONCLUSIONS AND RECOMMENDATIONS	88
7.1	NEW ACTIVITIES	88
7.2	CONCURRENT REHABILITATION	88
7.3	RELEVANCE AND EFFECTIVENESS OF THE EMPR AND MITIGATION MEASURES	89
7.4	OVERALL SIGNIFICANCE OF NON-COMPLIANCES.....	89
7.5	CORRECTIVE ACTION PLAN.....	89

INDEX OF FIGURES

FIGURE 6.1: EROSION IN REHABILITATED AREA ON GAMAGARA RIVERBANK 1	77
FIGURE 6.2: EROSION IN REHABILITATED AREA ON GAMAGARA RIVERBANK 2	77
FIGURE 6.3: EROSION IN REHABILITATED AREA ON GAMAGARA RIVERBANK 3	78
FIGURE 6.4: EROSION OUTSIDE GLORIA CONTRACTOR CAMP.....	78
FIGURE 6.5: EROSION OUTSIDE AT NCHWANING 2 SUBSOIL STOCKPILES FROM CONSTRUCTION OF THE NEW TSF.	79
FIGURE 6.6: LEAK EMANATING FROM THE BUND AT BLACK ROCK HAZARDOUS WASTE TRANSFER STATION.....	79
FIGURE 6.7: RESIDUE FROM FIRES AT NCHWANING 2 VENT SHAFT.....	80
FIGURE 6.8: CONTAMINATE SOIL AT BLACK ROCK SALVAGE YARD	81
FIGURE 6.9: SCRAPPED ENGINES AT BLACK ROCK SALVAGE YARD NOT STORED IN BUNDS.....	81
FIGURE 6.10: OVERFLOWS FROM AT GLORIA SEWAGE TREATMENT PLANT.....	82
FIGURE 6.11: OVERFLOWS FROM AT BLACK ROCK SEWAGE TREATMENT PLANT	83
FIGURE 6.12: EXAMPLE OF DEFECTIVE BUNDS AT GLORIA WORKSHOP.....	84
FIGURE 6.13: GLORIA WORKSHOP WASH BAY.....	85
FIGURE 6.14: STACKER-RECLAIMER STORMWATER DRAINS BLOCKED.	86
FIGURE 6.15: NCHWANING 3 EMULSION WASTE STORED OUTSIDE OF BUNDED AREA.....	86
FIGURE 6.16: NCHWANING 3 EMULSION WASTE STORED OUTSIDE OF BUNDED AREA.....	87

INDEX OF TABLES

TABLE 1-1: COMPLIANCE SCORING SYSTEM USED IN AUDIT REPORT	2
TABLE 2-1: SUMMARY OF THE TEAM.....	4
TABLE 4-1: TABULAR SUMMARY OF COMPLIANCE WITH CONDITIONS OF THE EMPR – PRE-CONSTRUCTION, PLANNING AND DESIGN.....	6
TABLE 5-1: TABULAR SUMMARY OF COMPLIANCE WITH CONDITIONS OF THE EMPR – PRE-CONSTRUCTION, PLANNING AND DESIGN.....	9
TABLE 5-2: TABULAR SUMMARY OF COMPLIANCE WITH CONDITIONS OF THE EMPR ADDENDUM – CONSTRUCTION PHASE.....	15
TABLE 5-3: OPERATION OF ALL AUTHORISED ACTIVITIES	39
TABLE 5-4: ORE PROCESSING PLANT.....	46
TABLE 5-5: MANGANESE PRODUCT STOCKPILES.....	46
TABLE 5-6: SINTER PLANT RAW MATERIAL STOCKPILES	47
TABLE 5-7: SINTER PLANT OPERATION	47
TABLE 5-8: FLUE GAS DESULPHURISATION WASTE DISPOSAL.....	48
TABLE 5-9: TAILINGS MANAGEMENT - TSF	50
TABLE 5-10: MECHANICAL SHAFT VENTILATION.....	52
TABLE 5-11: SEWAGE TREATMENT PLANT	52
TABLE 5-12: SALVAGE YARD	54
TABLE 5-13: BULK FUEL (INCLUDING INTER ALIA DIESEL, PETROL, HFO AND CTF)/OIL/CHEMICAL STORAGE)	56
TABLE 5-14: VEHICLE MAINTENANCE AND WASH BAYS.....	57
TABLE 5-15: TABULAR SUMMARY OF COMPLIANCE WITH THE RECOMMENDATIONS OF THE AQMP – IMPLEMENTATION PHASE	60
TABLE 5-16: TABULAR SUMMARY OF COMPLIANCE WITH THE RECOMMENDATIONS OF THE SOIL SPECIALIST – IMPLEMENTATION PHASE ..	62
TABLE 5-17: TABULAR SUMMARY OF COMPLIANCE WITH THE RECOMMENDATIONS OF THE NOISE SPECIALIST – CONSTRUCTION PHASE ..	62
TABLE 5-18: TABULAR SUMMARY OF COMPLIANCE WITH THE RECOMMENDATIONS OF THE NOISE SPECIALIST – IMPLEMENTATION PHASE	63
TABLE 5-19: TABULAR SUMMARY OF COMPLIANCE WITH RECOMMENDATIONS OF THE BIODIVERSITY SPECIALIST	65
TABLE 5-20: TABULAR SUMMARY OF COMPLIANCE WITH THE RECOMMENDATIONS OF THE HYDROGEOLOGIST	72
TABLE 5-21: REQUIREMENTS FOR GENERAL SURFACE REHABILITATION.....	74

ABBREVIATIONS

'The Mine'	Includes Black Rock, Gloria and Nchwaning 2 and 3 operations, unless stated otherwise
DAFF	Department of Agriculture, Forestry and Fisheries
DMR	Department of Mineral Resources
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme Report
EMS	Environmental Management System
HDPE	High Density Polyethylene
IAPs	Interested and Affected Parties
NC DENC	Northern Cape Department of Environment and Nature Conservation
NEMWA	National Environmental Management Waste Act, Act No. 59 of 2008
NEMA	National Environmental Management Act, Act No. 107 of 1998
NEMAQA	National Environment Management Air Quality Act, Act No. 39 of 2004
NWA	National Water Act, Act No. 36 of 1998
RDL	Red Data Listed
TSF	Tailings Storage Facility

1 INTRODUCTION

EScience Associates (Pty) Ltd. (herein referred to as 'ESA') was appointed as an independent auditor, by Assmang Black Rock Mine Operations (hereinafter referred to as 'BRMO'), to assess compliance with the conditions of the mine's Environmental Authorisation (EA) and the related commitments in the Black Rock Environmental Management Programme (EMPr).

BRMO is permitted to undertake various activities and planned expansions in accordance with Environmental Authorisation Ref No: NC 30/5/1/2/3/2/1/ (203) EM issued by the Department of Mineral resources (DMR).

1.1 OBJECTIVES OF THE AUDIT

The aim of this independent compliance audit is to review existing activities' compliance relating to the Environmental Authorisation as well as to document the potential areas of non-compliance and determine potential improvements that can be made to ensure compliance with the relevant provisions of the EMPr and environmental legislation.

In accordance with the requirements of the Environmental Impact Assessment Regulations (GN.R 982 of 2014) gazetted in terms of the National Environmental Management Act (Act 107 of 1998) {NEMA}, the objective of the environmental audit report is to:

(a) report on—

- (i) the level of compliance with the conditions of the environmental authorisation and the EMPr, and where applicable, the closure plan; and
- (ii) the extent to which the avoidance, management and mitigation measures provided for in the EMPr, and where applicable, the closure plan achieve the objectives and outcomes of the EMPr, and closure plan;

(b) identify and assess any new impacts and risks as a result of undertaking the activity;

(c) evaluate the effectiveness of the EMPr, and where applicable, the closure plan;

(d) identify shortcomings in the EMPr, and where applicable, the closure plan; and

(e) identify the need for any changes to the avoidance, management and mitigation measures provided for in the EMPr, and where applicable, the closure plan.

1.2 SCOPE OF AUDIT

The audit covers the aspects and activities as set out in the Environmental Authorisation and attendant EMPr.

1.2.1 HISTORY OF THE ENVIRONMENTAL AUTHORISATION

According to the EMPr, Initially BRMO operations had fragmented EMPs, these were consolidated into a single EMPr covering all operations and approved by the Department of Mineral Resources (DMR) on 11 February 2013. The EMPr was formulated prior to the "One Environmental System" as contemplated in Section 50A(2) of the

National Environmental Management Act (Act 107 of 1998) as amended on 02 September 2014.

The EMPr at that time included a proposed expansion project summarised as follows:

- Expansion of the mine's manganese production capacity through provision of two new vertical mine shafts, a vent shaft and associated surface shaft complexes, new washing, crushing and screening plant, upgrading of the Hotazel-Gloria Mine rail link, as well as the establishment of associated supporting service infrastructure (e.g. change house facilities, administrative offices, stores, electricity generation/distribution, water reticulation, sewage management, tailings handling facilities, rail and roads); and
- Establishment of a new sinter plant complex.

Due to significant global economic uncertainty BRMO was compelled to reconsider the extent of mine expansion and the feasibility of the sinter plant. BRMO took a considered decision to hold off on the planned expansion and sinter plant installation until such time as economic indicators and demand forecasts for their manganese products allow more certainty.

Approval of the EMPr was issued on 13 December 2013 and stamped on 16 January 2014 (DMR reference number (NC)30/5/1/2/2/203).

This EMPr was compiled in terms of the provisions of section 39 of the Mineral and Petroleum Resources Development Act [MPRDA] and to meet the requirements for the development of an environmental management programme, in terms of Regulation 33 of the 2010 NEMA EIA Regulations (GN.R 543 of 2010) and S22N of NEMA.

The EMPr was subsequently updated in accordance with chapter 5 of the EIA regulations (GN.R 982 of 2014), resulting in the issuing of the Environmental Authorisation, subsequently amended to an Integrated Environmental Authorisation on 29 November 2018.

1.3 ASSESSMENT METHODOLOGY

The proponent's compliance with the conditions of the EMPr relevant to the current development phase, as well as with the conditions of licencing, permitting and authorisation is audited using the following nominal scale (Table 1-1).

Table 1-1: Compliance scoring system used in audit report	
ID	Compliance Rating
N/A	Not relevant, or not audited/auditable
C	Compliant
NC	Non-compliant
UC	Uncertain, Compliance status could not be established

Compliance status is determined based the following:

- Interviews with relevant BRMO personnel, in particular the BRMO Environmental Specialist and Environmental Officers, and relevant management/supervisory personnel at the sites audited.
- Review of documents and records.
- Observation of the auditors at the time of the audit.

The auditor relies on the latter two methods as far as is practical in determining compliance status. In instances where there is no documented or visual evidence, the auditor uses reasonable discretion to inform the findings. In instances where confidential information could not be reviewed (e.g. detailed contracts with contractors), the auditor relies on the information reported unless there is reasonable suspicion, based on observation or otherwise, to doubt the reported information. In such instances compliance status cannot effectively be established.

EScience assumes the data and information obtained to be accurate and representative in the context that it has been used unless determined otherwise or there is a reasonable suspicion to the contrary.

It is assumed that activities and circumstances at the site, at the time of the audit, are representative of the activities and status of the site for the period audited unless determined otherwise or there is a reasonable suspicion to the contrary.

It is important to note that the audit process relies on a sampling methodology in respect of documents and records reviewed, as it is not practical, in many instances, to review all the information available for an extended period of time over an extended area.

It is important to note that activities are observed to the extent practical and may not cover the activities at the site in their entirety, and that the auditor prioritises those areas of potential significance based on: the conditions of authorisation; the stipulations of the EMPr; and, those areas or activities anticipated to have a potentially significant impact on the environment.

The results of the audit, together with auditor's comments as necessary, are provided in the ensuing sections. Photographic evidence is included where practical and significant.

2 DETAILS OF THE AUDITORS

A summary of the auditors' qualifications and experiences is presented below. For detailed information on the auditors refer to APPENDIX 1.

Name	Role	Qualification & Accreditation	Years of Experience
Abdul Ebrahim	Lead auditor	BEng (Hons) Environmental Engineering BEng (Hons) Mechanical Engineering Certified Environmental Assessment Practitioner Member Engineering Council of South Africa (ECSA) – Reg No: 20075012	18
James Pugin	Supporting auditor	Msc. Archaeology BSc(Hons) Archaeology BA Geography and Archaeology	3

Abdul Ebrahim is a director of EScience Associates, an environmental consultancy specialising in waste and waste recovery, effluent, atmospheric emissions and air quality, as well as cleaner and renewable energy. EScience Associates caters for a diversity of industries and economic sectors and has forged strong relationships with other specialists, and specialist agencies, allowing the company to deal with complex and contentious environmental problems.

Abdul Ebrahim holds a BEng (Hons) in both Mechanical and Environmental Engineering disciplines. His work experience includes environmental impact assessments, environmental management system development, environmental compliance auditing and compliance achievement planning.

He is a certified Environmental Assessment Practitioner (EAP) and member of amongst other organisations: Engineering Council of South Africa (ECSA), International Association of Impact Assessment SA (IAIASA), and the National Association of Clean Air (NACA).

Abdul has provided Honours level lecturing at the University of Pretoria, UNISA, Cape Town University of Technology and various private training institutions in the fields of Environmental Compliance Enforcement, Environmental Impact Assessment, Cleaner Production and Air Quality Management since 2005.

James Pugin is an environmental consultant at EScience Associates. James holds an MSc in Archaeology. His work experience GIS specialist work, environmental impact assessments, environmental control officer services and environmental compliance auditing. James has 3 years post graduate experience, and further part time experience in research whilst completing his MSc at the University of the Witwatersrand.

3 DECLARATION OF INDEPENDENCE

EScience Associates (Pty) Ltd, as the appointed auditors, led by Abdul Ebrahim hereby affirms that:

- The information herein is true and correct to the best of our knowledge;
- The auditor has ensured that information contained herein is based to the extent possible on facts and evidence availed by the auditees or observed during the audit;
- The audit has been undertaken in an objective manner.
- The auditor has the competence and experience required to undertake the audit effectively.

4 COMPLIANCE WITH THE ENVIRONMENTAL AUTHORISATION

4.1 ENVIRONMENTAL AUTHORISATION

Table 4-1: Tabular Summary of Compliance with Conditions of the EMPr – Pre-construction, Planning and Design				
No.	Condition/Requirement	Status	Finding	Auditor Comment
PRE-CONSTRUCTION, PLANNING AND DESIGN				
1	This office hereby acknowledges an updated Environmental Management Programme received on the 19 July 2016, and subsequent additional information as requested by the department on 06 October 2016.	N/A	Noted	
2	The proposed amendments to the authorised Environmental Management Programme (EMPr) have been evaluated and after due consideration have been approved.	N/A	Noted	
3	Factors considered include, inter alia:			-
A	The proposed amendments will not result in an increase of the authorised scope of activities.	N/A	Noted. Activities observed were within the scope authorised.	
B	The proposed amendments will result in a reduced environmental impact.	N/A	Noted	
C	The public participation undertaken in which no stakeholders registered any concerns with the proposed amendments.	N/A	Noted	
4	The approval is subject to the following conditions:			-
A	It is noted that the Black Rock Koppie is a potential heritage site in terms of the National Heritage Resources Act 25 of 1999. A heritage resources assessment must be undertaken and subsequent approval from the South African Heritage Resources Agency must be sought prior to any further development, or mining, of the Black Rock Koppie.	C	<p>No development has been undertaken at the Black Rock Koppie.</p> <p>A specialist archaeological assessment has been undertaken to determine the extent of the cultural heritage at the Black Rock Koppie. (Archaetnos Culture & Cultural Resource Consultants, report reference: AE01918V, dated April 2019.)</p> <p>The specialist states: "The Black Rock koppie on its own is the most important heritage feature</p>	<p>It is recommended that BRMO liaise with SAHRA in respect of the how the koppie should be managed.</p> <p>The finding of the 2019 assessment as well as a previous assessment (African Heritage Consultants, 2009) indicate the Black Rock mine to be of significant historical and cultural heritage importance.</p>

Table 4-1: Tabular Summary of Compliance with Conditions of the EMPr – Pre-construction, Planning and Design				
No.	Condition/Requirement	Status	Finding	Auditor Comment
			discussed. On its own it is. It should thus be graded as a National Heritage site (Grade I) of high cultural significance, but coupled with other heritage features it increases in significance. It is a unique feature indicating the earliest manganese mining activities in Southern Africa, dating back to the 1940's."	
B	The management actions stipulated in the EMPr and supporting specialist studies must be implemented and adhered to.	NC	Although the mine is compliant with most of the requirements, there are non-compliances noted as indicated in section 5 of this audit report.	It is recommended that a compliance achievement plan be implemented.
C	All registered interested and affected parties must be informed of the approved amendment within 14 days of the date of the decision to the fact that an appeal may be lodged against the decision in terms of the National Appeals Regulations, if such appeal is available in the circumstances of the decision.	C	The Environmental Authorisation is dated 29 November 2018, however it was only received by BRMO on 14 February 2019. Interested and affected parties were informed on 27 February 2019, which is within 14 days of receipt of the Environmental Authorisation. Although this is technically not compliant with the stipulated condition, it would not have been possible for BRMO to implement the condition as it is stated.	
D	An annual environmental audit must be undertaken in accordance with regulation 34 of the Environmental Impact Assessment Regulations, 2014, as amended	C	This audit has been undertaken within 1 year of the issuing of the Environmental Authorisation.	
E	The EMPr must be included in all contract documentation for all phases of implementation.	C	It was noted that contractors did not have the latest copy of the EMPr at the time of the audit.	
F	A copy of this approval and the EMPr must be kept at the facility where the activities will be undertaken. These must be produced to any authorised official of the Department who requests to see them and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the facility	C	Document contained within green files of contractors. It is noted from quarterly audit reports that although the majority of contractors have the EMPr and EA, two contractors did not have the correct EMPr and Environmental Authorisations (namely	

Table 4-1: Tabular Summary of Compliance with Conditions of the EMPr – Pre-construction, Planning and Design				
No.	Condition/Requirement	Status	Finding	Auditor Comment
			Petrocon and Servest). This had been rectified at the time of the audit.	
G	The applicant shall remain responsible for the facility, and/or any of its impacts on the environment.	C	Confirmed by the BRMO Environmental Specialist that BRMO is responsible for their facilities and the impacts resulting from their operations.	
H	The Department reserves the right to audit or inspect the Facility without prior notification at any time and frequency as may be determined by the Department.	N/A	An audit was undertaken in 2019 by the Department of Mineral Resources.	
I	The applicant must make any relevant records or documentation available to the Department upon request.	C	Documents and records were reported to have been availed to the department during the audit as requested.	
J	The License Holder must keep of all monitoring results, nuisances and complaints regarding the authorised activities.	C	A system for registering complaints is in place. Monitoring records are maintained. Dustfall and water quality monitoring records were availed to the auditor as requested.	

