mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH MINING RIGHT

SUBMITTED FOR AN INTEGRATED ENVIRONMENTAL AUTHORISATION LODGED IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 READ WITH REGULATION 19 OF THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS OF 2014 FOR MINING AND RELATED INFRASTRUCTURAL ACTIVITIES TAKING PLACE ON THE FARM ANNESLEY 109 KT AND THE FARM HOLFONTEIN 126 KT, SITUATED IN THE GREATER TUBATSE MUNICIPALITY OF THE LIMPOPO REGION

NAME OF APPLICANT: IMERYS REFRACTORY MINERALS SOUTH AFRICA (PTY) LTD ANNESLEY ANDALUSITE MINE

MINING RIGHT NUMBER: LP73MRC

APPLICATION PROPERTY: THE FARM ANNESLEY 109 KT AND THE FARM HOLFONTEIN 126 KT

April 2022

BECS Environmental (Pty) Ltd
In association with BECS Services (Pty) Ltd

DISCLAIMER

Although BECS Services (Pty) Ltd. / BECS Environmental (Pty) Ltd., 'BECS' exercised all care, skill, and diligence in the drafting of the report, BECS shall not be liable for any loss or damage caused by or arising out of circumstances over which BECS has no control, such as the use and interpretation of the report by the client, its officials, their representatives or agents. The information contained in this report was obtained from materials, information, data, and evidence derived from sources believed to be reliable and correct.

Whilst every endeavour has been made by the author of and contributors to this report to ensure that information provided is correct and relevant, this report is, of necessity, based on information that could reasonably have been sourced within the time period allocated to the assessment, and is, furthermore, of necessity, dependent on information provided by management and/or its representatives.

It should, accordingly, not be assumed that all possible and applicable observations and/or measures are included in this report as this assessment report represents a sample of assessable parameters. As a subsequent event, should additional information become available, BECS reserves the right to amend its observations and executive summary.

BECS can also not be held responsible for any stochastic events leading to damage to properties.

RIGHTS RESERVED

Copyright

Intellectual Property Right

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

ADDENDUMS

Addendum 4B: Copy and proof of advertisement
Addendum 4C: Copy and proof of the site notice, and map indicating the location of the site notice
Addendum 4D: Copy and proof of letters sent
Addendum 4E: Proof of draft and final ESR sent to I&APs and stakeholders
Addendum 4F: Proof of draft EIA sent to I&APs and stakeholders and attempts to obtain comments
Addendum 4G: Comments received and responses
Addendum 4H: Stakeholder database

ADDENDUM 5: COMPETENT AUTHORITIES' CORRESPONDENCE

Addendum 5A: Acceptance of environmental application from DMRE
Addendum 5B: Acceptance and comments on Final Scoping Report by DMRE including EAPs response
Addendum 5C: Comments on the Final Scoping Report by LEDEDT including EAPs response
Addendum 5D: Comments on the Final Scoping Report by DWS including EAPs response
Addendum 5E: Cover letter and checklist for application for Record of Decision from DWS

ADDENDUM 6: SUPPORTING DOCUMENTATION

Addendum 6A: Proof of service rendered: Septic tank cleaning and sewage removal
Addendum 6B: Proof of IWULA in progress
Addendum 6C: Proof of septic tanks being licensed (pages from the amendment IWUL)
Addendum 6D: Waste management license application form

ABBREVIATIONS

AEL	Air Emission Licence
ABA	Acid-Base Accounting
AMD	Acid Mine Drainage
AP	Acid Generating Potential
BAR	Basic Assessment Report
BoQ	Bill of Quantities
CA	Competent Authority
CoP	Code of Practice
DMR	Department of Mineral Resources
DMRE	Department of Minerals and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environment Assessment Practitioner
EC	Electrical conductivity
ECA	Environmental Conservation Act No 73 of 1989 (as amended)
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report

EIA Regulations	Environmental Impact Assessment Regulations, GN 982 of 2014 i.t.o. the National Environmental Management Act No 107 of 1998
EIS	Ecological Importance and Sensitivity
EMP	Environmental Management Programme
EMPs	Environmental Management Plans
ESR	Environmental Scoping Report
e-WULAAS	Electronic Water Use License Application and Authorisation System
FFFARSRA	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act No 36 of 1947
GA	General authorisations
GDP	Gross Domestic Product
GGP	Gross Geographic Product
GQM	Groundwater Quality Management
HCS	Hazardous chemical substance
HDPE	High-density polyethylene
HMS	Heavy Medium Separator
HSA	Hazardous Substances Act No 15 of 1973 (as amended)
I&APs	Interested and affected parties
IEA	Integrated environmental authorisation
IWWMP	Integrated Water and Waste Management Plan
IWUL	Integrated Water Use License
IWULA	Integrated Water Use License Application
LED	Local Economic Development
LEDET	Limpopo Department of Economic Development, Environment and Tourism
LoM	Life of Mine
MA	Minerals Act No 50 of 1991
mamsl	Meters above mean sea level
mbgl	Meters below ground level
MHSA	Mine Health and Safety Act No 29 of 1996 (as amended)
MPRDA	Mineral and Petroleum Resources Development Act No 28 of 2002 (as amended)
MPRDR	Mineral and Petroleum Resources Development Regulations, GN 527 of 2004 (as amended) i.t.o. the Mineral and Petroleum Resources Development Act No 28 of 2002
MRDs	Mine Residue Deposits
MSDS	Material safety data sheet
mS/m	Millisiemens/meter
MWP	Mining works programme
NDEA	National Department of Environmental Affairs
NEMA	National Environmental Management Act No 107 of 1998 (as amended)
NEMAQA	National Environmental Management Air Quality Act No 39 of 2004 (as amended)
NEMBA	National Environmental Management Biodiversity Act No 10 of 2004 (as amended)
NEMWA	National Environmental Management Waste Act 59 of 2009 (as amended)
NFA	National Forest Act No 84 of 1998
NHRA	National Heritage Resources Act No 25 of 1999

NNP	Net Neutralising Potential
NP	Neutralising Potential
NRTA	National Road Traffic Act No 93 0f 1996
NVFFA	National Veld and Forest Fire Act No 101 of 1998
NWA	National Water Act No 36 of 1998 (as amended)
OHSA	Occupational Health and Safety Act No 85 of 1993 (as amended)
PAEL	Provisional Atmospheric Emission Licence
PCB	Polychlorinated biphenyl
PCD	Pollution Control Dam
PES	Present Ecological Score
POPs	Persistent organic pollutants
PPE	Personal Protective Equipment
PPP	Public participation process
PTO	Permission to occupy
REMC	Recommended Ecological Management Class
Rhino Minerals	Rhino Minerals (Pty) Ltd
RoD	Record of Decision
RWD	Return Water Dam
RSIP	Rehabilitation Strategy and Implementation Programme
SABS	South African Bureau of Standards
SANAS	South African National Accreditation System
SDM	Sekhukhune District Municipality
SLP	Social and Labour Plan
SOP	Standard Operating Procedure
SWMP	Stormwater Management Plan
TDF	Tailings disposal facility, also tailings dam or slimes dam
TDS	Total Dissolved Solid
TSF	Tailings Storage Facility
WML	Waste management licence
WRD	Waste Rock Dump

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The objective of the Environmental Impact Assessment (EIA) process is to, through a consultative process—

a. determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
b. describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
c. identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the

identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

d. determine the—-
   i. nature, significance, consequence, extent, duration, and probability of the impacts occurring to inform identified preferred alternatives; and
   ii. degree to which these impacts—
      aa. can be reversed;
      bb. may cause irreplaceable loss of resources, and
      cc. can be avoided, managed, or mitigated;
e. identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
f. identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
g. identify suitable measures to manage, avoid or mitigate identified impacts; and
h. identify residual risks that need to be managed and monitored

EXECUTIVE SUMMARY

BECS Environmental has been appointed by Imerys Refractory Minerals South Africa (Pty) Ltd (Imerys): Annesley Andalusite Mine (Annesley) to apply for an integrated environmental authorisation (IEA) in terms of the National Environmental Management Act no 107 of 1998 (as amended) (NEMA), and the National Environmental Waste Management Act no 59 of 2008 (as amended) (NEMWA) for a Waste Management License (WML) for the extension of Quarry 3 with tailings as part of increasing tailings facility storage capacity and rehabilitation. The Department of Mineral Resources and Energy (DMRE) gave confirmation of receipt of the application for environmental authorisation on the 11th of August 2021. The application has been assigned the following reference number LP73MRC.

Document Layout

This report has been structured to comply with the information requirements as set out under Appendix 3(3) of the GNR982. For ease of reference the checklist in Table 1 has been provided.

Table 1: Checklist in terms of NEMA GN982

Requirement	Section
a) Details of – i. The EAP who prepared the report; and ii. The expertise of the EAP, including curriculum vitae;	Part A Section 1.2, Addendum 2A Addendum 2B
b) The location of the activity, including: i. The 21-digit Surveyor General code of each cadastral land parcel; ii. Where available the physical address and farm name; and	Part A Section 1.3

Requirement	Section
iii. Where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
c) 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 – i. A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; ii. On land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Part A Figure 1, Addendum 1A Addendum 1B
d) A description of the scope of the proposed activity, including – i. All listed and specified activities triggered and being applied for; and ii. A description of the associated structures and infrastructure related to the development;	Part A Section 1.5 Section 2.1 Section 2.2
e) 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;	Part A Section 2.3
f) 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;	Part A Section 3
g) A motivation for the preferred development footprint within the approved site;	Part A Section 4
h) A full description of the process followed to reach the proposed development footprint within the approved site, including: i. Details of the development footprint alternatives considered;	Part A Section 4
ii. Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Part A Section 5
iii. A summary of the issues raised by the interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Part A Section 5.5
iv. The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Part A Section 6
v. The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts – aa) can be reversed; bb) may cause irreplaceable loss of resources; and cc) can be avoided, managed or mitigated;	Part A Section 7
vi. The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Part A Section 7.1
vii. 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;	Part A Section 7.3.1

Requirement	Section
ix. The possible mitigation measures that could be applied and the level of residual risk;	Part A Section 7.3.2
x. If no alternative development locations for the activity were investigated, the motivation for not considering such; and	Part A Section 7.3.3
xi. A concluding statement indicating the preferred alternative development location within the approved site;	Part A Section 7.3.4
i) A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including – i. A description of all environmental issues and risks that were identified during the environmental impact assessment process; and ii. 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 mitigation measures;	Part A Section 7.3.5
j) An assessment of each identified potentially significant impact and risk, including – i. Cumulative impacts; ii. The nature, significance and consequence of the impact and risk; iii. The extent and duration of the impact and risk; iv. The probability of the impact and risk occurring; v. The degree to which the impact and risk can be reversed; vi. The degree to which the impact and risk may cause irreplaceable loss of resources; and vii. The degree to which the impact and risk can be mitigated;	Part A Section 7.3.6
k) Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Part A Section 7.4
l) An environmental impact statement which contains – i. A summary of the key findings of the environmental impact assessment; ii. 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 iii. A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Part A Section 7.5
m) 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 as well as for inclusion as conditions of authorisation;	Part A Section 8.1
n) The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Part A Section 8.2
o) 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;	Part A Section 8.3
p) A description of any assumption, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Part A Section 8.4

Requirement	Section
q) A 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;	Part A Section 8.5
r) Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	Part A Section 8.6
s) An undertaking under oath or affirmation by the EAP in relation to: i. The correctness of the information provided in the reports; ii. The inclusion of comments and inputs from stakeholders and I&APs; iii. The inclusion of inputs and recommendations from the specialist reports where relevant and iv. 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;	Part B Section 5
t) Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Part A Section 8.8
u) An indication of any deviation from the approved scoping report, including the plan of study, including – i. Any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and ii. A motivation for the deviation;	Part A Section 8.9
v) Any specific information that may be required by the competent authority and	Part A Section 8.10 Part B Section 4
w) Any other matters required in terms of section 24(4)(a) and (b) of the Act.	Part A Section 8.11

Specific information required by competent authorities

Please refer to PART B Section 4.1 and 4.2 for correspondence with DMRE and Department of Water and Sanitation (DWS).

Project description

The proposed activities are as follows:

- The extension of Quarry 3 with tailings as part of increasing tailings facility storage capacity and rehabilitation on the farm Annesley 109 KT and the farm Holfontein 126 KT.

Process followed

BECS Environmental has been appointed by Imerys Refractory Minerals South Africa (Pty) Ltd to apply for an environmental authorisation in terms of NEMA, and NEMWA for a WML for the extension and optimisation of Quarry 3 with tailings as part of increasing tailings facility storage capacity and rehabilitation. DMRE gave confirmation of receipt of the application for environmental authorisation on

the 11th of August 2021. The Environmental Scoping Report (ESR) was sent electronically on the 10th of November and as a hard copy on the 12th of November 2021. DMRE sent a letter of acknowledgement of receipt on the 8th of December 2021.

Summary of PPP

The process followed adheres to the National Environmental Management Act 107-1998 - National guideline on minimum information (20180209-GGN-41432-00086) and the 2012, IEM Guideline Series 7, Public participation, GN 807.

Comments were given on the final ESR by DMRE, DWS and LEDET. Refer to addendum 5 for correspondence with these Competent Authorities. Aside from this, no other formal comments have been received.

Summary of impacts and management measures

Due to its localised nature, no measurable reduction of groundwater in storage is expected during the construction phase. Potential accidental spillages of hydrocarbons will have no impact on the groundwater quantity (levels). Therefore, no significant impacts are expected on groundwater quantity during the backfilling process.

The severity of groundwater being negatively impacted by accidental spillages is rated as low during the short construction phase before and after mitigation.

No changes in the groundwater levels or flow directions are expected and the impact on the groundwater quality during the operational phase is therefore expected to be low.

The only relatively significant natural surface water near the mine is the Segorong River. This is a non-perennial river which was dry during the site visit. No substantial impacts are expected.

The risk profile associated with the tailings storage facility (TSF) design and operation would be acceptable, providing deposition and management stay within design and operational limits, meeting with good practice.

Refer to Part A Section 7.2 for the full impact assessment including management measures.

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

SECTION 1: INTRODUCTION

1.1 Details of the applicant

General background

Annesley is an existing andalusite ($Al_2O_3.SiO_2$) mine of which Havercroft Operation is part of the mine. Annesley has a Life of Mine (LoM) of up to 2035. All mining activities are currently taking place at the Segorong Quarry. Mining will further advance over Streatham farm.

The mine is opencast using hard rock bench mining. The quarry is cut into the slopes on the bedding plane of the formation for approximately 110 m with an average height of 40m (occasionally the height may reach 70 m). Annesley consists of the following surface infrastructure; open quarries, Waste Rock Dumps (WRD), overburden dumps; crusher and screening plant, silt traps, Pollution Control Dam (PCD), overflow dams, haul roads, power line to crusher, 5 km waterline from Penge; Heavy Medium Separator Plant (HMS), Laboratory, store and scrap yard, other water management infrastructure, ablution facilities, and mine offices.

Mining licence and mining right

Annesley which includes Havercroft obtained a mining licence in 2003 (combined mining licence) with licence number 19/2003, issued in terms of the old Minerals Act No 50 of 1991 (MA). This licence is to mine andalusite, garnet, straurolite, and associated minerals, on the farms Annesley 109 KT, Holfontein 126 KT, Morgenzon 125 KT, Havercroft 99 KT, and Streatham 100 KT.

Prior to this mining licence, Annesley Operation and Havercroft Operation were split into two separate mining licences. This licence was issued for Rhino Minerals (Pty) Ltd (Rhino Minerals). The mining licence was converted to a mining right under the Mineral and Petroleum Resources Development Act No 28 of 2002 (MPRDA), executed on 6 July 2009, with reference number LP73MRC. The converted mining right was also issued for Rhino Minerals. On 19 June 2015, the name Rhino Minerals, changed to Imerys Refractory Minerals South Africa (Pty) Ltd. This is still the same company with the same registration number.

Approved Environmental Management Plans (EMPs) under the mining licence and converted mining right

Annesley has an approved EMP, which was still approved under the MA in 1998. This EMP only included the farms Annesley 109 KT, Holfontein 126 KT, and Morgenzon 125 K. In 2003, an EMP was approved which included the farms Havercroft 99 KT, and Streatham 100 KT. At the end of 2003, Part 6 of the EMP was amended. This amendment included the backfilling of quarries, reshaping of slimes

dam, and placement of soil on slimes dam. The mine applied for a Section 102 i.t.o. the MPRDA amendment in 2006. This amendment was done to expand the mining area at Annesley into the Segorong area. The EMP was approved by the Department of Mineral Resources (DMR) in 2011.

Section 102 to backfill Quarries 6 and 7, construct an Emergency Dam (PCD), and divert the tributary

Imerys applied for a section 102 amendment under the MPRDA to backfill Quarries 6 and 7 on Annesley, as well as to construct an Emergency Dam and to divert the tributary. The final Environmental Impact Assessment Report (EIAR)/EMP was submitted to the Limpopo DMRE on 15 December 2017. This EIAR/EMP included the following listed activities under the National NEMA:

- Activity 12(ii)(c) of GN 983 (as amended by GN 327 of 2017) under NEMA for the development of infrastructure or structures with a physical footprint of 100m² or more; if no development setback exists, within 32m of a watercourse, measured from the edge of a watercourse. This is for the diversion of the tributary as licenced under the IWUL.
- Activity 6 of GN 984 (as amended by GN 325 of 2017) under NEMA for the development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution, or effluent. This activity is due to the construction of a Emergency Dam (PCD) to catch dirty water from the plant area.
- Category B(11) of GN 921 (as amended by GN 633 of 2015) under NEMWA for the establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the MPRDA. Quarries 6 and 7 are proposed to be backfilled.

Since the EIAR/EMP has been submitted, it has been assessed that the emergency dam is already existing, and was constructed in the late 1980's. Furthermore, no infrastructure or structures will be constructed within 32 m of the tributary. Activities will include earthworks which do not include construction. The DWS submitted a positive Record of Decision (RoD) on 05 March 20201 for the backfilling of the quarries. DMRE requested information on the financial provision for the section 102 that was submitted to DMRE on 31 March 2021. Imerys has now received final approval from DMRE.

Section 102 to remine various mine residue deposits (MRDs)

Imerys applied for a section 102 amendment under the MPRDA to remine various MRDs on both Annesley Operation and Havercroft Operation. The final EIAR/EMP was submitted to the Limpopo DMRE on 22 January 2019. This EIAR/EMP included the following listed activities under NEMA:

- Activity 11 of GN 983 (as amended by GN 327 of 2017) under NEMA for the development and related operation of infrastructure exceeding 1,000 m in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge, or slimes (i)

with an internal diameter of 0.36 m or more; or (ii) with a peak throughput of 120 l per second or more. Pipelines might be constructed to transport slimes.

- Category B(11) of GN 921 (as amended by GN 633 of 2015) under the NEMWA for the establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the MPRDA. Various MRDs to be remined.

DMRE is waiting for DWS to give a RoD on the remining of the MRDs. Please note that this Section 102 amendment will also include a portion of Penge 108 KT into the mining right in order to ensure the mine is responsible for the liability of this shaft. This farm is already included in the IWUL for Annesley Operation. Imerys is awaiting the final approval from DMRE.

Basic assessment to decommission the Havercroft Plant

Imerys applied for Basic Assessment in terms of NEMA to decommission the Havercroft Plant. The final Basic Assessment Report (BAR) was submitted to the Limpopo DMRE on 7 March 2018. This BAR included the following listed activities under NEMA:

- Activity 22(ii) of GN 983 (as amended by GN 327 of 2017) under NEMA for the decommissioning of any activity requiring (ii) a prospecting right, mining right, mining permit, production right or exploration right, where the throughput of the activity has reduced by 90% or more over a period of 5 years excluding where the Competent Authority (CA) has in writing agreed that such reduction in throughput does not constitute closure. The Havercroft Plant will be demolished.

Imerys received the Environmental Authorisation (EA) on 30 November 2018.

Integrated Water Use Licence (IWUL) for Annesley Operation

Imerys has an IWUL for Annesley Operation, with File Reference Number: 27/2/2/B71F/226 and Licence Number: 03/B71F/ACGI/4789. In 2007, an integrated water use licence application (IWULA) was submitted to the DWS in Mbombela under the National Water Act No 36 of 1998 (NWA). This IWULA as well as the documentation including the integrated water and waste management plan (IWWMP) was amended various times. According to a proof of submission, the final IWULA, IWWMP, additional information and the proof of payment was submitted to DWS on 4 June 2015.

In April 2016, DWS requested the applicant to amend the Section 21(a) water form. This was necessary to amend the name of the Water Resource to ‘Flag Bosheilo Dam / De Hoop (Olifants River System)’. These amended forms will thereby be included in the IWULA.

On 19 April 2016 DWS (Mbombela) sent a letter to the applicant, requesting additional information. This information is shortly as follow; the Present Ecological State (PES)/ Ecological Importance and Sensitivity (EIS) of the watercourse, motivation as to how the watercourse flow drivers (surface flow, interflow, groundwater flow, water quality) and responses (Geomorphology, habitat and biota) will be modified in the natural system and what mitigation is proposed (receiver stream impacts and mitigation measures at discharge point to be included), an EIAR/EMP had to be compiled and submitted as supporting document of the application, clarity on the end use of the land and motivation if the original stream will be reinstated or not, submission of water quality report indicating asbestos analysis, a contract between the service provider (honey sucker) and the municipality to dispose the sewage, an updated water balance and the water volumes on the water balance must correspond with the volumes of the application forms, submission of a plan for reducing dust suppression water volume. This information was submitted in August 2016. The information from this letter is also included in this IWULA.

The applicant was in the process to update its EMP for the mining right. During this exercise, it became apparent that certain water uses were not included in the IWULA, submitted in 2015. A meeting was held with DWS (Mashishing) on 11 September 2017 to discuss this matter. An IWUL with licence number 03/B71F/ACGI/4789, and file number: 27/2/2/B71F/226, and dated 12 October 2017 was issued by the DWS (Mashishing) to Annesley Andalusite Mine in terms of the NWA. However, the mine was not aware of the granting of this license and only became aware of it on the 13th of February 2018 during a meeting with DWS, Mashishing. This IWUL includes the following water uses:

- Section 21a water uses under the NWA. The abstraction of water from 1 borehole and Penge shaft.
- Section 21c&i water uses under the NWA. One WRD within a regulated watercourse and the diversion of a tributary at three locations.
- Section 21g water uses under the NWA. The disposal/storage of water in a cement dam, an emergency control dam, and Quarry 3 the Return Water Dam (RWD), the backfilling of Quarry 2, Quarry 3 sewage septic tanks, and dust suppression.

This IWUL will expire on 12 October 2037.

<u>IWUL amendment for Annesley Operation</u>

Imerys applied for an IWUL amendment to:

- Amend the name of the licensee from Rhino Minerals to Imerys;
- Correct the property names for all water uses;
- Correct coordinates for all water uses;
- Amend the condition that authorised water uses will impede as per IWUL;

- Amend that a person must be competent to sample water, as there is no qualification for sampling of water;
- Include that mining takes place as per the mining plan. Quarrying and movement of trucks generate noise and vibrations. This cannot be reduced.
- Include that Quarry 3 is not a constructed infrastructure;
- Mention there are no slurry settling ponds; and
- Correct that ANQ6 is not a borehole but the water from Quarry 6.

This IWUL amendment was issued on 18 December 2020, amending all conditions except for the following:

- Quarries cannot be lined with High Density Poly Ethylene (HDPE). This was discussed during the site visit in November 2018.

<u>New IWULA for Annesley Operation</u>

Imerys applied for an IWULA to include additional water uses on Annesley Operation. Water uses included in the IWULA are as follows:

- Section 21a water uses under the NWA. The abstraction of 150,000 l of water from Segorong Quarry for dust suppression, new borehole for domestic use,
- Section 21b water uses under the NWA. The storage of water in JoJo tanks (Mining, Mine office, Mind Old Change House, and Mine Lab),
- Section 21g water uses under the NWA. The backfilling of Quarry 1, Quarry 2, Quarry 3, Quarry 4, Quarry 5, Quarry 6 and Quarry 7, licensing of the Segorong WRD and overburden, HMS WRD, and old overburden dumps,
- Section 21j water uses under the NWA. The pumping of 150,000 l of water from Segorong Quarry for dust suppression.

Phase 3 of the Electronic Water Use License Application and Authorisation System (e-WULAAS) was submitted on 23 March 2020. DWS requested additional information on various occasions, and the IWULA was resubmitted on 15 May 2020, 20 October 2020, 29 October 2020, and 15 January 2021. The final submission was accepted on 29 March 2021; however, DWS engineering requested clarity on the engineering designs for the Quarry 3 extension. This information must still be submitted to DWS.

<u>Provisional Atmospheric emission licence (PAEL) for Annesley Mine</u>

Imerys received a PAEL on 1 February 2016, valid until 1 February 2018, for the following listed activities:

- Sub-category 4.1: Drying and calcining of mineral solids including ore; under the National Environmental Management Air Quality Act no 39 of 2004 (as amended) (NEMAQA); and

- Sub-category 5.2: The drying of mineral solids including ore, using dedicated combustion installations; under the NEMAQA.

This PAEL was issued by the Limpopo Department of Economic Development, Environment and Tourism (LEDET).

PAEL and Atmospheric emission licence (AEL) renewals for Annesley Mine

The PAEL was renewed for Sub-category 5.2: The drying of mineral solids including ore, using dedicated combustion installations; under the NEMAQA. The renewal was for one year, until 31 March 2019, and it was issued by the Sekhukhune District Municipality (SDM).

The PAEL was again renewed for Sub-category 5.2: The drying of mineral solids including ore, using dedicated combustion installations; under the NEMAQA. The renewal was for one year, until 30 June 2020, and it was again issued by the SDM.

Imerys has commenced with an Atmospheric emission licence (AEL) renewal, and the final submission was done on 11 March 2021, onto the South African Atmospheric Emission Licencing & Inventory Portal (SAAELIP). Awaiting finalisation from the CA.

Refer to Table 2 below for a description of the applicant.

Table 2: Description of the applicant

Project applicant	Imerys Refractory Minerals South Africa (Pty) Ltd – Annesley Andalusite Mine
Contact person	Hendrik Jones
Designation	Operational Director
Telephone number	+27 82 467 4532
E-mail address	Hendrik.Jones@imerys.com

1.2 Details of the environmental assessment practitioner

BECS Environmental was appointed as an independent consultant (EAP) to meet the requirements as set out in regulation 13 of the EIA Regulations. Refer to Table 3 below to a description of the EAP and refer to Addendum 2 for a detailed CV of the EAP, which includes the expertise including qualifications and experience.

Table 3: Description of the EAP

Name of company	BECS Environmental
Postal address	PO Box 72960, Lynnwood Ridge, 0040
Telephone number	012 361 9970

Cell phone number	072 191 6074
Facsimile number	012 361 0645
E-mail address	salome@becsenv.co.za
Name of responsible EAP (reviewer)	Salome Beeslaar
Expertise of EAP	B.Sc Environmental Science (UP[1]), B.Sc Honours Geography (UP), M.Sc Geography (UP), Registered EAP with EAPASA[2] number 2020/846, Professional Scientist (Environmental Science) with SACNASP[3] number 400385/14, member of the IAIAsa[4] with membership number: 5853
Name of responsible EAP (report compiler)	Christopher Delport
Expertise of EAP	B. Sc Environmental Science (UP), B. Sc Honours Geography & Environmental Science (UP), Candidate Scientist (Environmental Science) with SACNASP[5] number 144476, member of the IAIAsa[6] with membership number: 6643

I, Christopher Delport (9507265046081), hereby declare that I have no conflict of interest related to the work of this report. Specially, I declare that I have no business, personal, or financial interests in the property and/or mining right being assessed in this report, and that I have no personal or financial connections to the relevant property owners, or mine. I declare that the opinions expressed in this report are my own and a true reflection of my professional expertise and that there are no circumstances that may compromise my objectivity in performing such work.

_____

Christopher Delport
BSc Hons– Geography and Environmental Sciences
April 2022

I, Salome Beeslaar (8310190032081), hereby declare that I have no conflict of interest related to the work of this report. Specially, I declare that I have no business, personal, or financial interests in the property and/or mining right being assessed in this report, and that I have no personal or financial connections to the relevant property owners, or mine. I declare that the opinions expressed in this report

[1] University of Pretoria
[2] Environmental Assessment Practitioners Association of South Africa
[3] South African Council for Natural Scientific Professions
[4] International Association for Impact Assessment South Africa
[5] South African Council for Natural Scientific Professions
[6] International Association for Impact Assessment South Africa

are my own and a true reflection of my professional expertise and that there are no circumstances that may compromise my objectivity in performing such work.

_____

Salome Beeslaar
M.Sc Geography
April 2022

1.3 Regional setting and location of activity

As mentioned previously, the mine is located in the primary catchment of the Olifants River and the Quaternary Catchment referred to as the B71F draining region as defined by the DWS. The applicable water management area is the Olifants and the responsibility of the Mpumalanga Regional DWS, situated in Mashishing (Lydenburg). The central coordinates of the mine are approximately. S24°23'36.35", E30°14'51.72"

The mine is situated closest to the Ga Malepe township located South of Segorong Quarry, approximately 5km away. The old Penge Mining town is also found within a 5km radius of the mine. Currently, mining activities are taking place on the farm Annesley 109 KT, while other activities take place on the farm Holfontein 126 KT, Morgenzon 125 KT in the Greater Tubatse Local Municipality, Sekhukhune District Municipality, Limpopo Province.

1.4 Description of the property

Refer to Table 4 below for a description of the property. A locality map of the farm is provided below in Figure 1.

Table 4: Farm names, 21-Digit Surveyor General codes, and coordinates

	Annesley 109 KT	**Holfontein 126 KT**
Title deed number	T8670/1948	T8670/1948
Property owner	National Government of the RSA	National Government of the RSA
21-digit Surveyor General Code and extent for each farm portion	T00KT00000000010900000 2603.0193ha	T00KT00000000012600000 1839.5395ha
Coordinates	S24.4385, E30.2583 S24.3685, E30.2016 S24.3580, E30.2226 S24.3784, E30.2635	S24.4121, E30.2608 S24.3784, E30.2635 S24.4253, E30.3154 S24.4480, E30.3037

1.5 Description of the activities to be undertaken

The mine is currently operating under mining right LP73MRC. As this is an already existing mine, no additional infrastructure requirements will be necessary. Quarry 3 is an existing open pit located on the mine. The proposed development includes the extension and optimisation of Quarry 3 under the above-mentioned mining right with tailings as part of increasing tailings facility storage capacity and rehabilitation on the farm Annesley 109 KT and the farm Holfontein 126 KT. The footprint of the Annesley Q3 optimisation is 78,805 m^2 (7.88 ha), which is within the existing TSF footprint currently being utilised. The course discard impoundment wall will be constructed on existing course discard and the slimes will be deposited on existing slimes, with a footprint of 5.80 ha. The height of the pit will increase over time, and the material will be gradually pushed into the optimised space. No vegetation will be removed as part of this activity and the surrounding area is empty of vegetation.

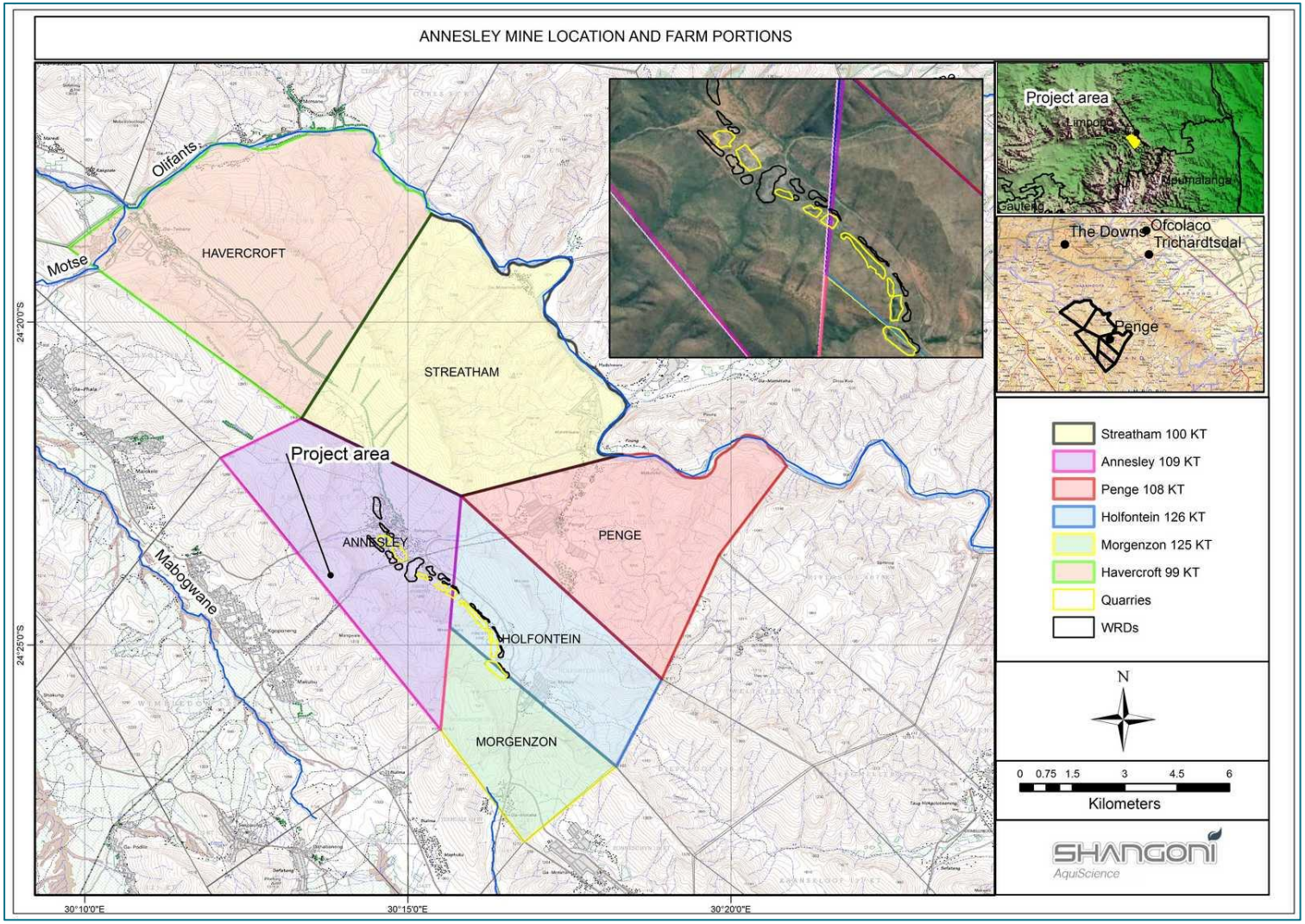


Figure 1: Locality map of Annesley Mine (Shangoni AquiScience, 2020)

SECTION 2: LEGAL REQUIREMENTS

According to Section 24(2) and 24(5) of the National Environmental Management Act No 107 of 1998 (as amended) (NEMA):

'The Minister, or an MEC with the concurrence of the Minister, may identify (a) activities which may not commence without environmental authorisation(EA) from the competent authority; (b) geographical areas based on environmental attributes, and as specified in spatial development tools adopted in the prescribed manner by the Minister or MEC, with the concurrence of the Minister, in which specified activities may not commence without EA from the competent authority.

The Minister, or an MEC with the concurrence of the Minister, may make regulations consistent with subsection (4) laying down the procedure to be followed in applying for, the issuing of and monitoring compliance with EAs.'

According to Section 19(1) of the National Environmental Management Waste Act No 59 of 2008 (as amended) (NEMWA):

The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.

Furthermore, *a person who wishes to commence, undertake, or conduct a waste management activity listed under Category B, must conduct a scoping and environmental impact reporting process set out in the EIA Regulations made under section 24(5) of the NEMA as part of a WML application contemplated in section 45 read with section 20(b) of NEMWA.*

2.1 Description of the scope of the proposed overall activity

This application is for an IEA for a WML, following an EIA process.

2.2 Listed and specified activities

Refer to Table 5 below for all listed activities applied for under NEMWA, tiggering a scoping and EIA process for a WML.

