PROPOSED DEVELOPMENT OF A HYDROGEN PRODUCTION DEVELOPMENT PLATFORM AT THE MOGALAKWENA PLATINUM MINE

Anglo American Platinum Ltd - Rustenburg Platinum Mine

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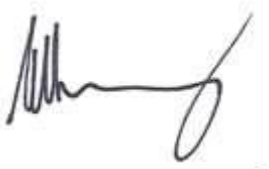

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EXECUTIVE SUMMARY

PROJECT BACKGROUND

Rustenburg Platinum Mine (RPM), a member of the Anglo American Platinum (AAP) group of companies, operates the Mogalakwena Mine, a platinum group metals (PGM) mining and processing operation located approximately 20 km north-west of the town of Mokopane, in the Modimolle Magisterial District, Limpopo Province. The Mogalakwena Mine operations and processing activities have expanded considerably since operations began in 1992. An initial environmental management plan (EMP) in support of the mine establishment, was compiled in 1991 (by Johannesburg Consolidated Investment (JCI) Limited) in terms of the Environmental Conservation Act (Act No. 73 of 1989) (ECA) and the Mines and Works Act (Act No. 27 of 1956).

Subsequent to 1991, there have been several environmental authorisations (EAs) and Environmental Management Programmes (EMPrs) developed and approved to cater for additional mining and processing activities, in line with the expansion of mine operations. In 2020, the Limpopo Regional Office of the Department of Mineral Resources and Energy (DMRE) approved an Integrated Environmental Authorisation (IEA) application for the Mogalakwena Mine Expansion EMPr Amendment Project (SRK Consulting, 2019). This IEA catered for the consolidation all EMPrs which fell within the Mogalakwena Mine Mining Right area, so as to allow for a greater level of management measures and monitoring reporting requirements between the different EMPrs. The Mogalakwena Mine currently operates under two Water Use Licences (WULs), approved EAs and Environmental Management Programmes (EMPrs).

The EAs relevant to the current application process are listed below (full copies are included as Appendix A: Existing Authorisations):

- An Integrated Environmental Authorisation (IEA) for the Mogalakwena Mine Expansion Project EMPr Amendment Project (for the expansion of existing mine operations and the addition of infrastructure to improve production capacity). Approved on 23 August 2020.
- Amendment of the EA for the Installation of a Hydrogen Fuel Generation and Photovoltaic Plant as well as the use of Hydrogen Fuel Cell Technology at Mogalakwena Mine as part of the Anglo American's Proof of Concept Studies and Carbon Footprint Reduction Strategy. Approved on 17 March 2020 (Authorisation reference LP30/5/1/2/3/2/1(050)EM)) by the Limpopo Regional Office of the DMRE.

AAP has implemented the nuGen^{TM} Zero Emission Haulage Solution (ZEHS) which aims at providing end-to-end integrated green hydrogen production, fuelling, and haulage systems. The nuGen^{TM} ZEHS technology was trialled at the Mogalakwena Mine through the development of a pilot hydrogen fuel production plant (referred to as the Proof of Concept Plant (PoC)). AAP would now like to expand the PoC Plant driven by the success of their pilot hydrogen fuel production operations. The proposed expansion of the PoC Plant comprises of the development of additional refuelling and distribution components to supply three additional mine haul trucks with hydrogen. This expansion is referred to as the Hydrogen Production Development Platform (PDP) (the Project) and will also include an increase in capacity of hydrogen storage (fixed and mobile storage).

SUMMARY OF AUTHORISATION REQUIREMENTS

Before AAP can commence with the Project, an EA application made in terms of the National Environmental Management Act (No 107 of 1998) (NEMA) and the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), for activities listed under the EIA Regulations Listing Notices of 2014 is required. A pre-application meeting was held with the Limpopo Regional Office of the DMRE on 07 April 2022, during which the Project's authorisation requirements were discussed. The DMRE advised that the Project will require a further authorisation to the Amended EA (authorisation reference LP30/5/1/2/3/2/1(050)EM) because the Project will result in a change of scope, whereby an activity contained in the EIA Regulations Listing Notice 1 of 2014 is triggered. As such, the NEMA EIA Regulations 2014 (as amended) require that a Basic Assessment (BA) process be undertaken, to inform authority consideration of the application. The application is being made to the Limpopo Regional Office of the DMRE.

SLR Consulting (Africa) (Pty) Ltd (SLR), an independent firm of Environmental Assessment Practitioners (EAPs), has been appointed by AAP to manage this BA Process.

OPPORTUNITY FOR COMMENT

The BAR and EMPr (English), and Non-Technical Summary (NTS) (English and Sepedi) are available for public review and comment period from 2 August 2022 – 2 September 2022. All registered I&APs were notified on the 1 August 2022, of the public review period. Notification was made by e-mails; text messages and notification letters were sent via post to I&APs who did not provide e-mail and mobile details.

Full copies of the BAR and a NTS are available on the SLR website https://www.slrconsulting.com/en/public-documents and the SLR data-free website https://slrpublicdocs.datafree.co/en/public-documents/. Hard copies of the BAR and EMPr are available for review at the following locations:

- Mogalakwena Local Library; and the
- Machikiri Community Hall.

SUMMARY OF IDENTIFIED IMPACTS AND SIGNIFICANCE

The potential impacts associated with the Project activities and infrastructure were rated as per the methodology outlined in Section 6.12. A summary of the identified impacts is provided in the table below.

Aspect	Potential Impact	Impact significance	
		Unmitigated	Mitigated
Geology	Loss and sterilisation of mineral resources.	Insignificant	
Topography	Altering topography.	Insignificant	
	Hazardous excavations resulting in safety risks to third parties and animals.	Insignificant	
Soil and land capability	Loss of soil resources through physical disturbance and contamination.	Very low	Insignificant
Biodiversity	Loss of terrestrial habitat and biodiversity through physical disturbance.	Insignificant	

Aspect	Potential Impact	Impact significance	
		Unmitigated	Mitigated
Surface water resources	Contamination of surface water resources.	Medium	Very low
	Alteration of natural drainage patterns.	Medium	Insignificant
Groundwater	Contamination of groundwater resources.	Medium	Very low
Air quality	Air pollution.	Very low	Insignificant
Noise	Increase in disturbing noise levels affecting sensitive receptors.	Insignificant	Insignificant
Visual	Negative visual views (construction and decommissioning).	Insignificant	Insignificant
	Negative visual views (closure).	Very low	Insignificant
Traffic	Road safety impacts.	Low	Insignificant
	Influence on road capacity and condition.	Very low	-
Cultural/heritage and palaeontological resources	Damage or loss of cultural, heritage and paleontological resources through physical disturbance.	Insignificant	Insignificant
Socio-economic	Inward migration.	Insignificant	Insignificant
	Positive economic impact (construction).	Positive medium	Not applicable
	Positive economic impact (operation).	Positive low	
Land Use	Change in land use.	Insignificant	Insignificant

ENVIRONMENTAL STATEMENT

The assessment of the Project presents the potential for negative impacts to occur (in the unmitigated scenario in particular) on the biophysical, cultural/heritage and socio-economic environments, both on the Project footprint and in the surrounding area. With the implementation of management actions, these potential impacts can be prevented or reduced to acceptable levels. It follows that provided the EMPr is effectively implemented, there is no reason from a biophysical, cultural/heritage or socio-economic standpoint why the Project should not proceed.

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
AAP	Anglo American Platinum
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act (No. 43 of 1983)
CBA	Critical Biodiversity Areas
CRR	Comments and Responses Report
BA	Basic Assessment
BAR	Basic Assessment Report
DARLRRD	Department of Agriculture, Land Reform and Rural Development
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DMR	Department of Mineral Resources
DMRE	Department of Mineral Resources and Energy
DoE	Department of Energy
DoT	Department of Transport
DSI	Department of Science and Innovation
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act (No. 73 of 1989)
EDL	Ephemeral Drainage Lines
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme Report
EN	Endangered
ERA	Electricity Regulation Act (No. 4 of 2006)
ESA	Ecological Support Areas
ESIA	Environmental and Social Impact Assessment
FEPA	Freshwater Ecosystem Priority Areas
GA	General Authorisation
GDP	Gross Domestic Product
GIIP	Good International Industry Practice
GHG	Greenhouse gas
GN	Government Notice
GNR	Government Notice Regulation

Acronym / Abbreviation	Definition
GWh	Gigawatt hours
ha	Hectares
HCCT	High Capacity Tube Trailer
HFCT	Hydrogen and Fuel Cell Technologies
HIA	Heritage Impact Assessment
HRS	Hydrogen Refuelling System
HSA	Hazardous Substances Act (No. 15 of 1973)
HSRM	Hydrogen Society Roadmap
I&APs	Interested and Affected Parties
IAIAsa	International Association of Impact Assessment South Africa
ICAO	International Civil Aviation Organisation
ICASA	Independent Communications Authority of South Africa
IDP	Integrated Development Plan
IEA	Integrating Environmental Authorisation
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IPP	Independent Power Producers
IRP	Integrated Resources Plan
LED	Local Economic Development
LEDET	Limpopo Department of Economic Development, Environment and Tourism
LDP	Limpopo Development Plan
LM	Local Municipality
LoM	Life of Mine
MAR	Mean Annual Runoff
MES	Minimum National Emission Standards
MLM	Mogalakwena Local Municipality
MM	Mogalakwena Mine
MNC	Mogalakwena North Concentrator
MPRDA	Mineral and Petroleum Resources Development Act
MR	Mining Right
MRA	Mining Right Area
MSC	Mogalakwena South Concentrator
MWh	Megawatt hour
NAAQS	National Ambient Air Quality Standards
NDC	Nationally Determined Contribution
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)

Acronym / Abbreviation	Definition
NEM:BA	National Environmental Management: Biodiversity Act (No. 10 of 2004
NEM:WA	National Environment Management: Waste Act (No. 59 of 2008)
NEMA	National Environmental Management Act (No. 107 of 1998)
NFA	National Forests Act (No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act (No. 25 of 1999)
NSSD	National Strategy for Sustainable Development
NVFA	National Veld Forest Fire Act (No. 10 of 1998)
NWA	National Water Act (No. 36 of 1998)
OHT	Overhead Transmission Lines
ORM	Operational Risk Management
PAPs	Project Affected Persons
PDP	Production Development Platform
PES	Present Ecological State
PGMs	Platinum Group Metals
PoC	Proof of Concept
PPA	Power Purchase Agreement
PPP	Public Participation Process
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producers Procurement Programme
RDI	Research Development and Innovation
RMIPPPP	Risk Mitigation Independent Power Producer Procurement Programme
RPM	Rustenburg Platinum Mines
TOPS	Threatened or Protected Species
SACAA	South African Civil Aviation Authority
SA CARs	South African Civil Aviation Regulations
SA CATs	South African Civil Aviation Technical Standards
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SALA	Subdivision of Agricultural Land Act (No. 70 of 1970)
SAMPI	South African Multidimensional Poverty Index
SANBI	South African National Biodiversity Act
SANEDI	South African National Energy Development Institute
SANS	South African National Standards
SANRAL	South African National Road Agency Limited
SAPVIA	South African Photovoltaic Industry Association

Acronym / Abbreviation	Definition
SARPs	Standard and Recommended Practices
SAWS	South African Weather Services
SDF	Spatial Development Framework
SDGS	Sustainable Development Goals
SIPs	Strategic Integrated Projects
SLR	SLR Consulting (Africa) Pty Ltd
SLP	Social and Labour Plan
SPLUMA	Spatial Planning and Land Use Management Act (No. 6 of 2013)
SWSAs	Strategic Water Source Areas
TA	Traditional Authority
TSF	Tailings Storage Facilities
UNCED	United Nations Conference on Environment and Development
UNFCCC	United Nations Framework Convention on Climate Change
UN	United nations
VU	Vulnerable
WESSA	Wildlife and Environment Society of South Africa
WMA	Water Management Area
WRD	Waste Rock Dump
WUL	Water Use License
ZEHS	Zero Emission Haulage Solution

Proposed Development of a Hydrogen Production Development Platform at the Mogalakwena Platinum Mine

INTRODUCTION

Project background

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The Mogalakwena Mine operations and processing activities have expanded considerably since operations began in 1992. An initial environmental management plan (EMP) in support of the mine establishment, was compiled in 1991 (by Johannesburg Consolidated Investment (JCI) Limited) in terms of the Environmental Conservation Act (Act No. 73 of 1989) (ECA) and the Mines and Works Act (Act No. 27 of 1956). Subsequent to 1991, there have been several environmental authorisations (EAs) and Environmental Management Programmes (EMPrs) developed and approved to cater for additional mining and processing activities, in line with the expansion of mine operations. In 2020, the Limpopo Regional Office of the Department of Mineral Resources and Energy (DMRE) approved an Integrated Environmental Authorisation (IEA) application for the Mogalakwena Mine Expansion EMPr Amendment Project (SRK Consulting, 2019). This IEA catered for the consolidation all EMPrs which fell within the Mogalakwena Mine Mining Right area, so as to allow for a greater level of management measures and monitoring reporting requirements between the different EMPrs. The Mogalakwena Mine currently operates under two Water Use Licences (WULs), approved EAs and Environmental Management Programmes (EMPrs).

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AAP has implemented the nuGen™ Zero Emission Haulage Solution (ZEHS) which aims at providing end-to-end integrated green hydrogen production, fuelling, and haulage systems, in an effort to become carbon neutral, across AAP mine sites. The nuGen™ ZEHS technology was trialled at the Mogalakwena Mine through the development of a pilot hydrogen fuel production plant (referred to as the Proof of Concept Plant (PoC)). The PoC Plant is located on the Farm Zwartfontein 818 LR and includes three main components; Hydrogen Generating Plant; Refuelling system; and Solar Photovoltaic (PV) Plant and associated infrastructure.

Driven by the successful operation of the retrofitted hydrogen fuel cell and battery-powered module onto a 930 E mine haul truck (in conjunction with the other components of the PoC Plant), AAP would now like to expand the PoC Plant to demonstrate the rapid refuelling of the mine haul truck which will include transportation of hydrogen via high capacity tube trailers and increased hydrogen storage on the mine haul truck (due to the high pressure refuelling). This rapid refuelling will maximize the mine haul trucks availability. This expansion is referred to as the Hydrogen Production Development Platform (PDP) (the Project) and will also include an increase in capacity of hydrogen storage (fixed and mobile storage) from the current capacity of 78 m^3 (at the PoC Plant) to an estimated total hydrogen storage capacity of 262.38 m^3.

Summary of authorisation requirements

Before AAP can commence with the Project, an EA application made in terms of the National Environmental Management Act (No 107 of 1998) (NEMA) and the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), for activities listed under the EIA Regulations Listing Notices of 2014 is required. A pre-application meeting was held with the Limpopo Regional Office of the DMRE on 07 April 2022, during which the Project's authorisation requirements were discussed. The DMRE advised that the Project will require a further authorisation to the Amended EA (authorisation reference LP30/5/1/2/3/2/1(050)EM) because the Project will result in a change of scope, whereby an activity contained in the EIA Regulations Listing Notice 1 of 2014 is triggered. As such, the NEMA EIA Regulations 2014 (as amended) require that a Basic Assessment (BA) process be undertaken, to inform authority consideration of the application. The application is being made to the Limpopo Regional Office of the DMRE.

SLR Consulting (Africa) (Pty) Ltd (SLR), an independent firm of Environmental Assessment Practitioners (EAPs), has been appointed by AAP to manage this BA Process.

Purpose of this report

This Basic Assessment Report (BAR) is compiled in accordance with Appendix 1 of the EIA Regulations 2014 (as amended) and will be distributed to Interested and Affected Parties (I&AP) for review and comment as part of the BA process undertaken for the Project. This BAR provides a description of the Project and the affected environment, summarises the BA process undertaken to date, identifies and assesses the key impacts resulting from the Project and presents management and mitigation measures that are recommended to enhance benefits and limit negative impacts. The specialist findings and other relevant information are integrated into this BAR, which includes an EMPr.

The purpose of the BAR is to present the afore-mentioned information in a clear and understandable format suitable for easy interpretation by I&APs and provide an opportunity for I&APs to comment on all aspects of the Project, as well as findings of the impact assessment. All comments received during the public review and comment period will be captured and considered during the BA process. These comments will be addressed and included in the updated BAR, which will submitted to the DMRE for decision-making.

Terms of reference

The terms of reference for the EA process are to:

- Undertake a BA process for the listed activity triggered by the Project in terms of the EIA Regulations 2014, the BA process will include any scope changes from the EA amendment as authorised;
- Ensure that the BA process for the Project is undertaken in an open, participatory manner that ensures all potential issues of concern and their associated impacts are identified;
- Undertake a formal public participation process (PPP), which includes the distribution of information to I&APs and provide an opportunity for I&APs to raise any issues/concerns arising from the Project, as well as an opportunity to comment on all documentation arising from the BA process; and
- Integrate all information into a BAR to allow for an informed decision to be taken on the Project by the DMRE.

Stakeholder engagement

In accordance with Appendix 1 of the EIA Regulations 2014 the objectives of the BA process are to:

- Identify the policies and legislation relevant to the activity and determine how the activity complies and responds to the policy and legislative context;
- Present the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity, technology and sites related to the Project;
- Undertake an impact assessment, inclusive of cumulative impacts, to determine the biophysical, cultural/heritage and socio-economic sensitivity of the project sites and assess the nature, significance, consequence, extent, duration, and probability of the impacts occurring;
- Assess the degree to which impacts can be reversed, may cause irreplaceable loss of resources, and can be avoided, managed, or mitigated; and
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

Opportunity to comment

The BAR and EMPr (English), and Non-Technical Summary (NTS) (English and Sepedi) are available for public review and comment period from 2 August 2022 – 2 September 2022. All registered I&APs were notified on the 1 August 2022, of the public review period. Notification was made by e-mails; text messages and notification letters were sent via post to I&APs who did not provide e-mail and mobile details.

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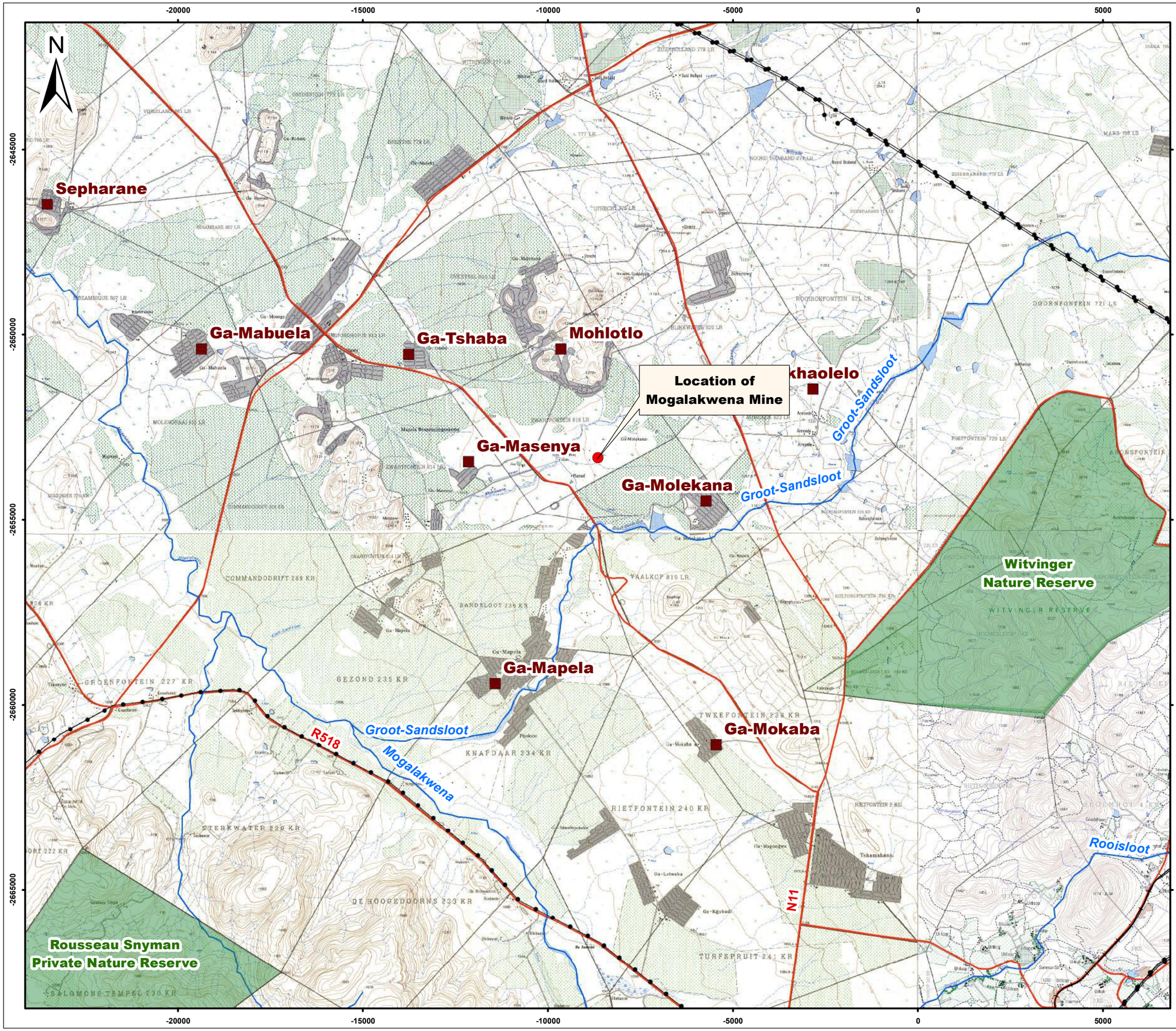

Legend

- Towns / Villages
- Roads
- Power Lines
- Railway
- Rivers
- South African Protected Areas

0 1 000 2 000 Meters

Scale: 1:100 000 @ A3

Projection:Transverse Mercator

Datum: Hartebeeshoek, Lo 29

ANGLO-AMERICAN

Figure 0-1: Regional Setting

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720.01145.00009

2022/04/11

Legend

- Towns / Villages
- Roads
- Power Lines
- Rivers
- Dams
- South African Protected Areas

0 1 000 2 000 Meters

Scale: 1:62 500 @ A3

Projection:Transverse Mercator

Datum: Hartebeeshoek, Lo 29

ANGLO-AMERICAN

Figure 0-2: Local Setting

SLR Consulting (South Africa) (Pty) Ltd
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720.01145.00009

2022/05/26

Structure of this report

This BAR has been prepared in accordance with the DMRE BAR template format and Appendix 1 and Appendix 4 of EIA Regulations 2014 , the contents of which are outlined below.

Table 0-1: Structure of the BAR

BAR requirements as per the DMRE template	BAR requirements as per the EIA Regulations 2014 (as amended)	Reference in the report
Part A of DMRE report template	**Appendix 1 of the NEMA EIA Regulations**	**Section/Appendix**
Details of the Environmental Assessment Practitioner.	Details of the EAP who prepared the report.	Section 1.1.
Expertise of the EAP.	Details of the expertise of the EAP, including curriculum vitae.	Section 1.2. Appendix B: Details of the Project Team.
Location of overall activity.	The location of the activity, including - the 21-digit Surveyor General code of each cadastral land parcel. Where available the physical address and farm name. Where the required information is not available, the coordinates of the boundary of the property or properties.	Section 2.1.
Locality plan.	A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is a linear activity, a description, and coordinates of the corridor in which the proposed activity or activities is to be undertaken or on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Section 2.1.
Description of the scope of the proposed overall activity.	A description of the scope of the proposed activity, including all listed and specified activities triggered. A description of the activities to be undertaken, including associated structure and infrastructure.	Section 3.
Policy and legislative context.	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.	Section 4.
Need and desirability of the proposed activity.	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Section 0.

BAR requirements as per the DMRE template	BAR requirements as per the EIA Regulations 2014 (as amended)	Reference in the report
Motivation for the overall preferred site, activities, and technology alternative.	A motivation of the preferred development footprint within the approved site including.	Section 0.
A full description of the process followed to reach the proposed development footprint within the site.	A full description of the process followed to reach the proposed development footprint within the approved site.	Section 0.
Details of the development footprint alternatives considered.	Details of all the alternatives considered.	Section 0.
Details of the Public Participation Process followed.	Details of the Public Participation Process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs.	Section 6.5.
Summary of issues raised by I&APs.	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	Section 6.6.
Environmental attributes associated with the alternatives.	The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 6.7.
Impacts and risks identified including the nature, significance, consequence, extent, duration, and probability of the impacts including the degree of the impacts.	The impacts and risks identified, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources, and can be avoided, managed, and mitigated.	Section 6.11.
Methodology used in determining the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks.	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.	Section 6.12.
The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternative will have on the environment and the community that may be affected.	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 6.13.
The possible management actions that could be applied and the level of risk.	The possible management actions that could be applied and level of residual risk.	Section 6.14.
Motivation where no alternative sites were considered.	The outcome of the site selection matrix. If no alternatives, including alternative	Section 6.15.

BAR requirements as per the DMRE template	BAR requirements as per the EIA Regulations 2014 (as amended)	Reference in the report
	locations for the activity were investigated, the motivation for not considering such.	
Statement motivating the alternative development location within the overall site.	A concluding statement indicating the preferred alternatives, including preferred location within the approved site.	Section 6.16.
Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (in respect of the final site layout) through the life of the activity.	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structure and infrastructure will impose on the preferred location through the life of the activity including a description of all environmental issues and risks that were identified during the environmental impact assessment process and an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of management actions.	Section 7.
Assessment of each identified potentially significant impact and risk.	An assessment of each identified potentially significant impact and risk including cumulative impacts, the nature, significant and consequence of the impact and risk, the extent and duration of the impact and risk, the probability of the impact and risk occurring, the degree to which the impact can be reversed, the degree to which the impact and risk may cause irreplaceable loss of a resources and the degree to which the impact and risk can be mitigated.	Section 8. Appendix D: Detailed Assessment of Potential Impacts.
Summary of specialist reports.	Where applicable the summary of the findings and recommendations of any specialist report complying with Appendix 6 of these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.	Section 9.
Environmental impact statement.	An environmental impact statement which contains a summary of the key findings of the environmental impact assessment, a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and a summary of the positive and negative	Section 10.

BAR requirements as per the DMRE template	BAR requirements as per the EIA Regulations 2014 (as amended)	Reference in the report
	impacts and risks of the proposed activity and identified alternatives.	
Proposed impact management objectives and the impact management outcomes for inclusion in the Environmental Management Programme Report .	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr.	Section 11.
Aspects for inclusion as conditions of authorisation.	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	Section 12.
Description of any assumptions, uncertainties, and gaps in knowledge.	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and management actions proposed.	Section 13.
Reasoned opinion as to whether the proposed activity should or should not be authorised.	Reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Section 14.
Period for which the EA is required.	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation (EA) is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised.	Section 15.
Undertaking.	An undertaking under oath or affirmation by the EAP in relation to the correctness of the information provided in the reports, the inclusion of comments and inputs from stakeholders and I&APs, the inclusion of inputs and recommendations from the specialist reports where relevant and any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.	Section 19.
Financial provision.	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.	Section 26.

BAR requirements as per the DMRE template	BAR requirements as per the EIA Regulations 2014 (as amended)	Reference in the report
Specific information required by the competent authority (CA).	Any specific information required by the CA.	Section 29.
Other matter required in terms of section 24(4)(a) and (b) of the Act.	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	Section 0.
Part B of the DMRE report template	**Appendix 4 of the NEMA regulations**	**Section/Appendix**
Details of EAP.	Details of the EAP who prepared the EMPr and the expertise of that EAP to prepare the EMPr, including curriculum vitae.	Section 20.
Description of the aspects of the activity.	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the Project description.	Section 21.
Composite map.	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers.	Section 22.
Description of impact management objectives including management statements.	A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including planning and design, pre-construction activities, construction activities, rehabilitation of the environment after construction and where applicable post closure; and where relevant, operation activities.	Section 23.
Impacts to be mitigated in their respective phases.	-	Section 23.4
Impact management outcomes.	A description and identification of impact management outcomes required for the aspects contemplated in paragraph.	Section 24.
Impact management actions.	A description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes be achieved, and must, where applicable, include actions to avoid, modify, remedy, control or stop any action, activity or process which causes	Section 25.
Financial provision.		Section 26.

BAR requirements as per the DMRE template	BAR requirements as per the EIA Regulations 2014 (as amended)	Reference in the report
	pollution or environmental degradation; comply with any prescribed environmental management standards or practices; comply with any applicable provisions of the Act regarding closure, where applicable comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	
Mechanism for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon.	The method of monitoring the implementation of the impact management actions.	Section 27.
	The frequency of monitoring the implementation of the impact management actions.	
	An indication of the persons who will be responsible for the implementation of the impact management actions.	
	The time periods within which the impact management actions must be implemented.	
	The mechanism for monitoring compliance with the impact management actions.	
	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	
Environmental Awareness Plan.	An environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work; and risks must be dealt with in order to avoid pollution or the degradation of the environment.	Section 28.
Specific information required by the competent authority	Any specific information that may be required by the CA.	Section 29.
Undertaking.	-	Section 30.

PART A – SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

1. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

1.1 DETAILS OF THE PROJECT TEAM

The details of the EAP and specialist consultants that were involved in the preparation of this Basic Assessment Report (BAR) and Environmental Management Programme Report (EMPr) are provided in Table 1-1 below.

Table 1-1: Details of the EAP and Specialist Consultants

SLR contact details		
Organisation	SLR Consulting (South Africa) (Pty) Ltd	
Postal address	PO Box 1596, Cramerview, 2060	
Tel No.	(011) 467 2075	
E-mail address	mmedallie@slrconsulting.com	
Environmental Assessment Practitioner (EAP)		
Name	**Organisation**	**Responsibility on the Project**
Stuart Heather - Clark	SLR	Project director and EAP.
Marline Medallie	SLR	Project manager, review and oversight of public participation and authorisation process.
Mavisha Nariansamy	SLR	Assistant project manager, report author, review of specialist reports, public participation process.
Matthew Hemming	SLR	Technical review.
Specialist Consultants		
Name	**Organisation**	**Specialist Input**
Dr Ilse Aucamp	Equispectives Research and Consulting Services	Socio-Economic
Doug McCulloch	SLR	Wetland Assessment Terrestrial Biodiversity
Jaco van de Walt	Beyond Heritage	Heritage and Palaeontology
Karen Loukes	SLR	Aquatic Biodiversity

Neither SLR nor any of the specialists involved in the BA process have any interest in the Project other than fair payment for consulting services rendered as part of the BA process. An undertaking by SLR is provided in Section 19. Declarations of specialist independence are included as part of the specialist reports as provided in Appendix F: Terrestrial Biodiversity - Appendix J: Social Compliance .

1.2 EXPERTISE OF THE EAP

Stuart Heather – Clark has over 24 years of environmental and social consulting experience in Africa. Having worked on over 130 development projects in Africa, his key strength is identifying and managing ESG risks for major capital projects from the concept phase through to the pre-feasibility, feasibility, and implementation phases. Through leading Environmental & Social Screening Studies, Environmental & Social Impact Assessments and Environmental & Social Due Diligences for major capital project in over 13 African countries; Stuart has developed a deep appreciation of key sustainability challenges facing development in Africa. He has excellent project management skills with the ability to manage projects from the concept phase through to project completion. Stuart has worked for and with a number of IFI's, DFI's and PE firms to identify and managing ESG risks of their investments in Africa. He has an integral knowledge of the Equator Principles and IFC Performance Standards and understands the expectations of lenders and financial institutions when it comes to managing ESG risks. Stuart has worked across various sectors including O&G, mining, infrastructure, and power. Over the past ten years he has focussed on the power sector leading projects for wind farms, solar PV plants, hydropower plants and gas to power plants. More recently he has advised various clients on the regulatory challenges for green hydrogen projects in Southern Africa. Stuart is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA) and is a member of the International Association of Impact Assessment South Africa (IAIAsa) and the International Association for Impact Assessment (IAIA International).

Marline Medallie holds a Master of Science in Botany and has over 13 years of experience in the field of environmental management and consulting primarily in the mining sector and more recently self-generation renewable energy in the mining sector. Marline has worked on projects throughout the project's lifecycle from site identification through conceptual to pre-feasibility and feasibility, to operation and closure for the mining, power, infrastructure and built environment sectors. This includes conducting site identification, screening and scoping studies, baseline studies and specialist management, BAs and EIAs, management planning and implementation including Integrated Water and Wastewater Management Plans, as well as public participation processes. Marline has worked extensively across South Africa and her mining experience constitutes coal mines (Mpumalanga & KwaZulu-Natal), diamond mines (Western Cape & Lesotho), gold mines (Free State, North West & Gauteng), iron ore mines (Northern Cape), manganese mines (Northern Cape), zinc mine (Northern Cape) and platinum mines (Limpopo).

Mavisha Nariansamy holds a Master of Environmental Management and a Post graduate diploma in Environmental Engineering. She has approximately 8 years of experience in the environmental consulting field gaining experience in the mining, power, linear infrastructure, and water sectors. Her experience includes the management and execution of Environmental Authorisation processes, compilation of management plans, compliance auditing. Mavisha is a registered Professional Natural Scientist (Environmental Science) with the South African Council for Natural Scientific Professions (SACNASP) and is a member of the IAIAsa.

Matthew Hemming is the Africa Infrastructure Sector Lead at SLR. Matthew holds a Masters' Degree in Conservation Biology and has more than 16 years' experience as an Environmental Assessment Practitioner within the environmental consulting field. Matthew is well versed in the authorisation and compliance requirements of all South African environmental legislation. He has expertise in a wide range of environmental disciplines, including EIAs, EMPs, Environmental Planning and Review and Public Consultation. Matthew is a registered EAP with EAPASA, is a registered Professional Natural Scientist (Environmental Science) with SACNASP and is a member of IAIAsa.

Relevant curricula vitae (including proof of registrations) are attached in Appendix B: Details of the Project Team.

2. LOCATION OF THE ACTIVITY

2.1 LOCATION OF THE OVERALL ACTIVITY

A description of the properties on which the Project is located is provided in Table 2-1 below.

Table 2-1: Description of the property

Description	Details
Farm Name	Farm Zwartfontein 818 LR (owned by the Mapela Traditional Authority - held in Trust by the National Government of the Republic of South Africa)
Physical address	Sandsloot Farm, N11 Groblers Bridge Road, Mokopane
Magisterial district	Modimolle Magisterial District
Distance and direction from nearest town	Mogalakwena Platinum Mine (Mogalakwena Mine) is located approximately 20 km north-west of the town of Mokopane. The regional and local setting is illustrated in Figure 0-1 and Figure 0-2 respectively.
21 digit Surveyor General Code for each farm portion	T0LR00000000081800000
Co-ordinates	The Project layout is illustrated in Figure 3-4. The co-ordinates of six points along the perimeter of the project area are presented below. **Latitude** **Longitude** A 23° 57' 59.55" S 28° 55' 28.40" E B 23° 58' 6.34" S 28° 55' 20.82" E C 23° 58' 9.09" S 28° 55' 20.70" E D 23° 58' 10.18" S 28° 55' 21.81" E E 23° 58' 11.19" S 28° 55' 22.23" E F 23° 58' 9.05" S 28° 55' 30.92" E
Application area (ha)	8 ha
Water catchment and management area	• Quaternary catchment A61G of the Mogalakwena River. • Limpopo Water Management Area (WMA).

2.2 LOCALITY MAP

The regional and local settings are illustrated in Figure 0-1 and Figure 0-2 respectively.

3. DESCRIPTION OF THE SCOPE OF THE ACTIVITY

The Project information presented in this section was sourced from the technical design and engineering input on the proposed activities provided by AAP, specialist investigations undertaken in support of this BA process (see Appendix F: Terrestrial Biodiversity - Appendix J: Social Compliance) and site observations made by the SLR project team.

Information on current activities at Mogalakwena Mine, which is provided for context, was sourced from the EIA and EMPr Report compiled for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019), the Environmental Impact Report (EIR) compiled for the Photovoltaic Solar Energy Facility at the Mogalakwena Mine (Zutari , 2021) and the motivation letter submitted to the DMRE in support of the non-substantive amendment for the installation of a hydrogen fuel generation and Photovoltaic plant, as well as the use of hydrogen fuel cell technology at Mogalakwena Mine (SRK Consulting, 2019). It is important to note that the activities associated with the Project will not alter or affect approved mining and processing methods of the Mogalakwena Mine.

3.1 OVERVIEW OF THE CURRENT MINING OPERATIONS

The Mogalakwena Mine is an open pit platinum mine located approximately 20 km north-west of the town of Mokopane in the Waterberg District Municipality and the Mogalakwena Local Municipality of Limpopo Province. The mine has been operational since 1992 and the current life of mine (LoM) is estimated to be beyond 2040. However, it is estimated that the reserves within the Mining Right area could extend the mining operations for a further period of approximately 100 years. The mining operations are undertaken 365 days per year, 24 hours per day.

The Mogalakwena Mine exploits platinum group metals (PGMs) and various base metals from the Platreef orebody. The mineral exploitation is undertaken via five open pits, namely the Sandsloot, Zwartfontein, South, Central and North Pits. Underground mining could supplement the open pit mining in future with initial access identified via decline shafts in the footwall of the Sandsloot Pit. The mined ore is transported by haul trucks to the gyratory crusher and by means of conveyors to the mineral processing plant, as well as within the plant. Crushing is achieved in three phases using a gyratory crusher as a primary crusher in an open circuit, followed by secondary and tertiary crushing with associated screening. Low grade ore and ore pebble stockpiles are situated at various locations on the mine. Ore stockpiles are situated in various locations on the farms Overysel 815 LR, Vaalkop 819 LR, Zwartfontein 818 LR and Sandsloot 236 KR. Mineral processing is undertaken at two mineral process plants, namely the Mogalakwena North Concentrator (MNC) and Mogalakwena South Concentrator (MSC) Plants. The plants have a current combined capacity of 1 185 ktpm. The final concentrate is dewatered prior to dispatch and transport off site (via road) to the smelter in Polokwane metallurgical complex for smelting.

Mineral waste management consists of the operation of Tailings Storage Facilities (TSF) for process tailings waste and waste rock. There are three operational TSF on the mine. These are the Vaalkop TSF (located on farms Zwartfontein 818 LR and Vaalkop 819 LR); Blinkwater 1 TSF (located on farm Blinkwater 820 KR) and extension to Blinkwater 2 TSF (not yet constructed). The Vaalkop TSF is currently under care and maintenance (with no future plans for operation). Tailings from the MNC and MSC Plant are pumped to the Blinkwater 1 TSF. The waste rock from mining operations are deposited on numerous, designated Waste Rock Dumps (WRD) located on farms Overysel 815 LR (WRD W02 to the west of the North pit and dump W020 to the East of the North pit), Zwartfontein 818 LR (WRD W01 situated to the northeast of South pit), Sandsloot 236 KR (WRD RS3 situated to the West of the Sandsloot pit and a portion of W07 situated to the south of Sandsloot Pit), Vaalkop 819 LR (WRD W07 located to the east of the Sandsloot Pit) and Gillimberg 861 LR (Witrivier WRD which is not yet developed).

The approved mine infrastructure and support services are listed in Table 3-1 below.

Table 3-1: Approved infrastructure and/or support services

Concentrator complexes	
South Concentrator (MSC) Plant	North Concentrator (MNC) Plant
Mining and related infrastructure	
Tailings Storage Facilities: • Blinkwater 1 TSF (in operation) • Blinkwater 2 TSF (in operation) • Vaalkop TSF Complex (currently under care and maintenance)	Waste Rock Dumps
Surface conveyors	Oxidized dumps
Ore Stockpiles	Water management facilities (clean and dirty stormwater control infrastructure)
Topsoil and subsoil dumps	Return water dams
Water Supply facilities	
Potable water supply	Process water supply
Internal potable and process water supply pipelines	Sewage treatment plant
Support infrastructure and/or services	
Domestic, general, and hazardous waste disposal	Waste tyre and processing site
Roads	Change houses
Stores	Offices, boardrooms, and training centres
Workshops	Clinic
Security offices	Fuel/lube bays
Green/conservation areas	Dispatch and other supporting buildings

3.2 PROOF OF CONCEPT PLANT

3.2.1 Overview

AAP has committed to implementing initiatives to reduce their carbon emissions and use of non-renewable fossil fuel through strategic focus, driven by Smart Energy Initiatives (see Section 5.2.2). The nuGen™ ZEHS is one such initiative which aims at providing end-to-end integrated green hydrogen production, fuelling, and haulage systems, in an effort to become carbon neutral, across AAP mine sites. The nuGen™ ZEHS technology was trialled at the Mogalakwena Mine through the development of a pilot hydrogen fuel production plant (referred to as the Proof of Concept (PoC) Plant).

The main goal of the pilot Project was to produce a hydrogen fuel cell and battery-powered module which could be retrofitted on to a large mine haul truck (a 930E truck). Alongside re-equipping the truck with a hydrogen system, AAP also developed a hydrogen production, storage, and refuelling complex at Mogalakwena Mine that incorporates an electrolyser and a solar PV field to support the 24 hour operation of the haul truck. The Project components work in an interlinked manner, operating as a unit, and is referred to as the PoC Plant.

The PoC Plant was developed within the Mining Right area of Mogalakwena Mine, adjacent to the waste / bioremediation site footprint. A non-substantive amendment in terms of Regulation 29 of the EIA Regulations 2014 was submitted to the DMRE in support of the PoC Plant (The installation of a hydrogen fuel generation and Photovoltaic plant, as well as the use of hydrogen fuel cell technology at Mogalakwena Mine). The DMRE issued RPM with an approval on 17 March 2020 (DMRE reference LP30/5/1/2/3/2/1 (050) EM).

3.2.2 Components of the PoC Plant

The PoC Plant consists of three main components. An overview of the components is provided below:

Hydrogen Generating Plant

The Hydrogen Generating Plant consists of a complete hydrogen production system including an electrolyser, and auxiliary systems which include a water treatment unit, rectifier, a hydrogen purification unit, dryer, a compressor and controlling system amongst other components. One area of the plant involves the generation and cleaning of hydrogen gas whereas the other area involves the compression and cooling for dispensing of hydrogen gas to the truck. The hydrogen is generated through an electrolysis process by applying a direct current (DC) voltage across an anode and cathode in a solution of alkalized water and collected and processed further. The oxygen is allowed to ventilate to the atmosphere through a stack, at ambient pressures. From the electrolyser the hydrogen is processed through various elements including a dryer, a purifier, compressors, and storage tanks. The system operates at two pressures; the low-pressure of 30 bar as the generated gas is processed through the drying and purification equipment, while the second pressure before dispensing to the truck is approximately 350 bar.

The hydrogen plant was intended to generate hydrogen gas and store 1000 kg of the compressed gas at two different pressures, which is enough to refuel the single converted truck for 24 hours of mining production. The plant was sized to generate enough hydrogen for two trucks for 24 hours of running production shifts, when powered by Solar PV with a nominal 8 hours of sunlight. The current hydrogen storage for the PoC Plant is 78 m^3. Electricity for the hydrogen plant is utilised from the grid. The power obtained from the Solar PV Plant is used to supply power to auxiliary equipment.

Refuelling system

The refuelling system comprises a buffer tank separating the hydrogen generating plant and a hydrogen refuelling station. The refuelling station consists of a compressing system, storage tanks, as well as a pre-cooling and dispensing unit. The hydrogen gas is transported in the pipeline at low pressure followed by compression to a nominal pressure of 525 bar by the compressor and stored at the same pressure in a 200 kg storage tank. When required, the hydrogen passes through the pre-cooling unit where it is cooled to – 40 °C and is dispensed at 350 bar to the truck tanks through the hose and the nozzle of the four dispensers.

Solar Photovoltaic (PV) Plant

Electricity to power the PoC Project is sourced from the ESKOM grid. The Solar PV Plant generates 616 kWh of electricity which is used to supply energy to auxiliary equipment. The solar PV Plant consists of a Photovoltaic facility which includes mount structures, twenty-two 15 kW solar modules, cabling for both power and communication transmission and a 1 MVA step-up transformer. The total area covered by solar PV equipment and access pathways is approximately 900m^2.

An aerial view layout of the existing PoC Plant is shown below in Figure 3-1.

