





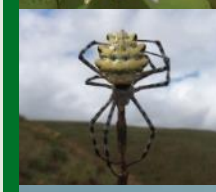



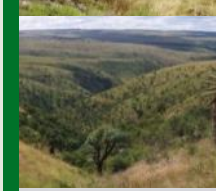


ENVIRONMENTAL IMPACT MANAGEMENT SERVICES

ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

Volume 1 of 4

PREPARED ON BEHALF OF:
PEMBANI COAL CAROLINA

Amendment to Mining Right and an amendment to Mine Works Programme

DMR REFERENCE NUMBER:

MP30/5/1/2/2/112MR

EIMS REFERENCE NUMBER:

1156

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20 YEARS 1993 - 2013

Leaders in Environmental Management

ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME

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Checked:	Liam Whitlow		April 2017
Authorized:	Liam Whitlow		April 2017

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REVISION AND AMENDMENTS

Date	No.	Description Of Revision Or Amendment
	0	

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WATSE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

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IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of Section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of Section 17)1)(c) the Competent Authority must check whether the application has taken into account any minimum requirements applicable ir instructions or guidance provided by the Competent Authority to the submission of applications.

It is therefore the instruction that the prescribed reports required in respect of application for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information requested herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the report, in order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment 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 impct 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. The degree to which these impacts-
        (aa) Can be reversed;
        (ba) May cause irreplaceable loss of resources; and
        (ca) Can be managed, avoided 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.

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ABBREVIATIONS

ABATE	:	Acid-Base Accounting Technique and Evaluation
AEL	:	Air Emissions Licence
AMD	:	Acid Mine Drainage
APPA	:	Atmospheric Pollution Prevention Act
BID	:	Background Information Document
DAP	:	Diatom Assessment Protocol
DARDLEA	:	Department of Agriculture, Rural Development, Land and Environmental Affairs
DEA	:	Department of Environmental Affairs
DEDET	:	Department of Economic Development, Environment and Tourism
DMR	:	Department of Mineral Resources
DWA	:	Department of Water Affairs
DWAF	:	Department of Water Affairs and Forestry
DWS	:	Department of Water and Sanitation
EA	:	Environmental Authorisation
EC	:	Electrical Conductivity
ECA	:	Environmental Conservation Act
EHS	:	Environmental, Health, and Safety
EIA	:	Environmental Impact Assessment
EIMS	:	Environmental Impact Management Systems (Pty) Ltd.
EMP	:	Environmental Management Plan
EMPR	:	Environmental Management Program
EMS	:	Environmental Management System
ESMS	:	Environmental and Social Management System
FAII	:	Fish Assemblage Integrity Index
FRAI	:	Fish Response Assessment Index
FPA	:	Fire Protection Agency
IFC	:	International Finance Corporation
IHAS	:	Invertebrate Habitat Assessment
ISO	:	International Organisation for Standardisation
IUCMA	:	Inkomati-Usuthu Catchment Management Agency
IWUL	:	Integrated Water Use License
IWULA	:	Integrated Water Use License Application
IWWMP	:	Integrated Water and Waste Management Plan
LoM	:	Life of Mine
MPRDA	:	Mineral and Petroleum Resources Development Act
NEMA	:	National Environmental Management Act
NEMAQA	:	National Environmental Management: Air Quality Act
NEMBA	:	National Environmental Management: Biodiversity Act

NEMWA:	National Environmental Management: Waste Act
NHRA :	National Heritage Resources Act
NOMR :	New Order Mining Right
OC :	Opencast
PES :	Present Ecological Status
PPP :	Public Participation Process
PRECIS:	Pretoria (PRE) Computerised Information System
Pri. Sci. Nat.:	Professional Natural Scientist
RSIP :	Rehabilitation Strategy and Implementation Plan
SASS5 :	South African
SAWQG:	South African Water Quality Guidelines
SHE :	Safety, Health and Environmental
SLP :	Social and Labour Plan
TDS :	Total Dissolved Solids
Temp :	Temperature
TOPS :	Threatened and Protected Species
TWQR :	Target Water Quality Ranges
TZP :	Twyfelaar Zandvoort Paardeplaats
UG :	Underground
WET :	Whole Effluent Toxicity
WML :	Waste Management License
WWC :	World Wide Coal (Pty) Ltd

EXECUTIVE SUMMARY

INTRODUCTION TO THE PROJECT

The Applicant, Pembani Coal Carolina (Pty) Ltd (Pembani) (formerly Worldwide Coal Carolina (Pty) Ltd), has an approved mining right and Environmental Management Programme (EMPR) in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002, as amended) (MPRDA) for the mining of coal at the Pembani Colliery. The Applicant has a Prospecting Right (PR) and an Environmental Management Plan (EMP) in terms of the MPRDA for the prospecting of coal on the farm Zandvoort 10 IT.

Pembani wish to amend the approved mining right (MP 30/5/1/2/2/112 MR) to include the following:

- Amend the Mining Right boundary to include Portions 1 and RE of the farm Zandvoort 10 IT (hereafter referred to as Zandvoort) for the purposes of underground mining of coal; and
- Pembani proposes to amend their existing mining works programme (within the approved mining right boundary) to include the mining of additional coal resources.

In order to amend the current Mining Right to include Zandvoort it is necessary that an Environmental Authorisation (EA) application, supported by a Scoping Report and an Environmental Impact Assessment Report (EIAR) are submitted to the DMR. Pembani is required to assess any new environmental impacts associated with the change in the mining programme, and area, and to establish appropriate mitigation measures to address the impacts. Consequently, a revised consolidated EMPR is required.

The proposed amendments aim to allow for the continuation of mining operations currently underway and extend the Colliery's current Life of Mine (LoM) by an additional ten (10) years to a total of 30 years. Coal will be transported and processed according to the existing mines current approved operations.

Pembani has an approved existing old order Mining License (ML) in terms of the Minerals Act (MA), over Portion 5 of the farm Groenvallei 40 IT (MP 30/5/1/2/2/221 MR OT 5/3/2/600), as well as an approved EMPR, dated March 2003. An application for conversion to a New Order Mining Right (NOMR), in terms of the MPRDA, was lodged with the DMR on 19 April 2007. An EMP amendment, for the inclusion of underground mining, the Imbani Wash Plant (previously referred to as the Carolina Coal Wash Plant), co-disposal and pollution control dams (PCD's), was submitted on 28 July 2009, as supporting document to the conversion. The old order mining licence is to date still awaiting conversion.

The Pembani Colliery and Zandvoort area are situated east of Carolina, immediately north of the R38, in the Mpumalanga Province, South Africa. The Pembani Colliery has been in operation since approximately 2008 and is situated in the magisterial district of Carolina and falls under the Chief Albert Luthuli Local Municipality, situated in the Gert Sibande District Municipality.

PURPOSE OF THIS DOCUMENT

Pembani Colliery has recently commenced with underground mining and wishes to extend their underground mining footprint to include the proposed Portions 1 and RE of the farm Zandvoort 10 IT. Furthermore, Pembani want to amend the existing Mine Works Programme (MWP) to include additional underground and opencast mining at Pembani Colliery.

It is the intention of this Environmental Impact Assessment Report (EIR) and Environmental Management Programme Report (EMPR) to provide the necessary information, impact assessment, mitigation measuresand monitoring progrmames regarding the proposed inclusion of additional areas within the existing Pembani Colliery Mining Right, as well as to provide information on the proposed changes with regards to amendment of the existing MWP.

Due to the changes in the MWP, to include additional mining areas, and proposed mine design (including Zandvoort into the NOMR), it is important that Interested and Affected Parties (I&AP's) are provided with an opportunity to review and comment on the EIR and EMPR, thereby contributing to the Environmental Impact Assessment (EIA) Process and assisting in identify any additional risks or impacts that may be experienced. As such this document shall be available to I&AP's for review and comment for a period of 30 days from 15 April 2017 to the 19 May 2017, before it is finalised to include the results of the consultation and submitted to the competent authority for adjudication.

BRIEF PROJECT SUMMARY

The Pembani Colliery is situated within the northern part of the Ermelo Coalfield, which forms part of the coal-bearing Vryheid Formation of the Ecca Group. The B Seam and the E Seam are the main economic coal seams present within the mining area and these are exploited by means of opencast and underground mining operations. The average depth of the E seam is 53 metres (m) and 27.6 m for the B seam.

The Pembani Colliery has been in operation for several years and as such there have been numerous EIA studies and a number of licenses and authorisations are held by the mine. The following rights, authorisations and approvals are currently in place and have been considered in the compilation of the report:

- A NOMR;
- A Prospecting Right;
- A Mining License (currently in process of conversion to a NOMR);
- An Environmental Authorisation in terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA); and
- An Integrated Water Use Licence (IWUL) in terms of the National Water Act (NWA).

The mining operations at Pembani Colliery involve a combination of both opencast and underground mining methods. A contractor is conducting the opencast operations which are undertaken in the form

of strip mining where the strips are laid out to follow the surface contours. As the strips progress, the previous pit is rehabilitated, thus resulting in minimal surface disturbance.

Historically, a number of opencast pits were mined however no progressive rehabilitation was undertaken. As such, in addition to the current opencast mining which follows the strip mining approach with progressive rehabilitation, there are historical opencast pits in various stages of rehabilitation. This EMPR includes an environmental management framework that will ensure that adequate rehabilitation is undertaken for the existing opencast areas and that future mining is undertaken together with progressive rehabilitation in accordance with best practise.

Underground mining has been initiated recently and is undertaken by Pembani. The underground reserves are accessed via one of the existing pits (highwall entrance). The mining methods to be employed for underground mining are standard bord and pillar techniques. The coal will then be transported by truck to the existing Imbani Wash Plant located on the farm Paardeplaats 12 IT (Portion 7 of Portion 3). From the plant, the coal is transported to local markets or the Droogvallei siding for rail transportation.

MINE INFRASTRUCTURE

At present the Pembani Colliery consists of the following main infrastructure:

- Opencast pits in various stages of rehabilitation;
- Haul roads;
- Storm water management infrastructure;
- Contractors camp including workshop, diesel storage, offices and ablution facilities;
- Raw water dams and Pollution Control Dams (PCD's);
- Water pipelines and associated water management infrastructure;
- Co-disposal facility
- Imbani Wash Plant;
- Administrative offices;
- Security and fencing;
- Product stockpiles;
- Discard and overburden stockpiles;
- Topsoil stockpiles;
- Monitoring boreholes;
- Highwall entrance to underground;
- Underground mining sections; and
- Site camp associated with underground mine entrance.

ENVIRONMENTAL SPECIALIST STUDIES

A comprehensive baseline assessment was undertaken during the EIA in support of the Mining Right Application from 2004 – 2006. In addition to these baselines studies, three additional specialist studies were undertaken in 2015 on Zandvoort in support of the S102 application, namely:

- Heritage and Palaeontology Assessment;
- Fauna and Flora Assessment; and
- Soils, Land Use and Land Capability Assessment.

During the scoping phase, it was identified that a biodiversity and a heritage study needs to be conducted for Kwaggafontein 8 IT. The results of these specialist studies have been included in this document. Furthermore, SAHRA requested palaeontological studies to be undertaken for Zandvoort during the EIR phase of the project. A palaeontological study was undertaken for both Kwaggafontein and Zandvoort during April 2017. The results of these studies have been included in this report.

ENVIRONMENTAL IMPACT ASSESSMENT

A screening assessment was undertaken to identify all the potential risks and impacts associated with each phase of the mining operations. The background information from existing EIA and specialist studies undertaken for the site were consulted as well as a screening of all the activities underway and planned for the mine to ensure that all of the potential impacts have been identified. For the existing mining operation, there are no construction phase related impacts to be assessed and therefore only operational, decommissioning, and rehabilitation and closure impacts have been assessed. Each of the identified risks and impacts for these phases was assessed using the EIMS impact assessment methodology described in the body of the report. The assessment criteria include the nature, extent, duration, magnitude/intensity, reversibility, probability, public response, cumulative impact, and irreplaceable loss of resources.