Table 5: All listed activities for this application

Name of activity	Listed activity	Applicable listing notice
The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the MPRDA.	Activity 11 Category B	GNR 633

2.3 Policy and legislative context

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Authorisation applications			
MPRDA	According to the MPRDA, Annesley Andalusite Mine must have a mining right as well as an approved EMP. Due to changes from the Minerals Act no 50 of 1991 (MA) to the MPRDA in 2002, all mining rights had to be converted in 2009 from the old MA to the new MPRDA. Any mining right application submitted after 8 December 2014 must be done in terms of NEMA and not MPRDA.	N/A	Annesley Mine obtained a mining licence in 2003 with licence number 19/2003, issued in terms of the MA. This mining right has also been converted to the new MPRDA requirements executed on 6 July 2009, with reference number LP73MRC. The mining right was applied for and approved prior to 8 December 2014, therefore the requirements ito NEMA pertaining to a new mining right is not applicable.
	Any changes in the mining right, EMP, mining works programme (MWP), or EA, must be authorised through a Section 102 (in terms of the MPRDA) amendment.	N/A	The mine applied for a section 102 amendment (i.t.o. MPRDA) in 2006, to include the Segorong Project (extension) into the mining right. The amendment was approved in 2011. A section 102 application for the re-mining of mine residue on the mine is also currently underway.
NEMA and the Environmental Conservation Act 73 of 1989 as amended (ECA)	The first listed activities which required an EA (referred to as a record of decision (RoD) in the past) commenced in 1998. These activities were published in the EIA Regulations of 1998 (GN1183).	PART A d) (i)	A person who wishes to commence, undertake, or conduct a waste management activity listed under Category B, must conduct a scoping and environmental impact reporting

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	In 2006, the ECA activities and EIA Regulations were replaced by the first NEMA EIA Regulations. The second set of NEMA EIA activities replaced the first set of NEMA EIA activities in 2010. The third set of NEMA EIA activities commenced on 8 December 2014. According to these listings, a Basic Assessment should be conducted if an activity on Listing Notice 1 or 3 is triggered. If an activity on Listing Notice 2 is triggered, then a full Environmental Impact Assessment (EIA) is required.		process set out in the Environmental Impact Assessment Regulations made under section 24(5) of the NEMA. Please note this application is not listed under Listing Notices 1 to 3.
NEMAQA	A list of activities which need an AEL was published in 2010 (GN 248 of 2010 i.t.o. the NEMAQA. This list was updated in 2013 (GN 893 of 2013 i.t.o. NEMAQA). These lists further included compliance timeframes for plant emission standards, whereby new plant had to comply to new plants emission standards on 1 March 2010; existing plants had to comply with existing plant standards on 1 March 2015, and existing plants have to comply with new plants standards on 1 March 2020.	N/A	There is a dryer at the Annesley Operation for which the mine has an AEL.
National Water Act No 36 of 1998, (NWA)	Section 21 of the NWA sets out the water uses for which a IWUL is required. These water uses	N/A	The mine has an IWUL for section 21 a,c & i and g water uses. This IWUL was amended on

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	commenced on 1 October 1998, and include permissible water uses (water uses for which no licencing or registration is necessary), general authorisations (GA) (water uses for which registration only is required), and water use licences (water used for which both registration and licencing is required). An existing lawful water use is any water use that commenced 2 years or more prior to the NWA and authorised under the old Act. These water uses are deemed lawful. In 1999, the GN 704 Regulations i.t.o. NWA were published.		18 December 2020. The mine is also in the process of applying for a new IWULA currently.
NEMWA GNR 633 Category B(11)	Waste management permits for certain waste activities were required form 1989 i.t.o. the ECA. These permits were repealed by the publishing of the first listed waste management activities licensing in 2009 (GN 718 of 2009 i.t.o. NEMWA). These listings were replaced by new listings in 2013 (GN 921 of 2013 i.t.o. NEMWA). If a site has a permit under ECA, this is still applicable until the National Department of Environmental Affairs (NDEA) requests an update under the new legislation (NEMWA).	This EIA.	This application is for the establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
National Heritage Resources Act no 25 of 1999 (NHRA)	All required permits as per the Act.	N/A	According to the Approved EMP (Shangoni Management Services, 2006), and the EMP PAR (BECS Environmental, 2015): Malepe Tribal Authority grave sites are situated near the mine area. According to the Cultural Resources Survey done by the National Cultural History Museum in August 2001, there were a total of 353 graves which are not yet removed. Some tools dating to the Early and Middle Stone Age were found within the boundaries of Segorong village but are of low archaeological significance and no archaeological site dating to the Iron Age was identified around the mining area. In the event of any heritage resource being discovered, a qualified specialist will be appointed.
Section 15(1) of the National Forest Act No 84 of 1998 (NFA)	No person may cut, disturb, damage or destroy any protected tree; or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected	N/A	This is not applicable as no additional vegetation will be removed.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	tree, or any forest product derived from a protected tree, except under a licence granted by the Minister.		
Mining			
Mining plans and surveying: GN 447 of 2011 i.t.o. the Mine Health and Safety Act No 29 of 1996 (as amended) (MHSA)	A competent person must survey the mine. No mining operations may be carried out within a horizontal distance of 100m from reserve land, buildings, roads, railways, dams, waste dumps, or any other structure whatsoever including such structures beyond the mining boundaries, or any surface, which it may be necessary to protect in order to prevent any significant risk, unless a lesser distance has been determined safe by risk assessment and all restrictions and conditions determined in terms of the risk assessment are complied with.	N/A N/A	A competent surveyor conducts the mine surveying. The mine conducted a risk assessment, which determined that mining was taking place within 100 metres of an ESKOM powerline and a road. The mine has since been granted permission from ESKOM to mine 40 metres away from ESKOM powerlines on the property (as per a letter dated 30 October 2020). In addition, the Roads Agency Limpopo SOC Limited (RAL) has approved that Annesley can mine within 100 metres and outside 40 metres from the road reserve boundary of road D4134 (as per a letter dated 20 November 2020).
Mine residue			
Mine residue management: Regulation 73 of the MPRDR (GN 349 of 2011 i.t.o. MPRDA), GN 632 of 2015 i.t.o. NEMWA.	The assessment of impacts relating to the management of residue deposits must form part of the EMP.	N/A	The impacts of the mine residue are contained within the mine's EIA/EMP.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Mine residue management - Assessment of impacts and analyses of risks Regulations 3 & 9(1)(a&g) & 12 of GN 632 of 2015 (Regulations Regarding the Planning and Management of Mine Residue) under NEMWA, regulation 8 of GN 634 of 2013 (Waste Classification and Management Regulations) under NEMWA, GN 632 of 2015 has replaced regulation 73 of GN 527 of 2004 under MPRDA. Refer to transitional period	A risk analysis based on the characteristics and the classification must be used to determine the appropriate mitigation and management measures.	N/A	A Waste Assessment Report was conducted for the mine residue in Annesley Operation, and recently Groundwater Complete conducted a geohydrological investigation in January 2022. This report includes a waste classification and risk analysis as well as pollution control measures.
	The decommissioning, closure and post-closure management of mine residue must be done in accordance with the relevant provisions in the environmental authorisation, an EMP; and any other relevant legislation.	PART B d) i) 1 - 4	The decommissioning, closure, and post-closure management of mine residue forms part of the EIA/EMP.
	The pollution control barrier system shall be defined by the: GN 635 of 2013 under NEMWA (National Norms and Standards for the Assessment of Waste for Landfill Disposal); and GN 636 of 2013 (National Norms and Standards for Disposal of Waste to Landfill).	N/A	This regulation has been amended as of September 2018. It now states that a competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of the Regulations. Please also note that this EIA is for sloping of mine residue which has already been planned and not for a new residue stockpile or deposit.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Mine residue management: Regulation 4 of GN 632 of 2015 under NEMWA (Regulations Regarding the Planning and Management of Mine Residue) under NEMWA	Mine residue must be characterised to identify any potentially significant health or safety hazard and environmental impact that may be associated with the residue when deposited.	N/A	A waste assessment has been done by Aquatico, which includes some of these requirements, but not all. A registered engineer is appointed as the competent person on dams and residue at the mine.
	Mine residue must be characterised in terms of its: • physical characteristics; • chemical characteristics; and mineral content that may include the specific gravity of the residue particles and its impact on particle segregation and consolidation.	N/A	
	Mine residue must be classified in accordance with SANS 10234 within 180 days of generation.	N/A	Although a Waste Assessment Report was compiled, it does not include the GHS classification.
Mine residue management - Characterisation Regulation 5 of GN 632 of 2015 (Regulations Regarding the Planning and Management of Mine Residue) under NEMWA	A risk analysis must be conducted and documented on all mine residue.	N/A	Groundwater Complete conducted a geohydrological investigation for the proposed Segorong Overburden Dump 5 in January 2022. This report includes a risk analysis.
	The classification of residue stockpile and residue deposit must be undertaken on the basis of the: • characteristics of the residue; • location and dimensions of the deposit (height, surface area);	PART A h)	The Annesley Quarry 3 Optimisation Report compiled by Tailings Solutions covers importance and vulnerability of the environmental components that are at risk.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	• importance and vulnerability of the environmental components that are at risk; • spatial extent, duration and intensity of potential impacts; and pollution control barrier system compliant with the commensurate norms and standards for disposal of waste to landfill.		
Mine residue management - Investigation and site selection Regulation 6 of GN 632 of 2015 (Regulations Regarding the Planning and Management of Mine Residue) under NEMWA	The process of investigation and selection of a site mine residue must entail: • the identification of a sufficient number of possible candidate sites. • qualitative evaluation and ranking of all alternative sites; Qualitative investigation of the top-ranking sites to review the ranking done in terms of paragraph(b); • a feasibility study on the highest-ranking site or sites, involving: o a preliminary health and safety classification; o an environmental classification; o geotechnical investigations; and o hydrological investigations.	N/A	This was not done for any of the sites; however, no new mine residue will be established.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	Further investigation on the preferred site, must be conducted by competent person		
Mine residue management: Regulations 7 & 9(1)(b) of GN 632 of 2015 (Regulations Regarding the Planning and Management of Mine Residue) under NEMWA	The design of the residue stockpile and deposit shall be undertaken by a competent person. The process of investigation and selection of a site for residue stockpiling and residue deposits must entail several factors as per the legislation. This will include geotechnical investigations and groundwater investigations. From these investigations, a preferred site must be identified. Further investigation on the preferred site is also necessary. This must be carried out by a competent person. A competent person must be qualified by virtue of his or her knowledge, expertise, qualifications, skills and experience; and is familiar with the provisions of the Act and other related legislation and has been trained to recognise any potential or actual problem in the performance of the work.	N/A	No designs according to this legislation were undertaken. This cannot be done anymore but must form part of any new mine residue planning.
Mine residue management - Impact Management Regulation 8 of GN 632 of 2015 (Regulations Regarding the Planning	Conduct statistical defensible and representative characterisation programme of relevant materials	N/A	Although a Waste Assessment Report was compiled, it does not include a statistical defensible and representative characterisation programme of relevant materials.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
and Management of Mine Residue) under NEMWA	Conduct an impact prediction study to assess the potential impacts of such actions or activities on the water resource over the full life cycle of the mining operations and until the impact from the operation is acceptable, which includes a monitoring programme and an evaluation of the effect of the mitigatory measures to demonstrate acceptable levels of impact.	N/A	Although a Waste Assessment Report was compiled, it does not include an impact prediction study to assess the potential impacts of such actions or activities on the water resource over the full life cycle of the mining operations and until the impact from the operation is acceptable, which includes a monitoring programme and an evaluation of the effect of the mitigatory measures to demonstrate acceptable levels of impact.
Mine residue management - Impact Management Regulations 9(1)(d-f)&(2) & 11 of GN 632 of 2015 (Regulations Regarding the Planning and Management of Mine Residue) under NEMWA	Preventative or remedial action must be taken in respect of any sign of pollution.	N/A	The mine has an environmental emergency procedure.
	Adequate measures must be implemented to control dust pollution and erosion of the slopes at all residues.	PART A h)	This will form part of the mine's management measures.
	Dust and mine residue must be managed in accordance with the requirements on dust control as regulated by Mine Health and Safety Act and in terms of the NEMAQA.		This will form part of the mine's management measures.
	A system of routine maintenance and repair in respect of all residues must be implemented to ensure the control of pollution and the integrity of rehabilitation.		This will form part of the mine's management measures.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Mine residue management - Monitoring and reporting system Regulation 9(1)(c) & 10 of GN 632 of 2015 (Regulations Regarding the Planning and Management of Mine Residue) under NEMWA	A monitoring system for a mining residue with respect to potentially significant impacts as identified in the EIA must be included	N/A	This forms part of the EMP of the mine.
Rehabilitation and closure			
Section 24R of NEMA, Appendix 5 of the EIA Regulations, sections 43, 56, 61 of MPRDA	A closure plan must be submitted 5 years before closure to DMR and NDEA. An EMP and rehabilitation plan must be submitted 5 years before commencing with closure to DWS. Closure objectives form part of the draft EMP and must identify the key objectives for mine closure to guide the project design, development, and management of environmental impacts; provide broad future land use objective(s) for the site and provide proposed closure costs. Imerys must ensure that details of rehabilitation of the residue deposit are provided in the EMP.	This entire ESR	The LoM for Annesley is more than 15 years.
Financial provision			
Section 24P of the NEMA, Regulations pertaining to financial provisioning for prospecting,	The EMP must address the requirements as determined in the regulations, pertaining to the financial provision for the rehabilitation. The mine	N/A	The financial provision is updated annually and the 2021 financial provision was submitted to DMRE in September 2021.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
exploration, mining, or production operations (GN 1147 of 2015 i.t.o. NEMA	must annually update and review the quantum of the financial provision in consultation with a competent person, as required in terms of the approved EMP, or as requested by the Minister.		
Non-mining waste management			
Waste classification and disposal Regulation 5 of GN 634 of 2013 (Waste Classification and Management Regulations) under NEMWA	Safety data sheets • Generators of hazardous waste must ensure that an MSDS for the hazardous waste is prepared in accordance with SANS 10234. • If possible, use MSDS of product or products it originates from. No MSDS necessary for Health Care Risk Waste.	N/A	The mine has a Waste Management Procedure in place which specifies that hazardous waste MSDSs must be in place and prepared according to SANS 10234. The procedure further states that no person may collect waste for removal from the mine unless authorised to do so. The procedure outlines that the records need to be kept for waste generated, including volumes or mass of waste generated, as well as the requirement of waste manifests for Hazardous waste.
Waste classification and disposal Regulation 15(d) of GN 1179 of 1995 (Hazardous Chemical Substances Regulations) under OHSA	A waste generator shall, as far as is reasonably practicable ensure that all HCS waste which can cause exposure, is disposed of only on sites specifically designated for this purpose in terms of the ECA (or NEMA), in such a manner that it does not cause a hazard inside or outside the site concerned.		
	No person may collect waste for removal from premises unless such person is authorised by law to collect that waste, where authorisation is required.		

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Waste classification and disposal Regulation 10 of GN 634 of 2013 (Waste Classification and Management Regulations) under NEMWA	Waste generators must keep accurate and up to date records of the management of the waste they generate, which records must reflect: • the classification of the wastes; • the quantity of each waste generated, expressed in tons or m^3 per month; • the quantities of each waste that has either been re-used, recycled, recovered, treated or disposed of; and • by whom the waste was managed. The records must be retained for a period of at least five (5) years, and made available to the Department upon request.		
Waste classification and disposal Regulation 11 of GN 634 of 2013 (Waste Classification and Management Regulations) under NEMWA	Every holder of waste that has been classified as hazardous must be in possession of a waste manifest document containing the relevant information. Generators of waste classified as hazardous must complete a waste manifest document for each consignment of waste transported to a waste manager or waste transporter. All waste generators of hazardous waste must:		

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	retain copies, or be able to access copies/records, of the waste manifest documentation for a period of at least five (5) years; and make the waste manifest documentation available to the Department upon request.		
Waste handling, and storage: GN 527 of 2004 i.t.o. MPRDA, GN 1179 i.t.o. OHSA, sections 7 & 24 of NEMWA, and GN 634 of 2013 i.t.o. NEMWA	Employees collecting, transporting, and disposal of hazardous waste must wear suitable Personal Protective Equipment (PPE). A waste disposal contractor must wear suitable PPE. All collectable hazardous waste must be placed into containers that will prevent the likelihood of exposure during handling. Waste containers must be intact and not corroded or in any other way rendered unfit for the safe storage of waste. Adequate measures must be taken to prevent accidental spillage or leaking. Waste must be contained in such a way that it cannot be blown away. Avoid nuisances such as odor, visual impacts, and breeding of vectors. Prevent pollution of the environment and harm to health. Any container or storage impoundment holding waste must be labeled, or where labeling is not possible, records must be kept. A new waste storage facility must be registered with the	N/A	This forms part of the mine's Waste Management Procedure.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	competent authority within 90 days prior to the construction taking place. The assessment of impacts relating to the disposal of waste material must form part of the EMP.		
Waste handling, and storage: Regulation 15(f) of GN 1179 (Hazardous Chemical Substances Regulations) under OHSA, Regulation 13 of GN 926 of 2013 (National norms and standards for the storage of waste) under NEMWA	A waste generator shall, as far as is reasonably practicable ensure that if the services of a waste disposal contractor are used, a provision is incorporated into the contract stating that the contractor shall also comply with the provisions of these regulations.	N/A	This is not in the contracts.
Waste handling, and storage Regulation 6 of GN 634 of 2013 (Waste Classification and Management Regulations) under NEMWA & Regulation 10 of GN 926 of 2013 (National norms and standards for the storage of waste) under NEMWA	Any container or storage impoundment holding waste must be labelled, or where labelling is not possible, records must be kept.	N/A	This forms part of the mine's Waste Management Procedure.
	Hazardous waste must be stored in covered containers and only open when waste is added or emptied.		N/A
Waste re-use, recycle, recover: GN 527 of 2004 i.t.o. MPRDA, sections 7 & 24 of NEMWA, and GN 634 of 2013 i.t.o. NEMWA	Waste must be re-used, recycled, recovered, treated and/or disposed of within 18 months of generation. Recycle hazardous waste as far as is reasonably practicable. Any person who undertakes	N/A	This forms part of the mine's Waste Management Procedure. Annesley mine currently recycles steel.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	an activity involving the reduction, re-use, recycling or recovery of waste must, before undertaking that activity, ensure that the reduction, re-use, recycling or recovery of the waste use less natural resources than disposal of such waste and to the extent that it is possible, is less harmful to the environment than the disposal of such waste.		
Unlawful disposal and littering: Sections 26 & 27 of NEMWA	No disposal of waste in or on any land, waterbody or at any facility. No disposal of waste in a manner that is likely to cause pollution of the environment or harm to health and well-being. No littering of any public place, land, vacant erf, stream, watercourse, street or road, or on any place to which the general public has access. Unless the disposal of that waste is authorised by law	N/A	This forms part of the mine's Waste Management Procedure. Furthermore, awareness is done through annual induction and monthly environmental talks on topics such as littering.
Waste tyres: Regulations in terms of storage of tyres (GN 149 of 2009 i.t.o NEMWA)	All requirements	N/A	The mine does not store tyres.
Asbestos management and disposal: GN 341 of 2008 i.t.o. ECA, and regulation 20 of GN 155 of 2001 i.t.o OHSAS	Ensure that all asbestos waste is placed in containers that will prevent the likelihood of exposure during handling. All vehicles, re-usable containers or any other similar articles which have been in contact with asbestos waste must be	N/A	The mine does not have asbestos waste.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	cleaned and decontaminated after use. All asbestos waste which can cause exposure must be disposed of only on sites specifically designated for this purpose. All persons occupied in the collection, transport, and disposing of waste in a manner which may detrimentally impact on a water resource, disposal of asbestos waste, must wear PPE, including contractors.		
Water management			
Water management and pollution control: GN 527 of 2004 i.t.o. MPRDA	An assessment of impacts relating to water management and pollution control at mining operations must form part of the EMP.	N/A	The impacts of water pollution are contained within the mine's EIA/EMP. The mine also has an IWUL in place and a new IWULA is ongoing which covers any such exemptions that might be necessary.
Water management and pollution control: GN 704 Regulations of 1999 i.t.o. NWA	No TDF shall be established on the bank of any stream, river, dam, pan, wetland, or lake without written permission and upon such conditions as determined and as approved in the EMP. Toilet facilities shall be located in such a manner that no water or other pollution is caused. GN 704 Regulations of 1999 i.t.o. NWA place: restrictions on locality; restrictions on the use of material; capacity requirements of clean and dirty water systems; protection of water resources; and security and additional measures.		

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Water management and pollution control Regulation 9 of GN 632 of 2015 (Regulations regarding the planning and management of residue stockpiles and residue deposits) under NEMWA, Regulation 68 of GN 527 of 2004 (Mineral and Petroleum Resources Development Regulations) under MPRDA	A mine must ensure that preventative or remedial action is taken in respect of any sign of pollution.	PART A h)	The mine has an environmental emergency procedure.
Dams with safety risks Sections 117-123 of NWA	All residue stockpiles and deposits must be classified into one or a combination of the following categories: (1) the safety classification to differentiate between residue stockpiles and deposits of high, medium and low hazard based on their potential to cause harm to life or property; and (2) the environmental classification to differentiate between residue stockpiles and deposits. A mine must within the period specified, provide the Minister with any information, drawings, specifications, design assumptions, calculations, documents, and test results requested by the Minister, pertaining to dams with a safety risk.	N/A	The mine does not have an environmental classification for the mine residue.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Hazardous chemical substances management			
Use, storage, and handling: Regulation 14 of GN1179 of 1995 under OHSAS, GN 1381 of 1994, GN 247 of 1993, and GN 690 of 1989 under the Hazardous Substances Act No 15 of 1973 (as amended) (HSA)	A Hazardous chemical substance (HCS) in storage or distributed must be properly identified, classified and handled in accordance with SABS 072 and SABS 0228. A container or a vehicle in which an HCS is transported must be clearly identified, classified and packed in accordance with SABS 0228 and SABS 0229. Any container into which an HCS is decanted must be clearly labelled with regard to the contents thereof. Hazardous substances must also be classified according to the Hazardous Substances Regulations (GN 453 of 1977) i.t.o the Hazardous Substances Act No 15 of 1973.	N/A	The mine has a hazardous substance procedure in place which deals with the use storage and handling of hazardous substances.
Transportation: Section 54 of National Road Traffic Act No 93 0f 1996 (NRTA), regulation 277 of GN 255 of 2000 under NRTA	No person shall except as prescribed, accept after transportation, any prescribed dangerous goods. The NRTA and regulations place strict obligations on the “consignee”, “consignor, “driver” and “operator” during transportation. Imerys is in the position of the “consignee” due to the off-loading.	N/A	Due to the number of requirements as set out in these regulations, it is unclear whether this is in place.
Polychlorinated biphenyl (PCB): GN 549 of 2014 I.t.o. NEMA	PCBs must be phased out.	N/A	The mine has allocated a budget to the phasing out of PCB transformers.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Radioactive sources: Section 3A of the HAS, GN 246 & 247 of 1993 i.t.o HSA	The possession and use of Group IV hazardous substances require a written authority in terms of the HSA.	N/A	There are no such sources on the mine.
Air quality management			
Ambient air quality management Regulation 64 of GN 527 of 2004 (Mineral and Petroleum Resources Development Regulations) under MPRDA, GN 1210 of 2009 (National Ambient Air Quality Standards) & GN 486 of 2012 (National Ambient Air Quality Standard for PM Less than 2.5 Micron Metres) under NEMAQA	Limits and compliance for SO2, NO2, PM10, O3, C6H6, Pb, CO, PM2.5	N/A	The mine has a draft AEL in place which specifies the point source maximum emission rates (under normal working conditions) for SO2, NOx and PM. Monitoring and reporting of these compounds will form part of the mine's AEL.
Ambient air quality management GN 351 of 2014 (Regulations Regarding the Phasing-out and Management of Ozone- Depleting Substances) under NEMAQA	Hydrochlorofluorocarbons are phased-out.	N/A	Annesley is not yet phasing out old air conditioners.
Dust control Regulations 9(f) & 11 of GN 632 of 2015 (Regulations Regarding the Planning and Management of	A mine must ensure that adequate measures are implemented to control dust pollution and erosion of the slopes at all residues.	N/A	This forms part of the mitigation measures in the mine's operational EMP. In addition, dust fall monitoring takes place at the mine.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Residue Stockpiles and Residue Deposits) under NEMWA			
Atmospheric impact report and air dispersion modelling GN 747 of 2013 (Regulations Prescribing the Format of the Atmospheric Impact Report) & GN 533 of 2014 (Regulations Regarding Air Dispersion Modelling) under NEMAQA	Atmospheric impact report and air dispersion modelling only if required from officer or if applying for AEL	N/A	The mine has an atmospheric impact report and air dispersion modelling in place.
Environmental noise control and management: Regulation 66 of GN 572 of 2004 i.t.o. MPRDA, section 34 of NEMAQA, Sections 25 & 26 of ECA, and GN 154 of 1992 i.t.o. ECA	The mine must comply with the provisions of the MHSA. The assessment of impacts relating to noise pollution management and control, where appropriate, must form part of the EMP No person shall make, produce, or cause a disturbing noise, or allow it to be made, produced or caused by any person, animal, machine, device or apparatus or any combination thereof. No person shall drive a vehicle on a public road in such a manner that it may cause a noise nuisance.	N/A	This forms part of the mine's operational EMP and states that noise zones may only be entered by persons wearing adequate hearing protection. The mine also has a SOP in place for PPE where PPE must be worn in areas of loud noise.
Noxious or offensive gases: Section 35 of NEMAQA, GN 1651 of 1974 i.t.o. APPA	No vehicle may be driven on a public road if the noxious gases emitted have a density or content as to produce a mean reading of 70 or more.	N/A	This is very old legislation, there is no new such legislation – technology also old.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Blasting, vibration and shock management, and control: Regulation 67 of GN 572 of 2004 i.t.o. MPRDA	The mine must comply with the provisions of the MHSA. An assessment of impacts relating to blasting, vibration and shock management and control, where applicable, must form part of the EMP.	N/A	No blasting takes place.
Biodiversity management			
Alien and invasive species GN598 of 2014 (Alien and Invasive Species Regulations) & GN864 of 2016 (Alien and Invasive Species Lists) under NEMBA	Category 1a Listed Invasive Species must be combatted or eradicated. Category 1b Listed Invasive Species must be controlled. Category 2 Listed Invasive Species require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit. Category 3 Listed Invasive Species are subject to exemption.	N/A	The mine has an invasive alien species programme in place.
Fire breaks and firefighting: Sections 12, 13, 17, 18 & 34 of National Veld and Forest Fire Act No 101 of 1998 (NVFFA)	Every owner on whose land a veldfire may start or burn or from whose land it may spread, must prepare and maintain a firebreak on his/her side of the boundary between his/her land and any adjoining land. Every owner must have the appropriate equipment and measures in place to be ready to be able to combat veld fires and must be in a position to report the occurrence of fires and to take such measures as may be necessary to combat such fires.	N/A	All vehicles and equipment at the mine are regularly inspected and maintained. The emergency plan includes the prevention and control of veld fires.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
Acquisition, disposal, sale or use of fertilizers, farm feeds, agricultural remedies, and stock remedies: Section 7*bis* of Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act No 36 of 1947 (FFFARSRA)	Prohibition of certain fertilisers.	N/A	N/A. The mine does not make use of any fertilizers.
Soil management			
Contaminated land: GN 527 of 2004 i.t.o. MPRDA, and sections 35-41 of NEMWA	The assessment of impacts relating to soil pollution and erosion control must form part of both the EMP. The acidification, salination and mineralisation of soils through seepage of polluted water must take place as approved in the EMP. The spillage of hazardous chemicals onto soils or its escape or migration into surrounding soils from the approved deposition area must be prevented. Oils, grease, and hydraulic fluids must be disposed of. Oils, grease, and hydraulic fluid spills must be cleaned up by removing all contaminated soil and disposing such soil in a waste disposal receptacle or at a licensed facility. The chemical and physical properties of topsoil to be used for the purposes of rehabilitation must not be changed by introducing	N/A	This forms part of the mitigation measures in the mine's operational EMP.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	foreign material, gravel, rock, rubble or mine residue to such soil. An owner of land that is significantly contaminated, or a person who undertakes an activity that caused the land to be significantly contaminated, must notify the department of that contamination as soon as that person becomes aware, of that contamination		
Heritage resources management			
Section 52 of MPRDA, and Sections 34 & 35 of National Heritage Resources Act No 25 of 1999 (NHRA)	An EMP must include impacts on heritage aspects. No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. Any person who discovers archaeological or palaeontological objects or material or a meteorite must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.	N/A	In the EMP for 73 MRC, it states 'In the event of any archaeological, historical or cultural resource being uncovered, all work must stop and a specialist must be contacted'.
Emergency incidents			
Section 30 of NEMA, section 20 of NWA S20, and Section 18 of NVFFA	In the event of an emergency, the mine must: report through the most effective means reasonably available; take all reasonable measures to contain	N/A	The mine has a new environmental emergency procedure. This procedure will be

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	and minimise the effects of the incident, including its effects on the environment and any risks posed by the incident to the health, safety and property of persons; undertake clean-up procedures; remedy the effects of the incident; and assess the immediate and long-term effects of the incident on the environment and public health. Any owner who has reason to believe that a fire on his or her land or the land of an adjoining owner may endanger life, property, or the environment, must immediately notify the fire protection officer or, any member of the executive committee of the fire protection association, if one exists for the area; and the owners of adjoining land; and do everything in his or her power to stop the spread of the fire.		implemented, and this will be audited as part of the legal compliance audit.
Sustainable development			
Sustainable development principles: Section 2(3 & 4), of NEMA, section 2, 2(a)(ii), 22(2)(d) of NWA, GN 527 of 2004 i.t.o. MPRDA, section 37 of MPRDA, section 2(a)(ii) of Section 2(3	Any mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic, and environmental factors into the planning and implementation of mining in order to ensure that exploitation of mineral resources serves	N/A	The mine has recently updated their environmental procedures. The mine also has a Social and Labour Plan (SLP) in place. The LoM is more than 15 years, however, the mine is in the process of compiling a closure plan as

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
& 4) of NEMA, section 2 of NWA, section of, and section of NWA	present and future generations. The mine shall investigate new and emerging technologies and put into practice water efficient devices or applied technique for the re-use of water containing waste. The Closure Plan must include agreed standard or land use which conforms with the concept of sustainable development.		part of the new NEMA requirements. This plan will include end land use.
International conventions/treaties	Convention on Biological Diversity, ratified by RSA on 2 November 1995: Conservation of biological diversity, the sustainable use of its components. UN Framework on Climate Change and Kyoto Protocol, ratified by RSA on 29 August 1997: The NDEA has published a report on 'A national climate change response strategy" in response to the Kyoto Protocol'. Greenhouse gas emissions and inventories will be specifically dealt with in the NEMAQA. Climate change is referred to explicitly in the White Paper on Integrated Pollution and Waste Management in 2000 and referenced in the White Paper on a National Water Policy for South Africa, 1997. It is also specifically addressed in the Government's imminent National Water Resource	N/A	The mine is aware of organic pollutants although these have not been documented yet. The mine must make a list of these chemicals if there are any on the mine. If there are no such chemicals on the mine, keep proof of this.

Applicable legislation and guidelines used to compile the report	Description of legislation and guidelines used to compile the report	Reference, where applied	How does this development comply with and respond to the policy and legislative context
	Strategy.' Greenhouse gases are only included under AEL requirements in the NEMAQA. Stockholm Convention on Persistent Organic Pollutants, ratified by RSA on 4 September 2002: Persistent organic pollutants (POPs) include various insecticides as well as PCBs. South Africa published a report 'National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants' in 2012. According to this report, the duty of care covers the responsibility of Imerys to avoid the use, storage, generation, or uncontrolled disposal thereof. Vienna Convention on the Protection of the Ozone Layer, and the Montreal Protocol, ratified by RSA on 15 January 1990: The Montreal Protocol includes ozone depleting substances as well as a list of products containing these substances. On 18 September 2015, the NDEA published a notice (GN 703 of 2015), requesting all companies to submit information regarding the listed chemicals as per Annex A within 60 days from the publication. 17 November 2015.		

SECTION 3: NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

This section was compiled in accordance with the Guideline on Needs and Desirability in terms of the EIA Regulations (published 20 October 2014).

3.1 Ecological context

This section described how this development (and its separate elements/aspects) impacts on the ecological integrity of the area.

Table 6: Need and Desirability of the proposed project – ecological integrity

Guideline requirement	Comments on requirement
1.1 How were the following ecological integrity considerations taken into account?	
1.1.1 Threatened Ecosystems,	The mine is located in Critical Biodiversity Area 1 as per the Limpopo Conservation Plan and is described as an Ecological Support Area as per the Limpopo Conservation Plan (SANBIGIS). According to Mucina & Rutherford (2006), the area is in the Ohrigstad Mountain Bushveld. The mine area falls within the Sekhukune Norite Bushveld vegetation unit which is an Endangered ecosystem as per NEMBA and an area of 'High biodiversity importance - high risk to mining' according to the Mining and Biodiversity Guidelines. Although the mine is within these areas. Please note that this activity will occur on an already disturbed site. As such, no significant alterations to the vegetation and animals are envisaged and no vegetation will be removed. The geohydrological study was updated to include the activities in the application for the Quarry 3 extension and the mine has a storm water management plan in place which will be implemented.
1.1.2 Sensitive, vulnerable, highly dynamic, or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure,	
1.1.3 CBAs and Ecological Support Areas (ESAs),	
1.1.4 Conservation targets,	
1.1.5 Ecological drivers of the ecosystem,	
1.1.6 Environmental Management Framework,	
1.1.7 Spatial Development Framework, and	
1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	
1.2 How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	A risk assessment methodology will be used to assess the impact that the development has on the region to ensure that the development does not cause significant alteration to the surrounding environment. Refer to Part A, Section 7.2.3 below where vegetation is included in the impact assessment.
1.3 How will this development pollute and/or degrade the biophysical environment? What measures were explored	

Guideline requirement	Comments on requirement
to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	
1.4 What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	No additional non-mining waste other than that which is already generated by the mine. The mine has a waste procedure in place for non-mining waste.
1.5 How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	All proposed activities are on the already existing mining area. It is not envisaged that any cultural heritage resources will be disturbed.
1.6 How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Non-renewable resources include: Earth minerals; fossil fuels, nuclear fuels; land surface; and soil. No additional earth minerals will be extracted. This is an already depleted quarry, therefore the impact on earth minerals has already taken place. The mine has done assessments to ensure no adverse sterilisation of any minerals will take place with the backfilling of the quarry. Fossil fuel energy is used to pipe the tailings to Quarry 3. No nuclear fuels are used by the mine. The backfilling of the quarries post-mining will aid in rehabilitation of the land surface. It will therefore have a positive rather than a negative impact on surface land. No additional land surface will be used for this activity.