5 COMPLIANCE WITH ENVIRONMENTAL MANAGEMENT PLAN (EMPR)

5.1 PRE-CONSTRUCTION, PLANNING AND DESIGNING

Table 5-1: Tabular Summary of Compliance with Conditions of the EMPr – Pre-construction, Planning and Design				
No.	Condition/Requirement	Status	Finding	Auditor Comment / Recommendations
PRE-CONSTRUCTION, PLANNING AND DESIGN				
1	The EMPr must be reviewed after completion of detailed design. If necessary the EMPr must be updated to ensure that it is relevant to the detailed design of all applicable site structures, supporting infrastructure and activities.	C	<p>It is reported that no updates are required as no changes to the intended designs and layouts have been undertaken that would warrant a review of the EMPr and the environmental management actions therein.</p> <p>It is noted that The Gloria mine tailings storage facility (TSF) is undergoing alterations to extend the life of the facility, however these alterations with neither increase the footprint nor increase the capacity, and will not require amendment of the site's water use licence nor result in a substantive alteration to the BRMO's impact on the environment which would require amendment of the EMPr.</p> <p>It is noted that a bridge is planned for construction over the Gamagara river to replace the existing bridge. This is in order to reduce or eliminate the constraint on the size of trains passing over the bridge due to the dip in the bridge. The proposed construction will occur within the existing rail reserve. The Department of Water and Sanitation (DWS) has confirmed that a general authorisation applies with GN 509 of 2016 provided that the proposed activity has 'low risk' as contemplated in the notice (email from DWS Philani P. Msimango dated 06 06 2019). This risk has accordingly been assessed and deemed by the specialist to be a low risk, along with various management provisions as required in the notice (Scientific Aquatic Services report, ref: SAS 219059). Similarly a heritage impact assessment has been undertaken which concludes the no sites of cultural heritage importance were identified and</p>	-

Table 5-1: Tabular Summary of Compliance with Conditions of the EMPr – Pre-construction, Planning and Design				
No.	Condition/Requirement	Status	Finding	Auditor Comment / Recommendations
			that the report is seen as ample mitigation and the development may therefore continue, but only after receiving the necessary approval from SAHRA.	
2	The competent authority must be informed of any significant changes to the project description or the EMPr	N/A	No significant changes have been reported or observed within the scope audited. It is notable that BRMO has not implemented the full scope of authorised activities at the time of the audit.	-
3	The EMPr must be updated to ensure that the conditions of relevant approvals, licences and authorisations issued for this project are not in conflict with the EMPr.	C	No updates have been required as no conflict with approvals, licences and authorisations has been noted.	
4	The project proponent must appoint an independent Environmental Control Officer who must audit compliance with the EMPr during the construction phase for mine expansion and the sinter plant complex.	C	The applicant has appointed EScience Associates (ESA) to conduct compliance audits of construction phase activities.	
5	The EMPr must be made binding to contractors and should be included in tender documentation for the contract.	C	<p>It is reported that the EA, and the EMPr, formed part of the contractor's conditions of contract, although the contracts themselves have not been reviewed.</p> <p>It was observed that contractors are issued with "green files" which contain the EA and the EMPr along with various environmental management procedures. These "green files" have a signed undertaking by relevant BRMO management and the contractors confirming agreement to adhering to the contents of the "green file".</p> <p>It is noted from the latest quarterly expansion project environmental compliance audit report (Audit Date: 7-9 October 2019) that two contractors did not have the updated EMPr in their green file. However the non-compliance had been rectified at the time of the audit.</p>	

Table 5-1: Tabular Summary of Compliance with Conditions of the EMPr – Pre-construction, Planning and Design				
No.	Condition/Requirement	Status	Finding	Auditor Comment / Recommendations
6	The EMPr must be made readily available to the contractors, staff, as well as other relevant role-players associated with the project.	C	<p>The EMPr is availed to staff via BRMO's network management system, and by request from the environmental department's personnel.</p> <p>It was observed that contractors are issued with "green files" which contain the EA and the EMPr along with various relevant environmental management procedures and information.</p> <p>It is noted from the latest quarterly expansion project environmental compliance audit report (Audit Date: 7-9 October 2019) that two contractors did not have the updated EMPr in their green file. However the non-compliance had been rectified at the time of the audit.</p>	
7	Contractors and staff must be properly trained in all environmental aspects relating to their role in the project's construction and operation, as per requirements of the associated environmental awareness plan.	C	<p>All contractors that were audited produced evidence of training in respect of the related BRMO procedures and awareness plans,</p> <p>However some contractors did not have the new EMPr. Given that the difference in the previous and updated EMPr are relatively small it is not expected that this impacts significantly on the level of awareness and competence required.</p>	It is recommended that refresher training be conducted with respect to those requirements of the EMPr that are pertinent to people's activities and responsibilities.
8	Obtain environmental authorisation, in terms of the National Environmental Management Act (107 of 1998), where activities listed in terms of Chapter 5 of the Act are triggered and not otherwise authorised.	C	<p>No unauthorised activities were reported or observed.</p> <p>BRMO applied for, and was issued with, an EA (Ref No: NC 30/5/1/2/3/2/1/) for the Gloria Plant Upgrade, received by BRMO on 22 October 2018.</p>	
9	Obtain a Waste Management Licence in terms of the National Environmental Management: Waste Act (59 of 2008) where activities listed in terms of S19 of the act are triggered and not otherwise authorised.	N/A	BRMO applied for the EA to be amended to an Integrated Environmental Authorisation (IEA), and was granted as such on 29 November 2018. It is therefore understood that a standalone WML is not required. The IEA includes relevant activities listed in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008).	

Table 5-1: Tabular Summary of Compliance with Conditions of the EMPr – Pre-construction, Planning and Design				
No.	Condition/Requirement	Status	Finding	Auditor Comment / Recommendations
			No unlicensed activities were reported or observed.	
10	Obtain an Atmospheric Emission Licence (AEL), in terms of the National Environment Management: Air Quality Act (39 Of 2004), from NCDENC for the operation of the sinter plant	N/A	A provisional AEL (Licence Number NC/AEL/JTG/ASSBRMO01/2012) was issued to the proponent in March 2013, but has since been retracted pending a decision from Assmang on whether the Sinter plant will be built. Therefore the requirement for an AEL is not applicable at the time of the audit.	
11	Permits applicable to the removal, relocation or destruction of protected plants must be obtained prior to undertaking any such activity.	C	<p>Several permits were obtained for various phases of the expansion project. These were issued by the <i>Northern Cape Department of Environment and Nature Conservation</i> and the <i>Department of Agriculture, Forestry and Fisheries</i> for protected plants and trees respectively. These include:</p> <p>NC DENC Permit:</p> <ul style="list-style-type: none"> • 091/2012 • 029/2014 • 031/2014 • 031/2/214 • 031/3/2014 • 029/2/2015 • 029/3/2015 • 0051/2017 • 0050/2017 <p>DAFF Permit</p> <ul style="list-style-type: none"> • NCU 2300612 • NCU6061115 • NCU 4021113 • NCU 6061115 • NCU 5320315 Amendment • NCU 7480617 	Compliance with these permits was not within the scope of the audit and was not audited.

Table 5-1: Tabular Summary of Compliance with Conditions of the EMPr – Pre-construction, Planning and Design				
No.	Condition/Requirement	Status	Finding	Auditor Comment / Recommendations
			<ul style="list-style-type: none"> • NCU 7360417 • NCU 8380518 	
12	Identify the need for any other environmental permits and obtain these as required.	NC	<p>BRMO identified the requirement for Water Use Licence, and applied for a Water Use Licence for relevant water uses listed in the National Water Act (Act 36 of 1998).</p> <p>Although a licence was issued (licence no: 10/041M/ABEGJ/3490), some activities, notably new Nchwaning 2 Tailings Storage Facility, were applied for but not licensed by the DWS.</p> <p>Based on the email communication history with the department, in particular the case officer (Esther Thivhondli Adeyileka email dated 10 May 2019, 11:36h), it is clear that the department committed to 're-doing' the licence. The department subsequently communicated that the Water User Authorisation Assessment Advisory Committee (WUAAAC) confirmed:</p> <p><i>"1. The omitted water uses were recommended to incorporated in the WUL;</i></p> <p><i>2. The table of water uses will be sent through to the applicant for verification; and</i></p> <p><i>3. The existing WUL will be amended and sent to National Office for signatures."</i></p> <p>(Reference email from DWS Nokulunga Memela, dated 28 November 2019).</p> <p>BRMO awaits the amended WUL.</p>	It is noted that this was an error on the part of the licensing authority, and BRMO are in the process of obtaining an amendment of the licence. However it is clear that not all the activities requiring licensing are included in the licence. It is recommended that BRMO continue to pursue rectification of the omissions and keep a clear record of communications.
13	Facilities for the storage [of] hazardous waste must be incorporated into the project design to ensure that all hazardous waste will be handled and stored in compliance with the NEMWA	NC	Facilities have been designed and constructed at the BRMO Waste Management Facility for the storage of hazardous waste.	It is recommended that BRMO ensure that all non-compliances with the National Norms and

Table 5-1: Tabular Summary of Compliance with Conditions of the EMPr – Pre-construction, Planning and Design				
No.	Condition/Requirement	Status	Finding	Auditor Comment / Recommendations
	National Norms and Standards for the Storage of Waste GN 926: 2013, or superseding equivalent.		<p>The facility is subject to biennial external audits. The latest audit report (Date: 05/12/2017) indicated some non-compliances with the Norms and Standards.</p> <p>Various none-compliances were noted at the hazardous waste management facility. Of particular significance these include, but are not limited to</p> <ul style="list-style-type: none"> • Internal compliance audits have not been undertaken. • an apparent leak in the bund wall at hazardous waste transfer facility. Refer to Figure 6.6 on page 79 <p>It was also noted that the stormwater collection system is unlikely to have sufficient capacity to contain a 1 in 50y rainfall event. This is based on visual inspection of the containment sump versus the area draining thereto as estimated using satellite imagery and reported 1 in 50yr storm event used for BRMO tailings facility design (106 mm).</p>	Standards for the Storage of Waste be rectified.
14	Design engineers and contractors must be informed of the required minimum standards as may be stipulated in permits relevant to the processes and activities they are designing such that these can be incorporated in the design.	C	<p>It is reported that the design briefs take into consideration environmental legal requirements. The contracts were not audited as the information therein is deemed to be sensitive and confidential.</p> <p>It was observed that Contractors are issued with "green files" which contain the EA and the EMPr along with various environmental management procedures. These "green files" have a signed undertaking by relevant BRMO management and the contractors confirming agreement to adhering to the contents of the "green file".</p>	

5.2 CONSTRUCTION PHASE

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase

No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1. CONSTRUCTION CAMP ESTABLISHMENT				
	Ambient air			
1	A dust palliative with at least 80% dust reduction efficiency must be applied to unpaved roads (See Appendix 5 for alternative palliative options). Roads paved with low grade ore or aggregate shall be considered as being paved.	C	<p>A ligno-sulphanate palliative is used (AGM DustBind, refer to Afri-Group MSDS Document Ref: AGM 0012). Although specific dust palliation effectiveness is not stated by the manufacturer, this type of dust suppressant is in accordance with the recommendations of the specialist air quality impact assessment report issued for the mine expansion environmental impact assessment, and is also reported to have a PM10 reduction efficiency of up to 99%.</p> <p>Application reportedly includes all product haul roads, unpaved roads within the production areas, and the road to the salvage yard. All significant haul roads observed during the audit had been treated.</p> <p>The soil surfaces in the laydown areas are generally covered with crushed stone or low grade ore where vehicles and frequent traffic are expected. No visible entrained dust was observed on these sites.</p> <p>BRMO undertakes monthly dust fallout monitoring. The results thereof show compliance with the National Dust Control Regulations GN.R 827 2013 as reported (Aquatico Monthly Dust Fall-Out Monitoring Reports, latest available report dated August 2019).</p>	
2	Waste shall not be burnt unless in a waste management facility, or other facility, licenced for that purpose. Evidence of lawful disposal all wastes streams generated must be maintained.	NC	<p>No evidence of waste burning observed during the audit.</p> <p>BRMO and project contractors maintain waste disposal certificates for hazardous waste by service providers, and waste logs for general waste disposal to the Black Rock Landfill.</p> <p>According to quarterly expansion project environmental compliance audits, abluion waste from contractors is</p>	It is recommended contractors be required to maintain safe disposal certificates for ablutions waste.

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
			disposed of by service providers (Sanitech and Kharki). However, safe disposal certificates are not maintained by some of the contractors and thus there is no immediate evidence of lawful disposal. This had not been rectified at the time of the audit.	
	Surface water, soil and Ground water			
3	<p>Contractor/s must provide appropriate (capacity/effective containment of grey and black water), ablution/sanitary arrangements for employees, and maintain/service such for the duration of their site's activities in accordance with the MHSa as a minimum.</p> <p>Mobile facilities must be inspected on a daily basis for leaks and cleanliness, and emptied at frequency adequate to prevent overflow.</p> <p>Septic tank must be emptied at a frequency sufficient to prevent overflow. Caution must be taken to prevent leaks or spills during emptying of septic tanks. In the event of spill residue must be removed and the affected area must be treated with lime.</p>	C	<p>Contractor laydown areas have either built or portable ablution/sanitary arrangement for employees.</p> <p>Portable toilets and septic tanks are serviced by their service providers (Sanitech and Kharki). Records of servicing of toilets and septic tanks are maintained by the contractors.</p>	
4	Concrete preparation (i.e. including mixing) and batching must take place on durable, impermeable, bunded surfaces.	C	No concrete preparation was observed during the audit and no runoff was observed. However it is reported that concrete preparation is undertaken in concrete mixers or where necessary within bunded facilities if manual preparation is required.	-
5	Run-off from preparation (i.e. including mixing) activities must be effectively contained and prevented from entering the natural environment (i.e. soils, surface water, and groundwater).	C	No concrete preparation was observed during the audit and no runoff was observed. However it is reported that concrete preparation is undertaken in concrete mixers or where necessary within bunded facilities if manual preparation is required.	-
6	No underground (i.e. buried) fuel tanks may be established as part of the construction activities	C	No buried fuel tanks observed or reported. A new fuel bay has been constructed at Nchwaning 2 which is above ground.	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	sites or anywhere else on site during construction, or operation.			
7	Bunded facilities must be compliant with specifications of the BRMO Spill Management and Specifications for Bund Walls procedure, as appended.	C	Construction related bunds observed were in compliance with the requirements of the procedure.	-
8	Above ground fuel, or oil storage tanks, must be located within appropriately sized, impermeable, bunding that is constructed in accordance with BRMO's spill management procedure. Decanting must be undertaken within the bunded area or on an impermeable surface for this purpose.	C	Oil is stored in drums and plastic containers kept in bunds. Fuelling is undertaken at the mine fuel stations. Two contractors (Olivier and Concor) were observed to have small fuel bowsers. Bunds have been built for these.	
9	Appropriate spill management kits must be kept and maintained on site wherever liquid hazardous materials are stored, and where refuelling and/or servicing of plant, vehicles and machinery takes place, in order to manage potential spillages effectively.	C	Spill kits observed at all sites visited where the relevant activities were undertaken.	-
10	Training, in the use and maintenance of the abovementioned kits, as well as any contaminated waste products, must be provided to ALL staff either directly or indirectly involved in any of the activities identified above.	C	Staff are reported to have been trained in the use of the kits. Staff signatures on the BRMO spill management procedures are reported as evidence of training and acknowledgment of understanding of the procedure. The procedures are signed dated by the staff trained. Contractors have training records maintained in their green files.	It is recommended that a formal training record be maintained for staff.
11	Hazardous chemical containers must be stored within appropriately constructed bunds. Inspection of containers' integrity must be undertaken regularly, and compromised containers must be replaced.	C	Storage facilities observed for construction phase activities were generally in accordance with these requirements. The nature of the construction activities is such that limited amounts of hazardous chemicals are stored for example paints, solvents and lubricants. These are generally in small containers (2L, 5L, 10L plastic or metal containers etc) kept within cages in bunds.	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
12	Sorbents and contaminated soil must be immediately collected and placed within a water-tight, skip/container for subsequent disposal or treatment at an appropriately licensed hazardous waste management facility.	C	Sorbents are reported to be handled and disposed of accordingly via the BRMO hazardous waste transfer facility. Used sorbents were not observed at the time of the audit. It was observed that a sealed skip with used sorbent is kept at the BRMO hazardous waste transfer facility for disposal. Contaminated soil is kept in dedicated bund at the hazardous waste storage facility as well prior to disposal. Safe disposal certificates are maintained.	
13	All servicing of plant and vehicles is to take place strictly within dedicated workshops within construction site/s, or otherwise off-site at appropriate maintenance facilities.	C	No vehicles were observed being serviced outside service bays.	-
14	Furthermore, servicing and maintenance of plant and vehicles must take place on impermeable surfaces with appropriate measures in place to contain contaminated run-off. Impermeable surfaces must be maintained.	C	Servicing of vehicles was observed within bunded areas.	-
15	Where emergency/unplanned repairs are required during construction activities, or oil leaks are identified, suitable drip trays must be used to prevent contamination of soil and water.	C	Historical non-compliances were reported in the quarterly construction project audits; however, these had been rectified at the time of the audit.	-
16	Uncontaminated storm water run-off within the sites must be prevented from flowing through workshops and wash bays or any other contaminated areas.	C	Areas where potentially significant contamination is likely are bunded or raised with drainage to containment sumps.	-
17	Potentially contaminated water must be effectively diverted, contained and managed, such that no contaminants are ever in contact with site soils	C	Areas observed where potentially significant contamination is likely are bunded with collection sumps.	-
18	Waste oil generated from vehicle workshops/drip trays must be immediately stored in sealable, water-tight, steel drums or containers within a bunded facility for subsequent removal from site for either recovery, or disposal thereof	C	No waste oil was observed at construction areas. Bunds and sealed storage are in place at the mine workshops.	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
19	Waste oil storage areas may only be placed within relevant construction/contractor's sites, and BRMO workshop areas, before being moved to the BRMO hazardous waste storage area or direct removal by an appropriate waste removal or recycling company.	C	No waste oil observed at construction areas. Bunds and sealed storage are in place at the mine workshops.	-
20	Sufficient, water-tight, skips/containers on site for the separate storage of general (including steel, rubble and other non-contaminated waste) and hazardous waste.	C	Sufficient waste disposal facilities were observed at construction areas.	
21	Under no circumstances must waste be stored on site anywhere but in the appropriate skips/containers provided for such.	C	No storage outside of skips or containers was observed. Two waste skips stored outside of bunded areas were observed at the Hazardous Waste Transfer Station at the time of the audit.	It is recommended all hazardous waste skips at the transfer station be stored within the bunded facility.
22	Waste skips/containers must be cleared when full, such that waste doesn't over-flow onto adjacent ground.	C	No observations to the contrary.	
23	Records of safe disposal must be obtained, and kept on file, for all waste removed from site; where the waste management facility/contractor used for such purposes must be appropriately licensed/permitted for such.	NC	BRMO and project contractors maintain waste disposal certificates for hazardous waste by service providers, and waste logs for general waste disposal to the Black Rock Landfill. According to quarterly expansion project environmental compliance audits, abluion waste from contractors is disposed of by service providers (Sanitech and Kharki). However, safe disposal certificates are not maintained by some of the contractors and thus there is no immediate evidence of lawful disposal. This had not been rectified at the time of the audit.	It is recommended contractors be required to maintain safe disposal certificates for ablutions waste.
24	The area supervisor is responsible for ensuring that wind-blown litter is collected from the sites on a daily basis.	C	No significant wind-blown litter observed.	-
25	Waste must not be temporarily stored on bare soil surfaces; Except where:	C	No observations to the contrary. All waste storage observed was in appropriate bins and skips.	

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	The waste is regarded as being 'inert' (e.g. waste bricks, un-contaminated steel scrap, etc.), in terms of the definition provided for in the National Environmental Management: Waste Act (59 of 2008); The waste will be removed from site within 30 days of the generation thereof; and No component of the waste is susceptible to dispersal by wind			
26	Skips/containers must, therefore, be clearly marked for purpose.	C	Quarterly construction phase compliance audits have reported non-compliance. However, at the time of the audit, it was reported that these non-compliances had been rectified. There were no observations of non-compliance during the audit.	
27	Safe disposal/management certificates must be obtained for all waste removed from site	NC	BRMO and project contractors maintain waste disposal certificates for hazardous waste by service providers, and waste logs for general waste disposal to the Black Rock Landfill. According to quarterly expansion project environmental compliance audits, abluion waste from contractors is disposed of by service providers (Sanitech and Kharki) however safe disposal certificates are not maintained by some of the contractors and thus there is no immediate evidence of lawful disposal. This had not been rectified at the time of the audit.	It is recommended contractors be required to maintain safe disposal certificates for ablutions waste.
28	Waste may only be taken to appropriately licensed/permited waste management facilities.	UC	Although it is reported that waste is only disposed to appropriately licenced facilities, safe disposal certificates (from Sanitech and Kharki for example) were not available in several contractor environmental green files. Compliance could therefore not be confirmed.	It is recommended contractors be required to maintain safe disposal certificates for ablutions waste.
29	Waste skip/container collection and replenishment schedules must be developed and managed pro-actively by the supervisors, in order to ensure that no skips/containers are left full and/or over-flowing for any extended period of	C	Skips and containers are collected on a periodic (generally weekly or bi-weekly) basis.	