The most significant risks and impacts were those that remain high in terms of significance even post mitigation measures being considered. The following impacts were determined to have a high negative final significance:

- Impacts on geology;
- Pollution of surface water resources/decreased water quality;
- Dewatering of groundwater aquifers;
- Pollution of groundwater/decreased water quality;
- Acid Mine Drainage (AMD);
- Decant from underground workings;
- Loss and disturbance of wetland habitat; and
- Destruction/damage of heritage resources.

In terms of positive imapcts, the following key benefits have been identified:

- Discovery and preservation of fossils;
- Coal supply for energy security;
- Economic growth; and
- Employment Opportunities.

SUMMARY OF KEY FINDINGS

Three new environmental specialist studies were undertaken for Zandvoort and it was determined that a number of sensitive features exist on this farm. Several new heritage sites were discovered which include graves and graveyards as well as historical structures. It was also determined that there are some remaining natural areas on this property which have a high biodiversity value. As Zandvoort will only be utilised for underground mining, which will be accessed through an existing opencast area, no surface disturbance will occur on this property. It was therefore determined that by implementing the recommended mitigation measures, the post mitigation impacts would be of low to medium significance. It was however noted that there is a potential for fossils to exist within the geology of this property as well as the other properties within the mining right. As such the specialist had made a recommendation for further investigation of the mine stockpiles to determine whether any significant fossil remains may exist. Furthermore, SAHRA requested that a palaeontological study be conducted for the Zandvoort site. During a field survey of the proposed development footprint no fossils were found. However, the palaeontological specialist indicated that should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist. This requirement has been included as a commitment in this EMPR. Depending on the results of the specialist visit, it may be necessary to develop a plan for the rescue and preservation of fossil material from the underground mining operations. In terms of heritage resources, the specialist has recommended a monitoring programme to detect any potential impacts due to blasting and vibration (although considered highly unlikely) and this has also been included as a commitment in the EMPR.

In terms of site sensitivities, the most sensitive features which will require protection on site may be summarised as follows:

- Critical Biodiversity Areas;
- Ecologically Sensitive Areas;
- Heritage sites (including graveyards and historical structures); and
- Watercourses, wetlands and dams.

EIR AND EMPR MITIGATION MEASURES

The EIR and EMPR have identified appropriate mechanisms for avoidance and mitigation of negative impacts. It is anticipated that the implementation of the Environmental and Social Management System (ESMS) and mitigation measures stipulated in this EIR and EMPR will result in effective mitigation of the negative impacts. Conversely the implementation of the mitigation measures designed to maximise the positive aspects of the project will result in a significant positive influence as a result of the mines operation.

Some of the key mitigation measures which have been identified to promote sound environmental and social performance are as follows:

- The Applicant shall develop an effective ESMS as described in the EMPR that is appropriate to the nature and scale of the project.
- The Applicant shall develop and implement social and environmental plans and procedures to support the successful implementation of the ESMS. The ESMS shall dictate which plans and procedures are required.
- An Integrated Rehabilitation and Closure Plan must be developed by a specialist for implementation within one year of the approval of the EIR and EMPR. The Plan shall be viewed as a dynamic document and shall be subjected to independent review on an annual basis along with the quantum for financial provision.
- The Applicant shall appoint a suitably qualified and competent Independent Environmental Control Officer (ECO) who shall be tasked with auditing the mines environmental compliance. The ECO shall undertake monthly site inspections and prepare audit reports to be submitted to the mines management. The ECO must preferably have a tertiary qualification in an Environmental Management or appropriate field and experience in the implementation of environmental management specifications.
- The EIR and EMPR must be made binding on all contractors, sub-contractors or agents operating on behalf of the Mining Right Holder.
- The Applicant must appoint suitably qualified palaeontology and archaeology specialists to develop a Heritage Management Plan for the mine. This should include the relevant measures to protect and monitor all known heritage resources on site. Furthermore, the plan should include a chance finds procedure to protect any heritage or fossil resources which may be discovered during the operations.
- A palaeontologist has conducted a single one-day site visit to Zandvoort and Kwaggafontein. Although no fossils were found on site, should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage

Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

- The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved collection (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA. The palaeontologist must provide a written report of the findings and submit this to the SAHRA. Should significant fossils be found, the Applicant shall develop and implement, in consultation with the palaeontologist, a long-term strategy and budget for the recovery of significant fossils during the mining operation.
- In the event that graves or cemeteries must be relocated, a full grave relocation process must be undertaken that complies with legal requirements and includes comprehensive social consultation.
- The Applicant shall take the necessary precautions to avoid any impacts to wetlands outside of the required construction and/or mining footprint. These areas should be considered as no-go areas, and the restriction should be enforced. Should the Applicant not be able to comply with these conditions, the relevant authorisations, exemptions or licences will be obtained and complied with.

ENVIRONMENTAL MANAGEMENT SYSTEM

In addition to mitigation of environmental impacts, this EIR and EMPR provides a framework for holistic environmental management at the mine through the implementation of an ESMS. The mine shall be required to appoint a suitably qualified specialist to develop the ESMS to be implemented on the mine. Adequate resources (people, financial and technical) shall be made available to ensure effective establishment, implementation, maintenance and continual improvements of the ESMS. The ESMS shall include the requirement to constantly monitor environmental performance and assess the adequacy of environmental resources provided for the mine. If required, the mine would need to procure further environmental resources to ensure the successful implementation of the ESMS and EMPR.

NEED AND DESIRABILITY OF THE PROJECT

The major benefits of the project are as follows:

- The Pembani Colliery has created direct employment for up to 171 workers and through the indirect employment of hiring contractors and obtaining supplies;
- The extension of Life of Mine (LoM), afforded by new opencast and underground areas, extends these job opportunities and postpones the need for large-scale retrenchment associated with mine closure;
- The Pembani Colliery mining operations make a significant contribution to the inland coal market and as an earner of foreign currency;

- The Pembani Colliery is a major contributor of rates and taxes to the Regional Services Council of Carolina, who will use the funds to develop the area; and
- Pembani invests in social capital by undertaking their Social and Labour Plan (SLP), and promoting sustainable local economic development within the surrounding area.

PART A:

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1. INTRODUCTION

The Applicant, Pembani Coal Carolina (Pty) Ltd (Pembani) (formerly World Wide Coal (Pty) Ltd) (WWC), has an approved Mining Right (MR) and Environmental Management Programme (EMPR) in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002, as amended) (MPRDA) for the mining of coal at the Pembani Colliery. The Applicant has a Prospecting Right (PR) and Environmental Management Plan (EMP) in terms of the MPRDA for the prospecting of coal on the farm Zandvoort 10 IT (hereafter referred to as Zandvoort).

Pembani has an approved existing old order Mining License (ML) in terms of the Minerals Act (MA), over Portion 5 of the farm Groenvallei 40 IT (MP 30/5/1/2/2/221 MR OT 5/3/2/600), as well as an approved EMP, dated March 2003. An application for conversion to a NOMR, in terms of the MPRDA, was lodged with the DMR on 19 April 2007. An EMP amendment, for the inclusion of underground mining, the Imbani Wash Plant (previously referred to as the Carolina Coal Wash Plant), co-disposal and pollution control dams (PCD's), was submitted on 28 July 2009, as supporting document to the conversion. The old order mining licence is to date still awaiting conversion and as such is not included in this EA application but is referred to in this report as a comprehensive description of the entire mining operation.

The Pembani Colliery and Zandvoort prospecting area are situated east of Carolina, immediately north of the R38, in the Mpumalanga Province, South Africa. The Pembani Colliery has been in operation since 2008 and is situated in the magisterial district of Carolina and falls under the Chief Albert Luthuli Local Municipality, situated in the Gert Sibande District Municipality.

The Pembani Colliery is situated within the northern part of the Ermelo Coalfield, which forms part of the coal-bearing Vryheid Formation of the Ecca Group. The B Seam and the E Seam are the main economic coal seams present within the mining area and these are exploited by means of opencast and underground mining operations. The average depth of the E seam is 53 metres (m) and 27.6 m for the B seam.

As an existing operational mine, the Pembani Colliery has been subject to several environmental approval processes in terms of the following legislation:

- MPRDA;
- Minerals Act, 1991 (MA, Act 50 of 1991);
- National Environmental Management Act (NEMA, Act No. 107 of 1998); and
- National Water Act (NWA, Act No. 36 of 1998).

The Pembani Colliery has been in operation for several years and as such there have been numerous EIA studies and a number of licenses and authorisations are held by the mine. The following rights, licenses, authorisations and approvals are currently in place and have been considered in the compilation of this report:

Table 1: Approval & Authorisation History

Document	Consultant	Applicable Properties	Reference Number
MA EMPR (2003)	Clean Stream Environmental Services	Portion 5 (a Portion of Portion 1) of Groenvallei 40 IT	(Mining Licence (ML)) MP 30/5/1/2/2/221 MR
MPRDA EMP (2006)	Ingwe Collieries (Pty) Ltd	Portions Remaining Extent (RE) and 1 of Zandvoort 10 IT	(PR) MP 30/5/1/1/2/415 PR
MPRDA EMPR (2006)	Digby Wells and Associates (Pty) Ltd (Digby Wells)	Portions 3, 4, 8, 9, and 10 of Twyfelaar 11 IT; Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT; Portions 2 and RE of Paardeplaats 12 IT; Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT; Leeuwpoort 13 IT; Portions RE, 1, 2, and 3 of Hawerfontein 7 IT; and Portion RE of Kwaggafontein 8 IT	(MR) MP 30/5/1/2/2/112 MR
MPRDA EMPR (2009)	Cabanga Concepts	Portion 5 (a Portion of Portion 1) of Groenvallei 40 IT; and Portion 7 (a Portion of Portion 3) of Paardeplaats 12 IT	(ML) MP 30/5/1/2/2/221 MR OT 5/3/2/600 (pending)

Document	Consultant	Applicable Properties	Reference Number
NEMA S24G (2011)	Cabanga Concepts	Portions RE, 4, and 5 of Haarlem 39 IT; Portions 16 and RE of Portion 1 of Groenvallei 40 IT; Portion RE of Portion 8 of Twyfelaar 11 IT; and Portion 8 of Kwaggafontein 8 IT	(EA) 17/2/4/G (GS) -33
NWA IWUL (2011)	Cabanga Concepts	Portion 9 of Appeldoorn 38 IT; Portions 5, 7, and 16 of Groenvallei 40 IT; Portion RE of Haarlem 39 IT; Portions 2 and 7 of Paardeplaats 12 IT; Portion 8 of Twyfelaar 11 IT; and Portion 1 of Zandvoort 10 IT	(IWUL) 05/X11D/AGJ/466
NEMA BAR (2012)	Cabanga Concepts	Portions RE and 4 of Haarlem 39 IT	(EA) 17/2/3 GS-78
NEMA EIA (2012)	Cabanga Concepts	Portions RE, 9, and 10 of Appeldoorn 38 IT; Portions RE 1, 5, RE of Portion 7, RE of Portion 8, RE of Portion 11, 12, 13, 14, 15, 16,17, and 19 of Groenvallei 40 IT Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE of Portion 1, 2, 3, 4, 5, 6, 7, 8, 9,	(EA) 17/2/3/GS-44

Document	Consultant	Applicable Properties	Reference Number
		10, and 13 of Hawerfontein 7 IT; Portions RE of Portion 6, RE of Portion 7, 8, 9, 10, and 11 of Kwaggafontein 8 IT; Leeuwpoort 13 IT; Portions RE, 2, 4, 5, and 7 of Paardeplaats 12 IT; Portions 3, 4, RE of Portion 5, 6, 10, 11, 12, and 13 of Twyfelaar 11 IT; and Portions RE and 1 of Zandvoort 10 IT	
NWA IWULA Amendment (2015)	Cabanga Concepts	Portion 9 of Appeldoorn 38 IT; Portion RE of Portion 4 of Haarlem 39 IT; Portions RE of Portion 1, RE of Portion 5, RE of Portion 7, 8, 16, and 17 of Groenvallei 40 IT; Portions 2, 3, and 7 of Paardeplaats 12 IT; Leeuwpoort 13 IT; Portion 3, 9, and11 of Twyfelaar 11 IT; Portion 8 of Kwaggafontein 8 IT; and Portions RE and 1 of Zandvoort 10 IT	(IWUL) 16/2/7X100/C180 (Updated IWUL, Licenced 07 July 2016, Licence No. 05/X11B/ACGIJ/4704)

In addition to the approved authorisations and licenses listed in **Table 1**, Pembani also wish to amend their approved mining right (MP 30/5/1/2/2/112 MR) to include their proposed prospecting right for

Portions 1 and RE of the farm Zandvoort 10 IT (hereafter referred to as Zandvoort). The inclusion of these properties into the mining right will allow for the continuation of underground mining operations currently underway and extend the operations current Life of Mine (LoM) by an additional ten (10) years to a total of 30 years. Furthermore, Pembani proposes to amend their existing mining works programme (within the approved mining right boundary) to include the mining of additional coal resources. Coal will be transported and processed according to the existing mines current approved operations. Pembani is required to assess any new environmental impacts associated with the change in the mining programme, and area, and to establish appropriate mitigation measures to address the impacts. Environmental Impact Management Services (Pty) Ltd. (EIMS) has been appointed by Pembani as the independent Environmental Assessment Practitioner (EAP) to manage the Application.