Guideline requirement	Comments on requirement
	No soil will be used for this activity and no additional soil will be removed for the activity to take place.
1.7 How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	Renewable resources include: Water resources; vegetation & animals; and air. The mine currently recycles water from Quarry 3 for plant operations and the recycled water accounts for more than 60% total mine water consumption, hence the need for this development in order to minimise the extraction of water from natural resources. As discussed above, this activity will occur on an already disturbed site. As such, no significant alterations to the vegetation and animals are envisaged. With the quarry being backfilled, revegetation can take place which will increase both vegetation and animal life on site. This activity will not have additional impacts on the air quality.
1.7.1 Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (Note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)	
1.7.2 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 this the proposed development alternative?)	
1.7.3 Do the proposed location, type and scale of development promote a reduced dependency on resources?	
1.8 How were a risk-averse and cautious approach applied in terms of ecological impacts?	Ecological components include: Land including soil; water (surface- and groundwater); air; micro-organisms; vegetation; and animal life.
1.8.1 What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The footprint is based on the engineering designs of the Quarry 3 extension, which indicates no footprint outside of the already disturbed quarry, will be used.
1.8.2 What is the level of risk associated with the limits of current knowledge?	Refer to Part A, Section 7 for the impact assessment, and Part A, Section 8.4 for a

Guideline requirement	Comments on requirement
	description of any assumptions, uncertainties, and gaps in knowledge.
1.8.3 Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	An impact assessment was done based on the type of activity and its footprint. Refer to Part A Section 7 for this impact assessment.
1.9 How will the ecological impacts resulting from this development impact on people's environmental right in terms following	Non-renewable resources include: Earth minerals; fossil fuels, nuclear fuels; land surface; and soil. Renewable resources include: Water resources; vegetation & animals; and air. Ecological components include: Land including soil; water (surface- and groundwater); air; micro-organisms; vegetation; and animal life.
1.9.1 Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	There will be no impacts or increased use of earth minerals, nuclear fuels; land surface; soil; vegetation & animals; or air. Therefore, there will be no negative impact form these components.
1.9.2 Positive impacts: e.g. improved access to resources, improved amenity, improved air, or water quality, etc. What measures were taken to enhance positive impacts?	The backfilling of Quarry 3 and potential revegetation in future will positively impact land surface, as well as vegetation and animal life.
1.10 Describe the linkages and dependencies between human wellbeing, livelihoods, and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	The site is surrounded by rural communities. Any form of rehabilitation will be a positive impact for these communities at a later stage once they have access to the site. Groundwater quality and quantity is expected to be slightly affected and surface water quality may be affected, however impacts to fauna and flora are expected to be minimal. This is because the development footprint will not extend into the surrounding environment. Ecosystem services are therefore expected to remain in a similar state of functioning for the benefit of the rural community.

Guideline requirement	Comments on requirement
1.11 Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	Ecological integrity: The ability of an ecological system to support and maintain a community of organisms that has species composition, diversity, and functional organisation comparable to those of natural habitats within a region. The proposed project does not increase the development footprint of the mine, and thus is expected to have a low impact on the ecological integrity of the area as a result of the specific activity. One of the main development targets for the Limpopo Development Plan (LDP) is Job creation, economic growth & poverty reduction. While the proposed project does not directly create additional jobs, it ensures long-term employment of currently employed individuals as well as the potential for future job opportunities at the mine. In addition, the proposed activity will contribute to the production of Andalusite and improve South Africa's Gross Domestic Product (GDP). This is partly because the country has one of the highest Andalusite reserves in the world.
1.12 Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	There is no alternative to this project. The no-go option will ultimately have a more significant effect than the preferred alternative because it will hinder the economic benefits which could balance the environmental impacts if the development takes place.
1.13 Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope, and nature of the project in relation to its location and existing and other planned developments in the area?	Refer to the cumulative impact assessment (Part A, Section 7.2). In summary: Geology is also removed at the other quarries of the mine and activities across Annesley mine also impact the pits due to mining activities. Farming, residential and mining activities in the area can lead to soil erosion and pollution. Residential, farming and mining activities can lead to the loss of indigenous vegetation and enhance the growth of alien vegetation. No other mines or any other groundwater abstractions are taking place that could

Guideline requirement	Comments on requirement
	result in substantial cumulative water quality or water quantity impacts that will remain post closure. Sewerage works, Annesley Mining Operations and domestic activities may influence the surface water quality. There is a safety concern related to highwalls of other pits on the mine.

3.2 Socio-economic context

This section described how this development (and its separate elements/aspects) impacts on the socio-economic context of the area.

Table 7: Need and Desirability of the proposed project – socio-economic aspects

Guideline requirement	Comments on requirement
2.1 What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	Refer to PART A, Section 6.15 for the socio-economic context of the area.
2.1.1 The Integrated Development Plan (IDP) (and its sector plans' vision, objectives, strategies, indicators, and targets) and any other strategic plans, frameworks of policies applicable to the area,	
2.1.2 Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	
2.1.3 Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	
2.1.4 Municipal Local Economic Development Strategy (LED Strategy).	
2.2 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?	
2.2.1 Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	There are no new employment opportunities that will be created from the activity.
2.3 How will this development address the specific physical, psychological, developmental, cultural, and social needs and interests of the relevant communities?	The backfilling of the quarry will not impact these requirements.
2.4 Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and	

Guideline requirement	Comments on requirement
long-term? Will the impact be socially and economically sustainable in the short- and long-term?	
2.5. In terms of location, describe how the placement of the proposed development will: 2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other, 2.5.2. reduce the need for transport of people and goods, 2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport), 2.5.4. compliment other uses in the area, 2.5.5. be in line with the planning for the area, 2.5.6. for urban related development, make use of underutilised land available with the urban edge, 2.5.7. optimise the use of existing resources and infrastructure, 2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement), 2.5.9. discourage "urban sprawl" and contribute to compaction/densification, 2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs, 2.5.11. encourage environmentally sustainable land development practices and processes, 2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.), 2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential), 2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and	

Guideline requirement	Comments on requirement
cultural-historic characteristics and sensitivities of the area, and 2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	
2.6 How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	
2.6.1 What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The site is within a closed and secured mining area. No additional job creation will take place, no impacts on any aspects as per 2.5 above will take place.
2.6.2 What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability, and sustainability) associated with the limits of current knowledge?	Refer to Part A Section 7.2.6 for this impact assessment on community safety. In short: The risk profile associated with the TSF design and operation would be acceptable, providing deposition and management stay within design and operational limits, meeting with good practice. This would mean that people from the community who walk in the vicinity of the mine are at low risk of falling into the open pits and the risk to the community is greatly reduced with mitigation measures.
2.6.3 Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	An impact assessment was done based on the type of activity and its footprint. Refer to PART A, Section 7.2 for this impact assessment.
2.7 How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1 Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	This project is not expected to affect these aspects.
2.7.2 Positive impacts. What measures were taken to enhance positive impacts?	Health awareness is done from time to time in the form of monthly talk topics, and every so often health practitioners are called to the site to engage with the employees.
2.8 Considering the linkages and dependencies between human wellbeing, livelihoods, and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	The consultation process will involve communication with the community and all activities are planned, taking environmental parameters into account.

Guideline requirement	Comments on requirement
2.9 What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	The mine generates tailings and overburden as part of its processing activities. This is an inevitable part of its mining. Backfilling of mined-out quarries has been an ongoing process on the mine, thereby reducing the footprint of an additional TDF as well as rehabilitation of mined-out quarries. The only other option will be to dispose of tailings on land. This will then have increased impacts on the environment and also result in Quarry 3 not being backfilled.
2.10 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 disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	Refer to the impact assessment in PART A h) (v) which includes the environmental objective to be achieved, the phase applicable to the management measure, management tools, management timeframe and schedule, monitoring programmes, responsibilities for implementation and long-term maintenance, financial provision for long-term maintenance and/or environmental costs and the mitigation hierarchy.
2.11 What measures were taken to pursue equitable access to environmental resources, benefits, and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	
2.12 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?	
2.13 What measures were taken to:	
2.13.1 ensure the participation of all I&APs,	The process followed adheres to the National Environmental Management Act 107-1998 - National guideline on minimum information (20180209-GGN-41432-00086) and the 2012, IEM Guideline Series 7, Public participation, GN 807. Below is a summary of the announcement. Formal announcement of the project:
2.13.2 provide all people with an opportunity to develop the understanding, skills, and capacity necessary for achieving equitable and effective participation,	
2.13.3 ensure participation by vulnerable and disadvantaged persons	
2.13.4 promote community wellbeing and empowerment through environmental education, the raising of	

Guideline requirement	Comments on requirement
environmental awareness, the sharing of knowledge and experience and other appropriate means	The notices as mentioned below include all requirements as per the EIA Regulations.
2.13.5 ensure openness and transparency, and access to information in terms of the process	Advertisement:
2.13.6 ensure that the interests, needs and values of all I&APs were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and	An advertisement was placed in 'Steelburger News' on the 19th of August 2021. Refer to Addendum 4B for a copy and proof of this advertisement.
2.13.7 ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted	Site notice: Site notices were placed at the mine and in the nearby community on the 19th of August 2021. Refer to Addendum 4C for a copy and proof of the site notices as well as a map indicating locations of the site notices.
2.14 Considering the interests, needs and values of all the I&APs, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	Letters: Letters were sent to all stakeholders as well landowners to the site on the 19th of August 2021. Refer to Addendum 4D for a copy and proof of these letters sent. Public meeting: As a result of Covid-19, no public meeting will be held. This EIA is simultaneously sent to DMRE, the registered I&APs and stakeholders. Any issues raised will be included in the final EIA/EMP before submission to DMRE. All registered I&APs are given the opportunity to comment on the EIA. This includes any issues that they have with the proposed activity and that they believe may be of significance in the consideration of the application.
2.15 What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	All contractors, sub-contractors and workers will attend compulsory environmental awareness training and inductions. This training will highlight the dangers associated with the workplace. Procedures relating to environmental risks will also be put in place and will be regularly updated.
2.16 Describe how the development will impact on job creation in terms of, amongst other aspects:	

Guideline requirement	Comments on requirement
2.16.1 the number of temporary versus permanent jobs that will be created,	No additional jobs will be created.
2.16.2 whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	
2.16.3 the distance from where labourers will have to travel,	
2.16.4 the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and	
2.16.5 the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.17 What measures were taken to ensure:	
2.17.1 that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and	A summary of various legislation is included in PART A, Section 2.3 of this report. All organs of state will receive this EIA/EMP for review. Any comments from them will be incorporated into the final EIA/EMP as well as the final decision.
2.17.2 that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	
2.18 What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	
2.19 Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Refer to impact assessment mitigation measures.
2.20 What measures were taken to ensure that the costs of remedying pollution, environmental degradation, and consequent adverse health effects and of preventing, controlling, or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	There are provisions made to ensure that environmental pollution does not occur, furthermore there is a financial provision in place for the mine which is updated annually to plan for all required environmental rehabilitation.
2.21 Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	There is no alternative to this project and the placement of the site was done considering all environmental attributes.

Guideline requirement	Comments on requirement
2.22 Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope, and nature of the project in relation to its location and other planned developments in the area?	The cumulative impacts can be summarised as follows: Farming, residential and mining activities in the area can lead to soil erosion and pollution. Residential, farming and mining activities can lead to the loss of indigenous vegetation and enhance the growth of alien vegetation. There is a safety concern related to highwalls of other pits on the mine.

SECTION 4: ALTERNATIVES

4.1 Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved site

There is no alternative to the extension and optimisation of Quarry 3 with tailings as part of increasing tailings facility storage capacity. The final decommissioning and rehabilitation will be discussed with the community. Furthermore, all activities will be planned with the aid of a specialist.

4.2 Details of the development footprint alternatives considered

The only activity to be considered for this application is the extension and optimisation of Quarry 3 with tailings as part of increasing tailings facility storage capacity. The final decommissioning and rehabilitation will be discussed with the community.

The following definition of "alternatives" is given in the EIA Regulations: *"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the -*

(a) property on which or location where the activity is proposed to be undertaken;

(b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity; or

(e) operational aspects of the activity; and

(f) includes the option of not implementing the activity;"

Please note the term preferred alternative is the preferred activity whereby the second alternative is the alternative to the preferred alternative.

4.2.1 The property on which or location where it is proposed to undertake the activity

As above, no alternatives are applied for.

4.2.2 The type of activity to be undertaken

As above, no alternatives are applied for.

4.2.3 The design or layout of the activity

As above, no alternatives are applied for.

4.2.4 The technology to be used in the activity

As above, no alternatives are applied for.

4.2.5 The operational aspects of the activity

As above, no alternatives are applied for.

4.2.6 The option of not implementing the activity

In the case of the no go option being implemented, the mine area cannot be rehabilitated to an adequate final land use as the region has already been disturbed.

SECTION 5: DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

According to the Publication of Participation Guideline (NEMA), an I&AP is:
"(a) any person, group or persons or organisations interested in or affected by an activity, and (b) any organ of state that may have jurisdiction over any aspect of the activity".

This definition is more detailed in the Guideline for consultation with communities and I&APs (MPRDA): *"Interested and affected' parties include, but are not limited to; (i) Host Communities, (ii) Landowners (Traditional and Title Deed owners), (iii) Traditional Authority, (iv) Land Claimants, (v) Lawful land occupier, (vi) The Department of Land Affairs, (vii) Any other person (including on adjacent and non-adjacent properties) whose socio-economic conditions may be directly affected by the proposed prospecting or mining operation (viii) The Local Municipality, (ix) The relevant Government Departments, agencies and institutions responsible for the various aspects of the environment and for infrastructure which may be affected by the proposed project."*

The process followed adheres to the National Environmental Management Act 107-1998 - National guideline on minimum information (20180209-GGN-41432-00086) and the 2012, IEM Guideline Series 7, Public participation, GN 807.

5.1 Identification of interested and affected parties

Refer to Table 8 below for all I&APs and stakeholders identified. All of these I&APs and stakeholders were in fact consulted. Refer to Addendum 4D for a copy and proof of letters sent to all stakeholders and I&APs and Addendum 4E for proof of the draft and final ESR having been sent to I&APs and stakeholders. Refer to Addendum 4F for proof of the draft EIA having been sent and Addendum 4 G for comments received. Refer to Addendum 4H for the complete stakeholder database.

Table 8: I&APs and stakeholders identified

Interested and Affected Parties[7]	Date comments received & Issues raised	EAPs response to issues as mandated by the applicant	Section reference in this ESR where issues and or response were incorporated
Affected parties			
Landowner/s			
According to the title deeds, the National Government of South Africa is the landowner, however, Roka Malepe	None	N/A	N/A

[7] Individual's names removed due to the Protection of Personal Information Act of 2013

Interested and Affected Parties[7]	Date comments received & Issues raised	EAPs response to issues as mandated by the applicant	Section reference in this ESR where issues and or response were incorporated
Traditional Council is the traditional landowner.			
Lawful occupier/s of the land			
The land is currently occupied by the mine.	None	N/A	N/A
Landowners or lawful occupiers on adjacent properties			
Roka Malepe Traditional Council - Manawe Malepe	None	N/A	N/A
Municipal councillor – ward 9, 15 and 16			
Cllr. [redacted] (ward 9)	None	N/A	N/A
Cllr. [redacted] (ward 15)	None	N/A	N/A
Cllr. [redacted] (ward 16)	None	N/A	N/A
GTLM - Municipal manager			
Cllr [redacted]	None	N/A	N/A
SDM - Municipal manager			
Mr. [redacted]	None	N/A	N/A
Limpopo Department of Mineral Resources and Energy			
[redacted]	2021/12/14: Acceptance and comments on the final ESR. Refer to Addendum 5B	Refer to Addendum 5B	Addendum 5B
Organs of state			
DWS Mpumalanga – Lydenburg/Mashishing Office	2021/12/13: Comments on the final ESR. Refer to Addendum 5D	Refer to Addendum 5D	Addendum 5D
DWS National	None	N/A	N/A
Communities			
Roka Malepe Traditional Council - [redacted]	None	N/A	N/A
DALRRD Limpopo			
[redacted]	None	N/A	N/A
Traditional Leaders			
Roka Malepe Traditional Council - [redacted]	None	N/A	N/A
Limpopo Department of Economic Development, Environment and Tourism			
[redacted]	None	N/A	N/A
[redacted]	2021/12/10: Comments on the final ESR. Refer to Addendum 5C	Refer to Addendum 5C	Addendum 5C
Other Competent Authorities affected			

Interested and Affected Parties[7]	Date comments received & Issues raised	EAPs response to issues as mandated by the applicant	Section reference in this ESR where issues and or response were incorporated
Limpopo Heritage Resources Agency (LHRA)	None	N/A	N/A
Limpopo Department of Agriculture and Rural Development (DARD)	None	N/A	N/A
Other affected parties			
Eskom	None	N/A	N/A
Roads Agency Limpopo (SOC) Ltd	2022/03/28: [redacted] Mehlape from RAL asked that a formal letter requesting comments on the draft EIA be sent via cell phone communication.	2022/03/28: Sent the formal letter requesting comments on the draft EIA.	Addendum 4G
Historical disadvantaged communities			
None identified	N/A	N/A	N/A
Land claimants			
None identified	N/A	N/A	N/A
Interested parties			
None identified	N/A	N/A	N/A

5.2 Formal announcement of the project

The notices as mentioned below include all requirements as per the EIA Regulations.

5.2.1 Advertisement

An advertisement is published in the local newspaper 'Steelburger News' on the 19th of August 2021. Refer to Addendum 4B for a copy and proof of this advertisement.

5.2.2 Site notice

Site notices were placed around the mine and in the nearby community where they were visible to people on the 19th of August 2021. Refer to Addendum 4C for a copy and proof of the site notice placement, as well as a map of the placement of the site notices.

5.2.3 Letters

Letters were sent to all stakeholders as well landowners to the site. See Addendum 4D for a copy and proof of these letters sent.

5.2.4 Public meeting

As a result of the Covid-19 pandemic, no public meeting will be held.

5.3 Environmental scoping report and environmental impact assessment report & environmental management programme

The draft ESR was sent to all stakeholders and registered I&APs on 11 October 2021, and the final ESR was sent to all stakeholders and registered I&APs on 10 November 2021 electronically, and as a hard copy on 12 November 2021. Refer to Addendum 4E for proof of these reports having been sent. The draft EIA was sent out to all stakeholders and registered I&APs electronically on 28 February 2021 for 30 days of comment. Refer to Addendum 4F for proof.

All I&APs were given the opportunity to comment on the report if registered. This includes any issues that they may have had with the proposed activity and that they believed may be of significance in the consideration of the application. These comments needed to be submitted within the specified timeframe. No comments were received by the EAP.

All comments are included in Part A, Section 5.5.

5.4 Decision making announcement to stakeholders and interested and affected parties

To be provided once received.

5.5 Summary of issues raised by interested and affected parties

Comments were given on the final ESR by DMRE, DWS and LEDET. Refer to addendum 5 for correspondence with these Competent Authorities. Aside from this, no other formal comments have been received.

SECTION 6: THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES – BASELINE ENVIRONMENT

Refer to Addendum 3 for the full report of specialist studies that were conducted for the development.

6.1 Geology

Information for this section was extracted from the Geohydrological Study and Impact Assessment for Backfilling of Quarries at Annesley Mine (Shangoni AquiScience, 2020).

The 2628 East Rand 1:250 000 geological map indicates that Annesley Mine is directly underlain by rocks of the Timeball Formation (Figure 2) belonging to the Pretoria Group and the Transvaal Sequence of rocks believed to be of Vaalian age.

The Timeball Hill Formation consists of one or more beds of quartzite sandwiched between shale at the base and at the top of the unit. The entire Pretoria Group is widely intruded by dolerite dykes and sills. A minimum of four distinct diabase sills, irregularly weathered and probably of Bushveld ligneous Complex origin, are intrusive along bedding planes in the vicinity of and within the ore body. These sills act as aquitards, restricting the movement of groundwater through them resulting in a confined aquifer and piezometric pressure heads.

6.1.1 Local geology

Within the hydrocensus covered area, the geology mainly consists out of the volcanic and sedimentary rocks of the Pretoria Group with outcrops of dolerite intrusions.

The ore zone principally comprises of quartz, feldspar, biotite and andalusite bearing hornfels. The ore body outcrops/sub-outcrops against the north-eastern slopes of the Radingwane Mountain, which is capped by Daspoort quartzite of the Daspoort Formation. The surface of the ore body is covered by a layer of rubble, between 0.5 m to 6 m thick, consisting primarily of quartzite boulders, occasional lava boulders and very little soil (Aurecon, 2010).

The ore body is a metamorphically altered alumina-rich shale horizon. It is essentially a quartzitic biotite-andalusite hornfels with minor amounts of garnet and staurolite. The ore body varies between 40 m and 50 m in thickness, strikes NW and dips on average 15° to the SW (Aurecon, 2010).

The geological map indicates the presence of several regional linear structures, comprising of NE-SW striking dolerite dykes and NW-SE striking diabase dykes. The drainage line through the mine area runs parallel to the regional orientation of the diabase dykes (Aurecon, 2010). The intrusive bodies vary in thickness from 0.5 m to 5 m and appear to upwardly transgress through the ore body from east to west. The ore above and below these sills displays alteration through contact metamorphism.

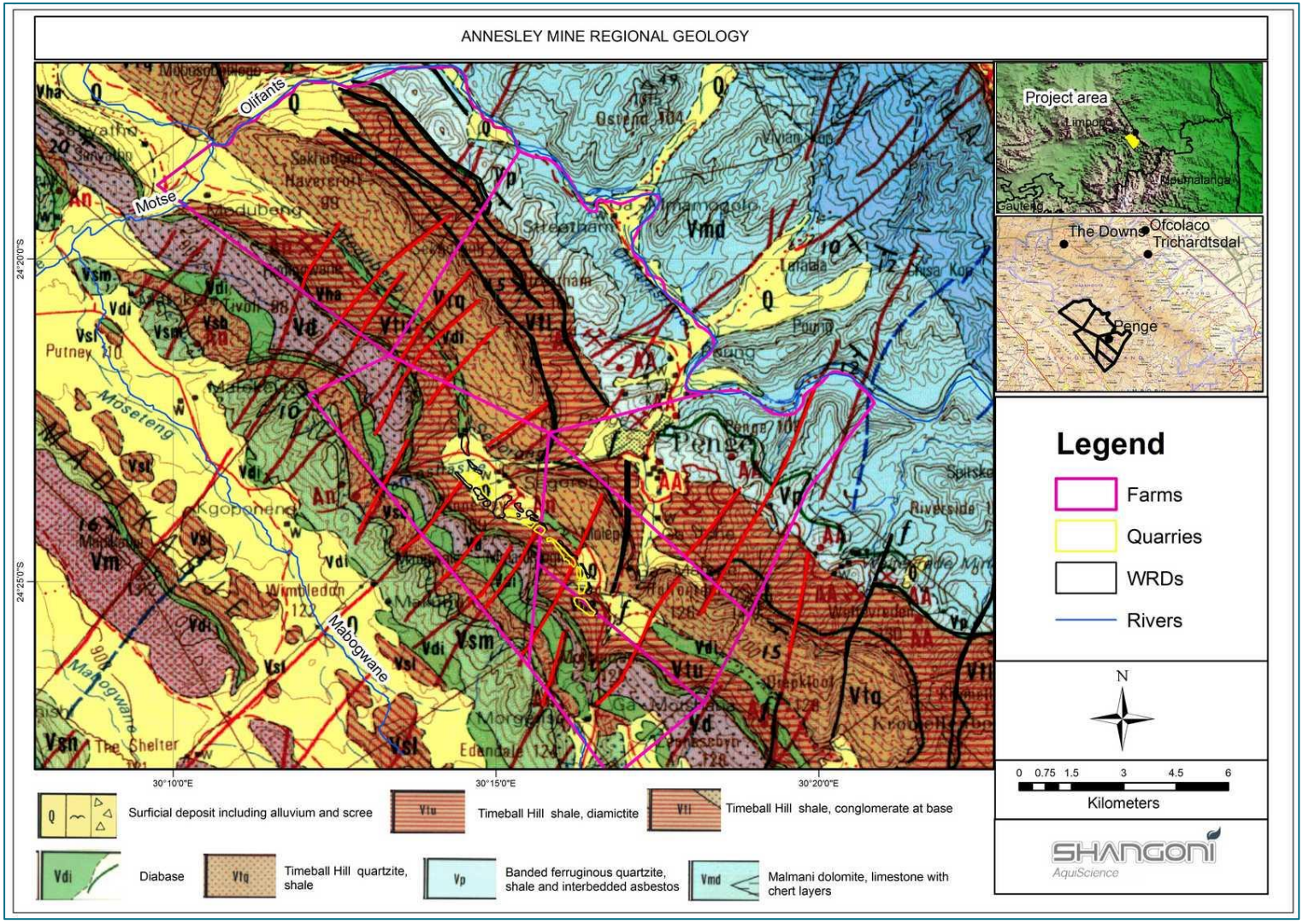


Figure 2: Regional Geology (Shangoni AquiScience, 2020)

A minimum of six, often very irregular, sub-vertical dolerite dykes of Karoo age transect the ore body along strike, from south-west to north-east. They are usually deeply weathered and deep gullies mark their position on the surface. Their effect on the ore appears to be minimal. None of these dykes will be mined, leaving the water compartments locally intact. Only minor faulting and other structural deformation have been observed. Any water compartments that may exist lie below the mining operations at depths in excess of 50 m. Similar to dolerite sills, these dykes act as vertical aquitards restricting the lateral migration of groundwater, consequently resulting in the existence of compartments (in theory). Some leakage is however expected at the surface where the dolerite dykes are usually intensely weathered.

The mining area is also underlain by a diabase sill of approximately 100 m thick and is concordant with the sedimentary rock in which it intrudes. This sill is approximately 40 m below the footfall of the ore body. Due to the highly undulating nature of the topography, varied geology and localised presence of dykes and sills, the depth to water table in the B71F quaternary catchment varies significantly. This could be less than 10 meters below ground level (mbgl) in some places and more than 40 mbgl at others while artesian boreholes and fountains are common due to the confined nature of the aquifer underlying the regional study area.

6.2 Climate

Information for this section was extracted from the IWWMP (Shangoni Management Services, 2012):

6.2.1 Regional climate

The climate is moderate to hot, with occasional, very hot conditions in the low-lying valleys. The average daily temperature variation is 15°C. The area is part of a major mountain range and the winds blow consistently from the northeast. The rainy season lasts from late October until April with a maximum in November, mainly in the form of thunderstorms from the south west, but also light to moderate precipitation blown in from the east. The rainfall is fairly low and in 12% of all years there are severe drought conditions. There is no frost.

6.2.2 Rainfall and evaporation

The mean monthly rainfall of the area is 559mm, which is higher than that of the surrounding area as a result of the microclimate (topography and aspect).

Table 9: Rainfall statistics

Month	Average (mm)	Days with more than 1 mm rain
January	95	9.8
February	84	6.8
March	70	6.8

Month	Average (mm)	Days with more than 1 mm rain
April	20	2.6
May	8	2.2
June	4	1.3
July	4	1.3
August	8	1.7
September	19	1.8
October	59	6.3
November	102	10.1
December	86	8.4
Annual	559	59

Table 10: Evaporation

Month	Evaporation (mm)
January	212
February	174
March	174
April	139
May	121
June	102
July	119
August	167
September	228
October	259
November	228
December	217
Average	178.33

6.2.3 Temperature

Table 11: Temperature for Annesley

Month	Temperature	
	Max	Min
January	30.1	17.3
February	29.7	17.4
March	28.2	16.2
April	27.4	12.1
May	24.5	8.1
June	21.7	3.9
July	21.6	4.0
August	24.0	6.9
September	27.5	11.3

Month	Temperature	
	Max	Min
October	30.4	14.6
November	30.2	16.4
December	30.1	17.4
Annual	27.1	12.2

6.2.4 Extreme events

The area experiences several extreme events on a regular basis, including frost, hail, drought, and high winds.

6.3 Topography

Information for this section was extracted from the Geohydrological Study and Impact Assessment for Backfilling of Quarries at Annesley Mine (Shangoni AquiScience, 2020).

The elevation of the mining area varies between 775 meters above mean sea level (mamsl) in the north and over 1070 mamsl in the south. The mining area is located on the north-eastern slope of the Radingwane Mountain. The ore body outcrops along the lower slopes of the mountain range, close to the valley floor. The quarry areas start at an elevation of 920 mamsl rising up the northern slope of the Radingwane Mountain range to a maximum elevation of 987 mamsl from where it dips again into the valley floor at approximately 775 mamsl (Figure 3). Although the slopes are intersected by many well-defined gullies, no major ravines are present on-site.

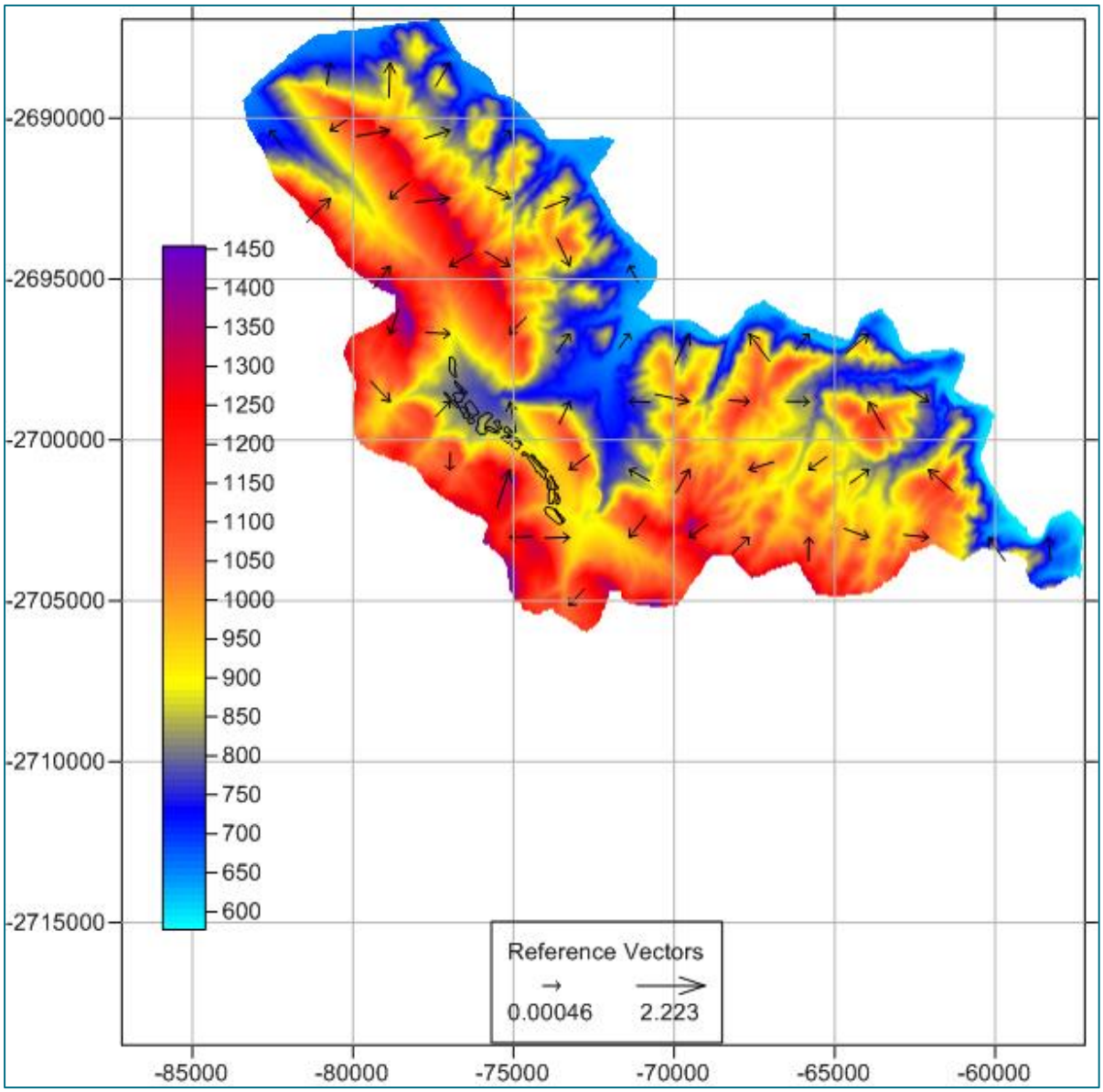


Figure 3: Topography of Annesley Mine

6.4 Soil

Information for this section was extracted from the Approved EMP (Shangoni Management Services, 2006):

The mining area is dominated by rock with limited soils. Red-massive or weak structured soils with high base status. The soils on the mountain slopes overlying the ore body are skeletal and only developed in localised potholes and as a component of the scree made up of metamorphic (hornfels) schists, diabase still material and quartzite rocks.

The major components of the topsoil are weathered silica and clay materials, chiefly loamy biotite and rich in porphyroblasts of staurolite and or garnets and cordierite. The topsoil is generally friable, politic, with an abundance of gravel and pebbles of all sizes. The terrain and types of soil in the area make it prone to erosion.

6.5 Pre-mining land capability, land use and existing infrastructure

Information for this section was extracted from the Approved EMP (Shangoni Management Services, 2006):

The area is disturbed by the existing mining excavation. The area is classified as Wilderness land as defined by the Chamber of Mines Rehabilitation Guideline. The slope of the majority of the site is considered steep, with soils being less than 250mm in depth and the volume of rocks larger than 100mm being more than 50%. The land was classified to be arable land and suitable grazing land. The entire mining area roughly comprises: Wilderness land: 50% Arable Land: 0% Grazing Land: 50% Wetland: 0%

6.6 Vegetation

Certain information for this section was extracted from the Approved EMP (Shangoni Management Services, 2006):

The mine is located in the Savanna Biome and within the Mixed Bushveld and Sourish Mixed Bushveld veld type (According to Acocks 1975). According to Mucina and Rutherford this area is classified as the Ohrigstad Mountain Bushveld vegetation unit (SVcb 26). This vegetation unit is characterised by open to dense woody layer, with associated woody and herbaceous shrubs and closed to open grass layer. Moderate to steep slopes on mountainsides and sometimes deeply incised valleys; also fairly flat terrain in a few places.

The quarry and plant areas are significantly disturbed. Heaps of overburden occur near the quarries and these heaps are heavily infested with *Xanthium spinosum* (Spiny cocklebur) and *X strumarium* (Large cocklebur). Of particular concern is the invasion of *Nicotiana glauca* (Wild tobacco) and *Opuntia* spp (Common prickly pear).

No red data species were noted.

Table 12: Invader plant species found on Annesley Andalusite Mine

Scientific name	Common name
Nicotiana glauca	Wild tobacco
Xanthium spinosum	Spiny cocklebur

Scientific name	Common name
Xanthium strumarium	Large cocklebur

6.6.1 River diversion

Information for this section was extracted from the Flora Report (Galago Environmental, 2016):

The vegetation of both the drainage lines and the area in between is in a natural condition, although the area was inhabited many years ago. Remnants of former habitation are still evident. The soil is sandy loam amongst scattered rocks, sustaining very dense growth of the woody stratum. The graminoid stratum is not very diverse and forbs are difficult to identify, this late in the season. A prominent feature is the lack of geophytes.

Two vegetation study units were identified (Figure 4):

- Drainage lines.
- Euphorbia shrub veld

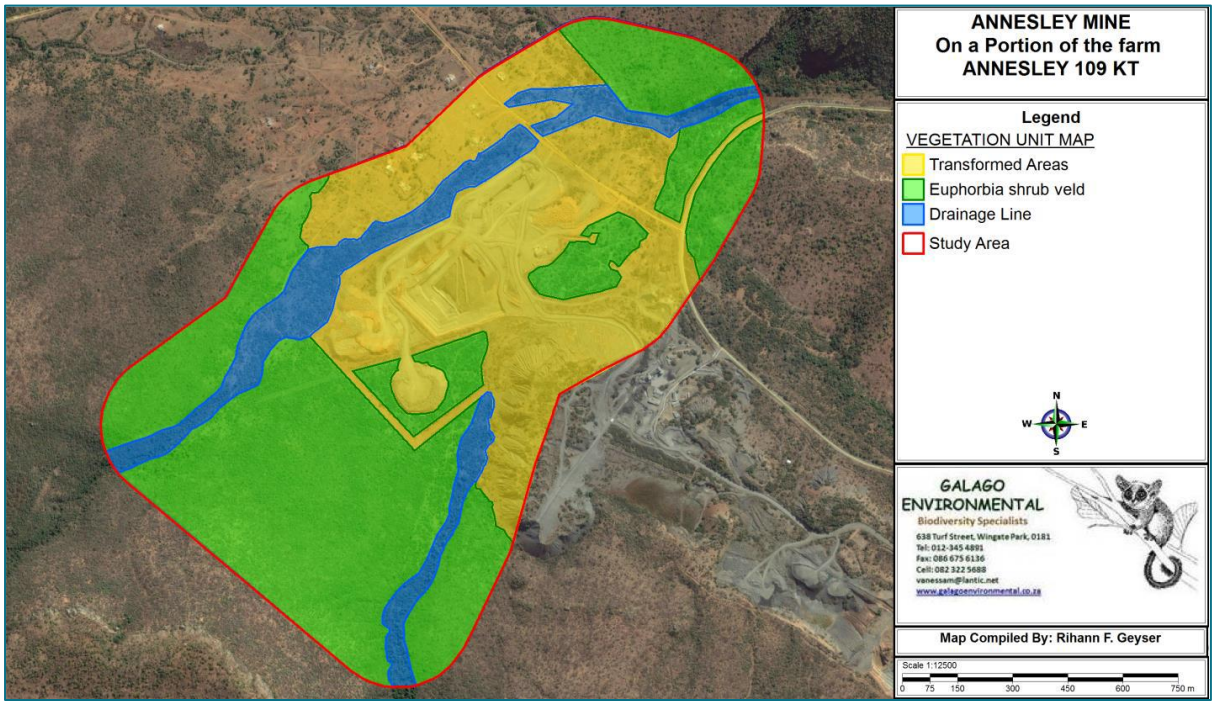


Figure 4: Vegetation study units

6.6.2 Medicinal species

Eleven of the 97 plant species recorded on the study site are known to have medicinal properties (Van Wyk et al. 2002; Van Wyk & Wink 2004).