Figure 3-1: Aerial layout of the Proof of Concept Plant

(received from AAP, 2022)

3.3 DESCRIPTION OF THE PROPOSED ACTIVITIES

The successful operation of the retrofitted hydrogen fuel cell and battery-powered module onto a 930 E mine haul truck (in conjunction with the other components of the PoC Plant) was demonstrated at the Mogalakwena Mine on 6 May 2022. Driven by this success, and in line with the Smart Energy Initiatives, the PoC Plant requires expansion. The aim of this expansion is to test rapid refuelling of the truck and transportation of hydrogen via tube trailers, which once proven, will be rolled out as the preferred refuelling system at the Mogalakwena Mine. The expansion of the PoC Plant comprises of the development of additional refuelling and distribution components to supply three additional mine haul trucks with hydrogen. This expansion is referred to as the Hydrogen Production Development Platform (PDP) (the Project) and is described in further detail below.

3.3.1 Production Development Platform

3.3.1.1 Project overview

The aim of the Project is to rapidly refuel the mine haul trucks at high pressure and to ensure transportation of hydrogen via high capacity tube trailers to the mine pits. This will require the development of fixed high-pressure and mobile low-pressure hydrogen storage infrastructure/ facilities. The Project will ultimately connect the hydrogen production and mine haul truck application through the establishment of an Export-Transport-Refuel System (ETRS), using commercially available equipment. The total additional hydrogen storage required is approximately 184.38 m^3 (34,58 m^3 fixed and 149.8 m^3 mobile storage).

At a high level the ETRS will receive the hydrogen gas from the electrolyser system (a component of the PoC Plant) where it will be compressed and loaded to a high-capacity tube trailer system. The compressed hydrogen in the tube trailer will be transported to the designated dispensing location, within the footprint area, where the tube trailer will interface with the Hydrogen Refuelling System (HRS). At the refuelling station, the gas will be compressed further and transfill the hydrogen gas at the appropriate flow rate, temperature, and pressure to the fuel tank of the connected mine-haul truck. A process flow diagram of the Project is provided in Figure 3-2 below.

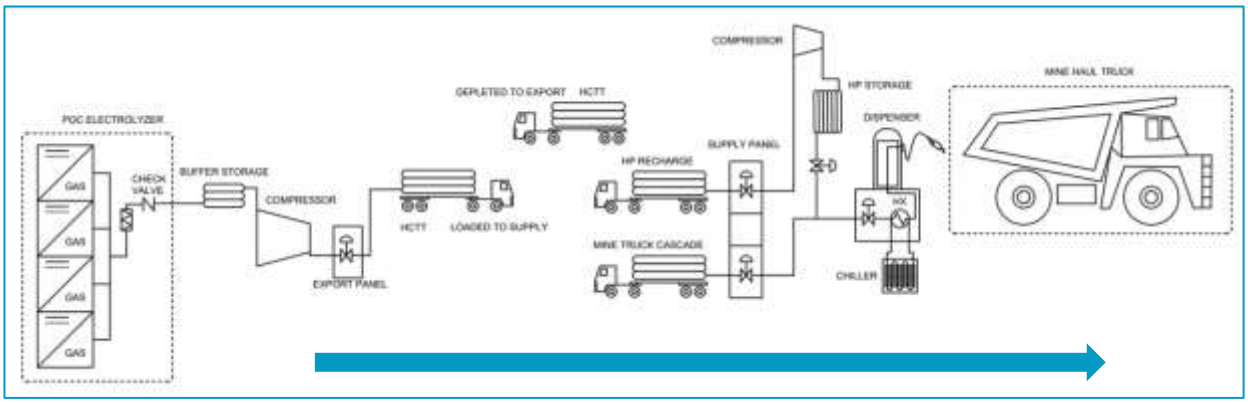

Figure 3-2: Process flow diagram of the Project

(Provided by LIFTE H2 Inc, 2022)

3.3.1.2 Project components

An overview of the Project components is provided below, and a preliminary 3D model for the Project is shown in Figure 3-3.

Export System

The Export System will receive hydrogen gas directly from the electrolyser via a pipeline. The Export System consists of an export panel which will load compressed hydrogen gas to a connected high-capacity tube trailer (HCTT). The HCTT will remain in position at the Export System during filling. Once the HCTT is filled with compressed gas, it will be disconnected from the Export System and transported to the hydrogen refuelling system for refuelling of the haul trucks. The Transport System will comprise of the following activities:

- the collection of a loaded HCTT from the Export System by means of a lorry;
- the transport and dropping off the loaded HCTT at the Hydrogen Refuelling System; and
- the delivery of empty HCTTs back to the Export System.

Hydrogen Refuelling System

The activities which will be undertaken at the HRS includes receiving compressed hydrogen gas from a loaded HCTT and processing and loading of the hydrogen gas to a mine-haul truck. The loaded HCTT will be positioned at the refuelling station supply panel and the lorry will be de-coupled and removed during refuelling of the mine haul truck. Hydrogen will be compressed to the required pressure during refuelling to the mine haul truck.

Storage of hydrogen gas

The fixed hydrogen storage will be located at the Buffer Storage located at the Export System (nominal working pressure storage) and the HRS (high pressure storage) and will be fastened to concrete foundations. A total of 5.78 m^3 (at 30 bar) and 28.8 m^3 (at 900 bar) will be required respectively. Mobile storage will be undertaken by the use of HCTTs, connected to either the Export System or HRS during normal operation. It is anticipated that four HCTTs will be used, and each HCTT will store up to approximately 1200 kg of hydrogen gas at pressure. The total quantity of mobile storage for the four HCTTs will be 149.8 m^3 (at 500 bar). The total additional storage of hydrogen required will be approximately 184.38 m^3. Given that the current and authorized, hydrogen storage capacity of the PoC Plant is 78 m^3, the Project will have a total combined hydrogen storage capacity of 262.38 m^3.

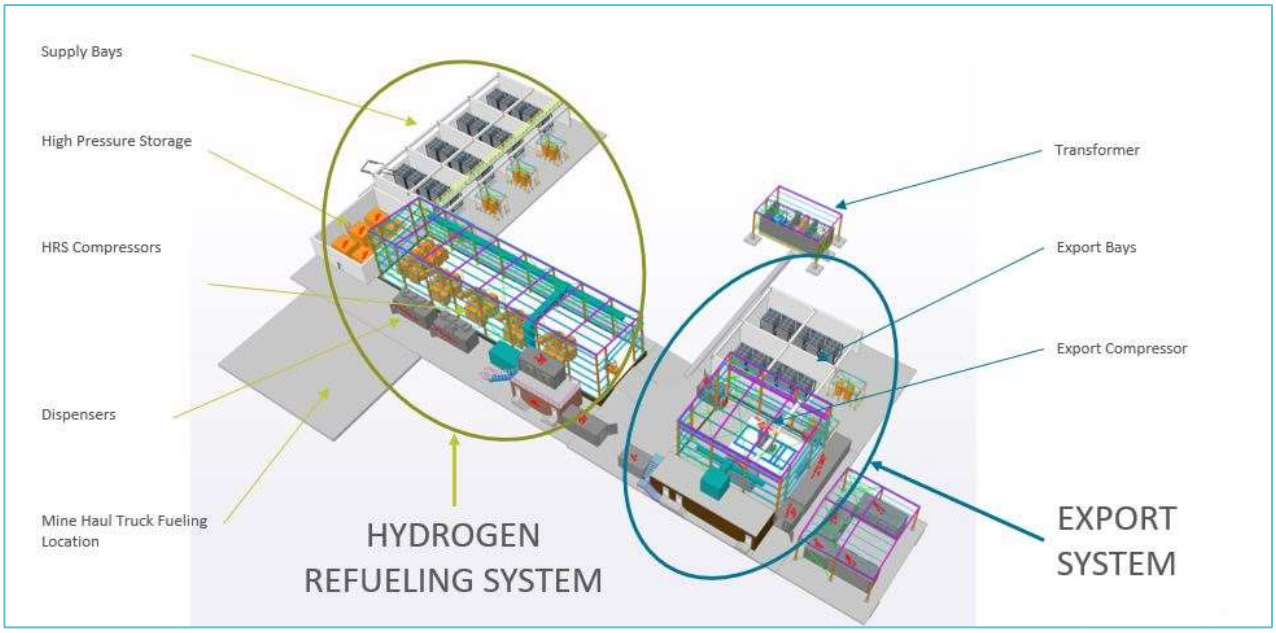

Figure 3-3: Preliminary 3D model of the Project
(Provided by LIFTE H2 Inc, 2022)

The Project will also involve the development of associated infrastructure and will utilise existing and approved mine support services. An overview is provided in Table 3-2 below. It is important to note that the table also provides information on existing infrastructure at the PoC Plant which will be utilised for the Project.

Table 3-2: Overview of the infrastructure and support services associated with the Project

Component	Detail
Laydown area	
Total footprint	0.1 ha
Security	
Fencing	1.3 ha in perimeter
Type of fencing	Electro-mesh Fencing which is electrified
Type of access control	Biometric Access Control
CCTV	Yes
Buildings	
Total footprint	0.2722 ha
Maximum height	15 m
Types	Export Building, Hydrogen Refuelling Building, ES LV Sub, HRS LV Sub, Workshop, Transformer Bays, high pressure storage
PDP access road	
Total length	0.76 km
Maximum width	18 m
Total footprint of access road corridor	1.7 ha

Component	Detail
Type	Compacted Gravel
PDP internal road	
Total length	0.17 km
Maximum width	25 m
Total footprint of internal road corridors	0.5 ha
Type	Compacted Gravel
Water pipeline	
Expansion of existing pipelines	New pipe from Raw Water Buffer Tank located at the PoC Plant
Internal diameter of pipeline	0.0025 m
Peak throughput	1 l/s
Average throughput	0.2 l/s
Maximum length of pipeline	0.25 km
Gas pipeline	
Peak throughput capacity	0.0629 kg/hr x 24 hr = 1.51 t/day
Average throughput capacity	1.3 t/day
Maximum length of pipeline	0.15 km
Power supply - Onsite substation	
Installed capacity	• Export System – 400 V, 1250 A LV Substation • HRS – 400 V, 2500 A LV Substation
Total footprint	Total - 0.0132 ha • Transformer Bays - 0.0052 ha • ES LV Sub - 0.0032 ha • HRS LV Sub -0.0048 ha
Maximum height	5 m (4 m Building elevated 1 m of the ground level)
Battery energy storage system (if required)	
Installed capacity	0.02 MWh (UPS)
Total footprint	0.0001 ha
Maximum height	2 m
Type	Lithium Ion or Lead Acid
Water Treatment Plant	
Water source	Raw Water Buffer Tank located at the PoC Plant
Total footprint	0,004 ha
Maximum height	3 m
Type of technology/method	Reverse Osmosis
Combined storage tank capacity	5 m^3
Types of waste produced	Brine
Quantities of waste produced	0.1 – 0.2 t/day

3.3.1.3 Project layout

The Project will be located within the existing and already disturbed footprint of the PoC Plant, covering an area of approximately 8 ha. As such, the extent of additional land use disturbance is anticipated to be limited (if any). A site layout of Project is given in Figure 3-4 below.

3.3.1.4 Project Phases

An outline of the main activities associated with each of the Project phases are provided below.

Construction Phase

The construction phases comprise of site preparation, earthworks, and civil works. During site preparation, there will be very limited clearing of vegetation and the establishment of a laydown area. A laydown area of 0.1 ha will be designated for temporary storage of equipment and supplies and for transport and off-loading of vehicles. The designated area is already disturbed and comprises of compacted soil surfaces.

The decommissioning of the solar PV plant area is required prior to the establishment of the ETRS. This will include dismantling and clearing of the existing solar PV panels and other associated infrastructure which are not required for the Project. Once dismantled, the panels will be returned to the supplier as per contractual agreements. The establishment of Project infrastructure will be limited to the assembly of already prefabricated components within the disturbed area of the PoC Plant.

Portions of the existing perimeter fencing will be removed where required and re-erected, and aligned to accommodate the Project components. The existing bio-remediation plant access road which runs around the Project area will remain. Additional internal and access roads will be established within the boundary and parallel to the existing bio-remediation road. Earthworks during this phase will also include the excavation, backfill and compaction for the internal and access roads.

Water will primarily be used for mixing concrete during this phase. The water supply during construction will be sourced from the existing mine supply, which is obtained from tankers located at the South Concentrator. Portable toilets will be used for ablution facilities. The toilets will be serviced by third party contractors throughout the phase.

The primary activities requiring electricity, include power supply to the offices and operation of the cement mixer, lighting, plugs, hand tools and welding. The power demand during construction is estimated at 0.2 MW and will be sourced from the electricity supply at the PoC Plant or the Pole transformer from the existing overhead line. Electricity will be supplemented by diesel generators where necessary.

Types of waste produced during construction include industrial waste, domestic waste, and possible hydrocarbon waste. The hazardous waste storage, handling and disposal procedures will be integrated with the hazardous waste management measures of the Mogalakwena Mine and be managed according to the Mogalakwena Mine EMPr. General and hazardous wastes will be separated on site. General waste which cannot be recycled will be directed to the Class B facility for waste disposal, located on the farm Zwartfontein 818 LR within the North Mining area. Hazardous waste will be placed at either of the designated storage areas located at both the North and South Concentrators. Used oil will be returned to suppliers for recycling or to sub-contractors. Hazardous material is removed on a weekly basis for disposal to a registered site. Industrial waste that cannot be salvaged or returned to suppliers for recycling is temporarily stored in a designated area within the waste disposal site before it is removed from site by a sub-contractor to a municipal landfill site. All scrap metal is separated from the other general waste at the waste disposal site and this is sold to scrap metal dealers.

Stormwater management at the Mogalakwena Mine is contained and fed into the attenuation dam. Water from attenuation dams is pumped to the return water dam. Water from the return water dam is used as process water. Stormwater from clean areas is diverted and is allowed to return to the natural environment in accordance with GN704. During construction, temporary stormwater controls will be constructed to ensure clean and dirty water operation. These temporary measures will be in addition to the existing controls of the PoC Plant.

The construction phase is expected to last 15 months. This includes 11 months of physical construction and 4 months of commissioning. A staff complement of approximately 150 individuals will be required during the construction phase, hereby providing skilled and unskilled job opportunities. Procurement opportunities will be sourced locally, as far as possible.

Operation Phase

Activities during the operation phase includes the operation of the PDP Plant infrastructure including the production, transport, and storage of hydrogen. The operational phase of the Project will provide 5 additional job opportunities when comparted to the PoC Plant.

Typical activities requiring water supply during operation includes drinking water, make-up water for evaporators and water for ablution facilities. The water demand during the operational phase is estimated at 1300 liters. The main water supply during this phase will be from the raw water buffer tank located at the PoC Plant. Septic tanks will be utilized for the ablution facilities. The effluent in the septic tanks will be pumped and transported to the contractor's camp.

Hydrogen compression will be the primary activity requiring power supply during operation, the power demand during operation of the hydrogen proof of concept system is estimated at 1.2 MW. The main power supply will be from the 11 kV substation located at the PoC Plant.

Types of waste produced during construction includes industrial waste, domestic waste, and possible hydrocarbon waste. Waste management for general waste will be handled through existing mining operational procedures. The hazardous waste storage, handling and disposal procedures will be integrated with the hazardous waste management measures of the Mogalakwena Mine and be managed according to the Mogalakwena Mine EMPr (see Section 25).

Decommissioning and Closure

The Project will form part of the current mining operations. As such, closure and rehabilitation activities for the Project will comply with the rehabilitation and closure commitments as per the approved EMPr. Any additional management and / or mitigation measures required for the Project have been included in this BAR, where relevant (see Section 25).

0 20 40 Meters

Scale: 1:3 400 @ A3

Projection:Transverse Mercator

Datum: Hartebeeshoek, Lo 29

ANGLO-AMERICAN

Figure 3 - 4: Site layout of the Project

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2022/07/29

3.3.2 Overview of project activities

Table 3-3 below provides an overview of the actions, activities and/ or processes which are associated with the Project and their respective phases.

Table 3-3: Overview of actions / activities/ processes associated with the Project

Main activity/ process		Sub-activities	Construction Phase	Operation Phase	Decommissioning and Closure Phase
General site management		Appointment of contractors and approval of the contractor's environmental policy.	At the beginning of the pre-construction		
		Planning and design of footprint areas.	At the beginning of the pre-construction		
		Site management (monitoring, inspections, maintenance).	On-going	On-going	As required
		Environmental awareness training and emergency response.	On-going	On-going	On-going
		On-going rehabilitation of facilities/disturbed areas (where possible).	On-going	On-going	On-going
Site preparation*	General	Limited clearing of vegetation within small undisturbed areas (in line with the mine's biodiversity management plan).	Limited		
		Cleaning and grubbing.	On-going		
		Establishment of laydown area.	At the beginning of construction		
		Removal of fencing (areas where required).	Limited		
		Removal of Solar PV Panels and other associated infrastructure.	Limited		

* All activities under site preparation can be undertaken as early works.

Main activity/ process		Sub-activities	Construction Phase	Operation Phase	Decommissioning and Closure Phase
	Decommissioning of Proof of Concept Plant solar PV plant	Solar panels to be returned to supplier.	Limited		
Earthworks	General	Limited stripping, handling, and stockpiling of topsoil within small undisturbed areas (in line with the mine's soil management plan).	Limited		
		Excavation of trenches and foundations and compaction of soils.	On-going		
		Levelling and excavating activities by dozer, grader, excavator, loader, and haul-trucks*.	Limited		
Civil works	Hydrogen Production Development Platform	Assembly of Export System and Hydrogen Refuelling System	On-going		
		Erection of mine haul truck fuelling station	On-going		
		Laying down of a gas pipelines and fire water tie-in	On-going		
	Support facilities	Mixing of concrete and concrete work, such as laying of foundations, trenches, berms and plinths.	On-going		
		Erection, use and removal of scaffolding and cranes.	On-going		
		Steel work (including installing re-enforcement steel, grinding and welding).	On-going		
		General building activities and erection of equipment and structures (including fencing)	On-going		
		Establishing internal, access roads for the Export-Transport-Refuel System	Limited		
	Power supply	Installation and lay down of cables and powerlines.	On-going		
		Installation and lay down of water pipelines.	On-going		

Main activity/ process		Sub-activities	Construction Phase	Operation Phase	Decommissioning and Closure Phase
		Establishment of onsite substation	On-going		
Hydrogen Production Development Platform and related support facilities		Use of supply bays, dispensers, HRS compressors		On-going	
		Erection of high pressure storage infrastructure	On-going		
		Use and operation of high pressure storage		On-going	
		Operation of mine haul truck fuelling station		On-going	On-going
		Operation of gas pipelines and fire water tie-in		On-going	
		Expanding existing truck road and using mine access roads and existing road networks.	On-going	Limited	
		Operation of onsite substation		On-going	Limited
		Diesel supply (where required)	As required		
		Use of 0.02 MWh battery energy storage system (if required)		On-going	
Use of existing support services		Use of access and internal roads	On-going	On-going	On-going
		Non-mineralised (general and industrial hazardous) waste management	On-going	On-going	On-going
		Water supply	On-going	On-going	As required
		Power supply	On-going	On-going	
		Security measures	On-going	On-going	On-going, until no longer needed
		Wastewater and sewage facilities (portable toilets during construction)	On-going	On-going	On-going
	Transport systems	Vehicle and plant equipment servicing and maintenance workshops, spray painting and wash bays.	On-going	On-going	On-going, until no longer needed
		Use of parking, loading and off-loading areas for trucks, busses, and other vehicles.	On-going	On-going	On-going, until no longer needed

Main activity/ process		Sub-activities	Construction Phase	Operation Phase	Decommissioning and Closure Phase
		Transportation of staff to and from site (using private cars and busses via surfaced roads).	On-going	On-going	On-going, until no longer needed
		Transport of input materials, supplies, services, and waste removal (using trucks and vans via roads).	On-going		
		Movement of construction vehicles/machinery within the site boundary (via on-mine private roads).	On-going		On-going
Storm water management **continue until infrastructure can be removed or successfully rehabilitated*		Establishing storm water controls (in line with GN R 704 compliant stormwater management plan).	On-going	On-going maintenance	
		Diversion of clean water from dirty areas	On-going	On-going	On-going*
		Containment of dirty water collected from dirty areas.	On-going	On-going	On-going*
Demolition		Dismantling and demolition of infrastructure and equipment. Removal of all unused materials.			On-going
Rehabilitation		Implementation of site approved rehabilitation procedures.		On-going	On-going, until no longer needed

3.3.3 Listed and Specified Activities

The EIA Regulations 2014 promulgated in terms of Chapter 5 of NEMA and published in GNR 982 control certain listed activities. These activities are listed in EIA Regulations Listing Notice 1 of 2014 (as amended), EIA Regulations Listing Notice 2 of 2014 (as amended) and EIA Regulations Listing Notice 3 of 2014 (as amended) and are prohibited until an Environmental Authorisation has been obtained from the Competent Authority (CA). The Project triggers the listed Activity 67 of the NEMA EIA Regulations Listing Notice 1 of 2014 (as amended). The environmental assessment will comprise a BA process as stipulated in the NEMA and EIA Regulations 2014. As a result, an EA is required from the Limpopo Department of Mineral Resources and Energy (DMRE) as the CA.

Table 3-4: Overview of activities requiring authorisation under the EIA Regulations 2014

Description of the project activity	Aerial extent of the activity (ha)	Listed activity number, applicable listing notice and activity description

Construction of the hydrogen Production Development Platform and related support facilities, including erection of associated structure, concrete and steel work:
• Export System comprising -
  ○ an export compressor
  ○ export bays
• Hydrogen Refuelling System comprising -
  ○ high pressure storage
  ○ HRS compressors
  ○ dispensers
  ○ supply bays
  ○ mine haul truck fuelling location
  ○ truck workshop
• Transformer bay
• Diesel generator
• Onsite substation to receive electricity from the overhead transmission line
• Battery Energy Storage System
• Gas pipeline
• Firewater tie-in
• Water pipeline, water tanks, pump station and reverse osmosis water treatment plant
• Temporary laydown area
	Within Project area of approximately 8 ha.	**Listing Notice 1: Activity 67**
		Phased activities for all activities - (i) listed in this Notice, which commenced on or after the effective date of this Notice or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices; where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold.
		
		Relevance: The Project comprises a phased approach for the storage (mobile and / or fixed) and handling of dangerous goods. This is due to the expansion of the storage capacity of the existing PoC Plant (78 m^3) by more than 80 cubic meters, with the inclusion of the storage facilities for the Production Development Platform (188.46 m^3).

4. POLICY AND LEGISLATIVE CONTEXT

4.1 ADMINISTRATIVE AND LEGAL FRAMEWORK

4.1.1 Mineral and Petroleum Resources Development Act

The Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA) governs the acquisition, use and disposal of mineral and petroleum resources. The objectives of the act, amongst others, are to promote economic growth and mineral and petroleum resources development in the Republic, particularly development of downstream industries through provision of feedstock and development of mining and petroleum inputs industries and to promote employment and advance the social and economic welfare of all South Africans. The DMRE must apply the range of environmental principles included in Section 2 of NEMA when taking decisions that significantly affect the environment. To give effect to the general objectives of Integrated Environmental Management (IEM), the potential impacts on the environment of listed or specified activities must be considered, investigated, assessed, and reported to the CA. These principles are included as per the stipulations set forth in Part IV: Pollution Control and Waste Management Regulations of the MPRDA.

The Project comprises the expansion of the existing PoC Plant (as detailed in Section 3.2) within the Mogalakwena Mining Right area. The Project does not directly relate to the mining of any minerals nor any change to area or scope currently included in the mining right. Therefore, a separate EA under the MPRDA is not deemed applicable. Section 102 of the MPRDA governs the amendment of rights, permits, mine work programmes and EAs and management programmes. In terms of the Act, these may not be amended or varied without the written consent of the Minister.

A pre-application consultation with officials from the DMRE (Polokwane) was undertaken on 07 April 2022. The discussions included the Project's authorisation requirements in terms of the MPRDA. The officials advised that a Section 102 application was not required for this Project because the Project will require only a further amendment of the Amended EA (Amended authorisation reference LP30/5/1/2/3/2/1(050)EM granted on 17 March 2020) . The Project will change the scope, but the change of scope constitutes a listed activity. Therefore, neither a Part 1 nor Part 2 amendment process can be followed. Meeting minutes are included in Appendix C: Public Participation Process.

4.1.2 National Environmental Management Act

The NEMA is the national framework for environmental governance in South Africa and echoes the mandates set forth in the Bill of Rights and Section 24 of the Constitution. This is specifically enabled through the following provisions:

- **Section 2 Principles**: NEMA sets forth nineteen guiding principles which are aimed at realising the objectives of the Constitution and the NEMA sustainability principles. These principles must be applied to inform decision making for proposed activities which may have an impact on the environment.
- **Section 28 – Duty of Care**: Duty to prevent and control pollution and remediate contamination arising from proposed activities.
- **Section 24 (1)(a) and (b)**: The potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law, and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.

The NEMA Section 2 Principles and Section 28 are interlinked based on promotion of environmentally sound and sustainable approaches to Project development. This application has been undertaken with due consideration to these principles. In line with sustainability principles, possible impacts arising from a potential activity must be identified and mitigation actions must be provided. The identified impacts and management measures are provided in Section 25.

4.1.1 Environmental Impact Assessment Regulations

The EIA Regulations 2014 (as amended) which were promulgated in terms of Chapter 5 of NEMA and published in Government Notice (GN) R982 , provide for control over certain listed activities. These listed activities are detailed in EIA Regulation Listing Notice 1 (GN R 983), Listing Notice 2 (GN R984) and Listing Notice 3 (GN R 985). The undertaking of activities specified in the Listing Notices is prohibited until EA has been obtained from the competent authority.

The EIA Regulations 2014 also set out the procedures and documentation that need to be complied with when applying for an EA. A BA process must be applied to an application if the authorisation applied for is in respect of an activity or activities listed in Listing Notices 1 and/or 3 and a Scoping and EIA process must be applied to an application if the authorisation applied for is in respect of an activity or activities listed in Listing Notice 2. As the Project triggers an activity listed in Listing Notice 1 of 2014 (as amended) (see Section 3.3.3), it is necessary that a BA process is undertaken in order for the DMRE to consider the application in terms of NEMA and the MPRDA.

4.1.2 National Environmental Management: Waste Act

The National Environmental Management: Waste Act, 2008 (No. 59 of 2008) (NEM:WA) regulates all aspects of waste management and has an emphasis on waste avoidance and minimisation. NEM:WA creates a system for listing and licensing waste management activities. Listed waste management activities above certain thresholds are subject to a process of impact assessment and licensing. Activities listed in Category A require a BA process, while activities listed in Category B require a Scoping & EIA process. NEM:WA also provides for the setting of norms and standards for the storage and disposal of waste. These norms and standards are listed in GN R926 of 2013 (storage) and GN R636 of 2013 (disposal).

The Project does not trigger a Listed Activity in terms of NEM:WA, thus a Waste Management License is not required for the Project. General and hazardous waste handling, storage and disposal will, however, be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926), published under Section 7(1)(c) of the NEM:WA, will need to be considered in this regard. Furthermore, any waste product produced would be disposed of via suitably qualified and licensed third-party service providers. These activities will be undertaken in compliance with the ongoing and existing waste management procedures of the Mogalakwena Mine.

4.1.3 National Environmental Management: Air Quality Act

The National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA) regulates all aspects of air quality, including prevention of pollution and environmental degradation; providing for national norms and standards regulating air quality monitoring, management, and control; and licencing of activities that result in atmospheric emissions and have or may have a significant detrimental effect on the environment. The NEM:AQA has established a National Framework for Air Quality Management with various standards being implemented. The updated Listed Activities and Minimum National Emission Standards were published in 2013 (GN 893, in Government Gazette No. 37054) and amended by GN 551, 12 June 2015; GN 1207, 18 October 2018; GN 687, 22 May 2019 and GN 421, 27 March 2020).

No listed activities in terms of the NEM:AQA are triggered by the Project, therefore, no atmospheric emissions licence is required. However, the proposed construction activities, including earthworks, may result in the temporary exposure to, dust. Appropriate dust control methods will need to be applied to ensure compliance with the National Ambient Air Quality Standards (NAAQS).

4.1.4 National Water Act

Chapter 4 of the National Water Act, 1998 (No. 36 of 1998, as amended) (NWA) requires proponents to proposed developments to submit applications to the CA, namely the Regional Office of the Department of Water and Sanitation (DWS), where a water use listed under Section 21 of the Act is triggered. Water Use is defined broadly by the Act and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), alteration of a watercourse, removing water underground for certain purposes and recreation.

This Project will be undertaken within the existing footprint of the PoC Plant and no further expansion of this footprint will be required. No water uses are triggered by the specific activities of the Project.

4.1.5 National Heritage Resources Act

The National Heritage Resources Act, 25 of 1999 (NHRA) provides for the identification, assessment and management of the heritage resources of South Africa. The Act lists development activities that would require authorisation by the responsible heritage resources authority. The NHRA requires that a person who intends to undertake a listed activity notify the relevant provincial heritage authority at the earliest stages of initiating such a development. The relevant provincial heritage authority would then, in turn, notify the person whether a Heritage Impact Assessment should be submitted. However, according to Section 38(8) of the NHRA, a separate report would not be necessary if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act (ECA) (Act No 73 of 1989) (now replaced by the NEMA) or any other applicable legislation. The decision-making authority should, however, ensure that the heritage evaluation fulfils the requirements of the NHRA and take into account in its decision-making any comments and recommendations made by the relevant heritage resources authority.

The Project activities may have the potential to impact upon heritage resources in terms of Section 38 of the NHRA, despite the already disturbed footprint in which the Project will be located, a Heritage Assessment was undertaken to determine the potential for adverse impacts to heritage resources due to the Project activities. The Heritage assessment concluded that the area is totally transformed and no heritage resources in terms of Section 38 of NHRA are expected to be adversely affected by the Project, and an application for exemption from a full Phase 1 HIA is applicable.

4.1.6 Hazardous Substances Act

The Hazardous Substances Act, 1973 (No. 15 of 1973) (HSA) was promulgated to provide for the control of substances which may cause injury, ill-health or death. Substances are defined as hazardous if their inherent nature is toxic, corrosive, irritant, strongly sensitising, flammable and generate pressure (under certain circumstances) which may injure ill-health, or death in humans.

The Act provides for the division hazardous substances or products into four (4) groups in relation to the degree of danger, the prohibition and control of the importation, manufacture, sale, use, operation, application, and disposal of such substances.

- Group 1: includes all hazardous substances defined in the Act;
- Group 2: substances include mixtures of Group 1 substances;
- Group 3: substances include substances found in certain electronic products (i.e., product with an electronic circuit); and
- Group 4: substances include all radioactive substances.

Any substance or mixture of substances which, in the course of customary or reasonable handling or use, including ingestion, might, by reason of its toxic, corrosive, irritant, strongly sensitizing or flammable nature or because it generates pressure through decomposition, heat or other means, cause injury, ill-health or death to human beings, to be a Group 1 or a Group 2 hazardous substance.

A hazardous substances classification is being undertaken in parallel with this BA process because the Mogalakwena Mine plans to utilise hydrogen as a sustainable alternative to diesel usage as part of the Project and for future operations. This classification is being undertaken by SciRad Consulting and will be submitted to the Department of Health in terms of Section 4(a) of the Act.

4.1.7 Mine Health and Safety Act and Regulations

The Mine Health and Safety Act and Regulations (No. 29 of 1996) aims to provide for the protection of the health and safety of employees and other persons at mines. This Act finds relevance to the Project as it will be located within a mining area. The objectives of the Act include:

a) to protect the health and safety of persons at mines;
b) to require employers and employees to identify hazards and eliminate, control and minimize the risks relating to health and safety at mines;
c) to give effect to the public international law obligations of the Republic that concern health and safety at mines;
d) to provide for employee participation in matters of health and safety through health and safety representatives and the health and safety committees at mines;
e) to provide for effective monitoring of health and safety conditions at mines;
f) to provide for enforcement of health and safety measure at mines;
g) to provide for investigations and inquiries to improve health and safety at mines; and
h) to promote -
    i. a culture of health and safety in the mining industry;
    ii. training in health and safety in the mining industry; and
    iii. co-operation and consultation on health and safety between the State, employers, employees, and their representatives.

As a result, health and safety measures will need to be implemented in terms of Act and Regulations for the full life cycle of the Project. In this regard, AAP has received a Partial Exemption from Regulations 23.12.3(b); 23.12.3(c); 23.12.4; 23.12.5; 23.12.6; 23.12.7 and 23.12.8 8 under Schedule 4 of the Mine Health and Safety Acton for any and all pressure vessels and pressurised cylinders, excluding portable compressor receivers, in use at the Hydrogen Generating Facility at Mogalakwena Platinum Mine , from the DMRE (Directorate: Mine Health and Safety). This approval was received on the 4 January 2022. The approval was granted for the PoC Plant and covers the testing of new refuelling strategies and pressure rated equipment at the Plant over the next five years

4.1.8 Additional Relevant Legislation/ Legislation considered in the preparation of the BAR

In accordance with the EIA Regulations 2014, all legislation and guidelines that have been considered in the BA process must be documented. Table 4-1 below provides a summary of other potentially applicable legislation.

Table 4-1: Potentially applicable legislation

Applicable legislation	Relevance
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMA:BA)	The NEM:BA, as amended, aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA, the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources and the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources. The Act places severe restrictions on activities that could have adverse effects on threatened or protected species. The purpose of the Act includes the following:

Applicable legislation	Relevance
	• The management and conservation of South Africa's biodiversity within the framework of the NEMA; • The protection of species and ecosystems that warrant national protection; and • The sustainable use of indigenous resources and the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources. The Act makes provision for the protection of threatened or protected ecosystems and species as well as provisions guarding against the introduction of alien and invasive species. The Act identifies restricted activities involving listed threatened, protected or alien species. These activities include picking parts of, or cutting, chopping off, uprooting, damaging, or destroying, any specimen of a listed threatened or protected species. As stipulated in Section 57 of the Act, a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7. Threatened or Protected Species (TOPS) permits for the carrying out of restricted activities in terms of the NEM:BA are required where applicable. The most recent lists of tops species and associated legislation is available in the NEM:BA, Threatened or Protected Species Regulations Notice 255 of 2015. In addition to these species, SANBI maintains a national list of the IUCN conservation status of all plant species in South Africa. Any endangered (VU, EN, CR) species under this list are also subject to the TOPS regulations. No TOPS permit will be required for the Project as no restricted activities are required due to the Project area being already largely disturbed.
National Building Regulations and Building Standards Act (No. 103 of 1977)	This Act provides for the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities; for the prescribing of building standards; and for matters connected therewith. Section 4 of the Act stipulates that no person shall without the prior approval in writing of the local authority in question, erect any building in respect of which plans and specifications are to be drawn and submitted in terms of this Act. This Act finds relevance in the Project in that approval from the local authority would be required for the expansion of the hydrogen plant facility.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	This Act provides for the control over the utilisation of the natural agricultural resources of the country in order to promote the conservation of the soil, the water sources and the vegetation, as well as the combating of weeds and invader plants. Section 5 of the Act prohibits the spread of weeds through the prohibition of their sale. GN R1084 (published under CARA) provides categories for the classification of the various weeds and invader plants, and restrictions where these species may occur. Regulation 15E of GN R1084 provides methods to be implemented for the control of weeds and invader species. The CARA finds application throughout the Project lifecycle of the Project. As a result, soil conservation and erosion prevention management and mitigation measures need to be implemented. Thus, a Weed Control and Management Plan must be developed and implemented for the duration of the life cycle of a Project.

Applicable legislation	Relevance
	Existing weed control and management measures as part of the mine wide operations will be undertaken for the Project.
Subdivision of Agricultural Land Act (No. 70 of 1970, as amended) (SALA)	The Subdivision of Agricultural Land Act, 1970 (No. 70 of 1970, as amended) (SALA) provides for the subdivision of all agricultural land within the Republic, thereby prohibiting certain activities from being undertaken without consent from relevant authority, namely the Minister of the Department of Agriculture, Land Reform and Rural Development. This Act finds relevance to the Project as any portion of land that is zoned for agriculture and will need to be leased for a period exceeding ten (10) years is regulated by the Act. The Farm Zwartfontein 818 LR, upon which the Project will be located, has been rezoned for mining activities.
National Forests Act (No. 84 of 1998) (NFA)	The NFA empowers the Minister of the Department of Forestry, Fisheries and the Environment (DFFE) to declare and list a tree, group of trees, woodland, or a species of trees as protected. A list of protected tree species is included in GN R908, published in November 2014. Section 7 of the Act prohibits the cutting and disturbance of NFA-listed trees. A permit is required for the removal of NFA-listed tree species, in terms of Section 4 of the Act. Prior to the submission of the permit application to the competent authority, a survey of the Project area is required in order to ascertain the presence and distribution of NFA-listed tree species. No protected tree species were observed within the site by the Terrestrial Biodiversity Specialist and as such, no tree clearing permit would be required.
National Veld and Forest Fire Act (No. 10 of 1998) (NVFA)	Chapter 4 of the NVFA requires landowners to prepare and maintain firebreaks and discusses the role of adjoining landowners and the fire protection association in an area. The Act, through Chapter 5, requires all landowners to acquire firefighting equipment and have available personnel for firefighting. Landowners with land where a veldfire may start or burn, or from whose land it may spread, must have firefighting equipment and personnel available. There are no permitting requirements for the Project in accordance with the NVFA. However, it must be ensured that firebreaks within the boundaries of the study area are prepared and maintained, and that firefighting equipment and personnel is made available for the duration of the life cycle of the Project.
The Spatial Planning and Land Use Management Act (No. 6 of 2013) (SPLUMA)	The Spatial Planning and Land Use Management Act, 2013 (No. 6 of 2013) (SPLUMA) aims to confirm and regulate the role of municipalities in land use planning and management. Objectives of the Act relevant to the Project ensure that the system of spatial planning and land use management promotes social and economic inclusion and to provide for the sustainable and efficient use of land. Section 33 (1) of the Act stipulates that except as provided in this Act, all land development applications must be submitted to a municipality as the authority of first instance. As a result, the Waterberg District Municipality and the Mogalakwena Local Municipality will be informed of the Project and engaged throughout the BA process.

Applicable legislation	Relevance
National Road Traffic Act (No. 93 of 1996), (NRTA) and National Traffic Regulations (2000)	The NRTA and Regulations, provide certain limitations on vehicle dimensions as well as axle and vehicle masses that a vehicle using a public road at any given time must comply with. Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed. Where such a vehicle or load cannot be dismantled, without disproportionate effort, expense, risk, or damage, into units that can travel or be transported legally. Such load is classified as an abnormal load and is permitted to be transported on public roads under an exemption permit issued in terms of Section 81 of the Act. A permit application in terms of Section 81 of the Act may be required for the transportation of load classified as abnormal under the Act. This will be confirmed prior to implementation of the Project.
Infrastructure Development Act (No. 23 of 2014)	The Infrastructure Development Act 23 of 2014 aims to provide for the facilitation and co-ordination of public infrastructure development which is of significant economic or social importance to the Republic. The Act also aims to ensure that infrastructure development in the country is given priority in planning, approval and implementation, whereby the development goals of the state are promoted through infrastructure development. The Act also makes provision for continuous improvement with regard to the management of such infrastructure during all life-cycle phases, including planning, approval, implementation, and operations. The South African government has identified hydrogen fuels cells as a national priority as an alternative energy source, and its potential as significant opportunity for economic development in the country through the creation of jobs and the monetization of the platinum industry. This Project forms a part of the Anglo Hydrogen Valley Project which has been registered as a Strategic Infrastructure Development System (SIDS) on 7 April 2022. The Anglo Hydrogen Valley Project is being undertaken as part of the Department of Science and Innovation (DSI) initiative to investigate opportunities to transform the Bushveld complex and larger region around Johannesburg, Mogalakwena and Durban into a Hydrogen Valley.
Certificate of registration ("CoR") for dangerous goods in terms of the Waterberg District Municipality Emergency Services By-laws	A CoR is required for the use, handling or storage of flammable gases with a total cylinder capacity in excess of 50 kg. The components of the Project will entail the use and handling and storage of hydrogen gas in respect of both mobile and fixed storage. RPM must obtain a CoR to the extent that the total cylinder capacity threshold of 50 kg will be exceeded.

4.2 KEY INTERNATIONAL, NATIONAL, REGIONAL AND LOCAL LEGISLATURE, POLICY, STRATEGIES AND PLANNING FRAMEWORKS

4.2.1 United Nations Framework Convention on Climate Change and Kyoto Protocol

The United Nations Framework Convention on Climate Change (UNFCCC, 1992) is an international environmental treaty aimed at addressing climate change, which was negotiated and signed by 154 countries at the United Nations Conference on Environment and Development (UNCED), informally known as the 'Earth Summit', held in Rio de Janeiro (Brazil) from 3 to 14 June 1992. The primary objective of this international environmental treaty is to stabilize greenhouse gas emissions in the atmosphere to a level that prevents harmful / dangerous human-induced interference with the earth's climate system. The treaty places an obligation on signatory countries, such as South Africa, to adopt national policies and take measures to mitigate the impacts of climate change by limiting their anthropogenic (i.e., man-made) emissions of greenhouse gases, as well as to report on the steps undertaken to return their emissions to pre-1990 levels. The treaty called for on-going scientific research and regular meetings, negotiations and future policy agreements designed to allow ecosystems to adapt naturally to climate change, to enable economic development to proceed in a sustainable manner. In addition, the treaty requires more developed economies (such as the United States of America) to provide financial resources to meet the costs incurred by developing nations (such as South Africa) in complying with their obligations to produce national inventories of their emissions.

The UNFCCC (1992) laid the foundation for the implementation of the Kyoto Protocol, which was signed by Parties in 1997 and enforced in 2005. In 2016, the UNFCCC was superseded by the 2016 Paris Agreement, which is a legally binding international treaty on climate change.

The Kyoto Protocol (1998) marked the implementation of the first measures of the UNFCCC and applies to six (6) greenhouse gases, namely Carbon Dioxide (CO2); Methane (CH4); Nitrous Oxide (N2O); Hydrofluorocarbons (HFCs); Perfluorinated Compounds (PFCs) and Sulfur Hexafluoride (SF6). The protocol primarily put into operation the aims of the UNFCCC (1992) by committing industrialised countries and economies in transition to limit and reduce their greenhouse gas emissions, in accordance with the agreed individual targets. The protocol requires signatories to adopt policies, measures on mitigation and to report greenhouse gas emissions periodically[2]. South Africa is the world's 14th largest emitter of greenhouse gases and accounts for the highest emissions of CO_2 in Africa[3]. South Africa's emissions are a result of its reliance on the combustion of fossil fuels (such as coal) for the generation of electricity, though recent policy turns have signaled a possible major shift towards renewable and gas. In 2019, South Africa emitted approximately 478.61 million tonnes of CO_2, with 279.9 million tonnes of this because of electricity generation[4].

To fulfil the requirements of the UNFCCC (1992) and the Kyoto Protocol (1998), the South African government developed legislation and policy to provide the framework for indicating how commitments to reduce greenhouse gas emissions will be met. These policies include the National Climate Change Response Policy (2011), Draft Climate Change Bill (2018) and the Carbon Tax Act (Act No. 15 of 2019).

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[2] **What is the Kyoto Protocol?** | UNFCCC. Accessed on 19 May 2022

[3] **The Carbon Brief Profile: South Africa** | Carbon Brief. Accessed on 19 May 2022

[4] **https://ourworldindata.org/co2/country/south-africa**. Accessed on 19 May 2022

Anglo American has implemented the NuGen™ programme as part of their FutureSmart Mining™ programme in order to develop a hydrogen-powered mining truck fleet in collaboration with leading fuel cell, electrolyser, battery, and engineering firms. The NuGen™ technology development programme is focused on decarbonising mine haulage and building onsite hydrogen production. This Project forms part of the commitment to reduce climate change and is in alignment with the international obligations and commitments by South Africa through the UNFCCC and the Kyoto Protocol.