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	time and that there is always appropriate temporary waste storage capacity on site.			
30	Contractors will be required to provide a method statement specific to waste minimisation, reuse, recovery and recycling, as well as temporary storage and disposal; where such plans would need to be signed off by competent site environmental personnel/environmental control officer (Environmental Control Officer) prior to the start of construction activities.	C	BRMO has enforced its own waste management procedure, thus obviating the need for contractor to supply their own method statements.	-
	Surface Water			
31	Surface storm water run-off must not be able to flow through any waste storage areas. Nor should skips/containers, or waste storage areas, be positioned where surface water may pond or flow preferentially during rainfall events.	C	In general, waste skips or bins are either kept in bunded, impermeable areas in the laydown areas or on surfaces paved with low-grade ore. There were no observations of likely surface flow through the storage facilities.	-
	Biodiversity			
32	Construction sites may only be established within the anticipated development footprints of the proposed project. E.g. proposed product stockpile floors.	C	Confirmed from 2018 aerial photos of the site.	-
34	The poaching, or killing, of indigenous site fauna is prohibited.	C	<p>A biodiversity management procedure has been developed prohibiting extermination of wildlife, but there is no reference within the document preventing poaching or killing of fauna on-site.</p> <p>Employees and contractors are made aware of this condition through toolbox talks and awareness training. Records of this awareness training is maintained by contractors and BRMO.</p> <p>No evidence observed of non-compliant activities and none reported, however it is recommended that the Biodiversity Management procedure be updated to prohibit trapping, poaching and killing of all indigenous fauna.</p>	It is recommended that the Biodiversity Management procedure be updated to prohibit trapping, poaching and killing of all indigenous fauna.

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
34	Under no circumstances are wood, or medicinal plants, to be 'harvested' without an appropriate permit or licence.	C	<p>Employees and contractors are made aware of this condition through toolbox talks. Records of this awareness training is maintained by contractors.</p> <p>No evidence observed of non-compliant activities and none reported.</p> <p>In the event that wood is required, the local community is allowed to collect wood that has been disposed of to the Licenced BRMO waste management facility. This consists of wood waste (e.g. pallets) and trees lawfully removed or trimmed within the mine boundaries.</p>	-
35	Under no circumstances are wood, or medicinal plants, to be 'harvested' by the contractor, or his/her employees	C	<p>Employees and contractors are made aware of this condition through toolbox talks. Records of this awareness training is maintained by contractors.</p> <p>No evidence observed of non-compliant activities and none reported.</p>	-
36	<p>If open fires (i.e. not contained in a brazier or equipment designed for that purpose), for the purposes of cooking, are to be tolerated within the construction site/s, the following conditions are to apply:</p> <ul style="list-style-type: none"> • Must be well removed from fuel and hazardous material storage areas, in line with appropriate BRMO safety standards; • Must be well removed from indigenous vegetation (at least 15m); • Fire-extinguisher must be readily available; • Must be screened from wind with non-flammable material/s; and • Non-smouldering ash residues must be disposed of in general waste skip/s, or containers, on site. 	C	<p>No evidence of fires was identified in the construction areas. Staff are provided with food brought to the site or at contractor housing facilities (contractor camps).</p> <p>Food for contractors at the contractor camps is made in dedicated canteens.</p> <p>Evidence of open fires was observed at the Nchwaning 2 vent shaft. This is clearly not related to construction activities as there is no construction in progress at or near the site.</p>	It is recommended that BRMO investigate the burning of material at the vent shaft as this poses a potential threat of uncontrolled veld fire.
37	Contractors must ensure that alien invasive species within the bounds of their sites are	C	No significant observations of alien invasive species in the construction areas.	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	managed in accordance with relevant provisions of the BRMO alien invasive species management plan			
38	All relevant personnel and contractors to receive training in regard to the above requirements.	C	BRMO issued flash cards for incorporation into training.	-
	Socio-economics			
39	Only contractor/s and his/her employees, or sub-contractors, may be housed within, or gain access to the construction site/s and housing facilities.	C	BRMO has an electronic access control system that only allows authorised persons into the mine and the related construction sites.	-
40	Access by the contractor and his/her employees to adjacent farms (i.e. other than those falling within the ambit of the project) is strictly forbidden; unless otherwise agreed upon, in writing, by the relevant landowner/s.	C	It is reported that contractors do not enter areas outside their scope of work. No complaints have been reported by neighbouring farms.	-
41	The enhancement of benefits associated with the effects on employment lie in the potential to increase the employment opportunities for local communities in the JT Gaetsewe DM and supporting more jobs through the procurement of local goods than imported materials and inputs where feasible. In this context, the following should be considered, where possible: <ul style="list-style-type: none"> • Employ labour-intensive methods in construction, where economically feasible; • Employ local residents and communities, where possible; • Sub-contract to local construction companies (in the JT Gaetsewe DM), where feasible; and utilise local suppliers, where feasible. 	UC	<p>It is reported that contractors obtain recommendations for local labour from BRMO's HR department and that local contractors are used where practical. BRMO provides a list of CVs for contractors to identify applicable local personnel.</p> <p>BRMO has committed to local economic development in the approved social and labour plan (SLP). BRMO also requires contractors to "...maximize the employment of local labour and follow the EAP (Economically Active Population) Statistics with Woman in Mining".</p> <p>It is reported that these recommendations have been considered by the project team. Notably, there has been a significant reduction in project scope which has reduced opportunities correspondingly.</p> <p>BRMO has a local labour recruitment procedure (Document No: PRO-ENG-P-GE-G-3779) whose purpose is "Ensure coordination between Contractors and BRMO for the recruitment of local labour". This procedure requires all contractors to recruit labour from BRMO's labour database.</p>	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
			<p>CV's of local labour must be verified and certified by the Local Community Council.</p> <p>The procedure clearly provides a practical system for ensuring hire of local labour</p> <p>Human resources records availed show that 52.19% of Black Rock labour is from within the John Taolo Gaetsewe municipality.</p> <p>Quantification of the implementation of these requirements (use of local sub-contractors for example) within the construction project was not available. It is therefore not possible to determine compliance status.</p>	
42	The negative impact on housing and service delivery provision pressures could be reduced by sourcing the majority of construction workers from local communities, thus reducing the need to bring new people into the local area.	C	<p>It is reported that contractor are required to maximize the employment of local labour and follow the EAP (Economically Active Population) Statistics with Woman in Mining. BRMO has a local labour recruitment procedure (Document No: PRO-ENG-P-GE-G-3779) whose purpose is "Ensure coordination between Contractors and BRMO for the recruitment of local labour". This procedure requires all contractors to recruit labour from BRMO's labour database. CV's of local labour must be verified and certified by the Local Community Council.</p> <p>The procedure clearly provides a practical system for ensuring hire of local labour. Human resources records availed show that 52.19% of labour is from within the John Taolo Gaetsewe municipality.</p>	
	Topography			
43	No slopes with gradient > 33° (i.e. 3H:1V) should be established on site; unless otherwise protected from erosion by appropriate storm water management measures, or slope stabilisation/re-vegetation	C	No such slopes were observed during audit. Slopes of the Nchwaning 2 Tailings Storage Facility are constructed at a gradient of 2.5H:1V However there is evidence of erosion occurring on-site. The erosion observed was relatively minor however this may become significant over time.	Vegetate slopes to prevent erosion on slopes prone to erosion.

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	Noise and Vibration			
44	Vegetation and topsoil stripping to only be undertaken between 7:00am and 5:00pm.	N/A	Vegetation stripping completed. No stripping occurring during the audit. It is reported that all stripping was done during 07:00 to 16:00. This is in line with the normal working hours for the contractors. No complaints received in this respect to date. Vegetation clearing is reported to be complete.	
45	In terms of noise impact for various increases over the ambient, the National Noise Regulations define an increase of 7 dBA as "disturbing". Noise levels during construction must, therefore, be kept within 7 dBA of the baseline data at sensitive receptors.	UC	No noise assessments have been undertaken thus this could not be confirmed. It is the auditor's unsubstantiated view that noise generated by the activities audited would not be substantial enough to cause a sustained 7dBA increase in noise levels. Furthermore it is reported that no complaints have been received. An integrated environmental monitoring assessment is scheduled to be completed in the first quarter of 2020. It is reported that this will include noise monitoring.	Noise from the construction activities was not audible.
46	Should noise complaints be received then the source of the noise causing the disturbance must be investigated and measures to reduce the noise level must be considered and implemented. Subsequent follow-up with the complainant must be undertaken to confirm elimination of the problem.	N/A	It is reported that no complaints have been received.	
47	Ground level vibrations resulting from blasting activities should not exceed 10 m/s beyond the mine boundary	N/A	No significant blasting related to the audited activities during the period of interest. Furthermore it is reported that no complaints have been received.	-
48	Air over pressure from blasting activities should not exceed 134 dB at the mine boundary	N/A	No significant blasting related to the audited activities during the period of interest. Furthermore it is reported that no complaints have been received.	-
49	No surface blasting to take place during windy conditions	N/A	No surface blasting related to construction activities at surface.	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
50	Ground level vibrations resulting from blasting activities should not exceed 10 m/s beyond the mine boundary	N/A	Duplicate of clause 47.	It is recommended that this duplication be removed in accordance with NEMA Section 47A(1)(b).
Biodiversity				
1	Vegetation clearance must be limited to the smallest area practical to enable construction activities and the establishment of structures and infrastructure. These areas need to be clearly marked out (e.g. taped off) under the supervision/assistance of the Internal Environmental Officer as vegetation clearance proceeds on site. Required to ensure that all vegetation clearance is restricted to designated areas to the greatest extent practical.	C	<p>No clearance of vegetation undertaken at the time of the audit. However clearance undertaken for the expansion project appears to have been kept to the required footprint based on a review of aerial photos and satellite imagery.</p> <p>There is an area south of Gloria mine that was cleared prior to BRMO's decision not to proceed with the sinter plant. It is reported that this area has been earmarked for a new super fines storage facility.</p>	-
2	No protected species may be removed, relocated or destroyed without the necessary permits for such having been obtained from the relevant competent authority.	C	<p>Reportedly no removal has been undertaken without permits. Several permits were obtained for various phases of the expansion project. These were issued by the <i>Northern Cape Department of Environment and Nature Conservation</i> and the <i>Department of Agriculture, Forestry and Fisheries</i> for protected plants and trees respectively. These include:</p> <p>NC DENC Permit:</p> <ul style="list-style-type: none"> • 091/2012 • 029/2014 • 031/2014 • 031/2/214 • 031/3/2014 • 029/2/2015 • 029/3/2015 • 0051/2017 • 0050/2017 <p>DAFF Permit</p> <ul style="list-style-type: none"> • NCU 2300612 • NCU6061115 • NCU 4021113 • NCU 6061115 	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
			<ul style="list-style-type: none"> • NCU 5320315 Amendment • NCU 7480617 • NCU 7360417 • NCU 8380518 <p>The relevant affected areas were briefly reviewed via historical satellite and aerial photos. No evidence of vegetation removal outside of the authorised areas was noted.</p>	
3	The removal, relocation or destruction of protected plant and tree species must be undertaken in compliance with all conditions stipulated in the above-mentioned permits, as well as supporting biodiversity off-set implementation plan.	NC	<p>No current permits are in effect with respect to the scope in the activities listed for the construction phase of the EMPr. The most recent permits availed being for the new NC2 TSF for removal of protected trees (NCU 7480617 and NCU 8380518), and protected plants (0051/2017 and 0050/2017).</p> <p>Compliance with the individual permits was not audited in detail, and it is also not practical given that most of the tree and plant removals occurred several years prior to the audit.</p> <p>Permit 0050/2017 required that BRMO provide a detailed report-back to ND DENC upon expiry of the permit (Addendum 1, condition 15). Evidence of such a report was not availed.</p> <p>Permit NCU 7480617 requires “BRMO shall plant or donate 500 indigenous trees by the expiry date of this license. A compliance report with recipient details (I.D. number, name, contact number and physical address where trees was planted); and/or GPS coordinates of planted seedlings must be supplied to the DAFF”. Evidence of such a report was not availed.</p> <p>A compliance status report to DAFF dated 27 February 2018 was availed. This report confirms that there have been non-compliances with various tree removal permits.</p>	It is recommended that BRMO continue discussions with DAFF and NC DENC to reach a conclusive agreement on whether or not biodiversity off-setting is required and what the terms thereof will be.

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
			<p>Notably DAFF LICENCE NCU 4021113 requires that "...the existing Biodiversity Conservation Initiative agreed upon, should be revised (see Minutes of meeting of 9 February 2012 and subsequent correspondence) and amended in consultation with the DENC and DAFF. A revised written agreement should be reached by all parties by June 2014. From this license on forward, the collective impact(s) of Assmang Black Rock Mine Operations (BRMO) on protected trees and woodlands would be assessed by DAFF. Accordingly, biodiversity offsets and/or other special conditions might be triggered by future expansion (license applications), where-after amendments will be made accordingly to DAFF license(s) and/or offset agreements."</p> <p>A subsequent permit (5320315 Amendment) states "Should the impact remain at 80 ha, a biodiversity offset will not be triggered now, but future expansions will include this impact in assessing impacts and may eventually triggers an offset."</p> <p>It is reported that the DAFF has not communicated any further specific special conditions despite several subsequent licences being issued. A biodiversity off-set plan has not been developed.</p> <p>The Environmental Specialist noted that BRMO has initiated communication with DAFF in respect of establishing their requirements.</p>	
4	Any <i>Ammocaris coranica</i> , <i>Harpogophytum procumbens</i> , <i>Babiana hypogaea</i> and <i>Boophane disticha</i> , or any other red data listed (RDL) species identified on site, need to be rescued and relocated under the guidance of a competent ecologist, or by parties trained to undertake such by a competent ecologist, as part of species specific rescue and relocation	UC	<p>It is reported that rescued plants from cleared areas were replanted accordingly on the Belgravia property and at the golf course.</p> <p>In the absence of relevant records and reports it cannot be confirmed with certainty that the required rescues and relocations took place.</p>	It is recommended that BRMO maintain records of the plants identified, and locations of removal and relocation.

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	plans formulated by a competent ecologist, where possible.			
	Soils			
5	All contractors and employees involved in vegetation clearance must be trained to identify the species above.	C	<p>Relevant contractors' staff are trained on the biodiversity management procedure and have flash cards for protected species.</p> <p>Proof of training is maintained by the contractors in their green files.</p> <p>For BRMO employees, no trees or plants are allowed to be removed without permission from the SHEQ department. The SHERQ department then stipulates the requirements. Although no formal training record is in place, the environmental officers have received on-the-job training and experience during previous tree and plant identification and removal activities with assistance from contracted biodiversity specialists.</p> <p>It is reported that information boards will be placed at each of the main entrances with illustrations of protected biota.</p>	
6	All areas stripped of indigenous vegetation cover and topsoil need to be regularly inspected for the potential establishment of alien invasive species, and appropriate control measures applied where these species are observed to have established (i.e. in accordance with the provisions of the BRMO 'alien invasive species management plan').	C	<p>Alien vegetation within BRMO is managed as per the Biodiversity Action Plan (prepared by Scientific Aquatic Services, Report Reference: SAS 211022).</p> <p>External contractors are appointed to remove/control alien invasive vegetation on an annual basis.</p>	-
7	A copy of the BRMO alien invasive species management plan, inclusive of quick 'weed identification' flash-card sets, to be supplied to the relevant employees and contractor/s involved in vegetation stripping.	C	Copies supplied to relevant contractors and maintained in their green files.	-
8	The degree of 'topsoil' lost to vegetation stripping needs to be kept to an absolute minimum by the relevant contractor/s.	C	No evidence to the contrary was observed. Topsoil from cleared areas has been stockpiled.	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
9	Any runnels, or erosion channels, which develop shall be back-filled and the area restored to the acceptable condition. The contractor shall not allow erosion to develop on a large scale before effecting repairs and all erosion damage shall be repaired as soon as possible (Topsoil washed away shall be replaced).	NC	<p>Potentially significant erosion was observed at Gloria. A drainage channel was built for the rehabilitated area on the banks of the Gamagara river. This channel has been eroded significantly. Erosion is likely to worsen over time. Refer to Figure 6.1 to Figure 6.3, on page 77 of this report.</p> <p>Erosion was also observed on an embankment on the southern side of the proposed Gloria contractor camp expansion area. Refer to Figure 6.4 on page 78 of this report.</p> <p>Erosion runnels were observed on the new Nchwaning 2 TSF walls, the Nchwaning 2 TSF Subsoil stockpile, and the Black Rock topsoil stockpile. However the erosion observed is generally on a relatively small scale. Refer to Figure 6.5 on page 79.</p>	<p>It is recommended that BRMO address the erosion of the rehabilitated area along the Gamagara riverbank.</p> <p>It is also recommended that BRMO review erosion on the embankment of the contractor camp expansion area as this may eventually lead to the Gamagara river.</p> <p>The erosion noted at Nchwaning 2 and Black Rock appear to be minor; however, it is recommended that these be addressed to ensure the integrity of the TSF walls and the soil stockpiles are not compromised. It is recommended that Black Rock consider vegetating these slopes to prevent erosion.</p>
Heritage Resources				
10	Appropriate training to be issued to BRMO Internal Environmental Officer and other relevant staff by a suitably qualified specialist.	C	Training on identification of heritage resources including a field excursion to identify stone age tools was developed by EScience associates (James Pugin MSc Archaeology) and externally reviewed by heritage specialist Professor Anton van Vollenhoven. Theory and field excursions were undertaken on 10 September 2019. A training register is maintained by BRMO.	-
11	Basic training needs to be provided to the relevant contractor/s, as well as their relevant vehicle/grader operator/s, for the identification of possibly encountered elements of cultural and heritage significance (e.g. archaeological sites, graves, etc.)	UC	Reported to have been trained on identification of grave sites and stone tools. Training information is reportedly available in the contractors' Green File. This was not verified during the audit.	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
12	If archaeological sites are exposed during vegetation or topsoil stripping and borrowing activities, these should immediately be reported to the Local and National Branches of the South African Heritage Resources Agency (SAHRA)	NC	It is reported that one of the late stone age sites identified in the Gamagara riverbank was disturbed during the rehabilitation of Gamagara riverbank. Heritage expert Prof Anton van Vollenhoven has recommended that mitigation be undertaken and subsequently reported to SAHRA.	It is recommended that the required mitigation be undertaken as soon as practical for the disturbed LSA site on the Gamagara riverbank.
13	Under no circumstances shall archaeological artefacts discovered on site during construction or operational activities be removed, destroyed or interfered with.	NC	Rehabilitation of the Gamagara River banks could potentially have interfered with the late stone age site that was registered there.	It is recommended that the required mitigation be undertaken as soon as practical for the disturbed LSA site in the Gamagara riverbank.
Socio-economics				
14	The wood from trees stripped during this phase of construction must be supplied to local community/ies as firewood; unless otherwise directed in the respective 'protected tree removal/destruction permit/s'.	C	The trees are allowed to be disposed of according to the permits issued by DAFF. Wood is stored at BRMO Waste Management Facility where the local community is permitted to collect for use.	
2. Topsoil Stripping				
1	Topsoil to be stripped to a depth of at least 30 cm from all development footprints and stockpiled for reuse in rehabilitation actions at mine closure.	C	Reported to have been undertaken as required. No topsoil stripping was in progress at the time of the audit. Topsoil is reported to have been stripped to a depth of 30cm and stockpiled. It is notable that the topsoil and subsoil stockpiles from the new Nchwaning 2 TSF have been laid contiguously, and the only visible differentiation is that the subsoil stockpile is taller. This may result in the loss of some topsoil and/or cross-contamination of topsoil with subsoil.	It is recommended that signage is erected at stockpiles to differentiate between the topsoil and subsoil stockpiles. There is a risk that the knowledge of how these stockpiles are differentiated will have been lost over time when rehabilitation finally commences.
2	Vegetation stripping should not be conducted more than two weeks (14 calendar days) prior to topsoil stripping, in preparation of development, or mining.	C	Reported to have been undertaken as required. No topsoil stripping was in progress at the time of the audit.	-
3	Topsoil and subsoil must only be utilised as required for rehabilitation within the mining area, and according to the topsoil management plan.	N/A	No rehabilitation requiring topsoil to be transferred to site had been undertaken at the time of the audit.	