Table 13: Number of medicinal plant species in the different study units. Study unit Total no. of species

Study unit	Total no. of species	No of medicinal species
Drainage lines	53	8
Euphorbia shrub veld	68	8

6.6.3 Alien species

Alien species are mainly herbs occurring in disturbed areas or are introduced tree and shrub species. Six alien species were recorded on the site, of which two are Category 1b, one Category 2 and one Category 3 Invasive species.

Table 14: Number of alien species in each study unit.

Study unit	No. of species	Cat. 1b	Cat. 2	Cat. 3	Not declared
Drainage lines	2	1	0	0	1
Euphorbia shrub veld	6	2	1	1	2

6.6.4 Species of conservation concern

There are no suitable habitats for any known species of conservation concern on the study site.

6.6.5 Threatened species

No threatened species were found on the study site.

6.6.6 Protected trees

Four tree species that are protected under NFA were found on the study site. *Balanites maughamii* subsp. *maughamii*, *Sclerocarya birrea* subsp. *caffra*, *Boscia albitrunca* and *Phylenoptera violacea* occur on this study site. *Lydenburgia cassinoides* is also listed for this QDS but there is no suitable habitat on the study site.

6.6.7 Drainage lines

6.6.7.1 Compositional aspects and connectivity

The north-western seasonal drainage line is of importance because it is from here that the water flow will be diverted to bypass the mining site. The vegetation consists of mainly trees and shrubs with a low diversity in graminoid and forb content. Tree and shrub species are predominantly *Senegalia schweinfurthii, Albizia anthelmintica, Capparis tomentosa, Hippocratea longipetiolata* and *Commiphora glandulosa*. The herbaceous layer is represented by members of the Acanthaceae and a few grass species such as *Eragrostis rigidior* and *Panicum maximum*. Connectivity exists in a corridor along the entire drainage line in a southwestern direction.

Table 15: Growth forms of species in the drainage lines

Growth form	No. of species
Woody and succulent tree	13
Woody and succulent shrub	21
Climber	3
Herb	11
Graminoid	5

6.6.7.2 Medicinal and alien species

Eight of the 53 species recorded in the study unit are known to have medicinal properties. Of the two alien species, one is a Category 1b Declared weed.

6.6.7.3 Sensitivity

The vegetation in this study unit is natural and therefore considered sensitive.

Table 16: Plant species recorded in drainage lines

Scientific name	Common name
Agave americana subsp. *americana* *	Century plant
Albizia anthelmintica	Worm-bark false-thorn
Aristida congesta subsp. *congesta*	Tassel three-awn
Asparagus sp.	Wild asparagus
Barleria prionitis	Thorny orange barleria
Bauhinia tomentosa	Yellow bauhinia
Boscia albitrunca	Shepherd tree
Boscia foetida subsp. *rehmanniana*	Foetid shepherd tree
Capparis tomentosa ♥	Woolly caper bush
Carissa edulis	Climbing num-num
Cenchrus ciliaris	Foxtail buffalo grass
Combretum hereroense ♥	Russet bush-willow
Commiphora glandulosa	Tall common corkwood
Commophora mollis	Velvet-leaved corkwood
Crotalaria sp.	
Croton menyharthii	Rough-leaved lavender fever-berry
Dichrostachys cinerea subsp. *africana* ♥	Small-leaved sickle bush
Dicliptera fruticosa	
Diospyros mespiliformis	Jackal-berry
Ehretia obtusifolia	Glandular puzzle bush
Eragrostis rigidior	Curly leaf
Euclea undulata ♥	Common guarri
Euphorbia cooperi var. *cooperi*	Bushveld candelabra tree

Scientific name	Common name
Euphorbia tirucalli	Hedge euphorbia
Flueggia virosa	White-berry bush
Grewia bicolor var. *bicolor*	White raisin
Grewia flavescens	Sandpaper raisin
Gymnosporia maranguensis	Tropical spike-thorn
Gymnosporia senegalensis	Red spike-thorn
Hibiscus engleri	Wild hibiscus
Hippocratea longipetiolata	Helicopter paddle-pod
Hyperacanthus amoenus	Thorn-gardenia
Jatropha sp.	
Kalanchoe rotundifolia	Nentabos
Kyphocarpa angustifolia	Silky burweed
Lippia javanica ♥	Fever tea
Melhania acuminata var. acuminata	Bushy honeycup
Melhania forbesii	
Melinis repens	Natal red top
*Opuntia ficus-indica * C1b*	Sweet prickly pear
Panicum maximum	Guinea grass
Pellaea calomelanos ♥	Hard fern
Philenoptera violacea	Apple-leaf
Pouzolzia mixta	Soap nettle
Pyrostria hystrix	Porcupine bush
Sansevieria hyacinthoides ♥	Mother-in-law's-tongue
Schotia brachypetala ♥	Weeping boer-bean
Searsia engleri	Velvet karee
Senegalia schweinfurthii var. *schweinfurthii*	River climbing thorn
Spirostachys africana	Tamboti
Vachellia robusta subsp. *robusta*	Broad-pod robust thorn
Vepris reflexa	Bushveld white ironwood
Waltheria indica	Meidebossie

Alien species are indicated by * and medicinal species by ♥. Declared weeds and invaders are marked C1b, C2 and C3

6.6.8 Euphorbia shrub veld

6.6.8.1 Compositional aspects and connectivity

The substrate of this study unit consists of rocky, sandy loam soil sloping down from 930m to 820m in a north-eastern direction. The vegetation is dominated by woody species forming dense, shrubby stands. The unit was inhabited some years ago but the only sign of disturbance is the presence of two Agave species and some ruins. The dominant trees are *Euphorbia cooperi, Euphorbia tirucalli*, *Commiphora* species and *Albizia anthelmintica*. The dense shrubby layer is represented by *Vachellia*

tortilis, Dichrostachys cineria, Grewia species and sparsely scattered creepers. At lower altitudes *Sclerocarya birrea, Boscia albitrunca* and *Balanites maughamii* become prominent. The graminoid and herb component is poorly represented. Connectivity exists to the west and southeast.

Table 17: Growth forms of species in the *Euphorbia* shrub veld

Growth form	No. of species
Woody and succulent tree	17
Woody and succulent shrub	27
Creeper	4
Herb	15
Graminoid	5

6.6.8.2 Medicinal and alien species

Eight of the 11 medicinal species found on the study site occur in this study unit. Of the six alien species found in this study unit, two are Category 1b, one Category 2 and one Category 3 Declared invaders.

6.6.8.3 Sensitivity

The vegetation in this unit is in a natural state. The few alien species that are sparsely present and the presence of several protected trees suggest that the vegetation is sensitive.

Table 18: Plant species recorded in the *Euphorbia* shrub veld

Scientific name	Common name
Agave americana subsp. *americana**	Century plant
*Agave sisalana * C2*	Sisal
Albizia anthelmintica.	Worm-bark false-thorn
Aloe castanea	Cat's-tail aloe
Aloe cryptopoda	Dr Kirk's aloe
Aloe marlothii subsp. *marlothii*	Mountain aloe
Aristida adscensionis	Annual three-awn
Asparagus acocksii	Wild asparagus
Asparagus sp.	Wild asparagus
Balanites maughamii subsp. *maughamii* ♥	Green thorn
Barleria kaloxytona	
Berchemia discolor	Brown ivory
Boscia albitrunca	Shepherd tree
Canthium armatum	
Capparis tomentosa ♥	Woolly caper bush
Cardiospermum halicacabum var. *microcarpum* * C3	Lesser balloon vine
Cheilanthes hirta var. *hirta*	Parsley fern
Clematis brachiata	Traveller's joy

Scientific name	Common name
Commiphora glandulosa	Tall common corkwood
Commiphora mollis	Velvet-leaved corkwood
Crabbea velutina	
Croton menyharthii	Rough-leaved lavender fever-berry
Dichrostachys cinerea subsp. *africana* ♥	Small-leaved sickle bush
Dyschoriste transvaalensis	
Ehretia rigida subsp. *nervifolia*	Puzzle bush
Enteropogon macrostachyus	Mopane grass
Eragrostis rigidior	Curly leaf
Euphorbia cooperi var. *cooperi*	Bushveld candelabra tree
Euphorbia tirucalli	Hedge euphorbia
Gomphocarpus sp.	
Gossypium herbaceum subsp. *africanum*	Wild cotton
Grewia bicolor var. *bicolor*	White raisin
Grewia flava	Velvet raisin
Grewia flavescens	Sandpaper raisin
Grewia villosa var. *villosa*	Mallow raisin
Gymnosporia senegalensis	Red spike-thorn
Hibiscus praeteritus	
Hippocratea longipetiolata	Helicopter paddle-pod
Melhania acuminata var *acuminata*	Bushy honeycup
Ochna inermis	Stunted plane
Opuntia aurantiaca * C1b	Jointed prickly pear
Opuntia ficus-indica * C1b	Sweet prickly pear
Panicum maximum	Guinea grass
Pechuel-Loeschea leubnitziae	Stinkbush
Pellaea calomelanos	Hard fern
Philenoptera violacea	Apple-leaf
Plectranthus sp.	
Psydrax livida	Green quar
Ptycholobium sp.	
Pupalia lappacea var. *lappacea*	Forest burr
Rhoicissus revoilii	Bushveld grape
Sansevieria hyacinthoides ♥	Mother-in-law's-tongue
Schotia brachypetala ♥	Weeping boer-bean
Sclerocarya birrea subsp. *caffra*	Marula
Seddera capensis	Seddera
Senegalia erubescens	Blue-thorn
Senegalia nigrescens	Knob-thorn
Sida dregei	Spider-leg

Scientific name	Common name
Steganotaenia araliacea var. *araliacea*	Carrot tree
Sterculia rogersii	Star-chestnut
Tetradenia sp.	
Triaspis glaucophylla	Blue-leaved saucer-fruit
Urochloa mosambicensis	Bushveld signal grass
Vachellia tortilis subsp. *heteracantha*	Umbrella thorn
Waltheria indica	Meidebossie
Ximenia americana var. *micropphylla*	Blue sourplum
Zinnia peruviana *	Redstar zinnia
Ziziphus mucronata ♥	Buffalo thorn

Alien species are indicated by * and medicinal species by ♥. Declared weeds and invaders are marked C1b, C2 and C3.

6.7 Animal life

Information for this section was extracted from the Approved EMP (Shangoni Management Services, 2006):

6.7.1 Mammals

The following larger mammals (amongst many more) are found in the general area: Kudu (*Tragelaphus strepiceros*), Klipspringer (*Oreotragus oreotrachus*), Grey Rhebok (*Pelea capreolus*) which is classed as Endangered, Common Duiker (*Sylvicapra grimmia*), Grey buck (*Raphicerus malanotis*), Bushpig (*Potamochoerus porcus*), Caracal (*Felis caracal*), Jackal (*Canis mesomelas*), African Wild Cat (*Felis lybica*), Leopard (*Panthera pardus*) which is classed as Endangered, Porcupine (*Hystrix africaeaustralis*), Dassie (*Procavia capensis*), Brown Hyaena (*Hyaena brunnea*), Slender Mongoose (*Galerella sanguinea*), Scrub Hare, (*Lepus saxatilis*), Chacma Baboon (*Papio ursinus*).

6.7.2 Birds

Birds that were recorded on the site were identified visually and with aid of audio recognition. Only a small fraction of the bird population was encountered. One of the species on the list White backed vulture is labelled by the IUCN (2000) as "vulnerable to extinction with an estimated continuing decline of at least 10% within the next 10 years". A pair of Black Eagles nest less than 1km from the current mining site.

6.8 Surface water

Information for this section was extracted from the IWWMP (Shangoni Management Services, 2012), the Aquatic Ecosystem Delineation Report (Galago Environmental, 2016), and the Geohydrological impact assessment as input to the Section 24G Rectification (Shangoni AquaScience, 2017):

The mine lies in the Primary Catchment of the Olifants River and the Quaternary Catchment referred to as the B71F draining region as defined by the DWS. The applicable water management area is the Olifants and the responsibility of the Mpumalanga Regional DWS. The quaternary catchment B71F has a mean annual precipitation of 799.91mm and mean annual runoff of 101.3%.

The area in which the mine is located shows an abundance of non-perennial streams flowing down the escarpment. There is no permanent natural surface water on the mining site. The area is drained by several non-perennial water courses. The most southern section of the mine area is drained by several intermittent streams flowing into a larger northern flowing stream which eventually confluences with the Olifants River. The northern section of the mine is drained by a number of NW flowing intermittent streams which flows to the Sekgorong River, forming part of the greater Olifants River catchment.

6.8.1 Surface water hydrology

Three upper tributaries of the Segorong River pass through the farm Annesley 109 KT over the andalusite ore body that will be mined in the near future During the wetland delineation site visit an impacted site was observed as a result of mining activities. Two drainage lines were observed, draining from steep mountain catchment areas into the existing open cast mining areas (red lines in Figure 5). Both drainage lines are currently intersected by the open cast mining activities on site. The eastern line has been rerouted and with diffused flows drains to the north. The northern line also redirected its diffused flows with much of the water expected to end up in the opencast mining area.

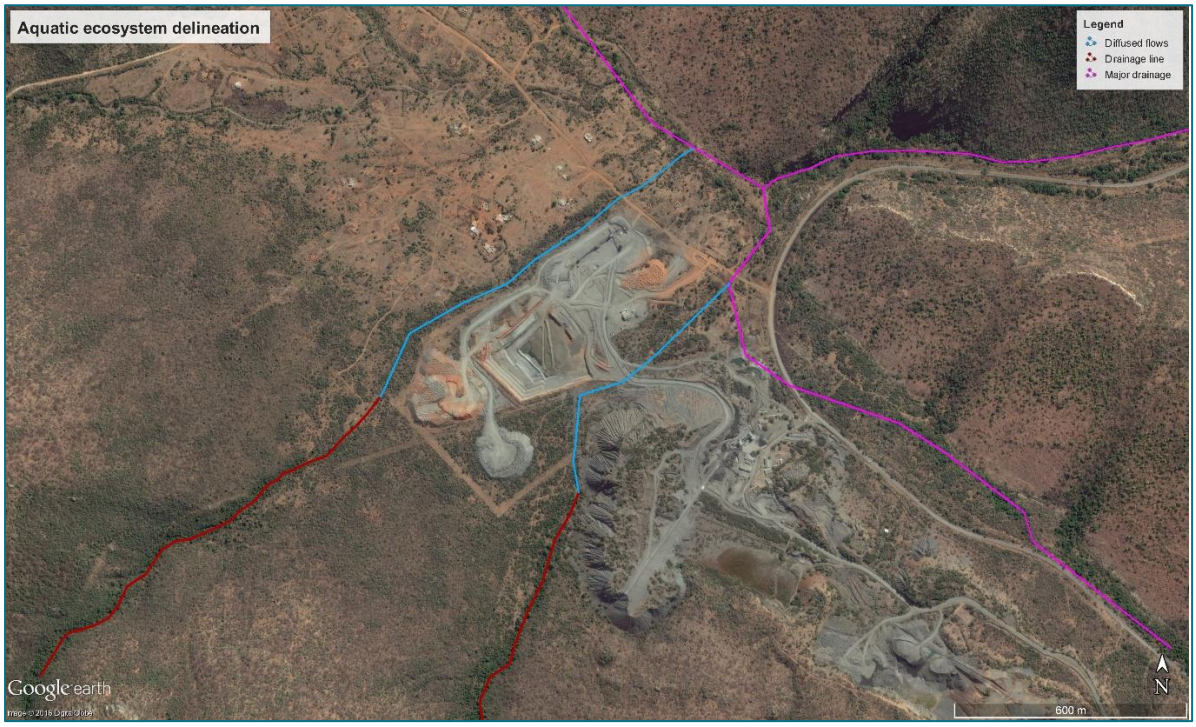


Figure 5: The aquatic ecosystems of the study site (Galago Environmental, 2016)

Due to the impact of the open cast mining, the proposed new activities on site include the diversion of two drainage lines into a single diversion to the east of the open cast mining area (Figure 6). This will remove the northern drainage line and divert water into the major drainage line to the northeast (Figure 7).

The drainage lines found on site only has active flows during high rainfall events in the catchment of the system (expected to be once every 5-20 years) and is ephemeral in nature. No hydrophytes were observed in the drainage lines. Alluvial deposits were however observed in areas with least inclination. Smaller cobbles and rock bubbles with hydric souring and formation was observed in these areas. The channel sinuosity improved with length of the system.

(***NOTE:*** *The diversion of the drainage lines is not part of this application but is included for a complete overview. Furthermore, these drainage lines do not pass-through Quarry 3.*)

Figure 6: The location of the diversion (Galago Environmental, 2016)

Figure 7: The effect of the diversion on the drainage lines (Galago Environmental, 2016)

6.8.2 Wetland indicators as in line with DWA, 2005

With exception of the topographic location of the systems, the wetland indicators necessary for the classification as wetlands were not observed on site.

Wetland (hydromorphic) soils and anaerobic conditions in the soil:
None was observed, mainly due to the low rainfall on the site.

The presence, at least occasionally, of water loving plants (hydrophytes):
Not observed.

Topographical location in relation to the landscape:
The drainage lines are located in a mountainous catchment where geological indentations have created valley bottoms for water to drain.

Open standing water or water near the surface:
Not observed.

6.8.3 Riparian area indicators as in line with DWA, 2005

The drainage lines found on site has some of the characteristics required to classify the system as riparian with one large exception - the lack of large trees and hydrophytes required to classify the area

as riparian. It is in the author's opinion that this, combined with the highly infrequent flows in the system, classifies the aquatic ecosystems of the study site as drainage lines.

Topography associated with the watercourse:
The drainage lines are located in a mountainous catchment where geological indentations have created valley bottoms for water to drain.

Vegetation especially changes in the composition of communities found on site:
Not observed, mainly derivative for the classification as drainage line.

Alluvial soils and deposited materials:
Some were observed in areas but not throughout.

6.8.4 Aquatic ecosystem classification

The classification of the system was done using the dichotomous key in Ollis et al. (2013).

Table 19: Classification of the wetland system

Watercourse	**Level 3**		**Level 4: HGM Unit**			**Level 5**				
	Key 1 Landscape Unit		**Key 2**			**Key 3a River Flow types**		**Key 3b Hydroperiod**		
	Level 3a	Level 3b	Level 4a HGM Type	Level 4b River zonation/ Landform/ Outflow drainage	Level 4c River Flow type	Level 5a	Level 5b	Level 5 a Inundation period	Level 5b Saturation period	Level 5 c Inundation depth class
Drainage line		Saddle						Never/ Rarely inundated	Unknown Saturation period	Unknown depth class

6.8.5 Present Ecological Score and Ecological Importance and Sensitivity

Due to the classification of the system, no methods can be empirically used to determine the Present Ecological Score (PES) of the drainage system.

Ecological Importance and Sensitivity (EIS):
During the site visit, the study area was quiet with no major bird activity. No signs or tracks of animals were observed. The site seemed devoid of life with the exception of dense vegetation and signs of cattle grazing (also old) on the site. It is suspected that poaching and active hunting has eliminated much of the natural fauna in the area. The system is also ephemeral and the lack of water (albeit standing or

flowing) reduces faunal activity in the area. The wetland found within the extended study area can be considered to be of moderate ecological management class. The Recommended Ecological Management Class (REMC) was calculated to be in **Low/ Marginal** condition "Aquatic ecosystems that is not ecologically important and sensitive at any scale. The biodiversity of these floodplains is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers". The Ephemeral hydrology of the system combined with the impact of the open cast mining somewhat isolates the system from the larger hydrological drainage network.

6.8.6 Surface water quality

According to the data contained in the water monitoring reports for Annesley Andalusite Mine from 2020 to present, and using the Department of Water Affairs and Forestry (DWAF) South African Water Quality Guidelines, 1996 Limits:
pH levels were within the limits stipulated, electrical conductivity (EC) was exceeded for samples taken in 2020-03-02 but has since decreased and does not exceed the limits for 2020-06-17. The same trend was observed for Calcium, Magnesium, Suspended Solids and Total Dissolved Solids (TDS), where the values exceeded the DWAF1996 Limit for samples taken in 2020-03-02 but have since decreased to acceptable levels.

6.9 Groundwater

Information for this section was extracted from the Geohydrological Study and Impact Assessment for Backfilling of Quarries at Annesley Mine (Shangoni AquiScience, 2020).

6.9.1 Acid generation capacity

Mineral waste material, mostly from coal and gold mines, contain sulphidic material (mostly pyrite) which may oxidise to produce acid mine drainage (AMD). The result is sulphuric acid generation which acidifies water it comes in contact with. This has several negative consequences and most notably includes the solubilisation of a variety of trace metals and metalloids. A number of factors control the generation of AMD, but the most important are the relative abundance of acid producing minerals (generally the sulphides) and acid consuming minerals (generally carbonates), moisture content/ ingress and exposure to air. As AMD has the potential to impact significantly on surface and groundwater quality, it is necessary to also quantify the potential of waste to generate acid.

Acid-Base Accounting (ABA) is a straightforward test to determine the acid potential of rock. The total acid generating potential (AP) is calculated from the total sulphur content of the rock material. The neutralising potential (NP) of minerals in the material is measured by reacting a finely ground sample of the test material with a measured excess of hydrochloric acid and back-titrating to a selected pH endpoint between 6.0 and 8.3 (to differentiate between the actions of carbonates and silicates). The

balance between the potentially acid consuming and potentially acid generating minerals in the sample is expressed as the net neutralising potential (NNP).

A study conducted by Shangoni in 2014 revealed that the Annesley mineral waste materials generated by the mining activities are non-acid forming. Shangoni concluded that this classification was based on the very high buffer minerals present in the material and virtually no acid generating sulphide minerals.

Table 20: Acid base accounting results for Annesley mineral waste material (from Shangoni, 2014)

Acid – Base Accounting Modified Sobek (EPA-600)	**Sample Identification**			
	Primary Waste	**Overburden**	**Slimes**	**HMS Waste**
Paste pH	7.5	8.0	7.9	8.0
Total Sulphur (%) (LECO)	0.02	0.01	0.02	0.01
Acid Potential (AP) (kg/t)	0.625	0.313	0.625	0.313
Neutralisation Potential (NP)	7.00	2.50	5.50	0.500
Nett Neutralisation Potential (NNP)	6.38	2.19	4.88	0.187
NPR (NP: AP)	11.20	8.00	8.80	1.60
Rock Type	III	III	III	III

If NNP (NP – AP) < 0, the sample has the potential to generate acid

If NNP (NP – AP) > 0, the sample has the potential to neutralise acid produced

As a result of the low acid forming potential and high neutralisation potential, no net acid can be generated from the mineral waste generated by Annesley. The pH is likely to be neutral to slightly alkaline and heavy metal solubilisation will therefore be minimal. The rock type can therefore be classified as a ***Type III*** which is defined as "***non-acid*" forming**.

Table 21: Rock classification

TYPE I	Potentially Acid Forming	Total S(%) > 0.25% and NP:AP ratio 1:1 or less
TYPE II	Intermediate	Total S(%) > 0.25% and NP:AP ratio 1:3 or less
TYPE III	Non-Acid Forming	Total S(%) < 0.25% and NP:AP ratio 1:3 or greater

6.9.2 Hydrogeology

6.9.2.1 Unsaturated zone (vadose zone)

The characteristics of vadose zone vulnerability dominating factors are closely related to the migration and transformation mechanisms of contaminants in the vadose zone, which directly affect the state of the contaminants percolating to the groundwater. The permeability and thickness of the unsaturated zone are some of the main factors determining the infiltration rate, the amount of runoff and consequently the effective recharge percentage of rainfall to the aquifer. The type of material forming the unsaturated zone as well as the permeability and texture will significantly influence the mass

transport of surface contamination to the underlying aquifer(s). Factors like ion exchange, retardation, biodegradation, and dispersion all play a role in the unsaturated zone.

The thickness of the unsaturated zone was determined by subtracting the undisturbed static water levels in the study area from the topography. Water level measurements showed that the depth to water level, and thus the unsaturated zone, generally varies between 6 and 45 mbgl.

6.9.2.2 Saturated zone

Groundwater occurrence favours weathered shale, brecciated, or jointed zones and especially the contact zone between intrusive diabase sheets and shale. These contact zones would usually act as targets for groundwater exploration.

The water-bearing properties of the shale formations are generally more favourable than those of the quartzites due to their greater susceptibility to weathering. The quartzites do, however, constitute productive aquifers where these rocks are fractured and especially in the presence of ferrugination. Lesser and/ or more isolated groundwater occurrences are associated with fault and associated shear zones and with contact zones between diabase sills, dykes, shale, and quartzite. Water may also occur in occasional joints and fractures in fresh diabase.

Annesley is located in a d3 aquifer class region. The groundwater yield potential is classed as low to medium on the basis that most of the boreholes on record in vicinity of the study area produce between 0.5 and 2.0 l/s. Higher yields do sporadically occur where groundwater is tapped from good water yielding fractures.

Typical characteristics of the saturated aquifer are:

- It is present as either confined or semi-confined aquifers. In the former instance, the aquifer is overlain by sediments (clay) or rock (dolerite, shale, etc) of a confining nature, thus limiting direct recharge from rainfall.
- Aquifers in the study area typically have a low hydraulic conductivity but are known to be highly heterogeneous with yields ranging from 0.5 up to 5 L/s. Higher yields are typically associated with higher hydraulic conductivities along contact zones with intrusive rocks.
- The contact zones of dolerite dykes with the host rock provide preferential flow paths, while the dolerite itself is rather impermeable or semi-permeable (hydraulic conductivity of 0.00086 m/d or $1x10^{-8}$ m/s). This setting promotes groundwater flow along, but not across dykes or sills.
- Depending on the residence time of the water in the aquifer, groundwater quality can be good to moderate.
- Recharge from rainfall is generally low and averages between 2.5 to 5% of the annual rainfall.
- Characteristics of the aquifer vary greatly over short distances.

- Contaminant transport through fracture flow aquifers is comparatively fast.
- There is hardly any attenuation of pollutants in the fractures.

6.9.2.3 Hydraulic conductivity

Three (3) boreholes were subjected to aquifer falling head tests to determine the hydraulic conductivity (K) of the aquifer in vicinity of the study area. The methodology used is discussed in detail under Section 4.5.1 of the original report. The results are displayed in Table 22 below and falling head curves can be viewed in Appendix B of the original report.

The K-values determined indicate that the aquifer/s in the vicinity have relatively low permeabilities with values ranging between 0.014 and 0.57 m/d, the former recorded for *ANBHChief* and the latter for the community borehole, *HBH02*.

Table 22: Borehole information and aquifer test results

Model	Borehole ID	Latitude	Longitude	SWL (mbs)	Borehole Depth (m)	Early K (m/d)	Late K- (m/d)
Aqtesolv	ANBH Chief	-24.38843	30.24434	24.06	89	0.014	-
Aqtesolv	ANBH Mine 3	-24.38794	30.24434	26.13	100.30	0.092	0.047
Aqtesolv	HBH02	-24.42537	30.28087	45.10	88.45	0.57	0.44

mbs – meters below surface

6.9.3 Groundwater levels

Groundwater levels were measured during the hydrocensus survey that was conducted in August 2020. Groundwater levels including other details captured can be viewed in Table 23 below.

Due to the mountainous terrain, borehole distribution is sparse. Seven boreholes were surveyed during August 2020, one fountain, Penge Shaft and four Quarries. Five of the boreholes surveyed (*ANW 02, ANBH Mine, ANBH Mine 2, ANBH Chief and ANBH Mine 3*) are owned by Annesley. Four (4) of these are unequipped and used for monitoring purposes while one is equipped and used for water supply to change house and workshop on the mine.

Two boreholes belong to the community (*HBH01* and *HBH02*). One, *HBH02,* used to supply water to the school but is currently unequipped while the other, HBH01 is equipped but not in working order.

Other localities surveyed include one fountain, Penge Shaft and 4 Quarries - Segorong Quarry 1 (SW01), Quarry 7 (SW02), Quarry 3 (SW03) and Segorong Quarry 2 (SW04).

All borehole water levels recorded were static. The water level of *ANW 02*, the borehole supplying water to the mine, could not be measured due to an obstruction. Large ranges were recorded – the shallowest being 6.70 meters below surface (mbs) and the deepest 45.20 mbs for *HBH02*, the borehole at the community school. Penge Shaft measured a water level of 86 mbs.

A map showing the positions of the localities surveyed can be viewed in Figure 8.

Table 23: Hydrocensus information (survey conducted 5-6 August 2020)

Borehole ID	Coordinates		Type	SWL (m)	Elevation (mamsl)	Application	Owner	Equipped
Groundwater/fountain								
ANBH Penge	-24.383510	30.280190	Shaft	86.00	688	Water supply - Plant	Annesley	Yes - submersible
ANW 02	-24.394860	30.255470	Borehole	obstructed	788	Water supply - Change house & workshop	Annesley	Yes - submersible
ANBH Mine	-24.393880	30.254360	Borehole	8.79	782	Monitoring	Annesley	No
ANBH Mine2	-24.393810	30.254400	Borehole	6.70	781	Monitoring	Annesley	No
ANBH Chief	-24.388430	30.244340	Borehole	24.06	792	Monitoring	Annesley	No
ANBH Mine 3	-24.387940	30.238650	Borehole	26.13	813	Monitoring	Annesley	No
HBH01	-24.424060	30.283780	Borehole	27.06	883	Water Supply	Community	Yes- Submersible – not in functional condition
HBH02	-24.425370	30.280870	Borehole	45.20	893	Water supply	School	No
ANW01	-24.442450	30.276600	Fountain	-	1022	Monitoring	Annesley	No
Surface water								
SW01	-24.391810	30.246670	Segorong Quarry 1	-	-	Rehabilitation (backfill)	Annesley	N/A
SW02	-24.421930	30.271160	Quarry 7	-	-	Rehabilitation (backfill)	Annesley	N/A
SW03	-24.402370	30.260760	Quarry 3	-	-	Water storage	Annesley	N/A
SW04	-24.389240	30.243350	Segorong Quarry 2	-	-	Mining	Annesley	N/A

N/A – not applicable

mamsl – meters above mean sea level

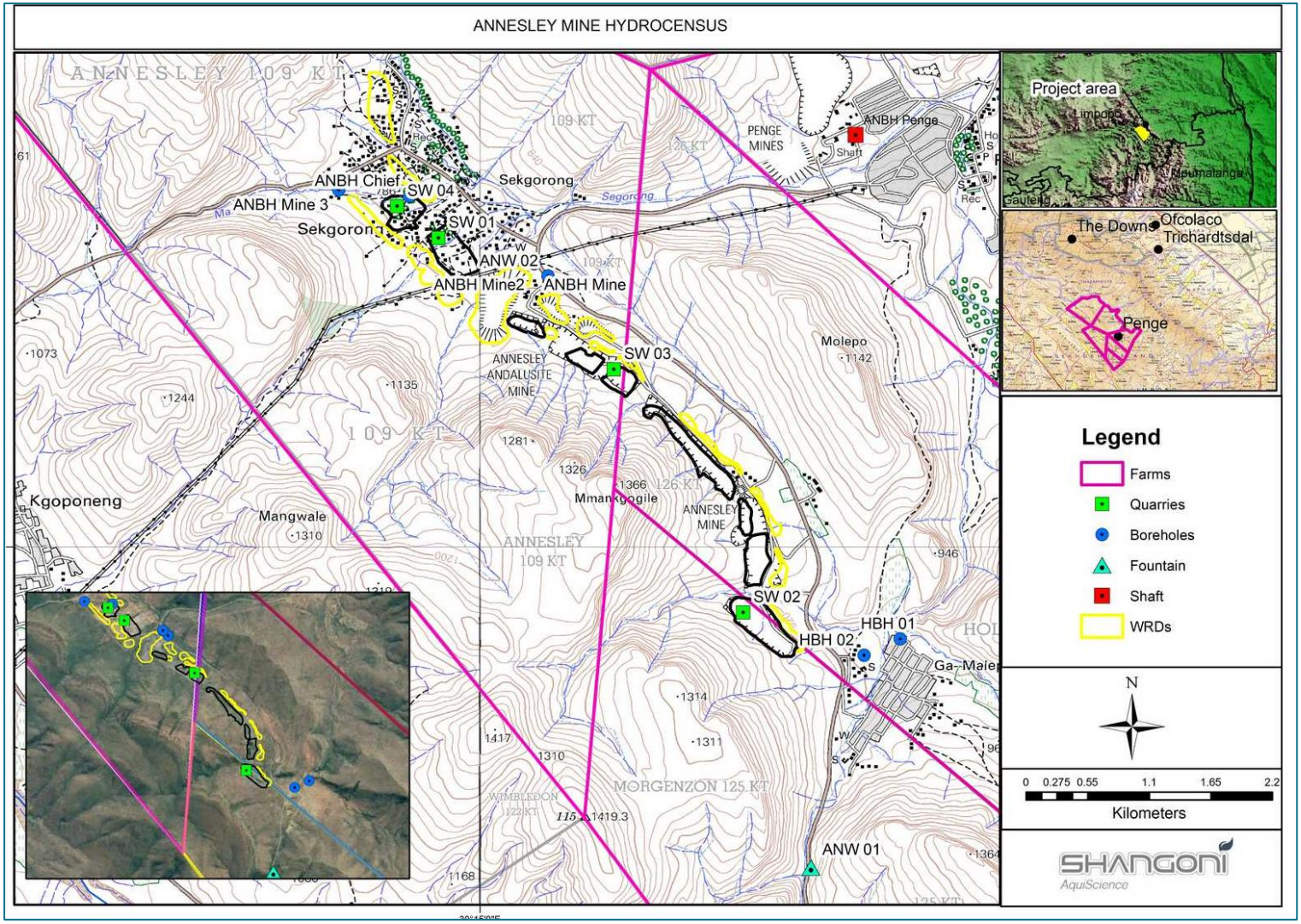


Figure 8: Hydrocensus locality map (Shangoni AquiScience, 2020).

Figure 9 shows linear regressions between the hydraulic heads of the deeper fractured aquifers and topography. Generally, a good relationship exists between topography and static hydraulic heads. This relationship can be used to distinguish between boreholes with natural unaffected water levels (*static*), or boreholes with anomalous groundwater levels due to disturbances such as pumping or seepage. A fair correlation of 0.91 was achieved for the hydraulic heads and the topography. However, Penge Shaft obviously does not represent a natural groundwater level and was removed from the regression, and a better correlation of 0.96 was achieved. Although it is assumed that groundwater flow patterns will mimic surface topography within the area, some unnatural deviations still exist.