4.2.2 Paris Agreement

The Paris Agreement is an international agreement / treaty, in terms of the UNFCCC, on climate change, which was adopted in 2015. It addresses mitigation, adaptation and finance and was adopted at the 2015 United Nations Climate Change Conference (COP21), which was held in Le Bourget near Paris, France. The Paris Agreement was opened for signature on 22 April 2016. The agreement aims to improve upon and replace the Kyoto Protocol by committing countries to keeping the long-term rise of global temperatures below 2°C, above pre-industrial levels, and to pursue efforts to limit the increase to 1.5°C, thereby recognizing that this would substantially reduce the risks and impacts of climate change.

South Africa signed the Paris Agreement and submitted its pledge in 2016. The pledge is also known as the 'Nationally Determined Contribution' or NDC. According to the pledge, South Africa adopted a 'peak, plateau and decline' approach, whereby it is anticipated the greenhouse gas emissions will peak by 2025, plateau for a decade and then start to decline. By signing the agreement, countries are required to adopt the conditions of the agreement into their own legal systems through ratification, acceptance, approval, or accession. The agreement will become enforceable when ratified / approved by at least 55 countries, which together account for at least 55 % of the global greenhouse gas emissions.

By authorising this hydrogen PDP Project, government will be contributing to South Africa acting on the obligations of the Paris Agreement. Authorising this development will allow the Mogalakwena Mine to reduce its use of non-renewable fossil fuel and subsequently reduce its carbon emissions and carbon footprint. From this perspective, the proposed hydrogen PDP Project aligns with the Paris Agreement, as well as any subsequent updates thereto.

4.2.3 Constitution of the Republic of South Africa

The Constitution of South Africa (No. 108 of 1996) provides environmental rights and includes implications for environmental management. Section 24 of the Constitution states that:
'Everyone has the right –

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

The Constitution is the overarching legislation for South Africa. Although it provides for certain rights and obligations, the NEMA has been promulgated to manage the various spheres of both the social and natural environment.

4.2.4 White Paper on the Energy Policy of the Republic of South Africa

The 1998 White Paper on the Energy Policy of the Republic of South Africa is the primary policy document which guides all subsequent policies, strategies and legislation within the energy sector. It provides specific policy statements on what government intends for the energy system as a whole and sets out five (5) key objectives. These objectives have subsequently formed the foundation and informed the Project of energy policy in South Africa and remain relevant. Various other energy policies have been developed and are in different stages of implementation.

Some of the key policies developed following the 1998 White Paper on Energy Policy include:

- The White Paper on Renewable Energy, 2003;
- The National Energy Efficiency Strategy of the Republic of South Africa, 2008; and
- The Integrated Resources Plan (IRP), 2010.

The White Paper (national energy policy) sets out to ensure that national energy resources will be efficiently used and developed to provide for the needs of the South African people. It was formulated to address the supply and consumption of energy over the following ten (10) years; however, it remains in place today. The policy laid out a set of Energy Sector Policy Objectives which included: increasing access to affordable energy services, improving energy governance, stimulating economic development, managing energy-related environmental and health impacts and securing supply through diversity. These objectives were formulated to help with the transformation of certain industries and governance systems. Energy policy priorities were also developed to help in achieving these policy objectives. The document identifies the significance of the medium and long-term potential of renewable energy, with the advantages of minimal environmental impacts and higher labour intensities than conventional energy generation technology.

4.2.5 Renewable Energy White Paper

The Department of Energy (DoE) gazetted its White Paper on Renewable Energy in 2003 and introduced it as a 'policy that envisages a range of measures to bring about integration of renewable energies into the mainstream energy economy.' At that time, the national target was fixed at 10 000GWh (0.8Mtoe) renewable energy contribution to final energy consumption by 2013. The White Paper proposed that this would be produced mainly from biomass, wind, solar and small-scale hydropower. It went on to recommend that this renewable energy should be utilised for power generation and non-electric technologies such as solar water heating and biofuels. Furthermore, the White Paper stipulates that fuel cells using hydrogen e.g. generated from renewable energy resources will also become commercially viable at some stage. Since the White Paper was gazetted, South Africa's primary and secondary energy requirements have remained heavily fossil-fuel dependent, both in terms of indigenous coal production and use, as well as the use of imported oil resources, the proposed hydrogen PDP Project aims to gradually change this notion.

4.2.6 National Climate Change Response Policy White Paper

This White Paper (2011) presents the South African Government's vision for an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society. South Africa's response to climate change has two (2) objectives:

- Effectively manage inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity.
- Make a fair contribution to the global effort to stabilise greenhouse gas (GHG) concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe that enables economic, social, and environmental development to proceed in a sustainable manner.

The proposed hydrogen PDP Project aligns with the objectives of the White Paper.

4.2.7 Integrated Energy Plan

A National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998, and in terms of the National Energy Act, 2008 (Act No. 34 of 2008) which places an obligation on the Minister of the DMRE to publish the IEP in the Government Gazette. The intention of the IEP is to provide a roadmap of the future of the energy landscape for South Africa which guides future energy infrastructure investments and policy development. The National Energy Act, 2008, requires the IEP to have a planning horizon of no less than 20 years. The Project of the IEP is therefore a continuous process at it needs to be reviewed periodically to consider changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives.

As a fast-emerging economy, South Africa needs to balance the competing need for continued growth with its social needs and the protection of the natural environment. South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. From the myriad of factors which had to be considered and addressed during the Integrated Planning Process for the IEP (2016), eight (8) key objectives were identified:

- Objective 1: Ensure security of supply;
- Objective 2: Minimise the cost of energy;
- Objective 3: Promote the creation of jobs and localisation;
- Objective 4: Minimise negative environmental impacts from the energy sector;
- Objective 5: Promote the conservation of water;
- Objective 6: Diversify energy supply sources and primary sources of energy;
- Objective 7: Promote energy efficiency in the economy; and
- Objective 8: Increase access to modern energy.

The proposed hydrogen PDP Project aligns with several of the IEP objectives.

4.2.8 Integrated Resources Plan

The Integrated Resources Plan (IRP) (2019) is an electricity capacity plan which is a subset of the IEP and aims to provide an indication of the country's electricity demand, how this demand will be supplied and what it will cost. Section 1 of the IRP, 2019 (Department of Energy, 2019) sets out targets for energy generation from renewable sources. The recent IRP (2019) supports a diverse energy mix and presents

policy interventions to ensure energy security for South Africa's electricity supply. Most of the energy targets set by the IRP will be from renewable sources, of which gas energy makes up a considerable amount. The IRP envisions an additional 14 400 MW of power being produced from wind, 6 000 MW from Photovoltaic (PV) solar plants, 3 000 MW from gas, 2 500 MW from hydropower and an additional 1 500 MW from coal by 2030. The renewable energy targets are procured through a competitive tendering process called the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) run by DoE. The success of this programme has been internationally recognised, with the United Nations Environmental Programme (UNEP) 2014 Report placing South Africa among the top ten countries in respect to renewable energy investment.

Through the IRP (2019), government recognises that coal will continue to play a significant role in electricity generation given the abundance of coal reserves. However, the existing Eskom fleet of coal-fired power stations will be decommissioned until 2030 and only then will 1 500 MW be procured from coal-fired power sources. Furthermore, the IRP states that South Africa's specific focus on the hydrogen economy and the progress achieved by the hydrogen initiative (or Hy-Sa) based at the University of the Western Cape, should be supported with more research and the chance for practical application within the power system.

The Project aligns with the IRP in that it will contribute to the advancement of the Hy-Sa strategy by propelling efforts to reduce the mine's reliance on non-renewable energy sources. This will be done through the implementation of novel technology which harnesses the potential for green hydrogen as an alternative energy source, thus enabling the long term progression of a hydrogen economy in South Africa.

4.2.9 National Infrastructure Plan

The main aim of the National Infrastructure Plan (2012) is to transform the South African economic landscape through the Strategic Integrated Projects (SIPs), which include catalytic projects that can fast-track development and growth. In that regard, green energy in support of the South African economy is supported by SIP 8, which seeks to support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IRP. Furthermore, SIP 8 supports bio-fuel production facilities. As such, the Project falls in line with the National Infrastructure Plan.

4.2.10 Limpopo Provincial Development Plan (2015 – 2019)

The objectives of the Limpopo Provincial Development Plan include the following:

- The need to improve the basic education system of Limpopo by high quality, universal early childhood education and quality school education, with globally competitive literacy and numeracy standards,
- A long-term vision through to 2030 towards dealing with the challenges of unemployment, inequality and creating a more inclusive society,
- Improve the institutional efficiency and effectiveness of the Government,
- Improve access to basic services, such as electricity, water, sanitation, telecommunications and public transport by investing in strong competitive networks of economic infrastructure designed to support the country's medium- and long-term economic and social objectives,
- Comprehensive rural development in which areas are spatially, socially and economically well integrated— across municipal, district and provincial and regional boundaries—where residents have economic growth, food security and jobs as a result of agrarian transformation and

infrastructure development programmes, and have improved access to basic services, health care and quality education.

- Development of a local state that is accountable, focused on citizen's priorities and capable of delivering high-quality services consistently and sustainably through cooperative governance and participatory democracy.
- Environmental protection by being environmentally sustainable, climate-change resilient, low-carbon economy and by just being a well-informed society.
- Attain regional integration by having prosperity and stability, with full employment in a country that is fully integrated into the region, the continent, and the global political economy.

The expansion and operation of the Project is aligned to the objectives of the Limpopo Provincial Development Plan as the implementation of the Project will stimulate the local economy within the surrounding areas. Stimulation of the local economy could be the creation of employment, business opportunities for community residents within the vicinity of the Project site and raising environmental awareness. The Project may require some support services which could be rendered by Small Medium and Micro Enterprises within the surrounding area mainly during the construction phase. The support services which could be sourced from Small Medium and Micro Enterprises (if locally available) include waste and sewage removal, security services, transportation of staff and the supply of construction material (i.e., sand and cement).

4.2.11 Limpopo Spatial Development Framework

The key objectives of the Limpopo Province Spatial Development Framework (SDF) include a rationalisation and optimal use of the land and protection of natural resource by considering high / moderate potential agricultural areas, high moderate / environmental sensitivity areas and mining / mineral deposit areas as well as other relevant factors. The SDF also includes imperatives for promoting, protecting, and managing a sustainable environment as well as to provide for the use and preservation of agricultural land.

The Project will be undertaken within already disturbed area within the footprint of the PoC Plant of the Mogalakwena Mine Mining Right area. Additional land clearance and disturbance is not required and will therefore not impact the agricultural potential of available soils in the area. In addition, the Project will be implemented in a manner which protects the baseline biophysical socio-economic and cultural heritage environment, by ensuring that management actions for specific impacts are undertaken. These actions are provided in Section 25. The implementation of the Project will also include employment opportunities being generated during the construction phase of the Project. Although temporary, the creation of these employment opportunities, even though negligible will contribute towards the reduction of the unemployment rate within the province and within the Local Municipality. From this perspective, the Project is aligned with the objectives of the Spatial Development Framework.

4.2.12 Mogalakwena Local Municipality Draft Integrated Development Plan 2022/23 – 2026/27

The Integrated Development Plan (IDP) is the principal strategic planning instrument which guides and informs all planning, budgeting, management, and decision-making processes in a municipality. The Mogalakwena municipality is committed to develop communities and promote economic growth by creating a conducive and sustainable environment for social and economic development. The 2011 Mogalakwena reviewed Local Economic Development (LED), Spatial Development Framework (SDF) and Tourism Strategies has identified that mining is one of the major role-players in terms of promoting growth and development within the municipality. It was highlighted that platinum mining in the region will become a more important facet to mining and mining development.

Platinum mining in Mokopane is a leading driving force to economic development, employment and community skills development and prosperity. The incorporation of this sector in the diversification of the local economy and promoting value-chain development for the purposes of clustering supportive economic functions in a single area will assist in the goals and objectives identified within the Mogalakwena IDP, Waterberg LED/IDP and the Limpopo Development Plan (LDP). The LDP has identified that the long term strategic vision of the mining sector should be transformed to become not only a resource-based industry but should also become knowledge-based industry which collectively creates a conducive environment for value-addition. Furthermore, in terms of sector contributions to the Gross Domestic Product (GDP), the mining sector contributes 20.1% to the municipality.

4.3 GUIDELINES

The guidelines listed in Table 4-2 below have been considered during the BA process.

Table 4-2: Guidelines considered in the BA process

Guideline	Governing Body	Relevance
Procedures for the Assessment and Minimum Criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (1998) when applying for EA	Department of Forestry, Fisheries, and the Environment	Provides procedures for ground-truthing environmental themes identified by the web-based Screening Tool. The baselines studies used in the Scoping Report have been undertaken in accordance with the requirements of this Notice, where relevant.
Public Participation in terms of NEMA, EIA Regulations (2017)	Department of Forestry, Fisheries, and the Environment	The purpose of this guideline is to ensure that an adequate Public Participation Process was undertaken during the BA process.
Guideline for consultation with communities and I&APs (2014)	DMRE	
IEM Guideline Series Guideline 7: Public participation in the EIA process (2012)	Department of Forestry, Fisheries, and the Environment	

Guideline	Governing Body	Relevance
Guideline on need and desirability in terms of the EIA Regulations (2017)	Department of Forestry, Fisheries, and the Environment	These guidelines inform the consideration of the need and desirability aspects of the Project.
Guideline on need and desirability in terms of the EIA Regulations (2014)		
National Development Plan (NDP) (2030)	National Planning Commission	
New Growth Path (2011)	Department of Economic Development	
Mogalakwena Local Municipality Draft Integrated Development Plan (IDP) (2022/23 – 2026/27)	Mogalakwena Local Municipality	
Waterberg District Integrated Development Plan IDP (2021 – 2026)	Waterberg District Municipality	
Limpopo Spatial Development Framework (SDF)	Office of the Premier of Limpopo	
Cumulative Effects Assessment, IEM, Information Series 7 (2004)	Department of Forestry, Fisheries, and the Environment	
Cumulative Effects Assessment, IEM, Information Series 7 (2004)	Department of Forestry, Fisheries, and the Environment	This guideline was consulted to inform the consideration of potential cumulative effects of the Project.
Criteria for determining Alternatives in EIA, IEM, Information Series 11 (2004)	Department of Forestry, Fisheries, and the Environment	This guideline was consulted to inform the consideration of alternatives.
Environmental Management Plans (EMP), IEM, Information Series 12 (2004)	Department of Forestry, Fisheries, and the Environment	This guideline was consulted to ensure that the EMPr has been adequately compiled.
Environmental Impact Reporting, IEM, Information Series 15 (2004)	Department of Forestry, Fisheries, and the Environment	This guideline was consulted to inform the approach to impact reporting.

Guideline	Governing Body	Relevance
Specialist Studies, IEM, Information Series 4 (2002)	Department of Forestry, Fisheries, and the Environment	This guideline was consulted to ensure adequate development of terms of reference for specialist studies.
Impact significance, IEM, Information Series 5 (2002)	Department of Forestry, Fisheries, and the Environment	This guideline was consulted to inform the assessment of the significance of impacts of the Project.
Mining and Biodiversity Guideline (DEA et al., 2013)	Department of Forestry, Fisheries, and the Environment	Biological diversity has been considered as part of Project planning.

5. NEED AND DESIRABILITY OF THE PROPOSED PROJECT

5.1 NEED AND DESIRABILITY

The 'need and desirability' of a Project should be evaluated against the strategic context of a Project, along with the broader societal needs and public interest. The Department of Forestry, Fisheries, and the Environment (DFFE) [formerly the Department of Environmental Affairs (DEA)] Guideline on Need and Desirability (GN R891, 2017), notes that while addressing the growth of the national economy through the implementation of various national policies and strategies, it is also essential that these policies take cognisance of strategic concerns such as climate change, food security, as well as the sustainability in supply of natural resources and the status of South Africa's ecosystem services. Thus, the over-arching framework for considering the need and desirability of developments in general is taken at the policy level, through the identification and promotion of activities /industries/developments required by civil society as a whole. The DFFE guideline further notes that at a project level, the rationale in terms of need and desirability of a Project should take into consideration the content of regional and local plans, frameworks, and strategies (as applicable to the BA process for this Project).

According to the Guideline on Need and Desirability, the concept of 'need and desirability' relates to the "nature, scale and location of the Project being proposed, as well as the wise use of land". The concept of 'need and desirability' can be explained in terms of the broader meaning of its two components, the need, primarily referring to 'time', and desirability to 'place'. It is acknowledged that 'need and desirability' are interrelated and the two components should be considered in an integrated and holistic manner (DEA&DP, 2013). The Guideline further states that the need and desirability of an activity should be evaluated against the principles of "promoting justifiable economic and social development" as well as the principles of "securing ecological sustainable development and use of natural resources" as set out set out in the bill of rights in the Constitution. However, the DEA&DP (2013) also states that consideration must also be given to the sum of all the impacts (due to the Project) considered holistically, when determining the if the proposed activity is the best option when considering "need and desirability".

Taking the above into consideration, this section of the report aims to provide an overview of the need and desirability for the Project, by highlighting how the Project is aligned with the strategic context of international, national, regional, and local development policy and planning, as well as broader societal needs (as appropriate). The overall need and desirability of the Project in the context of developing green hydrogen in South Africa and globally, is considered and described below.

5.2 MOTIVATION

5.2.1 South Africa's goals for decarbonization and the establishment of a Hydrogen Economy

The National Development Plan 2030 (NDP) (2012) stresses that the threat to the "environment and the challenge of poverty alleviation are closely intertwined" and as such environmental policies should not be framed as a choice between the environment and economic growth. The NDP states the following:
"*The 20th century was a period of unparalleled growth for humanity's population and socioeconomic development. During this period, environmental constraints to human activity were often not fully recognized. The world is now experiencing a growing number of undesirable consequences as continued economic expansion and resource exploitation threatens the stability of natural systems.*"

The NDP further adds that "…*South Africa faces urgent developmental challenges in terms of poverty, unemployment and inequality, and will need to find ways to "decouple" the economy from the environment, to break the links between economic activity, environmental degradation and carbon-intensive energy consumption…"* Furthermore, the plan calls for policy in the short term to *"…respond quickly and effectively to protect the natural environment and mitigate the effects of climate change…"*

As a signatory to the Paris Agreement, South Africa has planned to reduce carbon emissions with a net-zero target by 2050. While the backbone of its strategy is the IRP's (2019) Renewable energy program which relies largely on the increased production of Solar and Wind energy from Renewable Energy Independent Power Producers (REIPPP) to be added to the national grid between 2019 and 2030, hydrogen (as a clean/renewable fuel) serves as a vehicle to leverage new green renewable energy sources and decarbonize sectors that are hard to abate. Green Hydrogen (hydrogen produced by use of Renewable Energy sources with zero emissions such as water electrolysis- as is the case with the Project), are seen as holding the potential to water electrolysis.

Just Transition

According to the 2019 Integrated Resource Plan, the energy sector alone, contributes close to 80% towards total emissions, of which 50% are from electricity generation and liquid fuel production alone. As such, the timing of the transition to a low carbon economy must be in a manner that is socially just and sensitive to the potential impacts on jobs and local economies. Hydrogen promotes the transition from a fossil fuel-based economy to a low carbon economy and presents a significant opportunity for the country's economic development, including the creation of new jobs and the monetization of the platinum industry as global commitments towards hydrogen production and demand create an opportunity for South Africa to engage in energy export at the international level.

This will be done in a way that stimulates investment, local economic activity, and local manufacturing, as part of a just transition in the 2021 State of Nation Address, South African President Cyril Ramaphosa cited the use of hydrogen fuel cells as an alternative energy source, as a national priority. The country's Hydrogen ambitions are driven partly by its decarbonization goals to achieve its emissions reduction goals by 2050, and partly by a desire to leverage off Hydrogen for the country's economic growth and exports.

The South African Hydrogen Strategy

A 15-year national hydrogen and fuel cells Research, Development, and Innovation (RDI) Strategy (HySA Strategy) was established in 2008 (extended by an additional 10 years) to promote proactive innovation and create human resources required to develop future industries in Hydrogen and Fuel Cell Technologies (HFCT). The HySA identifies three Centres of Competence and focus areas to implement the HySA Programme including HySA Catalysis (with focus on Catalysts and catalytic devices for fuel cells and hydrogen production), HySA Infrastructure (with focus on technologies for hydrogen production, storage and distribution) and HySA Systems (with focus on Systems integration and technology validation). A Hydrogen Society Roadmap (HSRM) has been developed as recommended in the HySA Strategy, 2007 to guide its vision, and was approved by the South African cabinet on the 14th of September 2021. The implementation of the roadmap is expected to also support inclusive growth and assist government to reduce unemployment, poverty, and inequality. Apart from the HySA (as well as the roadmap), a policy specific to hydrogen production and use has not yet been developed in South Africa.

Table 5-1 below provides a list of national policies and plans to which Hydrogen makes a contribution, which can also be extrapolated to what Government hydrogen policy intervention might require.

Table 5-1:Existing policies and plans in support of hydrogen-related technologies (Hydrogen Society Roadmap For South Africa 2021, Department of Science, and Innovation)

Policy	Link to the Hydrogen Society
White Paper on Renewable Energy Policy (2003)	Increased RE contribution to the energy mix, which requires support from energy storage technologies.
HySA Strategy (2007)	Supports the development of hydrogen and fuel-cell technologies through the 15-year Hydrogen South Africa RDI Programme.
National Energy Efficiency Strategy (2008)	Supports the development and deployment of energy-efficient technologies. Based on their low-carbon attributes and potential for use in demand-side management, hydrogen and fuel cells are attractive options.
National Climate Change Response White Paper (2011)	South Africa has committed to reduce emissions via a peak, plateau and decline trajectory, to which hydrogen could make a contribution.
Beneficiation strategy for minerals industry of South Africa (2011)	Supports the development of technologies that beneficiate the country's mineral resources locally for increased revenue.
Department of Public Works and Infrastructure Green Building Policy (2018)	Given their low-carbon footprint, hydrogen fuel cells are a viable option for deployment in public buildings and to power critical infrastructure
Green Transport Strategy for South Africa (2018)	Advocates for the deployment of electric vehicles, including hydrogen fuel-cell powered vehicles, as a means for decarbonising the transport sector.
Integrated Resource Plan (2019)	Increased contribution of RE in the energy mix would require hydrogen for optimal usage and long-term storage.
National Development Plan 2030	Advocates for the transition to a low-carbon and diversified energy system.

A cornerstone of the government's HySA Strategy is the flagship Platinum Valley Project (South African Hydrogen Valley), an industrial cluster to combine various applications into an integrated hydrogen ecosystem. The South African Government's Department of Science and Innovation (DSI), in partnership with Anglo-American, Bambili Energy and ENGIE are looking into opportunities to transform the Bushveld complex and larger region around Johannesburg, Mogalakwena/Limpopo and Durban (catalytic green hydrogen hubs) into a Hydrogen Valley that can help kickstart the country's hydrogen economy. The South Africa Hydrogen Valley Feasibility Study Report (2021) proposes catalytic projects in the mobility sector, which will involve hydrogen fuel-cell powered buses, forklifts, and heavy-duty and mining trucks. The Mogalakwena region is positioned as the mining hub, with 90% of its nearly 40 kt of Hydrogen demand driven by possible demand from mining trucks across the region's mines (transitioning to the use of hydrogen fuelled mine trucks). This Project forms a part of the Anglo Hydrogen Valley Project which has been registered as a Strategic Infrastructure Development System (SIDS) on 7 April 2022.

5.2.2 Anglo American Sustainable Mining Plan

AAP is committed to being part of the solution to climate change and aim to play their part in maintaining global temperature rise to below 2°C as called for by the Paris Agreement. As such, Anglo has committed to achieve a 30% reduction in emissions by 2030 (on a 2016 baseline), and carbon neutrality across their operations for Scopes 1 and 2 by 2040, and to reduce their Scope 3 emissions by 50% by 2040, across their operations.

One way to achieve this is through FutureSmart Mining™, an Anglo-American innovation-led approach to sustainable mining. Integral to FutureSmart Mining™ is the Sustainable Mine Plan. The Sustainable Mine Plan is built around the three Global Sustainability Pillars aligned with the United Nation's (UN) Sustainable Development Goals (SDGs) and has set Global Stretch Goals relating to each of them. These include (1) maintaining healthy environments, (2) building thriving communities and (3) building trust as a corporate leader. The goal to healthy environments addresses (amongst other environmental issues) the pressing challenge of climate change through the reduction of greenhouse gases.

The Anglo-American Green House Gas emission reduction ambitions are built on the following:

- Scope 1: Deployment of FutureSmart Mining™ is central to reducing energy demand and delivering the step-change innovation required for avoiding emissions, including the capture and use of fugitive methane.
- Scope 2: The procurement and rapid roll-out of renewable power supply, including through embedded generation where necessary.

To date, AA have achieved a reduction in greenhouse gas emissions by 22% relative to the business as usual (BAU) projection. In addition, they have achieved an 8% reduction in energy consumption relative to BAU projection. AA have set the following milestones and targets for 2030 and 2040.

- Milestones and targets - 2030
  To reduce net greenhouse gas emissions by 30%. Improve energy efficiency by 30%. Be carbon netiral across 8 of their sites.
- Milestones and targets – 2040
  Be carbon neutral across all operations.

Furthermore, the realization of Anglo's ongoing programme for operational emissions reduction relies heavily on the use of renewable energy to power their mines operations, as well as the use of low carbon power sources through the integration of green hydrogen production and fuel switching at major opencast mines, together with the electrification or alternative low carbon fuels for other major diesel use applications. To this effect, the proposed PDP (as an extension to the PoC Plant and part of the FutureSmart Mining™ and NuGen™ programme) serves as an innovative initiative to reduce in Mogalakwena Mine's greenhouse gas emissions from its haulage and by building onsite hydrogen production.

In summary, the proposed development is desirable as it will contribute to the:

- Enhancement of energy security by contributing to and promoting South Africa's energy policy towards energy diversification.
- Promotion of local and national socio- economic development by creating jobs and promoting skills development at a local scale, the creation of downstream business opportunities and the enhancement of community infrastructure, and a contribution to the country's GDP through the establishment of a competitive Hydrogen economy.

- Assists in meeting international commitments to carbon emission targets in line with global climate change commitments.
- Reduces pollution by using 'cleaner' energy generating mechanisms and reducing the demand on carbon-based fuels.

The Project is therefore viewed in a positive socio-economic and environmental context due to the potential for employment creation, energy diversification and contribution to the country's GDP growth, as well as the reduction of greenhouse gasses and therefore climate change abatement. Table 5-2 provides more detailed responses with regards to the Project specific questions raised in the Need and Desirability Guideline of DEA (2017). The responses below take into consideration relevant municipal planning documents as well as the outcome of the BA process.

Table 5-2: Need (timing) of the proposed project (based on the 2017 DEA and 2013 DEA&DP Guidelines).

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Consideration	**Response / Motivation**
Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority i.e., is the proposed development in line with the projects and programmes identified as priorities within the Integrated Development Plan (IDP)?	The PDP Project serves to connect the Hydrogen production and mine haul truck application and entails the expansion of the existing PoC Plant to include the development of mobile low-pressure storage and fixed high pressure storage infrastructure or facilities. The PDP Project will therefore be undertaken within the existing PoC Plant area (located on the Mogalakwena Mine premises) managed in terms of the consolidated Mogalakwena EMPr with Reference Number: LP30/5/1/2/2/50 MR ("Consolidated EMPr") and therefore does not require a change of land use outside of the demarcated mining right area. The most recent regional and local SDFs do not make mention of the integration of Hydrogen as an alternative clean energy to be explored in the region as yet. However, the local and regional IDPs highlight climate change and air pollution from the mining sector as a challenge and threat to the region that needs to be addressed through the implementation of a climate change strategy. The Waterberg district 2021 One Plan (An integrated District Development Model (DDM) aimed at addressing service delivery challenges and localised procurement and job creation and that involves communities) also highlights the limited renewable energy infrastructure, and the need to for renewable energy sources mapping. The plan also makes reference to the Bulk-energy management strategy, which seeks to “unlock environmental and economic benefits of using renewable energy, generating energy that produces no greenhouse gas emissions from fossil fuels and reduces air pollution. Diversifying energy supply and reducing dependence on imported fuels. The bulk -energy management strategy also seeks to unlock the benefits of strategic energy maintenance through improved energy efficiency and energy conservation, improved peak demand management and reduced demand charges, decreased overall energy cost, greenhouse gas emissions and improved reliability through integration.” The South African government has identified hydrogen fuels cells as a national priority as an alternative energy source, and its potential as significant opportunity for economic development in the country through the creation of jobs and the monetization of the platinum industry. The Anglo Hydrogen Valley Project is being undertaken as part of the Department of Science and Innovation (DSI) initiative to investigate opportunities to transform the Bushveld complex

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	and larger region around Johannesburg, Mogalakwena and Durban into a Hydrogen Valley. As indicated, the Mogalakwena area has been identified as one of the strategic regions positioned for the Hydrogen Valley, driven by the demand for mining trucks fuel for surrounding mines in the Limpopo region. As such, the Project is aligned with the country's Project strategies and regional spatial development plans (Mogalakwena Hydrogen Valley region). This Project forms a part of the Anglo Hydrogen Valley Project which has been registered as a Strategic Infrastructure Development System (SIDS) on 7 April 2022.
Should development, or if applicable, expansion of the town/ area concerned in terms of this land use (associated with the activity being applied for) occur at this point in time?	The 2021_2022 IRP has identified the need for a diverse energy mix to reduce reliance on a single or a few primary energy sources. The Project serves as part Anglo's of a rollout of green hydrogen as an alternative and clean source of clean energy. The Project also aligns with national policy direction as well as contributing to South Africa being able to meet some of its international climate change obligations, by aligning domestic policy with internationally agreed strategies and standards as those set by the United Nations Framework Convention on Climate Change. Furthermore, the development is located within the planned "Mogalakwena Hydrogen valley, which is one of the strategic focal regions targeted to establish the green hydrogen economy in South Africa. The development entails the expansion of the existing PoC Project that is located within the Mogalakwena mine operations footprint. No other developments except for any additional mining activities deemed necessary can be carried out at the Project site during the current mine operational phase. An extensive site selection process was undertaken to identify the most suitable area within the mine where the PoC can be undertaken. The site was selected based on various engineering feasibility and environmental considerations.
Does the community / area need the activity and the associated land use concerned (is it a societal priority)?	As indicated, the local and regional IDPs highlight climate change and air pollution from the mining sector as a challenge and threat to the region, that needs to be addressed. Furthermore, the Waterberg district 2021 One Plan indicates that the district's current ability to mitigate or adapt to climate change risks poses an imminent threat on vulnerable communities and the future growth and development potential of the district. The HySa strategy notes that an investment into a Hydrogen economy is likely to have significant economic spinoffs for the region. Developments such as this one (that will help establish a hydrogen economy) in the proposed Mogalakwena Hydrogen Valley will likely

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	contribute to the following socio-economic benefits that the communities in the region can benefit from in the long run: • Promotion of local and national socio- economic development by creating jobs and promoting skills development at a local scale. • The creation of downstream business opportunities and the enhancement of community infrastructure, and a contribution to the country's GDP through the establishment of a competitive Hydrogen economy. • Reduction of pollution by using 'cleaner' energy generating mechanisms and reducing the demand on carbon-based fuels.
Are there necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	The Project serves as an expansion to the PoC Plant within the existing Mogalakwena Mine. As such no additional municipal services will be required at the site. Should any need for other services arise the relevant authority will be communicated with, and the necessary approvals / agreements obtained before proceeding • An additional internal road and access road will be developed for the Project, but this infrastructure will be located within the current PoC Plant footprint and tie into the existing mine road network. • Waste management for general waste will be handled and collected through the existing mine waste operational procedure, i.e., general waste will be collected and disposed of by the mine's licensed contractor for sorting at the mine sorting area for recycling in accordance with the Anglo PGM businesses' zero waste to landfill strategy. • The mine has a bioremediation site located adjacent to the Project area, where contaminated soil is treated for re-use/replacement on the mine site. Therefore, only a small additional amount of hazardous waste will be collected by the mine's licenced hazardous waste contractor for disposal at a licenced hazardous waste facility. • A 0.4 kV substation will be constructed on site to source electricity from an existing overhead transmission line. • Potable and make-up water supply will be sourced from the existing Mine South Concentrator and PoC Plant raw water buffer tank.
Is this development provided for in the infrastructure planning of the municipality, and if not, what will the implication be on the infrastructure planning of the municipality (priority and placements of services)?	Although the Project is not specifically mentioned in the relevant District and Local municipal planning documents (as it serves as one of the first of its nature, contributing to the establishment of the hydrogen sector in the country for both environmental and socio-economic reasons), reference is made to the need to establish climate adaptation measures and abate the climate change impacts.

NEED	
	The Project will have no bearing on the infrastructure planning of the municipality as it will require limited additional services and infrastructure and be confined to the existing footprint of the PoC Plant within the Mining Right area. However, as indicated, the Project will be supported by services and infrastructure sourced from the mine's existing services and infrastructure. Water will be sourced from existing licenced boreholes and electrical services required for the Project will be sourced from existing lines on the mine, generators and/or on-site renewable energy installations (e.g., solar panels). Waste will be collected and transported as part of the existing Mogalakwena waste handling procedures, much of which will be recycled by authorised recyclers. Therefore, apart from trucking a negligible amount of hazardous waste to licenced waste sites and sewerage from conservancy tanks to municipal wastewater plants, no additional municipal services are required for the proposed development. Additional storm water management requirements will be assessed, however any changes to the existing stormwater management will be integrated into the mine's existing stormwater management system. Should any other municipal services be required, these will be confirmed and agreed with the municipality prior to commencing. Should the municipality be unable to provide the necessary services, then the applicant (or their appointed contractor) will be responsible for providing the necessary services to the site via use of private service providers.
Is this project part of a national programme to address an issue of national concern or importance?	The establishment of the Project would further prove AA's concept and help establish a Hydrogen economy and contribute to the national mandate of diversifying energy sources as stipulated in the 2019 IRP and making a just transition and decarbonizing the country. The HySa strategy notes that an investment into a Hydrogen economy is likely to have significant economic spinoffs for the region. Developments such as this one (that will help establish a hydrogen economy) in the proposed Mogalakwena Hydrogen Valley. Furthermore, the South African President Cyril Ramaphosa cited the use of hydrogen fuel cells as an alternative energy source, as a national priority due to ambitions driven partly by its decarbonization goals to achieve its emissions reduction goals by 2050, and partly by a desire to leverage off Hydrogen for the country's economic growth and exports.

NEED	
Do location factors favour this land use (associated with the activity applied for) at this place?	As indicated, the Project is a brownfields project located in the existing PoC Plant within the already disturbed footprint area of the Mogalakwena Mine. As such, the development does not further encroach on, or impact additional communities and the areas potentially affected by the induced and negative impacts are minimal. The area has also been demarcated in the HySA as a flagship Platinum Valley (Mogalakwena Valley) , a catalytic green hydrogen hub that can help kickstart the kickstart the country's hydrogen economy due to the high Hydrogen demand driven by mining trucks across the region's mines. The ecological sensitivity of the site has also been considered in detail through an iterative screening assessment, as well as the various site assessments undertaken by the specialists. The process investigated the environmental sensitivities of the site and the possible impact on the receiving environment because of the proposed development. This allowed for a layout and site selection which avoids highly sensitive areas. Refer to Section 6.7 for a description of the baseline environment. Section 6.13 includes a description and assessment of potential impacts, as identified by specialists and the EAP.
Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements / aspects), and specifically also on the socio-economic objectives of the area? Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programmes?	Very few resultant negative socio-economic impacts are expected from the Project. Negative impacts include the increased safety risks associated with the increased hydrogen storage capacity, which will be managed in terms of regulatory requirements and industry standards. The 2021-2022 Mogalakwena Local Municipality IDP expresses the municipality's goal to support and contribute to the Limpopo Development Plan (LDP)'s main economic agenda to intensify sustainable job creation and enhance the skills base of the province towards supporting socio-economic growth and development in the province. Both the local and district municipalities also highlight these two factors (unemployment and skills shortage) as key performance areas requiring improvement in the region. The Mogalakwena Local Municipality's objectives include: • The creation of decent employment through inclusive economic growth and sustainable livelihoods • Improved quality of life of citizens • Prioritized social protection and social investment • Promotion of vibrant and equitable sustainable rural communities

NEED	
	• Improved effectiveness and efficiency of a developmental public service • Ensuring sustainable development The Project is expected to have indirect positive impacts related to the country's GDP growth through its contribution to the establishment of a hydrogen economy in the Mogalakwena Hydrogen valley. The Project will also contribute to as well as the creation of employment and skills development opportunities. The Hydrogen Valley has a strong potential to contribute to the just transition and could potentially add a significant capital injection to the GDP (including indirect contributions) by 2050. The Project is therefore aligned with the economic development vision of the Provincial and Local development Plans.
What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	The potential for the Project to negatively impact on the environmental health and safety have been recognised and a number of investigative steps have been identified to ensure a good understanding of these potential impacts throughout the Project's life cycle. Although the anticipated additional impacts that may result from the Project are considered negligible due to the Project being undertaken within the existing PoC Plant footprint. The Project site was assessed through various specialist studies including the following: • Terrestrial biodiversity assessment; • Aquatic assessment; • Socio-economic compliance statement; and • Heritage desktop assessment (including Palaeontological assessment). The assessments were undertaken to identify any potential impacts and suggest the necessary management measures and minimises impact to the receiving and/or surrounding environment. The outcome of the BA process will culminate in an EMPr (that encompasses the mitigation measures), that will be applicable to the pre-construction, construction, operational and decommissioning phases of the Project, to ensure that an environmentally and socio-economically sustainable approach is implemented. The EMPrs will be managed and implemented as a living document, to allow the Project to adapt to and accommodate unforeseen environmental / social / political / economic changes and needs.

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	Regarding the consideration of safety for Project, the construction and operation of the Project will include activities that are deemed as hazards and/or risks to the health and safety of the employees. Such hazards / risks will be managed in accordance with the relevant requirements of the Mine Health and Safety Act. A Major Hazardous Installations assessment is also being undertaken for the Project in parallel with this BA process. The assessment will be used in conjunction with the mine's current Operational Risk Management process.
What measures were taken to ensure the participation of all interested and affected parties? What measures were taken to ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge?	As part of the BA process required for this Project, it is necessary to engage with all Project affected persons (PAPs) and interested and affected parties (I&APs). PAPs / I&APs include all interested stakeholders, technical specialists, and the various relevant organs of state who work together to produce better decisions. Stakeholder Engagement will be undertaken as per the requirements of Regulations 41 and 42 (GNR. 326) of the NEMA EIA Regulations 2014, and the Public Participation guideline document in terms of NEMA (issued by the DFFE in 2017). Furthermore, the stakeholder engagement process will conform to the Anglo-American ESHIA standard, the Anglo Social Way as well the International Finance Corporation's (IFC) requirements and Performance Standards and is developed following principles of good international industry practice (GIIP). Information on the purpose, nature of the impacts, impact scale and impact duration of the proposed PDP Project as well as the mitigation measures will be presented to I&APs during the stakeholder engagement. The approach to stakeholder engagement is detailed / discussed in Section 6.5. A pre-application meeting was held with the Competent Authority (CA) (DMRE-Polokwane) on 06 April 2022 to provide the CA with information on the proposed development and confirm their agreement with the proposed public participation process, as outlined in the Stakeholder Engagement Plan. During this meeting, the procedural aspects of the application were discussed, and a brief overview of the Public Participation Process was presented to the department's officials. The officials provided recommendations for inclusion into the Public Participation Process. These recommendations were thereafter included in the Stakeholder Engagement Plan.
Describe the positive and negative cumulative socio-economic impacts bearing in mind the size,	Please refer to Section 8 for information on anticipated cumulative impacts, which were assessed in accordance with

NEED	
scale, scope and nature of the project in relation to its location and other planned developments in the area.	the methodology outlined in Section 6.12. It should be noted that this will be a brownfields Project located in an already disturbed footprint area of the Mogalakwena Mine, within the PoC Plant area. As such, the development does not further encroach on, or impact additional communities and the areas potentially affected by the induced and cumulative negative impacts are minimal. There are no negative cumulative impacts associated with the Project (see Appendix D: Detailed Assessment of Potential Impacts). The development does, however, make a significant contribution to the potential cumulative positive socio-economic impacts of the region, and the country on a national scale. Based on the expected socio-economic contributions of the establishment of the Hydrogen economy, it is anticipated that Project will contribute to or serve as a steppingstone towards the realisation of the following cumulative socio-economic impacts: • Promotion of local and national socio- economic development by creating jobs and promoting skills development at a local scale. • The creation of downstream business opportunities and the enhancement of community infrastructure, and a contribution to the country's GDP through the establishment of a competitive Hydrogen economy. • Reduction of pollution by using 'cleaner' energy generating mechanisms and reducing the demand on carbon-based fuels.
Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e., what are the opportunity costs of using these resources for the proposed development alternative?)	The provincial, district and local strategic planning documents have identified the socio-economic and environmental benefits of diversifying energy sources and exploring more renewable and clean energy developments, which this Project will serve. The proposed use of the natural resources of the area is therefore in line with these planning documents. Project infrastructure will be located on the existing mine site (a brownfields area). The Project will therefore not displace much natural resources and will have negligible negative impacts on the natural environment. Please also refer to Section 8 for further detail on potential impacts to the natural environment, as well as the associated recommendations and mitigation measures.
What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and	Stakeholder engagement is as an important aspect of sustainable development to ensure that adverse environmental impacts are appropriately addressed and not result in discriminating distribution of these impacts. For this reason, the Public Participation Process has been undertaken

NEED	
disadvantaged persons (who are the beneficiaries and is the development located appropriately)?	in line with legal requirements, to enable the Project team to incorporate and communicate the views of the I&APs and key stakeholders into the proposed development. Please refer to Section 6.5 for details regarding the public participation / engagement process undertaken.
What measures were taken to ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge?	The Public Participation Process required, in terms of the NEMA, has been undertaken in line with the requirements prescribed by the EIA Regulations, the Anglo-American ESHIA standard, the Anglo Social Way as well the International Finance Corporation's (IFC) requirements and Performance Standards and was developed following principles of good international industry practice (GIIP). Refer to Section 4.6 and Appendix 6 which details the Public Participation Process undertaken to date. A preliminary I&AP/Stakeholder database was compiled which consists of potentially interested and/or affected members of the public; landowners (including affected and directly adjacent landowners); ward councillors; authorities (local, regional, and national, as applicable); Organs of state; NGOs; Community-Based Organisations and other key stakeholders. As part of the Public Participation Process, site notices and posters containing Project related information and details on how to register were erected in certain locations near the site, while adverts (single newspaper advert in English and Sepedi) containing this information were also published in a local newspaper. The site notices / posters and newspaper adverts are being used to register potential I&APs on the Project database (i.e., being used to inform Project database). The Project database will be continually updated throughout the BA process. Additional I&APs will be added to the database, should additional requests be made to register. A Public and/or Focus Group Meeting may be held with I&APs and/or key stakeholders, should these be requested or deemed necessary. Should meetings be required or deemed necessary, the format of the meeting(s) (i.e., physical or virtual) will be agreed to and confirmed with all meeting attendees prior to making the necessary arrangements. The Draft BAR will be distributed to the public to all I&AP for review. The above measures ensured that the interests, needs and values of all I&APs are considered throughout the BA process.

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How was a risk-averse and cautious approach applied in terms of socio-economic impacts?	A screening of the Project site (including ground-truthing, where required), as well as specialist assessments were undertaken as part of the BA process, to allow environmental and social impacts to be considered and evaluated. The screening process involved the identification and mapping of sensitive and/or 'no-go' areas of the site to avoid all environmental, social and technical sensitive areas, and considered impacts from Project related infrastructure. The results of the BA process showed that there are no fatal flaws associated with the Project that should prevent the Project moving forward and that the Project should subsequently be authorised.

6. MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT ON THE SITE INCLUDING THE PROCESS FOLLOWED TO DEFINE THE PREFERRED DEVELOPMENT ALTERNATIVES

6.1 LOCATION ALTERNATIVES

The fundamentals of the Project design are based on the expansion of the existing and authorised PoC Plant. It follows that the Project location and layout will be dictated by the current location of the PoC Plant, which is within the operational area of the Mogalakwena Mine. As such, no site location alternatives were considered for the Project. It must be noted however that the chosen site location ensures the least impact on existing land use and excludes the clearing of additional and undisturbed land.