The Environmental Authorisation Application was submitted to the Department of Mineral Resources on 01 February 2017. The Scoping Report was submitted to the DMR on 16 March 2017, following a 30 day public review period. Since the compilation of the Scoping Report that was placed out for public review on 01 February 2017, it has come to the EAPs attention that Pembani has started clearing the ground on the farm Kwaggafontein 8 IT in preparation for opencast mining. This report and associated appendices constitutes the EIR and EMPr Reports for the Pembani Colliery application. This EIR report will be made available for public review and comment from the 15 April 2017 to the 17 April 2017.

1.1 REPORT STRUCTURE

Table 2 below provides a summary of the NEMA requirements in terms of Appendix 3 of the EIA regulations (GNR 982), and an indication in which section the supporting information and documentation can be found.

Table 2: Report Structure

Environmental Regulation	Description	Section in Report
NEMA Regulation 982 (2014) Appendix 3		
Appendix 3(3)(a):	Details of – (i) The EAP who prepared the report; and (ii) The expertise of the EAP, including a curriculum vitae;	Section 1.2 Section 1.3 Appendix A
Appendix 3(3)(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 (iii) Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 1.4
Appendix 3(3)(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;	Section 1.5

Environmental Regulation	Description	Section in Report
Appendix 3(3)(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;	Section 2
Appendix 3(3)(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;	Section 3
Appendix 3(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;	Section 4
Appendix 3(3)(g):	A motivation for the preferred development footprint within the approved site;	Section 5
Appendix 3(3)(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; (ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 5.1 Section 5.2 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7 Section 5.8

Environmental Regulation	Description	Section in Report
	(iv) The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage, and cultural aspects; (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; (vi) The methodology used in determining and ranking the nature, significance, consequences, extent duration and probability of potential environmental impacts and risks; (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; (viii) The possible mitigation measures that could be applied and level of residual risk; (ix) If no alternative development locations for the activity were investigated, the motivation for not considering such; and (x) A concluding statement indicating the preferred alternative development location within the approved site;	Section 5.9 Section 5.10

Environmental Regulation	Description	Section in Report
Appendix 3(3)(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;	Section 6
Appendix 3(3)(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; (vii) The degree to which the impact and risk can be mitigated;	Section 7
Appendix 3(3)(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;	Section 8

Environmental Regulation	Description	Section in Report
Appendix 3(3)(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 indicting 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;	Section 9
Appendix 3(3)(m):	Based on the assessment, and where applicable, recommendations from the 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;	Section 10
Appendix 3(3)(n):	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Section 11
Appendix 3(3)(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;	Section 12
Appendix 3(3)(p):	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 13

Environmental Regulation	Description	Section in Report
Appendix 3(3)(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;	Section 14
Appendix 3(3)(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;	Section 15
Appendix 3(3)(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&Ps; (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 and affected parties;	Section 16
Appendix 3(3)(t):	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Section 17
Appendix 3(3)(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	Section 18

Environmental Regulation	Description	Section in Report
	(ii) A motivation for the deviation;	
Appendix 3(3)(v):	Any specific information that may be required by the competent authority; and	Section 19
Appendix 3(3)(w):	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	Section 20
NEMA Regulation 982 (2014) Appendix 4		
Appendix 4(1)(1)(a):	Details of – (i) The EAP who prepared the EMPR; and (ii) The expertise of that EAP to prepare an EMPR, including a curriculum vitae;	Section 22.1 and Appendix A
Appendix 4(1)(1)(b):	A detailed description of the aspects of the activity that are covered by the EMPR as identified by the project description;	Section 22.2
Appendix 4(1)(1)(c):	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	Section 22.3
Appendix 4(1)(1)(d):	A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified though the environmental impact assessment process for all phases of the development including – (i) Planning and design;	Section 26

Environmental Regulation	Description	Section in Report
	(ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) Where relevant, operation activities;	
Appendix 4(1)(1)(e):	A description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	Section 26.10
Appendix 4(1)(1)(f):	A description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to – (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practices; (iii) Comply with any applicable provisions of the ac regarding closure, where applicable; and (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Section 26.11
Appendix 4(1)(1)(g):	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 28

Environmental Regulation	Description	Section in Report
Appendix 4(1)(1)(h):	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 28
Appendix 4(1)(1)(i):	An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 28
Appendix 4(1)(1)(j):	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 28
Appendix 4(1)(1)(k):	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 28
Appendix 4(1)(1)(l):	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 28
Appendix 4(1)(1)(m):	An environmental awareness plan describing the manner in which – (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 31
Appendix 4(1)(1)(n):	Any specific information that may be required by the competent authority.	Section 32

1.2 DETAILS OF THE EAP

EIMS was appointed by the Applicant as the EAP to compile this report. The contact details are as follows:

Name of the Practitioner: Sonja van de Giessen

Tel No.: 011 789 7170

Fax No.: 011 787 3059

E-mail address: pembani@eims.co.za

Website: www.eims.co.za

1.3 EXPERTISE OF THE EAP

1.3.1 QUALIFICATIONS OF THE EAP

In terms of Regulation 13 of the 2014 EIA Regulations (Government Notice R. (GNR) 982), an independent EAP, must be appointed by the applicant to manage the application. EIMS has been appointed by the Applicant as the EAP and is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations and Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

- Objective and Independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the Regulations and all other applicable legislation;
- Takes into account all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

Furtheremore, EIMS have appointed a team of specialists to undertake additional studies required for the project. EIMS is responsible for project management and the compilation of the EIA and EMPR with the guidance and input from the independent specialists. The declaration of independence of the EAP and the Curriculum Vitae (indicating the experience with environmental impact assessment and relevant application processes) of the consultants that were involved in the EIA process and the compilation of this report are attached as Appendix A.

1.3.2 SUMMARY OF EAP'S PAST EXPERIENCE

EIMS is a private and independent environmental management consulting firm that was founded in 1993 and has steadily grown to be a significant player in the environmental management consulting industry in South Africa and the rest of Africa. EIMS has in excess of 20 years' experience in conducting EIAs, including many EIA's for mines and mining related projects. Please refer to the EIMS website (www.eims.co.za) for examples of EIA documentation currently available.

The consultants involved in the EIA process and the compilation of this report have the following experience:

Sonja van de Giessen is a senior consultant with more than three years of experience in environmental impact assessments and environmental management. Her core experience and expertise is in the mining industry sector, focusing on Environmental Impact Assessments, Environmental Management Programmes, Water Use Licence Applications and Integrated Water and Waste Management Plans, and Environmental Auditing. Her involvement in such projects varies from project management, to the compilation of technical and environmental documentations and reports. Sonja is registered as a trainee certified natural scientist in the field of environmental science with SACNASP.

The declaration of independence of the EAP and the Curriculum Vitae (indicating the experience with environmental impact assessment and relevant application processes) of the consultants that were involved in the EA / Scoping process process and the compilation of this report are attached as Appendix A.

1.3.3 SPECIALIST CONSULTANTS

Specialist studies have been done for the previous assessments and additional studies were only done for Zandvoort, where the EAP identified this necessary to support this application. Specialist studies were undertaken to address the key issues that required further investigation, namely the impact on biodiversity, groundwater, heritage, and soils, land use and land capability.

The specialist studies involved the gathering of data relevant to identifying and assessing environmental impacts that may occur as a result of the proposed project. These impacts were then assessed according to pre-defined rating scales (see Section 10). Specialists also recommended appropriate mitigation / control or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively. During the Scoping phase, it was determined that addional heritage and biodiversity studies needed to be conducted for Kwaggafontein. SAHRA requested during the scoping phase that a palaeontological study be conducted for the Zandvoort, therefore, a palaeontological study was conducted for both Zandvoort and Kwaggafontein. The findings of these studies have been included in the EIR.

The specialist consultants that provided inputs into this report are summarised in Table 3 below.

Table 3: List of specialists appointed to the project

Aspect	Component	Company Responsible	Consultant	Date	Authorisation
Surface Water	Surface Water Report	Digby Wells	Digby Wells	2005	(MR) MP 30/5/1/2/2/112 MR
Soil	Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 1 and 4 of the Farm Haarlem 39 IT	Rehab Green Monitoring Consultants cc	P I Steenekamp	2005	(MR) MP 30/5/1/2/2/112 MR
Soil	Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 5 of the Farm Haarlem 39 IT	Rehab Green Monitoring Consultants cc	P I Steenekamp	2004	(MR) MP 30/5/1/2/2/112 MR
Soil	Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 4 and R/E of the Farm Haarlem 39 IT and Portion 3 and 9 of The Farm Appeldoorn 38 IT	Rehab Green Monitoring Consultants cc	P I Steenekamp	2004	(MR) MP 30/5/1/2/2/112 MR
Soil	Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 2 and RE of the Farm Paardeplaats 12 IT	Rehab Green Monitoring Consultants cc	P I Steenekamp	2004	(MR) MP 30/5/1/2/2/112 MR
Soil	Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 8 of the Farm Twyfelaar 11 IT	Rehab Green Monitoring Consultants cc	P I Steenekamp	2004	(MR) MP 30/5/1/2/2/112 MR

Aspect	Component	Company Responsible	Consultant	Date	Authorisation
Soil	Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 9 and 10 of the Farm Twyfelaar 11 IT	Rehab Green Monitoring Consultants cc	P I Steenekamp	2004	(MR) MP 30/5/1/2/2/112 MR
Soil	Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 6, 7, 8 and 17 of the Farm Groenvallei 40 IT	Rehab Green Monitoring Consultants cc	P I Steenekamp	2004	(MR) MP 30/5/1/2/2/112 MR
Soil	Pre-mining Soil Assessment of the Proposed Opencast Area on Portion LG of the Farm Groenvallei 40 IT	Rehab Green Monitoring Consultants cc	P I Steenekamp	2004	(MR) MP 30/5/1/2/2/112 MR
Heritage	Heritage Assessment	Matakoma Consultants	Matakoma Consultants	2004	(MR) MP 30/5/1/2/2/112 MR
Heritage	Heritage Assessment	Cabanga Concepts	Dr. A.C. Vollenhoven	2013	N/A
Social	Social Report	Digby Wells	Digby Wells	2005	(MR) MP 30/5/1/2/2/112 MR
Ecology	Fauna and Flora Report	Digby Wells	Digby Wells	2005	(MR) MP 30/5/1/2/2/112 MR
Ecology	Ecology (Flora & Fauna) study for Zandvoort underground mining expansion	David Hoare Consulting cc	David Hoare	2015	Completed for the S102 Application

Aspect	Component	Company Responsible	Consultant	Date	Authorisation
Ecology	Biodiversity Assessment for Kwaggafontein Mine.	The Biodiversity Company	Peter Kimberg	2017	Completed for this EIA.
Heritage	Heritage Study for proposed underground mining on Zandvoort 10 IT	PGS Heritage	Polke Birkholtz	2015	Completed for the S102 Application
Heritage	Proposed opencast mining on the farm Kwaggafontein 8IT, near Carolina, Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga	PGS Heritage	Wouter Fourie	2017	Completed for this EIA
Palaeontological	Proposed opencast mining on the farm Kwaggafontein 8IT, and proposed underground mining on the farm Zandvoort 10IT near Carolina, Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga	Banzai Environmental (Pty) Ltd.	Elize Butler	2017	Completed for this EIA
Wetlands	Wetland Assessment	Strategic Environmental Focus (Pty) Ltd	Strategic Environmental Focus (Pty) Ltd	2011	N/A

Aspect	Component	Company Responsible	Consultant	Date	Authorisation
Geohydrology	Groundwater study (2012)	Future Flow GPMS cc	Martiens Prinsloo	2012	N/A
Geohydrology	Groundwater study (2015)	Future Flow GPMS cc	Martiens Prinsloo	2015	Completed for the S102 Application

1.4 DESCRIPTION OF THE PROPERTY

The existing Pembani Colliery covers approximately 17 302 ha and the proposed Zandvoort Project area covering about 471 hectares (ha). Table 4 below indicates the farm portions that fall within the Mining Right Area and includes the Mining Right Application Area, as well as the properties for which Pembani is amending its Mining Works Programme (refer Table 4 below).