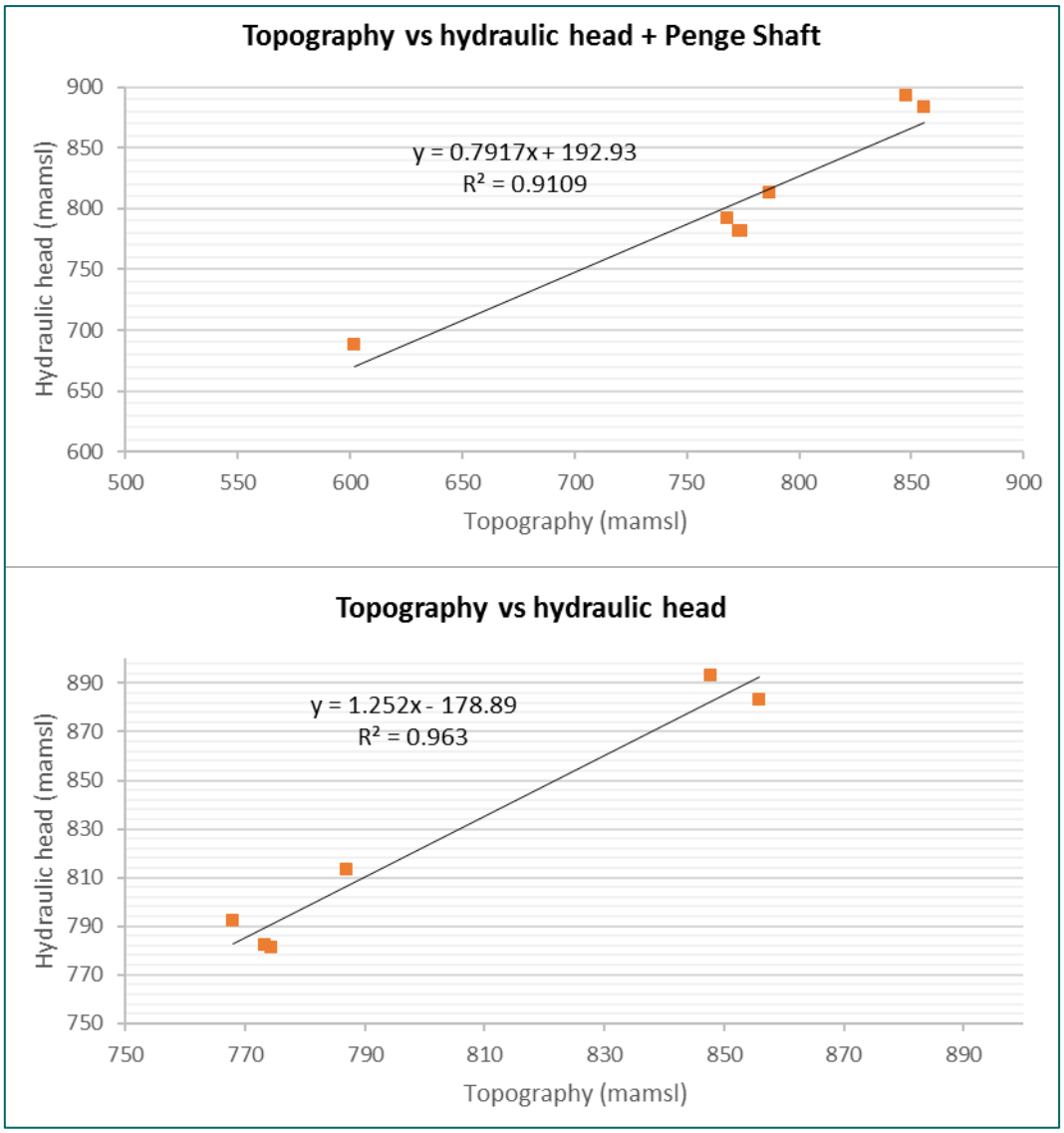


Figure 9: Linear regression between topography and hydraulic heads with suspected unnatural levels (A) and removed (B)

6.9.4 Groundwater potential contaminants

6.9.4.1 Geochemical assessments

Shangoni (2012) and Aquatico (2018) performed geochemical assessments on waste rock and tailings for classification purposes, and to identify contaminants of concerns. Shangoni also did an acid potential study to investigate acid generating tendencies of the mineral waste material. Based on the ABA study, it was concluded that the mineral waste materials are *non-acid generating* (refer to Section 5.2 of the original report).

Whole elemental analyses did reveal certain trace and major metals to be raised but due to the non-acid potentials and high neutralisation potentials, metals will remain in non-soluble state. Both these studies identified certain major ions and metals such as sulphate (SO_4), chloride (Cl), sodium (Na), fluoride (F) and manganese to be potential contaminants of concern (CoC) but with low risk potentials.

6.9.4.2 Wastewater quality

An assessment of the hydrochemistry of wastewater produced is another way to evaluate the CoCs within a mining environment.

Water is pumped from Penge Shaft into Quarry 3, and from there water is pumped to the plant for use as process water. Runoff from the plant and the site are directed into the PCD (emergency dam). Hydrochemical assessment of these wastewater sources may provide a good indirect estimation of the potential CoCs and risks posed towards groundwater.

Water quality for the PCD was supplied by the client and water from Quarry 3 and Penge Shaft was sampled and analysed during the 2020 hydrocensus. The data can be viewed in Table 24 and a Stiff diagram based on the dataset in Figure 10. *Note that the evaluation based on the SANS drinking water standards is solely for reference purposes and does not imply any non-compliances or usage suggestions.*

Table 24: Wastewater quality at Annesley Mine (August 2020)

Locality / Guideline / **Parameter**	**Unit**	**Domestic use SANS 241(1)**	**Quarry 3**	**PCD**	**Penge Shaft**
			Aug'20	**Jan'20**	**Aug'20**
pH	-	5 - 9.7	7.90	7.70	7.10
EC	mS/m	≤170	**239**	**295**	**246**
TDS	mg/l	1200	**1602**	**1925**	**1569**
Calcium (Ca)	mg/l		136	111	151
Magnesium (Mg)	mg/l	-	151	124	134
Sodium (Na)	mg/l	200	**216**	**269**	196
Potassium (K)	mg/l	-	8.9	3.1	46.3
Total alkalinity (MALK)	mg/l	-	234	212	363
Chloride (Cl)	mg/l	300	**436**	**312**	**385**
Sulphate (SO_4)	mg/l	500	**513**	473	437
Nitrate as N (NO_3-N)	mg N/l	11	<0.35	0.020	<0.35
Total ammonia (NH_3-N)	mg N/l	1.5	<0.45	-	<0.45
Phosphate (PO_4-P)	mg P/l	-	<0.03	0.020	<0.03
Fluoride (F)	mg/l	1.5	0.49	0.050	0.16
Aluminium (Al)	mg/l	0.30	<0.01	0.030	0.070
Iron (Fe)	mg/l	2	<0.01	0.002	<0.01
Manganese (Mn)	mg/l	0.5	0.040	0.005	**1.25**
Chromium (Cr)	mg/l	0.05	<0.01	-	<0.01
Copper (Cu)	mg/l	2.0	<0.01	-	<0.01
Nickel (Ni)	mg/l	0.070	<0.01	-	<0.01
Zinc (Zn)	mg/l	5.0	<0.01	-	<0.01
Total Hardness	mg $CaCO_3$/l	-	961	785	929

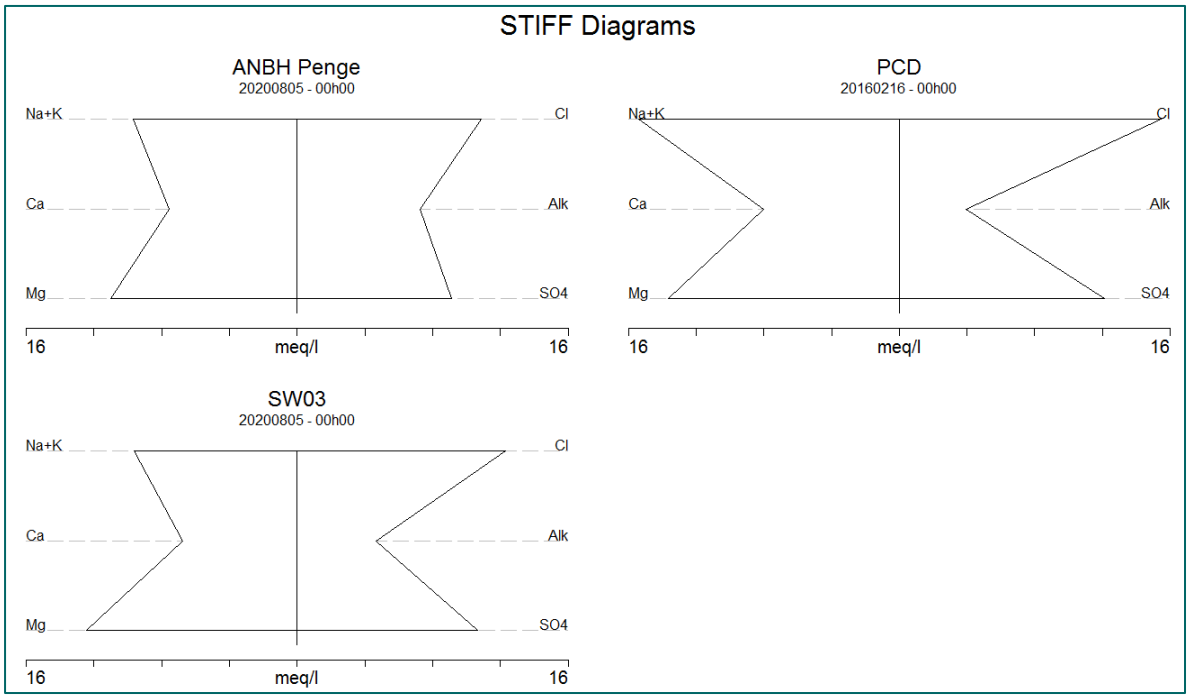


Figure 10: Stiff diagrams displaying major ions of wastewater at Annesley in meq/l

Based on Table 24 and Figure 10 the following:

- Similar chemical profiles exist for the wastewater with the PCD and Quarry 3 showing signs of evaporations not evident in Penge Shaft.
- The water is circum-neutral and extremely hard with raised EC/TDS.
- Raised salinity is largely attributed by Cl, SO_4 and Na and to lesser extents by Ca and Mg.
- Except for Mn in Penge Shaft, all trace metals recorded in low to undetected levels.
- EC/TDS, Cl, Na, SO_4 and Mn (only for Penge Shaft) exceed SANS drinking water standards (evaluation according to domestic standards is used for reference purposes only).

6.9.5 Groundwater quality

During the hydrocensus (refer to sections 4.2 and 5.4 of the original report), samples were taken from boreholes and surface water and analysed for hydrochemical quality. The hydrochemical data is displayed in Tables 25 (groundwater) and 26 (surface water), while interpretation based on hydrogeochemical Stiff diagrams and a Piper diagram can be viewed in Figures 11 and 12, respectively. A map showing spatial TDS data as analysed in 2020 for the hydrocensus localities, is shown in Figure 13 below.

Based on the data in Tables 25 and 26, the following:

- The pH levels of groundwater from the boreholes and Penge Shaft are circum-neutral ranging between 7.10 and 7.30.

- EC and TDS are raised in groundwater from Penge Shaft as well as in boreholes ANW02, ANBH Mine and ANBH Mine 2.
- Groundwater ranges from hard to very hard between 294 and 1275 mg/l with an average of 632 mg/l. Scaling of hot water appliances may expected at these concentrations.
- Nitrate (NO_3), total ammonia (NH_3) and phosphate (PO_4) in ground- and surface water remain low to undetected.
- Trace metals recorded in low to very low concentrations except for Mn in Penge Shaft, which recorded a concentration of 1.25 mg/l.
- Penge Shaft, ANW02, ANBH Mine, ANBH Mine 2 and Quarry 3 display similar water quality profiles.

Based on the hydrogeochemical diagrams in Figures 11, 12 and 13, the following:

- Four distinct groundwater types can be distinguished, Na(Mg)-Cl(SO_4), Na-Cl, Na-HCO_3 and Mg(Ca)-HCO_3.
- *Penge Shaft, ANW02, ANBH Mine, ANBH Mine 2 and Quarry 3* display Na(Mg)-Cl(SO_4) water types and plot in the top half of the diamond shaped quadrant. This profile is typical of mine impacted water that has undergone significant ion exchange, especially with SO_4, Cl, Na and Mg ions.
- One sample, Segorong Quarry 1 (*SW01*) display a Na-Cl(HCO_3) type, representing a Na(Mg)-Cl(SO_4) water that has mixed with water rich in Na or that has an evaporative signature.
- Quarry 7 (*SW02*) plot in the bottom left quadrant which is typical of fresh water that has undergone Na ion exchange.
- The remaining samples are Mg-HCO_3 types representing fresh, clean, relatively young water that has started to undergo Mg ion exchange.
- The spatial TDS map shows higher TDS levels for the boreholes ANW02, ANBH Mine and ANBH Mine 2, as well as for water from Penge Shaft and water contained in Quarry 3 (*SW03*).

Table 25: Groundwater quality results

Locality / Guideline Parameter	Unit	Domestic use SANS 241(1)[a]	ANBH Penge	ANW02	ANBH Mine	ANBH Mine 2	ANBH Chief	ANBH Mine 3	HBH01	HBH02
pH	-	5 - 9.7	7.10	7.10	7.10	7.10	7.30	7.00	7.10	7.30
EC	mS/m	≤170	246	369	164	319	87	62	105	84
TDS	mg/l	1200	1569	2479	1074	2184	481	317	622	445
Calcium (Ca)	mg/l	-	151	225	132	205	54	42	74	43
Magnesium (Mg)	mg/l	-	134	173	51	143	45	33	43	46
Sodium (Na)	mg/l	200	196	359	171	328	60	30	90	70
Potassium (K)	mg/l	-	46.3	11.9	6.6	13.7	5.6	2.5	4.3	2.3
Total alkalinity (MALK)	mg/l	-	363	421	208	361	365	238	417	380
Chloride (Cl)	mg/l	300	385	631	266	554	67	43	71	42
Sulphate (SO_4)	mg/l	500	437	819	322	718	17.3	25	21	11.0
Nitrate as N (NO_3-N)	mg/l	11	<0.35	1.43	<0.35	0.640	2.72	<0.35	15.6	0.67
Total ammonia (NH_3-N + NH_4-N)	mg/l	1.5	<0.45	<0.45	<0.45	<0.45	0.88	<0.45	<0.45	<0.45
Ortho-phosphate (PO_4)	mg/l	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Fluoride (F)	mg/l	1.5	0.16	0.44	0.55	0.55	0.10	0.12	0.17	0.22
Aluminium (Al)	mg/l	0.3	0.070	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron (Fe)	mg/l	2	<0.01	<0.01	0.040	<0.01	<0.01	0.010	<0.01	0.010
Manganese (Mn)	mg/l	0.5	1.25	0.050	0.070	0.13	0.16	0.040	<0.01	<0.01
Chromium (Cr)		0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (Cu)		2.0	<0.01	0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Nickel (Ni)		0.070	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (Zn)		5.0	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01

Locality / Guideline Parameter	Unit	Domestic use SANS 241(1)[a]	ANBH Penge	ANW02	ANBH Mine	ANBH Mine 2	ANBH Chief	ANBH Mine 3	HBH01	HBH02
Total Hardness	mg/l	-	929	1275	539	1103	319	238	361	294
[a] SANS 241: 2011										

Table 26: Surface water quality results

Locality / Guideline Parameter	Unit	Domestic use SANS 241(1)[a]	ANW01 (Fountain)	SW01 (Segorong Quarry 1)	SW02 (Quarry 7)	SW03 (Quarry 3)	SW04 (Segorong Quarry)
pH	-	5 - 9.7	6.46	8.33	7.71	7.91	8.34
EC	mS/m	≤170	4.8	71.7	58.8	239	81.4
TDS	mg/l	1200	25	384	316	1601	476
Calcium (Ca)	mg/l	-	3.6	10.9	21	136	29
Magnesium (Mg)	mg/l	-	1.82	13.7	23	151	37
Sodium (Na)	mg/l	200	2.85	117	72	216	99
Potassium (K)	mg/l	-	0.71	1.09	5.59	8.94	3.35
Total alkalinity (MALK)	mg/l	-	13.6	125	277	234	331
Chloride (Cl)	mg/l	300	5.70	92	24	436	45
Sulphate (SO_4)	mg/l	500	2.05	74	5	513	63
Nitrate as N (NO_3-N)	mg/l	11	<0.35	<0.35	<0.35	<0.35	<0.35
Total ammonia (NH_3-N + NH_4-N)	mg/l	1.5	<0.45	<0.45	<0.45	<0.45	<0.45
Ortho-phosphate (PO_4)	mg/l	-	<0.03	<0.03	<0.03	<0.03	<0.03
Fluoride (F)	mg/l	1.5	0.11	0.90	0.82	0.49	0.53
Aluminium (Al)	mg/l	0.3	0.030	0.090	<0.01	<0.01	<0.01
Iron (Fe)	mg/l	2	0.040	0.039	<0.01	<0.01	0.010

Locality / Guideline Parameter	Unit	Domestic use SANS 241(1)[a]	ANW01 (Fountain)	SW01 (Segorong Quarry 1)	SW02 (Quarry 7)	SW03 (Quarry 3)	SW04 (Segorong Quarry)
Manganese (Mn)	mg/l	0.5	0.010	<0.01	<0.01	0.040	<0.01
Chromium (Cr)		0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (Cu)		2.0	<0.01	<0.01	0.01	<0.01	<0.01
Nickel (Ni)		0.070	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (Zn)		5.0	<0.01	<0.01	<0.01	<0.01	<0.01
Total Hardness	mg/l	-	16.4	84	148	961	226
[a] SANS 241: 2011							

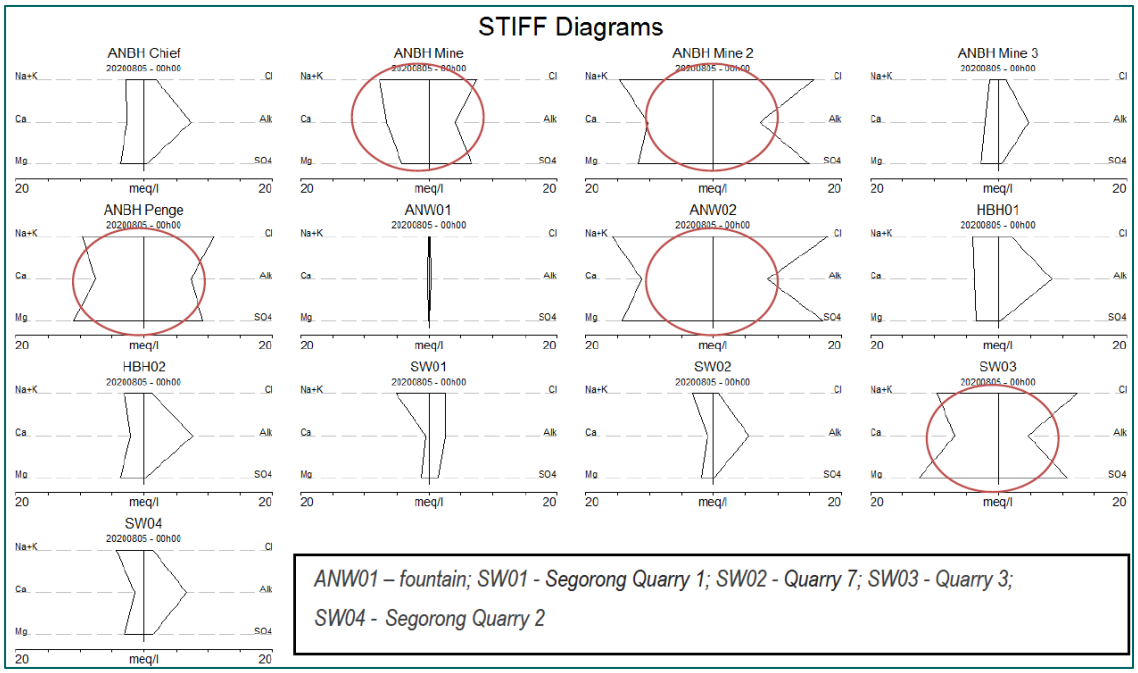


Figure 11: Stiff Diagrams based on meq/l

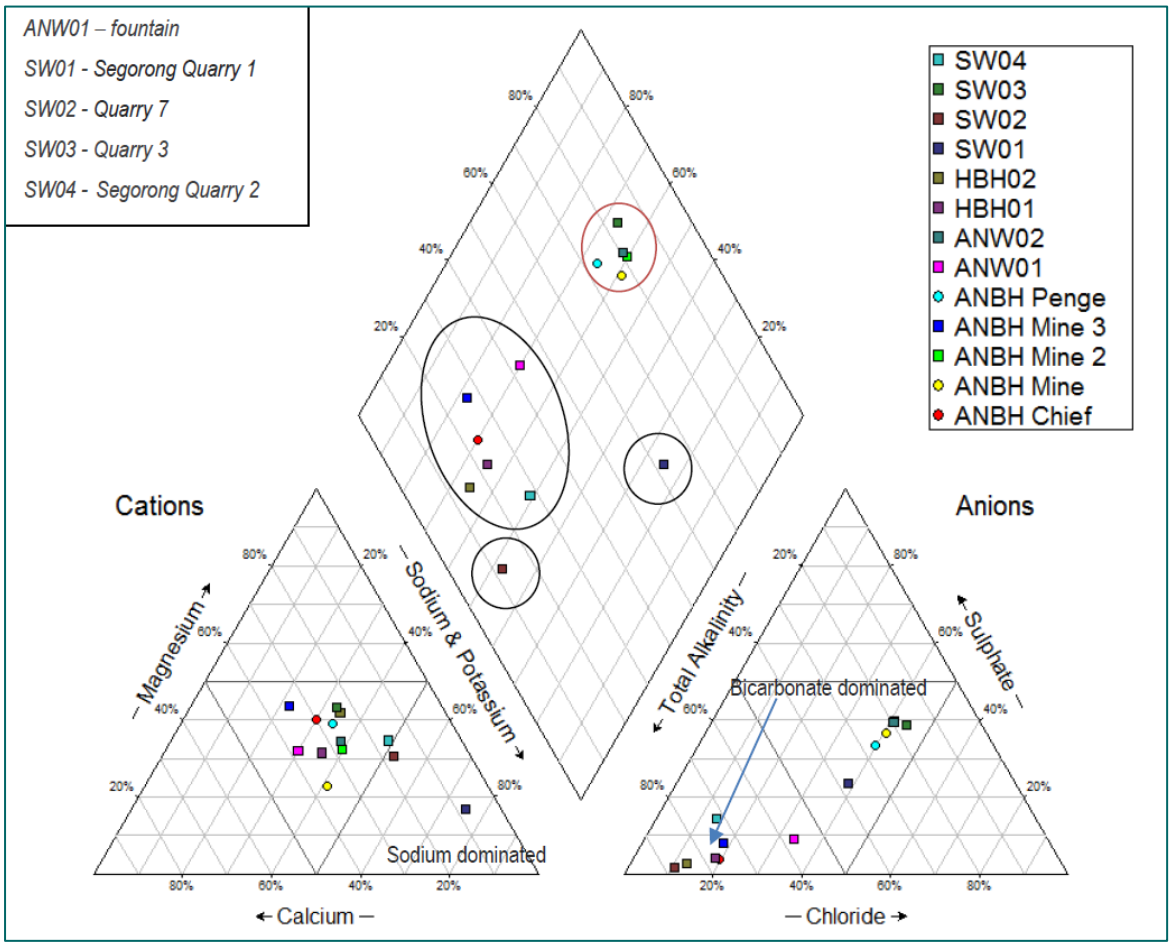


Figure 12: Piper diagram based on relative meq/l

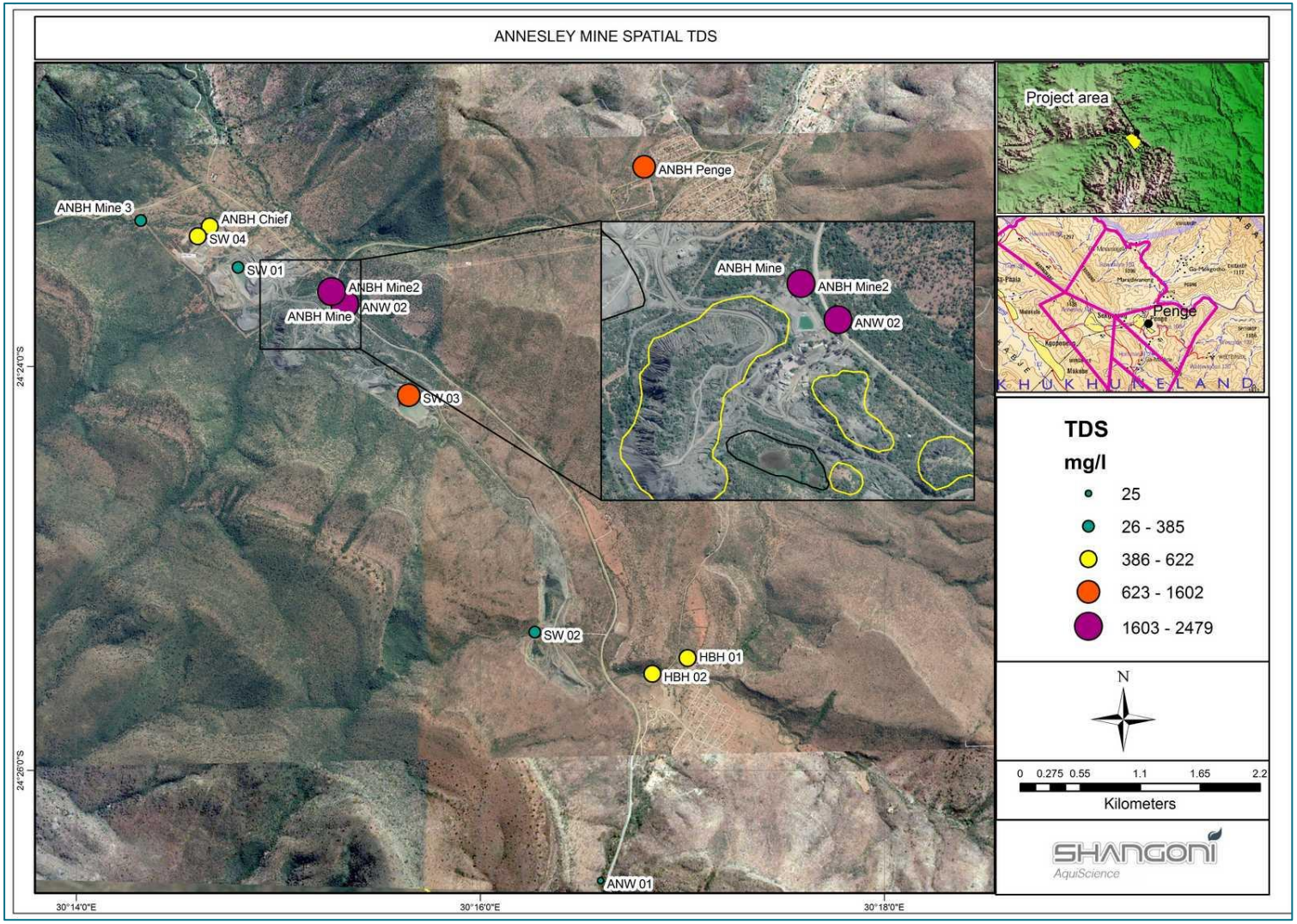


Figure 13: Spatial TDS (Shangoni AquiScience, 2020)

6.9.6 Aquifer characterisation

6.9.6.1 Aquifer vulnerability

Table 27 summarises the rating and weighting values and the final score for the vulnerability of the aquifer in vicinity of Annesley Mine. The final DRASTIC score of 101 indicates that the aquifer/s in the region has a medium susceptibility to pollution. It must be noted that the values are based on averages. Because of this together with the typical heterogeneity of fractured rock aquifers, the vulnerability should therefore be viewed as a worst-case scenario. Refer to the *Aquifer Protection Classification* in Section 6.3 of the original report for the *Groundwater Quality Management Index* and aquifer protection required.

Table 27: DRASTIC vulnerability scores

Factor	Range/Type	Weight	Rating	Total
D	15 - 30 m	5	3	25
R	10 - 50 mm	4	6	24
A	Fractured	3	6	18
S	Loamy sand	2	7	14
T	0-2%	1	10	10
I	Pretoria	5	4	20
C	-	3	-	-
DRASTIC SCORE = 101				

6.9.6.2 Aquifer classification

The DWS has characterised South African aquifers based on the rock formations in which they occur together with its capacity to transmit water to boreholes drilled into specific formations. The water bearing properties of rock formations in South Africa can be classified into four classes defined as:

1. **Class a - Intergranular**
    - Aquifers associated either with loose and unconsolidated formations such as sands and gravels or with rock that has weathered to only partially consolidated material.
2. **Class b - Fractured**
    - Aquifers associated with hard and compact rock formations in which fractures, fissures and/or joints occur that are capable of both storing and transmitting water in useful quantities.
3. **Class c - Karst**
    - Aquifers associated with carbonate rocks such as limestone and dolomite in which groundwater is predominantly stored in and transmitted through cavities that can develop in these rocks.
4. **Class d - Intergranular and fractured**
    - Aquifers that represent a combination of Class a and b aquifer types. This is a common characteristic of South African aquifers. Substantial quantities of water are stored in

the intergranular voids of weathered rock but can only be tapped via fractures penetrated by boreholes drilled into the fractured aquifer.

The classes are further subdivided into groups relating to the capacity of an aquifer to transmit water to boreholes, typically measured in l/s. The groups therefore represent various ranges of borehole yields.

The current operations at Annesley are in a **d3 aquifer class** region (Figure 14) with the geology listed as mostly undifferentiated rocks of mixed lithologies (shale with hornfels and carbonate layers in places) and pyroclastic rock such as tuff and agglomerate.

The groundwater yield potential is classed as moderate on the basis that most of the boreholes on record for the study area produce between 0.5 and 2.0 l/s. Groundwater should be targeted in vicinity of dolerite dykes or within fault areas where groundwater is held in good water yielding fractures.

The general groundwater occurrences for the Annesley area occur in joints and fractures in competent arenaceous rocks related to tensional or compressional stresses and off-loading, and good yields can be expected in vicinity of dolerite dykes and/ or faults. The hydrogeology of the region is defined as secondary fractured meta-sedimentary with the main sources of groundwater found in fractures, bedding planes, joints and faults and sometimes limited to weathered material. The aquifer formed is as a result of fracturing in sedimentary rocks caused by intrusions and / or metamorphosis to various degrees of the host rock/s (Figure 15).

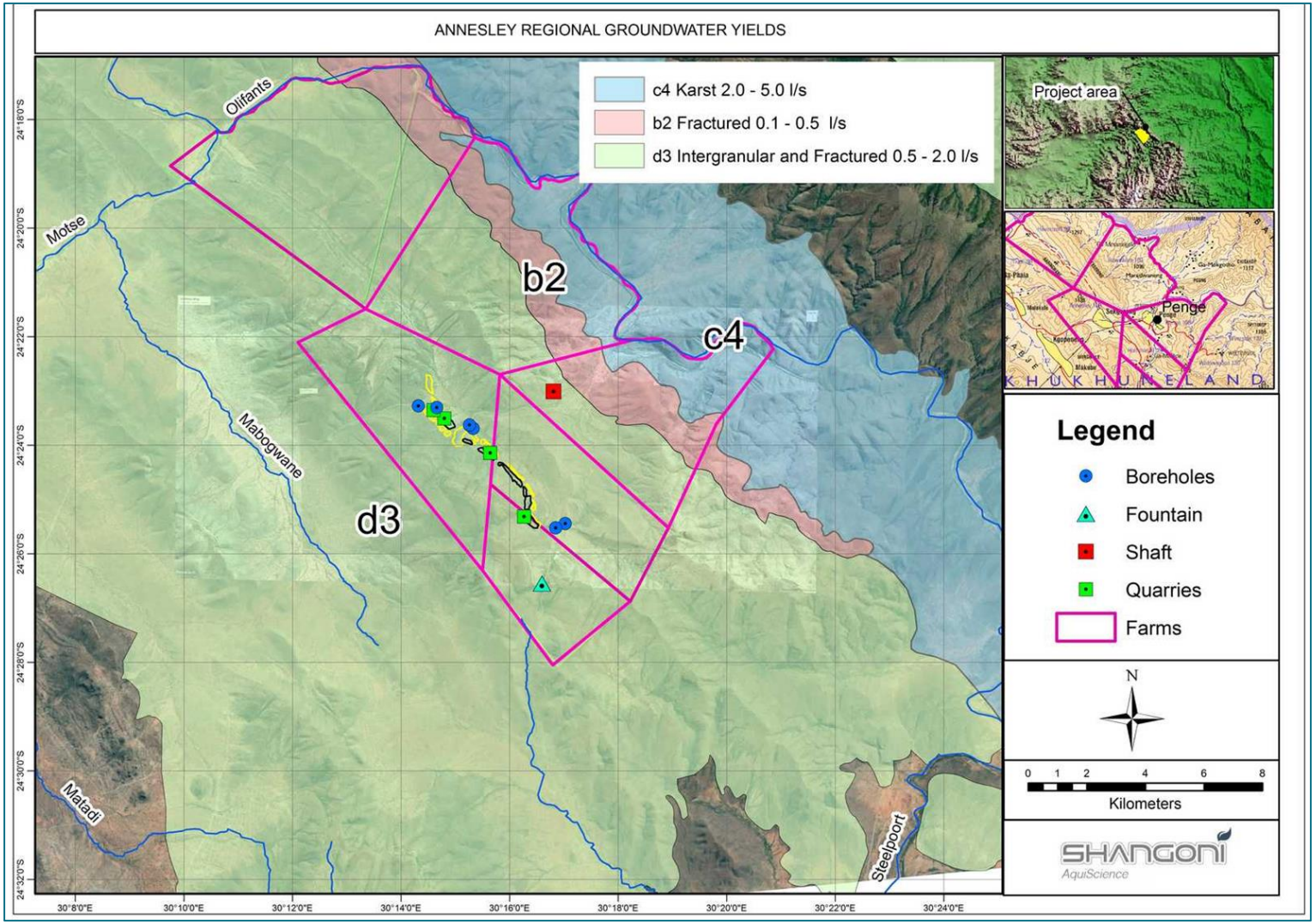
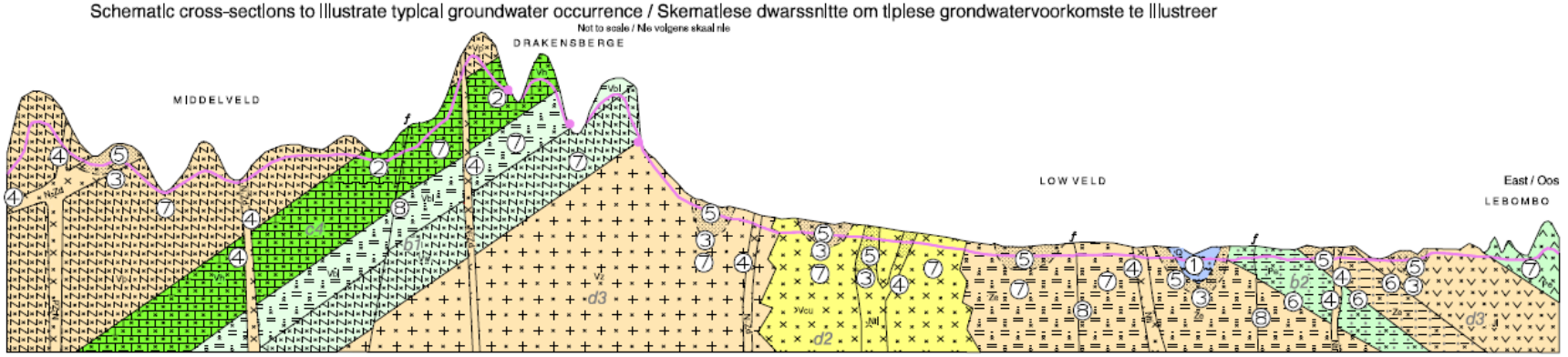


Figure 14: Typical groundwater occurrences in the study area (Shangoni AquiScience, 2020)



Typical groundwater occurrence	
1	Saturated unconsolidated alluvial deposits mainly occurring along river systems
2	Solution channels and fractures occurring in the carbonate rocks of the Chuniespoort dolomites
3	Fractured transitional zone between weathered and un-weathered bedrock
4	Fractures along the contact zone related to heating and cooling of host rock caused by the intrusion of dykes and sills
5	Basins of weathering occurring mostly in the crystalline rocks
6	Along sedimentary or sedimentary / igneous rock contacts
7	Fractures related to tensional or compressional stresses and / or off-loading
8	Faults or shear zones

Figure 15: Schematic cross section illustrating the typical groundwater occurrences for the study region (Shangoni AquiScience, 2020)

6.9.6.3 Aquifer protection classification

In order to achieve the Groundwater Quality Management Index a point scoring system as presented in tables 28 – 30 were used.