6.2 TECHNOLOGY ALTERNATIVES

AAP has committed to implementing initiatives to reduce their carbon emissions and use of non-renewable fossil fuel through strategic focus, driven by Smart Energy Initiatives (see Section 0). The nuGen™ Zero ZEHS is one such initiative which aims at providing end-to-end solution to decarbonise heavy duty transport and includes hydrogen production, on-site storage, ultra-heavy duty refuelling and hydrogen-battery hybrid powertrains to replace incumbent fossil fuel technology across all AA mines. The AA Smart Energy Initiatives are making technological advancements to energy efficiency across their mines by switching to low carbon energy sourcing and significantly increasing the role of renewables as an energy source. The technology used for this Project is based on the latest advancements in providing green energy to support a just transition to zero carbon emissions on the Mogalakwena Mine. The proposed technology therefore considers the latest global approaches, and novel patented hydrogen production fuel cell technology. The Project is also based on the expansion of technology of the PoC Plant and it follows that technology alternatives were limited to the technological concepts being currently tested.

6.3 ACTIVITY ALTERNATIVES

The main activity requiring environmental authorisation for this Project is the increase in capacity of hydrogen storage. The Project comprises the expansion of the PoC Plant in order to ramp up green hydrogen production in order to deploy three additional mine hauls trucks which are retrofitted with hydrogen fuel cell and battery-powered modules. Activity alternatives were therefore constrained by the feasibility of an expansion of existing infrastructure to meet the additional storage requirements. Further to this, the expansion activity is necessary as the next step in achieving full scale green hydrogen production at the Mogalakwena Mine.

Two types of hydrogen storage options were considered for the Project, these included fixed and mobile storage options. Mobile storage will be undertaken by the use of HCTTs which will be connected to the fixed storage facilities (Export System or HRS) during normal operation. Both these storage options were deemed feasible for the Project so as to enable rapid refuelling of the mine haul trucks.

Diesel powered haul trucks account for approximately 80% of total diesel consumption across AAP mines. AAP plan to replace diesel and petrol use for vehicle and other machinery, with hydrogen and electrification. The operation and success of PoC Plant and Project (if authorised) will reduce the mine's reliance on diesel and thereby contribute to carbon reduction and achievement of net zero emissions at the mine (in future).

The success of the Project in advancing the use of hydrogen fuels is also likely to support the creation of a hydrogen economy in the region. It follows that the use of hydrogen can be considered an alternative to diesel and petrol consumption.

6.4 THE "NO-GO" ALTERNATIVE

The No-Go alternative is the non-occurrence of the Project. The negative implications of not going ahead with the Project are as follows:

- Loss of opportunity to contribute to the decarbonising efforts on the mine.
- Loss of learning opportunities in expanding this technology across all mine sites to reduce climate change through the use of low carbon power sources.
- Loss of opportunity to expand existing infrastructure within disturbed footprints (to limit additional land disturbance).
- Loss of opportunity to contribute to the strategic development of a hydrogen economic ecosystem in SA.
- Loss of potential financial growth of the Mogalakwena Mine operations to reduce costs associated with diesel use.
- Minimal loss of job and procurement opportunities associated with the construction and operation phase.

6.5 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

This section describes the Public Participation Process (PPP) undertaken in line with Section 6 of the EIA Regulations 2014. In addition to this, the consideration was also given to various public participation guidelines governed by the DFFE, International lending standards and Anglo American Stakeholder Engagement policies and standards (see Appendix C: Public Participation Process).

The aim of the public participation process is to co-ordinate a mechanism through which I&APs are informed of the Project and the environmental authorisation process. The I&APs are given an opportunity to provide input into the Project plan, the assessment of potential impacts and proposed mitigation measures. The stakeholder engagement process was founded on the principles of openness and transparency and ensured that all Project stakeholders have equitable access to all information that has or may have the potential to influence any decision or comment made unless such access to information is protected by law. An overview of the public participation process undertaken as part of this BA Process is detailed below

6.5.1 Identification of Stakeholders

Stakeholders have been identified by considering the Project's area of influence, comprising the footprint of the facility and associated infrastructure, the extent of the anticipated direct and indirect impacts, and the areas potentially affected by the induced and cumulative impacts. The Project will be confined to a very small expansion footprint and will be undertaken within a brownfields site within an already disturbed area of the Mogalakwena Mine.

As part of the identification process the landowner, the Mapela Traditional Authority (held in Trust by the National Government of the Republic of South Africa), and owners, persons in control and occupiers of the site directly adjacent to the Project area were identified and recorded on the Project stakeholder database. This has been done through discussions and in agreement with the Stakeholder Engagement Team of

Mogalakwena Mine. It should be noted that AAP is the only land occupier and/or person in control of the site within the Project area.

In addition, stakeholders were further identified: by using the existing stakeholder engagement database compiled for the Mogalakwena Mine; through registration as an I&AP in response to the stakeholder notification and engagement process for the Project; parties with specific interest to Project aspects or hydrogen generation; and by using the DFFE screening tool. Authorities, Local Municipal Councillors, non-governmental organisations, and parastatals required to participate in the process were identified through SLR knowledge and experience working in the Limpopo Province or previous work and contributions from the Stakeholder Engagement Team of the Mogalakwena Mine. Table 6-1 shows the I&APs identified as part of the BA Process.

Details of the identified I&APs were collated to produce a project Stakeholder database which was updated throughout the Project and were considered as registered I&APs. This public participation process took cognisance of the Protection of Personal Information Act (2013). As such, registered I&APs were informed of their right to withdraw as a registered I&AP at any stage of the BA process.

Table 6-1: I&APs identified for the BA Process

Landowners, historic occupiers, and adjacent landowners	
Mapela Traditional Authority (Kgoro, Group 7 & Resettlement community)	Ga-Molekane
Ga-Puka	
Competent authority	
Department of Mineral Resources and Energy (Limpopo Office)	
Commenting authorities	
Mogalakwena Local Municipality	Waterberg District Municipality
Limpopo Department of Economic Development, Environment and Tourism (LEDET)	Department of Water and Sanitation (DWS) (Limpopo Office)
Department of Agriculture, Land Reform and Rural Development	Limpopo Heritage Resources Authority
National Department of Forestry, Fisheries and the Environment (DFFE)	South African Heritage Resources Agency
Department of Health	South African Civil Aviation Authority
Department of Public Works	Department of Defence
Department of Social Development (Limpopo)	Waterberg District Municipality
South African Grain Farmers Association	
State-owned entities and regulators	
Eskom Distribution	Square Kilometre Array
Eskom Transmission	Telecommunication Facilities
South African National Energy Development Institute (SANEDI)	South African Weather Services (SAWS)

South Africa Human Rights Commission (SAHRC)	National Energy Regulator of South Africa (NERSA)
Roads Agency Limpopo (RAL)	South African National Road Agency Limited (SANRAL)
Interest groups	
Chamber of Mines	Earthlife Africa
Independent Power Producer Office	South African Photovoltaic Industry Association (SAPVIA)
Birdlife South Africa	South African National Energy Development Institute (SANEDI)
Botanical Society of South Africa	Independent Power Producer Office
Centre for Environmental Rights	South African National Biodiversity Institute (SANBI)
Wildlife and Environment Society of South Africa (WESSA)	Department of Trade, Industry and Competition
Department of Science and Innovation	Department of Transport (DoT)
Department of Science and Technology	Infrastructure South Africa
Department of Public Works and Infrastructure	Limpopo Economic Development Agency
South African National Energy Development Institute	Independent Communications Authority of South Africa (ICASA)
Council for Scientific and Industrial Research	
Local stakeholders	
Neighbouring landowners	Community forums (e.g., employment, youth, environmental)

6.5.2 Project Notification

An overview of the material used to notify I&APs as part of the PPP undertaken to date is shown in Table 6-2 below.

Table 6-2: Overview of notification material and means of distribution for the BA process

Material	Purpose	Proposed distribution
Notification and consent letters	The notification letter included an invitation for the identified stakeholders to attend face-to-face focus group meetings in order to provide further information on the Project and to record any comments and issues.	• Project notification letters in English and Sepedi were sent electronically to all relevant owners, persons in control and occupiers of the site and the adjacent[5] sites, to ensure full involvement in the process. • The face-to-face focus meetings were arranged and conducted by the Mogalakwena Stakeholder Engagement Team.

[5] "*Adjacent*" isn't defined in NEMA so one could take a literal interpretation.
The Oxford Dictionary defines adjacent as "*next to or adjoining something else*".
Adjacent landowners and occupants have been identified by the Mine Stakeholder Engagement Team to include Ga-Molekane.

Material	Purpose	Proposed distribution
		• Consent from the owners of the affected farm on which the Project will be constructed - the Mapela Traditional Authority, was obtained by AAP. Proof of consent and distribution is provided in Appendix C: Public Participation Process.
SMS Notification	SMS notifications will be utilised as a means to contact I&APs who only have provided their cell phone numbers as a means of contact. Content of the messages will include a link to the Project website indicating where the reports can be accessed.	"SMS" text messages were sent to all registered I&APs, including neighbouring landowners, on the stakeholder database, where cell phone numbers are available. Proof of distribution of SMS notifications will be included in the final BAR and EMPr report submitted to the DMRE for decision making.
Site notices and posters	The site notices contained information on the proposed activity, the authorisation process, details of the EAP and information on how to register and participate in the public participation process.	The site notices were erected at conspicuous places in and around the mine in English and Sepedi. The notices were fixed at the following locations: • at the entrance of Mogalakwena Mine; • Mogalakwena Local Municipality; • Mogalakwena local library; • Waterberg District Municipality; • Machikiri Community Hall; and • Sandsloot Mabusela retail store. A photographic record and depicting the placement of the site notices are included in Appendix C: Public Participation Process.
Background Information Document (BID)	The purpose of the BID was to provide information about: • The Project; • The baseline environment of the Project area; • The environmental assessment process being followed; • Possible biophysical / cultural / socio-economic impacts; and • How to have input into the environmental assessment process.	The BID was compiled in English and Sepedi and were made available electronically to all I&APs and commenting authorities registered on the Project stakeholder database. SMS notifications were sent to all I&APs registered on the Project database to inform I&APs of the availability of the BID which was downloadable from either the SLR website or the SLR data-free website. Links to these websites were included in the SMS notifications. Hard copies of the BID were placed at the following locations: • at the entrance of Mogalakwena Mine; • Mogalakwena Local Municipality;

Material	Purpose	Proposed distribution
		• Mogalakwena local library; • Waterberg District Municipality; • Machikiri Community Hall; and • Sandsloot Mabusela retail store. A photographic record and depicting the placement of the site notices are included in Appendix C: Public Participation Process.
Newspaper Advertisement	Two newspaper advertisements were published to notify I&APs of the Project and authorisation process. The newspaper advertisement contained information on the nature of the activity, the application process, as well as details of the EAP and details on how to register as an I&AP and provide comment.	One round of advertisements was published in the Bosveld Review and Polokwane Observer, in English and Sepedi. • The adverts were placed in the Bosveld Review on 21 July 2022. • The advert in the Polokwane Observer was placed on 21 July 2022. Copies of the advertisement is attached in Appendix C: Public Participation Process.

6.5.3 Lands Claims Commissioner

The Department of Agriculture, Land Reform and Rural Development (DALRRD) in Limpopo was contacted to confirm if there are land claims on the Farm Zwartfontein 818 LR Marula upon which the Project will be undertaken. Correspondence was received from the Land Claims Commissioner on 22 June 2022. The Land Claims Commissioner confirmed that there are existing land claims for the farm Zwartfontein 818 LR, which were lodged prior to 1998. The claimants were the Mapela Community and the Boshomane Community. The claim status for the Mapela Community indicates that the Research Report is approved, but the claim not settled. The status of claims by the Boshomane Community has been settled by financial compensation. The registered claimants will be involved as stakeholders in the PP process. Correspondence is attached in Appendix C: Public Participation Process.

6.5.4 Pre-Application Consultation

A pre-application meeting was held with the Competent Authority (DMRE – Polokwane) on the 7 April 2022. The purpose of the meeting was as follows:

- to provide an introduction to the Project;
- to engage with the Department on the understanding of the environmental legislative framework and associated authorisation requirements;
- agree on procedural aspects and the way forward for the environmental authorisation for the Project;
- to discuss the planned public participation approach; and
- to record any comments and issues raised.

During this meeting, the procedural aspects of the application were discussed, and a brief overview of the Public Participation Process was presented to the department's officials. The officials provided recommendations for inclusion into the Public Participation Process. These recommendations were

thereafter included in the Public Participation Process approach described herein. Notes of the Pre-Application consultation is included in Appendix C: Public Participation Process.

6.5.5 Comments and Responses Report

All comments received during the Project were captured in a Comments and Responses Report (CRR). The CRR was updated on a continuous basis and presented to the authorities and stakeholders together with the BAR and EMPr. The CRR provides a full record of issues raised, and how the issues were addressed during the Project. Stakeholder comments were integrated into the BAR and EMPr, where relevant.

6.5.6 Review of the Basic Assessment Report

The BAR (English) and Non-Technical Summary (English and Sepedi) were made available for public review and comment from 1 August 2022 – 2 September 2022, in order to provide I&APs with an opportunity to comment on any aspect of the Project and the findings of the environmental assessment process. I&APs were notified of the public review period by text message, e-mail and post (where no other contact information was available).

Full copies of the BAR and the Non-Technical Summary were placed on the SLR website (https://www.slrconsulting.com/en/public-documents) and the SLR data-free website (https://slrpublicdocs.datafree.co/en/public-documents/). Hard copies of the BAR and EMPr were made available for review at the Mogalakwena Local Library; and the Machikiri community hall. All registered I&APs were notified of the BAR availability and review period.

6.5.7 Submission of the BAR to the Competent Authority

Following the 30-day public review period, the CRR, will be updated to include any comments and concerns received by I&APs and commenting authorities. The BAR and EMPr will be updated to reflect the integration of comments, where applicable. The updated BAR will be delivered in hard copy (maximum of 2 copies) to the DMRE (Polokwane) as requested by the authorities during the Pre-application meeting. Hard copy documents will be made to the commenting authorities upon request.

6.5.8 Notification of Decision

On receipt of the Environmental Authorisation (positive or negative) for the Project, registered I&APs will be informed of this decision and its associated terms and conditions as well as the appeal process by email correspondence.

6.6 SUMMARY OF ISSUES RAISED BY I&APS

A summary of the issues and concerns raised to date have been included in Appendix C: Public Participation Process. All written comments received to date, and issues raised during the PPP will be transcribed and provided in the Comments and Concerns Report attached in Appendix C: Public Participation Process.

6.7 ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PROJECT AND THE ALTERNATIVES

6.7.1 Baseline Biophysical Environment

6.7.1.1 Climate

The information presented in this section was sourced from the EIA and EMPr Report compiled in support of the Mogalakwena Mine Expansion Project (SRK Consulting, 2019), the Climate Change Knowledge Portal (World Bank Group, 2022), Green Book (Council for Scientific and Industrial Research, 2022) and climate change specialist knowledge (SLR, 2022).

Current climate

The Project area falls within the summer rainfall region of Limpopo with typically hot summers and cool, dry winters (SRK, 2019). The rainy season is from October to April. Most of the rainfall results from thunderstorms, and rainfall events of short duration mostly in the afternoon and early evenings. The average maximum temperature for the area ranges from 28.8 °C to 39.4 °C and average minimum range from 8.2 °C to 11 °C. The mean minimum monthly temperature is 13.0 °C and the maximum mean monthly temperature is 26.3 °C.

Rainfall data was obtained from the on-site weather stations as well as the Weather Station W0633482 located approximately 15 km southwest of the mine (1903-2000). Together, the stations have a 115-year record. The mean annual precipitation for weather station W0633482 and Site Rainfall is 620 mm, refer to Table 1 1. A maximum of 8-12 rain days per month is typically expected during the rainy season, whilst in the dry season a maximum of one rainy day may be expected per month. Most rain (85 %) falls in the six-month period from October to March. Only 8 % of the rainfall occurs between May and September. The rainfall is mainly in the form of thunderstorms. Hail, which is often associated with thunderstorms, does occur during the hot summer months.

Table 6-3: Rainfall Data (SRK Consulting, 2019)

Month	Rainfall (mm) WB 633482 (1903 to 2000) and Site Rainfall (2000 - Present)		
	Minimum	**Maximum**	**Average**
September	0	94.0	12.8
October	0	194.2	45.1
November	0	349.0	92.8
December	6.6	302.0	119.1
January	0	444.6	119.2
February	0	351.4	88.7
March	0	307.0	75.0
April	0	188.7	36.0
May	0	174.5	14.6
June	0	71.7	5.4
July	0	86.8	5.2
August	0	56.7	6.2
TOTAL			620

Available wind data for the period January 2016 to December 2018 was obtained from the Mogalakwena Mine. The prevailing wind direction during this period was predominantly from the east-northeast with

lower occurrences from the, east, east-southeast and north east. Daytime winds (06:00-18:00) prevail from the northwest, with lower occurrences of winds from the northerly and easterly quadrants. Winds blowing during the earlier parts of the night (18:00-00:00) and latter parts of the night (00:00-06:00) are similar, with the prevailing winds being from the east-northeast.

The average wind speed for the period from January 2016 to December 2018 is 3.46 m/s with calm conditions occurring approximately 5% of the time. During the day (06:00-18:00), the average wind speed is 2.98 m/s with calm conditions occurring approximately 8.5% of the time. The average wind speed during the early night is 3.71 m/s and increases to 4.13 m/s during the latter part of the night.

The seasonal wind roses are similar to the all-hour's wind rose, except during winter where winds from the south easterly quadrant are prevalent. The frequency of winds from the east increases during autumn albeit at lower wind speeds. During spring with the highest average wind speeds of 3.87m/s occurs with calm conditions occurring approximately 3.5% of the time. The Autumn season has the lowest average wind speeds with an average wind speed of 3.07 m/s and calm conditions occur approximately 7% of the time. The wind speeds during summer and winter are 3.65 and 3.27 m/s respectively.

Observed Changes

There has been an observed increase in mean annual temperatures from 1901 to 2020, as shown in Figure 8-1 (World Bank, 2022). There has also been an observed increase in aridity and droughts. While there has been observed decrease in mean annual rainfall, there has been an observed increase in heavy precipitation and flooding.

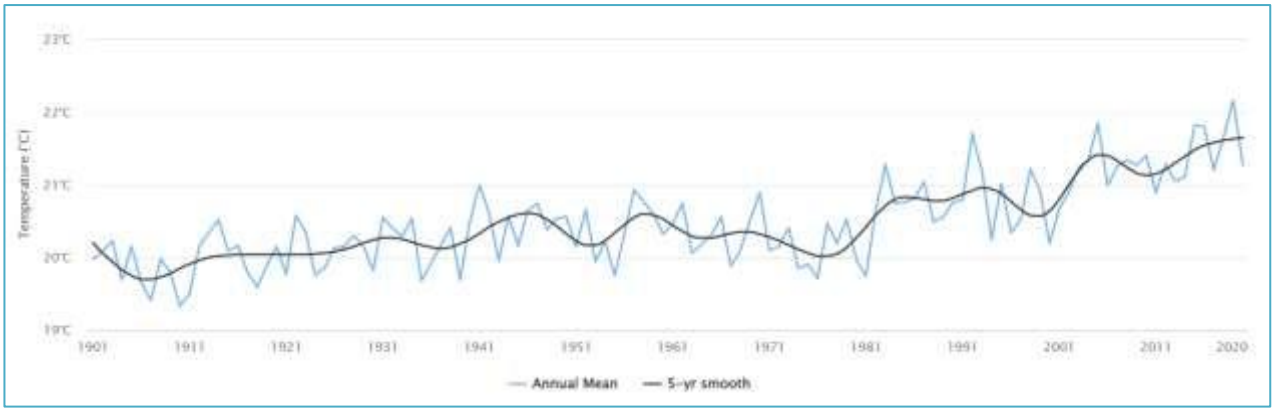


Figure 6-1: Observed changes in mean annual temperatures from 1901 to 2020 (World Bank Group, 2022)

Projected Changes

It is projected that average temperatures and number of very hot days will increase in the near and distant future with climate change (CSIR, 2022 and World Bank, 2022). In this context, very hot days are defined as days where the maximum temperature exceeds 35 °C. The likelihood of drought and wildfires are also projected to increase. While the average annual rainfall is projected to decrease marginally with climate change, there is likely to be slight increase in the number of extreme rainfall days and risk of fluvial flooding. In this context, an extreme rainfall event is defined as 20 mm or more of rain occurring within 24 hours.

Given the short duration (2-3 years) and nature of the Project (expansion of the existing Proof of Concept Plant), it is highly unlikely that changing climate will have a material impact on the Project. Climate-related risks have therefore not been considered further in this assessment.

6.7.1.2 Topography

The information presented in this section was sourced from the EIA and EMPr Report compiled in support of the Mogalakwena Mine Expansion Project (SRK Consulting, 2019).

The topography to the east of the Limpopo Province is the flat to gently undulating Lowveld plain. The Lowveld plain reaches an altitude of 300 to 600 metres above mean sea level (mamsl). To the west of the province, is the Northern Drakensberg escarpment and Soutpansberg, which is categorised as steep slopes and peaks reaching up to 2 000 mamsl. The topography of the Mining Right area can be considered to have slightly to moderately undulating plains sloping generally down to the north, with some hills in the southwest. The topographic elevations within the Mining Right area vary from 1 750 mamsl in the east to 1 000 mamsl in the west. Locally, the natural topography has been altered by historical and current mining operations, more especially the establishment of mining related infrastructure (such as tailings and return water dams, pits, rivers diversion, rocks dumps, buildings, etc.). The Project area will be located upon a flat, already modified operational area, as such the natural topography is already altered.

6.7.1.3 Geology, soils, and land capability

The information presented in this section was sourced from the Hydrogeological Study undertaken by (Itasca Africa (Pty) Ltd., 2019) in support of the EIA for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019). The Mogalakwena Mine Mining Right area is situated in the Northern Limb of the Bushveld Igneous Complex. The Platreef orebody lies at the base of the Main Zone of the Bushveld Complex and is overlain by gabbronorites which are in turn overlain by Upper Zone ferrogabbros. The Upper Zone ferrogabbros is a 100 m thick tabular body which strikes north-south and dips 45° to the west, and reaches a depth of at least 2 000 m. The geology of the Project area is predominantly underlain by Archean Hout River Geniss. The extrapolated Mohlosane Fault extends through the northern part of the Blinkwater TSF and is within proximity to the Project area.

Soils and land capability

The soils within the Project area are characterised by soils of the Avalon form (Orthic A/ Yellow-Brown Apedal B/ Soft Plinthic B) in the high-lying landscape, and highly erosive soils of the Estcourt form (Orthic A/ Prismacutanic B) in the low-lying areas (Soil Classification Working Group, 1991). These are duplex soils characterised by a subsoil horizon that is dispersive, composed of densely packed clay micro-peds and hardens when dry (Soil Working Group, 1991). This soil type forms an impermeable layer once hardened and contributes to surface runoff during heavy rains, especially during periods which are preceded by long, dry conditions. Given that the area is highly transformed and has disturbed if not no vegetation, water runoff commonly occurs as sheet erosion. As such the majority of the soils within and around the Project area can be classified as having a moderate to high erodibility index in terms of their organic carbon content and clay content, while the steepness of many of the slopes add to the erosion index.

Generally, the pH ranges from acidic at 5.2 to neutral and slightly alkaline at 6.25. In general, high levels of calcium and sodium, but deficiencies in the levels of magnesium, potassium, phosphorous, copper, aluminium, and zinc, with very low stores of organic carbon matter were reflected in the nutrient levels. At

best, the growth potential on soils with these nutrient characteristics can be classified as moderate to poor and additions of nutrient and organics will be necessary if vegetative cover is to be propagated on these soils. They are at best moderate or poor grazing lands, with a poor arable land capability rating.

The Project area is already transformed with hardened surfaces due to the construction of the PoC Plant, however, soils within proximity and adjacent to the Project area are of low agricultural potential and are highly erodible due to the permeability of the soils when dried.

6.7.1.4 Terrestrial Biodiversity

The information presented in this section was extracted from the Terrestrial Biodiversity Verification and Compliance Statement compiled by SLR (June 2022a) in support of the current BA Process. The full document is attached as Appendix F: Terrestrial Biodiversity. This section was also supplemented from information contained in the EIA and EMPr Report compiled for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019).

According to the Limpopo Conservation Plan the Project area is located within No Natural Remaining and Other Natural Areas (ONA). ONA's are natural and intact areas but are not required to meet targets, nor have they been identified as Critical Biodiversity Areas (CBA) or Ecological Support Areas (ESA). No management objectives, land management recommendations or land-use guidelines are prescribed. It must be noted that even though the Limpopo Conservation plan indicated that the site is partially located within an area designated as ONA, the Project area has no natural habitat and the footprint is occupied by existing infrastructure comprising the PoC Plant (Photovoltaic panels, workshops, and paved roads).

According to the National Biodiversity Assessment (SANBI, 2018a), the Mogalakwena Mine is located within the Central Bushveld bioregion within the Savanna Biome. The vegetation unit at the Mogalakwena Mine is represented by Makhado Sweet Bushveld which is classified as vulnerable (Musina and Rutherford, 2009). Makhado Sweet Bushveld is present on the plains between the Soutpansberg (to the north) and the Waterberg (to the west). This vegetation type is known for the short and shrubby bushveld with a poorly developed grass layer on the slightly too moderately undulating plains.

Historically, the Project area was cultivated extensively to enable crop production, prior to mining activities (including extraction and processing of ore and the construction and operation of mining and support infrastructure). The historical cultivation entailed the complete removal of primary vegetation, with a consequent decline in floral and faunal biodiversity. This cultivation was unsuccessful due to the variable nature of the rainfall and soils with low agricultural potential. The transformation of the Project area predates the development of the PoC Plant substantially (see Figure 6-2).

As indicated in Section 6.7.1.3, the soils in the Project area belong to the Estcourt form which hardens when dry (Soil Working Group, 1991), forming an impermeable layer which encourages surface runoff during rainfall events. When accompanied by the removal of vegetation, the surface wash results in substantial sheet erosion, effectively preventing the re-establishment of vegetation (these impacts are evident in the satellite imagery from 2011 as shown in Figure 6-2).

Figure 6-2 also shows the Project area in 2021, which indicates that this area is currently being used for industrial purposes, together with the proliferation of transforming activities in the immediate vicinity.

Environmental Authorisation has previously been granted for these activities. The Project area is already completely transformed by the establishment of infrastructure (see Figure 6-3).

Natural vegetation within the Project area has been severely compromised for at least a decade, as such, there is no available habitat to support terrestrial biodiversity. The ecological functioning of the land within the Project area has been permanently disrupted, and the scale of transformation in the surrounding landscape has also severely undermined landscape ecological processes. This transformation is permanent.

The Project area is also situated within an environment characterised by severe disturbance associated with mining activities, such as noise, large vehicle movement, and dust. This further discourages the permanent presence of fauna. Based on the results of the site verification, the Project area does not support terrestrial biodiversity. The sensitivity of terrestrial biodiversity in and around the Project area can be confirmed as Low. The transformation is pre-existing and permanent, and the development will not impact on any current terrestrial biodiversity.

Figure 6-2: Google Earth™ satellite imagery showing the timescale of the disturbance at the site. The image on the left is from 2011, and indicates historic cultivation, the complete removal of primary vegetation and a degree of soil sheet erosion; the image on the right is from 2021 and shows existing mining infrastructure.

Figure 6-3: Proposed Project area with existing PoC Plant infrastructure

6.7.1.5 Aquatic Biodiversity

The information presented in this section was extracted from the Aquatic Biodiversity Verification and Compliance Statement which was compiled by SLR (June 2022a) in support of the current BA Process. The full document is attached as Appendix G: Aquatic Biodiversity. This section was also supplemented with the information obtained from the EIA and EMPr Report compiled for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019)

Conservation Context of Aquatic Ecosystems

National Freshwater Ecosystem Priority Areas (NFEPA)

According to the Atlas of Freshwater Ecosystem Priority Areas (FEPA) in South Africa (Nel *et al*, 2011), the study site falls within an Upstream Management Catchment. These areas are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas. According to the NFEPA Database there are no wetland features associated with the Project area. However, a channelled valley bottom wetland is located approximately 100 m east of the Project area[6].

Strategic Water Source Areas (SWSAs)

Strategic Water Source Areas (SWSAs) are areas of land that either: (a) supply a disproportionate quantity of mean annual surface water runoff in relation to their size and are considered nationally important; or (b) have high groundwater recharge and where the groundwater forms a nationally important resource; or (c) areas that meet both criteria (a) and (b) (Le Maitre *et al,* 2018). The study area does not fall within a SWSA.

Based on the outcome of the desktop database investigation, no watercourses traverse the proposed development site. The area identified for the construction of the PDP is flat and already transformed with existing infrastructure that will be removed to construct the Project as indicated in Figure 6-3.

[6] Please refer to Section 13.1 for the environmental assessment limits of this BA.

Figure 6-4: Local Drainage context of the Project area

Aquatic features confirmed during the site investigation included ephemeral streams, namely the Mohlosane River located approximately 160 m south of the site and an unnamed tributary located approximately 15 m to the west of the development site (Figure 6-5). The upstream reaches of the unnamed tributary are canalised and have poor habitat features which are not expected to support macroinvertebrates of any particular ecological importance.

A channelled valley bottom wetland is located 100 m southeast from the Project area. Considering the ephemeral nature of the above-mentioned, streams and the existing impacts of the surrounding mine infrastructure, it is unlikely that these streams and wetlands support aquatic macroinvertebrates of any significance and if macroinvertebrates occur, these are expected to be limited to pollution-tolerant species which occur during the high flow season.

Habitat quality is compromised within the small tributary lying to the west of the Project area and such aquatic communities would be depauperate and of low biodiversity significance. Water quality within the Mohlosane River is also impacted by current mining activities and therefore only macroinvertebrates with low sensitivity to water quality impacts could be expected, if present.

Based on the results of the desktop review and the site verification, the sensitivity of aquatic biodiversity in and around the Project area can be confirmed as Low.

Figure 6-5: The unnamed tributary (A) with low water level and the Mohlosane River (B) with pooling within the active channel.

6.7.1.6 Surface Water

The information presented in this section was extracted from the Aquatic Biodiversity – Wetland Verification and Compliance Statement compiled by SLR (June 2022b) in support of the current BA Process. The full document is attached as Appendix H: Aquatic Biodiversity – Wetland Component. This section was also supplemented from information contained in the EIA and EMPr Report for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019) and information from the EIR for the Photovoltaic Solar Energy Facility at the Mogalakwena Mine (Zutari , 2021).

Catchment

The Mogalakwena Mine area is situated in the Limpopo River Water Management Area A6 and falls within quaternary catchment A61G of the Mogalakwena River. The quaternary catchment has an average area of 927 km^2, which has a Mean Annual Runoff (MAR) of 16.05 million cubic meters (mcm).

Water Resources and Drainage

The Project area extends across quaternary catchment A61G of the Limpopo Water Management Area (WMA). The Mohlosane River is located south of the proposed PDP development site and an ephemeral tributary of this river is situated to the west of this (see Figure 6-4). The Mohlosane River, an ephemeral system, has been assigned a Moderately to Largely Modified (Class C/D) Present Ecological State (PES)[7] reflecting the impact of surrounding mining activities.

Wetlands

In evaluating these systems, it is necessary to examine them in a historical context (see Figure 6-6). According to Google Earth™ satellite imagery, in 2004, prior to any mining developments, the area consisted of old, ploughed lands. The soils were highly erodible, and their agricultural productivity low. Farming activities were not sustained, and the land had reverted to secondary grassland. Much of the ploughed land was seasonally wet, and a concerted effort had been made to drain the western wetland.

[7] https://www.dwa.gov.za/iwqs/rhp/eco/peseismodel.aspx accessed on 20 January 2022.

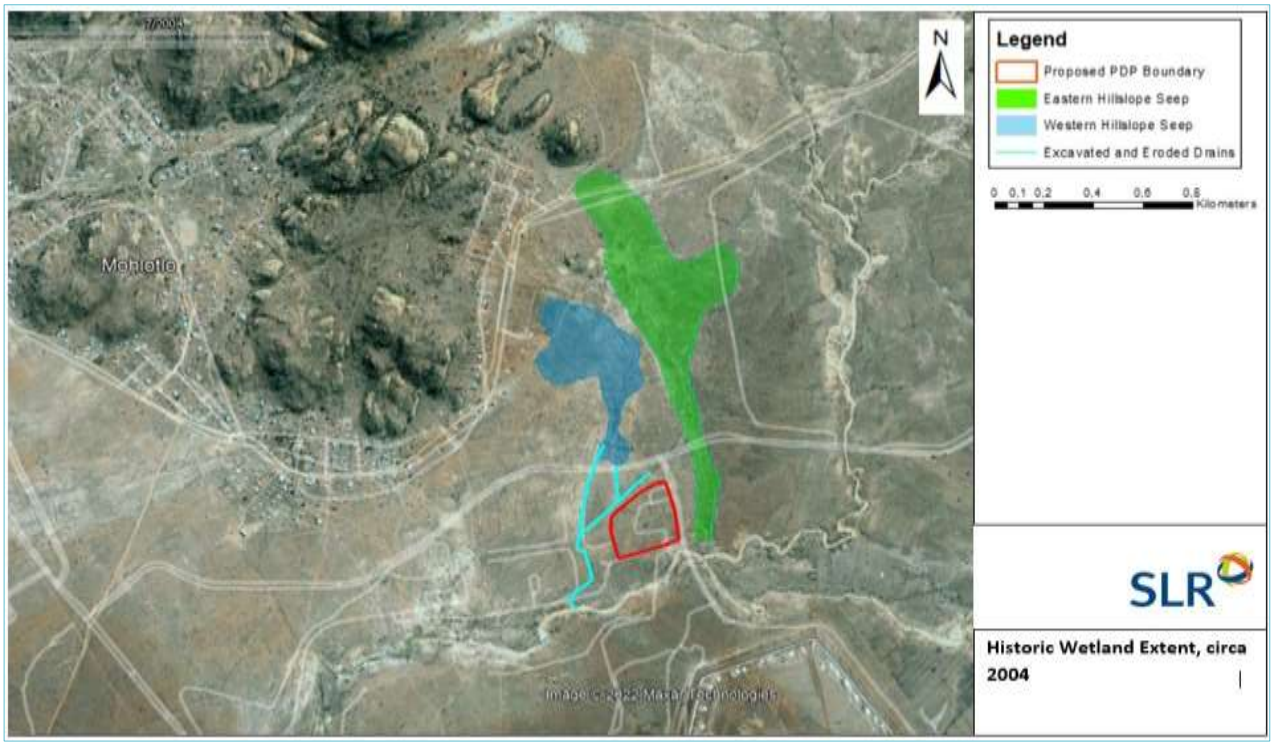


Figure 6-6: Estimated historic (circa 2004) distribution of wetland habitat associated with the landscape surrounding the development site, based on soil hydromorphic signatures (image from Google Earth™)

Two large hillslope seepage wetlands flowed from the granite outcrops to the north of the site, and historically would have bracketed the site to the east and west (through subsurface interflow along a clay aquitard) (see Figure 6-7). The soils at the base of the outcrops are luvic sandy loams overlying dense clay and soft plinthite. Rainfall infiltration from the granite hills percolates perpendicularly through the sandy topsoil before coming into contact with the dense clay layer. The infiltration rate slows to the point where lateral subsurface flow occurs at depth along the interface between the sandy horizon and the dense clay. At the base of the slope the water is expressed to the surface to form a wetland.

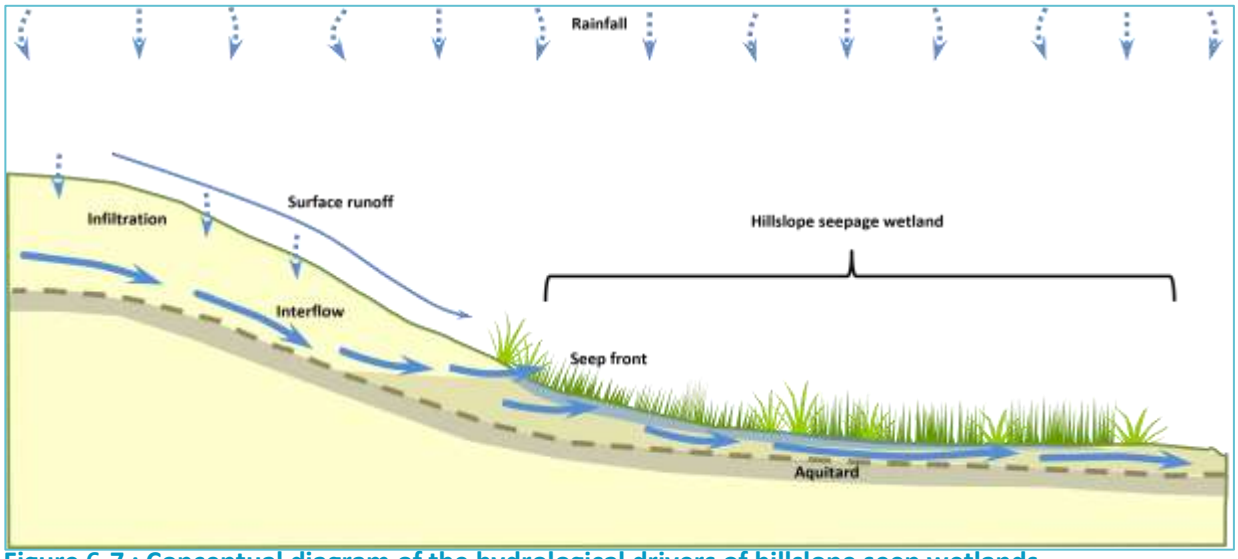


Figure 6-7 : Conceptual diagram of the hydrological drivers of hillslope seep wetlands

The distribution of the two wetland systems would have been determined by topography. The lower reaches of the western wetland were drained through the excavation of several large, straight channels. The soils in this area were characterised by highly erodible Prismacutanic subsoils (see Figure 6-7). When dry the subsoil forms a hard, dense impenetrable layer that prevents the infiltration of rainfall, resulting in periodically wet surface conditions.

The soil is stable if the surface remains intact, with water either moving across the interface between topsoil and subsoil or removed via evapotranspiration. If the surface is disturbed, and confined surface water flow introduced, the soils prove highly unstable and erodible. They slake when exposed to water, resulting in distinctive soil slumping and subsequent removal. Prismacutanic subsoils also tend to be dispersive, the bonds between the clay micro-peds dissociating in water.

The drainage of a large wetland area for crop cultivation resulted in the formation of a series of deep, broad eroded gullies, a consequent drop in water table and the desiccation of previously wetland habitat (see Figure 6-8). The western wetland drained into the head of two large drains, ultimately forming a modified seasonally-flowing Riparian B-channel that runs approximately 120 m west of the Project area and discharges into the Mohlosane River.

Figure 6-8: Main picture: straight excavated drains that have eroded and incised to become deep, broad, highly eroded gullies (Image from Google EarthTM, 2004). Inset: Estcourt soil form, showing distinctive difference between the shallow sandy topsoil and the hardened, erodible subsoil of Prismacutanic clay

The current scenario

The current landscape surrounding the proposed development site is provided in Figure 6-9**.** The upper reaches of both wetland systems have been separated from the drainage system downstream, and most of the wetland habitat has been removed from the landscape. These are now intercepted by deep cut-off drains that direct water through excavated drains through the mine operational area, into the drains adjacent to the proposed development site (features A and B, see Figure 6-10), and into the river. The eastern wetland no longer flows to the east of the site, this is now dry, disturbed secondary terrestrial habitat.

An artificial catchment has been established for the drains bypassing the west of the site, which is characterised by the steep slopes and coarse, porous stone medium of the tailings dam. A large area immediately north of the site consists of rock piles that further trap rainfall and encourage infiltration. The rainfall seeping out of these features feeds a series of drains that flow into the large, prominent excavated drains that now form the focus of this study.

There are two isolated wetland areas situated west of the site (features C and D), feeding into the drains (see Figure 6-10). These are artificial and have formed in response to the transformation of the landscape. There is no wetland signature in these areas on imagery dated prior to the mine development. The wetland area nearest to the site (C) is a seepage wetland that has most likely formed in response to elevated infiltration from the depressions in the rock dump site to the north. It consists of secondary vegetation and is present only in response to continual seepage from the rock dump.

The wetland furthest from the site (D) is also artificial. It is likely to have formed due to the combined effects of:

- Subsurface seepage from the rock dump site,
- Impoundment against the road berms to the east,
- Impoundment against the development platform to the west,
- A dense underlying clay subsoil, and
- Rainfall that is unable to drain away.

Both artificial wetlands are seasonal, with the degree of saturation varying with rainfall. Their habitat is secondary and human-induced, the vegetation community is typical of wherever disturbed soils remain saturated enough to support widespread hydrophilic species such as *Typha capensis* and *Imperata cylindrica*. There is a low likelihood of plant species of conservation importance occurring within the site. High levels of disturbance associated with current mining activities in the immediate area have resulted in a low likelihood of any wetland fauna species of conservation concern being present.

The ecological services provided by the aquatic features associated with the site are marginal, and summarised as follows:

- Streamflow augmentation is considered to be the most important ecological service provided by the wetlands; however, this is provided at a low level because of the small scale of the catchment relative to the wider catchment.
- The drains are densely vegetated, effectively trapping sediment and providing a stable conduit to water flow from the mine. This service is undermined by continuing lateral soil erosion and sediment deposition from the channel sides. Conversely, however, it is of heightened importance due to the sediment mobilised from mining activities upstream.
- Control of erosion due to the maintenance of dense vegetation is a beneficial, although limited ecoservice.
- Maintenance of water quality, which is considered to be a negligible contribution.

Figure 6-9: Extent of mining development surrounding the development site. The hillslope steeps are historic, the image illustrates the extent to which the mining operational area has encroached into them

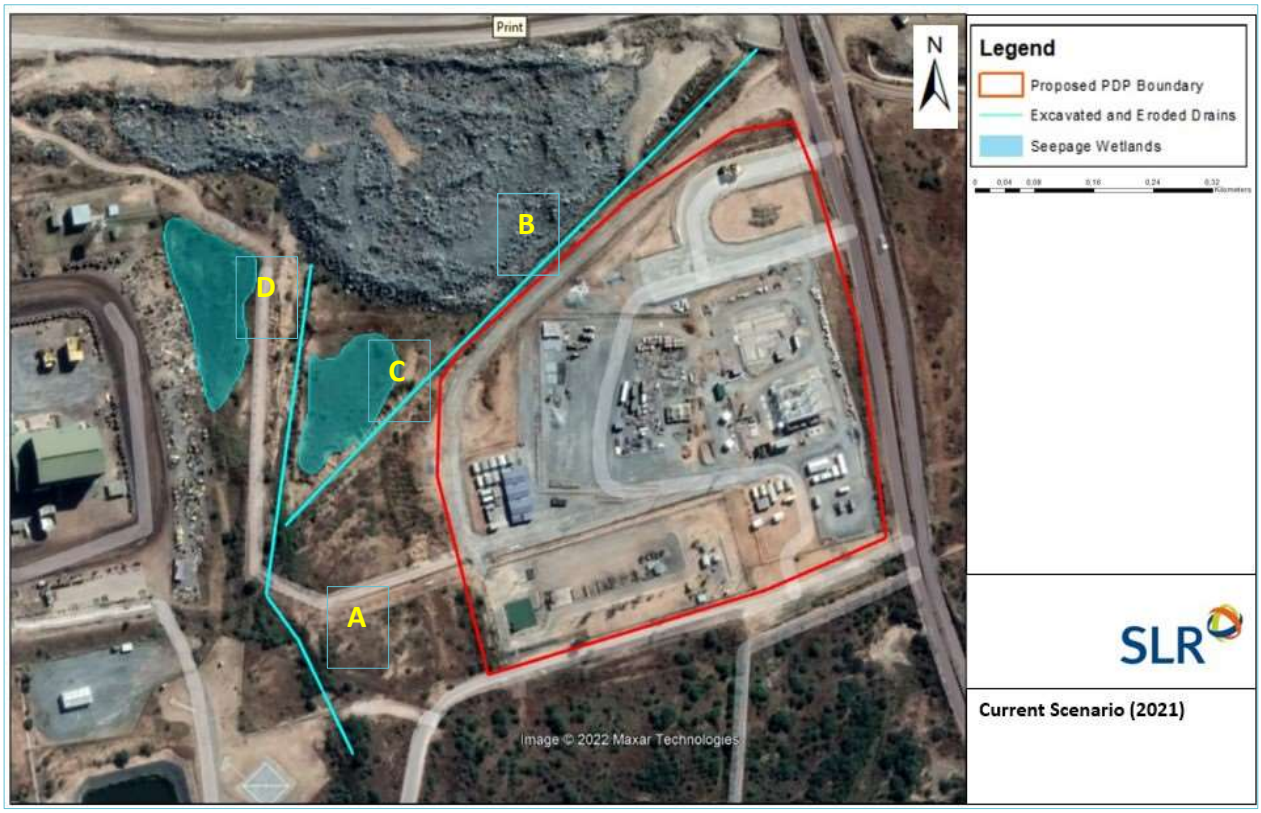


Figure 6-10: Artificial wetland areas in proximity to the site

Surface Water Use

Domestic and industrial use

The mine abstracts water from three wellfields within the mine lease area and surrounds. The surrounding communities are reliant on groundwater for potable and domestic use. Industrial use in the immediate area is limited to mining operations. Process water is made up of sewage effluent from the Mokopane and Polokwane sewage works, open pit water and process water dams that includes the return water from the TSFs. The process water is supplemented by the wellfield water. The water is contained within the mine's dirty water circuit and this captured water is also used in the process.