Table 4: Locality Details

Farm Name	**Mining Right holder** Pembani Coal Carolina (Pty) Ltd. is the holder of a Mining Right in respect of the following properties within the existing Pembani Colliery: • Appeldoorn 38 IT Remaining Extent (RE); Portion 9 and Portion 10; • Groenvallei 40 IT Remaining Extent (RE) of Portion 1; RE of Portion 7; (RE) of Portion 8; (RE) of Portion 11; Portion 12; Portion 13; Portion 14 Portion 15; Portion 16; Portion 17 and Portion 19. • Haarlem 39 IT Remaining Extent (RE); Portion 2; Portion 3; Portion 4 and Portion 5. • Hawerfontein 7 IT Remaining Extent (RE) of Portion 1; Portion2; Portion 3; Portion 4; Portion 5; Portion 6; Portion 7; Portion 8; Portion 9; Portion 10 and Portion 13. • Kwaggafontein 8 IT Remaining Extent (RE) of Portion 6; (RE) of Portion 7; Portion 8; Portion 9; Portion 10; and Portion 11. • Leeuwpoort 13 IT Remaining Extent (RE); • Paardeplaats 12 IT Remaining Extent (RE); Portion 2; Portion 4; Portion 5; Portion 6; Portion 10; Portion 11; Portion 12 and Portion 13. • Twyfelaar 11 IT Portion 3; Portion4; Portion 6; Portion 11; Portion 12 and Portion 13; RE of Portion 5 and RE of Portion 8. The farm portions which are proposed to be added to the existing Pembani Colliery as part of this Project are as follows: • Zandvoort 10 IT Remaining Extent (RE); and Portion 1.
Application Area (Ha)	The properties within the Zandvoort Project area cover about 471 hectares (ha). The existing Pembani Colliery covers approximately 17 302 ha, and therefore, the addition of the proposed areas would increase the Pembani Colliery to a size of approximately 17 773 ha.
Magisterial District	Magisterial District of Carolina
Distance and direction from nearest town	The Pembani Coilliery is situated east of Carolina, immediately north of the R38, in the Mpumalanga Province, South Africa. The Pembani Colliery is situated in the magisterial district of Carolina and falls under the Chief Albert

	Luthuli Local Municipality, situated in the Gert Sibande District Municipality. The closest town to the mining area is Carolina, situated approximately 3 km to the West of the proposed mining sites. Table 5 below indicates the distances and directions of the mine to the closest towns.		
21 digit Surveyor General Code for each Portion	**Farm Name:**	**Portion:**	**SG Codes:**
	1. Appeldoorn 38 IT	RE	T0IT00000000003800000
	2. Appeldoorn 38 IT	9	T0IT00000000003800009
	3. Appeldoorn 38 IT	10	T0IT00000000003800010
	4. Groenvallei 40 IT	RE of 1	T0IT00000000004000001
	5. Groenvallei 40 IT	RE of 7	T0IT00000000004000007
	6. Groenvallei 40 IT	RE of 8	T0IT00000000004000008
	7. Groenvallei 40 IT	RE of 11	T0IT00000000004000011
	8. Groenvallei 40 IT	12	T0IT00000000004000012
	9. Groenvallei 40 IT	13	T0IT00000000004000013
	10. Groenvallei 40 IT	14	T0IT00000000004000014
	11. Groenvallei 40 IT	15	T0IT00000000004000015
	12. Groenvallei 40 IT	16	T0IT00000000004000016
	13. Groenvallei 40 IT	17	T0IT00000000004000017
	14. Groenvallei 40 IT	19	T0IT00000000004000019
	15. Haarlem 39 IT	RE	T0IT00000000003900000
	16. Haarlem 39 IT	2	T0IT00000000003900002
	17. Haarlem 39 IT	3	T0IT00000000003900003
	18. Haarlem 39 IT	4	T0IT00000000003900004
	19. Haarlem 39 IT	5	T0IT00000000003900005
	20. Hawerfontein 7 IT	RE of 1	T0IT00000000000700001
	21. Hawerfontein 7 IT	2	T0IT00000000000700002
	22. Hawerfontein 7 IT	3	T0IT00000000000700003
	23. Hawerfontein 7 IT	4	T0IT00000000000700004
	24. Hawerfontein 7 IT	5	T0IT00000000000700005

	25. Hawerfontein 7 IT	6	T0IT00000000000700006
	26. Hawerfontein 7 IT	7	T0IT00000000000700007
	27. Hawerfontein 7 IT	8	T0IT00000000000700008
	28. Hawerfontein 7 IT	9	T0IT00000000000700009
	29. Hawerfontein 7 IT	10	T0IT00000000000700010
	30. Hawerfontein 7 IT	13	T0IT00000000000700013
	31. Kwaggafontein 8 IT	RE of 6	T0IT00000000000800006
	32. Kwaggafontein 8 IT	RE of 7	T0IT00000000000800007
	33. Kwaggafontein 8 IT	8	T0IT00000000000800008
	34. Kwaggafontein 8 IT	9	T0IT00000000000800009
	35. Kwaggafontein 8 IT	10	T0IT00000000000800010
	36. Kwaggafontein 8 IT	11	T0IT00000000000800011
	37. Leeuwpoort 13 IT	RE	T0IT00000000001300000
	38. Paardeplaats 12 IT	RE	T0IT00000000001200000
	39. Paardeplaats 12 IT	2	T0IT00000000001200002
	40. Paardeplaats 12 IT	4	T0IT00000000001200004
	41. Paardeplaats 12 IT	5	T0IT00000000001200005
	42. Twyfelaar 11 IT	3	T0IT00000000001100003
	43. Twyfelaar 11 IT	4	T0IT00000000001100004
	44. Twyfelaar 11 IT	6	T0IT00000000001100005
	45. Twyfelaar 11 IT	10	T0IT00000000001100006
	46. Twyfelaar 11 IT	11	T0IT00000000001100008
	47. Twyfelaar 11 IT	12	T0IT00000000001100010
	48. Twyfelaar 11 IT	13	T0IT00000000001100011
	49. Twyfelaar 11 IT	RE of 5	T0IT00000000001100012
	50. Twyfelaar 11 IT	RE of 8	T0IT00000000001100013
	51. Zandvoort 10 IT	RE	T0IT00000000001000002
	52. Zandvoort 10 IT	1	T0IT00000000001000001

Table 5: Distances and directions to neighbouring towns

Town	Distance	Direction
Carolina	4.6 km	West
Badplaas	41.6 km	East
Machadodorp	45 km	North
Chrissiesmeer	23 km	South

A description of the Title Deeds, registered landowners, and existing authorisations for each of these properties is provided in Table 6 below.

Table 6: Description of the land on which the Pembani Colliery is located

Farm Name	Portion	21 digit Surveyor General Code	Title Deed	Registered Landowner	Existing Authorisations
Appeldoorn 38 IT	Remaining Extent	T0IT00000000003800000	T31304/1966	Karel Jan Doyer	(MR) MP 30/5/1/2/2/112 MR
	Portions 9	T0IT00000000003800009	T31304/1966	Karel Jan Doyer	(MR) MP 30/5/1/2/2/112 MR (EA)17/2/3 GS-44
	Portion 10	T0IT00000000003800010	T10647/1983	Anton Uys	(MR) MP 30/5/1/2/2/112 MR
Groenvallei 40 IT	Remaining Extent of Portion 1	T0IT00000000004000001	T155494/2000	Groenvallei Landbougrond CC	(MR) MP 30/5/1/2/2/112 MR (EA) 17/2/4 G (GS) - 33
	Remaining Extent of Portion 7	T0IT00000000004000007	T170532/2003	Van Rensburg Family Trust	(MR) MP 30/5/1/2/2/112 MR
	Remaining Extent of Portion 8	T0IT00000000004000008	T170532/2003	Van Rensburg Family Trust	(MR) MP 30/5/1/2/2/112 MR (EA)17/2/3 GS-44
	Portion 1	T0IT00000000004000001	T155494/2000	Groenvallei Landbougrond Pty Ltd	(EA)17/2/3 GS-44
	Portion 5	T0IT00000000004000005	T45546/2002	Carolina Coal Pty Ltd	(ML) MP 30/5/1/2/2/221 MR (IWUL) 05/X11D/AGJ/466
	Portion 7	T0IT00000000004000007	T170532/2003	Van Rensburg	(EA)17/2/3 GS-44
	Remaining Extent of Portion 11	T0IT00000000004000011	T7060/2014	Nkosi Jane Promise	(MR) MP 30/5/1/2/2/112 MR
	Portion 12	T0IT00000000004000012	T3829/1991	Goss Jan Francois	(MR) MP 30/5/1/2/2/112 MR
	Portion 13	T0IT00000000004000013	T3392/1923	Preddy Charles	(MR) MP 30/5/1/2/2/112 MR
	Portion 14	T0IT00000000004000014	T3829/1991	Goss Jan Francois	(MR) MP 30/5/1/2/2/112 MR
	Portion 15	T0IT00000000004000015	T98948/2007	Potgieter Eduard Willem	(MR) MP 30/5/1/2/2/112 MR

Farm Name	Portion	21 digit Surveyor General Code	Title Deed	Registered Landowner	Existing Authorisations
	Portion 16	T0IT00000000004000016	T38096/1995	Luus Familie Trust	(MR) MP 30/5/1/2/2/112 MR (EA) 17/2/4 G (GS) - 33
	Portion 17	T0IT00000000004000017	T94002/1992	Groenvallei Landbougrond CC	(MR) MP 30/5/1/2/2/112 MR
	Portion 19	T0IT00000000004000019	T9713/2013	Uys Roule	(MR) MP 30/5/1/2/2/112 MR
Haarlem 39 IT	Remaining Extent	T0IT00000000003900000	T13851/2008	Worldwide Coal Carolina Pty Ltd	(MR) MP 30/5/1/2/2/112 MR (EA) 17/2/4 G (GS) - 33 (EA) 17/2/3 GS-78
	Portion 2	T0IT00000000003900002	T14436/1985	St. Louis Trust	(MR) MP 30/5/1/2/2/112 MR
	Portion 3	T0IT00000000003900003	T1905/2013	National Government of the Republic of South Africa	(MR) MP 30/5/1/2/2/112 MR
	Portion 4	T0IT00000000003900004	T129297/2006	Imbani Coal Pty Ltd	(MR) MP 30/5/1/2/2/112 MR (EA) 17/2/4 G (GS) - 33 (EA) 17/2/3 GS-78
	Portion 5	T0IT00000000003900005	T17145/2008	Worldwide Coal Carolina Pty Ltd	(MR) MP 30/5/1/2/2/112 MR (EA) 17/2/4 G (GS) - 33
Hawerfontein 7 IT	Remaining Extent of Portion 1	T0IT00000000000700001	T46737/1984	Hawerfontein Boerdery Belange Pty Ltd	(MR) MP 30/5/1/2/2/112 MR
	Portion 2	T0IT00000000000700002	T121625/2007	Niehaus Diederich Wilhelm	(MR) MP 30/5/1/2/2/112 MR
	Portion 3	T0IT00000000000700003	U B Trust	T121624/2007	(MR) MP 30/5/1/2/2/112 MR
	Portion 4	T0IT00000000000700004	T28420/2006	Niehaus Diederich Wilhelm	(MR) MP 30/5/1/2/2/112 MR
	Portion 5	T0IT00000000000700005	T121625/2007	Niehaus Diederich Wilhelm	(MR) MP 30/5/1/2/2/112 MR
	Portion 6	T0IT00000000000700006	T5101/1995	Uys Johannes Cornelis Isak	(MR) MP 30/5/1/2/2/112 MR
	Portion 7	T0IT00000000000700007	T2342/2011	Khulamnotfo Co-Operative LTD	(MR) MP 30/5/1/2/2/112 MR