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
4	Stockpiles must be monitored for alien vegetation any existing alien vegetation must be removed and destroyed in accordance biodiversity management plan.	C	No alien vegetation observed during the audit. The stockpiles are reportedly monitored on an informal basis.	It is recommended that the stockpiles be included in the broader mine alien vegetation management plan and that monitoring be undertaken on a scheduled basis.
5	A 'topsoil balance calculation' will be held by the BRMO, showing reasonable estimates of the topsoil volumes available in stockpiles against the volumes required for rehabilitation of affected development footprints for the project.	NC	The topsoil balance has not been updated since 2014.	It is recommended that the topsoil balance be updated.
6	In view of the overall deficiency of topsoil for rehabilitation, and the absence of alternative sources of topsoil, rehabilitation trials must be undertaken. Trials must be undertaken to assess the propensity for modification of subsoil to be effectively used in lieu of topsoil.	C	Trials were undertaken and the subsoil was found to be suitable for use in rehabilitation with appropriate fertilisers Report - Investigation Into The Properties Of Subsoil For Potential Use As Reclamation Material For Mine Rehabilitation At Black Rock Mine Operations Compiled by EScience Associates and Prof Andries Claassens, 10 April 2017.	It is recommended that the findings of the report be considered if BRMO should elect to vegetate the walls of the new Nchwaning TSF and the soil stockpiles.
3. Civil- and Earthworks				
TOPOGRAPHY				
1	No slopes with gradient 33° (i.e. 3H:1V) should be established on site; unless otherwise protected from erosion by appropriate storm water management measures, or slope stabilisation/re-vegetation	C	It is reported that the stockpiles were laid down such that slopes are in the order of 30°. Accurate measurements of the inclination of slopes of the stockpiles were not available. However the slope was estimated using cellular phone level meter to be approximately 30°, and confirmed by review of the slopes in photographs taken at the site. Although this is a subjective assessment, in the absence of more accurate measurements it is deemed reasonable to conclude that the slopes meet the 33° limit. Minor erosion was visible at Black Rock soil stockpile, Nchwaning II New Tailings Storage Facility, and Nchwaning subsoil stockpiles.	It is notable that a slope of 33° is not equivalent to a slope of 3H:1V. It is recommended that this be corrected in the EMPr. It is recommended that BRMO consider vegetating the soil stockpiles and TSF slopes to prevent further erosion.
SURFACE WATER				

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
2	Provision must be for the diversion of 'clean' storm water run-off away from or around potentially contaminated working surfaces	C	Due to the aridity of the area, and permeable soils, there is no evidence of significant stormwater runoff. Potentially contaminated areas such as hazardous substance storage and equipment maintenance are undertaken on bunded areas.	
3	Provision must be made for the diversion, and appropriate containment of 'dirty' storm water run-off generated within potentially contaminated mine works areas.	NC	<p>Drainage channels and a pollution control dam have been constructed for the stacker reclaim area.</p> <p>However, the drains are almost filled with sand and the ore stacks have spread over the drains. It is unlikely that water will flow through to the pollution control dam. The dam was dry at the time of the audit.</p> <p>Therefore, although these provisions are in place they are not effective.</p>	<p>It is notable that leach tests on low grade ore have shown insignificant potential for stormwater contamination and that the DWS accordingly issued a GN 704 exemption for the "[Use] of low grade ore for construction of laydown areas, roads and rail lines" recorded in the BRMO's Water Use Licence (Licence No: 10/041M/ABEGJ/3490).</p> <p>It is recommended that BRMO assess the potential for stormwater contamination from the products stored. If the potential is negligible then drainage channels are redundant.</p> <p>However if this is not the case then the system must be reviewed to ensure it is effective. Notably this requirement would then also need to be considered for other product stockpiles.</p>
4	All 'dirty' storm water containment dams must be lined with a durable, impermeable, liner system as required in the BRMO IWWMP (e.g. HDPE liner), such that 'dirty/potentially contaminated' storm water is effectively contained for ultimate return to the process water circuit.	C	<p>The tailings return water dams at Nchwanging and Gloria, the clarifier dam, and the Nchwanging 2 pollution control dam are HDPE lined.</p> <p>Underground dams are reportedly built on competent rock surfaces that are impermeable.</p>	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
			All other reservoirs observed are made of steel and/or concrete.	
5	All civil and earth works must ensure that no surface ponding of storm water ultimately occurs at the operational mine works areas	C	No evidence of ponding observed.	-
6	All 'dirty' storm water containment dams must be lined with a durable, impermeable, liner system (e.g. HDPE liner), such that 'dirty / potentially contaminated' storm water is effectively contained for ultimate return to the process water circuit	C	This condition is a repetition. The tailings return water dams at Nchwaning and Gloria, the clarifier dam, and the Nchwaning 2 pollution control dam are HDPE lined. Underground dams are reportedly built on competent rock surfaces that are impermeable. All other reservoirs observed are made of steel and/or concrete.	-
	All civil and earth work must ensure that no surface ponding of storm water ultimately occurs at the operational mine works areas.	C	This condition is a duplication the one below.	It is recommended that this duplication be removed in accordance with NEMA Section 47A(1)(b).
Biodiversity				
7	Civil- and earth works may only proceed where vegetation- and topsoil stripping have been effected in compliance with the provisions of the EMPr	C	No evidence to the contrary.	-
4. Shaft Sinking				
Topography				
1	All waste rock generated through shaft sinking is to be temporarily stockpiled at surface within the greater surface shaft complex development footprint/s, and subsequently used as fill / founding aggregate in the construction of structural, or infrastructural, foundations and / or establishment of operational working floors (or any other environmentally acceptable use within the greater BRMO)	C	No shaft sinking was undertaken during the period audited. A ventilation shaft was sunk at Gloria mine, and it is reported that the waste rock therefrom was used as aggregate for other construction activities at BRMO.	Depending on the method employed development of shafts may result in a significant portion of waste rock being disposed or used underground, BRMO should consider reviewing this to allow waste rock to be disposed underground provided that it can be shown that the potential

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
				environmental impact thereof is not significant.
2	No storm water run-off at surface should enter underground workings through vertical shaft/s openings at surface	C	No evidence of run-off into underground workings observed or reported.	-
3	Civil and earth works to only be undertaken between 7:00am and 5:00pm	C	No shaft sinking was undertaken during the period audited. It is reported that Gloria vent shaft sinking was undertaken during normal daytime working hours.	-
4	Ground level vibrations resulting from blasting activities should not exceed 10m/s beyond the mine boundary	UC	No measurements were taken. However it is notable that there have been no complaints received.	-
5	Air over pressure from blasting activities should not exceed 134dB at the mine boundary	UC	No measurements were taken. However it is notable that there have been no complaints received.	-
6	No surface blasting to take place during windy conditions	N/A	No surface blasting undertaken.	-
7	All immediately adjacent landowners should be provided with a weekly blasting schedule for the duration of blasting activities required for vertical shaft sinking.	C	Shaft sinking complete.	-
8	The services of a competent noise and vibration specialist are to be commissioned to routinely monitor blast impacts; where any complaints are received from IAPs in relation to noise and vibration from shaft sinking.	N/A	No complaints have been received.	
5. Borrow Pit Establishment				
1	Borrow pit dimensions must be optimised by the Proponent, such that final shaping and rehabilitation measures at closure are able to return the disturbed footprint/s to a state commensurate with end-land use objectives for the site	N/A	It is reported that no borrow pits have been established.	-
2	Borrow pits may not be established within 32m of any prominent drainage lines on site. Borrow pits may not be established within the buffer zone	N/A	It is reported that no borrow pits have been established.	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	and delineated wetland / riparian zone of the Gamagara River , or 100m from the edge of the Gamagara river			
3	Where borrow pits are established outside of dam /TSF footprint/s, the borrow pits must be appropriately rehabilitated within 6 months of the last borrowing from the respective pit/s	N/A	It is reported that no borrow pits have been established.	-
5	Appropriate storm water diversions must be installed on the up-slope/s of borrow pits, such that storm water ingress therein is minimised to the greatest extent possible (Borrow pit access on down-slope thereof)	N/A	It is reported that no borrow pits have been established.	-
6	Borrow pits must be established within the proposed development footprints of project dams and the TSF to the greatest extent that is practical (i.e. based on the suitability for purpose of the underlying material)	N/A	It is reported that no borrow pits have been established.	-
6. Haul/Access Roads				
1	Dust palliation with an effectiveness of at least 80% must be applied to all un-surfaced/gravel access and haul roads for the duration of the construction period.	C	A ligno-sulphanate palliative (AGM DustBind, refer to Afri-Group MSDS Document Ref: AGM 0012). Although specific dust palliation effectiveness is not stated by the manufacturer, this type of dust suppressant is in accordance with the specialist Air Quality Impact Assessment report issued for the mine expansion environmental impact assessment, and is also reported to have a PM10 reduction efficiency of up to 99%.	-
2	Palliatives must be applied and re-applied as necessary as per the manufacturer/supplier's recommendations	UC	Reportedly applied as required. The palliatives are applied by the supplier. It is thus anticipated that there are applied in accordance with their own recommendations. This was however not verified during the audit.	-
3	Vehicle speeds must be limited to 60 km/h on access roads unless these have bound paving, in which case speed regulations as per the relevant traffic regulations must apply.	C	Speed limit signs are in place. It is reported that drivers are instructed to obey the speed limits at all times.	-

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	Vehicle speeds must be limited to 40 km/h on any exposed surfaces where palliatives or paving have not been applied.			
4	Access and haul roads may only be established, immediately adjacent to (within 20m), or directly between, the anticipated development footprints of the various project components. All access and haul roads to be depicted on plan, subject to approval by ECO and BRMO environmental manager.	C	Access and haul roads are included in project design drawings. The layouts are included in the contractors' scope of works which is contained in the contractor's green files and signed off by various internal stakeholders including the BRMO environmental specialist.	-
5	The hauling of materials and vehicle access to and from development sites must be strictly maintained to designated access/haul roads on site	C	No haulage or evidence of access observed outside of designated roads.	-
7. Raw/Construction Material Stockpiles and Storage				
1	Raw / construction material storage areas and stockpiles may not be established within 32m of any prominent drainage lines on site. Nor within the buffer zone and delineated wetland / riparian zone of the Gamagara River, or within 100m of the Gamagara river	C	No significant material storage observed within 32m of any drainage lines, nor within the buffer zone and delineated wetland / riparian zone of the Gamagara River, or within 100m of the Gamagara river.	-
2	Raw / construction material storage may only take place within the development footprints of project structures and infrastructure, or designated construction camp/s	C	Raw material storage is located within development footprints of projects or within construction laydown areas.	-
3	Where daily quotas / stocks of hazardous materials are to be stored outside of the construction camp/s, the materials must be stored such that there is no contact between the material and site soils	C	The nature of the activities is such that there is little use of hazardous materials with the general exception of fuel, lubricants, paints and paint solvents. These are stored in containers on concrete surfaces or in trays. There were no observations of hazardous materials directly in contact with soil.	-
8. Gamagara River Railway Bridge Construction				
1	The engineering design for the railway bridge must be such that it does not result in the ponding of potential flood waters behind the bridge	C	Bridge not constructed. The bridge design is underway. Engineering design is taking into consideration various factors including impact on streamflow during flood events	

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	structure, or associated supporting columns and railway alignments		(Gamagara rail bridge hydraulic study – Aurecon, report reference: 505574).	
2	In the event that a new bridge will be constructed, the redundant bridge columns north of the 'existing' railway bridge must either – a) be used in the construction of the new bridge (i.e. where this is technically feasible and safe), or b) removed from the riverbed and either disposed of, or safely recovered for use as aggregate elsewhere on the project	UC	A bridge not yet constructed. A feasibility assessment and design considerations are underway. It is understood that the old columns are deemed unsafe, by the project engineers, for use for the proposed bridge.	It is understood that the new bridge will be constructed on new columns. It is recommended that BRMO consider the removal of the old bridge as part of the bridge construction or within the mine rehabilitation plan.
3	The alignment of the 'old'/redundant bridge, and what was once its associated railway track, should be used as the alignment for the 'new' bridge crossing over the Gamagara River; unless otherwise deemed technically flawed, in writing, by a competent engineer	C	The new bridge has not yet been constructed. Alignment with old bridge has been deemed to be undesirable by the project engineers. The proposed alignment is between the existing bridge and the old bridge as this provides the optimum alignment for existing and proposed rail infrastructure within the existing servitude. The preferred alignment of the new bridge has been shown to be of low risk in accordance with the DWS Risk Assessment Matrix following the format prescribed by the GN 509 of 2016 as it relates to the NWA (Scientific Aquatic Services specialist assessment, report reference: SAS 219059).	
4	The construction of the railway bridge, as well as the associated track alignments either side thereof, must take place within a 30 m construction corridor	C	Bridge not yet constructed. However, the proposed alignment is between the existing and old bridges and is thus clearly within 30m as the distance between the old and new bridges does not exceed 30m.	
5	Care should be taken by the contractor/s during any development activities, that if any archaeological and/or historical sites, features or artefacts are accidentally discovered, a qualified archaeologist be called in to investigate.	N/A	Bridge not yet constructed. A specialist archaeological assessment has been undertaken of the proposed footprint which has recommended various management measures for the proposed bridge construction (Archætnos Culture and Cultural Resources Consultants, report reference AE01954V).	

Table 5-2: Tabular Summary of Compliance with Conditions of the EMPr Addendum – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
6	Phase II heritage mitigation measures, as required by SAHRA, should be undertaken before the bridge development commences. This will need to entail the following: a) Mapping of the most significant sites (highest density of material) in the area. Sites 6 and 12, as identified by Dr. A. Pelsler, are recommended. With Site 6 located outside the area earmarked for development activities, Site 12 will therefore be mapped; and b) Controlled sampling of material in order to obtain a representative sample of the Stone Age material in the area. This will be in the form of blocks on the site, which will be mapped and material in these blocks will then be sampled.	C	A specialist archaeological assessment has been undertaken of the proposed footprint which has proposed various management measures for the proposed bridge construction (Archaeos Culture and Cultural Resources Consultants, report reference AE01954V). The report has not yet been submitted to SAHRA at the time of the audit. Notably the report was completed on 5 November 2019.	It is recommended that the heritage impact assessment report be submitted to SAHRA for the proposed bridge as required in terms of the National Heritage Resources Act (Act 25 of 1999).

5.3 OPERATIONAL PHASE

Table 5-3: Operation of all authorised activities				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	Resource Preservation			
1	Waste generated on the site must be separated at sources into recyclable categories and non-recyclables.	C	Bins for separation of waste streams are in place, and employee awareness programmes have been implemented. In general waste is observed to be separated. Although there were instances observed where waste is not separated, these are relatively few.	It is recommended that BRMO continue to encourage and enforce separation and recovery of recyclables.
2	Waste must be recovered, recycled and reused to the greatest practical extent.	C	Waste recovery undertaken at waste management site.	
3	Water abstraction, use and disposal must be monitored and BRMO must set targets and implement plans for optimisation of water used per tonne of product.	NC	BRMO has not undertaken a complete water balance as yet. A comprehensive water conservation and demand management plan is not yet in place. This has been budgeted for completion by the first quarter of 2020.	It is recommended that BRMO complete a comprehensive water balance assessment. And develop an effective water conservation and demand

Table 5-3: Operation of all authorised activities				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
			Water monitoring is in place for some of the abstraction, use, and disposal activities.	management plan as scheduled.
4	Electricity and fuel use must be monitored and energy improvement plans must be developed and implemented for optimisation of energy used per tonne of product.	UC	It is reported that energy use is being monitored, with targets in place. However, this could not be verified in the absence of supporting documents and records.	It is recommended that a formal energy monitoring and management plan be instituted.
Waste Management				
5	All areas where waste is generated must have suitable receptacles for source accumulation of separated waste.	C	Adequate waste receptacles observed throughout the audit.	
6	Waste must be stored in accordance with the requirements of the National Norms and Standards for storage of waste	NC	<p>The norms and standards apply to general and hazardous waste storage facilities exceeding 100m³ and 80m³, respectively. Applicable areas would therefore be the hazardous waste transfer facility at the Black Rock waste management facility, and debatably the various salvage yards.</p> <p>Various none-compliances were noted at the hazardous waste management facility. Of particular significance these include, but are not limited to</p> <ul style="list-style-type: none"> • Internal compliance audits have not been undertaken. • an apparent leak in the bund wall at hazardous waste transfer facility. <p>It was also noted that the stormwater collection system is unlikely to have sufficient capacity to contain a 1 in 50y rainfall event. This is based on visual inspection of the containment sump versus the area draining thereto as estimated using satellite imagery and reported 1 in 50yr storm event used for BRMO tailings facility design (106 mm).</p> <p>At the main salvage yard, it was noted that there are several instances of lubricant leaks onto bare soil from scrapped</p>	<p>It is recommended that BRMO undertake periodic internal compliance audits and prepare and implement corrective and preventative action therefrom.</p> <p>It is recommended that BRMO review the hazardous waste transfer site's stormwater containment capacity to ensure that it is adequate to contain 1 in 50y rainfall event.</p> <p>It is recommended that scrapped vehicles and engines be drained of oil where applicable to prevent soil and potential groundwater contamination at the salvage yard. Alternatively adequate facilities should be in place for containment of leaks.</p>

Table 5-3: Operation of all authorised activities				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
			vehicles at the site. Old engines, which may still contain oil, are stored on pallets on bare soil. Refer to Figure 6.6 on page 79.	
7	All waste that must be treated and/or disposed of, must be treated and/or disposed at suitably licenced facilities.	C	General waste is disposed of at the licenced Black Rock landfill (licence number 2012/L/1/1/BRMO). Hazardous waste is disposed of by appointed contractors and safe disposal certificates are kept on record.	
8	The landfill must be managed in accordance with its Waste Management Licence.	NC	An assessment of compliance with the WML was not undertaken in detail. However previous external audit reports were reviewed. Although the activities are largely compliant, there were non-compliances reported therein which had not been rectified at the time of visiting the site for this audit. It is notable that a weekly operational checklist is in place and weekly inspections are done at the site which cover day-to-day compliance requirements for running the site.	It is recommended that the BRMO develop, implement, and track, compliance achievement plans to ensure compliance with landfill WML.
Air Quality				
9	National limits for ambient air quality, in terms of those published in Government Notice No. 1210 of 24 December 2009, in terms of S9(1) of NEMAQA, must be met by the proponent	C	Given that the sinter plant has not been constructed, only the particulate matter (PM10, and by extension PM2.5) is applicable. Sources of the other pollutants in the standard are negligible, with the possible but unlikely exception of nitrogen dioxide from vehicle fuel combustion. Ambient concentrations are not monitored. However it is clear from the Air Quality Impact Assessment undertaken for the Environmental Impact Report for the mine expansion that the ambient impact from activities is expected to be well within the national ambient air quality standards. Other than unpaved haul, no significant sources of particulate matter were observed. Haul roads have a ligno-sulphanate dust suppressant applied, and dust entrainment observed from passing vehicles was minor. There have not been any complaints reported.	

Table 5-3: Operation of all authorised activities				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
			On the basis of the above it is inferred that the ambient standards are being met.	
10	Cumulative dust deposition target thresholds, in terms of SANS 1292, 2009/11/17, at the BRMO site boundary must be met	C	Measured dust fallout is in compliance with the standards as well as the National Dust Control Regulations GN.R 827 2013. Refer to Aquatico Monthly Dust Fall-Out Monitoring Reports. The latest report available was for July 2019, which graphed results back to November 2018 with no exceedances found.	
11	Where the above standards are not met, the cause of this non-compliance must be investigated and subsequent corrective and preventative action must be implemented.	N/A	No exceedances noted.	
12	A dust palliative with at least 80% dust reduction efficiency must be applied to unpaved roads (See Appendix 5 for alternative palliative options). Roads paved with low grade ore or aggregate shall be considered as being paved.	C	A ligno-sulphanate palliative is used (AGM DustBind, refer to Afri-Group MSDS Document Ref: AGM 0012). Although specific dust palliation effectiveness is not stated by the manufacturer, this type of dust suppressant is in accordance with the specialist Air Quality Impact Assessment report issued for the mine expansion environmental impact assessment, and is also reported to have a PM10 reduction efficiency of up to 99%.	
13	Waste shall not be burnt unless in a waste management facility, or other facility, licenced for that purpose. Evidence of lawful disposal all wastes steams generated must be maintained.	C	No evidence of burning of waste was noted on the site. However, evidence of fires was observed on the southern side of the Nchwaning 2 vent shaft. The materials burnt could not be determined. Refer to Figure 6.7 on page 80.	It is recommended that BRMO investigate the fires at the Nchwaning 2 shaft. It is unclear what was being burnt. The risk of uncontrolled veld fire must be considered as well in this regard.
	Surface Water, Soil and Ground Water			
14	Bunded facilities must be compliant with specifications of the BRMO Spill Management and Specifications for Bund Walls procedure, as appended	NC	Multiple bund facilities were observed that would not contain a significant spill, as the walls were broken. Bunds in the following locations are required to be repaired accordingly to meet the specifications of the BRMO Spill Management and Specifications for Bund Walls Procedure.	It is recommended that bunds be repaired to the required standard as soon as is possible.