Livestock watering and irrigation

Surface water is used for farming and livestock watering, although this is severely limited by the intermittent nature of flow in the rivers. The communities surrounding the mine also make use of the water from the Groot Sandsloot (Pholotsi) River when the water comes to surface.

6.7.1.7 Groundwater

The information presented in this section was extracted from information contained in the EIA and EMPr Report compiled for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019) and from the EIR for the Photovoltaic Solar Energy Facility at the Mogalakwena Mine (Zutari , 2021).

Aquifers

The regional hydrogeology is characterized as an 'intergranular and fractured aquifer' with a typical potential yield of 0.1 to 5.0 L/s. The underlying Malamani dolomite to the south of the Mine is characterised as a 'Karst aquifer' with yields of around 0.5 to 2.0 L/s. The dykes may compartmentalize flow due to their low permeability.

There are three aquifer systems underlying the Mogalakwena Mine Mining Right area:

- Localised primary aquifer: This aquifer occurs in the drainage channels of the Sandsloot, Mohlosane, and Witrivier non-perennial streams that drain the Mine area to the Mogalakwena River. Sub-surface flow throughout the year in the sandy sediments is intercepted in the shallow boreholes (<15 m depth average where measurable) that are used extensively by the local communities as their domestic water supply.
- The wetland to the east of Blinkwater 1 TSF, arises as springs fed by runoff and the shallow groundwater from the intrusive Utrecht Granite that forms the relief (hills) to the northwest and northeast of Blinkwater 1 TSF. Prior to the construction of Blinkwater 1 TSF, the springs were a source of the Mohlosane Stream. Following construction of Blinkwater 1 TSF, ponding to the north of the TSF occurs and sub-surface drains from the overflow of the wetland continue to feed the Mohlosane.
- Weathered bedrock aquifer: This aquifer extends to a depth of at least 30 -50 m within the weathered bedrock units. The weathered zone is more permeable than the underlying bedrock due to weathering and the presence of fractures. Deep weathering is associated with the Sandsloot and Mohlosane Rivers and tectonic structures. The weathered bedrock aquifer is hydraulically in connection with the alluvial aquifer in the non-perennial streams which may be gaining from or losing to the groundwater depending on the water table and the season.
- Groundwater flow in the unweathered bedrock is controlled mainly through fractures and joints and major fault blocks which are hydraulically connected. Higher yields occur in the shear zones at the contact with the Platreef, which serves as the main storage component of the aquifer, with some contribution by seepage from the overlying weathered zone. The unweathered norites and pyroxenites have low primary porosity and hydraulic conductivity values.

Groundwater Levels

There are various existing monitoring boreholes and piezometers at Mogalakwena Mine. A brief summary of the measured groundwater-level data is provided below:

- The depth to the groundwater table is generally between 0.5 to 24 mbgl.
- Groundwater flow is from South East to North West towards the Mogalakwena River, from > 1150 mamsl upgradient of the Mine to 1060 mamsl downgradient of the mine.
- The pits have been mined below the groundwater table and therefore are localised sinks or discharge points to the groundwater flow.
- Significant groundwater level fluctuations occur, in response to the recharge and discharge cycles that occur during the wet and dry seasons in the shallow alluvial boreholes.
- Almost all the measured groundwater levels in the deeper Mine monitoring boreholes do not fluctuate with precipitation events. This suggests that the recharge to the bedrock groundwater system during precipitation is limited to the unsaturated, permeable topsoil and fractured rocks and discharges via the alluvial sediments as sub-surface flow. The recharge from precipitation to the deeper groundwater system is a slow infiltration process.

- There is no obvious vertical hydraulic gradient, however, a minor downward vertical gradient was observed. For the low hydraulic conductivity value rocks at the Mogalakwena Mine, it is reasonable to observe no obvious or minor downward vertical gradients at the piezometers that are outside the perimeter of the open pits, confirming that the cone of drawdown due to the mining is steep and does not extend laterally.

Groundwater Use

Mine water supply/active dewatering boreholes

There are approximately 51 water supply pumping boreholes for potable use in the Mine area as three wellfields, namely: PPL, Blinkwater, and Commandodrift. The Blinkwater and Commandodrift wellfields are located along the Mogalakwena River, downgradient of the Mine. The PPL wellfield is located near the Tailings Storage Facilities and Return Water.

Passive dewatering from pit sumps

Passive dewatering includes the seepage water derived from the open-pit bottom and along the open pit sidewalls, and during the wet season from weathered-bedrock deposits, that is collected in the pit sumps and pumped out of the open pits for use in the Mine processes. The dry season seepage can be considered as an estimate of the bedrock seepage (i.e., groundwater inflows) without the effect of precipitation.

Community boreholes

Groundwater is the main water supply to the communities for domestic consumption and for livestock watering. Approximately 92% of the boreholes located in villages surrounding the Mogalakwena Mine, (both upstream and downstream) are used as domestic water supply. It is noted that most of the communities are clustered along the banks of the Sandsloot, Witrivier and Mohlosane rivers due to the availability of water from shallow boreholes. These shallow boreholes exploit sub-surface flow throughout the year. Other villages at further away from the alluvial drainage channels are likely to be exploiting the weathered aquifer. The effect of domestic pumping boreholes on the migration of the solutes related to the current mining operations are likely to be small.

Other mining activities

Illegal sand mining occurs periodically along the alluvial water courses (Sandsloot River), these activities could impact on the shallow alluvial aquifer that is used by the communities both in terms of reduced baseflow and deterioration in water quality. Other formal mining activities within the catchment include the Platreef Underground Mining operations at a distance of 8 km from Mogalakwena Mine and to depths of > 800 mbgl.

The Project will not result in significant additional water abstraction and reduction in groundwater levels. No additional boreholes for water supply for Project activities is required.

6.7.1.8 Air Quality

The information presented in this section was extracted from information contained in the EIA and EMPr Report compiled for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019) and from the monthly dust fallout reports for the periods February 2022 – May 2022.

Ambient air quality

Dust fallout monitoring has been undertaken historically both onsite, and off site in the surrounding villages in compliance with the requirements and regulations of the NEM:AQA. A total of 32 dust fallout sampling stations have been installed in and around the Mogalakwena Mine Project area. Eighteen are Residential Area dust fallout units and fourteen are Non-residential Area dust fallout units. Ambient air quality monitoring was not conducted for the Project because the Project area will be located within the existing footprint of the PoC Plant.

PM_{10} monitoring at the Mogalakwena Mine site is undertaken for both ambient air quality monitoring and occupational exposure monitoring. The particulate matter monitors located on site are near emissions sources, hence they are considered monitoring points. PM_{10} data for the period 2015 to 2018 was acquired by SRK Consulting (2019) from the Mogalakwena Mine. The general trend in the dispersion of PM_{10} is that concentrations decrease with distance away from the mine and are below the annual National Ambient Air Quality Standards (NAAQS) of 40 µg/m^3. The PM_{10} concentrations were also reported to have gradually increased over the years, with the concentrations in 2018 being higher than the preceding years.

Dust Fallout Data

The average dust fallout monitoring results for onsite locations were below the National Dust Regulations of non-residential limits of 1 200 mg/m^2/day, for the period January 2022 to June 2022. However, a single exceedance was reported in February 2022 at location P21. The average offsite residential dust fallout results were below National Dust Regulations standards of non-residential limits of 600 mg/m^2/day for the period January 2022 to June 2022. A single exceedance at monitoring location PUKA-444 (located across the N 11) was recorded in March 2022 due to non-mine related domestic construction activities which was located near the dust bucket. These results are consistent with the historical trend observed for monthly dust fallout monitoring results between December 2014 to December 2018.

Sensitive receptors

Potential sensitive receptors include communities positioned within close proximity to planned developments or Projects, where the main source of pollution arises during the construction phase of Project development and through decommissioning and closure activities.

The following communities were identified as sensitive receptors within the Mogalakwena Mining Right area:

- Armoede
- Danisane
- Fothane
- Ga-Chaba
- Ga-Chokoe
- Ga-Molekana
- Kwakwalata
- Mamala
- Matopa
- Motlhotlo
- Ga-Lelaka
- Ga-Machikiri
- Ga-Masenya
- Ga-Masenya-Hans
- Ga-Modipana
- Ga-Motlou
- Ga-Seema
- Magope
- Mesopolamia
- Mmahlongo

- Armoede
- Rooibokfontei
- Skimming Leruleng
- Ga-Lelaka
- Phafola
- Serukwe

The community located closest to the Project area is the Ga-Molekana Community. No exceedances from the residential dust fallout guideline limits were reported at locations within this community from January 2022 to June 2022. With management measures in place, the current dust falls out rates at the sensitive receptors are below Residential Area standards. The baseline ambient air quality is not expected to be significantly altered due to the Project because of its location within the existing operational footprint.

6.7.1.9 Noise

The information presented in this section was extracted from information contained in the EIA and EMPr Report compiled for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019).

Noise sources

Ambient noise monitoring was not conducted for the Project as part of the current BA process. However, surveys done for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019) reported that the following are noise sources occur within the Mogalakwena Mining Right area:

- Mining activity noise;
- Traffic noise along the feeder roads to the Mogalakwena Mine complex;
- Distant traffic noise from the neighbouring feeder roads;
- Traffic noise from the N 11 road;
- Subsistence farming activities; and
- Wind and natural noise (limited).

Noise monitoring locations were set up around the Mining Right area as part of the 2019 survey (see Figure 6-11). The Project area is located closest to location C which was placed on the Eastern side facing the north concentrator (south of the Project area). The results indicated that the prevalent noise sources at this point can be attributed to Distant Crusher noise. Day-time noise levels within the MRA ranges from 35– 45 dBA, which does not exceed the South African National Standards (SANS) day-time rating of 50 dBA. Night-time noise levels in the area range from 36 - 45 dBA and therefore also does not exceed the SANS day/night-time rating of 50 dBA. The Project area is located within an already operational mining area where elevated ambient noise levels are prevalent.

Noise monitoring is also conducted at offsite residential locations. The Ga-Molekane Community is located closest to the Project area, however according to the Quarter 1 noise monitoring report (SLR , 2022), daytime noise consists of local activity (people talking, children playing), birdsong, and local traffic. The night time noise consists of the Mogalakwena Mining activities, and chickens. These audible mining activities were dump truck movements and rock dumping from around the Vaalkop TSF.

Figure 6-11: Noise monitoring locations (dBA Acoustics, June 2019)

6.7.1.10 Visual

The information presented in this section was extracted from information contained in the EIA and EMPr Report compiled for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019) and from the EIR for the Photovoltaic Solar Energy Facility at the Mogalakwena Mine (Zutari , 2021).

Landscape Character

The landscape character of the areas surrounding the Mogalakwena Mine includes agricultural land, mining land, residential areas, dense woodland, and grasslands. The landscape character of the Mogalakwena Mine Right area can be described as rural with flat to moderately undulating topography. The are some scattered natural vegetation which is characterised by herbaceous layer dominated by grass species and a discontinuous, open tree layer, often represented in clumps.

Various formal, built houses (providing accommodation for mine labourers and associated industries) are scattered within the small rural settlements close to the Mining Right area. The Ga-Molekana settlement lies south east of the Project area and is the closet settlement to the Project area. At a Project scale, the current landscape character is limited to the operational area of the PoC Plant, as such the landscape character can be described as having a high level of anthropogenic transformation.

Sense of place

The sense of place for the communities around the mine is closely related to that of employment as it is assumed that many of the neighbouring villages have developed as a result of the mine's existence. However, other permanent residents in the area who are not reliant on the mine for a livelihood may experience the area in a different way. Travellers using the N 11 and surrounding road networks will have a temporary sense of place associated with mining while travelling through the landscape. The Project would not result in an altered sense of place because it's location is limited to the operational area of the PoC Plant within the already existing mine complex.

Visual Receptors

When viewed from the perspective of tourists and community members, mining activities could be associated with a sense of disenchantment. People who benefit from the Mogalakwena Mine (employees, contractors, service providers etc.) may not experience this disenchantment but rather see the mine with a sense of excitement and anticipation. It follows that the sensitive viewer locations are those situated within the vicinity of undisturbed natural areas or on surrounding transport routes (particularly those that are used to reach tourist destinations). Visual receptor locations and routes that are less sensitive, but that are still visual receptors to the visual intrusion of the Project, include the surrounding rural settlements, the N 11 and the various internal roads within the Project area.

When considering landscape character, scenic quality, sense of place and visual receptors the baseline conclusion is that the Project area is in an area which has already been disturbed by mining activities and infrastructure. It follows that the visual value of the Project area has already been influenced.

6.7.2 Baseline Cultural, Heritage and Palaeontological Environment

The information presented in this section was extracted from the Application for Exemption from a Heritage Impact Assessment letter compiled by Beyond Heritage (May 2022) in support of the current BA Process. The full document is attached as Appendix I: Cultural, Heritage and Palaeontology Resources.

Heritage

Historical Landscape use

An assessment of available archival and historical maps was undertaken to establish a historic layering for the study area. The Project area is currently part the Mogalakwena Mine, which was established in 1993 as the largest open-pit platinum mine in the world. Since 1993 the mine has undergone several expansions along with the development of other mining-related activities in the area. Before being levelled and cleared for the current mining activities the site was impacted on by cultivation from as early as the 1960s. Several unpublished cultural resource management surveys[8] were conducted in the general area surrounding the Project area. These surveys found numerous burial grounds, Iron Age artefacts, stone tool scatters, and historical structures. A Langa Ndebele stonewalled site was also located outside of Bakenberg (located about 1.5 hours outside of the Mogalakwena Mine). Known heritage sites within proximity to the Project area are indicated in Figure 6-12.

[8] Roodt 2008; 2012; 2017, Coetzee 2011, Murimbika 2012, Hutten 2013; 2014, van der Walt 2016; 2017, Birkholtz and Smeyatsky 2019

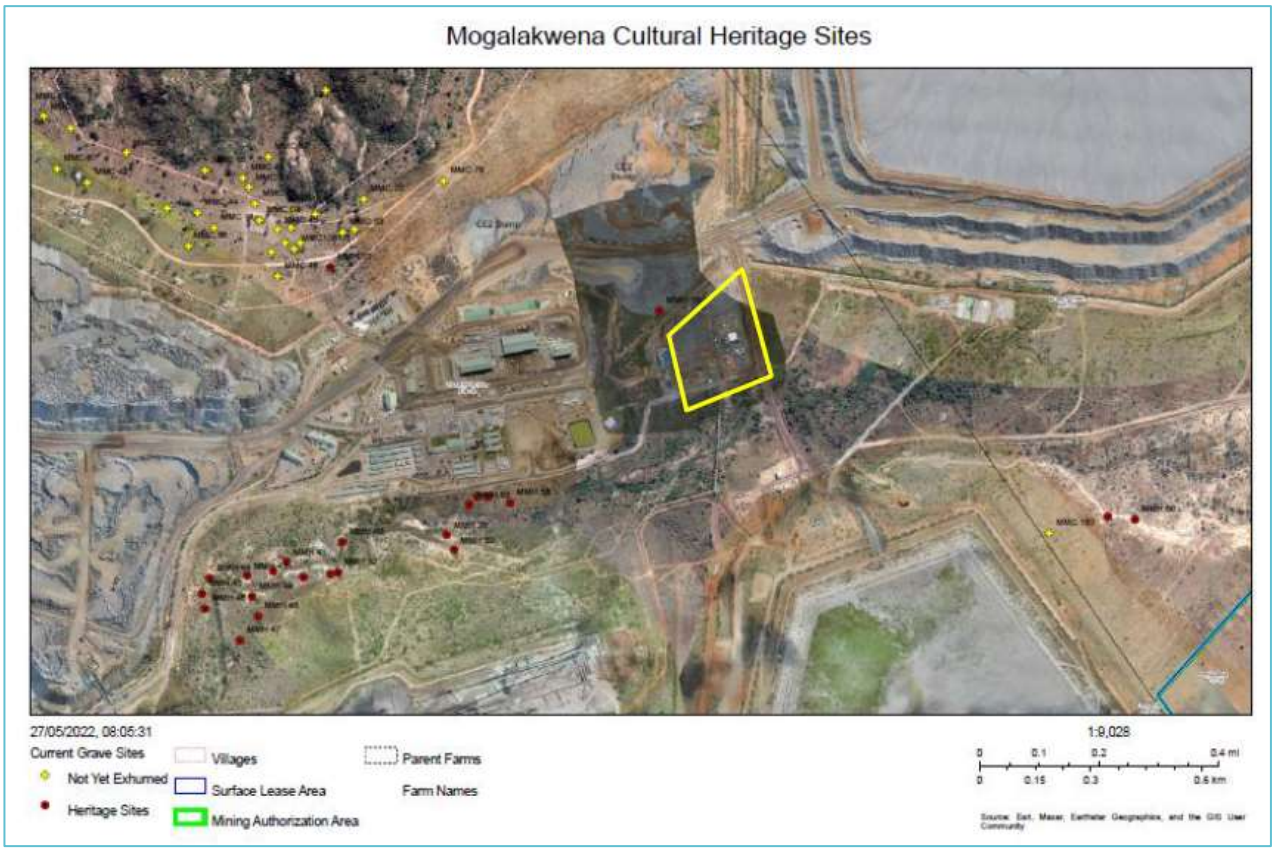


Figure 6-12: Known sites in relation to the Project (yellow polygon) as provided electronically by the Anglo Platinum: Cultural Heritage Principal (email dated 27 May 2022)

The entire Project area has been transformed by historical cultivation activities and more recently by infrastructure. Google imagery shows the initial development to the west of the Project area as the first development occurring within the immediate vicinity (see Figure 6-13). The entirety of the Project area was then cleared and prepared for development during April 2021, with the full transformation occurring in June 2021. The Project area was assessed by Roodt (2008), who recorded a Middle Stone Age scatter of low significance directly outside of the Project area footprint (see Figure 6-12 (Site MMH150)).

The surroundings were assessed by Birkholtz & Smeyatsky (2019) who recorded numerous sites ranging from the Stone Age to living heritage sites, as well as burial sites. None of these recorded features are located within the Project area. The extensive disturbance of the site, and the fact that no in-situ deposit will be disturbed by the Project activities means that the Project area is considered to be of low heritage potential and does not warrant a full Phase 1 HIA.

Palaeontology

South African Heritage Resources Information System (SAHRIS) requires a palaeontological rating to be done for all projects. According to the SAHRIS Palaeo Sensitivity map, there is a zero chance of finding fossils in the grey area, while there is a high chance of finding fossils in the red area. However, the igneous rocks of the Bushveld Complex would have baked fossils in this development footprint. South African Heritage Resources Information System (SAHRIS) requires a rating to be done for all projects. According to the SAHRIS Paleo - Sensitivity map the Project area is of insignificant/no sensitivity and no further palaeontological studies are required.

Figure 6-13: May 2016 Google image of the study area prior to the establishment of mining facilities.

Figure 6-14: April 2021 Google image of the study area indicating the clearing and preparation prior to the establishment of the Proof of Concept Plant.

6.7.3 Baseline Socio-Economic Environment Affected by the Proposed Activity

6.7.3.1 Socio-Economic

The information presented in this section was extracted from Social Compliance Statement compiled by Equispectives (June 2022) in support of the current BA Process. The full document is attached as Appendix J: Social Compliance .

The Project will be located in Ward 13 the Mogalakwena Local Municipality that falls under the Waterberg District Municipality (DM) in the Limpopo Province. The Mogalakwena Local Municipality (LM) consists largely of a tribal/traditional settlement type and is characterised by high levels of unemployment and poverty. The legitimacy of community leadership structures and traditional authority is often contested as these are not gazetted by the Government, and there is conflict between grassroots community interest groups in terms of benefit sharing, which may be driven by personal interest (Zutari, 2020). Community representative structures are fluid, and the area is characterised by unplanned and opportunistic urban expansion. Informal settlements are expanding in both urban and rural areas, and four of the six settlements identified are adjacent to the Mogalakwena Platinum mine, namely; Ga-Machikiri, Ga-Puka (Rooibokfontein), Ga-Sekhaolelo (Armoede) and Mapela next to Skimming.

The Mogalakwena LM is regarded as an unstable municipality and has collapsed in 2014 (Zutari, 2020). The municipality is burdened with routine and competing political intrusions that has resulted in an entrenched spiral of institutional damage, rising securitisation, protest, and violence, each of which reinforces the other. Platinum mining is considered key to the economic development in the area, and for communities surrounding the mine, it is one of the few economic opportunities available. As a result, there is a significant expectation for employment and procurement opportunities at the mine (Zutari, 2020).

The following table summarise some of the population statistics of Ward 13. From the table below it can be seen that Ward 13 has a young population and high unemployment rates. Education rates are low and there are more females than males in the ward. Sepedi is the dominant language spoken in the ward. Most people live in traditional houses and access to water and sanitation inside the house is low.

Table 6-4: Summary of selected Ward 13 socio-economic statistics

Category	Ward 13
Population	99% black population
Average age	26
Age distribution	Approximately 70% under 34 – young population
Sex distribution	54.6% female, 44.4% male
Home language	88.5% Sepedi
Education	19.3% completed Gr 12
Employment rate	17.1% employed, 20.6% unemployed, 10.8 discouraged work seeker, 51.5 not economically active
Employment sector (those aged between 15 and 65)	71.8% employed in formal sector, 18% employed in informal sector, 9.8% private household
Annual household income	• 16.9% no income

Category	Ward 13
	• 6.5% R 1 – R 4 800 • 13.4% R 4 801 – R 9 600 • 26.4% R 9 601 – R 19 600 • 23% R 19 601 – R 38 200 The rest of population above R 38 200 per annum.
Housing	97.2% traditional houses
Piped water	• 12.2% piped water in house • 50.2% pipe in yard • 15.6% pipe less than 200 m away from residence • 13.1% no access to piped water
Energy source for lighting	92.7% access to electricity
Sanitation	• 66.1% pit toilet without ventilation • 24.1% pit toilet with ventilation
Refuse removal	83.2% own refuse dump

The total dependency ratio is used to measure the pressure on the productive population and refer to the proportion of dependents per 100 working-age population. As the ratio increases, there may be an increased burden on the productive part of the population to maintain the upbringing and pensions of the economically dependent. A high dependency ratio can cause serious problems for a country as the largest proportion of a government's expenditure is on health, social grants and education that are most used by the old and young population.

The total dependency ratio on local level is much higher than on district or provincial level (see Table 6-5) and varies by ward. The same trend applies to the youth, aged and employment dependency ratios. Employed dependency ratio refers to the proportion of people dependent on the people who are employed, and not only those of working age. The employed dependency ratio for the Mogalakwena LM and ward 13 is higher than on provincial and district. This suggests high levels of poverty in this area.

Table 6-5: Dependency ratios (source: Census 2011 in Equispectives Research and Consulting Services, June 2022)

Area	Total dependency	Youth dependency	Aged dependency	Employed dependency
Limpopo Province	67.26	56.79	10.47	83.61
Waterberg DM	55.50	46.45	9.05	75.30
Mogalakwena LM	71.48	58.74	12.74	84.73
Ward 13	86.03	71.38	14.66	90.79

Poverty is a complex issue that manifests itself in economic, social, and political ways and to define poverty by a unidimensional measure such as income or expenditure would be an oversimplification of the matter. Poor people themselves describe their experience of poverty as multidimensional. The South African Multidimensional Poverty Index (SAMPI) (Statistics South Africa, 2014) assess poverty on the dimensions of health, education, standard of living and economic activity using the indicators child mortality, years of schooling, school attendance, fuel for heating, lighting, and cooking, water access, sanitation, dwelling type, asset ownership and unemployment.

The poverty headcount refers to the proportion of households that can be defined as multi-dimensionally poor by using the SAMPI's poverty cut-offs (Statistics South Africa, 2014). The poverty headcount has increased on all levels since 2011 (see Table 6-6), indicating an increase in the number of multi-dimensionally poor households.

The intensity of poverty experienced refers to the average proportion of indicators in which poor households are deprived (Statistics South Africa, 2014). The intensity of poverty has increased slightly on all levels. The intensity of poverty and the poverty headcount is used to calculate the SAMPI score. A higher score indicates a very poor community that is deprived on many indicators. The SAMPI score has increased on all levels, indicating that households might be getting poorer, especially in the Mogalakwena LM area.

Table 6-6: Poverty and SAMPI scores (sources: Census 2011 and Community Survey 2016)

Area	Poverty headcount 2011 (%)	Poverty intensity 2011 (%)	SAMPI 2011	Poverty headcount 2016 (%)	Poverty intensity 2016 (%)	SAMPI 2016
Limpopo Province	10.1	41.6	0.042	11.5	42.3	0.049
Waterberg DM	6.5	41.6	0.027	9	42.7	0.038
Mogalakwena LM	7.0	41.2	0.029	11.2	41.3	0.046

The community located closest to the Project area is the Ga-Molekane community which has an average household size of 4. The average age of individuals in this community is 33. Public infrastructure delivery is lacking within this community as is consistent with service delivery described for Ward 13.

The Mogalakwena Mine is situated in a complex socio-economic environment. Conflicts about leadership is a historical issue and remains a challenge to the management of community relations for the Mogalakwena Mine. Relationships between some of the communities around the mine is strained, and in the past, there have been incidents of violence and volatility.

6.7.3.2 Traffic

The information presented in this section was extracted from the EIR compiled for the Photovoltaic Solar Energy Facility at the Mogalakwena Mine (Zutari , 2021).

Bakenberg Road (D4380)

Bakenberg Road is a Class 2 district road which starts at its intersection with the N11 near the southeast of the Mogalakwena Mine, then proceeds to serve the Mogalakwena Mine and several communities northwest of Ga-Molekana and terminates in Leyden. Bakenberg Road is a single carriageway with one lane in each direction and has no shoulders. Bakenberg Road has an 80km/hr speed limit in the vicinity of Mogalakwena Mine.

Ga-Molekana access road

Ga-Molekana access road is the formal access to Ga-Molekana located just over 2 km from the Bakenberg Road/ N 11 intersection. It functions as a Class 4 collector/ distributor road. It is a single carriageway with one lane in each direction.

Several mining activities in the Mokopane area contribute to the high number of heavy vehicles on the road network. Consequently, road conditions in the Mogalakwena District are generally in fair to poor condition, according to the Waterberg District Municipality 2019/2020 IDP (2019). Low traffic volumes were observed along the N 11, with a notable number of heavy vehicles accessing the Mogalakwena mine off N 11 onto Bakenberg Road.

The N 11

The N 11 is part of a major public transport corridor in Mogalakwena. The Public Transport routes along N 11 include the following:

- From Nallie (D3505) to George Masibe Hospital / Bakenberg (D4380) to Mokopane
- (R518/N11);
- From Magabane (D3556/D3550) to Bakenberg (D4380) to Mokopane (R518/N11);
- From Cleremond (D3540/ D3537) to Bakenberg (D4380) to Mokopane (R518/N11);
- From Segole (D3561) to Mokopane (N11);
- From Steiloop/ Uitzech/ Ga - Molekane N11 to Mokopane;
- From Tshamahansi (N11) to Mokopane;
- From Mahwelereng (Dudu Madisha Drive) to Mokopane;
- From Moshate / Sekgakgapeng (N11).

Modes of transport

Minibus taxi was the only public transport mode observed in the vicinity of the site during the site visit. There are formal public transport lay-bys on both sides of the N 11 at the intersections of N11/ Ga Molekana Access Road and N11/ Ga-Sekhaolelo Access Road. Minibus taxis are utilised to drop off and pick up passengers on the road verges. Cyclists are rarely observed in the area and pedestrian are few. Most of the pedestrians use public transport and walk to and from the public transport facilities. However, a significant number of pedestrians from communities on the peripheral of Mokopane CBD walk toward the CBD along the N 11 during the morning peak. No roads near the Mogalakwena mine have pedestrian sidewalks, including the N 11.

The Project is unlikely to significantly contribute to the increase of traffic to the mine. Vehicles or delivery trucks will use existing public network.

6.8 DESCRIPTION OF THE CURRENT LAND USE

The information presented in this section was extracted from information contained in the EIA and EMPr Report compiled for the Mogalakwena Mine Expansion Project (SRK Consulting, 2019), the EIR for the Photovoltaic Solar Energy Facility at the Mogalakwena Mine (Zutari , 2021) and SLR knowledge of the area.

Mining and Prospecting Rights

Mogalakwena Mine currently operates under several approved Environmental Management Programmes (EMPrs) and associated environmental authorisations. The Project area is located on the footprint of the PoC Plant within existing Mogalakwena Mine Mining Right and lease area. This area is covered with the EAs detailed in Table 6-7 below.

Table 6-7: Approved EMPrs and associated environmental authorisations associated with the Project area

Name	Date	DMR/LEDET reference number
Environmental Management Programme Report Potgietersrus Platinum's Limited	Approved under the Minerals Act in November 1997	DMR: 6/2/2/160
Addendum Potgietersrus Platinum's Limited Zwartfontein South Project addendum to the EMPr	Approved under the Minerals Act in September 2002	DMR: 6/2/2/160
Potgietersrus Platinum's Limited PPRust North Mine addendum to the EMPr	Approved under the Minerals Act in January 2003	DMR: 6/2/2/160
Potgietersrus Platinum's Limited PP Rust North Mine amendment to the EMPr	Approved under the MPRDA in November 2007	DMR: 6/2/2/318
Mogalakwena Mine EMPr for the proposed development of a waste site on the farm Zwartfontein 818 LR	Approved under NEM:WA in September 2014 Amendment approved under NEM:WA in July 2015	DEA:12/9/11/L621/5

Land Ownership within the Mogalakwena Mine

Traditional authorities associated with Mogalakwena Mine

Land surrounding Mogalakwena Mine is owned by the national government but managed through the Traditional Authority (TA). The mine is surrounded by 42 villages under the Mapela Traditional Authority (Mapela TA), and 20 villages falling under the Mokopane Traditional Authority (Mokopane TA). Several communities had to relocate to make way for mining activities when the Mogalakwena Mine commenced prospecting in 1926 and became operational in 1993. These were Ga-Pila, Motlhotlo (Ga Sekhaolelo) and Motlhotlo (Ga-Puka) communities. The Project activities fall on land owned by the Mapela TA.

Land Claims

The Department of Agriculture, Land Reform and Rural Development (DALRRD) in Limpopo was contacted to confirm if there are land claims on the Farm Zwartfontein 818 LR Marula upon which the Project will be undertaken. Correspondence was received from the Land Claims Commissioner on 22 June 2022. The Land

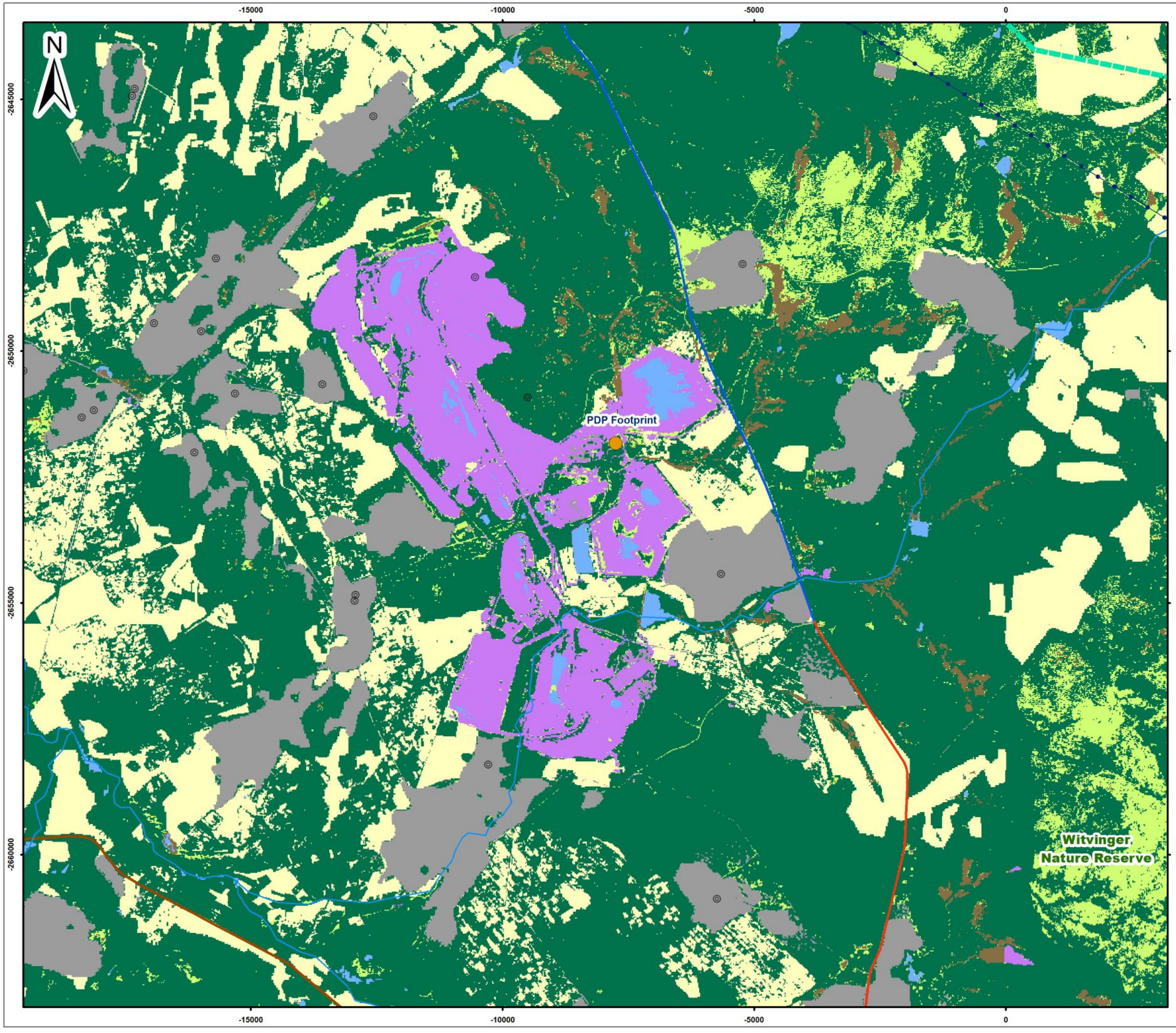
Claims Commissioner confirmed that there are existing land claims for the farm Zwartfontein 818 LR, which were lodged prior to 1998. The claimants were the Mapela Community and the Boshomane Community. The claim status for the Mapela Community indicates that the Research Report is approved, but the claim not settled. The status of claims by the Boshomane Community has been settled by financial compensation. The registered claimants will be involved as stakeholders in the PP process. Correspondence is attached in Appendix C: Public Participation Process.

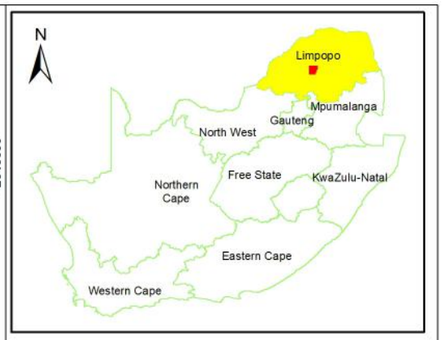
Land Use Surrounding the Mogalakwena Mine

Land use within in the surrounding area of the mine is dominated by rural residential development. The closest rural development lies with a 2.1 km radius of the Project area. Small scale agricultural plots are scattered amongst the Mining Right and mine lease area. The closest agricultural plots are within a 3.41 km radius of the Project area. The predominant land use to the east of the mine includes a modified natural environment (thicket and woodland) with urban areas (villages) developed in-between. The predominant land use to the west of the mine is cultivated land associated with villages and commercial agriculture further north-west.

Conservation

- The Project area is not located within a natural habitat and the footprint is occupied by existing infrastructure comprising the PoC Plant.
- The NFEPA Database there are no natural wetland features associated with the Project area, and the Project area does not fall within a SWSA.
- Mogalakwena Mine is located within the Central Bushveld bioregion represented by Makhado Sweet Bushveld, which is classified as vulnerable, however the terrestrial biodiversity within the Project area has been severely compromised, and there is no available habitat able to support terrestrial biodiversity.





Legend

- Towns/Villages
- PDP Footprint
- NFEPA Rivers
- National Routes
- Main Roads
- Arterial Routes
- Municipal_Boundary

LandCover

- Barren Land
- Built Form
- Cultivated Land
- Forested Land
- Grassland
- Mines / Quarries
- Shrubland
- Wetlands / Waterbodies

0 1 000 2 000 Meters

Scale: 1:62 500 @ A3

Projection:Transverse Mercator

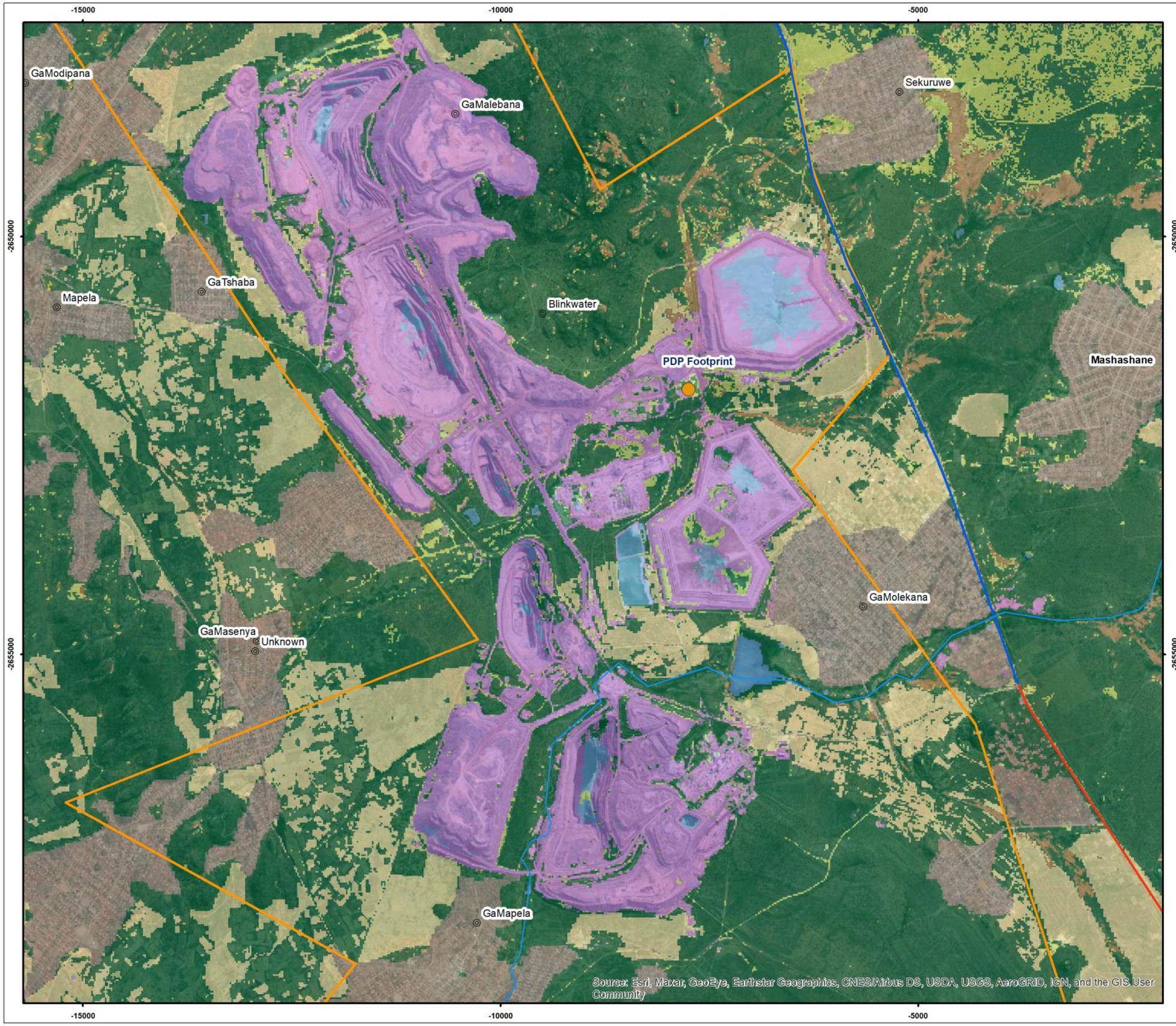
Datum: Hartebeeshoek, Lo 29

Anglo American Project SmartPower Mogalakwena H2 PDP

Figure 6 - 15: Regional Land Use

SLR Consulting (South Africa) (Pty) Ltd
P O Box 1596, Cramerview, 2060, South Africa
Tel: +27 (11) 467-0945 Fax: +27 (11) 467-0978

720.01145.00009 | 2022/06/22



Legend

- Towns/Villages
- PDP Footprint
- NFEPA Rivers
- National Routes
- Arterial Routes
- Mining Right Boundary

Land Cover

- Barren Land
- Built Form
- Cultivated Land
- Forested Land
- Grassland
- Mines / Quarries
- Shrubland
- Wetlands / Waterbodies

N

0 1 000 2 000 Meters

Scale: 1:62 500 @ A3
Projection: Transverse Mercator
Datum: Hartebeeshoek, Lo 29

Anglo American Project SmartPower Mogalakwena H2 PDP

Figure 6 - 16: Local Land Use

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6.9 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE

The environmental features associated with the Project area are described in Section 6.7 above. No notable environmental features are associated within or in close proximity to the Project area. Refer to Figure 22-1 for an illustration of the sensitive environmental features within proximity of the Project area.

A channelled valley bottom wetland is located approximately 100 m east of the Project area[9], however this feature will not be impacted upon due to the Project activities. The ephemeral Mohlosane River is located approximately 160 m south of the Project area, and an unnamed tributary located approximately 15 m to the west of the development site. It is important to note that these features lie a fair distance away from the Project area.

Noteworthy infrastructure within or in close proximity to the Project area includes the realigned section of the D 4380 Road west of Ga- Masenya village passing between the village and the school, the realignment was done as close as possible to the western boundaries of the farm Zwartfontein 818 LR. Notable infrastructure within proximity to the Project area are limited to mining related infrastructure. Two Blinkwater TSF and the Vaalkop TSF flanks the Project area to the north-east and south.

6.10ENVIRONMENTAL AND CURRENT LAND USE MAP

Regional and local land use maps are provided in Figure 6-15 and Figure 6-16 respectively.

6.11ENVIRONMENTAL IMPACTS AND RISKS OF THE ALTERNATIVES

With reference to Section 6, no Project alternatives have been considered and as such this section is not applicable.

6.12METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

The proposed method for the assessment of environmental impacts is set out below. The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the Project. The process involves consideration of, inter alia: the purpose and need for the Project; views and concerns of I&APs; social and political norms, and general public interest.