Farm Name	Portion	21 digit Surveyor General Code	Title Deed	Registered Landowner	Existing Authorisations
	Portion 8	T0IT00000000000700008	T18980/2008	F J van Rensburg Trust	(MR) MP 30/5/1/2/2/112 MR
	Portion 9	T0IT00000000000700009	T4088/1927	Transnet LTD	(MR) MP 30/5/1/2/2/112 MR
	Portion 10	T0IT00000000000700010	T2342/2011	Khulamnotfo Co-Operative LTD	(MR) MP 30/5/1/2/2/112 MR
	Portion 13	T0IT00000000000700013	T50568/2002	Kruger Aletta Elizabeth Dorothea Regina	(MR) MP 30/5/1/2/2/112 MR
Kwaggafontein 8 IT	Remaining Extent of Portion 6	T0IT00000000000800006	T12843/2000	McGinn Helen Jennifer	(MR) MP 30/5/1/2/2/112 MR
	Remaining Extent of Portion 7	T0IT00000000000800007	T12843/2000	McGinn Helen Jennifer	(MR) MP 30/5/1/2/2/112 MR
	Portion 8	T0IT00000000000800008	T6984/2009	Worldwide Coal Carolina (Pty) Ltd	(MR) MP 30/5/1/2/2/112 MR (EA)17/2/3 GS-44 (EA) 17/2/4 G (GS) - 33
	Portion 9	T0IT00000000000800009	T93133/2001	Wet Jan De Bruin De	(MR) MP 30/5/1/2/2/112 MR
	Portion 10	T0IT00000000000800010	T157814/2002	Taute Jan Hendrik Stander	(MR) MP 30/5/1/2/2/112 MR
	Portion 11	T0IT00000000000800011	T121624/2007	U B Trust	(MR) MP 30/5/1/2/2/112 MR
Leeuwpoort 13 IT	The entire farm	T0IT00000000001300000	T70525/2007	Worldwide Coal Carolina (Pty) Ltd	(MR) MP 30/5/1/2/2/112 MR
Paardeplaats 12 IT	Remaining Extent	T0IT00000000001200000	T15680/2010	National Government of the Republic of South Africa	(MR) MP 30/5/1/2/2/112 MR (IWUL) 05/X11D/AGJ/466 (EA)17/2/3 GS-44
	Portion 2	T0IT00000000001200002	T15314/1996	Versfeld-Schoeman Familie Trust	(MR) MP 30/5/1/2/2/112 MR (IWUL) 05/X11D/AGJ/466 (EA)17/2/3 GS-44
	Portion 4	T0IT00000000001200004	T14436/1985	St Louis Trust	(MR) MP 30/5/1/2/2/112 MR
	Portion 5	T0IT00000000001200005	T77628/2000	Arents Trust	(MR) MP 30/5/1/2/2/112 MR

Farm Name	Portion	21 digit Surveyor General Code	Title Deed	Registered Landowner	Existing Authorisations
	Portion 7 (A portion of portion 3)	T0IT00000000001200007	T140320/2000	Asithandaneni Communal Property Assoc	IMBANI WASH PLANT (ML) MP 30/5/1/2/2/221 MR OT 5/3/2/ 600 (pending)
Twyfelaar 11 IT	Portion 3	T0IT00000000001100003	T70525/2007	Nick Viljoen Familie Trust	(MR) MP 30/5/1/2/2/112 MR
	Portion 4	T0IT00000000001100004	T70525/2007	Nick Viljoen Familie Trust	(MR) MP 30/5/1/2/2/112 MR
	Remaining Extent of Portion 5	T0IT00000000001100005	T155560/2003	M J Pieterse Trust	(MR) MP 30/5/1/2/2/112 MR
	Portion 6	T0IT00000000001100006	T16021/2008	Carolina Ontwikkelings Trust	(MR) MP 30/5/1/2/2/112 MR
	Remaining Extent of Portion 8	T0IT00000000001100008	T6985/2009	Worldwide Coal Carolina (Pty) Ltd	(MR) MP 30/5/1/2/2/112 MR (EA)17/2/3 GS-44 (EA) 17/2/4 G (GS) - 33
	Portion 10	T0IT00000000001100010	T6985/2009	Worldwide Coal Carolina (Pty) Ltd	(MR) MP 30/5/1/2/2/112 MR (EA)17/2/3 GS-44
	Portion 11	T0IT00000000001100011	T173727/2003	Ekwaluseni Farming Enterprises	(MR) MP 30/5/1/2/2/112 MR
	Portion 12	T0IT00000000001100012	T34412/2005	Tau Kwena General Construction CC	(MR) MP 30/5/1/2/2/112 MR
	Portion 13	T0IT00000000001100013	T6984/2009	Worldwide Coal Carolina (Pty) Ltd	(MR) MP 30/5/1/2/2/112 MR (EA)17/2/3 GS-44
Zandvoort 10 IT	Remaining Extent	T0IT00000000001000002	T5103/1977	Davel Johannes Stephanus- Trustees	(EA)17/2/3 GS-44 Prospecting RIght
	Portion 1	T0IT00000000001000001	T5103/1977	Davel Johannes Stephanus- Trustees	(EA)17/2/3 GS-44 Prospecting Right

1.5 LOCALITY MAP

Figure **1** below indicates the locality of the Pembani Colliery, as well as the old mining licence, the prospecting right and the existing mining right boundaries.

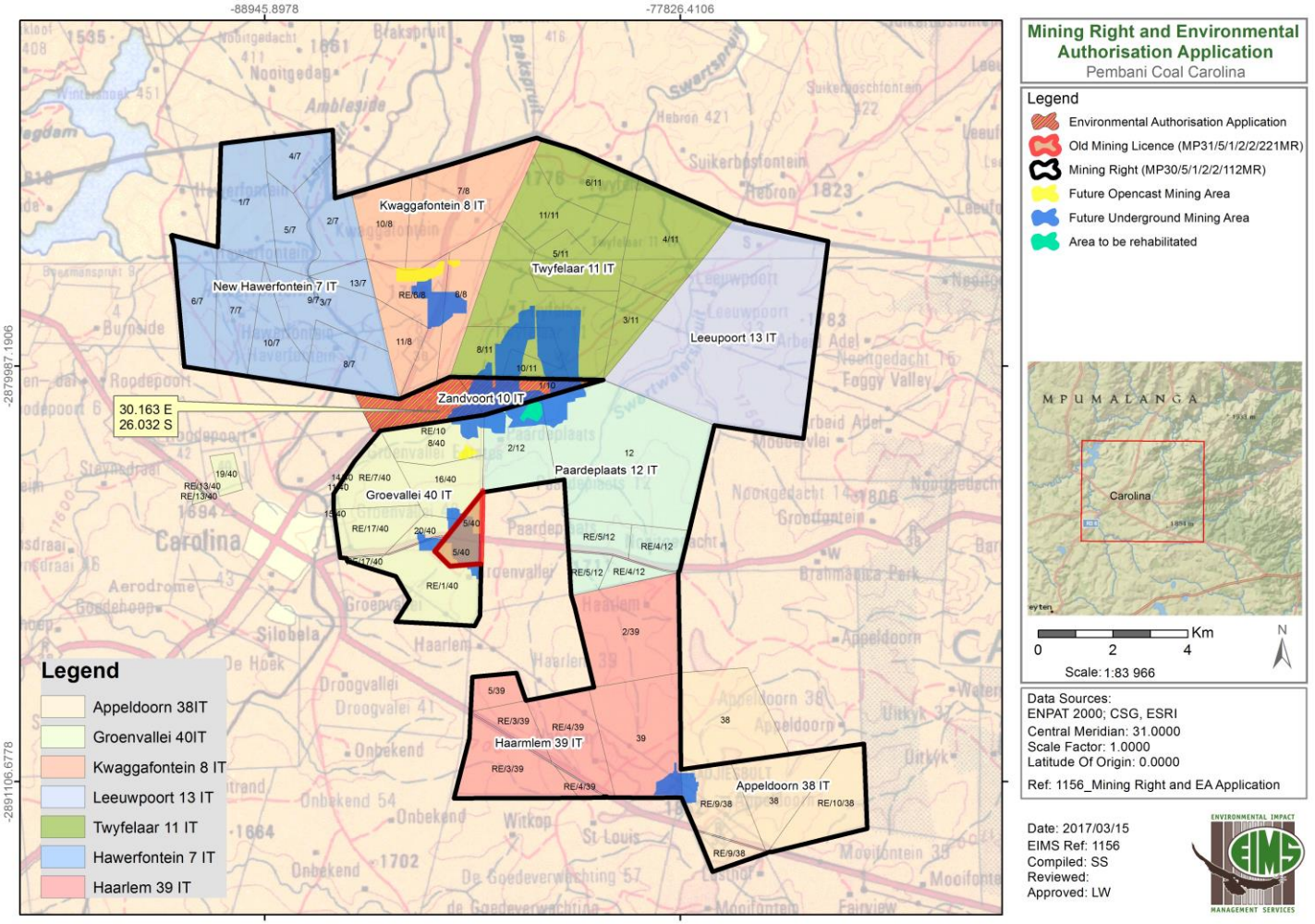


Figure 1: Locality Map

2. DESCRIPTION AND SCOPE OF THE PROPOSED ACTIVITY

Pembani has an approved mining right (MP 30/5/1/2/2/112 MR) and EMPR in terms of the MPRDA for the mining of coal at the Pembani Colliery. Additionally, the Applicant has applied for a prospecting right and EMP in terms of the MPRDA for the prospecting of coal on Zandvoort. Furthermore, Pembani proposes to amend their existing mining works programme (within the approved mining right boundary) to include the mining of additional coal resources. Coal will be transported and processed according to the existing mines current approved operations.

Opencast mining has taken place on a number of properties and the mining areas are in various stages of rehabilitation at present. The mine has recently commenced with underground mining and wishes to extend their underground mining footprint to include Zandvoort and also wish to make an amendment to the existing mining works programme to include the mining of additional coal resources by opencast and underground mining. As such a S102 amendment process is being undertaken by the mine to include the proposed Zandvoort prospecting right into the existing mining right (MP 30/5/1/2/2/112 MR). Pembani is also required to undergo an EA process including an Environmental Impact Assessment to assess any new impacts associated with the change in the extent of the approved mining area, and also to consolidate the numerous authorisation processes that have been undertaken to date to produce a single overarching EMPR for holistic management of the Pembani Colliery going forward.

The approved mining right area is illustrated in Figure **2** below. The S102 application and the EA process is being undertaken to incorporate Zandvoort into the mining right and to amend the existing mining works programme to include the mining of additional coal resources. Entrance to the underground reserves on Zandvoort will be accessed via existing underground workings and as such, no surface infrastructure will be constructed on this property. Coal will be transported and processed according to the existing mines current approved operations. It should be noted Pembani has an approved existing old order Mining License (ML) in terms of the Minerals Act (MA), over Portion 5 of the farm Groenvallei 40 IT (MP 30/5/1/2/2/221 MR OT 5/3/2/600), as well as an approved EMP, dated March 2003. An application for conversion to a NOMR, in terms of the MPRDA, was lodged with the DMR on 19 April 2007. An EMP amendment, for the inclusion of underground mining, the Imbani Wash Plant (previously referred to as the Carolina Coal Wash Plant), co-disposal and pollution control dams (PCD's), was submitted on 28 July 2009, as supporting document to the conversion. The old order mining licence is to date still awaiting conversion and t is referred to in this report as a comprehensive description of the entire mining operation.