Table 28: Ratings for the Aquifer System Management and Second Variable Classifications

Aquifer System Management Classification		
Class	Points	Study Area
Sole Source Aquifer System	6	
Major Aquifer System	4	
Minor Aquifer System	2	2
Non-Aquifer System	0	
Special Aquifer System	0-6	
Second Variable Classification (fractured)		
High	3	
Medium	2	2
Low	1	

Table 29: Ratings for the Groundwater Quality Management (GQM) Classification System

Aquifer System Management Classification		
Class	Points	Study Area
Sole Source Aquifer System	6	
Major Aquifer System	4	
Minor Aquifer System	2	2
Non-Aquifer System	0	
Special Aquifer System	0-6	
Second Variable Classification		
High	3	
Medium	2	2
Low	1	

The occurring aquifer, in terms of the above definitions, is classified as a minor aquifer system. The vulnerability, or the tendency or likelihood for contamination to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer is classified as medium. The level of groundwater protection based on the Groundwater Quality Management Classification is shown in Table 30:

Table 30: GQM index for the study area

GQM Index	**Level of Protection**	**Study Area**
<1	Limited	
1-3	Low level	

GQM Index	Level of Protection	Study Area
3-6	Medium level	4
6-10	High level	
>10	Strictly non-degradation	

The ratings for the Aquifer System Management Classification and Aquifer Vulnerability Classification yield a GQM index of 4 for the study area, indicating that medium level groundwater protection is required to adhere to water quality objectives set by DWS. Reasonable and sound groundwater protection measures are recommended to ensure that no cumulative pollution affects the aquifer, during short- and long-term. DWS's water quality management objectives are to protect human health and the environment. Therefore, the significance of this aquifer classification is that if any potential risk exists, measures must be taken to limit the risk to the environment, which in this case is the protection of the underlying aquifer.

6.10 Air quality

Information for this section was extracted from the 'Draft Final Air Quality Management Plan' (LWI, 2008):

The main activity in the Burgersfort, Steelpoort and Ohrigstad areas is the mining of chrome and platinum. There are also three chrome smelters in the area. Therefore, the area is likely to have air pollutants such as sulphur dioxide, nitrous oxides, chromium (VI) and particulate matter. Heavy traffic also occurs in the area due to the transportation of minerals which introduces a lot of pollution from the vehicles. Other pollutants such as pesticides can also emanate from the farms around Ohrigstad, the extent of which has not yet been determined.

The mine itself is situated in a rural area. There are no direct activities within the area surrounding the mine that would cause significant air pollution.

6.11 Environmental noise

Information for this section was extracted from the 'Approved EMP' (nd, nd):

No baseline values were determined as the area is classified as rural and the statutory requirement for such areas is known to be 45dB. The only source of noise beyond the boundaries of the mine is expected to be low volume traffic noise from public roads.

6.12 Visual aspects

There is no specialist study done for visual aspects. Based on observations made during site visits Annesley Mine Operation is only visible from the Penge access road, adjacent to the mine.

6.13 Cultural and heritage resources

Information for this section was extracted from the Approved EMP (Shangoni Management Services, 2006), and the EMP PAR (BECS Environmental, 2015):

Malepe Tribal Authority grave sites are situated in the proposed mining area. According to the Cultural Resources Survey done by the National Cultural History Museum in August 2001 there are a total of 353 graves. These graves are not yet removed.

Some tools dating to the Early and Middle Stone Age were found within the boundaries of Segorong village but are of low archaeological significance.

No archaeological site dating to the Iron Age was identified in the area of the mining area.

6.14 Sensitive landscapes

The mine is located in an area described as Critical Biodiversity Area 1 as per the Limpopo Conservation Plan, however the mine itself is described as an Ecological Support Area as per the Limpopo Conservation Plan (SANBIGIS). The mine area falls within the Sekhukune Norite Bushveld vegetation unit which is an Endangered ecosystem as per NEMBA. The mine falls within a 'High biodiversity importance - high risk to mining' according to the Mining and Biodiversity Guidelines. Refer to Figure 4 (above) and Figures 16, 17 and 18 below for the sensitive landscapes.

The mine already consists of disturbed areas and the proposed expansion of Quarry 3 will take place in an already disturbed area.

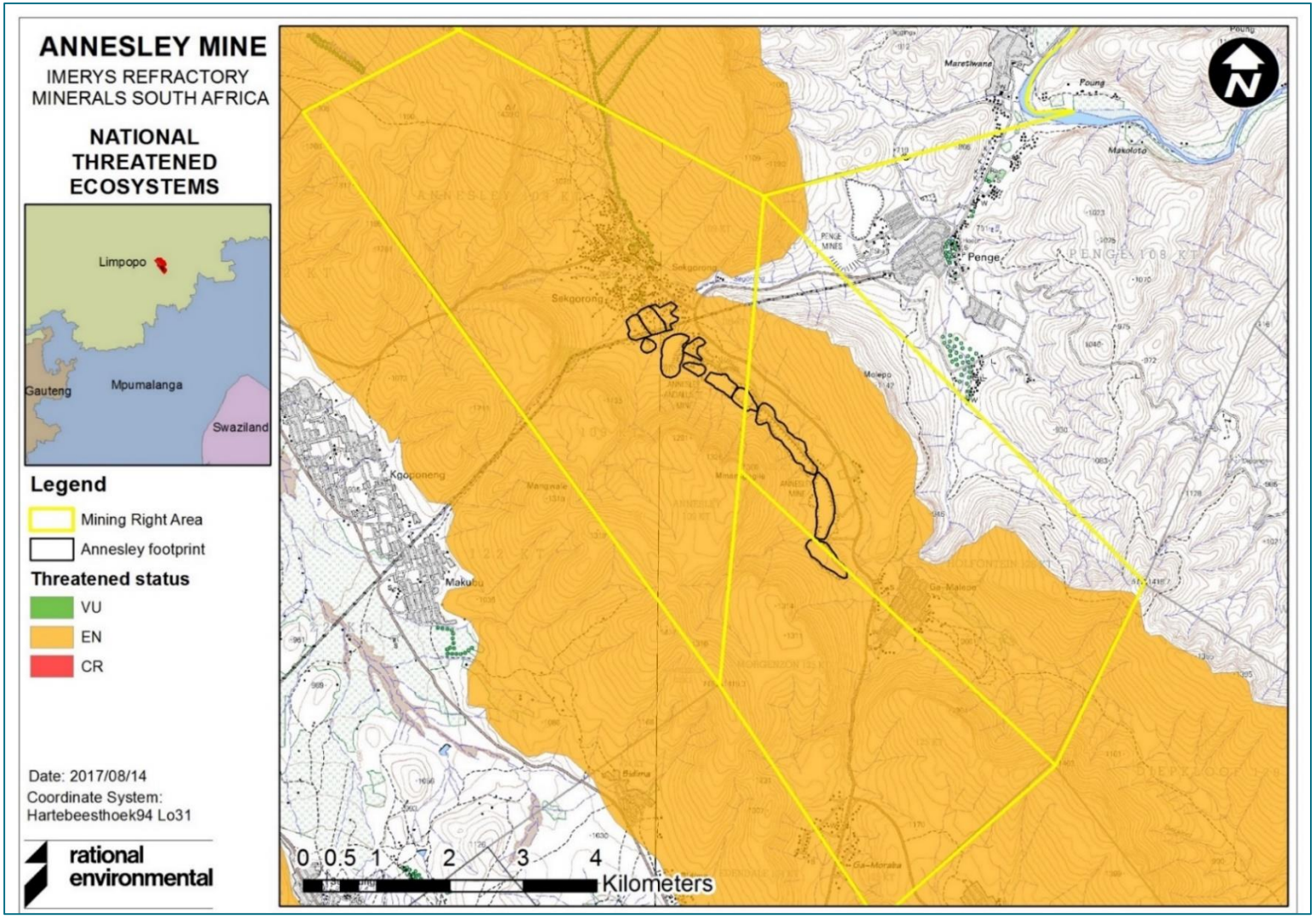


Figure 16: Layout plan which includes the national list of threatened ecosystems (Rational Environmental, 2017)

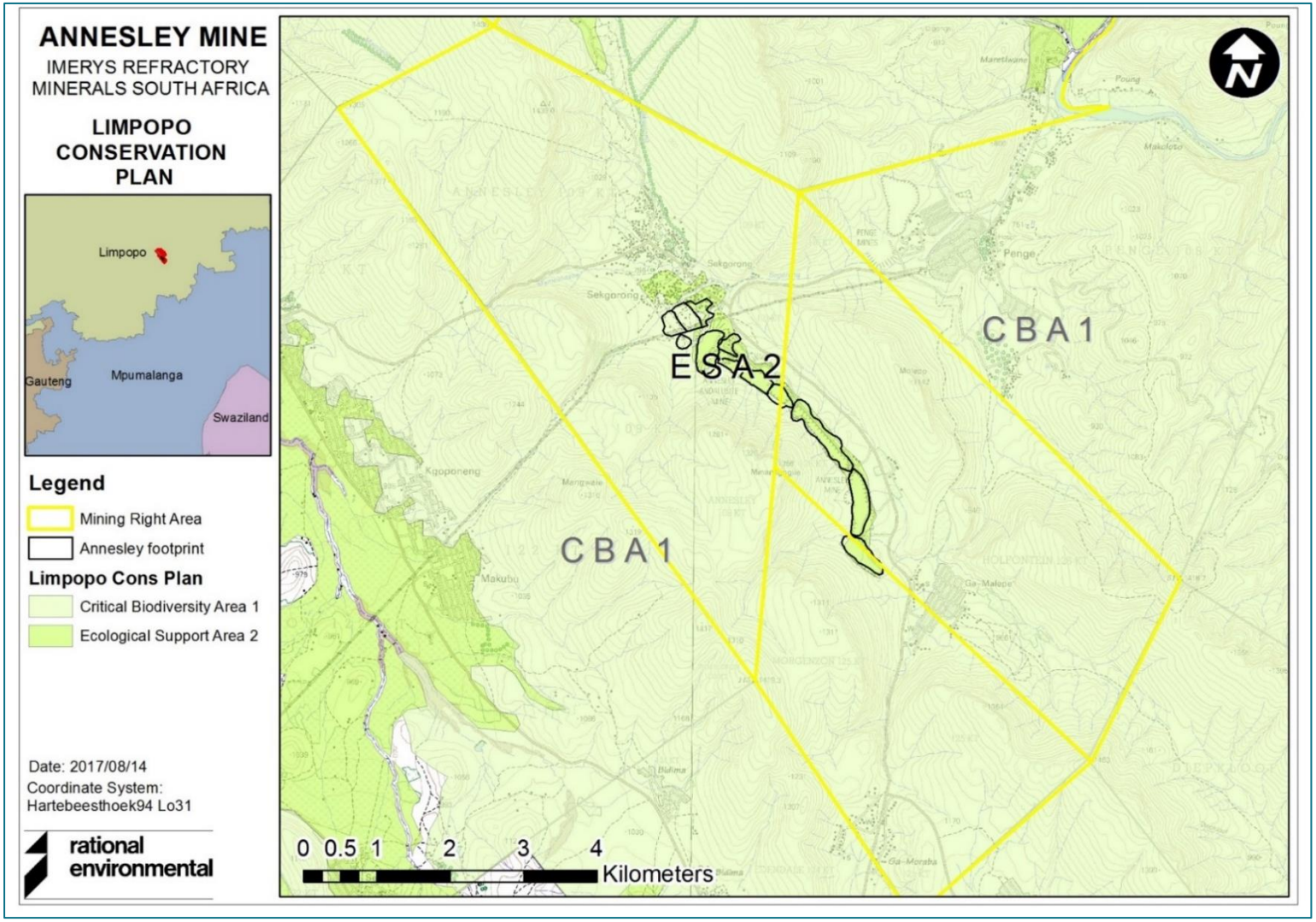


Figure 17: Layout plan indicating the Limpopo Critical Biodiversity Areas (Rational Environmental, 2017)

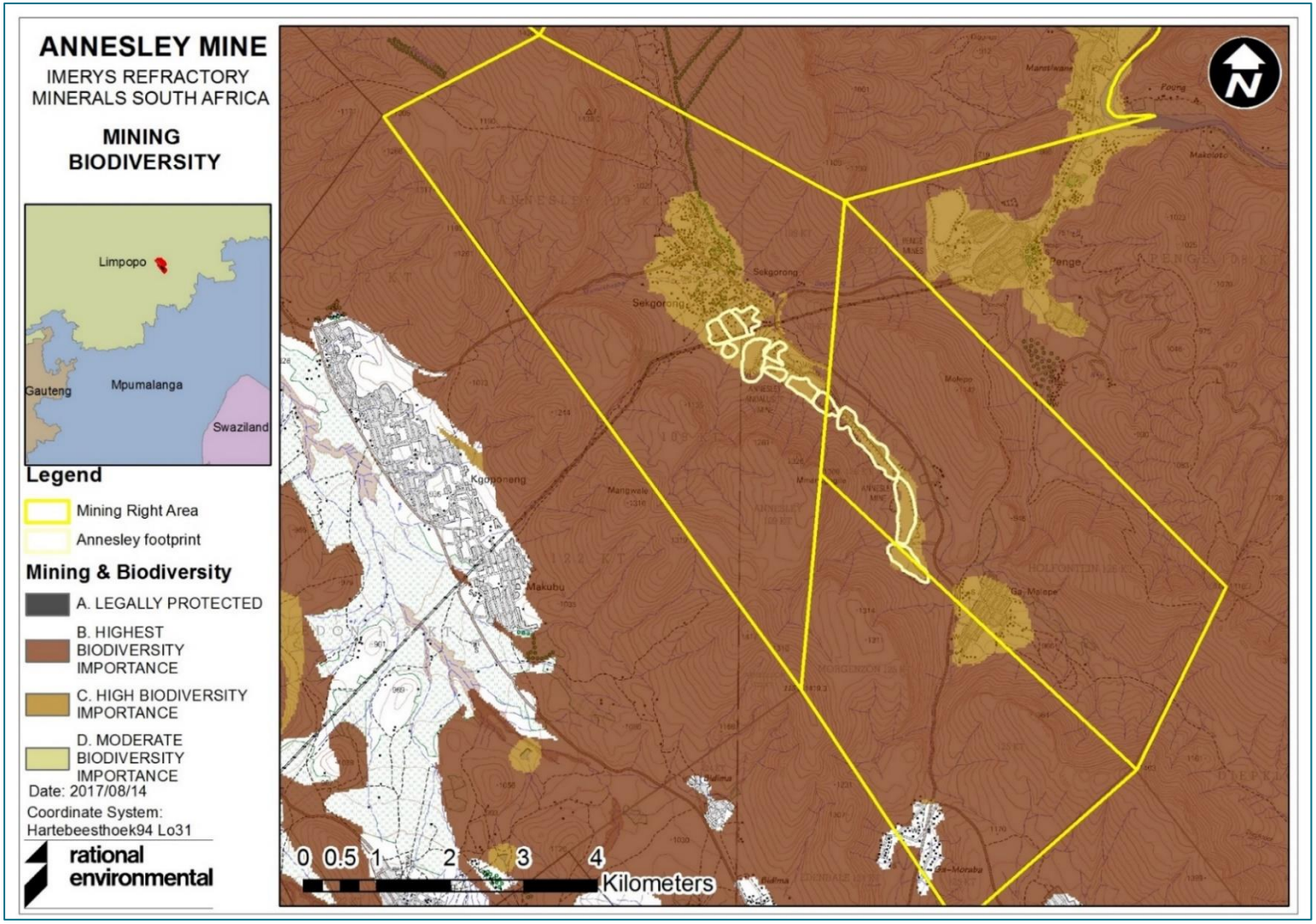


Figure 18: Layout plan indicating the Mining Biodiversity areas (Rational Environmental, 2017)

6.15 Regional socio-economic aspects

Information for this section was extracted from the IWWMP (Shangoni Management Services, 2012):

The mining site is situated within the SDM and GTLM. The statistics indicated in the table below was generated by the Demarcation Board and was valid as of March 2000.

Table 31: Socio-economic statistics for the area

Statistic	Number	Statistic	Number
No. of Households	1,410	**Age breakdown**	
Population		0-4	1,085
African	7,625	5-19	3,531
Coloured	12	20-29	1,155
Indian	0	30-49	1,143
White	12	50-64	426
Unspecified	33	Over 65	294
Gender		Age Unknown	55
Male	3,434		
Female	4,246		
Annual individual income		**Annual household income**	
None	6,740	None	472
R1 – 2,400	86	R1 – 2,400	163
R2,401 – 6,000	366	R2,401 – 6,000	313
R6,001 – 12,000	121	R6,001 – 12,000	182
R12,001 – 18,000	91	R12,001 – 18,000	96
R18,001 – 30,000	62	R18,001 – 30,000	54
R30,001 – 42,000	67	R30,001 – 42,000	39
R42,001 – 54,000	49	R42,001 – 54,000	28
R54,001 – 72,000	20	R54,001 – 72,000	22
R72,001 – 96,000	3	R72,001 – 96,000	16
R96,001 – 132,000	3	R96,001 – 132,000	5
R132,001 – 192,000	3	R132,001 – 192,000	4
R192,001 – 360,000	1	R192,001 – 360,000	3
Over R360,000	0	Over R360,000	0
Unspecified	70	Unspecified	13

6.15.1 Major economic activities and sources of employment

- Annesley Andalusite Mine;
- Local shops;
- Schools and
- Farmers in the Burgersfort/Steelpoort areas.

6.15.2 Unemployment estimate for the region

Statistics are misleading as rural communities don't always understand the difference between self-employed, employed, unemployed and pensioner. It is estimated that only about 11% of the residents are formally employed.

6.15.3 Housing demand, and availability

The mine is in the Malepe Tribal Area and land allocation is informal. The land is administrated as communal land where small plots are allocated on a "Permission to Occupy" (PTO) basis. A number of formal townships have been established in the region, or is in the construction phase, and stands are readily available.

6.15.4 Social infrastructure - schools, hospitals, sporting and recreating facilities, shops, police, civil administration

- Churches at Segorong: 4 churches namely; Baptist Church, Segorong RCC, Apostolic Church, St Engenas ZCC.
- Schools in Segorong: Segorong Primary School: (260 pupils, 8 teachers) and Madikoloshe Secondary School (126 pupils, 9 teachers);
- Businesses in Segorong: Magana Gokatwa (bottle store, not in use), Hygienic Butchery (not in use), Matikwene Eating house (active), Majestic Café, Super Saving Store (active);
- Health Services: Hospital at Penge;
- Recreation Facilities: None;
- Police: Burgersfort;
- Civil Administration: The authority in the area is the Malepe Tribal Authority and is in the jurisdiction of the SDM. The Administrative Centre is at Praktiseer, some 24km to the south.

6.15.5 Bulk services

- Process water to the mine is pumped from the old mine at Penge;
- Bulk water supply to Segorong Village is from a tank fed by a fountain;
- There is no internal water reticulation in Segorong. The community collects the water at the storage tank and carries it to their houses;
- No waste removal services exist;
- Existing sewerage varies from ordinary pit latrines with makeshift structure to no sewerage at all;
- The high voltage power line to Penge passes through the property and a low voltage line from the Penge substation supplies electricity to the mine;
- There is no electricity in Segorong Village.
- Key Economic Activities

There are no Gross Geographic Product (GGP) estimates available for SDM, in which the Annesley Andalusite Mine – Segorong Project resides, since the demarcation was done in December 2000. The closest proxy is to consider sectoral employment. However, there is not a strict correlation between employment and GGP, because a sector such as agriculture has a considerably higher employment co-efficient than a sector such as mining, which is more capital intensive. Sectoral employment figures for SDM are reflected below, because these are the best available at present.

Table 32: Socio-Economic statistics for the area

Sector	Employment number
Agriculture, hunting; forestry and fishing	11357
Mining and quarrying	5618
Manufacturing	3315
Electricity; gas and water supply	707
Construction	3299
Wholesale and retail trade	9180
Transport; storage and communication	2668
Financial, insurance, real estate and business services	2736
Community, social and personal services	17250
Other and not adequately defined	6
Private Households	7642
Undetermined	6844
Total	70622

Community services, which are mostly government, is the largest employer by far, accounting for 25% of employment. It is probably also the largest contributor to GGP. It is evident that government is far more dominant in the Limpopo portion of SDM than in Mpumalanga.

The second biggest employer is agriculture and hunting, with 16% of total employment. In this case, Mpumalanga is the dominant contributor. Trading activities are in third place (13%) and this time the relative contributions from Limpopo and Mpumalanga are more balance, but with Limpopo ahead. This is a reflection of the larger number of people living in the Limpopo part of SDM.

Private household activities are in fourth place at 11%. This time Mpumalanga is well ahead, reflecting the domestic work opportunities that are available at Groblersdal, Marble Hall and Burgersfort. Mining is only the fifth largest employer, but probably the largest or second largest contributor to GGP. Limpopo, with its platinum mines in Tubatse and Fetakgomo, is the dominant area.

All the other sectors, including manufacturing and construction, are relatively small, accounting for less than five percent of total employment each. In-migration is likely to be less than 3000 of the total

employment of almost 71,000, which is less than 5%. However, in addition to the total number of locally employed persons, there are probably at least 42,000 men who have families in SDM, but who work elsewhere.

.

SECTION 7: IMPACT ASSESSMENT AND MANAGEMENT

7.1 Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks

7.1.1 Impact assessment

The methodology used to assess the significance of an impact is based on the requirements as set out in EIA Regulations, (GN 982) of 2014 i.t.o. the NEMA as well as the Proposed National Guideline on Minimum Information Requirements for Preparing EIA for Activities that Require EA, of 2018, GN 86 in terms of NEMA. The impact significance methodology described below also complies to Appendix B of the Operational Guideline to Integrated Water and Waste Management of 2010 in terms of the NWA. In the event of any Section 21c&i water uses in terms of the NWA being assessed, Appendix A of the General Authorisations of 2016, GN 509 in terms of the NWA will be used to construct a risk matrix. Regulation 3(b) of the General Authorisations of 2016, GN 509 in terms of the NWA states that a suitably qualified SACNASP professional member must determine risks associated with this risk matrix.

Impact identification and prediction means forecasting the change of environmental parameters due to developmental patterns. These parameters may also be changing due to climate change and should be included.

7.1.1.1 Method of assessment

Impact identification and prediction is a stepwise procedure to identify the direct, indirect, and cumulative impacts (relating to both positive and negative impacts) for which a proposed activity and its alternatives will have on the environment as well as the community. This should be undertaken by determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity aspects of sites and locations as well as the risk of impact of the proposed activity. Refer to part A, Section 6 for a complete description of these environmental attributes. Sources of data to be used for gathering data on the environmental attributes as well as the impacts include; monitoring / sampling data collected and stored, assumptions and actual measurements, published data available from the departments or other stakeholders in the area as well as specialist studies. Likely impacts should be described qualitatively and then studied separately in detail. This provides consistent and systematic basis for the comparison and application of judgements.

7.1.1.2 Significance rating

Ratings should then be assigned to each criterion. Significance of impacts should be determined for each phase of the project lifecycle this includes; preconstruction, construction, operational, closure (including decommissioning) and post closure phases. The significance of impacts should further be assessed both with and without mitigation action. The description of significance is largely judgemental, subjective, and variable. However, generic criteria can be used systematically to identify, predict,

evaluate, and determine the significance of impacts resulting from project construction, operation, and decommissioning. The process of determining impact magnitude and significance should never become mechanistic. Impact magnitude is determined by empirical prediction, while impact significance should ideally involve a process of determining the acceptability of a predicted impact to society. Making the process of determining the significance of impacts more explicit, open to comment and public input would be an improvement of environmental assessment practice. Impact magnitude and significance should as far as possible be determined by reference to either legal requirements (accepted scientific standards) or social acceptability. If no legislation or scientific standards are available, the EAP can evaluate impact magnitude based on clearly described criteria. A matrix selection process is the most common methodology used in determining and ranking the site sensitivities:

- The consequence: includes the nature / intensity / severity of the impact, spatial extent of the impact, and duration of the impact.
    - The nature / intensity / severity of the impact: An evaluation of the effect of the impact related to the proposed development on the receiving environment. The impact can be either positive or negative. A description should be provided as to whether the intensity of the impact is high, medium, or low or has no impact in terms of its potential for causing negative or positive effects. Cognisance should be given to climate change which may intensify impacts.
    - The spatial extent of the impact: Indication of the zone of influence of the impact: A description should be provided as to whether impacts are either limited in extent or affect a wide area or group of people. Cumulative impacts must also be considered as the extent of the impact as may increase over time.
    - The duration of the impact: It should be determined whether the duration of an impact will be short-term, medium term, long term or permanent. Cumulative impacts must also be considered as the duration of the impact as it may increase over time.
- The likelihood: includes the probability of the potential occurrence of the impact, and frequency of the potential occurrence of the impact.
    - The probability of the impact: The probability is the quality or condition of being probable or likely. The probability must include the degree to which these impacts can be reversed; may cause irreplaceable loss of resources; and can be avoided, managed, or mitigated.
    - The frequency of the potential occurrence of the impact.
- The significance: This is worst case scenario without any management measures. See below how significance is determined: Impact that may have a notable effect on one or more aspects of the environment or may result in noncompliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude,

intensity, and probability of occurrence. Mitigation measures should be provided with evidence or motivation of its effectiveness.

7.1.1.3 Example of significance rating

Prior to mitigation

Intensity and magnitude	1 Natural processes or functions are not affected and will adequately return to its natural state. The impact will be completely reversed with correct management, and can be completely avoided, managed, or mitigated.	2 Natural processes or functions are affected, and natural processes or functions will continue in a modified manner. The impact will be reversed to some degree with correct management, and can be somewhat avoided, managed, or mitigated	3 Natural processes or functions are to the extent where it temporarily or permanently ceases. The impact cannot be reversed even with correct management, and cannot be avoided, managed, or mitigated
Resource replaceability	1 Loss of resource can be completely replaced.	2 Loss of resource can somewhat be replaced.	3 Resources will be completely lost.
Duration	1 The impact will be short-lived.	2 The impact will last for the entire operational life of the activity but will be mitigated thereafter.	3 The impact will not cease after the operational life of the activity ceases but will be permanent.
Extent or spatial scale	1 The impact will be site specific.	2 The impact will affect the local area.	3 The impact will affect an area larger than just the local area.
Probability	1 It is unlikely that the impact will occur.	2 There is a probability for the impact to occur.	3 The impact will definitely occur.
Significance	None or low If the sum of the above ranking is equal or more than 5 and 7, and no ranking equals 3.	Medium If the sum of the above ranking is equal or more than 8 to 11.	High If the sum of the above ranking is 12 or more.

Post to mitigation

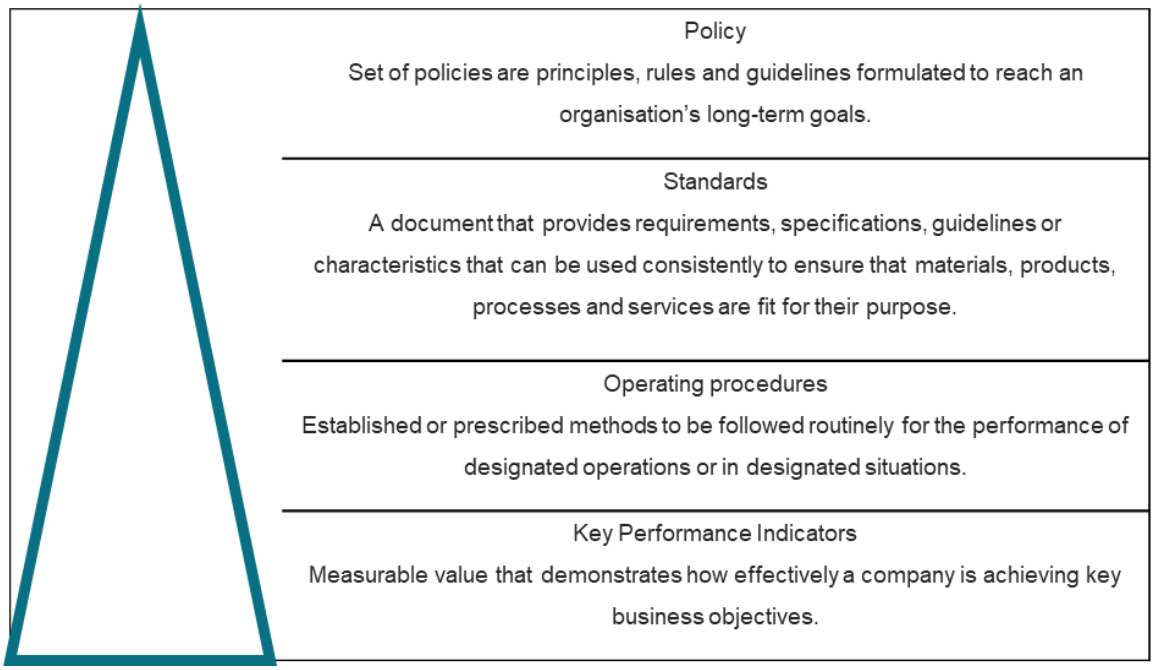
Intensity and magnitude	1 Natural processes or functions are not affected and will adequately return to	2 Natural processes or functions are affected, and natural processes or functions will	3 Natural processes or functions are to the extent where it temporarily or

	its natural state. The impact will be completely reversed with correct management, and can be completely avoided, managed, or mitigated.	continue in a modified manner. The impact will be reversed to some degree with correct management, and can be somewhat avoided, managed, or mitigated	permanently ceases. The impact cannot be reversed even with correct management, and cannot be avoided, managed, or mitigated
Resource replaceability	1 Loss of resource can be completely replaced.	2 Loss of resource can somewhat be replaced.	3 Resources will be completely lost.
Duration	1 The impact will be short-lived.	2 The impact will last for the entire operational life of the activity but will be mitigated thereafter.	3 The impact will not cease after the operational life of the activity ceases but will be permanent.
Extent or spatial scale	1 The impact will be site specific.	2 The impact will affect the local area.	3 The impact will affect an area larger than just the local area.
Probability	1 It is unlikely that the impact will occur.	2 It is likely for the impact to occur.	3 The impact will definitely occur.
Significance	None or low If the sum of the above ranking is equal or more than 5 and 7, and no ranking equals 3.	Medium If the sum of the above ranking is equal or more than 8 to 11.	High If the sum of the above ranking is 12 or more.

7.1.2 Mitigation and management

Management methodology is based on the requirements as set out in EIA Regulations, (GN 982) of 2014 i.t.o. the NEMA as well as the Proposed National Guideline on Minimum Information Requirements for Preparing EIA.

Management statements detail the processes, procedures and practices required to achieve an impact management outcome. A hierarchy of management tools used can also be used as seen below.



Mitigation should include measures in the following order of priority. The aim is to prevent adverse impacts from happening or, where this is unavoidable, to limit their significance to an acceptable level.

7.1.2.1 Avoiding or preventing impacts

If the biodiversity (an ecosystem, habitat for threatened species, ecological corridor or area that provides essential ecosystem services) is of conservation value or importance, it is best to plan to avoid or prevent impacts altogether by changing the location, siting, method or processes of the mining activities and related infrastructure.

7.1.2.2 Minimising impacts

Minimising impacts of mining is a mitigation measure that deals with the environment in general. In areas where the biodiversity is to be affected is of conservational value or importance, then every effort should be made to minimise those impacts that cannot be avoided or prevented. Mining companies should strive to minimise impacts on biodiversity to ensure environmental protection. Section 2 of NEMA contains environmental management principles that resonates with minimising the impact rather than stopping at mitigation, this is imperative in the mining sector.

7.1.2.3 Rehabilitating impacted areas

Rehabilitation is the measures that are undertaken to as far as it is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations to its natural or predetermined state or to a land use which aligns to the generally accepted principle of sustainable development. A closure plan is an essential part of rehabilitation and must be developed based on the establishment of the closure objectives and criteria.

7.1.2.4 Biodiversity offsets

Biodiversity offsets are measurable conservation gains that help to balance any significant biodiversity losses that remain after actions to avoid, minimise, and restore negative impacts have been taken. They are the last stage of mitigation and should be considered after appropriate avoidance, minimisation, and rehabilitation/restoration measures have been applied already.

7.1.3 Conclusion

When dealing with management, impact management outcomes must:

- be set for the expected activity-based impacts;
- describe the desired outcome of the management measure/s prescribed or the standard to be achieved (environmental objective);
- be clearly documented and identified per project phase as in the impact identification and significance rating process (this must be aligned to the mines closure objectives, and must therefore include predicted long-term result of the applied management measures);
- be measurable to determine compliance, which includes time frames and schedule for the implementation of the management measures; responsibilities for implementation and long-

term maintenance of the management measures; financial provision for long-term maintenance; and monitoring programmes to be implemented;

- be informed by stakeholder expectations; and
- ensure legal compliance;

Finally, the impact assessment must refer to the residual and latent impact after successful implementation of the management measures.

7.2 Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

This section includes 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, an assessment of each identified potentially significant impact and risk, including cumulative impacts, as well as how these impacts can be managed or mitigated and level of residual risk.

7.2.1 Geology and topography including drainage patterns and visual aspects

Activity, nature, and consequence of impact:

Partially sloping of mine residue over potentially economically viable minerals and change in topography due to sloping of the slimes dam, waste rock dumps and the pits.

Cumulative impacts:

Geology is also removed at the other quarries of the mine and activities across Annesley mine also impact the pits due to mining activities.

Assumptions, uncertainties, and gaps in knowledge:

Information for this risk was extracted from the Approved EMP (Shangoni Management Services, 2006).

Partially sloping of mine residue over potentially economically viable minerals		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	1 The impact of the sloping mine residue will not alter the geology in the area; therefore, natural, social, cultural, and environmental processes are not affected.	1 The impact of the sloping mine residue will not alter the geology in the area; therefore, natural, social, cultural, and environmental processes are not affected.

Partially sloping of mine residue over potentially economically viable minerals		
	Impact pre-mitigation	**Impact post-mitigation**
Resource replaceability	3 The impact is not reversible, and the resource cannot be replaced.	3 The impact is not reversible, and the resource cannot be replaced.
Duration	3 Once sloping is finished, this will remain as a permanent land pattern.	3 Once sloping is finished, this will remain as a permanent land pattern.
Extent or spatial scale	1 Impact occurs on-site at the point where the mine residue is sloping.	1 Impact occurs on-site at the point where the mine residue is sloping.
Probability	1 The mine has already removed all the economic viable material.	1 The mine has already removed all the economic viable material.
Significance	9 Medium	9 Medium

Topography including drainage patterns and visual aspects		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	2 The impact on the topography will be positive and medium to high. Topography is not a resource, however, other resources such as drainage patterns and visual aspects are affected.	3 The impact on the topography will be positive and medium to high. Topography is not a resource, however, other resources such as drainage patterns and visual aspects are affected.
Resource replaceability	2 The original topography cannot be replaced; however sloping will achieve a more natural appearance.	2 The original topography cannot be replaced; however sloping will achieve a more natural appearance.
Duration	3 Once sloping is finished, this will remain as a permanent land pattern.	3 Once sloping is finished, this will remain as a permanent land pattern.
Extent or spatial scale	1	1

Topography including drainage patterns and visual aspects		
	Impact pre-mitigation	**Impact post-mitigation**
	Impact occurs on-site at the point where the pits and mine residue will be sloped.	Impact occurs on-site at the point where the pits and mine residue will be sloped.
Probability	3 The impact will occur regardless of any prevention measures	3 The impact will occur regardless of any prevention measures
Significance	11 Medium **(Positive)**	12 High **(Positive)**

Environmental objective
To ensure correct sloping of mine residue.

Management measures to be applied	**Phase applicable to management measure**	**Management tools**	**Monitoring programmes**	**Management timeframe and schedule**	**Responsibilities for implementation and long-term maintenance**	**Mitigation hierarchy**
Sloping should be done in accordance with the rehabilitation plan. In short: • Q3: General sloping for free drainage should be established. • Sloping of most of the material to the north in the direction of the tailings facility and to the east towards the plant area.	During rehabilitation	Rehabilitation Strategy and Implementation Plan	Monitoring of rehabilitation: After reshaping the resultant topography must be surveyed to determine the degree to which the final topography meets planned objectives, particularly in terms of surface drainage and slope.	During rehabilitation	Mine Manager	Rehabilitate

Stakeholder expectations and / or comments None received.
Residual and latent risks The residual impacts from the removal of geology will remain, as well as the residual impact from covering of geology. The sloping will lessen this residual impact. No additional latent impacts are envisaged.