Table 5-3: Operation of all authorised activities				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
			<ul style="list-style-type: none"> Gloria Salvage Yard - all bunds to be fixed or replaced. Refer to Figure 6.12 on page 84 of this report. BRMO Hazardous Waste Transfer Facility – fix leaks in southern bund wall. Figure 6.6 on page 79 of this report. Nchwaning 2 Emulsion Storage slopes towards the rail exit instead of towards a sump (such as is the case at Nchwaning 3), thus a spill would not be contained. 	
15	All liquid (including sludges and slurries) hazardous substances (including wastes) must be stored within bunded facilities.	NC	<p>In general liquid hazardous substances were observed to be in bunds. Although some of the bunds as noted above are potentially not effective in the event of a significant spill.</p> <p>It was also observed that emulsion waste at Nchwaning 3 was stored in drums outside the emulsion tank bund. It is reported that this waste is spillage from loading and is stored in drums for collection by supplier. Waste manifests were available for confirmation or previous disposal. The drums should be kept within a bund. Refer to Figure 6.15 on page 86.</p>	<p>It is recommended that bunds be repaired to the required standard as soon as is possible.</p> <p>It is recommended that emulsion waste be stored in bunded facilities.</p>
16	Appropriate spill management kits must be kept and maintained on site wherever liquid hazardous materials are stored, and where refuelling and/or servicing of plant, vehicles and machinery takes place, in order to manage potential spillages effectively.	C	Spill kits are available in on site where hazardous liquid substances are handled.	
17	Training, in the use and maintenance of the abovementioned kits, as well as any contaminated waste products, must be provided to ALL staff either directly or indirectly involved in any of the activities identified above.	C	Training in spill management is undertaken as part of induction, and also in toolbox talks for on-going awareness.	
18	Sorbents and contaminated soil must be immediately collected and placed within a water-tight, skip/container for subsequent	C	Used sorbents and contaminated soil are stored in bunds and subsequently transferred to the Black Rock hazardous waste	

Table 5-3: Operation of all authorised activities				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	disposal or treatment at an appropriately licensed hazardous waste management facility.		transfer facility where they are stored in a skip within a bund and a contaminated soil bund respectively.	
19	All equipment (e.g. gear boxes, portable generators) which may leak oil, liquid fuels, or hazardous chemical substances must be located on impermeable bases which can contain leaks or must have appropriately sized drip trays.	NC	In general this requirement is complied with. However scrapped equipment at the Gloria and Black Rock salvage yards was observed on bare soil and not on impermeable surfaces. There is clear evidence of soil contamination. Refer to Figure 6.8 on page 81.	
20	Where storm water flow paths are identified, storm water management infrastructure must be installed (i.e. cut-off trenches, diversion berms, silt traps, etc.).	C	No storm water flow paths identified. The site has permeable soils and low annual rainfall. Even in compacted areas such as laydown areas and roads. There is no evidence of significant surface water flow away from these sites.	
21	Storm water management infrastructure must be regularly inspected and maintenance applied as necessary to ensure the efficient functioning thereof.	NC	<p>Drainage channels and a pollution control dam have been constructed for the stacker reclaim area.</p> <p>However, the drains are almost filled with sand and the ore stacks have spread over the drains. It is unlikely that water will flow to through to the pollution control dam. The dam was dry at the time of the audit.</p> <p>Therefore, although these provisions are in place they are not effective.</p> <p>There are no records of inspections.</p>	<p>It is recommended that the drains be regularly inspected and cleared.</p> <p>It is notable that leach tests on low grade ore have shown insignificant potential for stormwater contamination and that the DWS accordingly issued a GN 704 exemption for the "[Use] of low grade ore for construction of laydown areas, roads and rail lines" recorded in the BRMO's Water Use Licence (Licence No: 10/041M/ABEGJ/3490).</p> <p>It is recommended that BRMO assess the potential presented by the product for stormwater contamination. If the potential is negligible then drainage channels are redundant.</p>

Table 5-3: Operation of all authorised activities				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
				However if this is not the case then the system must be reviewed to ensure it is effective. Notably this requirement would then also need to be considered other for product stockpiles.
	Noise			
22	Noise caused by operations must not cause a nuisance. Any environmental noise complaints reported must be investigated and appropriate corrective and/or preventative action taken.	C	It is reported that no complaints were received.	
	Biodiversity			
23	The potential presence of alien invasive species on, and adjacent to the operational sites must be monitored and appropriately managed, in accordance with the BRMO alien invasive species management plan (Appendix 10)	C	An invasive species management plan is in place. An external contractor is appointed on an annual basis to remove invasive species observed by the BRMO environmental officers.	
24	The use of herbicides on site must be undertaken according to the BRMO environmental procedure for the use of herbicides, and in accordance with the manufacturers' instructions.	UC	It is reported that the contractor appointed to remove invasive species is registered, and required to be registered in order to be appointed, in terms of the Regulations Relating To The Registration Of Fertilizers, Farm Feeds, Agricultural Remedies, Stock Remedies, Sterilizing Plants And Pest Control Operators, Appeals And Imports. However proof of registration was not available. Compliance could therefore not be confirmed with confidence.	It is recommended that BRO maintain proof of registration as required for the use of herbicides.
	Preparation for Rehabilitation			
25	Current topsoil stockpile volumes at the time of updating the EMPr are insufficient for rehabilitation of the entire disturbed area. BRMO must therefore undertake an assessment of subsoils for use in rehabilitation and determine	C	Trials undertaken and subsoil found to be suitable for use in rehabilitation with appropriate fertilisers Report - Investigation Into The Properties Of Subsoil For Potential Use As Reclamation Material For Mine Rehabilitation	

Table 5-3: Operation of all authorised activities				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	suitable procedures for successful use thereof if found to be possible.		At Black Rock Mine Operations Compiled by EScience Associates and Prof Andries Claassens, 10 April 2017.	

Table 5-4:Ore Processing Plant				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1	All water and storm water contaminated through process works must be collected into the process water circuit.	C	Water is collected and used in the process water circuit to the extent practical.	It is recommended that BRMO complete a comprehensive water balance assessment. And develop an effective water conservation and demand management plan as scheduled.

Table 5-5:Manganese Product Stockpiles				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1	Product stockpile areas must be contained to the designated footprints. No further land may be cleared without appropriate permitting and review of the EMPr.	C	Stockpiles were confirmed to be within the designated areas based on a review of 2018 aerial photos and google earth images.	
2	Stockpile areas and road will be compacted and covered with ore to prevent generation of dust.	C	Stockpile areas are compacted and covered with low grade ore.	
3	Dust suppression will be applied to unpaved roads.	C	Application of dust suppressants was observed during the time of the audit. There were no observations of potentially significant dust being generated from vehicles passing by on haul roads.	

Table 5-6: Sinter Plant Raw Material Stockpiles				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1	Reductants must be off-loaded and stored at a single dedicated storage area; unless otherwise stored in day bins provided for such	N/A	Sinter plant not built.	
2	Reductants with potential to cause contamination of soil and water must be stored in impermeable bunkers, ideally roofed to prevent ingress of rain.	N/A	Sinter plant not built.	
3	All potentially contaminated/'dirty' water run-off from the storage area must be diverted to a pollution control dam on site	N/A	Sinter plant not built.	
4	Appropriate berms, cut-off trenches or other suitable infrastructure must be in place to prevent ingress and subsequent contamination of clean surface water, and outflow of contaminated surface water.	N/A	Sinter plant not built.	
5	All storm water management infrastructure (i.e. cut-off trenches, diversion berms, silt traps, pollution control/storm water dams, etc.) applicable to storm water management in relation to raw material stockpile floors must be regularly inspected, and maintenance applied as necessary to ensure the efficient functioning thereof	N/A	Sinter plant not built.	

Table 5-7: Sinter Plant Operation				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1	Stack emission limits and tolerable exceedances must not exceed those stipulated for all applicable criteria pollutants, in terms of the conditions of the AEL issued.	N/A	Sinter plant not built.	
2	Stack emissions must be measured, monitored, and reported according to requirements set out in the AEL issued.	N/A	Sinter plant not built.	

Table 5-7: Sinter Plant Operation				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
3	A fugitive dust emission plan must be developed and implemented if dust fall out exceeds the limits stipulated in the national dust control regulations.	N/A	Sinter plant not built.	
4	Sludge produced from flue gas desulphurisation must be analysed and classified in accordance with the requirements of NEM:WA. An MSDS and labelling must be formulated for handling of this material.	N/A	Sinter plant not built.	
5	FGD sludge must be treated and/or disposed at a facility appropriately authorised for that purpose.	N/A		

Table 5-8: Flue Gas Desulphurisation Waste Disposal				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1	As a precautionary approach, the intermediary FGD disposal facility must be lined to “Class A” performance equivalent, until such time as FGD waste sampling and analysis can take place to determine the actual groundwater risk posed by the waste (i.e. to inform the engineering design of the operational FGD disposal site).	N/A	Sinter plant not built.	
2	Detailed intermediary FGD disposal site engineering- and liner designs must be submitted to the DWS and the DMR for approval prior to construction of the facility	N/A	Sinter plant not built.	
3	No waste, or materials, other than FGD residues may be deposited onto the intermediary disposal site	N/A	Sinter plant not built.	
4	The final positioning of the intermediary FGD disposal site must be informed by a geo-physics survey of the proposed area, as well as inputs	N/A	Sinter plant not built.	

Table 5-8: Flue Gas Desulphurisation Waste Disposal				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	from a specialist geo-hydrologist, to ensure that groundwater pollution risks are minimised			
5	Any person either directly, or indirectly, involved in aspects relating to the disposal of FGD waste residues must receive training to ensure competency in respect of fulfilling their operational role in a manner that yields acceptable environmental outcomes	N/A	Sinter plant not built.	
6	Assmang must rehabilitate the site or any portion thereof upon decommissioning, in accordance with a closure and rehabilitation plan, which must be submitted to the DMR for approval	N/A	Sinter plant not built.	
7	Once operational, the FGD waste residues from the sinter plant must be subjected to sampling and analysis by a competent, specialist, EAP, such that the actual risk posed to the groundwater environment by the waste can be determined.	N/A	Sinter plant not built.	
8	The FGD disposal facility must be lined according to the 'risk profile' of the waste, as determined through the prescribed method in the ' <i>National Standard for the Assessment of Waste for Landfill</i> ' – presently in draft, but reasonably believed to be in effect at the time of project implementation.	N/A	Sinter plant not built.	
9	Detailed FGD disposal site engineering- and liner designs must be submitted to the DWS and the DMR for approval prior to construction of the facility	N/A	Sinter plant not built.	
10	No waste, or materials, other than FGD residues may be deposited onto the disposal site	N/A	Sinter plant not built.	
11	The final positioning of the FGD disposal site must be informed by a geo-physics survey of the proposed area, as well as inputs from a specialist geo-hydrologist, to ensure that groundwater pollution risks are minimised	N/A	Sinter plant not built.	

Table 5-8: Flue Gas Desulphurisation Waste Disposal				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
12	The final positioning of the TSF must be approved by the DWS and the DMR prior to construction of the facility	N/A	Sinter plant not built.	
13	Any person either directly, or indirectly, involved in aspects relating to the disposal of FGD waste residues must receive training to ensure competency in respect of fulfilling their operational role in a manner that yields acceptable environmental outcomes	N/A	Sinter plant not built.	
14	Assmang must rehabilitate the site or any portion thereof upon decommissioning, in accordance with a closure and rehabilitation plan, which must be submitted to the DMR for approval	N/A	Sinter plant not built.	
15	All pipe-work and associated infrastructure used in the transport of FGD waste residues from the processing plant to the disposal site must be regularly inspected (i.e. for structural integrity) and maintenance applied as necessary to ensure no losses between the plant and the disposal site	N/A	Sinter plant not built.	
16	The proponent must ensure effective access control of the waste management facility to prevent unauthorised access thereto	N/A	Sinter plant not built.	
17	Weatherproof, durable and legible signs in at least three relevant languages applicable to the area must be displayed at all site entrances and must convey information pertaining to at least the following:	N/A	Sinter plant not built.	

Table 5-9: Tailings Management - TSF				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	Groundwater			

1	The TSF must have an installed pollution containment barrier with at least a "Class C" performance equivalent.	C	The Nchwaning 2 Tailings storage facility was designed and constructed with a Class C liner equivalent. The design was approved by the Department of Water and Sanitation (DWS).	
2	Detailed TSF liner designs are to be submitted to the Department of Mineral Resources for consideration and approval prior to commencing with construction or operation of the TSF.	NC	No records of submission of design drawings to DMR other than information submitted in the Environmental Impact Report.	It is notable that the design was approved by the Department of Water and Sanitation (DWS). It is recommended that the designs be submitted to the DMR for the record.
3	No waste, or materials, other than tailings may be deposited into the TSF.	C	No other waste or materials have been reported, or observed, to be deposited in the tailings storage facilities.	
4	Update Geochemical model	C	Undertaken in 2018 (refer to Envass report Geohydrological Investigation Report Number: GEO-REP-107-18-19)	
Water Demand Management				
5	The proponent must investigate and implement processes to maximise recovery of process water for re-use in the processing plant	C	The new TSF is lined and thus seepage loss is minimised.	A comprehensive water conservation and demand management plan is not yet in place. This has been budgeted for completion by the first quarter of 2020. It is recommended that BRMO complete a comprehensive water balance assessment. And develop an effective water conservation and demand management plan as scheduled.
6	Supernatant (i.e. water pooling at compartment surfaces - predominantly derived from storm water ingress) must be decanted from the top surfaces of the TSF compartments via purpose built decant barges, and diverted into a purpose built decant water dam adjacent to the TSF; for subsequent reuse in plant processes	C	Water collection system and return water dam in place to collect water.	
Soil				
7	All pipe-work and associated infrastructure used in the transport of tailings from the processing plant to the TSF must be regularly inspected (i.e.	C	Inspections are undertaken as part of scheduled monitoring and maintenance.	

	for structural integrity) and maintenance applied as necessary to ensure no losses between the plant and the TSF			
8	The TSF must have a minimum design free-board for storm water infiltration, in addition to a minimum 0.8 m dry freeboard over and above the normal operating level and excluding decant return.	C	Freeboard of at least 0.8m observed at all the active tailings storage facilities.	
9	Any tailings spillages outside of the TSF footprint, resulting from tailings recovery activities, must be immediately removed from location for subsequent recovery thereof.	C	Reported that there have been no spillages of tailings. No evidence of spillages of tailings was observed during the audit.	

Table 5-10: Mechanical shaft ventilation

No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1	Vent shaft openings are to be directed away from sensitive noise receptors, and appropriately coupled with diffusers if necessary to ensure compliance with ambient noise limits stipulated in SANS 10103 of 2008	C	Vent shaft openings at Gloria and Nchwaning 3 point upwards, whilst Nchwaning 2 vent shaft also points upwards and has deflection berms in place to reduce noise impact on the nearby guest house.	

Table 5-11: Sewage Treatment Plant

No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	Groundwater			
1	The plant must be regularly inspected, and maintenance applied as necessary (within 2 days of problem identification), to ensure the optimal efficiency thereof and prevention of leaks and	NC	Evidence of spillages identified at Gloria and BRMO STPs. Refer to Figure 6.10 and Figure 6.11 on page 82. There is an inspection checklist. However, no daily inspection records were not availed. Thus it is unclear if the inspections	It is recommended that the daily inspection logs be enforced and that spills or leaks be immediately reported for repairs to be effected.

Table 5-11: Sewage Treatment Plant				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	spillages. Daily inspection log to be signed off by plant operator		<p>are undertaken as required. Relevant personnel were not available at the sites during the site audit thus it could not be confirmed whether these inspection are being undertaken effectively.</p> <p>The overflow residues at the plants were both completely dry at the time of the inspection. This gives the impression that they occurred a potentially significant time before the site audits.</p>	<p>Affected soil should also be treated in a as soon as practical.</p> <p>There is a history of overflow incidents at the sewage treatment plants. It is recommended that effective long terms solutions be implemented.</p>
2	Flow meters must be installed on the incoming sewerage feed, as well as treated effluent output pipelines, in order to allow for water balance approximations as part of pro-active identification of any significant plant leaks to the groundwater environment.	C	Flow meters are installed at sewage treatment works.	It is recommended that the planned water balance assessment be completed as scheduled.
Water demand management				
3	Treated effluent must be recovered to the process water circuit for reuse on site	C	Recovery of effluent is in place. Treated water is used for irrigation in accordance with the site's Water Use Licence (licence no: 10/041M/ABEGJ/3490).	
Soil and groundwater				
4	Final plant design must ensure adequate installed treatment capacity in relation to additional project demand.	C	<p>The Gloria plant has reportedly been designed to meet the required capacity. Spills and leaks relate to clogging of the plant's rotary sieve rather than an inherent deficiency in treatment capacity.</p> <p>BRMO is in process of reviewing sewage and water treatment capacity with intent of installing adequate capacity for current and foreseeable demand.</p>	
5	The mine must ensure that the operator/s of the plant are technically trained to operate the	C	Training of sewage operators was undertaken by Aquaplan. Training certificates were presented for by the auditee dated	

Table 5-11: Sewage Treatment Plant				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	specific plant and prevention of environmental impacts therefrom.		20 February 2015. It is reported that the same operators are still running the plants.	
6	All sewage sludge and screenings must be stored on impermeable, bunded, platforms within the plant grounds	C	Sludge is dried in impermeable bunded areas. Screenings are deposited in a roller bin within a bund. It is notable that this is where the spills occur, however the source of the spills (blockages) needs to be addressed rather than necessarily increasing bund capacity.	
7	Screenings and sludge from the sewage plant must be temporarily stored as hazardous waste, in accordance with the NEMWA national norms and standards for storage of waste.	NC	Screenings and sludge are dried and then stored in sealed skips at the Black Rock sewage treatment plant prior to disposal as hazardous waste. However the skips are stored on bare ground. It is recommended that the skips be kept in suitable bund. Current storage quantities do not exceed the 80m ³ threshold applicable for the norms and standards.	It is recommended that the skips be kept in suitable bund.
8	The site must be fenced off from the remainder of the operations and access thereto well regulated by a designated operator	NC	Fence and access control in place at Gloria Sewage treatment plant. Black Rock Sewage Treatment plant has a fence and access control in place, however at time of audit gate to premise was open and no restrictions to access were in place. There is no fence or access control at Nchwaning II Sewage Treatment Plant.	It is recommended that the required control be put in place.

Table 5-12: Salvage Yard				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	Soil, surface water and groundwater			
1	The salvage yard floor must be concreted where potentially contaminated bulky material/items are stored outside of water tight steel skips/containers, and appropriately integrated with the remainder of the site's 'dirty' storm water management system.	NC	At the main salvage yard, it was noted that there are several instances of lubricant leaks onto bare soil from scrapped vehicles at the site. Old engines, which may still contain oil, are stored on pallets on bare soil. Refer to Figure 6.6 on page 79	It is recommended that scrapped vehicles and engines be drained of oil where applicable to prevent soil and potential groundwater

Table 5-12: Salvage Yard				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
				contamination at the salvage yard. Alternatively adequate facilities should be in place for containment of leaks.
2	All machinery that may leak lubricants or any other pollutants that is not stored on an impermeable surface must have appropriate drip trays in place.	NC	Large machinery placed at salvage yards did not have sufficient drip trays in place and soil contamination was evident.	It is recommended that scrapped vehicles and engines be drained of oil where applicable to prevent soil and potential groundwater contamination at the salvage yard and that adequate drip trays are put in place.
3	The salvage yard must be inspected on a monthly basis to ensure that there is no contamination of soil and water from leakages or exposure of hazardous materials to soil and rainfall.	NC	There is no record of monthly inspections. There is clear evidence of soil contamination. Refer to Figure 6.8 on page 81.	
	Records			
4	Records of all materials deposited at the salvage yard must be maintained including the date of placement.	NC	Records are reported to be in place; however these were not provided.	
	Access Control			
5	The site must be fenced off from the remainder of the operations and access thereto well regulated by a designated gate controller.	C	Site is fenced and access is controlled by the supervisor.	
6	Records must be kept of all parties entering the site (Name, Section, Date, Time and Signature), as well as of the type and estimated volumes of wastes off-loaded by those parties.	NC	There is no log in place.	It is recommended that a visitors' log be implemented. This will also improve records management.
7	Hazardous material/chemical containers/tanks must be stored within appropriately sized, impermeable, bund walls (inclusive of valve for	N/A	No hazardous material/chemical containers/tanks at the site. These are kept at the hazardous waste transfer facility.	