The following rights, authorisations and approvals are currently in place and have been considered in the compilation of the report:

- Mining Right (MR) MP 30/5/1/2/2/112 MR, granted to Imbani Coal (Pty) Ltd (Imbani), in terms of Section 23 (1) of the MPRDA;
- Prospecting Right (PR) MP 30/5/1/1/2/415 PR, granted to Ingwe Collieries Limited, in terms of Section 17(1) of the MPRDA has lapsed and following consultation with the DMR a new application has been submitted (MP 30/5/1/1/2/14360 PR);

- Mining License (ML) MP 30/5/1/2/2/221 MR OT 5/3/2/600, granted to World Wide Coal (Pty) Ltd (WWC), in terms of the Mineral Act, 1991 (Act 50 of 1991) (MA), application for conversion to NOMR and inclusion of Imbani Wash Plant submitted 2007;
- NEMA Environmental Authorisation (EA) 17/2/4/G (GS) -33;
- NEMA Environmental Authorisation (EA) 17/2/3/GS-44;
- NEMA Environmental Authorisation (EA) 17/2/3 GS-78; and
- NWA IWULA (IWUL) 05/X11D/AGJ/466, amendment application (IWUL) 16/2/7X100/C180 submitted 2014 and granted on 07 July 2016, (Licence No. 05/X11B/ACGIJ/4704).

The existing mine infrastructure includes:

- Opencast pits in various stages of rehabilitation;
- Haul roads;
- Storm water management infrastructure;
- Contractors camp including workshop, diesel storage, offices and ablution facilities;
- Raw water dams and PCD's;
- Water pipelines and associated water management infrastructure;
- Co-disposal facility
- Imbani Wash Plant;
- Administrative offices;
- Security and fencing;
- Product stockpiles;
- Discard and overburden stockpiles;
- Topsoil stockpiles;
- Monitoring boreholes;
- Highwall entrance to underground;
- Underground mining sections;
- Conveyors (underground conveyors transporting coal to surface); and
- Site camp associated with underground mine entrance.

The mine infrastructure is illustrated in the master plan map series indicated in Figure **3** to Figure 10 below and Figure 11 below indicated the proposed mining on Groenkloof 40IT.