[9] Please refer to Section 13.1 for the environmental assessment limits of this BA.

6.12.1 Identification and Description of Impacts

Identified impacts will be described in terms of the nature of the impact, compliance with legislation and accepted standards, receptor sensitivity and the significance of the predicted environmental change (before and after mitigation). Mitigation measures may be existing measures or additional measures that were identified through the impact assessment and associated specialist input. The impact rating system considers the confidence level that can be placed on the successful implementation of mitigation. In assigning significance ratings to potential impacts before and after mitigation the approach presented below is to be followed.

- Determine the impact consequence rating:
  This is a function of the "intensity", "duration" and "extent" of the impact.
- Determine impact significance rating:
  The significance of an impact is a function of the consequence of the impact occurring and the probability of occurrence.
- Modify significance rating (if necessary):
  Significance ratings are based on largely professional judgement and transparent defined criteria. In some instances, therefore, whilst the significance rating of potential impacts might be "low", the importance of these impacts to local communities or individuals might be extremely high. The importance/value which interested and affected parties attach to impacts will be highlighted, and recommendations should be made as to ways of avoiding or minimising these perceived negative impacts through Project design, selection of appropriate alternatives and / or management.
- Determine degree of confidence of the significance assessment:
  Once the significance of the impact has been determined, the degree of confidence in the assessment will be qualified. Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact.

6.12.2 Criteria for Impact Assessment

The criteria for the impact assessment are provided in Table 6-8 below.

Table 6-8: Impact Assessment Criteria

Criteria	Rating	Description
Criteria for ranking of the INTENSITY (SEVERITY) of environmental impacts	**ZERO TO VERY LOW**	Negligible change, disturbance, or nuisance. The impact affects the environment in such a way that natural functions and processes are not affected. People / communities are able to adapt with relative ease and maintain pre-impact livelihoods.
	LOW	Minor (slight) change, disturbance, or nuisance. The impact on the environment is not detectable or there is no perceptible change to people's livelihood.
	MEDIUM	Moderate change, disturbance, or discomfort. Where the affected environment is altered, but natural functions and processes continue, albeit in a modified way. People/communities are able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support.
	HIGH	Prominent change, disturbance, or degradation. Where natural functions or processes are altered to the extent that they will temporarily or permanently cease. Affected people/communities

		will not be able to adapt to changes or continue to maintain-pre impact livelihoods.
Criteria for ranking the DURATION of impacts	**SHORT TERM**	< 5 years.
	MEDIUM TERM	5 to < 15 years.
	LONG TERM	> 15 years, but where the impact will eventually cease either because of natural processes or by human intervention.
	PERMANENT	Where mitigation either by natural processes or by human intervention will not occur in such a way or in such time span that the impact can be considered transient.
Criteria for ranking the EXTENT / SPATIAL SCALE of impacts	**LOCAL**	Impact is confined to Project or study area or part thereof, e.g. limited to the area of interest and its immediate surroundings.
	REGIONAL	Impact is confined to the region, e.g. coast, basin, catchment, municipal region, etc.
	NATIONAL	Impact is confined to the country as a whole, e.g. South Africa, etc.
	INTERNATIONAL	Impact extends beyond the national scale.
Criteria for determining the PROBABILITY of impacts	**IMPROBABLE**	Where the possibility of the impact to materialise is very low either because of design or historic experience, i.e. ≤ 30% chance of occurring.
	POSSIBLE	Where there is a distinct possibility that the impact would occur, i.e. > 30 to ≤ 60% chance of occurring.
	PROBABLE	Where it is most likely that the impact would occur, i.e. > 60 to ≤ 80% chance of occurring.
	DEFINITE	Where the impact would occur regardless of any prevention measures, i.e. > 80% chance of occurring.
Criteria for determining the DEGREE OF CONFIDENCE of the assessment	**LOW**	≤ 35% sure of impact prediction.
	MEDIUM	> 35% and ≤ 70% sure of impact prediction.
	HIGH	> 70% sure of impact prediction.
Criteria for the DEGREE TO WHICH IMPACT CAN BE MITIGATED – the degree to which an impact can be reduced / enhanced	**NONE**	No change in impact after mitigation.
	VERY LOW	Where the significance rating stays the same, but where mitigation will reduce the intensity of the impact.
	LOW	Where the significance rating drops by one level, after mitigation.
	MEDIUM	Where the significance rating drops by two to three levels, after mitigation.
	HIGH	Where the significance rating drops by more than three levels, after mitigation.
Criteria for LOSS OF RESOURCES – the degree to which a resource is permanently affected by the activity, i.e. the degree to which a resource is irreplaceable	**LOW**	Where the activity results in a loss of a particular resource but where the natural, cultural, and social functions and processes are not affected.
	MEDIUM	Where the loss of a resource occurs, but natural, cultural, and social functions and processes continue, albeit in a modified way.
	HIGH	Where the activity results in an irreplaceable loss of a resource.

6.12.3 Determining Consequences

Consequence attempts to evaluate the importance of a particular impact, and in doing so incorporate extent, duration, and intensity. The ratings and description for determining consequence are provided below.

Rating	Description
VERY HIGH	Impacts could be EITHER: of ***high intensity*** at a ***regional level*** and endure in the ***long term***; OR of ***high intensity*** at a ***national level*** in the ***medium term***; OR of ***medium intensity*** at a ***national level*** in the ***long term.***
HIGH	Impacts could be EITHER: of ***high intensity*** at a ***regional level*** and endure in the ***medium term***; OR of ***high intensity*** at a ***national level*** in the ***short term***; OR of ***medium intensity*** at a ***national level*** in the ***medium term;*** OR of ***low intensity*** at a ***national level*** in the ***long term***; OR of ***high intensity*** at a ***local level*** in the ***long term***; OR of ***medium intensity*** at a ***regional level*** in the ***long term.***
MEDIUM	Impacts could be EITHER: of ***high intensity*** at a ***local level*** and endure in the ***medium term***; OR of ***medium intensity*** at a ***regional level*** in the ***medium term***; OR of ***high intensity*** at a ***regional level*** in the ***short term***; OR of ***medium intensity*** at a ***national level*** in the ***short term***; OR of ***medium intensity*** at a ***local level*** in the ***long term***; OR of ***low intensity*** at a ***national level*** in the ***medium term;*** OR of ***low intensity*** at a ***regional level*** in the ***long term.***
LOW	Impacts could be EITHER of ***low intensity*** at a ***regional level*** and endure in the ***medium term***; OR of ***low intensity*** at a ***national level*** in the ***short term***; OR of ***high intensity*** at a ***local level*** and endure in the ***short term***; OR of ***medium intensity*** at a ***regional level*** in the ***short term***; OR of ***low intensity*** at a ***local level*** in the ***long term***; OR of ***medium intensity*** at a ***local level*** and endure in the ***medium term.***
VERY LOW	Impacts could be EITHER of ***low intensity*** at a ***local level*** and endure in the ***medium term***; OR of ***low intensity*** at a ***regional level*** and endure in the ***short term***; OR of ***low to medium intensity*** at a ***local level*** and endure in the ***short term.*** OR **Zero to very low intensity** with any combination of extent and duration.

6.12.4 Determining Significance

The consequence rating is considered together with the probability of occurrence in order to determine the overall significance using the table below.

		PROBABILITY			
		IMPROBABLE	POSSIBLE	PROBABLE	DEFINITE
CONSEQUENCE	VERY LOW	INSIGNIFICANT	INSIGNIFICANT	VERY LOW	VERY LOW
	LOW	VERY LOW	VERY LOW	LOW	LOW
	MEDIUM	LOW	LOW	MEDIUM	MEDIUM
	HIGH	MEDIUM	MEDIUM	HIGH	HIGH
	VERY HIGH	HIGH	HIGH	VERY HIGH	VERY HIGH

In certain cases, it may not be possible to determine the significance of an impact. In these instances, the significance is **UNKNOWN**.

6.13POSITIVE AND NEGATIVE IMPACTS OF THE PROPOSED ACTIVITY AND ALTERNATIVES

As noted in Section 6, no site layout or location alternatives have been considered for the Project. This is because the Project comprises the expansion of an existing facility (PoC Plant) within an already disturbed area of the Mogalakwena Mine, therefore an assessment of alternatives is not applicable to the Project. Impacts assessed for the preferred Project components are detailed in Appendix D: Detailed Assessment of Potential Impacts and summarised in Section 10.3.

6.14POSSIBLE MANAGEMENT ACTIONS THAT COULD BE APPLIED AND THE LEVEL OF RISK

A summary of issues and concerns raised by I&APs during the BA process is provided in Section 6.5.5. A list of the potential impacts identified by SLR and raised by I&APs, as well as the possible management, mitigation measures and the level of residual risk after management or mitigation will be provided once the Public Participation Process has commenced.

***Note this section can only be completed once the Public Participation Process has commenced because it requires that the EAP addresses specific comments received from I&APs through the process.**

6.15MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

The details of alternatives which were considered and alternatives which could not be considered is provided in Section 6.

6.16STATEMENT MOTIVATING THE PREFERRED ALTERNATIVE

Refer to Section 6 for more information regarding the motivation for no alternative considered. It follows that the preferred alternative applies to the project description detailed in Section 3.3.

7. FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE THROUGH THE LIFE OF THE ACTIVITY

7.1 DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY IMPACTS

Biophysical and socio-economic impacts associated with the Project were identified through review of the project description and operational information provided by AAP, site visits undertaken by the project team, and the specialist studies as well as the review of historical specialists reports compiled for the Mogalakwena Mine, the approved EIA and EMPr (SRK Consulting, 2019).

The specialist team utilised the latest to inform their verification compliance statements. In addition, verification assessments, which included the review of site layout maps, review of available databases, conservation plans, biodiversity coverage maps and Google imagery, provided a geospatial context to identify, assess and rank potential impacts.

Input into the assessment of impacts included engagement with local knowledge which occurred through collaboration with the Mogalakwena Stakeholder team, engagement with authorities (competent and commenting) and engagement with local specialists. Opportunities were provided to I&APs to contribute indigenous knowledge of the area as part of the Public Participation Process (refer to Section 6.5). All comments and concerns received were addressed and considered in the assessment of impacts where possible.

7.2 DESCRIPTION OF THE PROCESS UNDERTAKEN TO ASSESS AND RANK THE IMPACTS AND RISKS

A description of the assessment methodology used to assess the severity of identified impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated, is provided in Section 6.12.

7.3 A DESCRIPTION OF THE ENVIRONMENTAL IMPACTS AND RISKS IDENTIFIED DURING THE ENVIRONMENTAL ASSESSMENT PROCESS

Descriptions of the biophysical, cultural, heritage and socio-economic impacts in respect of each of the main project activities and phases are provided in Table 7-1. The detailed assessment of these impacts is provided in Appendix D: Detailed Assessment of Potential Impacts. Impacts that have been deemed insignificant, but only due to the implementation of mitigation, are also included. Impacts that are deemed insignificant without mitigation are included for completeness and will not be associated with any activities or project phase.

Table 7-1: List of potential impacts in respect of each project activity and phase

Potential Impact	Activity	Phase
Loss and sterilisation of mineral resources.	• Not Applicable	• Not Applicable
Altering topography.	• Not Applicable	• Not Applicable
Hazardous excavations resulting in safety risks to third parties and animals.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Transport systems • Storm water management • Demolition • Rehabilitation	• Construction • Decommissioning and Closure
Loss of soil resources through physical disturbance and contamination.	• General site management • Site preparation • Earthworks • Civil works • Transport systems • Storm water management • Demolition • Rehabilitation	• Construction • Decommissioning and Closure
Loss of terrestrial habitat and biodiversity through physical disturbance.		
Contamination of surface water resources.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Transport systems • Storm water management • Demolition • Rehabilitation	• Construction • Operation • Decommissioning and Closure
Alteration of natural drainage patterns.	• Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Use of existing support services • Storm water management • Demolition	• Construction • Operation • Decommissioning and Closure

Potential Impact	Activity	Phase
Contamination of groundwater resources.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Transport systems • Storm water management • Demolition • Rehabilitation	• Construction • Operation • Decommissioning and Closure
Air pollution. Increase in disturbing noise levels affecting sensitive receptors.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Use of existing support services • Demolition • Rehabilitation	• Construction • Operation • Decommissioning and Closure
Negative visual views (construction and decommissioning).	• General site management • Site preparation • Earthworks • Civil works • Demolition • Rehabilitation	• Construction • Decommissioning
Negative visual views (closure).		• Closure
Road safety impacts. Influence on road capacity and condition.	• Transport systems	• Construction • Operation • Decommissioning and Closure
Damage or loss of cultural, heritage and paleontological resources through physical disturbance.	• Not Applicable	• Not Applicable
Inward migration.	• Not Applicable	• Not Applicable
Positive economic impact (construction). Positive economic impact (operation).	• General site management • Site preparation • Earthworks • Civil works	• Construction • Operation

Potential Impact	Activity	Phase
	• Hydrogen Production Development Platform and related support facilities • Use of existing support services	
Change in land use.	• Not Applicable	• Not Applicable

7.4 ASSESSMENT OF THE SIGNIFICANCE OF EACH IMPACT AND RISK AND AN INDICATION OF THE EXTENT OF WHICH THE ISSUE AND RISK CAN BE AVOIDED OR ADDRESSED BY THE ADOPTION OF MANAGEMENT ACTION

The assessment of the significance of potential impacts, including the extent to which impacts can be avoided or mitigated, is included in Section 8 and Appendix D: Detailed Assessment of Potential Impacts.

8. ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

A summary of the assessment of the identified potentially significant biophysical, cultural, heritage and socio-economic impacts associated with the Project is provided in Table 8-1. A full description of the assessment is included in Appendix D: Detailed Assessment of Potential Impacts.

Table 8-1: Assessment of significant impacts and risks

Aspects affected	Potential Impact	Activity	Phase	Significance (Unmitigated)	Management actions	Significance (Mitigated)	Extent to which the impact can be reversed, avoided, or cause irreplaceable loss and the degree to which the impact and risk can be mitigated
Geology	Loss and sterilisation of mineral resources.	Not Applicable	Not Applicable	Insignificant	Not Applicable	Insignificant	Not Applicable
Topography	Altering topography.	Not Applicable	Not Applicable	Insignificant	Not Applicable	Insignificant	Not Applicable
	Hazardous excavations resulting in safety risks to third parties and animals.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Transport systems • Storm water management • Demolition • Rehabilitation	• Construction • Decommissioning and Closure	Insignificant	Not Applicable	Insignificant	Not Applicable
Soil ad	Loss of soil resources through physical disturbance and contamination.	• General site management • Site preparation • Earthworks • Civil works • Transport systems • Storm water management • Demolition • Rehabilitation	• Construction • Decommissioning and Closure	Very Low	Time period for implementation - Ongoing • Conduct effective maintenance and implementation of the stormwater management measures. • Inspect linear infrastructure (roads and pipelines) on a regular basis (ideally monthly) to ensure that the associated water management infrastructure is effective in controlling erosion. • Regularly inspect all surface water management infrastructure constructed from soil (berms, canals, and bunds) (ideally monthly), if applicable. • Where necessary, soil for the purpose of rehabilitation will be stripped from areas to be cleared for construction and operation and stockpiled in accordance with the site wide soil conservation principles. • Contaminated soil should be considered and treated as hazardous and should be temporary stored with other hazardous waste in the designated area. • Ensure that oil/fuel storage facilities are adequately bunded, with no outlets to external drainage systems.	Insignificant	Possible with mitigation.

Aspects affected	Potential Impact	Activity	Phase	Significance (Unmitigated)	Management actions	Significance (Mitigated)	Extent to which the impact can be reversed, avoided, or cause irreplaceable loss and the degree to which the impact and risk can be mitigated
					• Prevent discharge or emissions that pose an unacceptably high risk to the environment *This can be done through employee awareness training for potential environmental risks and proper handling and storage procedures.* • *Rehabilitate disturbed land throughout the life of the PDP Plant where possible.* • *Ensure that all accidental spillages are immediately cleaned up and managed in accordance with Anglo American Policies and Guidelines to manage and remediate spills.* • *Restrict vehicle and machinery movement to designated areas.*		
Biodiversity	Loss of terrestrial habitat and biodiversity through physical disturbance.			Insignificant	• Not Applicable	Insignificant	Not Applicable
Surface water	Contamination of surface water resources.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Transport systems • Storm water management • Demolition • Rehabilitation	• Construction • Operation • Decommissioning and Closure	Medium	• Dirty water and clean water systems will be designed according to the conceptual design criteria given in Regulation 704. • *Investigate and utilise if feasible, the use of various commercially available pollution and toxicant traps to clean runoff prior to its discharge into the receiving environment (from stormwater management controls).* • Do not locate any sanitary convenience (chemical toilet), fuel depot or storage facility for anything which may cause pollution within the 1:50 year flood line of a watercourse. • Establish clean water diversions and dirty water collection facilities before land clearing and construction commences, to prevent clean rainfall runoff becoming contaminated by construction activities. • There must be an effective drainage system to a waterproof spillage collection area, where any spillage can be recovered and suitably treated. • Waste (other than mine residues) should be stored, handled, transported, and disposed of in accordance with a documented waste management protocol. • Implement a Stormwater Management Strategy. • Ensure separation of clean and dirty water in accordance with GN 704. • Exposed surfaces within dirty areas will be kept to a minimum to minimise the volume of dirty runoff generated. • Implement the Mogalakwena Mine Water Management Strategy. • *Locate all* water storage facilities and plant infrastructure will be located above the 1:100 year floodline or at least 100 m from a watercourse, whichever is the greater.	Very low	Likely with mitigation.

Aspects affected	Potential Impact	Activity	Phase	Significance (Unmitigated)	Management actions	Significance (Mitigated)	Extent to which the impact can be reversed, avoided, or cause irreplaceable loss and the degree to which the impact and risk can be mitigated

Surface water	Alteration of natural drainage patterns.	• Site preparation
		• Earthworks
		• Civil works
		• Hydrogen Production Development Platform and related support facilities
		• Use of existing support services
		• Storm water management
		• Demolition
			• Construction
			• Operation
			• Decommissioning and Closure
				Medium	• *Review the existing stormwater management controls and implement a stormwater management plan for the Project which encourages diffuse surface runoff and limits point source discharge. This can be achieved by considering the following:*
					  ○ *Implementation of appropriate attenuation of runoff prior to discharge into the receiving environment to reduce the velocity of discharge. These include attenuation ponds and bio-attenuation ponds.*
					  ○ *Design controls for stormwater leaving the attenuation structures into the receiving environment via well-vegetated swales (broad, grass-covered earthen drains), with multiple small discharge points. These should be reinforced where necessary by reno-mattresses.*
					• *Investigate and utilise if feasible, the use of various commercially available pollution and toxicant traps to clean runoff prior to its discharge into the receiving environment (from stormwater management controls).*
						Insignificant	High with mitigation.

Groundwater	Contamination of groundwater resources.	• General site management
		• Site preparation
		• Earthworks
		• Civil works
		• Hydrogen Production Development Platform and related support facilities
		• Transport systems
		• Storm water management
		• Demolition
		• Rehabilitation
			• Construction
			• Operation
			• Decommissioning and Closure
				Medium	• Ensure that vehicle storage and maintenance areas are hard-surfaced and includes measures for collection of leaks and spills.
					• Ensure collection and treatment of hydrocarbon spills, at the sites licenced remediation site.
					• Ensure clean and dirty water diversion around the Project area *in accordance with GN 704.*
					• Prevent discharges that pose an unacceptably high risk to the environment. *This can be done through the following:*
					  ○ *Ensure all employees have undertaken environmental risk awareness training; and*
					  ○ *Ensure compliance to proper hazardous material handling and storage procedures.*
					• *Ensure that continuous adherence with approved waste management and soil management procedures to limit the potential for pollution.*
					• *Drip trays should be placed under all standing machinery.*
					• *Ensure all employees have undertaken environmental risk awareness training.*
					• *Ensure that all portable toilets are kept clean and are regularly maintained by a licensed service provider. Sewerage should be removed on a regular basis.*
						Very low	Likely with mitigation.

Air Quality	Air pollution.	• General site management • Site preparation • Earthworks • Civil works	• Construction • Operation • Decommissioning and Closure	Very low	• Limit vehicle speed at the site to the mine specified speed limits for the waste site area. • Disturbance of the area should be limited to the footprint area. • All vehicles to remain on designated roads/tracks. ○ *Ensure that vehicles and construction machinery are maintained as per the manufacturer's specifications.*	Insignificant	Likely with mitigation.

Aspects affected	Potential Impact	Activity	Phase	Significance (Unmitigated)	Management actions	Significance (Mitigated)	Extent to which the impact can be reversed, avoided, or cause irreplaceable loss and the degree to which the impact and risk can be mitigated
		• Hydrogen Production Development Platform and related support facilities • Use of existing support services • Demolition • Rehabilitation			○ *Ensure dust suppression on roads by the application of a dust allaying agents, and / or other approved dust suppression used on the mine.* • *Efforts for concurrent rehabilitation of disturbed areas should be considered and undertaken wherever possible.*		
Noise	Increase in disturbing noise levels affecting sensitive receptors.			Insignificant	• Undertake regular maintenance of equipment and vehicles. • Machines used intermittently should be shut down between work periods and not left running unnecessarily. • Limit speed at the site to the mine specified speed limits for the waste site area.	Insignificant	Likely with mitigation.
Visual	Negative visual views (construction and decommissioning).	• General site management • Site preparation • Earthworks • Civil works • Demolition • Rehabilitation	• Construction • Decommissioning	Insignificant	• *Security lighting required at night during the operational phase should use minimum lumen or wattage in light fixtures.* • *In the decommissioning phase the Mogalakwena Mine will implement their closure plan which will involve the removal of infrastructure, and the rehabilitation and re-vegetation of cleared areas and any final landforms that will remain post closure. Rehabilitation should be undertaken in a manner that both achieves landscape functionality and limits and/or enhances the long-term visual impact.*	Insignificant	The impact of negative visual views can only be reversed following removal of the additional infrastructure and after the completion of rehabilitation activities.
	Negative visual views (closure).		• Closure	Very low		Insignificant	
Traffic	Road safety impacts.	• Transport systems	• Construction • Operation • Decommissioning and Closure	Low	• Limit speed at the site to the mine specified speed limits for the waste site area. • *Ensure that heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations (2000) for vehicles using a public road.* • *Discourage the routing of heavy vehicle traffic through populated areas.* • *Avoid transporting bulk and abnormal loads during peak traffic periods.* • *Manage daily delivery volumes and times, minimising vehicles during AM and PM peak hours.* • *Provide workers and contractor workers with training on road safety including running road safety and awareness campaigns at the mine.*	Insignificant	Likely with mitigation.
	Influence on road capacity and condition.			Very low	Not Applicable	Not Applicable	Not Applicable

Aspects affected	Potential Impact	Activity	Phase	Significance (Unmitigated)	Management actions	Significance (Mitigated)	Extent to which the impact can be reversed, avoided, or cause irreplaceable loss and the degree to which the impact and risk can be mitigated
Cultural, heritage and paleontological resources	Damage or loss of cultural, heritage and paleontological resources through physical disturbance.	• Not Applicable	• Not Applicable	Insignificant	Not Applicable	Insignificant	Not Applicable
Socio-economic	Inward migration.	• Not Applicable	• Not Applicable	Insignificant	Not Applicable	Insignificant	Not Applicable
	Positive economic impact (construction).	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Use of existing support services	• Construction • Operation	Positive medium	Where feasible, local communities need to be considered for any construction phase requirements including materials supply and employment.	Not applicable	Not applicable.
	Positive economic impact (operation).			Positive low			
Land Use	Change in land use.	• Not Applicable	• Not Applicable	Insignificant	Not Applicable	Insignificant	Not Applicable

9. SUMMARY OF SPECIALIST REPORT FINDINGS

The relevant specialist studies that were undertaken as part of the Project including the recommendations made by the specialists are provided in Table 9-1. All relevant specialist reports have been attached as Appendix F: Terrestrial Biodiversity – Appendix J: Social Compliance .

Table 9-1: A List of specialist studies and recommendations

Specialist Study	Recommendation of Specialist	Specialist Recommendations that have been included in the BAR (Mark with X)	Reference to Applicable Section in this Report
Aquatic Biodiversity	• Based on the results of the desktop review and the site verification, the sensitivity of aquatic biodiversity in and around the proposed PDP Project can be confirmed as Low. • The development will not impact on any freshwater biodiversity and no impact management interventions are required in this respect.	x	Section 6.7.1.5. Appendix D: Detailed Assessment of Potential Impacts. Appendix G: Aquatic Biodiversity.
Wetland Assessment	• Based on the results of the desktop review and the site verification, the sensitivity of aquatic biodiversity associated with the wetlands in and around the Project area can be confirmed as Low. • The Project is being constructed within an existing hardened development footprint and is unlikely to impact on the current state of wetlands. • The Project is unlikely to have cumulative impacts on freshwater biodiversity. There is an opportunity to incorporate additional mitigation management measures (if required) potentially resulting in: (i) a reduction in the impacts currently experienced by the receiving environment, (ii) the stabilising of the aquatic habitats within the area of influence of the proposed development site, and (iii) an increase in the PES of these riparian reaches. Management measures include:	x	Section 6.7.1.6. Section 25. Appendix D: Detailed Assessment of Potential Impacts. Appendix H: Aquatic Biodiversity – Wetland Component.

Specialist Study	Recommendation of Specialist	Specialist Recommendations that have been included in the BAR (Mark with X)	Reference to Applicable Section in this Report
	○ The appropriate attenuation of runoff prior to discharge into the receiving environment, the goal being to reduce the velocity of discharge. These include attenuation ponds and bio-attenuation ponds. Surface runoff is temporarily captured in ponds with a designed outlet that allows the water to exit at a slower rate. ○ The provision of adequate rainfall storage to compensate for the loss in soil storativity (the amount of rainfall that infiltrates, and remains in, the soil during and following a rainfall event) caused by the hardened surfaces. This volume is calculated using mean annual rainfall and soil porosity. Examples of this would be storage ponds, underground concrete tanks or JoJoTM tanks. The water could then be used within the facility as, for example, irrigation water for gardens or for suppressing dust. ○ The introduction of stormwater leaving the attenuation structures into the receiving environment via well-vegetated swales (broad, grass-covered earthen drains), with multiple small discharge points. These should be reinforced where necessary by reno-mattresses. • The use of various commercially available pollution and toxicant traps and methods to clean runoff prior to its discharge into the receiving environment.		
Terrestrial Biodiversity	• Based on the results of the site verification, the Project area site does not support terrestrial biodiversity. • The sensitivity of terrestrial biodiversity in and around the Project area can be confirmed as Low. The transformation is pre-existing and permanent, and the development will not impact on any current terrestrial biodiversity. • No impact management interventions are required in this respect.	x	Section 6.7.1.4. Appendix D: Detailed Assessment of Potential Impacts. Appendix F: Terrestrial Biodiversity.
Socio-Economic	A full Social Impact Assessment was not required for this BA process because:	x	Section 6.7.3.1.

Specialist Study	Recommendation of Specialist	Specialist Recommendations that have been included in the BAR (Mark with X)	Reference to Applicable Section in this Report
	• The Project will be undertaken within a disturbed area within the existing operations (PoC Plant), it is not expected that any additional social risks or impacts will be created. • There are current socio-economic studies that have been conducted in the social area of influence, therefore an updated social baseline is available.		Appendix D: Detailed Assessment of Potential Impacts. Appendix J: Social Compliance .
Heritage, Cultural and Palaeontology	• The Project area was previously assessed by Roodt (2008) who recorded a low significance Stone Age site outside of the Project area and no sites of significance within the Project area. • The Project area is totally transformed and no heritage resources in terms of Section 38 of the National Heritage Resources Act (NHRA) are expected to be adversely affected by the Project. • An application for exemption from a full Phase 1 HIA is supported. • In terms of Palaeontological sensitivity, the assessment concluded that the study area is of insignificant sensitivity according to the SAHRA paleontological map.	x	Section 6.7.2. Appendix D: Detailed Assessment of Potential Impacts. Appendix I: Cultural, Heritage and Palaeontology Resources.

10.ENVIRONMENTAL IMPACT STATEMENT

10.1SUMMARY OF KEY FINDINGS

This section provides a summary of the potential impacts associated with the preferred alternative in the unmitigated and mitigated scenarios for all project phases (Table 10-1). The assessment of the Project presents the potential for negative impacts to occur (in an unmitigated scenario) on the biophysical environments both on the Project site and in the surrounding area. With the implementation of management actions, these potential impacts can be prevented or reduced to acceptable levels. It follows that, provided the EMPr is effectively implemented, there is no biophysical, cultural heritage or socio-economic reason why the Project should not proceed.

Table 10-1: Summary of potential impacts

Aspect	Potential Impact	Impact significance	
		Unmitigated	Mitigated
Geology	Loss and sterilisation of mineral resources.	Insignificant	
Topography	Altering topography.	Insignificant	
	Hazardous excavations resulting in safety risks to third parties and animals.	Insignificant	
Soil and land capability	Loss of soil resources through physical disturbance and contamination.	Very low	Insignificant
Biodiversity	Loss of terrestrial habitat and biodiversity through physical disturbance.	Insignificant	
Surface water resources	Contamination of surface water resources.	Medium	Very low
	Alteration of natural drainage patterns.	Medium	Insignificant
Groundwater	Contamination of groundwater resources.	Medium	Very low
Air quality	Air pollution.	Very low	Insignificant
Noise	Increase in disturbing noise levels affecting sensitive receptors.	Insignificant	
Visual	Negative visual views (construction and decommissioning).	Insignificant	Insignificant
	Negative visual views (closure).	Very low	Insignificant
Traffic	Road safety impacts.	Low	Insignificant
	Influence on road capacity and condition.	Very low	-
Cultural/heritage and palaeontological resources	Damage or loss of cultural, heritage and paleontological resources through physical disturbance.	Insignificant	
Socio-economic	Inward migration.	Insignificant	
	Positive economic impact (construction).	Positive medium	Not applicable
	Positive economic impact (operation).	Positive low	
Land Use	Change in land use.	Insignificant	

10.2FINAL SITE MAP

The final site layout map is included in Figure 3-4.

10.3SUMMARY OF THE POSITIVE AND NEGATIVE IMPACTS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES

The positive and negative impacts and risks of the proposed activity are summarised above in Section 10.1. No site layout or infrastructure location alternatives were considered and as such this section is not applicable.

11. IMPACT MANAGEMENT OBJECTIVES AND OUTCOMES FOR INCLUSION IN THE EMPR

11.1 PROPOSED MANAGEMENT OBJECTIVES AND OUTCOMES FOR ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

Specific environmental objectives and outcomes to control, remedy or prevent potential impacts from the Project are provided in Table 11-1.

Table 11-1: Environmental objectives and outcomes

Aspect	Environmental Objective	Environmental Outcome
Soil and land capability	• To minimise the loss of soil resources and related land capability through physical disturbance, erosion, compaction, and soil pollution.	• Loss of soil resources through contamination and physical disturbance is prevented. • Handle, manage and conserve soil resources to be used as part of rehabilitation and re-establishment of the pre-mining land capability.
Biodiversity	• To prevent the unacceptable disturbance and loss of biodiversity and related ecosystem functionality through physical and general disturbance.	• Limit the area of disturbance as far as practically possible to that of the PoC Plant site.
Surface water resources	• To prevent pollution of surface water resources. • To minimise unacceptable alteration of drainage patterns and related reduction of downstream surface water flow of surface water resources.	• To ensure that surface water quality remains within acceptable limits for both domestic and agricultural purposes, and for supporting aquatic biodiversity. • To ensure that potential contaminants do not reach nearby watercourses. • To limit the volume of runoff into the downstream catchment, to what is necessary and ensure that the natural drainage patterns are re-established as part of rehabilitation in order to prevent unacceptable alteration of drainage patterns and related reduction of downstream surface water flow.
Groundwater	• The objective of the mitigation measures is to prevent pollution of groundwater resources and related harm to water users.	• To ensure that groundwater quality remains within acceptable limits for both domestic and agricultural purposes.
Air quality	• To prevent nuisance dust and air pollution health impacts.	• Ensure that any pollutants emitted as a result of the Project remains within acceptable limits so as to prevent nuisance or health related impacts.
Noise	• To prevent public exposure to disturbing noise.	• Ensure that any noise generated as a result of the project remains within acceptable limits to avoid the disturbance of third parties.

Aspect	Environmental Objective	Environmental Outcome
Visual	• To limit negative visual impacts.	• Negative visual views are limited.
Traffic	• To prevent transport related accidents and/or injury to people and livestock.	• Ensure that the use of public roads due to the Project activities is done in a responsible manner to reduce the potential for safety and vehicle related impacts on road users.
Cultural/heritage and palaeontological resources	• To minimise the disturbance of heritage resources.	• Protect heritage resources where possible. • If disturbance is unavoidable, then mitigate impact in consultation with a specialist and the SAHRA and in line with regulatory requirements.
Socio-economic	• To enhance the positive economic impacts and limit the negative economic impacts. Part of this objective is to enhance the contribution to the local economy. • To limit inward migration and related social impacts and enhance positive economic impacts.	• Work with existing structures and organisations to establish and maintain a good working relationship with surrounding communities, local authorities, and landowners in order to limit the impacts associated with inward migration. • Enhance the positive economic impacts by working together with existing structures and organisations.

11.1.1 Activities and Infrastructure

The source activities of potential impacts which require management include:

- Site preparation (including decommissioning of PoC solar PV plant);
- Earthworks;
- Civil works;
- Installation/ erection of Hydrogen Production Development Platform and related support facilities;
- Use of existing support services
- Transport systems;
- Stormwater management;
- Demolition; and
- Rehabilitation.

The phases of development associated with the above-mentioned source activities are provided in Table 3-3.

11.1.2 Management Actions

Management actions which will be implemented to control the Project activities or processes which have the potential to pollute or result in environmental degradation are provided in Section 8.

11.1.3 Roles and Responsibilities

The key personnel to ensure compliance to this BAR and EMPr are the operations executive and the Environmental Department Manager and officers. As a minimum, their roles, as they relate to the implementation of monitoring programmes and management activities, include:

- Ensuring that monitoring programmes and audits are scoped to be fit for purpose and included in the annual mine budget;
- Identifying and appointing appropriately qualified specialists/engineers to undertake the monitoring programmes;
- Appointing specialists in a timeous manner to ensure work can be carried out to acceptable standards;
- Liaising with the relevant company, municipal and community structures in terms of the commitments in the Social and Labour Plan (SLP);
- Ensuring that commitments in the SLP are developed and implemented timeously;
- Establishing and maintaining good working relations with surrounding communities and landowners; and
- Facilitating stakeholder communication, information sharing and a grievance mechanism.

12. ASPECTS FOR INCLUSION AS CONDITIONS OF THE AUTHORISATION

Management actions (refer to Section 8 and Table 8-1) including monitoring requirements (see Section 27), should form part of the conditions of the EA. With reference to Regulation 26 of the EIA Regulations 2014, additional conditions that should form part of the EA that are not specifically included in the EMPr report, include compliance with all applicable environmental legislation, whether specifically mentioned in this document or not, and which may be amended from time to time.

13. ASSUMPTIONS, UNCERTAINTIES, LIMITATIONS AND GAPS IN KNOWLEDGE

13.1 ENVIRONMENTAL ASSESSMENT LIMIT

- This BA process focuses on third parties only and does not assess health and safety impacts on employees and contractors because the assumption is made that these aspects are separately regulated by health and safety legislation, policies and standards, and that Mogalakwena Mine will adhere to these.
- This BA process is limited to the assessment and permitting of activities described for authorisation as stated in this BAR (refer to Section 3.2).
- It is assumed that the information provided by AAP is accurate and unbiased, and that no information that could change the outcome of the BA process has been withheld.

13.2 AQUATIC BIODIVERSITY

The following assumptions and limitations apply to the aquatic assessment techniques and methods utilised for the Aquatic Biodiversity Compliance Report compiled for the Project:

- Only a single site assessment was undertaken and therefore temporal and seasonal trends could not be calculated; and
- The impacts for the site are specific to the Project.

13.3 AQUATIC BIODIVERSITY – WETLAND COMPONENT

The following assumptions and limitations apply to the aquatic assessment techniques and methods utilised for the Wetland Component of the Aquatic Biodiversity Compliance Report compiled for the Project.

- Only a single site assessment was undertaken and therefore temporal and seasonal trends could not be calculated;
- Access within the site was strictly controlled, limiting the freedom with which fieldwork could be conducted within the timeframe available;
- The mapped features showing the historic and current ecological scenarios, are illustrative and based on specialist experience in identifying wetland soil, topographic and vegetation signatures from aerial imagery. Accurate field delineation was not possible due to the extent of land transformation that has occurred since 2005; and
- The impacts for the site are specific to the Project.

13.4 TERRESTRIAL BIODIVERSITY

The following assumptions and limitations apply to the Terrestrial Biodiversity Compliance Report:

- The Project boundary has been extrapolated from information provided by AAP.

13.5CULTURAL, HERITAGE AND PALAEONTOLOGY

The following assumption and limitations apply to the Cultural, Heritage and Palaeontology motivation for exemption Report compiled in support of the Project:

- A desktop survey of available literature was conducted to extract data and information on the Project area, and a field survey was not deemed necessary.

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

14.1 REASONS WHY THE ACTIVITY SHOULD BE AUTHORISED OR NOT

The assessment of the Project presents the potential for negative impacts to occur (in the unmitigated scenario in particular) on the biophysical, cultural, heritage and socio-economic environments, both on the Project site and in the surrounding area. With the implementation of management actions, these potential impacts can be prevented or reduced to acceptable levels. It follows that provided that the EMPr is effectively implemented, there is no reason from a biophysical, cultural, heritage or socio-economic standpoint why the Project should not proceed.

14.2 CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORISATION

14.2.1 Specific Conditions for Inclusion in the EMPr

Refer to Section 12.

14.2.2 Rehabilitation Requirements

The Project will be integrated into the mine's overall infrastructure and will therefore fall under the site wide Rehabilitation Plan. This site plan will be updated to include specific management and rehabilitation measures as identified during the BA process, and through integration with the Social and Labour Plan of Mogalakwena Mine as well as the Anglo Social Way.

15. PERIOD FOR WHICH AUTHORISATION IS REQUIRED

The Project will be primarily utilized for demonstration purposes and will be a temporary facility, once the concept is proven, the facility could be utilized for marketing purposes. However, the facility and all listed activities will cease at the end of mining operations. It follows that this authorisation should be valid for the remaining LoM, beyond 2040.

16. FINANCIAL PROVISION

16.1 METHOD TO DERIVE THE FINANCIAL PROVISION

The NEMA Financial Provisioning Regulations GNR 1147 (in Government Gazette 39425 of 20 November 2015)(as amended) requires that an applicant or holder of right or permit must make financial provision for the rehabilitation and remediation, decommissioning, closure activities as well as the remediation and management of latent or residual environmental impacts due to the development and implementation of a proposed project.

An estimate of the financial closure liability which will account for all activities and infrastructure required for the Project is currently being prepared by SLR in support of this BA Process. The financial closure liability cost estimate will be calculated as per the Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine as published by the DMRE in January 2005.

Upon completion, the financial closure liability report will be incorporated into the Final BAR and EMPr Reports which will be submitted to the Limpopo Regional Office of the DMRE for consideration and decision making.

16.2 CONFIRM THAT THE AMOUNT CAN BE PROVIDED FOR FROM OPERATING EXPENDITURE

The confirmation that the financial closure liability costs, in order to manage and rehabilitate the environmental disturbance (as a result of the Project) will be provided for in the mine operating costs will be indicated in the Final BAR and EMPr Reports, which will be submitted to the Limpopo Regional Office of the DMRE for consideration and decision making.

17. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

17.1 IMPACT ON THE SOCIO-ECONOMIC CONDITIONS OF ANY DIRECTLY AFFECTED PERSON

The impacts associated with socio-economic conditions are discussed in Sections 0 and Section 8 and detailed in Appendix D: Detailed Assessment of Potential Impacts. Management actions identified to address any socio-economic impacts are provided in Section 25. No person will be directly affected by the Project given that no I&APs currently reside, or undertake any livelihood activities (i.e., farming, etc.) within the Project area.

17.2 IMPACT ON ANY NATIONAL ESTATE REFERRED TO IN SECTION 3(2) OF THE NHRA

No national estate will be affected by the Project. Refer to Section 6.7.2 for a description of the receiving environment in which the Project will be undertaken. Refer to Appendix D: Detailed Assessment of Potential Impacts for a detailed assessment of impacts.

17.3 DEPARTMENT OF FORESTRY, FISHERIES, AND THE ENVIRONMENT SCREENING TOOL

The DFFE developed an online screening tool which identifies environmental sensitivities within a Project area. The use of the Screening Tool was made compulsory from 4 October 2019. The report generated by the DFFE screening tool was attached to the NEMA application for the Project and is included in Appendix E: Screening tool report. The screening tool report outlines specialist studies that need to be considered as part of the Project. However, this tool is provided for guidance purposes and the relevance of the specific specialist studies should be ground truthed and determined by the EAP and Project team taking the current layout and environmental situation into consideration. The specialist studies that were identified in the screening tool report are detailed below in Table 17-1. The table also provides a motivation where a study was not undertaken as part of the BA process.

Table 17-1: Findings of the DFFE screening tool

Theme	Sensitivity	Requirements addressed as part of the BA Process
Agriculture	Medium	The Project will be constructed and operated within an already disturbed footprint of the Mining Right area, upon which the PoC Plant currently occupies. No additional land disturbance is anticipated with Project activities. Soil and agricultural resources are sterilised by the current PoC Plant, it follows that the Agricultural potential and sensitivity of the Project area is low. No specialist assessment was undertaken for this BA process.
Animal Species	Medium	Given the already disturbed and degraded status of the Project area, and that Project activities will be confined within the existing PoC Plant, the potential impact on terrestrial and aquatic biodiversity is considered low. However, in accordance with the DFFE Screening Protocols, compliance statements for Aquatic Biodiversity, wetland assessment and Terrestrial ecology were undertaken in support of the BA process. The results of the assessments were used to inform the baseline environment description and the impact assessment (Appendix D: Detailed Assessment of Potential Impacts). The specialist compliance statements are provided
Aquatic Biodiversity	Low	
Plant Species	Medium	
Terrestrial Biodiversity	High	

Theme	Sensitivity	Requirements addressed as part of the BA Process
		Appendix F: Terrestrial Biodiversity Appendix G: Aquatic Biodiversity and in Appendix H: Aquatic Biodiversity – Wetland Component Note: The Project is not associated with wind energy generation and transmission and as such does not trigger the requirement for an avifaunal assessment.
Archaeological and Cultural Heritage	Low	The Project area is located within an existing and disturbed footprint of the PoC Plant, as such, no additional land disturbance is anticipated with Project activities. A desktop Heritage and Palaeontological assessment was undertaken to confirm the low archaeological and cultural heritage of the area. The assessment concluded the area is totally transformed and no heritage resources in terms of Section 38 of the NHRA are expected to be adversely affected by the Project. The specialist motivated that an exemption from a full Phase 1 HIA be applicable for the Project. In terms of Palaeontological sensitivity, the assessment concluded that the study area is of insignificant sensitivity according to the SAHRA paleontological map. The results of the assessment were used to inform the baseline environment description (Section 6.7.2) and the impact assessment (Appendix D: Detailed Assessment of Potential Impacts). The specialist report is provided in Appendix I: Cultural, Heritage and Palaeontology Resources.
Palaeontology	Medium	
Civil Aviation	High	Not applicable because the Project does not include the establishment of any structures which could influence flight paths.
Defence	Medium	Not applicable because the Project will be undertaken within the already disturbed footprint of the PoC Plant. In addition, the Project will assimilate within the current mining operations, and no change in the land use or function (which could cause an impact on military and defence sites) of the area will occur. As such the defence sensitivity is not applicable.

18. OTHER MATTERS REQUIRED IN TERMS OF SECTION 24(4)(A) AND (B) OF THE ACT

No other matters are required in terms of Section 24(4)(A) and (B) of the Act.