Table 5-12: Salvage Yard				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	release of storm water ingress, unless otherwise roofed or indoors)			

Table 5-13: Bulk Fuel (including inter alia diesel, petrol, HFO and CTF)/Oil/Chemical Storage)				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	Soil, surface water and groundwater			
1	Above ground fuel, or oil storage tanks, must be located within appropriately sized, impermeable, bund walls (inclusive of valve for release of storm water ingress, unless otherwise roofed)	C	All storage stations reviewed were compliant, this includes the Nchwaning 3 fuel and lubricant depot, the Black Rock bulk storage near the clarifier, Gloria bulk fuel storage, and the new and old Nchwaning 2 fuel stations. It is notable that the old Nchwaning 2 fuel station is being replaced by a new station with improved stormwater management.	
2	Appropriate hydrocarbon spill management kits must be kept and maintained on site wherever fuels and oils are stored, and where refuelling and/or servicing of plant, vehicles and machinery takes place, in order to manage potential hydrocarbon spillages effectively	C	Spill kits observed where hydrocarbons are stored.	
3	Training, in the use and maintenance of the abovementioned kits, as well as any contaminated waste products, must be provided to ALL staff either directly, or indirectly, involved in any of the activities identified above	C	Training for use of spill kits completed as part of induction training. Awareness is maintained through toolbox talks.	
4	Hazardous material/chemical containers/tanks must be stored within appropriately sized, impermeable, bund walls (inclusive of valve for release of storm water ingress, unless otherwise roofed or indoors)	C	Condition is generally compliant as the majority of tanks, containers and hazardous materials are stored according to the BRMO Spill Management Procedures.	
5	Sorbents and contaminated soil must be immediately collected and placed within a water-tight, skip/container for subsequent	C	Used sorbents were noted at the Nchwaning 3 depot and the old Nchwaning 2 station. These were kept in water-tight roller bins.	

Table 5-13: Bulk Fuel (including inter alia diesel, petrol, HFO and CTF)/Oil/Chemical Storage				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	disposal or treatment at an appropriately licensed hazardous waste management facility.			
6	Spill management must take place according to the BRMO 'Spill Management' environmental procedure – Appendix 7).	NC	Contaminated soil was observed at the black salvage yard. The date of contamination could not be established with certainty however it was reported to be several weeks old. It was noted that the BRMO "Spill Management and Specifications for Bund Walls Document No: PRO-SHE-E-Ge-G-1520" does not stipulate a timeframe for removal or remediation of the soil. Contaminated soil is transferred to the hazardous waste transfer facility where its kept in a bunded area prior to collection for disposal or treatment. There was contaminated soil observed at the facility awaiting collection for disposal.	It is recommended that the procedure be updated to reflect timeframes for remediation or removal of contaminated soil.
	Access Control			
7	The site must be fenced off from the remainder of the operations and access thereto well regulated by a designated operator	NC	Not all the sites are fenced off. However, this may not be practical and it is also unlikely that there is any environmental management benefit of significance to be had from fencing off the sites.	It is recommended that BRMO consider removing this requirement.

Table 5-14: Vehicle Maintenance and Wash Bays				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	Soil, surface water and groundwater			
1	All servicing and washing of vehicles is to take place strictly within maintenance workshops or otherwise off-site at appropriate maintenance facilities.	C	It is reported that maintenance and washing occurs at the workshops. No observations to the contrary were made.	

Table 5-14: Vehicle Maintenance and Wash Bays				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
2	Furthermore, servicing and maintenance of vehicles must take place on impermeable surfaces with appropriate measures in place to contain contaminated run-off. Impermeable surfaces must be maintained.	C	All workshops visited during the audit have impermeable surfaces and containment systems in place to prevent contaminants entering the environment.	
3	Where emergency/unplanned repairs are required, or oil leaks are identified, suitable drip trays must be used to prevent contamination of soil and water.	C	It is reported that maintenance personnel are required to use drip trays. This could not be verified as no emergency/unplanned repairs were observed.	
4	Vehicle wash bay surfaces must be concreted, and all wash water run-off diverted to an impermeable collection sump linked to an oil-water separator.	NC	<p>The Gloria workshop has a wash bay which is concreted. However, there is no collection and treatment of the run-off. Refer to Figure 6.13 on page 85 of this report.</p> <p>The wash bay visited at Nchwaning 2 Surface Ore Transport Workshop has an impermeable surface and runoff flows to a sump. Water is oil-skimmed and reused until water is deemed no longer clean and then is disposed of to process water for treatment. Oil is collected in a bunded used oil tank for collection by an oil recycling service provider.</p> <p>The Black Rock workshop is concreted and contaminated water flows to an external collector for subsequent disposal.</p>	It is recommended that the Gloria surface workshop be upgraded to meet the requirements of the EMPr.
5	Wash water must be effectively diverted, contained and managed, such that no hydrocarbon contaminants are ever in contact with site soils	NC	As noted above. No evidence of contamination resulting from wash water at Nchwaning 2 and Black Rock. However at Gloria it is clear that there is seepage onto the surrounding soil. Refer to Figure 6.13 on page 85 of this report.	It is recommended that the Gloria surface workshop be upgraded to meet the requirements of the EMPr.
6	Vehicles may only be serviced on site in a dedicated workshop, which must;			
	· Have a concrete floor;	C	Concrete floors observed accordingly.	
	· Have a dedicated hazardous waste skip/container (marked clearly for purpose) for temporary storage of oiled rags, oil/fuel filters, etc.); and	C	Observed at the areas audited.	

Table 5-14: Vehicle Maintenance and Wash Bays				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
	<ul style="list-style-type: none"> Well bunded waste oil container; and 	NC	Broken bund wall at Gloria Workshop.	It is recommended that the Gloria surface workshop bunds be repaired as soon as practical. The workshop supervisor reported that this has been budgeted for and awaits contractor appointment.
	<ul style="list-style-type: none"> Available, well maintained, hydrocarbon spill kits 	C	Spill kits observed at the time of the audit.	
7	Potentially contaminated water must be effectively diverted, contained and managed, such that no contaminants are ever in contact with site soils	NC	Oil separation in place at Nchwaning 2 SOT workshop and the Black Rock workshop. This was not the case at the Gloria workshop, refer to Figure 6.13 on page 85.	It is recommended that an oil separator pit be erected at Gloria workshop
8	Uncontaminated storm water run-off within the sites must be prevented from flowing through workshops and wash bays or any other contaminated areas.	C	Raised floors and cut-off trenches prevent the ingress of clean storm water into wash bays and workshops.	
9	All equipment (e.g. gear boxes) which may leak oil, liquid fuels, or hazardous chemical substances must be located on impermeable bases which can contain leaks or must have appropriately sized drip trays.	NC	At the time of the audit equipment with potential for hazardous substances (e.g. transformers) was stored in bunds which were in disrepair and therefore would not contain substantial leaks or spills.	It is recommended that the Gloria surface workshop bunds be repaired as soon as practical. The workshop supervisor reported that this has been budgeted for and awaits contractor appointment.
10	All potentially hazardous waste (e.g. oily rags, used oil filters, etc.) must be stored in appropriately labelled hazardous waste containers, and kept in a bunded area or indoors on an impermeable floor as appropriate. Non-recyclable waste must be treated and/or disposed of at an appropriately authorised facility. Used oil must be stored separately for collection.	C	Hazardous waste stored within appropriate bins at workshops.	

No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
11	Used oil must be collected and recycled if economically feasible.	C	Used oil collection undertaken by Rose foundation for recycling.	

5.4 COMPLIANCE WITH SPECIALISTS RECOMMENDATIONS

5.4.1 AIR QUALITY

Note that the postponement of the Sinter Plant complex has significantly reduced the anticipated emissions from the mine expansion and the relevance of the AQMP as it is largely aimed at addressing sinter plant emissions whereas the EMPr deals with general particulate emissions from the expansion project.

No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1	Appoint an Internal Environmental Control Officer (ECO) who will be required to monitor the site with a direct hands-on approach and ensure compliance and co-operation of all personnel.	N/A	BRMO's environmental specialist is assigned the responsibility of ensuring compliance.	Recommended that this be removed as this would be determined within an Atmospheric Emission Licence and the condition AEL of the should be adhered to.
2	This AQMP must be updated to ensure that it is relevant to the detailed design and layout of proposed activities.	N/A	The postponement of the sinter plant obviates the need to update the AQMP. The current requirements are deemed adequate for the mine expansion excluding the sinter plant.	
3	This AQMP must be updated to ensure that all conditions of the Authorisation issued for this development have been incorporated into the AQMP.	N/A	No conditions in the Environmental Authorisation require updating if the AQMP.	

Table 5-15: Tabular Summary of Compliance with the Recommendations of the AQMP – Implementation Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
4	This AQMP must be updated to ensure that all conditions of the any instrument of environmental legislation (e.g. permits, licenses etc.) issued for this project have been incorporated into the AQMP.	N/A	The Atmospheric Emissions Licence issued was retracted due to the postponement of the Sinter Plant.	
5	The mine must appoint an independent Environmental Control Officer (ECO) who must monitor the contractor's compliance with the AQMP.	N/A	An ECO was appointed through Worley Parsons to monitor compliance and enforce procedures. The remaining construction activities have dwindled as the project has progressed to completion. The ECO contract was concluded. It is understood that the BRMO Environmental Specialist act as the ECO. EScience has been appointed to audit the construction phase of the expansion project.	
6	The priority of the ECO is to maintain the integrity of the development conditions outlined in the AQMP.	N/A	AQMP not required as the development pertaining to the AEL has not commenced and as a result the AEL has lapsed.	
7	The contractor must ensure that the construction crew attend an environmental briefing and training session presented by the ECO prior to commencing of site activities.	C	All contractors that were audited produced evidence of training in respect of the EMPr and related BRMO procedures and awareness plans. However, some of the contractors did not have a copy of the updated EMPr on file.	
8	The AQMP must be made binding to the main contractor as well as individual contractors and should be included in tender documentation for the construction contract.	C	Contractors are issued with a green file which includes a signed commitment to abiding by the environmental management requirements.	
9	AQMP must be made available to the main contractor as well as individual contractors, as well as other relevant role-players.	C	The provisions of the AQMP are integrated into the EMPr	
10	Contractors and staff must be properly trained in all environmental aspects relating to their role in the project's construction and operation.	C	All contractors that were audited produced evidence of training in respect of the EMPr and related BRMO procedures and awareness plans.	

5.4.2 SOIL

Table 5-16: Tabular Summary of Compliance with the Recommendations of the Soil Specialist – Implementation Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1. PRE-CONSTRUCTION, PLANNING AND DESIGN				
1	Stripping depth - Because the A horizon is relatively thin (20 cm) with a very low organic content, no specific recommendation on how deep the topsoil should be excavated to prepare the area is necessary. The excavation could be deeper than 20 cm. The normal practice is to excavate to 30 cm before the surface is prepared for construction is acceptable.	C	Stripping during the construction phase was carried out to 30cm depth. It is reported that the same was undertaken for the new TSF. This could not be verified as there was no stripping underway at the time of the audit. However topsoil and subsoil have been stockpiled separately.	
2	Handling of stockpiled soil - Because of the texture of the soil and the size distribution of the different sand fraction of the soil, the soil will not tend to compact and become cemented while it is stockpiled. No special arrangements are necessary for stockpiling.	N/A	No special arrangements are necessary for stockpiling.	
3	Soil preparation for remediation - Although the soil is not very fertile, the stockpiled soils can be used as such to reclaim the disturbed area at mine closure. No fertilizer program is recommended because it is assumed that the disturbed areas will be re-vegetated with natural grasses which are adapted to the local environment.	N/A	No preparation required.	

5.4.3 NOISE

Table 5-17: Tabular Summary of Compliance with the Recommendations of the Noise Specialist – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1. PRE-CONSTRUCTION, PLANNING AND DESIGN				
1	Haul Roads - Machinery with low noise levels to be used and construction work to take place during daytime periods.	C	Construction work is restricted to daytime. It could not be confirmed that the machinery has 'low noise levels' however no noise complaints have been received.	

Table 5-17: Tabular Summary of Compliance with the Recommendations of the Noise Specialist – Construction Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
2	Preparation of the footprint area - Machinery with low noise levels to be used and construction work to take place during daytime periods.	C	Construction work is restricted to daytime. It could not be confirmed that the machinery has 'low noise levels' however no noise complaints have been received.	
3	Drilling surface shaft complex - Drilling of holes for blasting to take place during the daytime.	C	No drilling and blasting underway during the time audit. However, all construction work is reported to have been undertaken during daylight hours.	
4	Blasting to take place that is in line with the blasting chart to minimise the ground vibration and over air pressure levels; Blasting to take place during daytime only.	N/A	No blasting underway during the period audit.	
5	Provision of services - Any power generation plant to be acoustically screened off and compliance certificate to be provided; All construction work to take place during normal working hours; Machinery with low noise levels to be used.	C	Construction work is restricted to daytime. It could be confirmed that the machinery has 'low noise levels' however no noise complaints have been received. There are small electricity generators operated by some contractors (less than 5KW) however these are not significant enough to warrant screening.	
6	Assembling of equipment/machinery - Machinery with low noise levels to be used and construction work to take place during daytime periods.	C	Construction work is restricted to daytime. It could not be confirmed that the machinery has 'low noise levels' however no noise complaints have been received.	

Table 5-18: Tabular Summary of Compliance with the Recommendations of the Noise Specialist – Implementation Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1. PRE-CONSTRUCTION, PLANNING AND DESIGN				

Table 5-18: Tabular Summary of Compliance with the Recommendations of the Noise Specialist – Implementation Phase				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1	ADT's to travel within the speed limit within the plant area at all times; Haul roads to be maintained in good order without any potholes.	C	Speed limit signs are in place. It is reported that drivers are instructed to obey the speed limits at all times. Haul road maintenance is on-going and no potholes, severe corrugations or other indications of the roads not being "in good order" were observed.	
2	Acoustic mitigatory measures to be implemented at all equipment that produce a noise level higher than 85.0dBA at 3m from the source; Applicable to parts or equipment such as crushers, gearbox, belts, rotating parts, crushing section, screening and washing sections.	UC	In the absence of noise measurements it could not be established whether there is a need for acoustic mitigation. An integrated environmental monitoring assessment is scheduled to be completed in the first quarter of 2020. It is reported that this will include noise monitoring.	It is recommended that an environmental noise survey be undertaken to inform noise mitigation requirements.
3	Conveyor system to be maintained in good order and all rotating equipment to be serviced on a regular basis; All squeaking rollers to be replaced or repaired without delay.	C	No observations to the contrary.	
4	Ventilation shafts to be located away from any noise sensitive areas and the opening of the vent shaft to face away from any noise sensitive area.	C	Vent shaft face upwards. A berm has been built at the Nchwaning vent shaft to deflect noise away from the neighbouring farm and guesthouse.	

5.4.4 BIODIVERSITY

Table 5-19: Tabular Summary of Compliance with Recommendations of the Biodiversity Specialist				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1. PRE-CONSTRUCTION, PLANNING AND DESIGN				
1	Design a training program which informs staff about the relevance and importance of biodiversity management	C	Training in respect of RDL species and invasive species is undertaken through toolbox talks. Training in respect of the Conservation of Biodiversity has been undertaken by each contractor audit. Proof of training is kept in the form of a register of attendance with signatures. Biodiversity related posters, per the toolbox talks, are put up at eating areas at the laydown camps.	Recommend that biodiversity management procedure be updated to include trapping, hunting and poaching of animals.
2	Identification and counting of RDL species within areas earmarked for development	UC	It is reported that all protected species have been counted and areas assessed prior to obtaining related permits and commencement of clearing. However in the absence of complete protected plant removal and relocation reports this could not be confirmed.	

3	<p>Community and mine specific actions to promote the conservation of RDL and protected floral species within the region:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Establishment of a nursery wherein protected and RDL floral species are propagated for the use in future rehabilitation <input type="checkbox"/> The use of RDL and protected floral species in the greening of facility grounds <input type="checkbox"/> Providing local schools with RDL and protected floral species on environmental days celebrated in South Africa such as National Arbour Week <input type="checkbox"/> Supporting research projects within the Northern Cape specifically directed towards RDL and protected species within the province <input type="checkbox"/> Implementation of a replacement program for indigenous trees instead of alien/invasives with special mention of the Black Rock village 	NC	<p>A nursery has not been established. However, the requirement for offset was postponed by the relevant departments.</p> <p>Permit 0050/2017 required that BRMO provide a detailed report-back to ND DENC upon expiry of the permit (Addendum 1, condition 15). Evidence of such a report was not availed.</p> <p>Permit NCU 7480617 requires "<i>BRMO shall plant or donate 500 indigenous trees by the expiry date of this license. A compliance report with recipient details (I.D. number, name, contact number and physical address where trees was planted); and/or GPS coordinates of planted seedlings must be supplied to the DAFF</i>". Evidence of such a report was not availed.</p> <p>A compliance status report to DAFF dated 27 February 2018 was availed. This report confirms that there have been non-compliances with various tree removal permits.</p> <p>Notably DAFF LICENCE NCU 4021113 requires that "<i>...the existing Biodiversity Conservation Initiative agreed upon, should be revised (see Minutes of meeting of 9 February 2012 and subsequent correspondence) and amended in consultation with the DENC and DAFF. A revised written agreement should be reached by all parties by June 2014. From this license on forward, the collective impact(s) of Assmang Black Rock Mine Operations (BRMO) on protected trees and woodlands would be assessed by DAFF. Accordingly, biodiversity offsets and/or other special conditions might be triggered by future expansion (license applications), where-after amendments will be made accordingly to DAFF license(s) and/or offset agreements.</i>".</p>	<p>It is recommended that BRMO continue discussions with DAFF and NC DENC to reach a conclusive agreement on whether or not biodiversity off-setting is required and what the terms thereof will be.</p> <p>It is recommended that BRMO liaise with relevant authorities for and schools to implement the required biodiversity research and school initiatives.</p>
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Table 5-19: Tabular Summary of Compliance with Recommendations of the Biodiversity Specialist				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
			<p>A subsequent permit (5320315 Amendment) states "Should the impact remain at 80 ha, a biodiversity offset will not be triggered now, but future expansions will include this impact in assessing impacts and may eventually triggers an offset."</p> <p>It is reported that the DAFF has not communicated any further specific special conditions despite several subsequent licences being issued. A biodiversity off-set plan has not been developed.</p> <p>The Environmental Specialist noted that BRMO has initiated communication with DAFF in respect of establishing their requirements.</p> <p>A tree planting and tree replacement and indigenous planting programme is in place.</p> <p>Provisions for local schools and research projects are however not in place.</p>	
4	Implementation of a biodiversity offset initiative	NC	As per the finding above a biodiversity offset has not been initiated. The Environmental Specialist noted that BRMO has initiated communication with DAFF in respect of establishing their requirements.	<p>It is recommended that BRMO continue discussions with DAFF and NC DENC to reach a conclusive agreement on whether or not biodiversity off-setting is required and what the terms thereof will be.</p> <p>It is recommended that the biodiversity offset plan be finalised accordingly if required.</p>
5	Detailed invertebrate study of the area which will form the baseline information for future invertebrate monitoring	NC	An invertebrate study has not been undertaken. Invertebrate monitoring is not in place.	It is recommended that invertebrate study be undertaken and finalised.