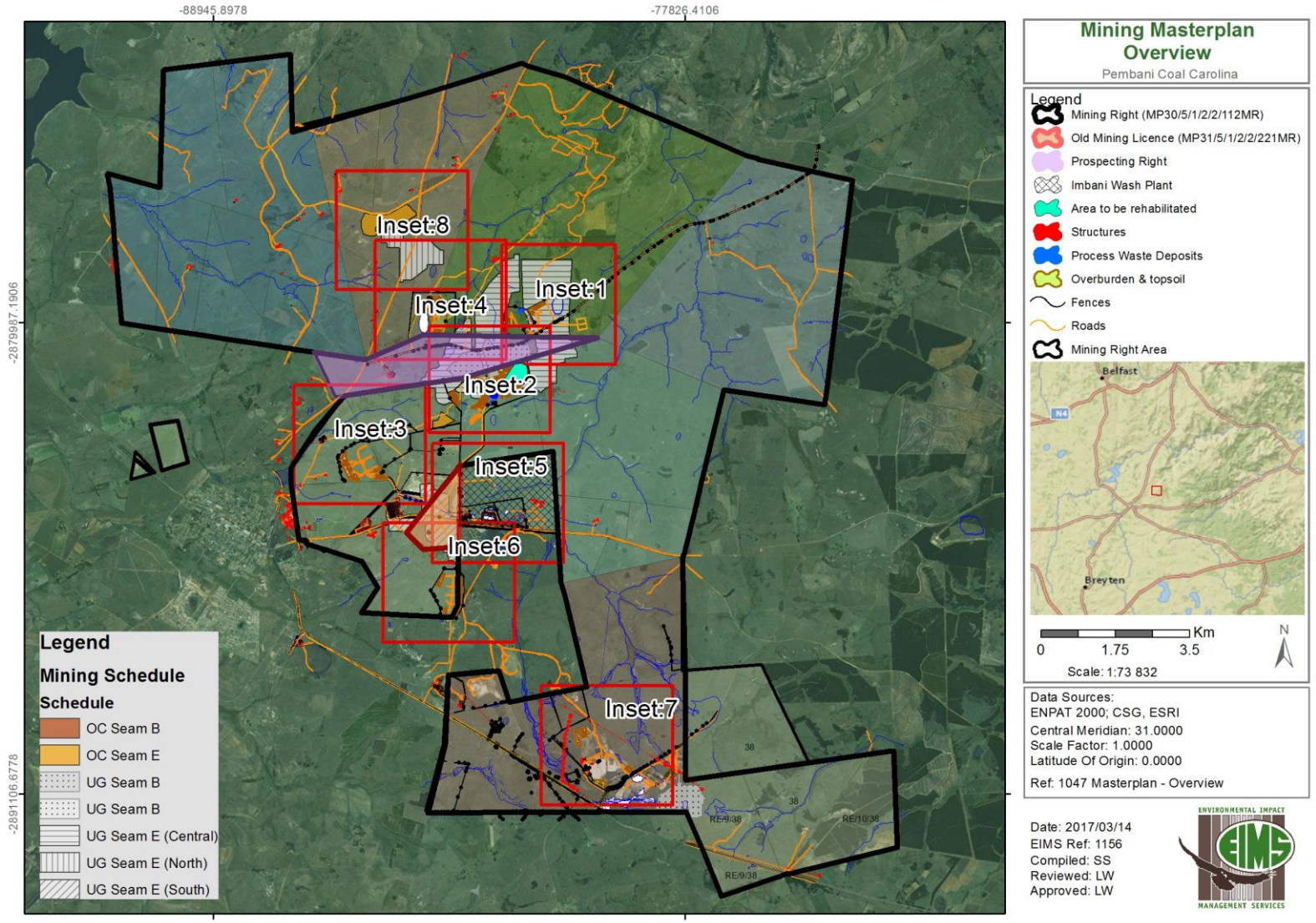


Figure 2: Pembani Colliery Project Overview

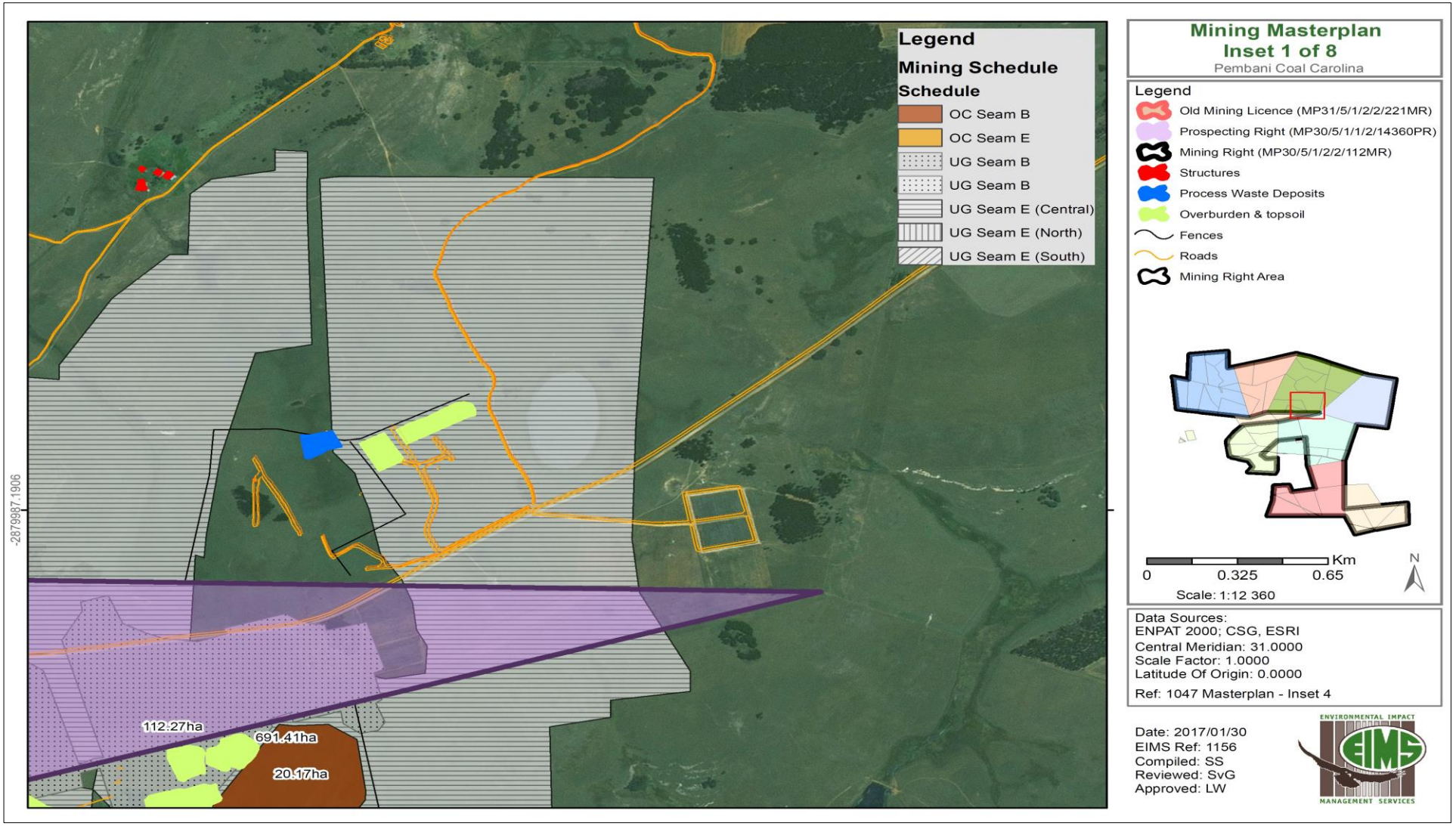


Figure 3: Master plan map showing mine infrastructure – Inset 1

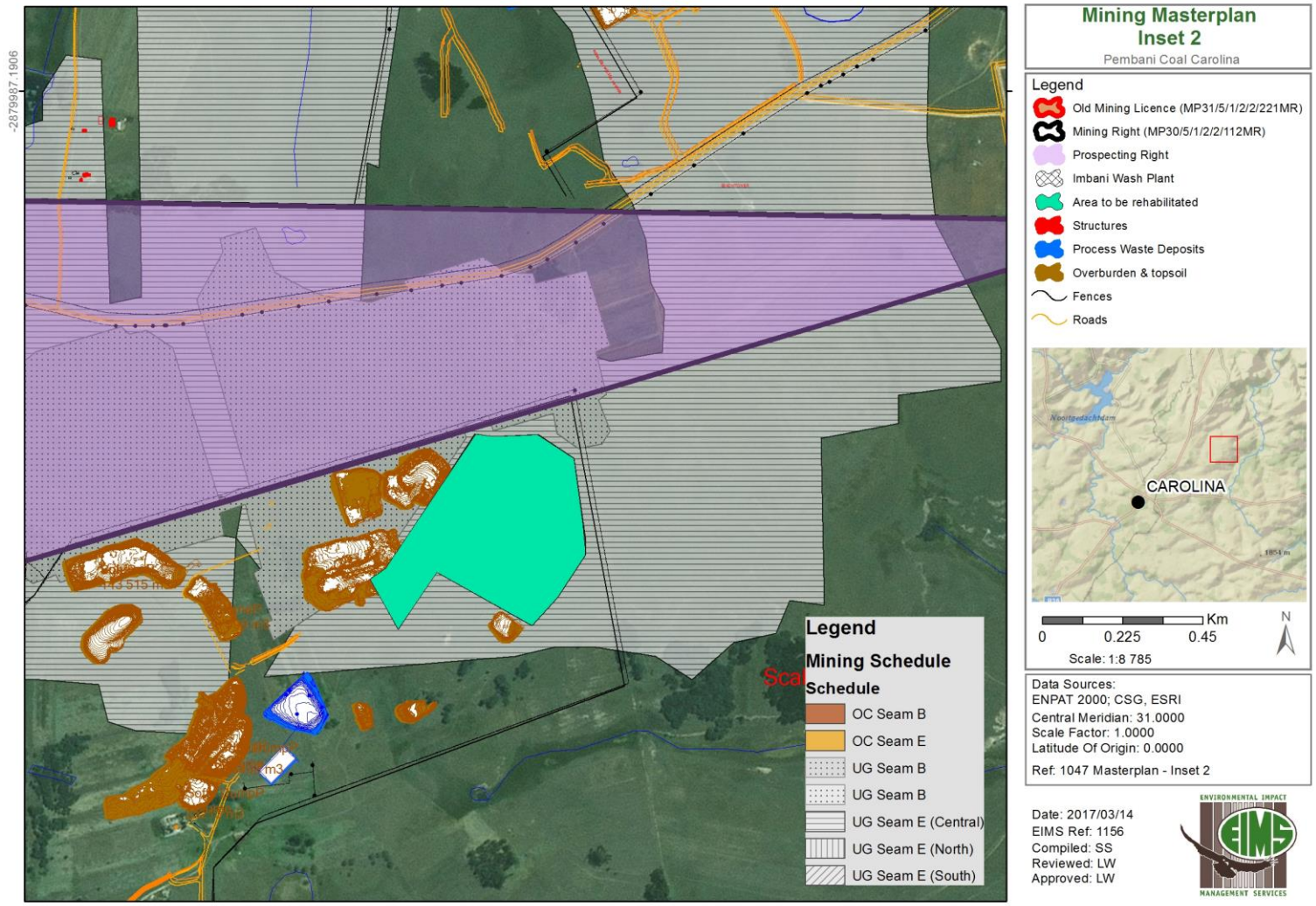


Figure 4: Master plan map showing mine infrastructure – Inset 2

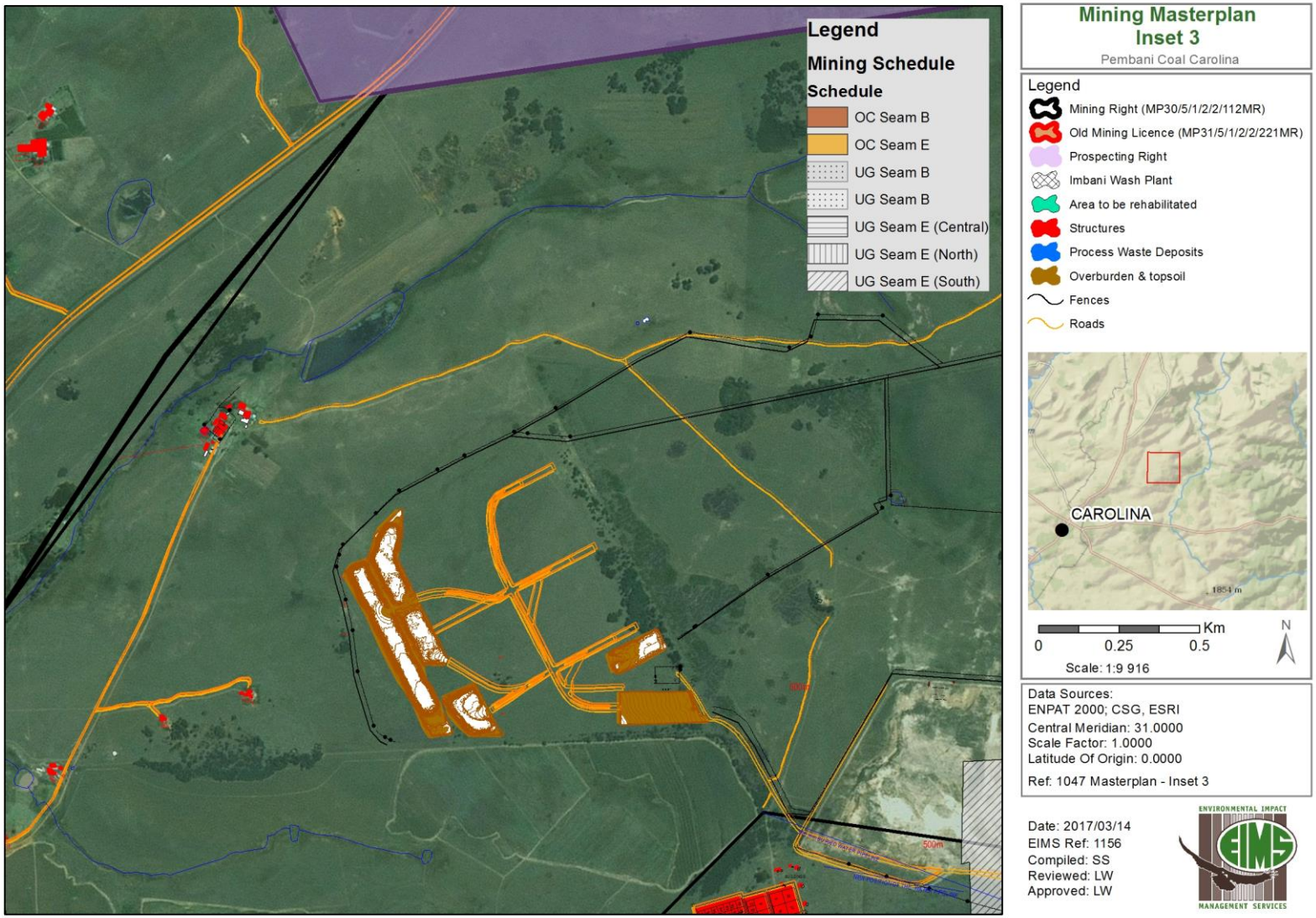


Figure 5: Master plan map showing mine infrastructure – Inset 3

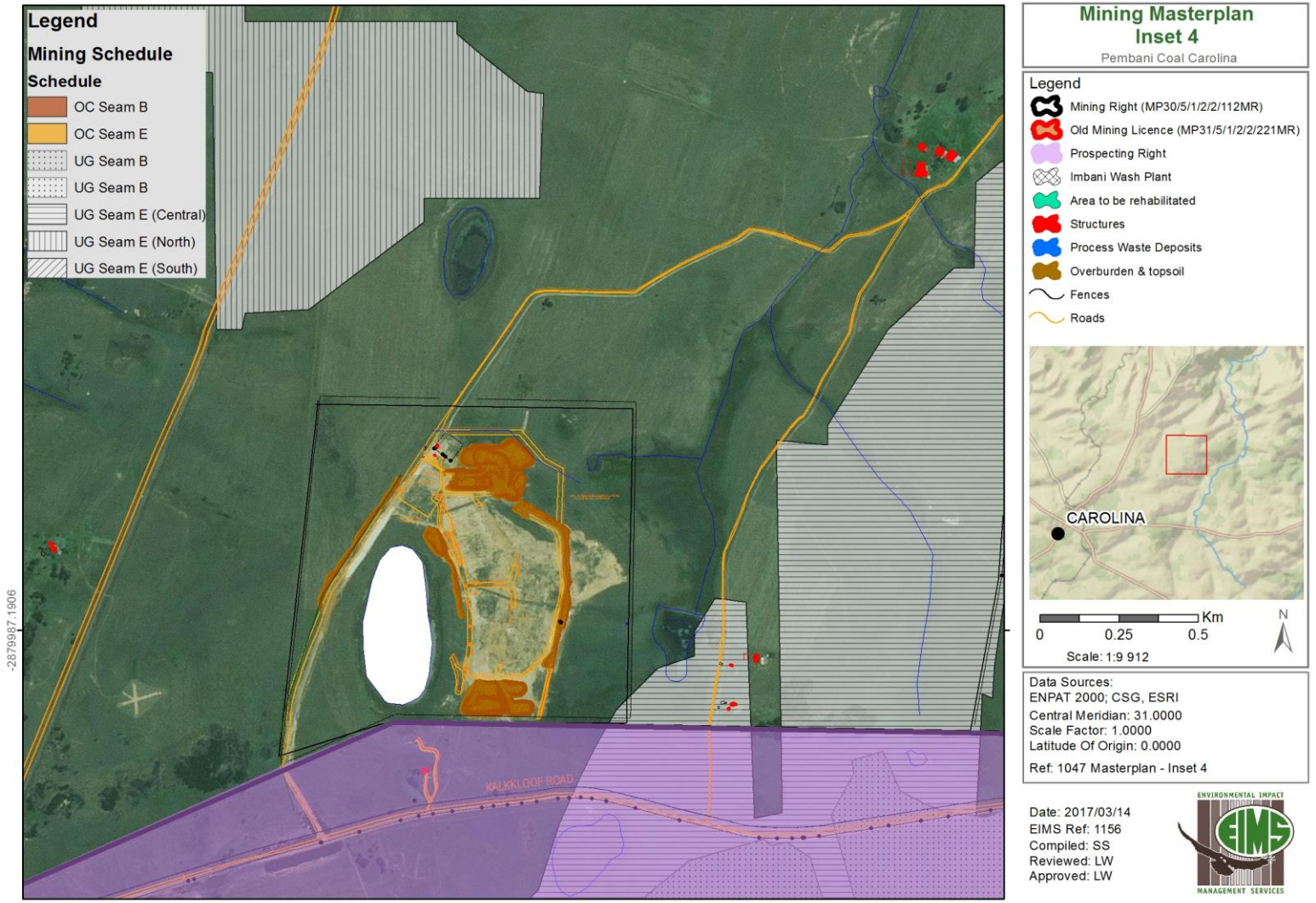