19. UNDERTAKING

I, **Stuart Heather-Clark**, the EAP responsible for undertaking this Basic Assessment Process, undertake that:

- The information provided herein is correct;
- Comments and inputs from I&APs and commenting authorities have been included and correctly recorded in this EIA;
- Inputs and recommendations from the specialist reports have been included where relevant; and
- Any information provided to I&APs and any responses to comments or inputs made is correct or was correct at that time.

Signature of EAP

August 2022
Date

I certify that the DEPONENT has acknowledged that he/she knows and understands the contents of this affidavit, he/she does not have any objection to taking the oath, and he/she considers it to be binding on his/her conscience and that the administering oath complied with the regulations contained in Government Gazette No. R1258 of July 1972, as amended.

Signature of Commissioner of oath[10]

[10] This will be signed off by a Commissioner of Oaths prior to submission of the final BAR and EMPr Reports to the DMRE.

PART B – ENVIRONMENTAL MANAGEMENT PROGRAMME

20. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

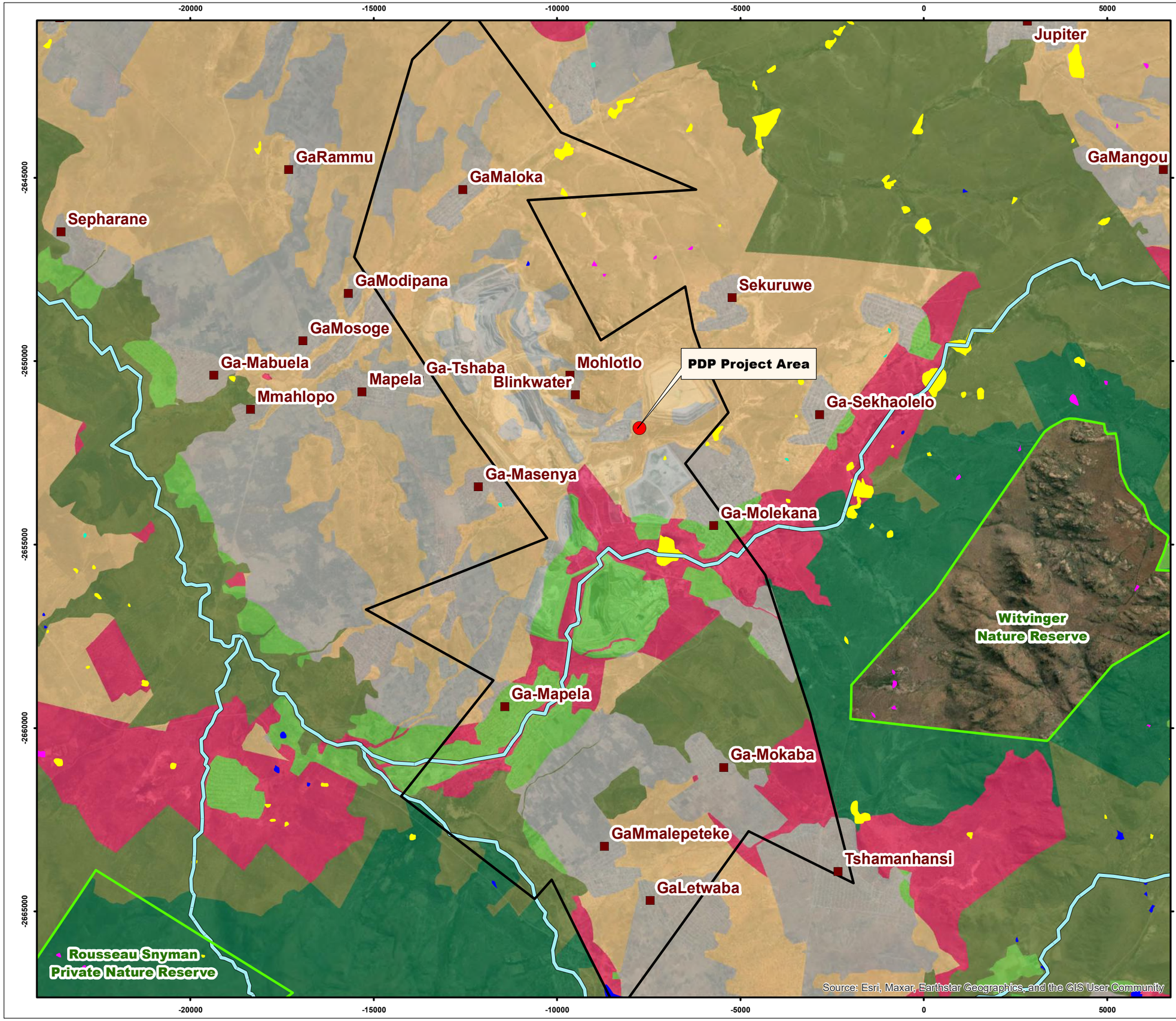
The details of the EAP and Project team, who undertook this BA process and prepared this EMPr are provided in Part A, Section 1.

21. DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

The activities covered by this BAR are fully described in Part A, Section 3.

22. COMPOSITE MAP

A composite map including all proposed surface infrastructure superimposed on environmentally sensitive areas of the preferred site is included in Figure 22-1.



Legend

- Towns / Villages
- Mining Right Boundary
- South African Protected Areas

NFEPA Rivers
- CLASS C: Moderately Modified

NFEPA Wetlands
- Channelled valley-bottom wetland
- Flat
- Floodplain wetland
- Seep
- Unchannelled valley-bottom wetland

Critical Biodiversity Areas
- Critical Biodiversity Area 1
- Critical Biodiversity Area 2
- Ecological Support Area 1
- Ecological Support Area 2
- No Natural Remaining
- Other Natural Areas

N

0 1 000 2 000 Meters

Scale: 1:100 000 @ A3

Projection:Transverse Mercator

Datum: Hartebeeshoek, Lo 29

Anglo American Project SmartPower Mogalakwena H2 PDP

Figure 22 - 1: Composite Sensitivity Map

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23. DESCRIPTION OF THE IMPACT MANAGEMENT OBJECTIVES, INCLUDING THE MANAGEMENT STATEMENTS

23.1 DETERMINATION OF CLOSURE OBJECTIVES

The closure objectives for the proposed project will be aligned with the overall closure objectives of the mine. It is important to note that these closure objectives may be refined through the life of mine as and if changes to the operational activities and/or infrastructure are required. The closure objectives for the mine are outlined below:

- To adhere to all statutory and other legal requirements.
- To develop landforms and land-uses that are stable, sustainable and aesthetically acceptable on
- closure.
- To ensure safety & health of all stakeholders during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks.
- Ensure that closure supports productive uses, where practical, considering pre-mining conditions and agree with commitments to with stakeholders.
- Physically and chemically stabilise remaining structures to minimise residual risks.
- Promote biodiversity and biological sustainability to the maximum extent practicable.
- Utilize closure strategies that promote a self-sustaining condition with little or no need for ongoing care and maintenance.
- To achieve agreed quality targets set by the Catchment Management Agency (CMA) and the DWS as far as practical relative to impacts and reasonability to achieve.

23.2 VOLUMES AND RATE OF WATER USED FOR THE OPERATION

The Project will only require minimal volumes of water as part of the construction and operation phase, and the water will be supplied from the existing mine services. The water requirement for the construction phase activities is estimated at 3 400 m^3. The water demand during the operational phase is estimated at 1 300 liters per day.

23.3 HAS A WATER USE LICENCE BEEN APPLIED FOR?

This Project will be undertaken within the existing footprint of the PoC Plant and no further expansion of this footprint will be required. No water uses are triggered by the specific activities of the Project.

23.4 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

The assessment of potential impacts is included in Section 0 and Appendix D: Detailed Assessment of Potential Impacts. Management actions which will be implemented to avoid and minimise potential impacts are detailed in Section 25. Mitigation of impacts as according to their respective phases are shown in Table 23-1.

Table 23-1: Measures to rehabilitate the environment affected by the undertaking of any listed activity

Activity (Listed: NEMA and NEM:WA)		Phase	Size and scale of disturbance	Mitigation measures	Compliance with standards	Time period for implementation
Number	Description					
NEMA EIA Regulations Listing Notice 1, Activity 67	**Listing Notice 1: Activity 67** Phased activities for all activities - (i) listed in this Notice, which commenced on or after the effective date of this Notice or similarly listed in any of the previous NEMA notices, which commenced on or after the effective date of such previous NEMA Notices; where any phase of the activity was below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold.	Construction Operation Decommissioning Closure	8 ha	Refer to Section 25 for the mitigation measures.	Refer to Section 25 for the mitigation measures.	Refer to Section 25 for the mitigation measures.

24. IMPACT MANAGEMENT OUTCOMES AND OBJECTIVES

Table 24-1 below provides a description of the outcomes and objective of management actions in order to manage, remedy, control or modify potential impacts. The management actions identified to achieve these outcomes and objectives are described in Section 25.

Table 24-1: Description of impact management outcomes and objectives

Aspects affected	Potential Impact	Activity	Phase	Management actions	Standard to be Achieved (Impact Management Objective and Outcomes)
Geology	Loss and sterilisation of mineral resources.	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Topography	Altering topography.	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Hazardous excavations resulting in safety risks to third parties and animals.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Transport systems • Storm water management • Demolition • Rehabilitation	• Construction • Decommissioning and Closure	Not Applicable	Not Applicable
Soils and land capability	Loss of soil resources through physical disturbance and contamination.	• General site management • Site preparation • Earthworks • Civil works • Transport systems • Storm water management • Demolition • Rehabilitation	• Construction • Decommissioning and Closure	• Conduct effective maintenance and implementation of the stormwater management measures. • Inspect linear infrastructure (roads and pipelines) on a regular basis (ideally monthly) to ensure that the associated water management infrastructure is effective in controlling erosion. • Regularly inspect all surface water management infrastructure constructed from soil (berms, canals, and bunds) (ideally monthly), if applicable. • Where necessary, soil for the purpose of rehabilitation will be stripped from areas to be cleared for construction and operation and stockpiled in accordance with the site wide soil conservation principles. • Contaminated soil should be considered and treated as hazardous and should be temporary stored with other hazardous waste in the designated area. • Ensure that oil/fuel storage facilities are adequately bunded, with no outlets to external drainage systems. • Prevent discharge or emissions that pose an unacceptably high risk to the environment *This can be done through employee awareness training for potential environmental risks and proper handling and storage procedures.* • *Rehabilitate disturbed land throughout the life of the PDP Plant where possible.* • *Ensure that all accidental spillages are immediately cleaned up and managed in accordance with Anglo American Policies and Guidelines to manage and remediate spills.* • *Restrict vehicle and machinery movement to designated areas.*	• Manage soils in line with the requirements of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN R 37603 No 331). • Anglo American Policies and Guidelines to manage and remediate spills.

Aspects affected	Potential Impact	Activity	Phase	Management actions	Standard to be Achieved (Impact Management Objective and Outcomes)
Biodiversity	Loss of terrestrial habitat and biodiversity through physical disturbance.			• Not Applicable	
Surface water	Contamination of surface water resources.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Transport systems • Storm water management • Demolition • Rehabilitation	• Construction • Operation • Decommissioning and Closure	• Dirty water and clean water systems will be designed according to the conceptual design criteria given in Regulation 704. • *Investigate and utilise if feasible, the use of various commercially available pollution and toxicant traps to clean runoff prior to its discharge into the receiving environment (from stormwater management controls).* • Do not locate any sanitary convenience (chemical toilet), fuel depot or storage facility for anything which may cause pollution within the 1:50 year flood line of a watercourse. • Establish clean water diversions and dirty water collection facilities before land clearing and construction commences, to prevent clean rainfall runoff becoming contaminated by construction activities. • There must be an effective drainage system to a waterproof spillage collection area, where any spillage can be recovered and suitably treated. • Waste (other than mine residues) should be stored, handled, transported, and disposed of in accordance with a documented waste management protocol. • Implement a Stormwater Management Strategy. • Ensure separation of clean and dirty water in accordance with GN 704. • Exposed surfaces within dirty areas will be kept to a minimum to minimise the volume of dirty runoff generated. • Implement the Mogalakwena Mine Water Management Strategy. • *Locate all* water storage facilities and plant infrastructure will be located above the 1:100 year floodline or at least 100 m from a watercourse, whichever is the greater.	• Anglo American Policies and Guidelines to manage and remediate spills. • Water Quality Objectives as specified in the Water Use License issued by DWS. • *Compliance with GN 704 for the separation of clean and dirty water*.

Surface water	Alteration of natural drainage patterns.	• Site preparation
		• Earthworks
		• Civil works
		• Hydrogen Production Development Platform and related support facilities
		• Use of existing support services
		• Storm water management
		• Demolition
			• Construction
			• Operation
			• Decommissioning and Closure
				• *Review the existing stormwater management controls and implement a stormwater management plan for the Project which encourages diffuse surface runoff and limits point source discharge. This can be achieved by considering the following:*
				  ○ *Implementation of appropriate attenuation of runoff prior to discharge into the receiving environment to reduce the velocity of discharge. These include attenuation ponds and bio-attenuation ponds.*
				  ○ *Design controls for stormwater leaving the attenuation structures into the receiving environment via well-vegetated swales (broad, grass-covered earthen drains), with multiple small discharge points. These should be reinforced where necessary by reno-mattresses.*
				• *Investigate and utilise if feasible, the use of various commercially available pollution and toxicant traps to clean runoff prior to its discharge into the receiving environment (from stormwater management controls).*
					Compliance with GN 704 for the separation of clean and dirty water.

Groundwater	Contamination of groundwater resources.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities	• Construction • Operation • Decommissioning and Closure	• Ensure that vehicle storage and maintenance areas are hard-surfaced and includes measures for collection of leaks and spills. • Ensure collection and treatment of hydrocarbon spills, at the sites licenced remediation site. • Ensure clean and dirty water diversion around the Project area *in accordance with GN 704.* • Prevent discharges that pose an unacceptably high risk to the environment. *This can be done through the following:*	• Anglo American Policies and Guidelines to manage and remediate spills. • Water Quality Objectives as specified in the Water Use License issued by DWS • Compliance with GN 704 for the separation of clean and dirty water.

Aspects affected	Potential Impact	Activity	Phase	Management actions	Standard to be Achieved (Impact Management Objective and Outcomes)
		• Transport systems • Storm water management • Demolition • Rehabilitation		○ *Ensure all employees have undertaken environmental risk awareness training; and* ○ *Ensure compliance to proper hazardous material handling and storage procedures.* • *Ensure that continuous adherence with approved waste management and soil management procedures to limit the potential for pollution.* • *Drip trays should be placed under all standing machinery.* • *Ensure all employees have undertaken environmental risk awareness training.* • *Ensure that all portable toilets are kept clean and are regularly maintained by a licensed service provider. Sewerage should be removed on a regular basis.*	
Air Quality	Air pollution.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Use of existing support services • Demolition • Rehabilitation	• Construction • Operation • Decommissioning and Closure	• Limit vehicle speed at the site to the mine specified speed limits for the waste site area. • Disturbance of the area should be limited to the footprint area. • All vehicles to remain on designated roads/tracks. ○ *Ensure that vehicles and construction machinery are maintained as per the manufacturer's specifications.* ○ *Ensure dust suppression on roads by the application of a dust allaying agents, and / or other approved dust suppression used on the mine.* • *Efforts for concurrent rehabilitation of disturbed areas should be considered and undertaken wherever possible.*	• GNR 893 Minimum Emission Standards. • Anglo Air Quality Performance Standards.
Noise	Increase in disturbing noise levels affecting sensitive receptors.			• Undertake regular maintenance of equipment and vehicles. • Machines used intermittently should be shut down between work periods and not left running unnecessarily. • Limit speed at the site to the mine specified speed limits for the waste site area.	• Compliance with SANS 10103 Acceptable Ambient Levels and SANS 10210 of 2004, the national standard for the calculating and predicting of road traffic noise. • Compliance with SANS 10328 of 2008 Noise Control Regulations – GNR 154 of 10 January 1992.
Visual	Negative visual views (construction and decommissioning). Negative visual views (closure).	• General site management • Site preparation • Earthworks • Civil works • Demolition • Rehabilitation	• Construction • Decommissioning • Closure	• *Security lighting required at night during the operational phase should use minimum lumen or wattage in light fixtures.* • *In the decommissioning phase the Mogalakwena Mine will implement their closure plan which will involve the removal of infrastructure, and the rehabilitation and re-vegetation of cleared areas and any final landforms that will remain post closure. Rehabilitation should be undertaken in a manner that both achieves landscape functionality and limits and/or enhances the long-term visual impact.*	Not Applicable.
Traffic	Road safety impacts.	• Transport systems	• Construction • Operation • Decommissioning and Closure	• Limit speed at the site to the mine specified speed limits for the waste site area. • *Ensure that heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations (2000) for vehicles using a public road.* • *Discourage the routing of heavy vehicle traffic through populated areas.* • *Avoid transporting bulk and abnormal loads during peak traffic periods.*	• Road Traffic Act (Act No 93 of 1996). • National Road Traffic Regulations (2000).

Aspects affected	Potential Impact	Activity	Phase	Management actions	Standard to be Achieved (Impact Management Objective and Outcomes)
				• *Manage daily delivery volumes and times, minimising vehicles during AM and PM peak hours.* • *Provide workers and contractor workers with training on road safety including running road safety and awareness campaigns at the mine.*	
	Influence on road capacity and condition.			Not Applicable	
Cultural, heritage and paleontological resources	Damage or loss of cultural, heritage and paleontological resources through physical disturbance.	• Not Applicable	• Not Applicable	Not Applicable	• Ordinance on Excavations (Ordinance no. 12 of 1980) (replacing the old Transvaal Ordinance no. 7 of 1925).
Socio-economic	Inward migration.	• Not Applicable	• Not Applicable	Not Applicable	• Anglo American Closure Toolbox. • Anglo American Social Way. • Anglo American Environmental Way.
	Positive economic impact (construction).	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Use of existing support services	• Construction • Operation	Where feasible, local communities need to be considered for any construction phase requirements including materials supply and employment.	
	Positive economic impact (operation).				
Land Use	Change in land use.	• Not Applicable	• Not Applicable	Not Applicable	Not Applicable

25.IMPACT MANAGEMENT ACTIONS

Management actions identified to prevent, reduce, control, or remedy the assessed impacts are presented in Table 25-1 below. The action plans include the timeframes for implementing the management actions together with a description of how management actions comply with relevant standards. For completeness purposes, the table below includes existing management actions and/or measures as approved by the Amended EA (Amended authorisation reference LP30/5/1/2/3/2/1(050)EM granted on 17 March 2020) for the PoC Plant. Any management actions indicated in *italics* are additional management measures applicable to the Project activities.

Table 25-1: Description of Impact Management Actions

Potential Impact	Activity	Management actions	Time Period for Implementation	Standard to be Achieved (Impact Management Objective and Outcomes)
Loss of soil resources through physical disturbance and contamination.	• General site management • Site preparation • Earthworks • Civil works • Transport systems • Storm water management • Demolition • Rehabilitation	• Conduct effective maintenance and implementation of the stormwater management measures. • Inspect linear infrastructure (roads and pipelines) on a regular basis (ideally monthly) to ensure that the associated water management infrastructure is effective in controlling erosion. • Regularly inspect all surface water management infrastructure constructed from soil (berms, canals, and bunds) (ideally monthly), if applicable. • Where necessary, soil for the purpose of rehabilitation will be stripped from areas to be cleared for construction and operation and stockpiled in accordance with the site wide soil conservation principles. • Contaminated soil should be considered and treated as hazardous and should be temporary stored with other hazardous waste in the designated area. • Ensure that oil/fuel storage facilities are adequately bunded, with no outlets to external drainage systems. • Prevent discharge or emissions that pose an unacceptably high risk to the environment *This can be done through employee awareness training for potential environmental risks and proper handling and storage procedures.* • *Rehabilitate disturbed land throughout the life of the PDP Plant where possible.* • *Ensure that all accidental spillages are immediately cleaned up and managed in accordance with Anglo American Policies and Guidelines to manage and remediate spills.* • *Restrict vehicle and machinery movement to designated areas.*	• Ongoing	• Manage soils in line with the requirements of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN R 37603 No 331). • Anglo American Policies and Guidelines to manage and remediate spills.
Contamination of surface water resources.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Transport systems • Storm water management • Demolition • Rehabilitation	• Dirty water and clean water systems will be designed according to the conceptual design criteria given in Regulation 704. • *Investigate and utilise if feasible, the use of various commercially available pollution and toxicant traps to clean runoff prior to its discharge into the receiving environment (from stormwater management controls).* • Do not locate any sanitary convenience (chemical toilet), fuel depot or storage facility for anything which may cause pollution within the 1:50 year flood line of a watercourse. • Establish clean water diversions and dirty water collection facilities before land clearing and construction commences, to prevent clean rainfall runoff becoming contaminated by construction activities. • There must be an effective drainage system to a waterproof spillage collection area, where any spillage can be recovered and suitably treated. • Waste (other than mine residues) should be stored, handled, transported, and disposed of in accordance with a documented waste management protocol. • Implement a Stormwater Management Strategy. • Ensure separation of clean and dirty water in accordance with GN 704.	• *Pre*-construction and stormwater management design • Construction • On-going	• Anglo American Policies and Guidelines to manage and remediate spills. • Water Quality Objectives as specified in the Water Use License issued by DWS. • *Compliance with GN 704 for the separation of clean and dirty water*.

Potential Impact	Activity	Management actions	Time Period for Implementation	Standard to be Achieved (Impact Management Objective and Outcomes)
		• Exposed surfaces within dirty areas will be kept to a minimum to minimise the volume of dirty runoff generated. • Implement the Mogalakwena Mine Water Management Strategy. • *Locate all* water storage facilities and plant infrastructure will be located above the 1:100 year floodline or at least 100 m from a watercourse, whichever is the greater.		

Alteration of natural drainage patterns.	• Site preparation
	• Earthworks
	• Civil works
	• Hydrogen Production Development Platform and related support facilities
	• Use of existing support services
	• Storm water management
	• Demolition
		• *Review the existing stormwater management controls and implement a stormwater management plan for the Project which encourages diffuse surface runoff and limits point source discharge. This can be achieved by considering the following:*
		  ○ *Implementation of appropriate attenuation of runoff prior to discharge into the receiving environment to reduce the velocity of discharge. These include attenuation ponds and bio-attenuation ponds.*
		  ○ *Design controls for stormwater leaving the attenuation structures into the receiving environment via well-vegetated swales (broad, grass-covered earthen drains), with multiple small discharge points. These should be reinforced where necessary by reno-mattresses.*
		• *Investigate and utilise if feasible, the use of various commercially available pollution and toxicant traps to clean runoff prior to its discharge into the receiving environment (from stormwater management controls).*
			• Pre-construction and stormwater management design	• *Compliance with GN 704 for the separation of clean and dirty water*.

Contamination of groundwater resources.	• General site management
	• Site preparation
	• Earthworks
	• Civil works
	• Hydrogen Production Development Platform and related support facilities
	• Transport systems
	• Storm water management
	• Demolition
	• Rehabilitation
		• Ensure that vehicle storage and maintenance areas are hard-surfaced and includes measures for collection of leaks and spills.
		• Ensure collection and treatment of hydrocarbon spills, at the sites licenced remediation site.
		• Ensure clean and dirty water diversion around the Project area *in accordance with GN 704.*
		• Prevent discharges that pose an unacceptably high risk to the environment. *This can be done through the following:*
		  Ensure all employees have undertaken environmental risk awareness training; and
		  Ensure compliance to proper hazardous material handling and storage procedures.
		• *Ensure that continuous adherence with approved waste management and soil management procedures to limit the potential for pollution.*
		• *Drip trays should be placed under all standing machinery.*
		• *Ensure all employees have undertaken environmental risk awareness training.*
		• *Ensure that all portable toilets are kept clean and are regularly maintained by a licensed service provider. Sewerage should be removed on a regular basis.*
			• On-going
			• Construction
				• Anglo American Policies and Guidelines to manage and remediate spills.
				• Water Quality Objectives as specified in the Water Use License issued by DWS
				• *Compliance with GN 704 for the separation of clean and dirty water*.

Potential Impact	Activity	Management actions	Time Period for Implementation	Standard to be Achieved (Impact Management Objective and Outcomes)
Air pollution.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Use of existing support services • Demolition • Rehabilitation	• Limit vehicle speed at the site to the mine specified speed limits for the waste site area. • Disturbance of the area should be limited to the footprint area. • All vehicles to remain on designated roads/tracks. • *Ensure that vehicles and construction machinery are maintained as per the manufacturer's specifications.* • *Ensure dust suppression on roads by the application of a dust allaying agents, and / or other approved dust suppression used on the mine.* • *Efforts for concurrent rehabilitation of disturbed areas should be considered and undertaken wherever possible.*	• On-going • Construction and Decommissioning	• GNR 893 Minimum Emission Standards. • Anglo Air Quality Performance Standards.
Increase in disturbing noise levels affecting sensitive receptors.		• Undertake regular maintenance of equipment and vehicles. • Machines used intermittently should be shut down between work periods and not left running unnecessarily. • Limit speed at the site to the mine specified speed limits for the waste site area.	• On-going • Construction phase	• Compliance with SANS 10103 Acceptable Ambient Levels and SANS 10210 of 2004, the national standard for the calculating and predicting of road traffic noise. • Compliance with SANS 10328 of 2008 Noise Control Regulations – GNR 154 of 10 January 1992.
Negative visual views (construction and decommissioning). Negative visual views (closure).	• General site management • Site preparation • Earthworks • Civil works • Demolition • Rehabilitation	• *Security lighting required at night during the operational phase should use minimum lumen or wattage in light fixtures.* • *In the decommissioning phase the Mogalakwena Mine will implement their closure plan which will involve the removal of infrastructure, and the rehabilitation and re-vegetation of cleared areas and any final landforms that will remain post closure. Rehabilitation should be undertaken in a manner that both achieves landscape functionality and limits and/or enhances the long-term visual impact.*	• Construction phase • Decommissioning Phase	• Not Applicable
Road safety impacts.	• Transport systems	• Limit speed at the site to the mine specified speed limits for the waste site area. • *Ensure that heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations (2000) for vehicles using a public road.* • *Discourage the routing of heavy vehicle traffic through populated areas.* • *Avoid transporting bulk and abnormal loads during peak traffic periods.* • *Manage daily delivery volumes and times, minimising vehicles during AM and PM peak hours.* • *Provide workers and contractor workers with training on road safety including running road safety and awareness campaigns at the mine.*	• Ongoing	• Road Traffic Act (Act No 93 of 1996) • National Road Traffic Regulations (2000)
Positive economic impact.	• General site management • Site preparation • Earthworks • Civil works • Hydrogen Production Development Platform and related support facilities • Use of existing support services	Where feasible, local communities need to be considered for any construction phase requirements including materials supply and employment.	• Construction • Operation	• Anglo American Closure Toolbox. • Anglo American Social Way. • Anglo American Environmental Way.

26. FINANCIAL PROVISION

26.1 DETERMINATION OF THE AMOUNT OF FINANCIAL PROVISION

The NEMA Financial Provisioning Regulations GNR 1147 (in Government Gazette 39425 of 20 November 2015)(as amended) requires that an applicant or holder of right or permit must make financial provision for the rehabilitation and remediation, decommissioning, closure activities as well as the remediation and management of latent or residual environmental impacts due to the development and implementation of a proposed project.

An estimate of the financial closure liability which will account for all activities and infrastructure required for the Project is currently being prepared by SLR in support of this BA Process. The financial closure liability cost estimate will take the closure objectives into account and will be calculated as per the Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine as published by the DMRE in January 2005.

This report will culminate in the determination of the quantum of the financial provision. The mechanism for the financial guarantee will be confirmed by AAP upon completion of the financial closure liability report. The final financial closure liability report will be incorporated into the Final BAR and EMPr Reports, which will be submitted to the Limpopo Regional Office of the DMRE for consideration and decision making. The closure costing will also be integrated with the mine's over all financial provisioning. The financial provision for the mine will be updated on an annual basis and be submitted to the DMRE for the duration of the operation in accordance with the relevant legislation.

26.1.1 Closure Objectives Description and the Alignment with the Baseline Environment

The closure objectives for the proposed project will be aligned with the overall closure objectives of the mine. It is important to note that these closure objectives may be refined through the life of mine as and if changes to the operational activities and/or infrastructure are required. The closure objectives for the mine are outlined below:

- To adhere to all statutory and other legal requirements.
- To develop landforms and land-uses that are stable, sustainable and aesthetically acceptable on
- closure.
- To ensure safety & health of all stakeholders during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks.
- Ensure that closure supports productive uses, where practical, considering pre-mining conditions and agree with commitments to with stakeholders.
- Physically and chemically stabilise remaining structures to minimise residual risks.
- Promote biodiversity and biological sustainability to the maximum extent practicable.
- Utilize closure strategies that promote a self-sustaining condition with little or no need for ongoing care and maintenance.
- To achieve agreed quality targets set by the Catchment Management Agency (CMA) and the DWS as far as practical relative to impacts and reasonability to achieve.

26.1.2 Confirmation that Closure Objectives Have Been Consulted with I&APs

The closure objectives are outlined in this report and is made available to I&APs for review and comment.

26.1.3 Rehabilitation Plan

The Project does not require the development of an annual rehabilitation plan as outlined in the Financial Provisioning Regulations, 2015 (GNR 1147 of 20 November 2015) (as amended) that focusses on rehabilitation for the forthcoming 12 months. This is because the Project will be integrated into Mogalakwena Mine's overall infrastructure and will therefore fall under the site wide Rehabilitation Plan. At a high level the site wide Rehabilitation Plan will be updated to include specific management and rehabilitation measures as identified during the process, and through integration with the Social and Labour Plan of Mogalakwena Mine as well as the Anglo Social Way.

The rehabilitation closure objectives and principles for the Mogalakwena Mine include that:

- environmental damages are minimised to the extent that they are acceptable to all parties involved;
- mine closure is achieved efficiently, cost effectively and in compliance with the law; and
- the social impacts resulting from mine closure are managed in such a way that establishment of a socially stable community in line with the principles of sustainable development is facilitated.

26.1.4 Compatibility of the Rehabilitation Plan with the Closure Objectives

It is confirmed that mine's rehabilitation plan will be compatible with the closure objectives given that the closure objectives will be taken into account during the determination of the financial provision.

26.1.5 Calculate and State the Quantum of the Financial Provision

The NEMA Financial Provisioning Regulations GNR 1147 (in Government Gazette 39425 of 20 November 2015)(as amended) requires that an applicant or holder of right or permit must make financial provision for the rehabilitation and remediation, decommissioning, closure activities as well as the remediation and management of latent or residual environmental impacts due to the development and implementation of a proposed project.

An estimate of the financial closure liability which will account for all activities and infrastructure required for the Project is currently being prepared by SLR in support of this BA Process. The final financial closure liability report will be incorporated into the Final BAR and EMPr Reports, which will be submitted to the Limpopo Regional Office of the DMRE for consideration and decision making.

26.1.6 Confirmation that the Financial Provision will be Provided as Determined

A confirmation that the amount required in order to manage and rehabilitate the environmental impacts as determined for financial provision can be provided by AAP, will be provided completion of the financial closure liability report. This confirmation will be incorporated into the Final BAR and EMPr Reports, which will be submitted to the Limpopo Regional Office of the DMRE for consideration and decision making.

27. MECHANISMS FOR MONITORING COMPLIANCE AND PERFORMANCE AGAINST THE EMPR

The Mogalakwena Mine currently has monitoring programmes in place for its existing mining operations. There are no environmental impacts specifically associated with the Project that require additional monitoring. It is recommended that the implementation of existing monitoring programmes be continued. As a general approach, Mogalakwena Mine should ensure that their monitoring programmes comprises the following:

- adherence to a formal monitoring procedure;
- use of appropriately calibrated equipment by personnel trained to use the equipment;
- the preservation of samples according to laboratory specifications by personnel trained to use the equipment, where samples require analysis;
- the identification of monitoring parameters in consultation with a specialist in the relevant field and/or the relevant authority;
- the amendment of monitoring parameters, where necessary, following the initial monitoring results and in consultation with a specialist and/or the relevant authority; and
- the interpretation of data and reporting of trends will be undertaken by an appropriately qualified person.

An overview of the existing monitoring programmes which are applicable to Project activities are provided below.

Surface and groundwater monitoring

The mine operates an extensive water monitoring programme which includes all water and waste management facilities in accordance with the Groundwater and Surface water Monitoring Procedures MS-SHE-ENV-PRO- 0009 and MS-SHE-ENV-PRO-0004 for the mine. These procedures are reviewed every two years. The water monitoring programme is aligned with the Best Practice Guidelines G3 (published by DWAF, 2006). The programme also aligns with the objectives provided in the Anglo Water Management Guideline (GTG 21). The guideline includes the following:

- responsibility for the monitoring program;
- locations of routine samples to be taken and purpose;
- required sampling and preservation guidelines (surface / groundwater);
- analytical parameters required per sample;
- frequency of sampling;
- sample quality/custody controls; and
- data management, and reporting.

Mogalakwena Mine staff and external contractors undertake the surface and groundwater sampling. The water resources monitored include the Mohlosane and Groot Sandsloot (Pholotsi) River, upstream and downstream of mining activities and on Vaalkop Dam. The water monitoring programme also includes conditions stipulated in the approved WULs. The water samples are analysed by a SABS accredited laboratory.

Air quality monitoring

Air quality at Mogalakwena Mine is monitored through thirty-two dust fallout monitoring and three PM_{10} monitoring points situated across the mining area. Currently there are 18 residential area dust fallout monitoring stations and 13 non – residential dust fallout monitoring stations. Refer to Figure 27-1 for a map of the monitoring locations.

Noise monitoring

The mine operates a Noise Monitoring Plan and a Noise Impact Management Plan which was approved as part of the Mogalakwena Mine expansion project. The Noise Impact Management Plan was developed in line with relevant environmental noise standards and guidelines. Refer to Figure 27-1 for a map of the monitoring locations.

Continuous maintenance

There is continuous infrastructure maintenance undertaken by the mine. This is done on infrastructure which has the potential to affect the environment, which includes pipelines, roads, conveyors, and infrastructure traversing watercourses. The maintenance is a result of planned inspections (in line with a maintenance schedule) on these facilities where specific requirements for maintenance is required.

Legend

- Towns / Villages
- Roads
- Rivers
- Dams
- South African Protected Areas
- Air Quality Monitoring Points
- Noise Monitoring Points

0 1 000 2 000 Meters

Scale: 1:54 200 @ A3

Projection:Transverse Mercator

Datum: Hartebeeshoek, Lo 29

ANGLO-AMERICAN

Figure 27 - 1 : Monitoring Network

SLR Consulting (South Africa) (Pty) Ltd
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Tel: +27 (11) 467-0945 Fax: +27 (11) 467-0978

720.01145.00009

2022/07/29

27.1 FREQUENCY OF SUBMISSION OF THE PERFORMANCE ASSESSMENT / ENVIRONMENTAL AUDIT REPORT

A formal audit of the performance assessment of the Mogalakwena Mine's EA and EMPr(s) takes place every 2 years.

27.2 CLOSURE COST REPORTING

The financial provision for the mine (including components of this Project) will be updated on an annual basis and be submitted to the DMRE for the duration of the operation in accordance with the relevant legislation.

28. ENVIRONMENTAL AWARENESS PLAN

The environmental policy of the Mogalakwena Mine, states the mines' commitment to the implementation of the AAP policy towards environmental management, with specific focus on water related issues. The policy states that: "*Anglo American Platinum Corporation Limited, as the world's leading primary producer of platinum group metals, commits itself to the creation of a safe and healthy environment for all our employees and the citizens of the communities with which we interact*".

In order to give practical expression to their commitments and to measure their progress, AAP has the following aims with regard to the environment:

- conserve environmental resources;
- prevent or minimise adverse impacts arising from our operations;
- demonstrate active stewardship of land and biodiversity;
- promote good relationships with, and enhance capacities of, the local communities of which we are a part and;
- respect people's culture and heritage.

The Project will form a part of the current and approved overall mining operations, as such the Project will utilise the existing Mogalakwena Mine SHE Department Environment - Competence, Training and Awareness procedure.

29. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

The following documents will be submitted to the DMRE from the start of construction until mine closure:

- As noted in Section 27.1, an environmental audit report, prepared by an independent person, will be submitted to the DMRE at intervals indicated in the EA. The purpose of the environmental audit report will be to assess compliance with the conditions of the EA and the EMPr.
- The financial provision will be updated on an annual basis and submitted to the DMRE in accordance with the relevant legislation at the time.

30. UNDERTAKING

I, **Stuart Heather-Clark**, the EAP responsible for compiling this Basic Assessment Process, undertake that:

- The information provided herein is correct;
- Comments and inputs from I&APs and commenting authorities have been included and correctly recorded in this EIA;
- Inputs and recommendations from the specialist reports have been included where relevant; and
- Any information provided to I&APs and any responses to comments or inputs made is correct or was correct at that time.

Signature of EAP	August 2022 Date

I certify that the DEPONENT has acknowledged that he/she knows and understands the contents of this affidavit, he/she does not have any objection to taking the oath, and he/she considers it to be binding on his/her conscience and that the administering oath complied with the regulations contained in Government Gazette No. R1258 of July 1972, as amended.

Signature of Commissioner of oaths[11]

[11] This will be signed off by a Commissioner of Oaths prior to submission of the final BAR and EMPr Reports to the DMRE.

31.REFERENCES

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- Zutari . (2021). Proposed Solar Photovoltaic Energy Facility for the Mogalakwena Mine Solar Power (Pty) Ltd, Limpopo. Zutari South Africa (Pty) Ltd.

APPENDIX A: EXISTING AUTHORISATIONS

APPENDIX B: DETAILS OF THE PROJECT TEAM

APPENDIX C: PUBLIC PARTICIPATION PROCESS

APPENDIX D: DETAILED ASSESSMENT OF POTENTIAL IMPACTS

The potential impacts described in this Appendix have been identified by the EIA project team with input from specialists, regulatory authorities, and I&APs (through comments received throughout the BA process). The sequence in which these issues are listed are in no order of priority or importance. The potential impacts are rated with the assumption that no management actions are applied and then again with management actions. The mitigated assessment assumes that technical design controls would be included in the detailed design of the Project and implemented when the Project components are constructed and operated.

An indication of the phases in which the impact will occur, including the Project specific activity associated with each impact is provided below (where applicable). A summary of the impact assessment findings is provided in Section 8. Management actions identified to prevent, reduce, control, or remedy the assessed impacts are provided under the relevant impact discussion sections below and detailed in Section 11. Where impacts are considered to be insignificant, no mitigation and/or management actions have been identified.

It is important to note that the PoC Plant (and associated activities) was approved by the DMRE on the 17 March Amended EA (Amended authorisation reference LP30/5/1/2/3/2/1(050)EM granted on 17 March 2020) by the DMRE – Limpopo Region. Specific mitigations and/or actions as provided in the Motivational letter for Proof of Concept Studies at Mogalakwena Mine (SRK Consulting, 2019) and the Application for EA dated 04 February 2020 (submitted to the DMRE) were used to manage identified impacts for the PoC Plant.

Some of the components of the PoC Plant will be removed to accommodate the expansion activities required for the Project. It follows that some previous mitigation and/or management measures previously approved for the PoC Plant, may no longer be relevant. As such, mitigations and/or actions which are no longer relevant were removed as part of this assessment. Previous mitigations and/or actions which were still deemed relevant are included below. These additional mitigation and/or management measures applicable to this Project (and associated activities) are included in *italics* below.

GEOLOGY

ISSUE: LOSS AND STERILISATION OF MINERAL RESOURCES

Mineral resources can be sterilised and/or lost through the placement of new permanent infrastructure above or in close proximity to ore resources, thereby preventing access to exploitable ore and limiting mining activities. The Project comprises the expansion of the existing PoC Plant which is located on an already developed area. It is understood that PoC Plant was sited to avoid the loss of mineral resources. No existing ore bodies will be affected because the Project will maintain the status quo. It follows that the Project will not result in the sterilisation of any mineral resources. This impact has therefore been rated as **INSIGNIFICANT** and has not been assessed further.

LAND USE

ISSUE: CHANGE IN LAND USE

The Project will be located within the already disturbed and existing footprint of the PoC Plant and no land take is required. As such, the current land use of the Project area is considered to remain as is. There will be no impact on land use because the function of the area will not be changed. Cumulative impacts are not anticipated because there will not be a change in adjacent land use. The post closure land use will be

determined as per the closure and rehabilitation plans of the entire site. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

TOPOGRAPHY

ISSUE: ALTERING TOPOGRAPHY

The natural topography of the Project area has already been altered by the establishment of the PoC Plant. The Project will be located within the already disturbed and existing footprint of the PoC Plant and no land take is required. As such, the current topography of the Project area is considered to remain largely as is. It follows that any potential for the alteration of topography is expected to be **INSIGNIFICANT** and has not been assessed further.

ISSUE: HAZARDOUS EXCAVATIONS AND INFRASTRUCTURE RESULTING IN SAFETY RISKS TO THIRD PARTIES AND ANIMALS

Hazardous excavations and infrastructure include all structures into, or off of, which third parties and animals could fall and be harmed. The presence of hazardous excavations and infrastructure can occur in all Project phases. In the construction and decommissioning phases, hazardous excavations and infrastructure are usually temporary in nature, usually existing for a few weeks to a few years. The operational phase may present long-term hazardous infrastructure. No hazardous structures are expected at closure, as land would be rehabilitated and all infrastructure would be removed.

A description of the Project infrastructure is provided in Section 3.3 and Table 3-2, and largely includes buildings, roads, underground pipelines, and power supply infrastructure. These are similar to the existing structures at the PoC Plant. The Project requires the development of fixed high-pressure and mobile low-pressure hydrogen storage infrastructure which will be housed within a contained facility. The Project activities will be undertaken within the operational area of the PoC Plant. The perimeter of the PoC Plant is secured by access control (electric fencing, motion sensitive security beams and cameras) as well as signage indicating on-site hazards within the PoC Plant area. Additionally, the PoC Plant is within the Mogalakwena Mine, which is also subject to access control and not accessible to unauthorised parties.

The construction phase will typically include earthworks activities such as bulldozing, excavation of trenches and foundations. However, these activities will be temporary in nature because all excavations will be filled and/or replaced with new infrastructure. In addition, the Project will be located within the Mining Right area which is access controlled. Therefore, the potential for hazardous excavations is expected to be negligible. Given that the Project will form part of the existing mining operations, the existing environmental and safety awareness procedures will be implemented for the Project during all phases. When considered cumulatively in the context of the existing PoC Plant, the Project presents additional sources of hazardous excavations which will not differ from what is already located within the PoC Plant. The impact as a result of hazardous excavations is therefore considered as **INSIGNIFICANT**.

With regard to hazardous infrastructure, the high pressure storage may pose additional mine, health, and safety risks, due to the potential for fire and explosions (due to hydrogen at high pressure). In addition to this, there is a potential for gas leaks from the gas pipelines, and electrolysers during construction (for installation activities) and operation of the facilities. These potential impacts will likely be mitigated by proper installation through design (where design controls include designated buffer areas to ensure employee safety and instrumentation safeguards). These risks are being assessed separately as part of a Major Hazardous Installation Assessment undertaken for the Project and is therefore outside of the scope of this assessment. Risks to third parties are unlikely as the mine area and Project site are access controlled, preventing unauthorised persons from entering the site where they could be exposed to risks. The impact as a result of hazardous structures is therefore considered as **INSIGNIFICANT**.

TRAFFIC

Traffic impacts can occur when Project vehicles make use of the private and public transport network in and adjacent to the Project area. The key potential traffic related impacts are on road capacity and condition and impacts to public safety. These impacts can occur in all phases, but traffic volumes are typically higher during the construction, decommissioning and closure phase. This is commonly due to the increased movement of vehicles required for the transport of materials. Traffic volumes typically taper off during the operational phase.

Section 6.7.3.2 provides a description of the existing traffic network at the Mogalakwena Mine. High traffic volumes (most of which are heavy vehicles) access the Mogalakwena Mine off the N 11 onto the Bakenberg Road. Existing traffic on the N 11 comprises of public and private vehicles, traffic owing to the Mogalakwena mining operations as well as several other mining operations in the Mokopane area. The Ga-Molekana settlement is located approximately 2 km from the Project area. Access to this community is gained through the Ga-Molekana Access Road located just over 2 km from the Bakenberg Road/ N 11 intersection. Existing traffic on this road is attributed to access to community and individual residential properties.