7.2.2 Soils

Activity, nature, and consequence of impact:

The EMP focusses on soil pollution. No mention is made of the residual impacts on the soil erosion. Very little topsoil was stockpiled during the mining activities. Topsoil is mixed with overburden and shows signs of erosion. Until such time that revegetation is completed, these areas will be prone to soil erosion.

Cumulative impacts:

Farming, residential and mining activities in the area can lead to soil erosion and pollution.

Assumptions, uncertainties, and gaps in knowledge:

Information obtained as per the final EMP Performance Assessment conducted in 2018, erosion is visible on the site.

Impact pre-mitigation:

Soil erosion		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	2 The risks on soil erosion will be somewhat severe. The resources are moderately sensitive.	1 The risks on soil erosion will be somewhat severe. The resources are moderately sensitive.
Resource replaceability	2	1

Soil erosion		
	Impact pre-mitigation	**Impact post-mitigation**
	The risks on soil erosion will be somewhat severe and reversible. The resources are moderately sensitive.	The risks on soil erosion will be somewhat severe and reversible. The resources are moderately sensitive.
Duration	3 Soil erosion will be permanent without management.	2 Soil erosion will be temporary with management.
Extent or spatial scale	1 The risks will be site specific.	1 The risks will be site specific.
Probability	2 The impact will be probable without management measures.	1 The impact is less likely with management measures.
Significance	10 Medium	6 Low

Soil pollution		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	1 The risks on soil pollution will not be severe. The resources are not sensitive.	1 The risks on soil pollution will not be severe. The resources are not sensitive.
Resource replaceability	1 The risks on soil pollution will not be severe and reversible. The resources are not sensitive.	1 The risks on soil pollution will not be severe and reversible. The resources are not sensitive.
Duration	1 Soil pollution will be temporary.	1 Soil pollution will be temporary.
Extent or spatial scale	1 The risks will be site specific.	1 The risks will be site specific.
Probability	2	1

Soil pollution		
	Impact pre-mitigation	**Impact post-mitigation**
	The impact will be probable without management measures.	The impact is less likely with management measures.
Significance	6 Low	5 Low

Environmental objective
To prevent soil erosion and pollution.

Management measures to be applied	**Phase applicable to management measure**	**Management tools**	**Monitoring programmes**	**Management timeframe and schedule**	**Responsibilities for implementation and long-term maintenance**	**Mitigation hierarchy**
Soil erosion prevention as per the rehabilitation plan.	Operational phase until closure	Rehabilitation Strategy and Implementation Plan	Erosion monitoring	On-going until rehabilitation and closure	Mine Manager	Prevent
Energy dissipators (such as rock packing and gabion baskets) to be included along the trench that follows the access road from Quarry 4 to drain into Quarry 3.	Operational phase until closure	Rehabilitation Strategy and Implementation Plan & Stormwater Management Plan	Erosion monitoring	On-going maintenance until rehabilitation and closure	Mine Manager	Minimise
All vehicles and machinery must be maintained to prevent soil pollution. Any contaminated soil due to leakages or spillages must be removed as hazardous waste.	Operational phase until closure	Spill handling procedure, spill kits	Site inspections.	On-going until rehabilitation and closure	Mine Manager	Prevent

Stakeholder expectations and / or comments
None received.
Residual and latent risks
No residual risks from soil erosion or pollution; however, the loss of topsoil, which is a residual risk from mining activities, will remain.

7.2.3 Vegetation

Activity, nature, and consequence of impact:

EMP (Shangoni, 2006), after closure, the rehabilitated soil could become infested with alien and invasive plant species.

Cumulative impacts:

Residential, farming and mining activities can lead to the loss of indigenous vegetation and enhance the growth of alien vegetation.

Assumptions, uncertainties, and gaps in knowledge:

Information for this risk was extracted from the Approved EMP (Shangoni Management Services, 2006).

Impact pre-mitigation:

Risk of alien vegetation infestation		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	2 The risks of alien vegetation infestation will be somewhat severe. The resources are also moderately sensitive.	1 The risks of alien vegetation infestation will be less severe with management.
Resource replaceability	2 The impacts will be somewhat severe but reversible.	1 Alien vegetation impacts are reversible with adequate management.
Duration	3 Destruction of natural vegetation due to alien vegetation will be permanent.	1

Risk of alien vegetation infestation		
	Impact pre-mitigation	**Impact post-mitigation**
		Destruction of natural vegetation due to alien vegetation will be temporary with mitigation measures.
Extent or spatial scale	1 The risk will be site specific.	1 The risk will be site specific.
Probability	3 Alien vegetation is already evident on the existing mine.	1 Probability is low with management.
Significance	11 Medium	5 Low

Risk of incorrect planting methods		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	2 The severity of incorrect planting methods is medium.	1 The severity of incorrect planting methods is low with management.
Resource replaceability	2 Incorrect planning methods can be somewhat reversed.	1 Incorrect planting methods can be reversed with management.
Duration	3 Destruction of natural vegetation due to the incorrect plating of indigenous vegetation will be permanent.	1 Destruction of natural vegetation due to the incorrect plating of indigenous vegetation will be temporary with mitigation measures.
Extent or spatial scale	1 The risk will be site specific.	1 The risk will be site specific.
Probability	2 Incorrect planting methods is a possibility.	1 Probability is low with management.
Significance	10 Medium	5 Low

Environmental objective
To prevent the establishment of alien vegetation as they use a lot of environmental resources which restricts the growth of indigenous vegetation.

Management measures to be applied	Phase applicable to management measure	Management tools	Monitoring programmes	Management timeframe and schedule	Responsibilities for implementation and long-term maintenance	Mitigation hierarchy
Implement an alien invasive plant monitoring and management plan whereby the spread of alien and invasive plant species into the rehabilitated areas are regularly removed and re-infestation monitored for at least five years.	Rehabilitation phase	Rehabilitation Strategy and Implementation Plan Alien and Invasive Species Monitoring and Management Plan	Rehabilitated areas will be monitored for a period of at least five years for the occurrence or alien invasive plant species	During Rehabilitation	Mine Manager	Minimise and avoid

Stakeholder expectations and / or comments
None received.
Residual and latent risks
With adequate monitoring and maintenance, there will be no residual or latent risks.

7.2.4 Groundwater

Mineral waste that is backfilled in open pits is sometimes neutralised with lime to reduce acidity and/or solute generation but due to the low acid potential of the mineral waste generated at Annesley, no additional treatment is necessary.

Activity, nature, and consequence of impact:

The impacts on groundwater quality are primarily related to the management of materials, wastes and spills and unauthorised disposal of contaminated substances. Contamination of groundwater may also arise due to incorrect handling and disposal of waste materials. This risk is considered low. Due to the short exposure and small scale of these possible spills, the impacts will be negligible during the construction phase. Except for the lesser oil and diesel spills, there are no activities expected that could impact on regional groundwater quality. This phase should thus cause very little additional impacts. It is expected that the current status quo will be maintained. A very limited groundwater quality impact is expected during the construction phase, generally because of the small surface areas involved and the short duration thereof.

No sulphidic minerals are present in the tailings or waste rock that could result in acidity of drainage or mine water and ABA tests confirmed that no acid potential exists. The mineral waste material is a low risk waste with no acid generating capacity. Trace metals will remain in non-soluble states and is, therefore, of no concern. However, geochemical studies did identify that SO4, Cl, Na, F to be potential contaminants of concern with some seepage potentials. The impact on the groundwater quality during the operational phase is therefore expected to be low.

Cumulative impacts:

No other mines or any other groundwater abstractions are taking place that could result in substantial cumulative water quality or water quantity impacts that will remain post closure.

Assumptions, uncertainties, and gaps in knowledge:

The numerical groundwater model, despite all efforts and advances in software and algorithms, remains a very simplified representation of the very complex and heterogeneous interacting aquifer systems underlying the study area (Shangoni AquiScience, 2020).

Groundwater quality		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	1	1

Groundwater quality		
	Impact pre-mitigation	**Impact post-mitigation**
	A very limited groundwater quality impact is expected.	A very limited groundwater quality impact is expected post - mitigation.
Resource replaceability	1 The resource is not irreparably damaged and is replaceable.	1 The resource is not irreparably damaged and is replaceable.
Duration	2 This is a medium-term impact.	2 This is a medium-term impact.
Extent or spatial scale	2 The local area is affected.	1 The risk is localised.
Probability	1 It is improbable for this impact to occur.	1 It is improbable for this impact to occur.
Significance	7 Low	6 Low

Environmental objective
Prevent or contain groundwater contamination from seepage and to contain and remediate any accidental hydrocarbon or other chemical spillages.

Management measures to be applied	**Phase applicable to management measure**	**Management tools**	**Monitoring programmes**	**Management timeframe and schedule**	**Responsibilities for implementation and long-term maintenance**	**Mitigation hierarchy**
Monitor groundwater levels in source and receptor boreholes.	Operational until closure	Water monitoring programme	Groundwater level monitoring	Until DWS and DMR states otherwise.	Mine Manager	Minimise
Separation of clean and affected water through diversion canals and an affected water management system that collects affected runoff water from dirty	Operational until closure	SWMP	Inspections of surface water drainage systems	Continuous	Mine Manager	Minimise

Management measures to be applied	Phase applicable to management measure	Management tools	Monitoring programmes	Management timeframe and schedule	Responsibilities for implementation and long-term maintenance	Mitigation hierarchy
management areas, which drain towards the process water storage facilities. Such water is then re-used in the plant as process water.						
Minimisation of dirty water management areas and the separation of clean and dirty water management areas.	Operational until closure	SWMP	Inspections of surface water drainage systems	Continuous	Mine Manager	Minimise
Keep the quarry as dry as possible.	Operational until closure	SWMP	Inspections	Continuous	Mine Manager	Minimise
The quarry should be compacted as far as possible to reduce rainfall recharge.	Operational until closure	Operational manual	Inspections	Continuous	Mine Manager	Minimise
Surface water should be directed around the backfilled quarry.	Operational until closure	SWMP	Inspections	Continuous	Mine Manager	Minimise
Water quality and levels of the quarry should be measured on a quarterly basis. The parameters should correspond to the waste classification elevated parameters.	Operational until closure	Water monitoring programme	Groundwater level monitoring	Continuous	Mine Manager, Sampler	Minimise
When flow is visible in the Segorong River, water samples should be taken for chemical analysis.	Operational until closure	Water monitoring programme	Surface water quality monitoring	Continuous	Mine Manager, Sampler	Minimise
Contain spillage, excavate and dispose of soil if required. Utilisation of spill kits and/or excavation of affected soil with subsequent disposal at an accredited disposal site is crucial.	Operational until closure	Spill handling procedure	Develop and maintain a Standard Operating Procedure to contain and remediate any accidental hydrocarbon or other chemical spillages.	Continuous	Mine Manager	Minimise

Stakeholder expectations and / or comments
None received.
Residual and latent risks
Depending on the results of further monitoring, the risk of potential pollution and sedimentation will not be a latent risk.

7.2.5 Surface water

Activity, nature, and consequence of impact:

Run-off is generated from already existing mine residue. This can lead to pollution and sedimentation. In order to prevent dirty water from mixing with clean water, underdrains in the Tailings Storage Facility (TSF) are allowed for. Collected water reports to the plant storage tank from where it is kept in the "dirty" water circuit. Drain outlets discharge into the provided sump. This water is kept in the "dirty" water system and re-used in the mineral processing plant. Stormwater from the upstream hillside is diverted around the TSF (Tailings Solutions, 2020).

Cumulative impacts:

The sewerage works, Annesley Mining Operations and domestic activities may influence the surface water quality.

Assumptions, uncertainties, and gaps in knowledge:

Information for this risk was extracted from the Quarterly Water Quality Monitoring Report (BECS Environmental, 2016) and Rhino Minerals (Pty) Ltd – Annesley Andalusite Mine Storm Water Management Plan (Shangoni Management Services, 2013)

Surface water pollution		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	2 The dirty water may mix with the clean water stream if berms and other means of diversion are not implemented.	1 The impact is lessened with mitigation measures.

Surface water pollution		
	Impact pre-mitigation	**Impact post-mitigation**
Resource replaceability	2 The impacts will be somewhat reversible.	2 The impacts will be somewhat reversible.
Duration	3 Pollution potential will be permanent, depending on new monitoring results	3 Pollution potential will be permanent, depending on new monitoring results
Extent or spatial scale	2 Receptors which may be influenced by the mining activities include the users in the Mogomotsi River (aquatic species, livestock, wildlife).	1 Impacts are kept to a local scale with management.
Probability	2 This is already evident on the existing mine; however, the probability will decline if management measures are implemented.	1 This impact is less probable if management measures are implemented.
Significance	11 Medium	8 Medium

Sedimentation		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	1 Sloping of wastes do pose several advantages compared to surface storage and include the elimination of erosion and therefore sedimentation risks towards the receiving environment.	1 Sloping of wastes do pose several advantages compared to surface storage and include the elimination of erosion and therefore sedimentation risks towards the receiving environment.
Resource replaceability	1 The impact is reversible.	1 The impact is reversible.
Duration	3 Pollution potential will be permanent, depending on new monitoring results	3 Pollution potential will be permanent, depending on new monitoring results

Sedimentation		
	Impact pre-mitigation	**Impact post-mitigation**
Extent or spatial scale	2 Receptors which may be influenced by the mining activities include the users in the Mogomotsi River (aquatic species, livestock, wildlife).	1 Impacts are kept to a local scale with management.
Probability	1 Sedimentation from mine residue will not be probable.	1 Sedimentation from mine residue will not be probable.
Significance	8 Medium	7 Low

Environmental objective
To prevent the contamination and sedimentation of surface water resources by implementing management strategies.

Management measures to be applied	**Phase applicable to management measure**	**Management tools**	**Monitoring programmes**	**Management timeframe and schedule**	**Responsibilities for implementation and long-term maintenance**	**Mitigation hierarchy**
The quarry will be sloped as to reduce erosion and subsequent sedimentation. In addition, the slimes dam will be revegetated. This will help to reduce any form of sedimentation from the dam.	Operational until closure	SWMP	• Surface water drainage systems • Surface water quality • Maintenance and inspections	On-going until rehabilitation and closure	Mine Manager	Minimise
Maximum amount of clean runoff upstream of the mining area should be diverted away to separate the clean and affected areas. This berm should be located upstream of the mining activities and gradually cut the contour lines to provide a steady slope draining to the west. The use of rocks to line the floor of the berm is recommended.						
Regular inspections and maintenance should be conducted to ensure the capacity and integrity of the berms, culverts and the trenches are maintained.						

Management measures to be applied	Phase applicable to management measure	Management tools	Monitoring programmes	Management timeframe and schedule	Responsibilities for implementation and long-term maintenance	Mitigation hierarchy
The diversion berm along the highwall of Q3 and Q2 will be extended towards Q4 to serve as clean water supply to rehabilitation areas and avoid diverting clean water into process water supply.						
The open section in the upstream diversion berm between Q3 and Q2 will be closed.						

Stakeholder expectations and / or comments
None received.
Residual and latent risks
Depending on the results of further monitoring, the risk of potential pollution and sedimentation will not be a latent risk.

7.2.6 Community safety

Activity, nature, and consequence of impact:

Extension of Quarry 3 as a Tailings Storage Facility (TSF) to increase tailings storage capacity.

Cumulative impacts:

There is a safety concern related to highwalls of other pits on the mine.

Assumptions, uncertainties, and gaps in knowledge:

Some of the information for this section was obtained from the Imerys Annesley Quarry 3 Optimisation Report (Tailings Solutions, 2020). In this report, the stability calculations assumed a drained facility.

Quarry 3 TSF safety identification		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	3 Based on the determined Zone of Influence and the safety identification, the Annesley Q3 TSF would classify as having a **High Hazard** Classification. The third party worker at the Plant and mine offices as well as the cost of an environmental clean-up justifies this classification.	2 The risk profile associated with the TSF design and operation would be acceptable, providing deposition and management stay within design and operational limits, meeting with good practice.
Resource replaceability	3 Risk to the surrounding environment is high without mitigation.	2 Risk to the surrounding environment is reduced with mitigation.
Duration	3 The impact is permanent.	3 The impact is permanent.
Extent or spatial scale	1 The impact is local in scale.	1 The impact is local in scale.
Probability	1 Slimes dam failure is not probable.	1 Slimes dam failure is not probable.
Significance	11 Medium	9 Medium

High walls of open pits		
	Impact pre-mitigation	**Impact post-mitigation**
Intensity and magnitude	3 People from the community who walk in the vicinity of the mine are at risk of falling into the open pits.	1 People from the community who walk in the vicinity of the mine are at low risk of falling into the open pits.
Resource replaceability	3 Risk to the community is high without mitigation.	1 Risk to the community is greatly reduced with mitigation.
Duration	3	3

High walls of open pits		
	Impact pre-mitigation	**Impact post-mitigation**
	The impact is permanent.	The impact is permanent.
Extent or spatial scale	1 The impact is local in scale.	1 The impact is local in scale.
Probability	2 Falling from a pit is probable without management measures.	1 Falling from a pit is improbable with management measures.
Significance	12 High	7 Low

Environmental objective
Provide an environment that is safe for the community

Management measures to be applied	**Phase applicable to management measure**	**Management tools**	**Monitoring programmes**	**Management timeframe and schedule**	**Responsibilities for implementation and long-term maintenance**	**Mitigation hierarchy**
Slurry pumping capacity and the integrity of the slurry reticulation infrastructure have been identified as one of the important risk drivers.	Operational until closure	Operational Manual. This is part of the Mandatory Code of Practice. (CoP) as per DMR regulations	Inspection and maintenance	On-going until rehabilitation and closure	Mine Manager	Prevent
The performance and durability of pumps, electrical motors, performance duties, pipes and valves must be monitored as part of the management and risk controls of the Code of Practice (CoP)						
Standpipe piezometers are part of the integrity and performance monitoring on TSF's. These instruments can be installed after commissioning, however, installation during construction is cost effective and the depth can be accurately controlled.						

Management measures to be applied	Phase applicable to management measure	Management tools	Monitoring programmes	Management timeframe and schedule	Responsibilities for implementation and long-term maintenance	Mitigation hierarchy
• Coarse tailings should be placed from the Course discard wall crest, using an upstream deposition technique. This would cover the drains with coarse material, beaching the fines away from the perimeter wall, maintain freeboard and construct the coarse and dry outer wedge. • Supernatant water will be decanted. No water would be stored on top of the TSF. • Tailings placement would be with spraybars, an upstream deposition method would be implemented. • Tailings placement would meet with the standards as per the Quarry 3 Optimisation report.						
• The TSF must be considered to be an access control area. The water is part of the "dirty" water circuit and should be treated as such. • Underdrains in the TSF are allowed for. Collected water reports to the plant storage tank from where it is kept in the "dirty" water circuit. • Stormwater from upstream hillside is diverted around the TSF.	Operational until closure	SWMP	Inspection and maintenance	On-going until rehabilitation and closure	Mine Manager	Minimise
Drowning or being stuck in mud is a health and safety risk. The following should be implemented (as a minimum): • The TSF complex should be fenced, with at least a cattle proof fence.	Operational until closure	Highwall safety CoP	Inspection and maintenance	On-going until rehabilitation and closure	Mine Manager	Prevent

Management measures to be applied	Phase applicable to management measure	Management tools	Monitoring programmes	Management timeframe and schedule	Responsibilities for implementation and long-term maintenance	Mitigation hierarchy
• Safety and warning signage to be placed along this fence. This signage should be installed specifically at the catwalk and penstock entrances, and walkways to the side of the TSF.						

Stakeholder expectations and / or comments
None received.
Residual and latent risks
No residual or latent risks.

7.3 Impact assessment on alternatives

7.3.1 The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

No alternatives are applied for.

7.3.2 The possible mitigation measures that could be applied and the level of risk

Refer to Part A, Section 7.2 for all mitigation measures that could be applied and the level of risk.

7.3.3 Motivation where no alternative sites were considered

There is no alternative to the extension of Quarry 3. The activities in this report are the most effective way to mine and rehabilitate the area.

7.3.4 Statement motivating the preferred site

Not applicable. No alterative considered.

7.3.5 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 plan) through the life of the activity

Refer to Part A, Section 7.1 and 7.2 above for a 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 plan) through the life of the activity.

7.3.6 Assessment of each identified potentially significant impact and risk

Refer to Part A, Section 7.2 above for a full description of all impacts as well as their significance. This includes potentially significant impact and risks

7.4 Summary of specialist reports

The specialist groundwater investigation relating to this application (Shangoni AquiScience, 2020) concluded and recommended the following:

- No substantial groundwater related impacts, quality, and quantity, are foreseen during construction, operation or post-closure phases.
- There are shortcomings with regards to current monitoring and surface water and groundwater monitoring should be implemented as recommended in this report.
- Monitoring should include quality and water level monitoring with regular interpretation of results by a qualified and professional geohydrologist.
- Decommissioning of the facilities should entail final rehabilitation, i.e. re-shaping to enhance free drainage / surface run-off, top soiling and seeding.

- Monitoring and management of the natural surface water environment should also receive priority. Degradation of these natural systems should be avoided.
- Discharge or seepage of affected water into the natural surface water environment should be avoided.
- The management measures as recommended in this report should be used in the EMP or closure plan and conditions should apply to the environmental authorisation.

According to the Imerys Annesley Quarry 3 Optimisation Report (Tailings Solutions, 2020):

- The proposed Q3 Optimisation would provide storage capacity to the waste from the Annesley Mine processing plant for 13.5 years.
- The risk profile associated with the TSF design and operation would be acceptable, providing deposition and management stay within design and operational limits, meeting with good practice.

The storm water management plan developed for Annesley Mine (Shangoni Management Services, 2013) is conceptual in its design, but should be used as an action strategy by the operation. Principles and mitigation measures have been discussed to separate clean and affected water. Infrastructure design recommendations and maintenance requirements should be integrated into the existing operational management.

The following main storm water measures were identified:

- Clean surface runoff upstream of the mine should be diverted around the mining area to separate clean and affected catchments as well as to limit runoff on site.
- Concentration of runoff during flood events may cause erosion and should be avoided by placing preventative measures such as cement, grass or rock at such areas to act as energy dissipators;
- Regular inspections and maintenance should be conducted to ensure the capacity and integrity of the berms, culverts and the trenches are maintained.

7.5 Environmental impact statement

7.5.1 Summary of the key findings of the environmental impact assessment

The following is extracted from Shangoni AquiScience (2020):

Due to its localised nature, no measurable reduction of groundwater in storage is expected during the construction phase. Potential accidental spillages of hydrocarbons will have no impact on the groundwater quantity (levels). Therefore, no significant impacts are expected on groundwater quantity during the backfilling process.

The only foreseeable potential impact on the ambient groundwater quality during the construction phase is due to accidental hydrocarbon or other chemical spillages from the construction vehicles. Such spillages are localised, quickly reversible if properly contained and/or excavated and are unlikely to occur. The severity of groundwater being negatively impacted by accidental spillages is rated as low during the short construction phase before and after mitigation.

As discussed previously, greater recharge from rainfall is expected to occur within the rehabilitated and backfilled quarries. However, no changes in the groundwater levels or flow directions are expected.

The two most common processes by which groundwater are contaminated include interstitial release and ion exchange release. Argillaceous sediments such as shale and mudstone could contain pore water with high saline content. The most released ions during this weathering process are SO4, Na and Cl including Ca and Mg.

No sulphidic minerals are present in the tailings or waste rock that could result in acidity of drainage or mine water and ABA tests confirmed that no acid potential exists. As discussed previously (refer sections 5.5 and 7.6.2.3 of the original report), the mineral waste material is a low risk waste with no acid generating capacity. Trace metals will remain in non-soluble states and is, therefore, of no concern. However, geochemical studies did identify that SO4, Cl, Na, F to be potential CoCs with some seepage potentials.

Sulphate (SO4) was selected as source parameter for use in the transport model since it is a conservative tracer and was also identified as a contaminant of concern. This will provide an indication of the maximum potential contaminant extent or worst-case scenario. Plume migration will only occur once equilibrium has been reached and due to the low permeability of the host rock and low source concentrations, will be a slow process and no sensitive groundwater receptors will be impacted on. The impact on the groundwater quality during the operational phase is therefore expected to be low.

The only relatively significant natural surface water near the mine is the Segorong River. This is a non-perennial river which was dry during the site visit. No substantial impacts are expected.

According to the Imerys Annesley Quarry 3 Optimisation Report (Tailings Solutions, 2020):

- The risk profile associated with the TSF design and operation would be acceptable, providing deposition and management stay within design and operational limits, meeting with good practice.

7.5.2 Final Site Map

Refer to Addendum 1 for all the maps.

7.5.3 Summary of the positive and negative implications and risks of the proposed activity and identified alternatives

Due to the type of activity, there are no alternatives.

SECTION 8: CONCLUSION

8.1 Proposed impact management objectives and the impact management outcomes for inclusion in the environmental management programme

Refer to Part A, Section 7.2 for all Proposed impact management objectives and the impact management outcomes for inclusion in the EIA/EMP Part B.

8.2 Final proposed alternatives

There are no alternatives.

8.3 Aspects for inclusion as conditions of Authorisation

All management measures set out in this EIA/EMP must be complied to. The mine must further comply with any conditions set out under other authorisations such as the IWULA that is currently underway.

8.4 Description of any assumptions, uncertainties, and gaps in knowledge

Various specialist studies were conducted as part of the application. All impact assessments and management measures are based on either the new specialist studies conducted, previous studies or on acceptable general standards.

The following assumptions were given in the specialist studies:

The numerical groundwater model, despite all efforts and advances in software and algorithms, remains a very simplified representation of the very complex and heterogeneous interacting aquifer systems underlying the study area. The integrity of a numerical model depends strongly on the formulation of a sound conceptual model and the quality and quantity (distribution, length of records etc.) of input data. Nonetheless, a numerical model can be used successfully to assess the effectiveness of various management and remediation options/techniques, especially if the shortcomings in information and assumptions made in the construction and calibration of the model are clearly listed and kept in mind during modelling (Shangoni AquiScience, 2020).

The stability calculations assumed a drained facility (Tailings Solutions, 2020).

Whilst all due care has been taken in reviewing the supplied information, the accuracy of the results and conclusions from the SWMP are entirely reliant on the accuracy and completeness of the supplied data. Flood peak calculations assume rainfall intensity is uniform throughout the duration of the storm. Analysis does not account for runoff retention or artificial acceleration within the catchment. Calculations are done for complete sub-catchment areas and should be distributed where there are more than one drainage point within the same built up catchment. Storm water control recommendations are based on industry experience and best practice. Final designs for construction should be authorised by an

approved engineer. Contour and elevation data as provided during the analysis are assumed to be accurate and representative of the site and catchment areas. Upstream catchment activities are interpreted according to common practices and no detailed insight is available on possible storm water measures beyond the site. The assessment does not guarantee the integrity of downstream infrastructure in the event of release or discharge from site. The SWMP does not impose preference over existing or proposed measures as this is an operational document to assist in the complete management of all storm water measures. Recommendations represented in this report apply to the site conditions and features as they existed at the time of Shangoni's investigations, and those reasonable foreseeable. The recommendations do not necessarily apply to conditions and features that may arise after the date of this SMWP, for which Shangoni had no prior knowledge nor had the opportunity to evaluate. (Shangoni Management Services, 2013).

8.5 Reasoned opinion as to whether the proposed activity should or should not be authorised

8.5.1 Reasons why the activity should be authorised or not

The proposed activity should be authorised as it will contribute largely to the production of Andalusite which is a refractory mineral that can contribute largely to South Africa's GDP as South Africa has one of the highest Andalusite reserves in the world. Through the allowance of the expansion and optimisation of Quarry 3, the environmental impact is significantly less than starting a new project in a new vicinity which is why the project should be authorised. The project will also ensure that locals are involved and will create opportunities for skill transfer between the mine and locals.

8.5.2 Conditions that must be included in the authorisation

The mine must update the water monitoring requirements as soon as DWS has issued an IWUL.

8.6 Period for which the Environmental Authorisation is required

According to the MWP, the estimated LoM is until 2035, however, it is possible for extension in the future. There is no specific period for which the EA is required.

8.7 Undertaking

The undertaking required to meet the requirements of this section is provided at the end of the EMP and is applicable to both the EIA report and the EMP

8.8 Financial Provision

8.8.1 Annual forecasted financial provision calculation

The financial provision for the mine is updated on an annual basis. The update will include any changes due to this project.

8.8.2 Confirmation of the amount that will be provided should the right be granted

8.8.2.1 Financial provision methodology

The following is extracted from the Imerys South Africa (Pty) Ltd: Annesley Andalusite Mine Closure Liability Report 2021 in line with Financial Provision Regulations (Shangoni Management Services, 2021):

Process followed (methodology)

The following steps were taken to update the environmental closure liability:

- A site visit was conducted on the 25th of March 2021,
- The latest survey data, aerial photos and other documents necessary to update the closure liability were obtained from the mine and information was incorporated in the calculation spreadsheet,
- Where new measurements and volumes of structures were required, designs, surveyor maps and plans and Lidar data were used to measure these aspects,
- The relevancy of the assumptions was reviewed and adjusted where necessary,
- Concurrent rehabilitation was considered, where applicable, and
- Reference maps were created and aligned with the costing sheet and this report to present a visual indication of the structures and areas as included in this report. Refer to Appendix B of the original report for maps.

The closure liability consists of the following categories:

- Physical - Demolition of infrastructure where infrastructure does not form part of end land use,
- Biophysical - Actions to safeguard (making safe and stable) and re-establish the biophysical to ensure a sustainable landform and mitigate identified risks. This includes ripping disturbed areas and seeding some of the ripped areas (where vegetation could not establish naturally), and
- Post closure management – Actions required as part of aftercare after the mine has been closed.

Demolition and rehabilitation rates

Haaks Quantity Surveyors (Haaks) was contracted by Shangoni to acquire rates for demolition and rehabilitation of mining activities. Procurement of budget pricing was approached by identifying reputable demolition companies, various sites of varying sizes at various locations and identifying local companies in the country with ability to work on similar scale project. A Bill of Quantities (BoQ) was distributed to the various companies.

The BoQ was distributed to the identified contractors to obtain the required rates. The contractors identified were contacted prior to the BoQ distribution; all contractors expressed interest and willingness

to participate in the budget estimate. As a result of the current COVID-19 pandemic and lockdown period, Haaks was not successful in obtaining any pricing from the local contractors. As a result of the lack of pricing received in the 2020 exercise, Haaks reverted to the 2015 pricing submission received and applied escalation factors to the rates based on the available Steel and Engineering Industries Federation of Southern Africa (SEIFSA) escalation factors and indexes.

After perusing several different options to gain averages, Haaks evaluated all the individual rates from the contractors received, thereafter Haaks removed all high and low outliers in order to ascertain the most relevant rate for comparison. Based on the escalation principles applied, the rates have increased by 12.7% across the board.

A CPI adjustment of 4.4% (Stats SA, April 2021) was applied to the 2020 rates to obtain the 2021 rates. The rates used as well as escalation detail, are included in Appendix C of the original report.

8.8.2.2 Auditable calculations of financial provision per activity or infrastructure

The following is extracted from the Imerys South Africa (Pty) Ltd: Annesley Andalusite Mine Closure Liability Report 2021 in line with Financial Provision Regulations (Shangoni Management Services, 2021):

Table 33: Detailed closure liability calculations

Main area	Description	Source of info	Status	Objective	Implementation phase	Rates category	Component	Schedule	Size ($m/m^2/m^3$)	Rate	Final cost
Quarries	Quarry 3	Google earth & survey plans	In process	To be filled with tailings	Concurrent	Seeding	Biophysical	2019	65000	R3.96	R257 189.40

8.8.2.3 Financial provision estimation

The Imerys South Africa (Pty) Ltd: Annesley Andalusite Mine Closure Liability Report 2021 (Shangoni Management Services, 2021) calculated the financial provision, which has included the cost of backfilling. This will take place as part of the operation and therefore no additional costs need to be set aside for this. The financial provision of R257 189.40 indicated in the table above is for reseeding of the quarry once backfilled.

Detailed calculations are included in Appendix D of the original report. The 2021 financial provision report was submitted to DMRE in September 2021.

8.8.3 Method of providing financial provision contemplated in regulation 53

This amount will be provided using a bank guarantee.

8.8.4 Capacity to manage and rehabilitate the environment

Annesley Mine has a budget for operational environmental aspects.

8.9 Deviations from the approved scoping report and plan of study

There have been no deviations to the methodology used in determining the significance of potential environmental impacts and risks

8.10 Other Information required by the competent Authority

8.10.1 Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998)

8.10.1.1 Impact on the socio-economic conditions of any directly affected person

Refer to Part A, Section 7.2 above.

8.10.1.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act

Refer to Part A, Section 7.2 above.

8.11 Other matters required in terms of sections 24(4)(a) and (b) of the Act

24 (4) Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment-	
(a) must ensure, with respect to every application for an EA-	
i. Coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state;	DMR is the only applicable authority for the proposed integrated EA and thus the only organ of state. DWS is, however the competent authority for the IWULA. All other organs of state and stakeholders will receive the EIA/EMP as well as the EIA/EMP for review.

ii. That the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in this Act and the principles of environmental management set out in section 2 are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, process, plan or project;	All the findings from investigations have been included in this EIA/EMP.
iii. That a description of the environment likely to be significantly affected by the proposed activity is contained in such application;	Environmental baseline information, based on specialist studies, has been included in this EIA/EMP.
iv. Investigation of the potential consequences for or impacts on the environment of the activity and assessment of the significance of those potential consequences or impacts; and	Investigation of impact on the environment and assessment of the significance of the potential impacts have been done by specialists.
v. Public information and participation procedures which provide all I&APs, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures; and	Refer to Part A, Section 5 for the PPP.
(b) must include, with respect to every application for an EA and where applicable-	
i. Investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity;	Investigation of impact on the environment and assessment of the significance of the potential impacts have been done by specialists.
ii. Investigation of mitigation measures to keep adverse consequences or impacts to a minimum;	Investigation of mitigation measures were done by the specialists.
iii. Investigation, assessment and evaluation of the impact of any proposed listed or specified activity on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act;	In the event of any heritage resource discovered, a qualified specialist will be appointed. This is, however, highly unlikely as the project is only for the optimisation of a quarry for tailings disposal.
iv. Reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information;	All gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information will be included in the EIA/EMP.
v. Investigation and formulation of arrangements for the monitoring and management of consequences for or impacts on the environment, and the assessment of the	A monitoring plan is included in the EIA/EMP.

effectiveness of such arrangements after their implementation;	
vi. Consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection (3); and	Environmental attributes identified were taken into consideration during the process.
vii. Provision for the adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question.	Refer to Part A, Section 2 for adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SECTION 1: DESCRIPTION OF IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

1.1 Determination of closure objectives

1.1.1 End land use

Rehabilitation of disturbed landforms is an integral part of the closure process. In order to achieve closure objectives as discussed in the previous section, it is vital for rehabilitation to commence as soon as possible during the life of the mine. Rehabilitation at Annesley Mine is being implemented on a progressive basis as mining advances, in order to minimise the long-term impact and to prevent prolonged maintenance after closure.

The end land-use has been identified as grazing and game farming. Water accumulating within the remaining quarries will be utilised and optimised to compliment the end land-use. Sloping should be at a safe angle for cattle and other animals to graze on site and provide easy access to the water. Sloping should allow for free drainage and prevent siltation of the water resources. If exotic species are introduced, they can be managed through a land management plan and the biodiversity action plan.

1.1.2 Residual impacts

If adequate concurrent rehabilitation takes place, soil and geology will be replaced, thereby reinstating the current land capability and land use. The visual impacts will also be mitigated, and surface water flow will be normal. Once mining has ceased, any dust pollution and environmental noise will also cease. No impacts from the mine will take place on heritage resources after closure. Implementation of the buffer zones will prevent the loss of highly ecological sensitive areas. Implementation of the buffer zones will prevent the loss of highly ecological sensitive areas. Mine closure will lead to retrenchment and loss of employment. This is being managed through the Social and Labour Plan (SLP). The following residual impacts are envisaged if rehabilitation does not take place successfully.