Table 5-19: Tabular Summary of Compliance with Recommendations of the Biodiversity Specialist				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
6	<p>Community specific actions in order to eradicate and manage exotic/weed floral species:</p> <ul style="list-style-type: none"> • Implementation of a replacement program for indigenous trees instead of alien/invasives with special mention of the Black Rock village and Hostel complex with surroundings • Inform community about dominant alien vegetation species within the Black Rock Mine village and Hostel complex with surroundings • Implement alien vegetation control plan specific for the exotic/weed species identified within the Black Rock Mine village and Hostel complex with surroundings 	NC	<p>An alien vegetation removal is undertaken on an annual basis. However a formal plan was not available at the time of the audit.</p> <p>Community awareness campaigns are not in place.</p>	<p>It is recommended that a formal identification and removal plan be implemented.</p> <p>It is recommended that a community awareness programme be developed and implemented.</p>
7	<p>Compile a library of faunal and floral literature applicable to the area. Specific emphasis must be placed on RDL species, invasive species and their control methods, endemic species and their conservation</p>	NC	<p>A formal library is not in place.</p>	<p>Recommended that a faunal and floral library be generated.</p>
8	<p>Erosion control and rehabilitation:</p> <p>Identify activities which are causing erosion and incision of any of the drainage features in the Activity Footprint areas:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Obtain relevant legislative approval for any activities to be undertaken within the drainage features to rectify excessive erosion <input type="checkbox"/> Reprofilling of the banks of disturbed drainage areas to a maximum gradient of 1:3 to ensure bank stability <input type="checkbox"/> Reinforce banks and drainage features where necessary with gabions, reno mattresses and geotextiles. <input type="checkbox"/> Reseed any areas where earthworks have taken place to prevent further erosion 	NC	<p>Potentially significant erosion was observed at Gloria. A drainage channel was built for the rehabilitated area on the banks of the Gamagara river. This channel has been eroded significantly. Erosion is likely to worsen over time. Refer to Figure 6.1 to Figure 6.3, on page 77 of this report.</p> <p>Erosion was also observed on an embankment on the southern side of the proposed Gloria contractor camp expansion area. Refer to Figure 6.4 on page 78 of this report.</p> <p>Erosion runnels were observed on the new Nchwaning 2 TSF walls, the Nchwaning 2 TSF Subsoil stockpile, and the Black Rock topsoil stockpile. However the erosion observed is generally on a relatively small scale. Refer to Figure 6.5 on page 79.</p>	<p>It is recommended that the required erosion prevention and mitigation measures be instituted where applicable.</p>

Table 5-19: Tabular Summary of Compliance with Recommendations of the Biodiversity Specialist				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
9	<p>Hazardous materials control, erosion control, water quality control; Soil pollution control; and, Sustainable use of groundwater</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ensure that all hazardous storage containers comply with the relevant SABS standards to prevent leakage. Regularly inspect all construction vehicles for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil. Erosion management measures must be implemented to prevent soils from eroding into surface water resources. <input type="checkbox"/> Ensure that all runoff and process water are adequately contained in the dirty water system to prevent discharge of dirty water to the receiving environment. Water quality within the receiving environment should also be continuously and regularly monitored. 	NC	<p>Hazardous goods are generally stored within bunded facilities. However, it was also observed that emulsion waste at Nchwaning 3 was stored in drums outside the emulsion tank bund. It is reported that this waste is spillage from loading and is stored in drums for collection by supplier. Waste manifests were availed for confirmation or previous disposal. The drums should be kept within a bund. Refer to Figure 6.15 on page 86.</p> <p>Fuelling is undertaken at designated fuelling facilities.</p> <p>Affected water is adequately contained with bunding and drainage where required A water quality monitoring programme is in place as per the site's WUL.</p> <p>Potential for erosion at hazardous materials storage areas was not observed.</p>	
10	<p>Sustainable use of groundwater:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ensure that all activities impacting on geohydrological resources of the property are managed according to the relevant DWAF Licensing regulations and groundwater monitoring requirements. 	UC	<p>An audit of compliance with site's WUL was not undertaken. The site's current WUL has not yet been audited at the time of this audit. Therefore compliance could not be verified for the entire WUL.</p>	
11	<p>Dust control:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ensure that all roads and construction areas are regularly sprayed with water in order to curb dust generation <input type="checkbox"/> If any excessive dying out of vegetation occurs in areas of dust generation, measures to mitigate the impact should be immediately sought 	C	<p>Palliatives and water are applied to roads to prevent dust generation as per the AQMP.</p> <p>No dust significant dust impact on vegetation was observed.</p>	

Table 5-19: Tabular Summary of Compliance with Recommendations of the Biodiversity Specialist				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
12	Noise control: Ensure that noise levels do not exceed the relevant standards	UC	No complaints have been received. Environmental noise measurements have not been undertaken to confirm that the SANS 10103 standard is met, however thus the potential impact on biota cannot be ascertained. An integrated environmental monitoring assessment is scheduled to be completed in the first quarter of 2020. It is reported that this will include noise monitoring.	It is recommended that an environmental noise survey be undertaken.
13	Removal of alien and invasive species: Develop a comprehensive alien vegetation monitoring program which should include <ul style="list-style-type: none"> o Identification of priority areas o Liaison with surrounding stakeholders, and the local municipality to control upstream and surrounding nodes of seed production o Identify priority species to control in consultation with relevant stakeholders o Develop protocols for the removal of all alien species o Removal of species <ul style="list-style-type: none"> • Re-assessment and monitoring of the area to determine success of the action and any follow-up measures required • Identify areas to be greened • Identify floral species to be utilised • Identify suitable maintenance methods (water, fertilizer, etc.) • As far as possible, employ local community members • Source plants from established nursery • Design and implement landscape development plans • Continuously monitor efficacy of landscaping 	NC	An alien vegetation removal is undertaken on an annual basis. However a formal plan was not available at the time of the audit.	It is recommended that alien vegetation removal is developed in accordance with the recommendations of the biodiversity specialist.

Table 5-19: Tabular Summary of Compliance with Recommendations of the Biodiversity Specialist				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
14	Establish a nursery focusing on RDL/ Protected/ Endemic/ Medicinal plants to be utilised during operations and rehabilitation greening activities	NC	A nursery has not been established. Protected species have been relocated from affected areas however it could not be confirmed that all of these were relocated as a records were not available.	It is recommended that BRMO consider the need to establish the nursery in conjunction with the Biodiversity offset discussion with the relevant officials.
15	Removal of litter and solid waste: <input type="checkbox"/> Liaison with stakeholders and surrounding landowners to ensure that surrounding sources of litter are addressed <input type="checkbox"/> Identify a suitable area for disposal of collected solid waste <input type="checkbox"/> Removal of litter and solid waste	C	No potentially significant visible litter observed during the audit.	
16	Access control: <input type="checkbox"/> Identify areas where the value of the biological resource warrants protection and therefore controlled access by the public <input type="checkbox"/> Maintenance of fences to ensure that access control is maintained.	C	It is assumed that all the properties have protected biota and there fences are in place accordingly for the whole mine area. Access to the mine and Belgravia farm is controlled.	
17	Veld fire management <input type="checkbox"/> Construct and maintain fire breaks on the property in compliance with legislated requirements. <input type="checkbox"/> Train relevant staff members in the philosophy, construction and maintenance of fire breaks	UC	Fire breaks are in place and employees are reported to have been trained. Training records were not available during the audit.	
18	Establish a No-Go biodiversity reserve within the riparian area and associated 32 meter buffer.	C	No activities are allowed in or adjacent to the Gamagara delineation.	
19	Compare plans of surface activities regularly to the areas of mapped sensitivity.	C	Aerial photographs are undertaken annually and reviewed. No encroachments have been identified.	

Table 5-19: Tabular Summary of Compliance with Recommendations of the Biodiversity Specialist				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
20	<p>Employ specialist consultants to assist in developing the detailed rehabilitation and closure plans to ensure that the plan will allow sufficient recovery of the area to take place to be sustainable</p> <p>Ensure that sufficient after care and maintenance takes place and that sufficient budget for these activities is made available to ensure that rehabilitation measures become established and self-sustaining</p>	C	<p>Rehabilitation plans have been developed (EnviroGistics final rehabilitation plan, Ref: 21904).</p> <p>Rehabilitation plans have been developed in accordance with the Mine Closure Provisions Regulations GN.R 1147 of 2015.</p> <p>The required budget confirmation is reported to have been submitted to the DMR.</p>	
21	<p>Ensure that all proposed expansion and closure plans take biodiversity management aspects into consideration as part of the planning and design phase of a proposed development or closure plan:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Initiate trials with designated sample plots in which the suitability of various grass and tree species are tested to ensure that the most suitable species are utilised for large scale rehabilitation. <input type="checkbox"/> Appoint relevant ecological specialists to provide input into the decision making and design process of new facilities and the closure of existing facilities <input type="checkbox"/> Ensure that ecological issues are sufficiently considered as part of the overall design and project execution of any development or closure activity 	C	<p>Potting trials have been undertaken and the area adjacent to the Gamagara river at Gloria mine has been successfully rehabilitated. (Report reference - Investigation Into The Properties Of Subsoil For Potential Use As Reclamation Material For Mine Rehabilitation At Black Rock Mine Operations EScience Associates and Prof Andries Claasens 10 April 2017.</p> <p>SAS environmental have been appointed to undertake biodiversity assessments and related management plans for various projects undertaken by BRMO including the planned bridge upgrade, and the new Nchwaning 2 TSF. Other developments have thus far been within the authorised boundaries.</p>	

5.4.5 HYDROGEOLOGY

Table 5-20: Tabular Summary of Compliance with the Recommendations of the Hydrogeologist				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1	The development of a groundwater monitoring network is recommended. It is recommended that the frequency of monitoring be bi-annual.	C	Monitoring network in place, sampling is undertaken quarterly by service provider Aqautico. Results were availed to the auditor.	

Table 5-20: Tabular Summary of Compliance with the Recommendations of the Hydrogeologist				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
2	The monitoring network should be implemented as soon as possible to get background data before the project commences.	C	Implemented completed in 2013. Monitoring results availed.	
3	Further recommendations can be made after the implementation of the monitoring network.	C	A consolidated Groundwater assessment for the entire existing operation was undertaken in 2016. It was concluded that no further network improvements are required. A further assessment was undertaken by EnvAss in 2018 (refer to Envass report Geohydrological Investigation Report Number: GEO-REP-107-18-19) recommending extra monitoring boreholes.	It is recommended that BRMO install the recommended extra monitoring boreholes.
4	Temporal and spatial trend analysis of the groundwater quality should be conducted biannually to determine whether the priority areas are being managed as well as to identify new areas of concern. The monitoring system should then be adapted accordingly.	C	Quarterly monitoring reports trend historical data accordingly.	

5.5 CLOSURE PLAN

Given the final closure is not imminent, only compliance with the concurrent rehabilitation plan has been audited. At the time of the audit there has been limited concurrent rehabilitation undertaken, consisting in the main of demolition of the old Gloria Hostels and the affected Gamagara riverbanks adjacent to Gloria mine. It is notable that BRMO has an annual rehabilitation plan update and schedule.

Table 5-21: Requirements for General Surface Rehabilitation				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1. Concurrent rehabilitation				
1.1	Any items of economically salvageable or recyclable value (e.g. steel, electrical cabling etc.) must be identified and marked for salvaging.	C	Reported that any salvageable material is deposited at the salvage yards for recycling.	
1.2	Structures to be demolished must be inspected to identify if there are any red data or protected species which require removal or relocation prior to disposal. Permits for removal must be obtained prior to removal if they are required (e.g. removal of camel thorn and grey camel thorn trees).	NC	Pre-demolition inspection for red data species has not been undertaken at the old Gloria hostels for example.	It is recommended that inspection take place prior to demolition where applicable.
1.3	Asbestos roofs and materials containing asbestos must be identified and removed by a person competent to do so. Asbestos waste must be disposed of to an appropriately licenced facility.	UC	Asbestos roofing was adequately disposed of but no evidence of this was presented to determine compliance. It is reported that asbestos roofs were identified. However, demolition commenced prior to removal of the roofs, therefore the entire affected rubble was disposed of as asbestos contaminated waste.	
1.4	All structures must be demolished and removed.	C	Derelict structures are demolished when required such as unused Gloria housing.	
1.5	All foundations must be excavated and removed to a depth of 0.5m below ground level where applicable.	C	Reported to have been undertaken for the old Gloria hostels.	
1.6	Potentially contaminated soil must be removed for treatment or disposal at an appropriately licenced facility.	C	No contaminated soil identified other than affected by the demolition mentioned above. It is reported that the soils was excavated with the affected rubble to a depth of 500mm.	The reference to 500 m appears to be an error and should be 500mm.
1.7	Shape to contours of natural surrounds, Rip to 500 m, and scarify compacted soil.	C		

Table 5-21: Requirements for General Surface Rehabilitation				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
1.8	Cover exposed surfaces with topsoil and revegetate.	C	The old Gloria hostel area is being used as part of the Gloria upgrade project footprint.	
1.9	Monitor and manage rehabilitated area in accordance with alien and invasives management procedure.	C		
1.10	Any areas with slope $\geq 3^\circ$ should be inspected for signs of topsoil erosion following the replacement thereof, and appropriate action taken to curb any problematic areas. This to be undertaken until vegetation is permanently established.	C	No erosion observed.	
2. Disturbed area on the eastern boundary of Gloria mine encroaching on the Gamagara river				
2.1	Obtain a Water Use Licence or a General Authorisation in terms of the National Water Act (Act 36 of 1998) prior to commencement of rehabilitation activities in the river bed/riparian zone or other restricted demarcation.	C	Rehabilitation of the Gamagara riverbed fell within the ambit of general authorisation.	
2.2	Identify any protected species that may require permitting prior to disturbing.	C	Flash cards provided to prevent interference with protected species.	
2.3	If any archaeological artefacts of potential significance are identified at any stage, work must cease and SAHRA must be notified for instruction on how to proceed.	NC	Disturbance of an archaeological site occurred during rehabilitation of the Gamagara River banks.	It is recommended that mitigation be undertaken by a suitably qualified specialist within one year of this audit.
2.4	Removal of all foreign material and legacy waste in the area to be rehabilitated.	C	Removal of foreign material was undertaken as part of the rehabilitation.	
2.5	Rip compacted areas, and landscape to prevent erosion.	C	Reported to be the case. However, there is evidence of erosion present at the rehabilitated site.	It is recommended that the erosion in the rehabilitated area be addressed as soon as practical.
2.6	Revegetate in accordance with the recommendations of the biodiversity specialist, and monitor in accordance with alien and invasives management procedure.	C	Revegetated in accordance with the recommendation of the biodiversity specialist and it is reported that the area is monitored in accordance with BRMO alien and invasive management procedure.	
3. Golf Course, old laydown areas, old railway track (removed), and other disturbed surfaces				
3.1	All residual structures must be demolished and removed.	NC	The golf course has not yet been rehabilitated.	It is recommended that the golf course be rehabilitated.

Table 5-21: Requirements for General Surface Rehabilitation				
No.	Condition/Requirement	Status	Finding	Auditor Comment/Recommendation
3.2	Shape to contours of natural surrounds, Rip to 500 m, and scarify compacted soil.	NC	The golf course has not yet been rehabilitated.	The reference to 500 m appears to be an error and should be 500mm.
3.3	Cover exposed surfaces with topsoil and revegetate.	NC	The golf course has not yet been rehabilitated.	
3.4	Monitor and manage rehabilitated area in accordance with alien and invasives management procedure.	NC	The golf course has not yet been rehabilitated.	
3.5	Any areas with slope $\geq 3^\circ$ should be inspected for signs of topsoil erosion following the replacement thereof, and appropriate action taken to curb any problematic areas. This to be undertaken until vegetation is permanently established.	NC	The golf course has not yet been rehabilitated.	
4. General provisions				
4.1	All areas disturbed through construction related activities, and which can reasonably and feasibly be rehabilitated once the subject construction ceases, should be rehabilitated in accordance with Phases 4 to 7 in Table 7-1.	C	It is notable that no areas require rehabilitation at present, with the exception of an area cleared to the west of the Gloria mine TSF for proposed activities relevant to the sinter plant establishment which was subsequently postponed. This area is intended for the establishment of a new super fines storage facility and thus need not be rehabilitated as yet. The Environmental Authorisation process for SFSF was underway at the time of the audit.	

6 PHOTOGRAPHIC EVIDENCE FROM SITE AUDIT



Figure 6.1: Erosion in rehabilitated area on Gamagara riverbank 1



Figure 6.2: Erosion in rehabilitated area on Gamagara riverbank 2



Figure 6.3: Erosion in rehabilitated area on Gamagara riverbank 3



Figure 6.4: Erosion outside Gloria contractor camp



Figure 6.5: Erosion outside at Nchwaning 2 subsoil stockpiles from construction of the new TSF.



Figure 6.6: Leak emanating from the bund at Black Rock Hazardous Waste Transfer Station



Figure 6.7: Residue from fires at Nchwaning 2 Vent Shaft



Figure 6.8: Contaminate Soil at Black Rock salvage yard



Figure 6.9: Scrapped Engines at Black Rock salvage yard not stored in bunds



Figure 6.10: Overflows from at Gloria Sewage Treatment Plant



Figure 6.11: Overflows from at Black Rock Sewage Treatment Plant



Figure 6.12: Example of defective bunds at Gloria Workshop



Figure 6.13: Gloria Workshop Wash bay



Figure 6.14: Stacker-reclaimer stormwater drains blocked.



Figure 6.15: Nchwaning 3 Emulsion waste stored outside of bunded area.



Figure 6.16: Nchwaning 3 Emulsion waste stored outside of bunded area.

7 CONCLUSIONS AND RECOMMENDATIONS

The ensuing sub-section include various broad conclusions and recommendations that are aligned with or in addition to the detailed compliance assessment in the previous sections of this report.

7.1 NEW ACTIVITIES

No new activities, that are not otherwise authorised, were observed during the audit. It is recommended that BRMO review the total extent of land clearance underway for buildings to ensure that Activity 27 of EIA listing notice 1: "27. *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—*

- (i) the undertaking of a linear activity; or*
- (ii) maintenance purposes undertaken in accordance with a maintenance management plan."*

Note that " 'indigenous vegetation' refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years;"

7.2 CONCURRENT REHABILITATION

It is notable that there are various disturbed areas and old works which have become derelict overtime which have not been demolished and rehabilitated. These include, for example, but are not limited to:

- Old buildings next to the Nchwaning 2 vent shaft.
- Old buildings and plant adjacent to the Nchwaning 3 vent shaft.
- Old processing and water management infrastructure at Gloria mine.
- The old railway bridge in the Gamagara river.

There also historical residue deposits which have not been rehabilitated, namely:

- Old tailings facility at Gloria mine
- Old tailings facility at Nchwaning 2

Rehabilitation of the gold course has not been undertaken.

BRMO has an updated annual rehabilitation plan, which covers areas that are planned for rehabilitation which are additional to those in the EMPr concurrent rehabilitation requirements.

It is recommended that rehabilitation plans and implementation thereof be reviewed to consideration of the above.

7.3 RELEVANCE AND EFFECTIVENESS OF THE EMPr AND MITIGATION MEASURES

It is notable that the requirement for a biodiversity offset as set out in agreements with the Department of Agriculture, Forestry and Fisheries (DAFF) and the Northern Cape Department of Environment and Nature Conservation (NC DENC) has not been developed in detail in the EMPr, although this has been variably included in the tree removal permits issued by the DAFF. There is uncertainty as to whether such offset is required and to what extent. It is recommended that the offset requirements be established in liaison with the relevant departments being NC DENC and the now Department of Environment, Forestry and Fisheries.

Based on review of the activities at the site, their impacts, and environmental monitoring results, the EMPr is deemed to be effective.

It is notable that the Black Rock Koppie and related mining relics have been identified as features of high heritage significance by two separate archaeological specialists. Although these activities are not currently significantly impacted upon by BRMO's activities, it is clear that any future activities that may impact thereon must include adequate management measures thereto. It's recommended that BRMO liaise with the South African Heritage Resource Agency (SAHRA) in respect of the heritage management requirements for these sites.

7.4 OVERALL SIGNIFICANCE OF NON-COMPLIANCES

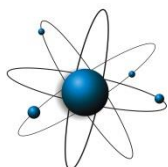
It must be noted that BRMO is located within a water scarce area and thus the delay in comprehensively assessing water use efficiency and set related water conservation and water demand management plans is of particular significance. BRMO has commenced with a water balance and subsequent management plans. It is recommended that BRMO management place particular importance on the implementation the impending water conservation and demand management plan.

Although various non-compliances have been identified, it is anticipated that these may generally be rectified without substantive or irreversible impacts on the environment.

7.5 CORRECTIVE ACTION PLAN

It is recommended that BRMO develop a corrective action plan based on the audit findings and thus such plant have timebound objectives and action along with designated responsibilities.

APPENDIX 1. : CURRICULAR VITAE OF THE AUDITORS



EScience Associates
9 Victoria Road, Oaklands
Johannesburg, 2192
Tel: +27 (0)11 718 6380

Curriculum Vitae:

Abdul
Ebrahim

Surname: Ebrahim

Name: Abdul

Date of birth: 07 December 1977

Residency: RSA

Position: Director

Key Qualifications: BEng (Hons) Environmental, BEng (Hons) Mechanical

Contact details

☎: 011 7186380/ 072 268 1119

✉: abdul@escience.co.za

Abstract

Abdul Ebrahim is a director of EScience Associates, an environmental consultancy specialising in waste and waste recovery, effluent, atmospheric emissions and air quality, as well as cleaner and renewable energy. EScience Associates caters for a diversity of industries and economic sectors and has forged strong relationships with other specialists, and specialist agencies, allowing the company to deal with complex and contentious environmental problems.

Abdul Ebrahim holds a BEng (Hons) in both Mechanical and Environmental Engineering disciplines. He specialises in air quality management, hazardous waste management and cleaner production, as well as their related environmental authorisation and licensing processes. His work experience includes numerous environmental impact assessments, cleaner production, waste recover-recuse-recycling, hazardous waste management assessments, and air quality impact management projects in power generation, manufacturing, minerals processing, and mining industries. His interests range from atmospheric modelling and wind energy, to the beneficial use of industrial wastes and effluents.