ISSUE: ROAD SAFETY IMPACTS

Safety risks associated with mining traffic making use of public road infrastructure include pedestrian accidents and vehicle accidents due to the increased frequency of vehicular movement and higher traffic volumes. Increased traffic volumes are likely during the construction, decommissioning phases, due to the delivery of construction materials and commuting workers. The Project is expected to create an average of 150 temporary jobs during the construction phase. These additional workers are expected to travel to and from site using mini-bus taxis, or private vehicles on primarily surfaced public roads. According to a traffic study undertaken by Zutari (2021), there are formal public transport lay-bys on both sides of the N 11 at the intersections of N 11 and Ga-Molekana Access Road. However, mini-bus taxis were observed dropping off and picking up passengers on the road verges. A potential impact to human safety may occur in instances where adherence to formal road rules is ignored.

During operation, only 5 additional jobs will be created, generating very low additional demand for public transport and non-motorised transport. This increase will be accommodated by the existing public transport services and facilities. Potential safety risks to pedestrians and other road users outside of the traffic controlled areas of the Mogalakwena Mine is negligible because the mine implements measures to manage traffic and road safety in accordance with their approved EIA and EMPr.

The transport of materials is likely to increase traffic volumes on the internal (within the Mining Right area) and access roads surrounding the Project area during the construction, decommissioning and closure phases. Such traffic is likely to include heavy motor vehicles and some abnormal loads. During operation, lower traffic volumes are expected as no significant input materials are required. Inside the Mining Right area, safety risks will be limited to mining personnel. These personnel are provided with Health and Safety Awareness Training, thereby reducing the potential for traffic safety incidents. On public roads, construction vehicles would comprise a relatively small portion of traffic, would enter the mine through the established intersection and only be active for the relatively short duration of the construction period. Provided that construction vehicles comply with the rules of the road, the significance of the impact is rated as **LOW** and reduces to **INSIGNIFICANT** with mitigation.

IMPACT RATING

ISSUE: ROAD SAFETY IMPACTS		
PHASE: CONSTRUCTION, DECOMMISSIONING AND CLOSURE		
Criteria	Without Mitigation	With Mitigation
Intensity	High	Low
Duration	Medium term	Medium term
Extent	Local	Local
Consequence	Medium	Very low
Probability	Possible	Improbable
Significance	Low	Insignificant
Nature of cumulative impacts	No significant contribution to cumulative impacts.	
Degree to which impact can be reversed	Permanent injury or death cannot be reversed.	
Degree to which impact may cause irreplaceable loss of resources	Permanent injury or death would be an irreplaceable loss.	
Degree to which impact can be mitigated	High as mitigation measures should achieve impact avoidance.	
Residual impacts	None as no mine traffic related activities take place after closure.	
Mitigated outcome	Transport related accidents and/or injury to people and livestock are prevented.	

MANAGEMENT OBJECTIVE

To prevent transport related accidents and/or injury to people and livestock.

MANAGEMENT OUTCOME

Ensure that the use of public roads due to the Project activities is done in a responsible manner to reduce the potential for safety and vehicle related impacts on road users.

MITIGATION AND/OR MANAGEMENT ACTIONS

Time period for implementation – Ongoing

- Limit speed at the site to the mine specified speed limits for the waste site area.
- *Ensure that heavy vehicles and abnormal load vehicles comply with limitations on vehicle dimensions and axle and vehicle masses and safety standards set out in the Road Traffic Act, 1996 (Act No 93 of 1996) and the National Road Traffic Regulations (2000) for vehicles using a public road.*
- *Discourage the routing of heavy vehicle traffic through populated areas.*

- *Avoid transporting bulk and abnormal loads during peak traffic periods.*
- *Manage daily delivery volumes and times, minimising vehicles during AM and PM peak hours.*
- *Provide workers and contractor workers with training on road safety including running road safety and awareness campaigns at the mine.*

MONITORING REQUIREMENTS

None identified.

ISSUE: INFLUENCE ON ROAD CAPACITY AND CONDITION

The road conditions of the Mogalakwena District are generally in fair to poor condition (Waterberg District Municipality 2019/2020 IDP, 2019). An increase in load bearing heavy vehicular traffic could potentially damage the road surfaces and decrease the physical quality of the road. During the construction phase, there will be an increase in vehicular traffic on the N 11 onto the Bakenberg Road, owing to the transport of materials and prefabricated infrastructure to the Project area. It is anticipated that there will be a short term increase in heavy vehicle traffic and trucks carrying abnormal loads. During decommissioning and closure, the infrastructure will be stripped into component parts. The existing site wide waste management procedures will be complied with, as such, material will be recycled where possible, and landfilled where required. Equipment leased from suppliers will likely be returned, and thus transported using large trucks carrying abnormal loads.

During operation, traffic activities will be primarily limited to the personnel trips. Upgrades to the Bakenberg Road, authorised as part of the Mine Expansion Project (SRK Consulting, 2019) will also facilitate operational traffic flow. On public roads, vehicles transporting materials would comprise a relatively small portion of traffic and would only be active for the relatively short duration of the construction or decommissioning period. When considering the road capacity, the additional construction traffic volumes on the road network could result in an increase in average vehicle delays and congestion. It is estimated that additional vehicles required during construction are estimated at 20 to 30 vehicles with approximately 5 delivery trucks per week. Backfill material delivery trucks are estimated at 10 trucks per day during the first 3 to 5 months of construction, however, these trucks will utilize the mining haul road (and not Bakenberg). During operation there will be approximately 5 to 10 additional vehicles.

Increased traffic volumes within the Mining Right and the Project area are not expected. Traffic flow within the Project area will be streamlined through the development of a 0.76 km gravel compacted access road and a 0.17 km gravel compacted internal road, which will integrate with the existing road infrastructure. Designated truck stop terraces will be developed to accommodate the routing of the three additional hydrogen fuel cell trucks and ensure efficient vehicular movement around the Plant. The roads will be maintained as part of the Mine's road maintenance programme.

The significance of the impact of increased vehicular traffic due to the Project activities on road capacity and condition is rated as very low. Given that the road network routinely services operational mines in addition to the Mogalakwena Mine, the potential for damage to the current road is expected to be minimal, due to the localized, small scale, short duration of the Project. The significance of increase traffic volumes on the road capacity and road condition was rated as **VERY LOW**. No specific mitigation or management measures are provided for this impact because it will not affect the significance of the impact.

IMPACT RATING

ISSUE: INFLUENCE ON ROAD CAPACITY AND CONDITION		
PHASE: CONSTRUCTION, DECOMMISSIONING AND CLOSURE		
Criteria	Without Mitigation	With Mitigation
Intensity	Low	-
Duration	Short term	-
Extent	Local	-
Consequence	Very low	-
Probability	Definite	-
Significance	Very low	-
Nature of cumulative impacts	Not applicable.	
Degree to which impact can be reversed	The impact would largely be reversed with the cessation of construction and to a lesser extent, decommissioning and closure activities	
Degree to which impact may cause irreplaceable loss of resources	Not applicable.	
Degree to which impact can be mitigated	None.	
Residual impacts	Not applicable.	
Mitigated outcome	Not applicable.	

VISUAL

ISSUE: NEGATIVE VISUAL VIEWS

Visual impacts on the receiving environment may be caused by activities and infrastructure at all Project phases. During operation, the Project infrastructure (buildings, additional lighting and component infrastructure) will blend with the existing landscape character. This is because the expansion will be compatible with the existing land use of the area (PoC Plant and operational mining activity). The impact during the operational phase is therefore considered negligible. Construction and decommissioning phased activities (albeit short term) may have the potential to cause negative visual views due to the creation of fugitive dust (resulting from earthworks activities, transport of material, and removal of existing infrastructure), these impacts are usually limited to the Project area and immediately surrounding areas and last for a short duration. Given that there are no sensitive receptors within and around the Project area, and that Project activities are consistent with operational mining activities, the intensity of the visual impact is considered low.

The construction phase impacts occur for a short term, whereas during closure, the duration of the impact can be long term if all infrastructure is not removed and rehabilitation has not been undertaken adequately. The significance of the impact of negative visual views is rated as **INSIGNIFICANT** before and after mitigation during the construction phase. During closure the impact is rated as **VERY LOW** and reduced to **INSIGNIFICANT** after mitigation.

IMPACT RATING

ISSUE: NEGATIVE VISUAL VIEWS		
PHASE: CONSTRUCTION, DECOMMISSIONING AND CLOSURE		
Criteria	Without Mitigation	With Mitigation
Intensity	Low	Low
Duration	Short term (construction and decommissioning) Long term (closure)	Short term
Extent	Local	Local
Consequence	Very low (construction and decommissioning) Low (closure)	Very low
Probability	Possible	Improbable
Significance	Insignificant (construction and decommissioning) Very low (closure)	Insignificant
Nature of cumulative impacts	Low. The Project area will be located within the already disturbed footprint of the PoC Plant which already has an altered visual landscape due to the existing mining infrastructure.	
Degree to which impact can be reversed	The impact of negative visual views can only be reversed following removal of the additional infrastructure and after the completion of rehabilitation activities.	
Degree to which impact may cause irreplaceable loss of resources	Not applicable.	
Degree to which impact can be mitigated	None (construction and decommissioning) Low (during closure)	
Residual impacts	No residual impacts are anticipated.	

MANAGEMENT OBJECTIVE

To limit negative visual impacts.

MANAGEMENT OUTCOME

Negative visual views are limited.

MITIGATION AND / OR MANAGEMENT ACTIONS

Time period for implementation - Construction phase

- *Security lighting required at night during the operational phase should use minimum lumen or wattage in light fixtures.*

Time period for implementation - Decommissioning phase

- *In the decommissioning phase the Mogalakwena Mine will implement their closure plan which will involve the removal of infrastructure, and the rehabilitation and re-vegetation of cleared areas and any final landforms that will remain post closure. Rehabilitation should be undertaken in a manner that both achieves landscape functionality and limits and/or enhances the long-term visual impact*.

MONITORING REQUIREMENTS

None identified.

CULTURAL, HERITAGE AND PALEONTOLOGICAL RESOURCES

ISSUE: DAMAGE OR LOSS OF CULTURAL, HERITAGE AND PALEONTOLOGICAL RESOURCES THROUGH PHYSICAL DISTURBANCE

The placement of and removal infrastructure during construction and decommissioning, have the potential to remove, damage or destroy cultural, heritage and palaeontological resources, either directly or indirectly. This results in the loss of the resources for future generations. The Project area has been completely transformed by historical cultivation and recently by infrastructure development, including the PoC Plant. The baseline cultural, heritage and paleontological environment of the Project area is described in Section 6.7.2. Middle Stone Age scatter of low significance, living heritage sites, as well as burial sites were found outside the Project area by the heritage specialist. A review of the Project area concluded that no in-situ deposits will be disturbed by the Project activities because the area has a low heritage and cultural sensitivity. According to the paleo -sensitivity map accessed from SAHRA, the study area is of insignificant/no sensitivity and no further palaeontological studies are required. The significance of the impact of damage or loss of cultural, heritage and paleontological resources through physical disturbance is considered **INSIGNIFICANT.**

MANAGEMENT OBJECTIVE

To minimise the disturbance of heritage resources.

MANAGEMENT OUTCOME

Protect heritage resources where possible. If disturbance is unavoidable, then mitigate impact in consultation with a specialist and the SAHRA and in line with regulatory requirements.

MITIGATION AND/OR MANAGEMENT ACTIONS

Implement the existing Chance Find Procedure for the Mogalakwena Mine, as included in the Anglo Social Way Section 4H, during construction.

COMPLIANCE TO STANDARDS

Ordinance on Excavations (Ordinance no. 12 of 1980) (replacing the old Transvaal Ordinance no. 7 of 1925).

BIODIVERSITY

ISSUE: LOSS OF TERRESTRIAL HABITAT AND BIODIVERSITY THROUGH PHYSICAL DISTURBANCE

Areas of ecological sensitivity include functioning biodiversity areas with species diversity and associated intrinsic value. Linkages between these areas have value because of the role they play in allowing the migration or movement of flora and fauna between the areas, which is a key function for a broader ecosystem. The transformation of land for any purpose increases the destruction of the site-specific biodiversity, the fragmentation of habitats and reduces its intrinsic ecological functionality.

With reference to Section 6.7.1.4, the Project area has been verified as having low terrestrial biodiversity sensitivity (see Appendix F: Terrestrial Biodiversity). This is because the Project area has been subject to significant disturbance and permanent transformation, whereby all-natural vegetation has been removed. The Project will be located within the already disturbed and existing footprint of the PoC Plant and no land take is required. As such, no direct impact to terrestrial habitat is anticipated during any of the construction, operations or closure. Further to this, the Project area is an enclosed facility and does not allow for the natural movement of faunal species. The existing PoC Plant and mining activities, such as noise, large vehicle

movement, and dust discourage the permanent presence of faunal species within the Project area. The Project will not contribute to cumulative negative impacts on terrestrial habitat and biodiversity because there will be no additional degradation and disturbance of greenfield land due to Project activities. As such this impact is considered **INSIGNIFICANT** and has not been assessed further.

MANAGEMENT OBJECTIVE

To prevent the unacceptable disturbance and loss of biodiversity and related ecosystem functionality through physical and general disturbance.

MANAGEMENT OUTCOME

Limit the area of disturbance as far as practically possible to that of the PoC Plant site.

MITIGATION AND/OR MANAGEMENT ACTIONS

No mitigation or management measures have been identified for this Project.

COMPLIANCE WITH STANDARDS

Continue to comply with the following:

- Anglo American Biodiversity Performance Standards.

MONITORING REQUIREMENTS

No additional monitoring requirements identified.

NOISE

ISSUE: INCREASE IN DISTURBING NOISE LEVELS AFFECTING SENSITIVE RECEPTORS

There are a range of construction, operation and decommissioning activities that have the potential to generate noise. The noise-generating activities associated with the Project is limited in time and extent, i.e., to the Project area and to the construction phase (11 months of physical construction). Activities likely to generate noise include heavy vehicle movement and traffic; use of electric equipment (power tools, jackhammers, electric saws, welding machines); cement mixers; earthworks; civil works; erection and assembly of infrastructure; and noise from labour force. During the operational phase, additional noise sources are limited to the travel and refuelling of the three additional mine haul trucks. There will also be minimal operational noise from the transformers and substations (as these are housed inside of buildings). The decommissioning and closure phases will include noise from dismantling, stripping and demolition of infrastructure as part of the mine's existing closure commitment and procedures. These noise emissions will also be short lived like the construction phase activities.

With reference to Section 6.7.1.9, ambient noise levels around the Project area are already elevated. Prevalent noises include the distant sound of the crusher as well as noise emanating from mining activities.

The construction activities may result in an increase to ambient noise levels within the site and immediate surrounds. There will be no potential for noise disturbance to biodiversity because of the transformed state of the Project area and lack of biodiversity. No sensitive human receptors are located within and immediately adjacent to the Project area. The nearest settlement is located approximately 2 km away from the Project area (the Ga-Molekana settlement). This community is located amongst other mining

infrastructure, and already experiences ambient noise due to these activities. If the Project noises are audible, they will not differ from those already experienced. No cumulative impact to ambient noise levels surrounding the Project area, the mine and its surrounds is expected, due to the small scale of the Project and associated activities. The potential impact of Project activities to increase noise, to levels which cause disturbance to sensitive receptors is therefore considered **INSIGNIFICANT** and not assessed further.

MANAGEMENT OBJECTIVE

To prevent public exposure to disturbing noise.

MANAGEMENT OUTCOME

Ensure that any noise generated as a result of the project remains within acceptable limits to avoid the disturbance of third parties.

MITIGATION AND/OR MANAGEMENT ACTIONS

Time period for implementation – On-going

- Undertake regular maintenance of equipment and vehicles.
- Machines used intermittently should be shut down between work periods and not left running unnecessarily.

Time period for implementation - Construction phase

- Limit speed at the site to the mine specified speed limits for the waste site area.

MONITORING REQUIREMENTS

Continue to implement the site wide Noise Impact Management Plan and site wide noise monitoring programme.

COMPLIANCE WITH STANDARDS

Continue to comply with the following:

- Compliance with SANS 10103 Acceptable Ambient Levels and SANS 10210 of 2004, the national standard for the calculating and predicting of road traffic noise.
- Compliance with SANS 10328 of 2008 Noise Control Regulations – GNR 154 of 10 January 1992.

SOILS AND LAND CAPABILITY

ISSUE: LOSS OF SOIL RESOURCES THROUGH PHYSICAL DISTURBANCE AND CONTAMINATION

Soil is a valuable resource that supports a variety of ecological functions and land uses. Project activities have the potential to damage soil resources through physical disturbance and/or contamination which has the potential to impact on biodiversity, surface, and groundwater resources. The loss of soil resources has a direct impact on the potential loss of the natural capability of the land.

Construction phase activities such as civil works, earthworks, and heavy vehicles have the potential to physically alter the soil structure causing compaction and erosion. There is also potential for soil contamination during the construction phase, primarily through accidental spillages and leaks of hydrocarbon material and hazardous materials. These impacts are short lived and typically reduce after the completion of the construction phase. The operation phase will have limited potential for physical disturbance because all activities will be confined to already disturbed areas, however contamination

through leaks and spillages are possible from the movement of vehicles. Decommissioning and closure activities such as dismantling of infrastructure, earthworks, and utilisation of transport systems may cause physical damage by movement and compaction of soil and soil contamination through spillages, and leaks.

The Project will occupy a relatively small area (approximately 8 ha) which is already transformed by hardened surfaces of the PoC Plant. Topsoil was previously disturbed by prior cultivation and mining activities and then mostly stripped during development of the PoC Plant. As such the available soil resources in the Project area is severely limited. The Project area also has low ecological sensitivity and low agricultural potential.

There is limited risk of soil loss during bulk earthworks in the construction phase and again during the decommissioning. In the unmitigated scenario the significance of the impact is rated as **VERY LOW** and is reduced to **INSIGNIFICANT** with mitigation and management measures. Given that the Project activities will be assimilated with existing operations and management measures no further mitigation measures have been identified.

IMPACT RATING

ISSUE: LOSS OF SOIL RESOURCES THROUGH PHYSICAL DISTURBANCE AND CONTAMINATION		
PHASE: CONSTRUCTION, OPERATION, DECOMMISSIONING AND CLOSURE		
Criteria	Without Mitigation	With Mitigation
Intensity	Low	Medium
Duration	Short term	Short term
Extent	Local	Local
Consequence	Very low	Very low
Probability	Probable	Possible
Significance	Very low	Insignificant
Nature of cumulative impacts	No cumulative impacts are anticipated due to the small scale of Project activities and that the Project activities will not cause additional disturbance from the current and approved operations of the PoC Plant.	
Degree to which impact can be reversed	Possible with mitigation.	
Degree to which impact may cause irreplaceable loss of resources	Low.	
Degree to which impact can be mitigated	Low.	
Residual impacts	No residual impacts are anticipated.	

MANAGEMENT OBJECTIVE

To minimise the loss of soil resources and related land capability through physical disturbance, erosion, compaction, and soil pollution.

MANAGEMENT OUTCOME

- Loss of soil resources through contamination and physical disturbance is prevented.

- Handle, manage and conserve soil resources to be used as part of rehabilitation and re-establishment of the pre-mining land capability.

MITIGATION AND/OR MANAGEMENT ACTIONS

No additional mitigation or management measures have been identified for this Project. However, the mine should continue to implement the existing mitigation and/or management actions for the PoC Plant (SRK Consulting, 2019) to maintain the status quo. These are as follows:

Time period for implementation - Ongoing

- Conduct effective maintenance and implementation of the stormwater management measures.
- Inspect linear infrastructure (roads and pipelines) on a regular basis (ideally monthly) to ensure that the associated water management infrastructure is effective in controlling erosion.
- Regularly inspect all surface water management infrastructure constructed from soil (berms, canals, and bunds) (ideally monthly), if applicable.
- Where necessary, soil for the purpose of rehabilitation will be stripped from areas to be cleared for construction and operation and stockpiled in accordance with the site wide soil conservation principles.
- Contaminated soil should be considered and treated as hazardous and should be temporary stored with other hazardous waste in the designated area.
- Ensure that oil/fuel storage facilities are adequately bunded, with no outlets to external drainage systems.
- Prevent discharge or emissions that pose an unacceptably high risk to the environment *This can be done through employee awareness training for potential environmental risks and proper handling and storage procedures.*
- *Rehabilitate disturbed land throughout the life of the PDP Plant where possible.*
- *Ensure that all accidental spillages are immediately cleaned up and managed in accordance with Anglo American Policies and Guidelines to manage and remediate spills.*
- *Restrict vehicle and machinery movement to designated areas.*

COMPLIANCE WITH STANDARDS

- Manage soils in line with the requirements of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN R 37603 No 331).
- Anglo American Policies and Guidelines to manage and remediate spills.

MONITORING REQUIREMENTS

No specific monitoring identified.

AIR QUALITY

ISSUE: AIR POLLUTION

There are several activities in all phases that have the potential to contribute to the pollution of air. In the construction and decommissioning phases these activities are usually temporary in nature, usually existing for a few weeks to a few months. The operational phase will present more long-term activities. Negative impacts may impact on the ambient air quality and public receptors. The significant pollutants associated with infrastructure development and vehicular movement include total suspended particulate (TSP) and inhalable particulate matter less than 10 microns in size (PM_{10} and $PM_{2.5}$). If not, properly mitigated air emissions, can cause high levels of dust which may travel at distance and affect sensitive receptors.

The construction activities associated with site preparation, earthworks, civil works and transport have the potential to generate dust causing elevated concentrations of particulate matter in the atmosphere. In addition, particulate matter concentration may be increased by wind erosion from exposed materials within the Project area, resulting in an increase in dust fall. The operation of diesel or petrol engines will also negatively impact on the air quality by contributing CO, HC, NOx, and CO_2 into the atmosphere during construction and decommissioning. During decommissioning and closure, dust sources will emanate through removal, stripping and demolition of structure and through some rehabilitation activities. Operational activities contributing to air pollution are limited to dust generation through mine haul truck wheel entrainment. The three additional hybrid hydrogen fuel cell mine haul trucks will only emit water and warm air. Ambient air quality monitoring shows a decrease in PM_{10} concentrations at distances away from the mine operations. The Project activities will be confined to operational mining areas, in which the ambient air quality has already been altered from a natural state. The existing sources of emissions include gaseous and particulate emissions from mining operations; miscellaneous fugitive dust sources including vehicle entrainment on roads and windblown dust from open areas and gaseous and particulate emissions from vehicles.

The closest sensitive receptor to the Project area is the Ga-Molekana Community (approximately 2 km away). Dust fallout monitoring indicates no exceedance of the residential area standards at this sensitive receptor location. Given the small scale of the Project (and associated activities), the short-duration of construction and its location within an operational mining area, the significance of the impact of air pollution was rated as **VERY LOW** without mitigation and reduces to **INSIGNIFICANT** with mitigation.

IMPACT RATING

ISSUE: AIR POLLUTION		
PHASE: CONSTRUCTION, OPERATION, DECOMMISSIONING AND CLOSURE		
Criteria	Without Mitigation	With Mitigation
Intensity	Medium (construction, decommissioning and closure) Low (operation)	Low (construction, decommissioning and closure) Very low (operation)
Duration	Short (construction, decommissioning and closure) Long (operation)	Short (construction, decommissioning and closure) Long (operation)
Extent	Local	Local

Consequence	Very low (construction, decommissioning and closure) Low (operation)	Very low (construction, decommissioning and closure) Very low (operation)
Probability	Probable (construction, decommissioning and closure) Possible (operation)	Possible (all phases)
Significance	Very low (all phases)	Insignificant (all phases)
Nature of cumulative impacts	Low contribution to cumulative impacts.	
Degree to which impact can be reversed	Likely with mitigation.	
Degree to which impact may cause irreplaceable loss of resources	Low.	
Degree to which impact can be mitigated	Low.	
Residual impacts	No residual impacts are anticipated.	

MANAGEMENT OBJECTIVE

To prevent nuisance dust and air pollution health impacts.

MANAGEMENT OUTCOME

Ensure that any pollutants emitted as a result of the Project remains within acceptable limits so as to prevent health related impacts.

MITIGATION AND/OR MANAGEMENT ACTIONS

No additional mitigation or management measures have been identified for this Project. However, the mine should continue to implement the existing mitigation and/or management actions for the PoC Plant (SRK Consulting, 2019) to maintain the status quo. These are as follows:

Time period for implementation – On-going

- Limit vehicle speed at the site to the mine specified speed limits for the waste site area.
- Disturbance of the area should be limited to the footprint area.
- All vehicles to remain on designated roads/tracks.
- *Ensure that vehicles and construction machinery are maintained as per the manufacturer's specifications.*
- *Ensure dust suppression on roads by the application of a dust allaying agents, and / or other approved dust suppression used on the mine.*

Time period for implementation – Construction and Decommissioning

- *Efforts for concurrent rehabilitation of disturbed areas should be considered and undertaken wherever possible.*

MONITORING REQUIREMENTS

- The mine should continue to implement the approved air quality monitoring programme.

COMPLIANCE WITH STANDARDS

Ensure compliance with the following:

- GNR 893 Minimum Emission Standards.
- Anglo Air Quality Performance Standards.

GROUNDWATER RESOURCES

ISSUE: CONTAMINATION OF GROUNDWATER RESOURCES

Groundwater is a valuable resource and is defined as water which is located beneath the ground surface in soil/rock pore spaces and in the fractures of lithological formations. Project activities in all phases have the potential to impact on groundwater resources. Negative impacts through potential groundwater contamination may impact on both the environment and on third-party users.

Some of the potential groundwater contamination sources associated with the Project activities include the following:

- accidental spills and leaks from equipment and vehicles, non-mineralised waste and equipment which have the potential to reach shallow groundwater during all phases;
- improper handling and storage of hazardous materials and wastes during all phases;
- spillage of sewerage from portable toilets used during construction ;
- spillages of brine wastes from the water treatment plant during operation; and
- leakages and spillage of hazardous materials (such as acids, resins, toxic liquids, anti-scalent, battery acid, hydrocarbon material) from the HRS during construction and operation.

During construction, activities are of short duration and are risks primarily associated with improper handling, and temporary storage of hazardous materials, especially hydrocarbon contamination. Sewerage spillages may pose a risk to water resources during construction. During operation, there could be leakages and spillage from hazardous materials contained in the HRS. During decommissioning and closure, the activities such as dismantling of equipment and infrastructure, transport of materials to and off site, have the potential to cause accidental spills and leaks. The risk to groundwater pollution is directly related to the ability of the contaminant to infiltrate the ground surface and enter the aquifer.

The Project area is located on an area with already heavily compacted soils and some concrete surfaces. Geological formations such as dykes do not underlie the Project area and cannot act as preferential flow paths to the groundwater. Despite this, without management and mitigation measures in place, there is a possibility for contaminants to infiltrate the ground surface or enter surface water resources through the eroded channels west of the Project site, thus contributing to groundwater contamination of the localised primary aquifer. Contamination of this aquifer will negatively impact local communities (downstream of the Project area) who use shallow boreholes for domestic water supply. Given the limited scale of Project activities within the context of the larger mining activities, the significance of contamination of groundwater resources, is rated as **MEDIUM** in the unmitigated scenario and reduces to **VERY LOW** in the mitigated scenario.

IMPACT RATING

ISSUE: CONTAMINATION OF GROUNDWATER RESOURCES		
PHASE: CONSTRUCTION, OPERATION, DECOMMISSIONING AND CLOSURE		
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low
Duration	Medium term	Medium term
Extent	Local	Local
Consequence	Low	Very low
Probability	Probable	Probable
Significance	Medium	Very low
Nature of cumulative impacts	Low contribution to cumulative impacts.	
Degree to which impact can be reversed	Likely with mitigation.	
Degree to which impact may cause irreplaceable loss of resources	Low. The contamination of groundwater resources through Project activities is likely to	
Degree to which impact can be mitigated	Medium.	
Residual impacts	No residual impacts expected.	

MANAGEMENT OBJECTIVE

The objective of the mitigation measures is to prevent pollution of groundwater resources and related harm to water users.

MANAGEMENT OUTCOME

The outcome is to ensure that groundwater quality remains within acceptable limits for both domestic and agricultural purposes.

MITIGATION AND/OR MANAGEMENT ACTIONS

The mine should continue to implement the existing mitigation and/or management actions for the PoC Plant (SRK Consulting, 2019) to maintain the status quo. Additional mitigation and/ or management measures are included in italics. These are as follows:

Time period for implementation – On-going

- Ensure that vehicle storage and maintenance areas are hard-surfaced and includes measures for collection of leaks and spills.
- Ensure collection and treatment of hydrocarbon spills, at the sites licenced remediation site.
- Ensure clean and dirty water diversion around the Project area *in accordance with GN 704.*
- Prevent discharges that pose an unacceptably high risk to the environment. *This can be done through the following:*
    - *Ensure all employees have undertaken environmental risk awareness training; and*
    - *Ensure compliance to proper hazardous material handling and storage procedures.*
- *Ensure that continuous adherence with approved waste management and soil management procedures to limit the potential for pollution.*
- *Drip trays should be placed under all standing machinery.*

Time period for implementation – Construction

- *Ensure all employees have undertaken environmental risk awareness training.*
- *Ensure that all portable toilets are kept clean and are regularly maintained by a licensed service provider. Sewerage should be removed on a regular basis.*

MONITORING REQUIREMENTS

- No additional monitoring requirements were identified for this Project however the mine should continue to implement the groundwater monitoring programme.

COMPLIANCE WITH STANDARDS

Ensure compliance with the following:

- Anglo American Policies and Guidelines to manage and remediate spills.
- Water Quality Objectives as specified in the Water Use License issued by DWS
- *Compliance with GN 704 for the separation of clean and dirty water*.

SURFACE WATER RESOURCES

ISSUE: CONTAMINATION OF SURFACE WATER RESOURCES

Surface water is a valuable resource that supports aquatic and terrestrial biodiversity, land use and people. It is highly mobile and can disperse contaminants rapidly. Negative impacts through surface water contamination may impact on both the environment and on third-party users.

There are several pollution sources in all phases that have the potential to pollute surface water, particularly in the unmitigated scenario. In the construction and decommissioning phases these potential pollution sources are temporary in nature. Although these sources may be temporary, the potential pollution or resultant risks, may be long term. The operational phase will present more long-term sources (e.g. brine, acids, resins, toxic liquids, anti-scalent, battery acid, hydrocarbon material) that may have the potential to contaminate surface water through seepage and/or run-off. During the closure phase, project related infrastructure should be removed, and the areas rehabilitated, thereby removing sources of contamination.

With reference to Section 6.7.1.6, surface water resources within proximity to the Project area include ephemeral streams, namely the Mohlosane River (approximately 160 m south) and an unnamed tributary (approximately 15 m to the west) and a channelled valley bottom wetland, located about 100 m from the Project area. These resources are already transformed and degraded with low ecological sensitivity. Surface water is used for farming and livestock watering (depending on availability of water flow), whilst local communities rely mainly on the Mohlosane River and Groot Sandsloot (Pholotsi) River for domestic supply.

Project activities will be confined to already compacted, degraded, operational areas of the PoC Plant, however these hardened areas may result in an increase in increased runoff of pollutants into the receiving environment. In addition, deep eroded channels evident directly west to the Project area provides a conduit for water drainage through to the Mohlosane River.

In the unmitigated scenario, through accidental spillages and leaks (at all phases), the surface water may collect contaminants (hydrocarbons, salts, chemicals, hazardous and toxic liquids, metals, sewerage, and brine) and disperse these. Increased turbidity due to increased dust fallout can also contribute to negative surface water quality during the construction phase. At elevated concentrations, contaminants can exceed the relevant water quality objectives specified in the mine's WUL and can be harmful to humans and

livestock if ingested (directly or indirectly) and may also negatively impact on aquatic ecology. In the mitigated scenario, additional improvements to the existing stormwater management may help reduce the source of pollutants and their transport into nearby surface water resources. The significance of the contamination of surface water resources is rated as **MEDIUM** without mitigation and reduces to **VERY LOW** with mitigation.

IMPACT RATING

ISSUE: CONTAMINATION OF SURFACE WATER RESOURCES		
PHASE: CONSTRUCTION, OPERATION, DECOMMISSIONING AND CLOSURE		
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	High	Low
Duration	Medium term	Medium term
Extent	Regional	Local
Consequence	High	Low
Probability	Possible	Possible
Significance	Medium	Very low
Nature of cumulative impacts	Low contribution to cumulative impacts due to the limited river flow.	
Degree to which impact can be reversed	Likely with mitigation.	
Degree to which impact may cause irreplaceable loss of resources	Low.	
Degree to which impact can be mitigated	Medium.	
Residual impacts	No residual impact expected.	

MANAGEMENT OBJECTIVE

The objective is to prevent pollution of surface water resources.

MANAGEMENT OUTCOME

- To ensure that surface water quality remains within acceptable limits for both domestic and agricultural purposes, and for supporting aquatic biodiversity.
- To ensure that potential contaminates does not reach nearby watercourses.

MITIGATION AND/OR MANAGEMENT ACTIONS

The mine should continue to implement the existing mitigation and/or management actions for the PoC Plant (SRK Consulting, 2019) to maintain the status quo. Additional mitigation and/ or management measures are included in italics. These are as follows:

Time period for implementation – *Pre-construction and stormwater management design*

- Dirty water and clean water systems will be designed according to the conceptual design criteria given in Regulation 704.
- *Investigate and utilise if feasible, the use of various commercially available pollution and toxicant traps to clean runoff prior to its discharge into the receiving environment (from stormwater management controls).*

Time period for implementation – Construction

- Do not locate any sanitary convenience (chemical toilet), fuel depot or storage facility for anything which may cause pollution within the 1:50 year flood line of a watercourse.

- Establish clean water diversions and dirty water collection facilities before land clearing and construction commences, to prevent clean rainfall runoff becoming contaminated by construction activities.

Time period for implementation – On-going

- There must be an effective drainage system to a waterproof spillage collection area, where any spillage can be recovered and suitably treated.
- Waste (other than mine residues) should be stored, handled, transported, and disposed of in accordance with a documented waste management protocol.
- Implement a Stormwater Management Strategy.
- Ensure separation of clean and dirty water in accordance with GN 704.
- Exposed surfaces within dirty areas will be kept to a minimum to minimise the volume of dirty runoff generated.
- Implement the Mogalakwena Mine Water Management Strategy.
- *Locate all* water storage facilities and plant infrastructure will be located above the 1:100 year floodline or at least 100 m from a watercourse, whichever is the greater.

MONITORING REQUIREMENTS

No additional monitoring requirement was identified.

COMPLIANCE WITH STANDARDS

Ensure compliance with the following:

- Anglo American Policies and Guidelines to manage and remediate spills.
- Water Quality Objectives as specified in the Water Use License issued by DWS.
- *Compliance with GN 704 for the separation of clean and dirty water*.

ISSUE: ALTERATION OF NATURAL DRAINAGE PATTERNS

Natural drainage across the site is via sheet flow and/or non-perennial preferential flow paths (drainage lines). Mining related infrastructure and activities have the potential to alter drainage patterns by reducing the volume of run-off into the downstream catchments through their location within watercourses. This in turn has the potential to cause water supply impacts on downstream human and biodiversity users. During the construction, operational and decommissioning phases, these activities will continue until such time as mine and project infrastructure can be removed, and the areas rehabilitated. During the closure phase rehabilitation will allow for the restoration of drainage patterns.

The Project area is completely transformed and flattened due to current mining infrastructure and the PoC Plant which has hardened surfaces. There is increased runoff from the Project area due to the impermeable nature of the soil, artificial hardened surfaces, and confined point-source discharge. This results in an increase in velocity and volume of water runoff from the Project area. The Project will comprise of the expansion of the existing facilities and erection of new structures and buildings. There will also be an increase in the hardened areas and in some cases tarmacking for safety purposes. Although the Project infrastructure will not significantly differ from the current PoC Plant these changes are expected to increase the volume and velocity of water entering the environment. The increased velocity can result in lateral erosion at the point of entry, or channel incision and scouring further downstream. The increased velocity can contribute to pollutant discharge during rainfall events. The impact of the current drainage of the PoC

Plant has already altered the natural drainage as is evident by the eroded drainage channels west of the Project area leading to the Mohlosane River.

It must be noted that the ecological function of nearby surface water resources is low, and the alteration of drainage patterns due to Project activities are not expected to impact the status quo in the unmitigated scenario. The unmitigated scenario will result in exacerbation of current impacts to drainage patterns whilst mitigation measures introduced as part of Project implementation can provide an opportunity for stormwater improvements to the current condition during operation, decommissioning and closure. In the unmitigated scenario, the impact is rated as **MEDIUM** and reduces to **INSIGNIFICANT** after mitigation.

IMPACT RATING

ISSUE: ALTERATION OF NATURAL DRAINAGE PATTERNS		
PHASE: CONSTRUCTION, OPERATION, DECOMMISSIONING AND CLOSURE		
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low
Duration	Long term	Medium term
Extent	Local	Local
Consequence	Medium	Very low
Probability	Definite	Possible
Significance	Medium	Insignificant
Nature of cumulative impacts	The cumulative impacts include the alteration of drainage patterns, causing channel incision, increase erosion and water quality impacts downstream of the Project area.	
Degree to which impact can be reversed	High with mitigation.	
Degree to which impact may cause irreplaceable loss of resources	Low.	
Degree to which impact can be mitigated	High.	
Residual impacts	No residual impacts are expected given that all infrastructure will be removed and the area rehabilitated at closure.	

MANAGEMENT OBJECTIVE

To minimise unacceptable alteration of drainage patterns and related reduction of downstream surface water flow of surface water resources.

MANAGEMENT OUTCOME

To limit the volume of runoff into the downstream catchment, to what is necessary and ensure that the natural drainage patterns are re-established as part of rehabilitation in order to prevent unacceptable alteration of drainage patterns and related reduction of downstream surface water flow.

MITIGATION AND/OR MANAGEMENT ACTIONS

The mine should implement the following mitigation and/ or management measures:

Time period for implementation – Pre-construction and stormwater management design

- *Review the existing stormwater management controls and implement a stormwater management plan for the Project which encourages diffuse surface runoff and limits point source discharge. This can be achieved by considering the following:*
    - *Implementation of appropriate attenuation of runoff prior to discharge into the receiving environment to reduce the velocity of discharge. These include attenuation ponds and bio-attenuation ponds.*
    - *Design controls for stormwater leaving the attenuation structures into the receiving environment via well-vegetated swales (broad, grass-covered earthen drains), with multiple small discharge points. These should be reinforced where necessary by reno-mattresses.*
- *Investigate and utilise if feasible, the use of various commercially available pollution and toxicant traps to clean runoff prior to its discharge into the receiving environment (from stormwater management controls).*

MONITORING REQUIREMENTS

No additional monitoring requirement was identified.

COMPLIANCE WITH STANDARDS

Ensure compliance with the following:

- *Compliance with GN 704 for the separation of clean and dirty water*.

SOCIO-ECONOMIC

ISSUE: INWARD MIGRATION

Mines and the development of their supporting infrastructure tend to bring with them an expectation of employment in all project phases prior to closure. This expectation can lead to the influx of job seekers to an area which in turn increases pressure on existing communities, housing, basic service delivery and raises concerns around safety and security.

With reference to Section 6.7.3.1, the Project area is situated a socially complex environment, amongst numerous communities and villages. These populations experience high unemployment rates with job opportunities from the Mogalakwena Mine being sought after.

The Project does not have a high public profile and there is limited evidence of any expectation of significant employment. The Project is expected to generate approximately 150 short term employment opportunities during the construction phase. There is a demand for employment within surrounding communities and it is likely that unskilled labour can be sourced locally accordance with the Anglo Social Way. The skilled labour during the construction phase will be sourced through existing AA procedures and through the use of registered vendors. The impact of inward migration is expected to be **INSIGNIFICANT** and has not been assessed further.

MANAGEMENT OBJECTIVE

To limit inward migration and related social impacts and enhance positive economic impacts.

MANAGEMENT OUTCOME

Work with existing structures and organisations to establish and maintain a good working relationship with surrounding communities, local authorities, and landowners in order to limit the impacts associated with inward migration.

MITIGATION AND/OR MANAGEMENT ACTIONS

No mitigation or management measures have been identified.

MONITORING REQUIREMENTS

No additional monitoring requirement was identified.

COMPLIANCE WITH STANDARDS

Ensure compliance with the following:

- Anglo American Closure Toolbox.
- Anglo American Social Way.
- Anglo American Environmental Way.

ISSUE: POSITIVE ECONOMIC IMPACT

In the broadest sense, all activities associated with the mine contribute towards a positive economic impact in all phases. Mining has a positive net economic impact on the national, local, and regional economy. Direct benefits are derived from wages, taxes, and profits. Indirect benefits are derived through the procurement of goods and services, and the increased spending power of employees.

The socio-economic baseline of the Mogalakwena LM area can be considered as a socially complex environment characterized by high unemployment rates and poverty (see Section 6.7.3.1). The Project activities have the potential to positively stimulate the local economy by providing employment, albeit temporary. During the construction phase, the Project will create a total of 150 skilled and unskilled employment opportunities and a total of 5 job opportunities during the operation phase. Labour requirements during the construction phase is largely associated with earthworks and civil works. The construction phase is expected to last 15 months. This is a temporary impact but given the high levels of unemployment in the area, it would have a positive social impact in the short term. The operational phase will provide additional job opportunities for approximately five individuals, thereby creating a positive impact in the lives of those five individuals and their families. The decommissioning and closure phases are also likely to provide temporary employment opportunities however this will be undertaken in accordance with the approved SLP at the time of closure. In addition to local employment opportunities, the proponent undertakes to source procurement locally, as far as possible which can also potentially create positive social impacts.

The creation of employment opportunities and local procurement during the construction phase will be create positive economic growth, of a short duration for the local community. The significance of this impact was rated as **POSITIVE MEDIUM**. There will be fewer employment opportunities during the operation phase, for a longer period of time. There are also fewer (if any) local procurement opportunities during this phase. The significance of the impact in the operation phase is rated as **POSITIVE LOW**.

IMPACT RATING

ISSUE: POSITIVE ECONOMIC IMPACT		
PHASE: CONSTRUCTION AND OPERATION		
Criteria	**Without Mitigation**	**With mitigation**
Intensity	High (construction) Medium (operation)	Not Applicable
Duration	Short term (construction) Medium term (operation)	
Extent	Local	
Consequence	Medium (construction) Low (operation)	
Probability	Probable	
Significance	Positive Medium (construction) Positive Low (operation)	
Nature of cumulative impacts	There would be a positive cumulative impact due localised spending by contractors employed as part of Project.	
Degree to which impact can be reversed	Not applicable.	
Degree to which impact may cause irreplaceable loss of resources	Not applicable.	
Degree to which impact can be mitigated	Not applicable.	
Residual impacts	Any employment after the completion of the Project as a result of experience gained or improved skills base would be a residual impact.	

MANAGEMENT OBJECTIVE

To enhance the positive economic impacts and limit the negative economic impacts. Part of this objective is to enhance the contribution to the local economy.

MANAGEMENT OUTCOME

Enhance the positive economic impacts by working together with existing structures and organisations.

MITIGATION AND/OR MANAGEMENT ACTIONS

Where feasible, local communities need to be considered for any construction phase requirements including materials supply and employment.

MONITORING REQUIREMENTS

No additional monitoring requirement was identified.

COMPLIANCE WITH STANDARDS

Ensure compliance with the following:

- Anglo American Closure Toolbox.
- Anglo American Social Way.
- Anglo American Environmental Way.

APPENDIX E: SCREENING TOOL REPORT

APPENDIX F: TERRESTRIAL BIODIVERSITY

APPENDIX G: AQUATIC BIODIVERSITY

APPENDIX H: AQUATIC BIODIVERSITY – WETLAND COMPONENT

APPENDIX I: CULTURAL, HERITAGE AND PALAEONTOLOGY RESOURCES

APPENDIX J: SOCIAL COMPLIANCE STATEMENT

RECORD OF REPORT DISTRIBUTION

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