1.1.2.1 Geology

The removal of andalusite and hence geology will be permanent and therefore the impact will be permanent and therefore a residual risk.

1.1.2.2 Soil, pre-mining land capability and land use

Erosion of rehabilitated areas and erosion of final void edges will occur along with safety risks caused by water filling the final void.

1.1.2.3 Vegetation and animal life

Alien vegetation establishing on areas that have not been rehabilitated in a residual risk. This will be mitigated through vegetation monitoring.

1.1.2.4 Surface water

A natural depression will remain post-closure where surface water will likely accumulate.

1.1.2.5 Groundwater

The groundwater quality is not expected be affected in terms of quality and the water level will recover post closure. Therefore no/little residual impacts are expected if effective practices are in place during mining. Groundwater levels are expected to remain unaffected by the proposed opencast mining activities since the pit floor is planned to remain largely above the local groundwater level.

1.1.3 Closure objectives

According to the Approved Environmental Management Programme for Annesley Andalusite Mine, LP73MRC, approved 2005:

The closure objective is to restore the land to a self-sustaining, aesthetically pleasing landform and planted to pasture that could be used for grazing by the surrounding communities.

- Demolition or disposal of structures and buildings, removal of foundations and debris and rehabilitation of the surface, subject to Section 40 of the Minerals Act
- Disposal facilities (pipes, solution trenches, return water dams etc.).
    - The tailings delivery and return water pipes will be removed, as will the conveyor belt feeding the tailings dumps
- On-going seepage, control of rainwater.
    - Minimise seepage through control of rainwater on residue.
- Long-term stability.
    - Long-term stability will be enhanced by the relatively flat slope of spoil areas and the re-vegetation of bare areas with a combination of creeping and tufted grass species.
- Final rehabilitation in respect of erosion and dust control.
    - Long-term erosion and dust control will be achieved by the re-vegetation of spoil and bare areas with a combination of creeping and tufted grass species.

1.1.4 Rehabilitation process

1.1.4.1 Quarry 3

This quarry will be filled with coarse HMS residue to capacity. Hereafter, the quarry will be levelled and seeded. Final maintenance will include erosion monitoring and repair, if necessary, as well as alien

vegetation monitoring and eradication if necessary ('Rhino Minerals: Havercroft & Annesley Andalusite Mine-Environmental Management Programme Report: Blue Swallows Environmental, 2003).

1.1.4.2 Quarry 3 overburden dump

This dump will be seeded and monitored for erosion and alien vegetation (Approved Samrec (Pty) Ltd Environmental Management Programme: le Cordeur, 1998)

NOTE: Refer to the 2021 Rehabilitation strategy and implementation programme (RSIP) for the mine-wide rehabilitation measures. Also note that the RSIP will still be updated for 2022.

1.2 Rehabilitation plan

1.2.1 Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure

An annual rehabilitation plan was submitted to the DMRE and will be relevant for a period of 1 year. Objectives of the plan include a review concurrent rehabilitation and remediation activities already implemented; establishing rehabilitation and remediation goals and outcomes for the forthcoming 12 months, which contribute to the gradual achievement of the post-mining land use, closure vision and objectives identified in the holder's final rehabilitation, decommissioning and mine closure plan, establishing a plan, schedule and budget for rehabilitation for the forthcoming 12 months, identifying and addressing shortcomings experienced in the preceding 12 months of rehabilitation; and evaluating and updating the cost of rehabilitation for the 12-month period and for closure, for purposes of supplementing the financial provision guarantee or another financial provision instrument.

1.2.2 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives

The closure objectives in this EMP were taken from the Annesley Andalusite Mine Annual Rehabilitation Plan which includes the latest closure objectives which are in line with activities that will take place on site. The rehabilitation plans outline how the closure objectives are to be achieved and they work simultaneously with activities on site.

1.3 The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

1.3.1 Potential risk of acid mine drainage

Geohydrological Study and Impact Assessment for Backfilling of Quarries at Annesley Mine (Shangoni AquiScience, 2020):

As a result of the low acid forming potential and high neutralisation potential, no net acid can be generated from the mineral waste generated by Annesley. The pH is likely to be neutral to slightly

*alkaline and heavy metal solubilisation will therefore be minimal. The rock type can therefore be classified as a **Type III** which is defined as "**non-acid" forming**.*

1.3.2 Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

Refer above, not necessary.

1.3.3 Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Refer above, not necessary.

1.3.4 Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage

Refer above, not necessary.

1.3.5 Volumes and rate of water use required for the mining, trenching or bulk sampling operation

This is not applicable for the proposed activities.

SECTION 2: MECHANISMS FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON

Baseline monitoring is required to establish existing conditions that will help to define the requirements for site restoration and provide a basis for comparison of effects during the operation. Compliance monitoring should be carried out during the operation to ensure that the specified target limits are being met. The following environmental monitoring will be conducted at Annesley Mine.

Only monitoring applicable to this project is included, all additional monitoring is found in prior environmental documents.

2.1 Monitoring of impact management actions

2.1.1 Geology and topography including drainage patterns and visual aspects

Mechanism for monitoring compliance:

- After reshaping the resultant topography must be surveyed to determine the degree to which the final topography meets planned objectives
- Surface drainage and slope must meet land capability objectives, a surveyor must assess this
- Deviations from plan must be documented, and the final reshaped surface should be signed off by the responsible person prior to the replacement of topsoil.

Environmental component affected and impact	Monitoring and reporting frequency	Responsible persons
• Visual aspect. Change in topography	Once after reshaping	Mine manager / site geologist and surveyor.

2.1.2 Soil pollution and erosion

Mechanism for monitoring compliance:

Monitoring will take place in accordance with the rehabilitation plan.

- Maintenance of vehicles and machinery as per maintenance register.
- Maintenance of stormwater infrastructure
- Inspections of routes for any pollution.
- Inspections of pipeline routes.
- Inspection of road routes.
- Erosion monitoring.
- Surface water quality monitoring; groundwater quality monitoring; and monitoring of surface water drainage systems in accordance with the water monitoring programme
- Spill handling procedures should be adopted in the event of a spillage.

Environmental component affected and impact	Monitoring and reporting frequency	Responsible persons
• Soils, land capability, surrounding land use and landscape character. Pollution of topsoil and erosion • Surface and groundwater: Runoff or infiltration of spillages	Weekly basis.	Mine manager / site geologist.

2.1.3 Vegetation

Mechanism for monitoring compliance:

Monitoring will take place in accordance with the alien and invasive species monitoring and management plan.

- Alien invasive species monitoring
- Alien invasive species removal as per the management plan

2.1.4 Ground water monitoring

Please note, the groundwater monitoring below is only a recommendation. The IWUL will include the final groundwater monitoring requirements. This EMP must therefore be read with the IWUL, whereby the IWUL will be followed.

Mechanism for monitoring compliance:

Ground water monitoring will take place as per the water monitoring programme. The water monitoring programme was compiled in line with the stipulated conditions as per the IWUL. The license has not yet been granted therefore surface water monitoring will take place as per the geohydrological study.

The following parameters are proposed to be included in the groundwater monitoring programme.

- pH, EC
- TDS
- Major cations including Ca, Mg, Na, K
- Major anions including Cl, SO4, T-Alk (HCO3-/CO3-)
- Minor cations/metals including Fe, Al, Mn, Si, F
- Nutrients including PO4-, NO3-, NH4+
- Soap-oil-grease (SOG)
- Groundwater levels

Based on the geophysical investigation, additional monitoring and/ or characterisation boreholes should be drilled in the vicinity of anomalies identified on traverses 2 and 4 during the geophysical investigation

(Table 34). Water quality analyses should be undertaken as a once-off initially and then bi-annually when mining on the extension area commences.

Table 34: Positions of recommended monitoring and characterisation boreholes

Traverse no.	Station no.	Coordinates	
2	420	S24.408476	E30.272350
4	290	S24.396921	E30.257998

2.1.5 Surface water monitoring

Please note, the surface water monitoring below is only a recommendation. The IWUL will include the final surface water monitoring requirements. This EMP must therefore be read with the IWUL, whereby the IWUL will be followed.

Mechanism for monitoring compliance:

Surface water monitoring will take place as per the water monitoring programme. The water monitoring programme was compiled in line with the stipulated conditions as per the IWUL. The license has not yet been granted therefore surface water monitoring will take place as per the geohydrological study.

The following parameters are proposed to be analysed for in the surface water monitoring programme.

- pH, EC
- TDS
- Major cations including Ca, Mg, Na, K
- Major anions including Cl, SO4, T-Alk (HCO3-/CO3-)
- Minor cations/metals including Fe, Al, Mn, Si, F
- Nutrients including PO4-, NO3-, NH4+
- Soap-oil-grease (SOG)

2.1.6 Community safety

Mechanism for monitoring compliance:

Inspections will take place to ensure that the extension and optimisation of Quarry 3 is done in accordance with the following:

- The standards outlined in the Quarry 3 Optimisation report
- The Operational Manual. This is part of the Mandatory CoP as per DMR regulations
- The Highwall safety CoP

Environmental component affected and impact	Monitoring and reporting frequency	Responsible persons
• Socio-economic aspects. Safety.	As per the CoP conditions.	Site manager Health and Safety Officer

2.2 Indicate the frequency of the submission of the performance assessment report

The performance of the EIA/EMP will be assessed every two years. A financial provision will accompany the EIA/EMP which will be updated on an annual basis. This financial provision update will be accompanied by a report on rehabilitation that has taken place. An audit on the Integrated Water Use License (IWUL) will also be done to ensure compliance in all water uses and activities taking place on the mine.

SECTION 3: ENVIRONMENTAL AWARENESS PLAN

3.1 Scope

This policy applies to all permanent employees of IMERYS South Africa and its subsidiary companies being Samrec, Rhino Minerals, Ecca Holdings and Plibrico South Africa.

3.2 Purpose

IMERYS S.A. is committed to the development and empowerment of its employees by providing access to education and training programmes in order to improve employees' quality of work. The Company supports the establishment of the Skills Development Act and the Skills Development Levies Act, inter calla, by paying consistently and fully the 1% skills developmen.t levy to the Department of Labour. IMERYS S.A. realises the value of training and developing its workforce adequately and to an extent where the trained employees can be able to apply acquired knowledge and skills effectively across different contexts. Priority focus will be placed on the development of strategic skills that are related to the Company's business activities. Generic training is undoubtedly very crucial for the provision of fundamental life skills and therefore will also become a secondary area of focus.

Responsible personnel

The responsibility and authority of this policy is vested in Directors, Mine Managers, Heads of Department, Line Managers, and the EE/SD Committees.

The HRD Manager is responsible for:

- Identifying training and development. needs.
- Establishing a database of accredited service providers to provide training.
- Ensuring development and implementation of training and development interventions is in line with the Workplace Skills Plan (WSP).

Every Manager is responsible for:

- Discussing and planning training and development needs with their subordinates.
- Offering subordinates access to training and development activities.
- Monitoring performance, supporting, and coaching subordinates.

Eligible employees

Training & Development will be provided to all permanent employees who demonstrate willingness and ability to develop and grow within the Company and become more competent in their current jobs. Priority attention will be given to HDSA employees as espoused by the Mining Charter.

Principles

The following principles will guide training and development within IMERYS S.A.

- Prior to attending any training session/seminars/conferences the employee must obtain approval from his/her immediate manager.
- Equal opportunities will be provided to all staff to have access to training and development.
- All training and development interventions will be needs driven. Training needs will be determined by means of various processes such as Competence and Psychometric Assessments, Skills Audits, etc.
- Only NQF aligned and/or outcomes-based courses will be delivered by accredited training providers.
- Any training programme costing R10,000.00 and above per employee will be treated as a Bursary scheme, whereby terms and conditions thereof will be applied.
- Any additional expenses incurred while attending external she courses/seminars/conferences such as travelling and accommodation will be reimbursed by the Company on presentation of the necessary receipts, provided prior authorisation by the immediate Manager. Re-imbursement for travelling using private transport will be treated in accordance with the current Imerys S.A. Travel Allowance Policy.
- In terms of this policy, short courses will refer to a duration of 0.5 to consecutive days.

3.3 Process

- All formal training requests will be co-ordinated (via the HRD Manager) by (Managers will complete the Training Request Form and forward it to the HR Manager.
- The HRD Manager and Head of RR, Policy and. Strategy will determine the relevance of the training programme in consultation with relevant Managers or Heads Department.
- The HRD Manager will contact suitable service providers.
- Every Manager will make payment requisitions and submit those with authentic quote or pro-forma invoices to Finance Department.
- The HRD Manager will notify the Manager of the final training arrangement advance.
- At the commencement of training, all attendees will complete the internal attendance. register and the Manager will ensure proper filing thereof
- Fair assessment will be conducted to determine the competence acquired against the criteria.

3.4 Records

- All formal training seminars/conferences attended by subordinates will be recorded onto an attendance register and kept in a tile by every Manager.
- Every Manager will compile and send a Monthly Training Report to HR Department h not later than the Wednesday after production month-end.
- The HRD Manager will compile and keep a consolidated monthly training report.
- Finance Department will maintain an accurate account of training expenditure and grant received, and keep copies of invoices thereof

- Finance Department will run a monthly report of the conducted training and cost thereof, and grants received.
- All training records will be kept for a minimum period of 5 years.
- Training Request Forms to be filed by HRD Manager.
- Training Attendance Registers to be kept in file by all Managers.

3.4 Leave

Special leave on full pay will be granted for the duration of an approved short-coup training.

SECTION 4: SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

4.1 Environmental scoping report comments from DMRE

The acceptance of the final scoping report received from DMRE on the 19th of August 2021, included comments for the consideration of the EAP. These comments are covered in the able below.

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
1. The Department has evaluated the submitted SR and Plan of Study for Environmental Impact Assessment submitted on 12th of November 2021 and is satisfied that the documents complied with the minimum requirements of Appendix 2(2) of National Environmental Management Act, 1998 (as amended) (NEMA) Environmental Impact Assessment (EPA) Regulations, 2014. The SR is hereby accepted by the Department in terms of regulation 22(a) of the NEMA EPA Regulations, 2014.	The comment was noted.	N/A
2. You may proceed with the Environmental Impact Assessment process in accordance with the tasks contemplated in the Plan of Study for Environmental Impact Assessment as required in terms of the NEMA E1A Regulations, 2014 as amended.	The comment was noted.	N/A
3. Please ensure that all relevant stakeholders are consulted, and comments are submitted to the Department with the Environmental Impact Assessment Report (EIAR). This includes but is not limited to the Provincial Heritage Resources Authority via the SAHRIS portal, Provincial Environmental Department, Department of Agriculture, Forestry and Fisheries (DAFF), DWS Department of Road &	The Environmental scoping report was uploaded on the SAHRIS online system and sent to DMRE, LEDET, DWS, DARD and all other stakeholders on 10 November 2021. All above-mentioned stakeholders (including the Department of Road & Transport as well as Eskom) will be sent the draft EIA and comments/proof of the attempts made to obtain comments will be submitted with the final EIAR.	Addendum 4F: Proof of draft EIA sent and attempts to obtain comments

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
Transport, Eskom, local municipality, and the communities affected. Proof of correspondence with the various stakeholders must be included in the EIAR. Should you be unable to obtain comments, proof of the attempts that were made to obtain comments should be submitted to the Department.		
4. In addition, the following amendments and additional information are required for the EIR and EMPr: a) Details of the future land use for the site and infrastructure after decommissioning in 20-30 years.	The end land-use has been identified as grazing and game farming.	PART B, Section 1 Description of impact management objectives including management statements
b) The total footprint of the proposed development should be indicated.	The following information was provided by Tailings Solutions, the specialists that conducted the Quarry 3 optimisation report, "The total footprint area of the Annesley Q3 optimisation is 78,805 m^2 (7.88 ha). This is within the existing TSF footprint that is currently being utilised. The course discard impoundment wall will be constructed on existing course discard. Slimes will be deposited on existing slimes footprint. (5.80 ha)".	PART A, Section 1.5 Description of the activities to be undertaken
c) Possible impacts and effects of the development on the vegetation ecology with regard to lowland-highland interface in the locality should be indicated.	According to the 1998 approved EMP for Annesley Andalusite Mine, Quarry 3 was described as a planned quarry. According to the 2003 approved EMP for Annesley Andalusite Mine, Quarry 3 was described as an active pit. Therefore, using these EMPs as reference, the quarry was established between 1998 and 2003. Therefore, it can be surmised that the surrounding area had already been cleared of vegetation since	This table.

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
	approximately 2003. At present, this quarry has been mined out and is used for the storage of process water and is the mine's RWD. Backfilling of this quarry commenced after 2014, starting from the south-eastern end of the quarry. Under the mine's Integrated Water Use License (03/B71F/ACGI/4789), the disposal of 77,256m^3/a of slime water from the plant into Quarry 3 is authorised, and the water is pumped to a still tank for re-use. As the area is already disturbed and the optimisation of the already existing quarry will not lead to any clearance of vegetation (there is no increase in footprint). Thus, it is envisaged that there will be no impact on the vegetation ecology with regard to lowland-highland interface in the locality.	
d) Possible impacts and effects of the development on the surrounding industrial area.	The proposed development will take place on an already existing mining area, which has already been disturbed (as mentioned above). It is therefore envisaged that there will be no impact on the surrounding industrial area.	This table.
e) Information on services required on the site, e.g. sewage, refuse removal, water and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained?	The mine is currently operational and has these services in place already. Sewage is removed by Mokopelane General Trading cc. Refuse is removed by Bauba Marumo Waste Management, and hazardous waste is removed by Ahoy Enterprises. Water is sourced from two boreholes on the mine (section 21(a) water uses under the IWUL, with reference	This table & Addendum 6A

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
	number 03/B71F/ACG1/4789, dated 12 October 2017 and amended 18 December 2020). Electricity is provided by Eskom.	
f) A construction and operational phase EMP to include mitigation and monitoring measures.	Refer to PART A h) v) and PART B h)	This EIA
g) Should blasting be required, appropriate mitigation measures should be provided.	This comment is noted. It has been confirmed that no blasting will be taking place as part of the proposed project.	N/A
5. The applicant is hereby reminded to comply with the requirements of regulation 3 of the EIA Regulations, 2014 with regards to the time period allowed for complying with the requirements of the Regulations.	This is noted. The time frames will be adhered to.	N/A
6. Please ensure that the EIAR includes the A3 size locality maps of the area and illustrates the exact location of the proposed development. The maps must be of acceptable quality and as a minimum, have the following attributes: • Maps are relatable to one another; • Co-ordinates; • Legible legends; • Indicate alternatives; • Scale and • Vegetation types of the study area.	This has been included, please note that there are no alternatives to the proposed project.	Addendum 1A and B

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
7. Further, it must be reiterated that, should an application for Environmental Authorisation be subjected to any permits or authorisations in terms of the provisions of any Specific Environmental Management Acts (SEMAs), proof of such application will be required.	This is noted. This an Integrated Environmental Authorisation process for a Waste License and an IWULA is currently under way, which includes the necessary water uses.	Addendum 6B
8. In order to comply with Section 49 (2) and Section 50 (3) of NEMWA, you are requested to request for a Record of Decision from the department of Water and Sanitation using the **cover letter** attached to this comments. **NB**: Your Environmental Impact Report to be submitted together with the cover letter, must also address the aspects as stipulated on the **checklist** further attached on this comments.	The cover letter and checklist are attached under Addendum 5E.	Addendum 5E
9. Your attention is brought to Section 24F of the NEMA which stipulates "that no activity may commence prior to an environmental authorisation being granted by the competent authority".	This is noted. No activities will commence prior to an Environmental Authorisation and Waste License having been granted.	N/A
10. Ensure that Biodiversity specialist study is consulted with the specific unit within the Department of Environment since your Listed activities include LN3 of activity 12 of the EIA Regulation.	Please note that the clearance of an area of 300m² or more of indigenous vegetation will not be taking place. As mentioned above, the proposed development will take place on an already existing mining area, which has already been disturbed and cleared of vegetation since approximately 2003. Furthermore, the extension is taking place within the current quarry footprint.	N/A

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
11. Kindly ensure that positive & negative impact on social, environment and economic are clearly thoroughly investigated and mitigation measures are also stipulated and ensure that social impact form part of the report since the road to be relocated is a public road.	Positive & negative impacts on social, environmental, and economic aspects will be included in the report. However, there is no road that will be relocated as part of the activity.	PART A, Section 7.2
12. Ensure that financial provision quantum form part of the EIAR and it caters for the proposed additional listed activities.	Financial provision has been included for the Quarry 3 extension.	Part A, Section 8
13. You are requested to consult with relevant state department's that adjudicate mining activities and conduct PPP and submit three (3) hard copies of the EIAR and EMPr report to this office.	This is noted. The draft EIAR and EMP report was sent to all relevant state departments for 30-days for comment and 3 hard copies of the final EIAR and EMPr will be submitted at the DMR Building, 101 Dorp Street, Polokwane, 0699.	Addendum 4E

4.2 Environmental scoping report comments from DWS

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
1. 1. The applicant shall take note of Section 22(1) of the National Water Act. 1998 (Act 36 of 1998), "Permissible water use", a person may only use water- a) without a licence- I. if that water use is permissible under Schedule 1;	This comment is noted. The water uses which will be required for the proposed project are part of an IWULA for the mine, which is currently still in process. Phase 3 of the Electronic Water Use License Application and Authorisation System (e-WULAAS) was submitted on 23 March 2020. DWS requested additional information on various occasions, and the IWULA was resubmitted on 15 May 2020, 20 October 2020, 29 October	N/A

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
II. If that water is permissible as a continuation of an existing lawful use (section 32); or III. If that water use is permissible in terms of general authorisation issued under section 39; b) If the water use is authorised by a licence under this Act; or c) If the responsible authority has dispensed with a licence requirement under subsection (3), (of the same Act). 2. Therefore, any other water uses related activities associated with this project that are not permissible as indicated on Section 22(1) of the National Water Act, 1998 (Act No. 36 of 1998) shall have to be authorised by the DWS prior to such water use activities taking place.	2020, and 15 January 2021. The final submission was accepted on 29 March 2021; however, DWS engineering requested clarity on the engineering designs for the Quarry 3 extension. This information was submitted to DWS on 7 February 2022.	
3. Rehabilitation: it is indicated on the report that quarry's will be backfilled by overburden material as a process of rehabilitation. The applicant shall note that the use of overburden material for backfilling are water use activities in terms of section 21(g) "disposing of waste in a manner which may detrimentally impact on a water resources" of the National Water Act, 1998 (Act 36 of 1998) and requires authorisation by the DWS before commencement of such activity.	This comment is noted and as discussed above; this water use is included in the IWULA that is still in progress.	N/A
4. Water supply: The applicant shall note that sourcing water from any water resources for domestic is a water use activity in terms of section 21(a) of the National Water Act, 1998 (Act 36 of 1998) "taking water from a water resource" that requires authorisation by DWS. The	The applicant currently sources groundwater from a borehole situated next to the HMS Plant and abstracts groundwater from Penge shaft for mine operation at the plant. These water uses are authorised as section 21(a) water uses under the IWUL, with reference number 03/B71F/ACG1/4789,	N/A

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
applicant shall also provide DWS with a copy of signed service agreement with the service provider if water will be provided by the municipality or any stakeholder involved.	dated 12 October 2017 and amended 18 December 2020. Please note that four additional boreholes are being applied for as part of the IWULA that is currently in progress.	
5. Ablution facilities: the applicant shall note that the use of Septic tanks for sanitation system are water use activities in terms of section 21(g) "disposing of waste in a manner which may detrimentally impact on a water resources" of the National Water Act, 1998 (Act 36 of 1998) and requires authorisation by the DWS. The applicant shall provide DWS with the copy of signed service agreement with the service provider of where the effluent of the toilets will be disposed.	All septic tanks currently in use on the mine have been authorised as section 21(g) water uses under the IWUL held by the mine. The signed service agreement or proof of service being rendered will be included in the final EIA.	Addendum 6A & Addendum 6C: Proof of septic tanks being licensed (pages from the amendment IWUL)
6. Water and soil contamination: this shall be avoided by implementing proper storm water management during the entire life of the operation. The applicant must ensure that stormwater is diverted away from all the working areas. The stormwater leaving the construction areas must not be contaminated by any substance, whether that substance is a solid, liquid, vapour or any combination thereof. The soil must be stabilised in order to prevent the resulting wash downs into any water resource.	This comment is noted. The mine storm-water management plan (SWMP) was compiled by Shangoni Management Services (2013) the plan includes management measures to divert stormwater from the quarry and prevent water and soil contamination. Another SWMP was compiled for a proposed diversion on the mine in December of 2020, with general measures for stormwater management across the mine. Relevant measures from this report will be included in the EIA.	PART A, Section 7.2.2 and 7.2.5.
7. Pollution of underground and surface water: this shall be avoided by the implementing of proper water and waste management during the entire life of operation.	This comment is noted. The mine avoids such pollution by implementing a water monitoring programme as well as the Integrated Water and Waste Management Plan (IWWMP), which has been updated for 2021. Furthermore, a Geohydrological Study and Impact Assessment was	PART A, Section 7.2.4

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
	compiled in 2020 for the proposed activity (compiled by Shangoni AquiScience, a division of Shangoni Management Services (Pty) Ltd). The management measures listed in the report will be implemented by the mine to mitigate groundwater and surface water pollution.	
8. Wetland and Streams: an indication shall also be provided on the availability of any wetland or river within the proposed area as these are regarded as water resources in terms of NWA and requires full protection from any possible impacts. The applicant shall note that any activity or infrastructure located within 1: 100 year flood line of a water resources is a water use activity in terms of section 21 (c) and (i) "impeding or diverting the flow of water in a watercourse; altering the bed, banks, course or characteristics of a watercourse" of the National Water Act, 1998 (Act No.36 of 1998) and shall have to be authorised by DWS before commencement of such activity.	This is noted; however, the quarry is not located within the 1: 100 year flood line of a water resource and thus does not impede or divert the flow of water in a watercourse. An aquatic ecosystem delineation (conducted in 2016 by Galago Environmental) indicated that two drainage lines occur on site, draining from steep mountain catchment areas into the existing open cast mining areas near Segorong Quarry 1 (North of quarry 3). Another non-wetland drainage line occurs north of quarry 3 but is over 250 meters away from the quarry.	N/A
9. Storage of oil, diesel, hydraulic fluids and grease: The storage areas for these fluids should also be bunded with concrete. The applicant shall ensure that are stored and handled properly in a concrete or cement lined surface with berm walls to avoid any seepage into the groundwater resources and also ensure that the design of the storage area is such that any leakages or spillages can be contained.	This is noted. According to an external IWUL audit conducted by BECS last year, it was observed that diesel storage tanks are placed within a bunded area that was built to the capacity of the facility and can withstand a spillage event. In addition, all chemicals and reagents are placed in a chemical storage room which is built to contain any spillages.	N/A

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
10. The Applicant is requested to liaise with the DWS for guidance on the requirements for water use authorisation applications for the water use activities associated with the proposed project.	This is noted. Please note that the client is currently busy with the IWULA, as discussed above under point 2.	N/A
11. Waste management: it is indicated that waste will be collected and disposed of at a licensed waste disposal site. A signed copy of service agreement shall be submitted to the DWS to demonstrate that provision will be made to render such service.	A signed copy of the service agreement or proof of service being rendered will be submitted to the DWS as soon as possible.	Addendum 6A
12. Public Participation: The applicant should note that this is one of the critical requirements when processing a water use authorisation application and it must be done as per section 41 (4) of the National Water Act, 1998 (Act 36 of 1998).	This comment is noted. An advertisement summarising the proposed project was published in the local newspaper 'Steelburger News' and site notices were placed around the mine and in the nearby community where they were visible to people on the 19th of August 2021. As a result of the Covid-19 pandemic, no public meeting was held. However, letters were sent to all stakeholders on the 19th of August 2021. The draft scoping report was then sent to registered I&APs and stakeholders for comment on the 11th of October 2021 and the final ESR was submitted to DMRE, Limpopo Department of Economic Development, Environment and Tourism (LEDET), DWS and the Department of Agriculture and Rural Development (DARD) on the 12th of November 2021. All registered I&APs and stakeholders also received an electronic copy.	Addendum 4: Public Participation Process
13. The applicant shall note that in terms of section 19(1) of the National Water Act, 1998 (Act 36 of 1998), It is stated that "An owner of land , a person in control of land or a person who occupies or uses	This is noted and if such an event occurs, it will be reported to the Provincial Head of the DWS within 24 hours. The mine has an environmental incident	N/A

Comment raised	EAP's Response	Section reference in this EIA where issues and or response were incorporated
the land on which-(a) any activity or process is or was performed or undertaken; or (b) any other situation exists, which causes, has caused or is likely to cause pollution of a water resources must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring". Any pollution incident(s) originating from the proposed project shall be reported to the Provincial Head of the DWS within 24 hours.	response procedure which outlines the process to be followed in such an event.	

4.3 Procedures for environmentally related emergencies and remediation

The following was extracted from the Environmental emergency's procedure (BECS Environmental, 2016).

An Environmental incident is defined as follows:
An unexpected, sudden, and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property (NEMA); includes any incident or accident in which a substance pollutes or has the potential to pollute a water resource; or has, or is likely to have, a detrimental effect on a water resource (NWA).

The mine has an environmental incident procedure in place, which specifies the procedure to be followed in the case of such an event taking place.

4.4 Integrated water use licence

The water uses which will be required for the proposed project are part of an IWULA for the mine, which is currently still in process. Phase 3 of the Electronic Water Use License Application and Authorisation System (e-WULAAS) was submitted on 23 March 2020. DWS requested additional information on various occasions, and the IWULA was resubmitted on 15 May 2020, 20 October 2020, 29 October 2020, and 15 January 2021. The final submission was accepted on 29 March 2021; however, DWS engineering requested clarity on the engineering designs for the Quarry 3 extension. This information was submitted to DWS on 7 February 2022.

SECTION 5: UNDERTAKING

The EAP herewith confirms

a) the correctness of the information provided in the reports ☒
b) the inclusion of comments and inputs from stakeholders and I&APs ☒
c) the inclusion of inputs and recommendations from the specialist reports where relevant ☒
d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed ☒

The EIA/EMP will, should it comply with the provisions of section 24N of NEMA as well as the applicable EIA Regulations i.t.o. NEMA, be approved, become an obligation in terms of the approved EIA/EMP and mining right issued.

Herewith I, the person, whose name, and identity number are stated below, confirm that I am the person that compiled this report in accordance with the above-mentioned conditions.

Full Names and Surname	Christopher Allen Delport
Identity Number	9507265046081
Designation	Report compiler Candidate Scientist (Environmental Science) with SACNASP: Number 144476
Signature	

Herewith I, the person, whose name, and identity number are stated below, confirm that I am the person that reviewed this report in accordance with the above-mentioned conditions.

Full Names and Surname	Salome Beeslaar
Identity Number	8310190032081
Designation	Report reviewer Reg. EAP (EAPASA): Number 2020/846
Signature	

-END-

REFERENCES

Acocks, J.P.H., 1975: Veld Types of South Africa

Aquatico, 2018: Waste Assessment Report, Tailings & Waste Rock Streams

Aurecon, 2010: Geohydrological Evaluation for the Water Use Licence Application

BECS Environmental, 2015: Environmental Management Programme Performance Assessment Report

BECS Environmental, 2016: Quarterly Water Quality Monitoring Report

BECS Environmental, 2017: EIA/EMP for Annesley Mine

BSS, 2003: Environmental Management Plan Report. Rhino Minerals (Pty) Ltd. - Havercroft & Annesley Operation

Department of Environmental Affairs and Tourism, 2002: Information Series 5: Impact Significance of the Integrated Environmental Management Information Series

Department of Environmental Affairs, Department of Mineral, Resources, Chamber of Mines, South African Mining and Biodiversity Forum, and South African National Biodiversity Institute, 2013: Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector

Department of Water Affairs, 1996: South African Water Quality Guidelines for South Africa

Department of Water Affairs and Forestry, 2005: A level I river Ecoregional classification system for South Africa, Lesotho and Swaziland- final.

Galago Environmental, 2016: Aquatic Ecosystem Delineation Report

Galago Environmental, 2016: Aquatic ecosystem rehabilitation plan for the On a Portion of the farm ANNESLEY 109 KT

Galago Environmental, 2016: Flora Report for a Portion of the farm ANNESLEY 109 KT

Geological Survey. 2430 Pelgrims Rest published 1:250 000 Geological Map

International Union for Conservation of Nature and Natural Resources, 2000: The IUCN Red List of Threatened Species

Letaba Environmental Services, 2016: Chemical and Microbiological Analysis Report

LWI, 2008: Draft final air quality management plan

Mucina, L. & Rutherford, M.C. (eds), 2006: The vegetation map of South Africa, Lesotho and Swaziland. Strelitzia 19, South African National Biodiversity Institute

nd. nd: Environmental Management Programme

Ollis, D. J., Snaddon, C. D., Job, N. M. & Mbona, N., 2013. Classification system for wetlands and other aquatic ecosystems in South Africa. User Manual: Inland Systems. Pretorai: South African National Biodiversity institute

Rational Environmental, 2016: Diversion Storm Water Management Plan

Rational Environmental, 2020: Annesley Mine - Storm Water Management Plan

Shangoni, 2006: Environmental Management Programme

Shangoni, 2012: Integrated Water and Waste Management Plan

Shangoni Management Services, 2013: Annesley Andalusite Mine: Storm Water Management Plan

Shangoni, 2014: Geochemical study

Shangoni Management Services, 2016: Air Emission License

Shangoni AquaScience, 2017: Geohydrological impact assessment as input to the Section24G Rectification

Shangoni AquiScience, 2020: Geohydrological Study and Impact Assessment for Backfilling of Quarries at Annesley Mine

Tailings Solutions, 2020: Imerys Annesley Quarry 3 Optimisation Report

Van Wyk, B-E., Van Oudtshoorn, B. & Gericke, N., 2002: Medicinal plants of South Africa. Briza Publications, Pretoria

Van Wyk, B-E. & Wink, M. 2004: Medicinal Plants of the World. Briza Publications, Pretoria

Water Research Commission, 1998: Quality of domestic water supplies. Vol. 1: Assessment guide. TT 101/98

Alien and Invasive Species List, GN599 of 2014 i.t.o. the National Environmental Management Biodiversity Act No 10 of 2004 (as amended)

Alien and Invasive Species Regulations, GN598 of 2014 i.t.o. the National Environmental Management Biodiversity Act No 10 of 2004 (as amended)

Conservation of Agricultural Resources Act Regulations, GN1048 of 1984 i.t.o. the Conservation of Agricultural Resources Act No 43 of 1983 (as amended)

Environmental Conservation Act no 73 of 1989 (as amended)

Environmental Impact Assessment Regulations, GN 982 of 2014 i.t.o. the National Environmental Management Act No 107 of 1998 (as amended)

Minerals Act no 50 of 1991 (as amended)

Mineral and Petroleum Resources Development Act no 28 of 2002 (as amended)

Mineral and Petroleum Resources Development Regulations, GN 527 of 2004 (as amended) i.t.o. the Mineral and Petroleum Resources Development Act No 28 of 2002 (as amended)

National Environmental Management Act No 107 of 1998 (as amended)

National Environmental Management Biodiversity Act No 10 of 2004 (as amended)

National Environmental Management Waste Act No 59 of 2008 (as amended)

National Forest Act No 84 of 1998

National Heritage Resources Act no 25 of 1999

National Veld and Forest Fire Act No 101 of 1998

National Water Act no 36 of 1998 (as amended)

Publication of Exempted Alien Species, GN509 of 2013 i.t.o. the National Environmental Management Biodiversity Act No 10 of 2004 (as amended)

Publication of National List of Invasive Species, GN507 of 2013 i.t.o. the National Environmental Management Biodiversity Act No 10 of 2004 (as amended)

Publication of Prohibited Alien Species, GN508 of 2013 i.t.o. the National Environmental Management Biodiversity Act No 10 of 2004 (as amended)

Regulations pertaining to financial provisioning for prospecting, exploration, mining, or production operations, GN 1147 of 2015 i.t.o. NEMA

South African National Standards, SANS 241, 2011: Physical, aesthetic, operational and chemical determinants for drinking water