He is a certified Environmental Assessment Practitioner (EAP) and member of amongst other professional organisations: Engineering Council of South Africa (ECSA), and the National Association of Clean Air (NACA).

Abdul has provided Honours level lecturing at the University of Pretoria, UNISA, Cape Town University of Technology and various private training institutions in the fields of Environmental Compliance Enforcement, Environmental Impact Assessment, Cleaner Production and Air Quality Management since 2005.

His work experience includes:

- Waste management (classification, handling, storage, and disposal requirements, development of waste minimisation treatment & recycling strategies);
- Air quality management and Air Quality Management Plan development (industrial, household fuel burning, biomass burning and waste burning emissions modelling and inventorisation, development of emissions abatement and management strategies; meteorological and air quality modelling and impact assessment);
- Environmental Authorisation, Waste Management Licensing, Atmospheric Emissions Licensing, Mine Environmental Management Programme development, and their relating environmental impact assessment and stakeholder engagement processes.
- Development of specialist training courses (including EIA Administration and Review, Environmental Enforcement, Environmental Compliance Achievement for Industry).
- Environmental Due Diligence – due diligence assessment to inform purchase or ownership transfer of existing going concerns or proposed new establishments.

Abdul has over 15 years post graduate experience of which four years are in industry, and the remainder in consulting.

Education

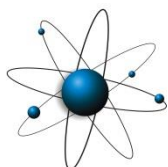
BEng (Hons) Mechanical Engineering

BEng (Hons) Environmental Engineering

Languages

English (excellent speaking and writing)

Limited French and Portuguese



Experience

Personal work experience includes:

- Cleaner and renewable energy strategy development, plan and project development;
- Technical and environmental due diligence – industrial and energy projects
- Waste management (classification, handling, storage, and disposal requirements;
- Development of waste minimisation treatment & recycling strategies);
- Air quality management and emissions inventorying, development of abatement and management strategies;
- Environmental Impact Assessment and Permitting
- Development and dissemination of specialist training for government and the private sector at NQF level 7 (honours degree).

Abdul's work experience in a wide diversity of economic sectors and industries and provides him with a good understanding of both small scale and large scale impacts of waste and pollution, as well as keeping up to date with various management alternatives available and their individual advantages and disadvantages, both locally and internationally implemented and pilot scale. Various waste streams have been dealt with to determine the most applicable disposal methods and impacts on the environment, from various industries:

- Metallurgical processes
- Power generation
- Food processing
- Waste recovery, reuse, and recycling and waste to energy
- Mining
- Cement manufacturing
- General Commercial – General waste management from various industries

Professional Registration

Environmental Assessment Practitioner (EAP)
Engineering Council of South Africa (ECSA)

Hourly Rate

Nature of expertise offered

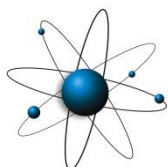
- Ability to interpret and analyse technical material on wide range of subjects
- Engineering expertise in energy, waste, air quality and multi-disciplinary subjects
- Ability to undertake technology feasibility studies, technical and financial due diligence
- Understanding of the green economy and technologies, ICT and agricultural and agro-processing sectors
- Ability to undertake a market research and investigation into the industry
- Proposal evaluation expertise

Experience and relevant projects

1. AIR QUALITY MANAGEMENT:

1.1 Government & Regulatory

- Vaal Triangle Air-shed Priority Area - Air Quality Management Plan review, development of emissions inventory and Ambient Air Quality Impact Assessment.
- Highveld Priority Area Air Quality Management Plan – development of emissions inventory, and mitigation strategies.
 - Reference: Dr Thulile Mdluli



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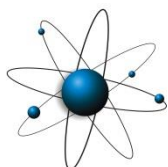
Curriculum Vitae:

Abdul
Ebrahim

- Tel: 012 310 3436
- Email : tmdluli@environment.gov.za
- Ekurhuleni Metropolitan Municipality - Development of an Air Quality Management Plan (AQMP)
 - Reference: Mr Edmund van Wyk
 - Tel: 011 999 2470
 - Email: Edmund.vWyk@ekurhuleni.gov.za
- Nkangala District Municipality - Development of an Air Quality Management Plan (AQMP)
 - Reference: Mr Vusi Mahlangu
 - Tel: 013 249 2164
 - Email: Mahlangumv@nkangaladm.gov.za
- North West Province - development of provincial emissions inventory (PM, NO_x, SO₂ etc)
- Development of National Air Quality Officers Companion Guide for the Republic of South Africa
- Development of the atmospheric emissions licensing department for Nkangala District Municipality
- EThekweni Municipality (Durban) - Greenhouse gas emissions quantification
- Newcastle Local Municipality - Development of an Air Quality Management Plan (AQMP)
 - Reference: Mr Phelelani Ntshingila
 - Tel: 034 328 3300
 - Phelelani.Ntshingila@newcastle.gov.za

1.2 Industrial and Mining

- A large variety of major industrial and mining operation across the Highveld and Vaal Triangle as part of Highveld Priority Area and Vaal Triangle Air-shed Priority Area AQMP projects.
- Lanxess CISA Chrome Chemicals Plant Expansion, CO₂ generation, Power Generation and hazardous waste treatment and recovery
- Samancor Chrome Proposed Chrome Chemicals plant
- Karbochem (Synthetic Rubber Manufacture) proposed Power Generation Plant
- PPC Cement Slurry Cement Plant Expansion
- PPC Cement Jupiter Cement Plant Expansion
- PPC Cement PE Cement Plant Expansion
- PPC Cement Dwaalboom waste heat recovery
- PPC Cement De Hoek, PE, Slurry, and Dwaalboom postponement applications
- Afrisam Cement - Dudfield Environmental Management Programme update.
- ClinX Medical Waste Incineration plant expansion
- Goedemoed organic waste incineration
- AWPP pyrolysis of organic waste
- Interwaste Waste Recovery, Waste to Energy and Waste Incineration plant
- Eskom power generation emissions off-setting
- Hayes Lemmerz SA Aluminium Wheel Manufacturing
- Evraz Highveld Steel and Vanadium proposed Powered Generation - Furnace Off-Gases
- Assmang Ferrochrome and Ferromanganese plants Powered Generation - Furnace Off-Gases
- Resource Generation Proposed Boikarabelo Power Station – coal fired
- Weir Minerals Africa (Isando, Alrode and Heavy Bay Foundries)
- Goedemoed Prison proposed Waste incineration and Landfill
- Consolidated Wire Industries Expansion
- Sylvania Proposed Open Cast PGE Mine and Processing Plant
- Assmang Black Rock proposed manganese mine expansion and sinter plant
- Assmang machadodorp proposed smelter plant expansion and cross-over to manganese



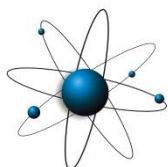
- Dwarsrivier Chrome Mine
- Nkwe proposed Platinum Mine
- Agricultural Research Commission hazardous and infectious waste incineration
- Sephaku Aganang proposed use of AFR's in cement manufacture
- Idwala Phalaborwa atmospheric emission licence for magnetite drying
- Mandini Wealth (Pty) Ltd Air quality health risk assessment
- Johnson Tiles a Division of Norcross Sa (Pty) Ltd Air quality health risk assessment
- Lanxess CISA (Pty) Ltd Air quality health risk assessment

2. WASTE CLASSIFICATION, HAZARD RISK ASSESSMENT AND MANAGEMENT

- Weir Minerals Africa
- Heavy Bay foundry Port Elizabeth
- Lafarge Gypsum
- Consolidated Wire Industries
- BPB Gypsum
- PG Bison melamine plant
- ABBW Electrical manufacturing plant
- CBI copper and fibre optical cable manufacture
- Holcim Cement
- Lanxess Chrome Chemicals
- Assmang Chrome
- Assmang Manganese
- Hayes Lemmerz SA Aluminium Wheel Manufacturing
- Auto industrial group (Pty) Ltd
- CBI Electrical
- Various metal ore mines

3. ENVIRONMENTAL IMPACT ASSESSMENT:

- Highveld Steel furnace off-gas power generation
- Lanxess CISA chrome chemicals plant development
- Samancor chrome chemicals plant development
- Herculon Ferrochrome power generation from furnace off-gases
- Kanhym Biogas project
- Turfontein Race Course night racing
- Alumicor secondary aluminium recovery rotary salt furnaces
- Hays Lemmerz Aluminium smelters, furnace and alloy die casting
- Plettenburg Polo Estates
- PG Bison Decorative Panels
- British Aerospace Land Based OMC Systems
- BPB Gypsum phosphogypsum plant
- Extrupet HPDE and PET recycling plants
- Assmang BRMO
- Assmang Machadodorp
- Interwaste waste recovery and waste to energy plants
- PPC Cement
- ClinX Healthcare Risk Waste Management

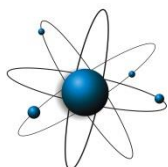


4. ENVIRONMENTAL LEGAL COMPLIANCE ASSESSMENT & RECTIFICATION PLANNING:

- SASOL Synfuels
- NATCOS Petrochem
- Dwarsrivier Chrome Mine
- Angloplatinum Base Metals Recovery
- Samancor Hotazel Manganese Mines
- PG Bison (Pty) Ltd MDF manufacturing
- Samancor Manganese Division Samancor Metalloys Meyerton
- Holcim SA (Pty) Ltd Cement Plants:
 - DUDFIELD
 - ULCO
 - ROODEPOORT
- Natal Portland Cement Plants:
 - NEWCASTLE
- Consolidated Wire Industries
- South African Airways (Pty) Ltd Technical Division
- TWK forestry strategic environmental legal compliance assessment
- Inergy Automotive Systems(Pty) Ltd
- Consolidated Wire Industries
- Mittal Steel Vereeniging and Dunswart plants – specialist assistance to DEAT environmental management inspectors
- Assmang Black Rock Mining Operations
- ClinX Medical Waste Management
- Extrupet PET and HDEP recycling plants
- Scaw Metals High Chromium Ball Plant
- Unilever waste recovery, recycling, and zero waste-to-landfill
- Numerous waste recycling facilities
- Oilflow
- The Smart Company
- Darkling Industrial Metals CC
- Unilever waste recovery, recycling, and zero waste-to-landfill
- Central Waste
- AT Packaging
- EWaste Africa
- Mpact Recycling
- Wasteplan
- Fine Metals
- Living Earth
- Industrial Plastic Recyclers
- SA Paper Mills
- Interwaste
- Matchem
- TGS
- Verigreen
- SB Boxes
- Drumpal
- Oscars Meat
- FOSECO South Africa (Pty) Ltd
-

5. GREENHOUSE GAS Quantifications and Assessments

- PPC Riebeeck



- Lafarge Lichtenburg
- Ilangabi Investments 12 (Pty) Ltd
- Lanxess CISA (Pty) Ltd

6. CLEANER PRODUCTION AUDITS, WASTE TO ENERGY, ENERGY RECOVERY, WASTE RECOVERY AND RELATED PROJECTS:

- Tuffy Plastics
- Proplas plastics
- WHS Distribution
- Premier Foods Pretoria Wheat Mill
- Alfred Nzou municipality
- Lanxess chrome chemicals residue recovery
- Karbochem power generation ash to bricks project
- Cement kilns alternative fuels and raw materials assessment for South Africa
- Kanhym Estates Biogas Generation from piggery effluent
- British American Tobacco:
- Tobacco Processors Zimbabwe
- Souza Cruz Brazil

7. ENVIRONMENTAL MANAGEMENT SYSTEM DEVELOPMENT & IMPLEMENTATION:

- British American Tobacco (full system development from scratch – ISO 14001 and ISO 9001)
 - Weir Minerals Aspects Identification, Rating, Assessment and Development of EMPs
 - Lafarge Gypsum Aspects Identification, Rating, Assessment and Development of EMPs
 - Environmental Aspects Identification, rating and formulation of EMPs for Samancor Metalloys Meyerton
 - Environmental Aspects Identification, rating and formulation of EMPs for DMS Powders.
 - Holcim Slagment development & implementation of EMS components including waste and air quality management
 - Holcim Roodepoort development & implementation of EMS components including waste and air quality management
 - Consolidated Wire Industries Environmental Aspects Identification, rating and formulation of EMPs and operational control procedures.
 - Samancor Metalloys Ferro Silicon Manganese and FerroSilicon production
 - DMS FeSi dense media production

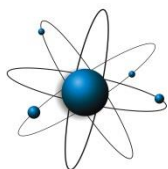
8. ISO14001 AUDITING:

- Debswana Orapa and Letlhakane Mines
- Ingwe Colliery
- Arnot Colliery
- FOSECO South Africa (Pty) Ltd
- Lafarge Gypsum
- CWI

9. SPECIALIST TRAINING COURSE DEVELOPMENT & PRESENTATION

- 2011 Training of Atmospheric Emissions Licensing Authorities – air quality management, emissions quantification, regulation and enforcement.
- 2007-2015 Training of Authorities for EIA review and permitting

Responsible for development of NEMA EIA Review Course and Administrators EIA Review Manual, theoretical and practical training material, and training of Government Officials responsible for EIA Review - responsible for the whole



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Curriculum Vitae:

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manual other than Law applicable to EIA Review. As at May 2013 approximately 1000 officials from National, Provincial and Local Government.

- 2005&6 Bridging Training for Environmental Management Inspectors and Enforcement
ESA was part of a consortium selected to develop and conduct the EMI Training. More than 2000 officials and university students have completed the training.

- University Of Pretoria Specialist Lecturer
 - Environmental Legal Compliance inspections and investigations (RSA)
 - Environmental Legal Compliance achievement (RSA)
 - Environmental Legal Compliance inspections and investigations (Africa)

- University Of South Africa Specialist Lecturer
 - Environmental Legal Compliance inspections and investigations (RSA)

- Training for industry and mining

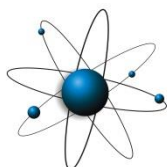
Development and presentation of training material for environmental impact identification and management in terms of South African environmental law for the SABS and other training institutions.

10. SOIL AND GROUNDWATER CONTAMINATION ASSESSMENT:

- Weir Heavy Bay Foundry
- Lafarge Gypsum
- Kanhym Estates
- SABAT (Pty) Ltd Johannesburg – investigation of heavy metal contamination of soils and groundwater
- Chemiphos SA (Pty) Ltd – investigation of phosphate and heavy metal contamination of soils and groundwater
- Castrol Lubricants Zimbabwe

11. ENVIRONMENTAL DUE DILIGENCE AUDITS, INCLUDING ASSESSMENT OF ENVIRONMENTAL AND CLOSURE LIABILITY:

- Determination and quantification of financial provision for the environmental rehabilitation and closure requirements of smelting operations for Highveld Steel & Vanadium operations:
 - HIGHVELD IRON AND STEEL WORKS
 - VANCHEM
 - TRANSALLOYS
 - RAND CARBIDE
 - MAPOCHS MINE
- Determination and quantification of financial provision for the environmental rehabilitation and closure requirements of smelting operations for TransAlloys
- Determination and quantification of financial provision for the environmental rehabilitation and closure requirements of mining operations for Samancor Chrome:



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Curriculum Vitae:

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- MIDDELBURG FERROCHROME
- FERROMETALS
- TUBATSE FERROCHROME
- WESTERN CHROME MINES
- EASTERN CHROME MINES
- Determination of critical environmental liability associated with the purchase of Xmeco Foundry by Weir Minerals Africa, and subsequent legal compliance achievement programme

12.

Possible timelines to commit to the assignment

- Available for assignments over the next two years
- Not available during the December holiday period - from 15 December until 3 January – due to company's closure for the festive season

Name James Malcolm Pugin
Date of Birth 23 March 1989
Identity Number 8903235061089

Qualifications

- MSc (Archaeology) (University of the Witwatersrand) 2013 – 2016
- BSc Honours: Archaeology (University of the Witwatersrand) 2012 - 2012
- Bachelor of Arts (University of the Witwatersrand) 2009 - 2011

Key Experience

- **GIS Mapping and Modelling**
- **Site Feasibility Analysis**
- **Atmospheric Impact Report Mapping**
- **Environmental Reporting**
- **Predictive Modelling for archaeological sites**
- **Database Coordinating**
- **Archaeological Survey and recording**
- **Baseline Archaeological Survey of Sehlabathebe National Park on behalf of UNESCO**

Employment History & Project Experience

Environmental Science Associates **2016 - Present**

Environmental and Geographic Information System Consultant

Map Production

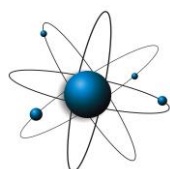
- Air Quality and Geographical Information Systems Isopleth Mapping
- Site Feasibility Analysis for prospective developments ranging from Wind Farms to Industrial sites

Other responsibilities

- Environmental reporting including Scoping and Environmental Impact Reports, Environmental Management Programmes, Basic Assessments etc.
- Environmental Applications for Water Use License, Waste Management Licences, and Environmental Authorisations
- Co-audited Water use licence and Waste management licences

Key Project Involvement

- Policy and Measures Assessment for the Department of Environmental Affairs
 - Assisting with development of models based on GIS datasets
- Mapping of Acid deposition, along with development of catchments based on points for WRC project: K5/2550 (Atmospheric deposition impact assessment)
- Mapping of Acid deposition for WRC project: K5/2466 (Development, Parameterisation and Verification of WRFChem Acid Deposition Modelling over the Highveld)
- Site Selection Assessment for the development of a new facility for Mandini Wealth based on specific developmental constraints.



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Saxonwold
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E MAIL:
james@escience.co.za

TEL:
+27 11 718 6384
FAX:
+27 866 106703

Associate Researcher, Co-Author and Specialist Photographer **2015-2016**

UNESCO world heritage survey of Sehlabathebe National Park, Lesotho

Baseline Archaeological Survey

- Geographic Information System and Remote Sensing that included the modelling of known rock art data to predict areas with a higher likelihood for containing rock art sites.
- Data capture and report writing
- Spatial Analysis, cartography and map production
- Site recording
- Field survey
- Data tabulation
- Photography

Database Coordinator (part time) **2013-2016**

- Managing the Matatiele Archaeology and Rock Art (MARA) rock art site database
- Research Assistant
- Geographic Information System and Remote Sensing that includes the modelling of known rock art data to predict areas with a higher likelihood for containing rock art sites.
- Data capture and report writing
- Spatial Analysis, cartography and map production
- Site recording
- Field survey
- Data tabulation
- Photography

Presentations

Presentation	Date	Conference/Seminar
Locating the Rock art of the Maloti-Drakensberg	2014	Pan African Archaeologist Conference, The University of the Witwatersrand, South Africa
Lecture: Rock art survey techniques and tactics	2013	Association of South African Professional Archaeologists (ASAPA) Student Development Workshop – Parys, South Africa
Developments in Mountainous Rock Art Survey	2013	Association of South African Professional Archaeologists (ASAPA)- Gaborone, Botswana

Research Contribution

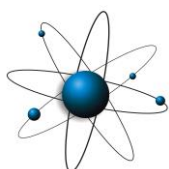
- Contributed towards digitisation and cartography of the distribution of canine species and disease spread for Mitchell, P 2017. Disease: A Hitherto Unexplored Constraint on the Spread of Dogs (*Canis lupus familiaris*) in Pre-Columbian South America. *Journal of World Prehistory*.
- Challis, W., Mullen, A., Pugin, J, 2016. Rock Art and Baseline Archaeological Survey of the Sehlabathebe National Park, Kingdom of Lesotho; Final Report to the World Heritage Committee of the United Nations Educational, Scientific and Cultural Organization. Publication to UNESCO

Education

University of the Witwatersrand

▪ **MSc (Archaeology)**

- Dissertation: Locating the rock art of the Maloti-Drakensberg: Identifying areas of higher likelihoods using remote sensing



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- Geographic Information Systems and Remote Sensing
- Predictive Modelling
- Rock Art Field Surveying
- Photographic recording of rock art sites

Available: at:

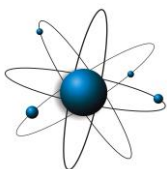
https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjz-qfVv8HbAhWDesAKHUcMAWIQFggoMAA&url=http%3A%2F%2Fwiredspace.wits.ac.za%2Fhandle%2F10539%2F1686&usg=AOvVaw0PF7e8F-Rs4WNkdx_OfCzC

▪ **BSc Honours (Archaeology)**

- Dissertation: Improving rock art survey: finding the sandstone shelters of the Maloti- Drakensberg.
 - Geographic Information Systems
 - Rock Art Field Surveying
 - Photographic recording of rock art sites

▪ **Bachelor of Science**

- Major Courses:
 - Geography
 - Archaeology



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