Figure 6: Master plan map showing mine infrastructure – Inset 4

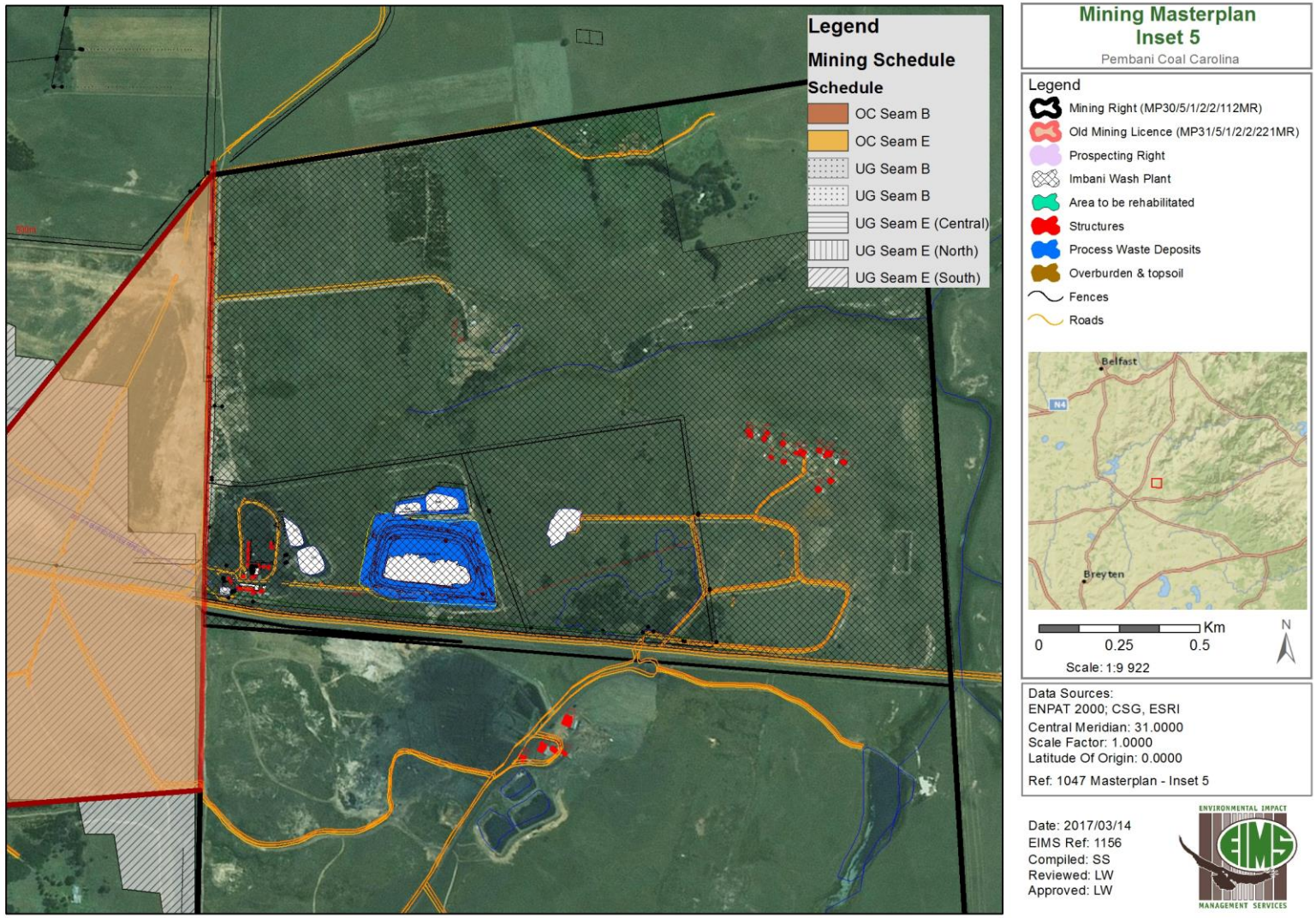


Figure 7: Master plan map showing mine infrastructure – Inset 5

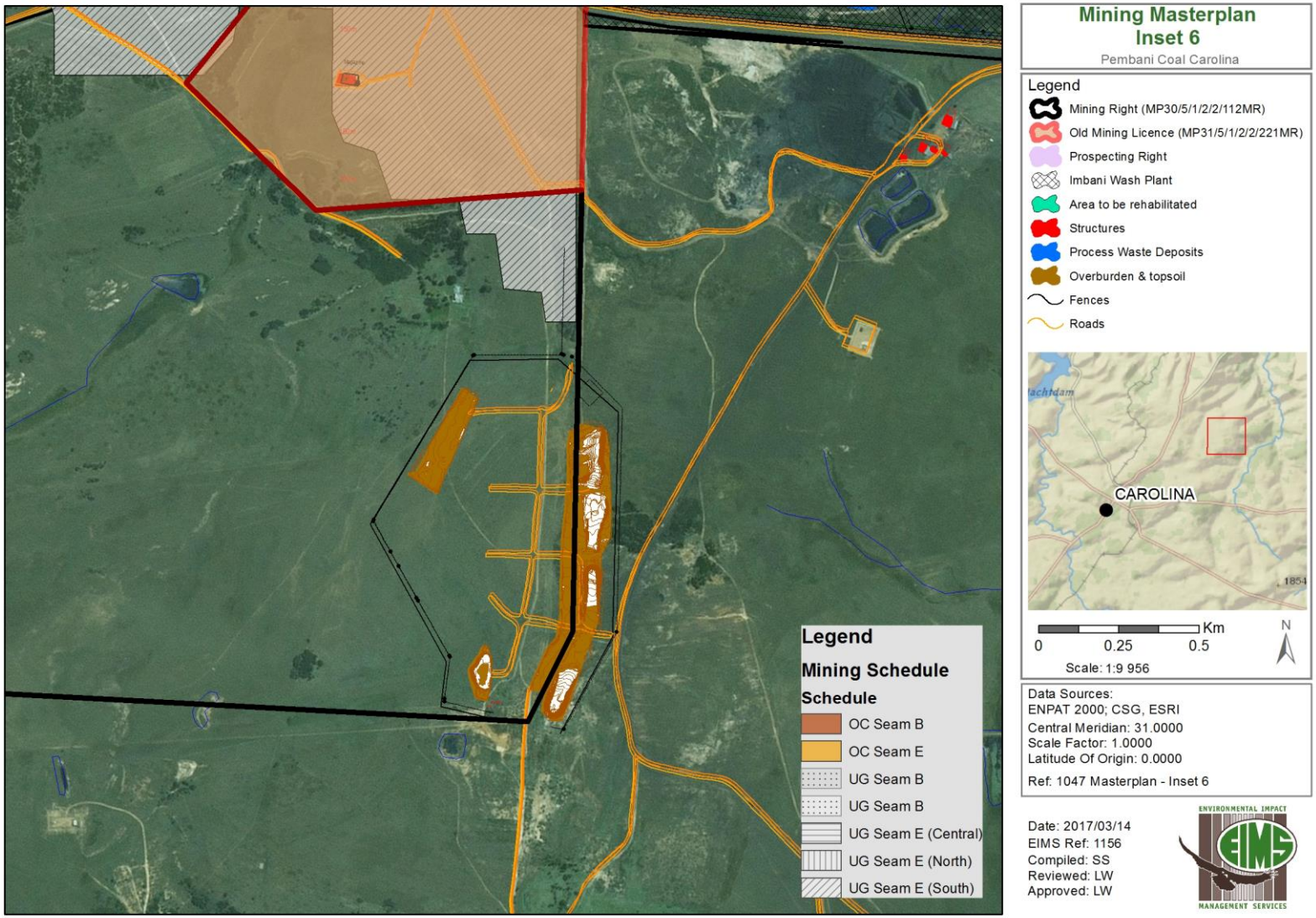


Figure 8: Master plan map showing mine infrastructure – Inset 6

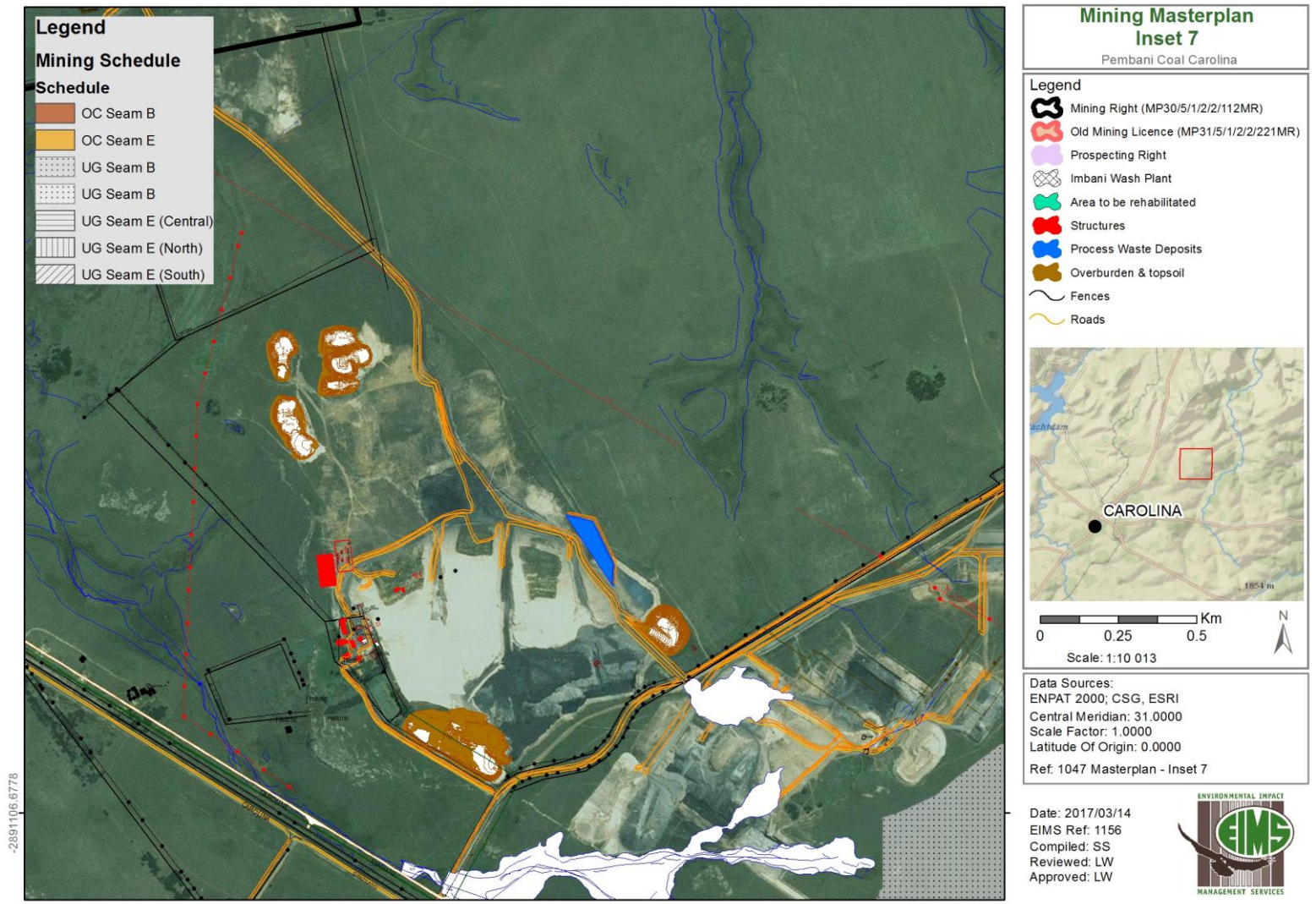


Figure 9: Master plan map showing mine infrastructure – Inset 7

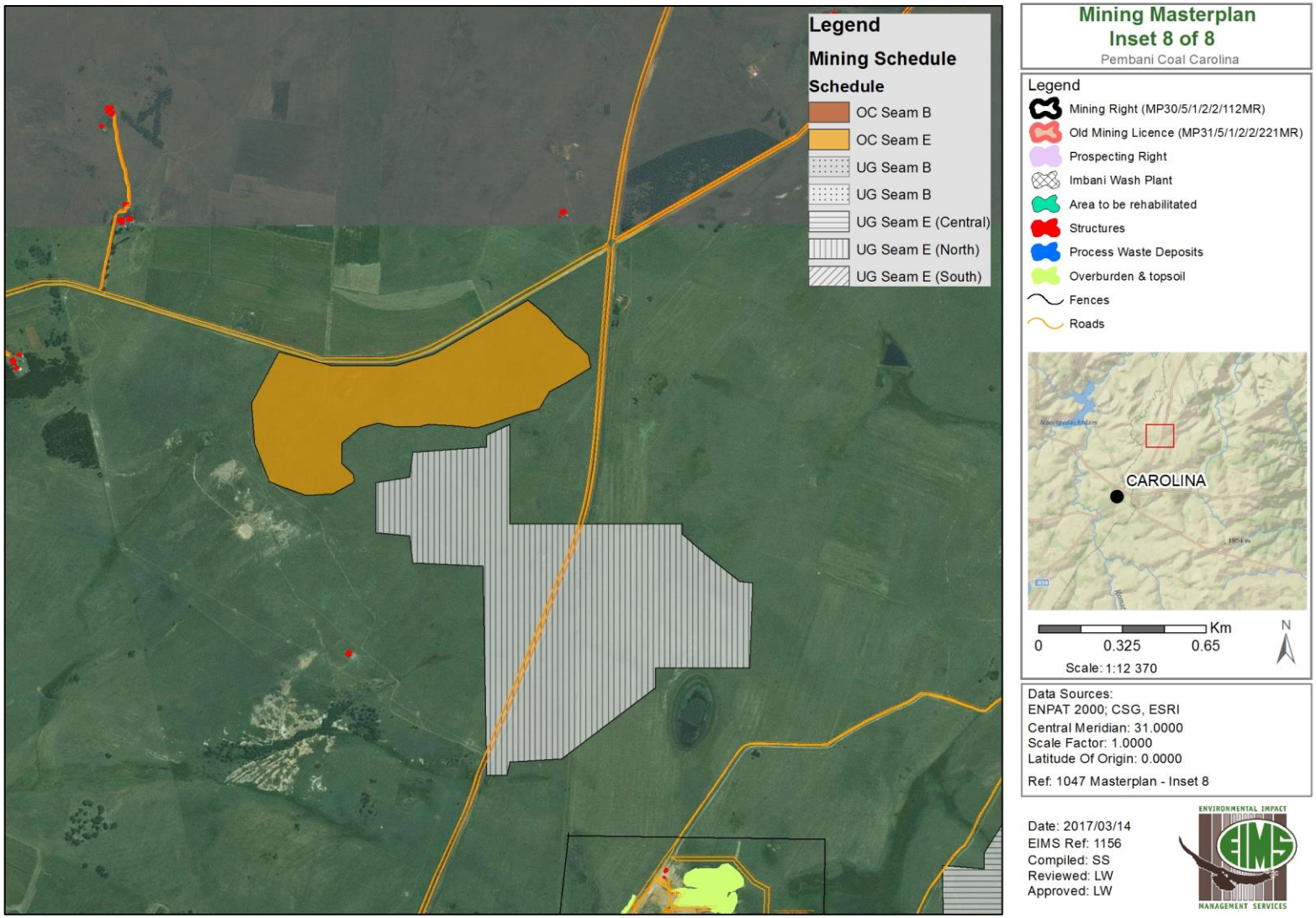


Figure 10: Master plan map showing mine infrastructure - Inset 8

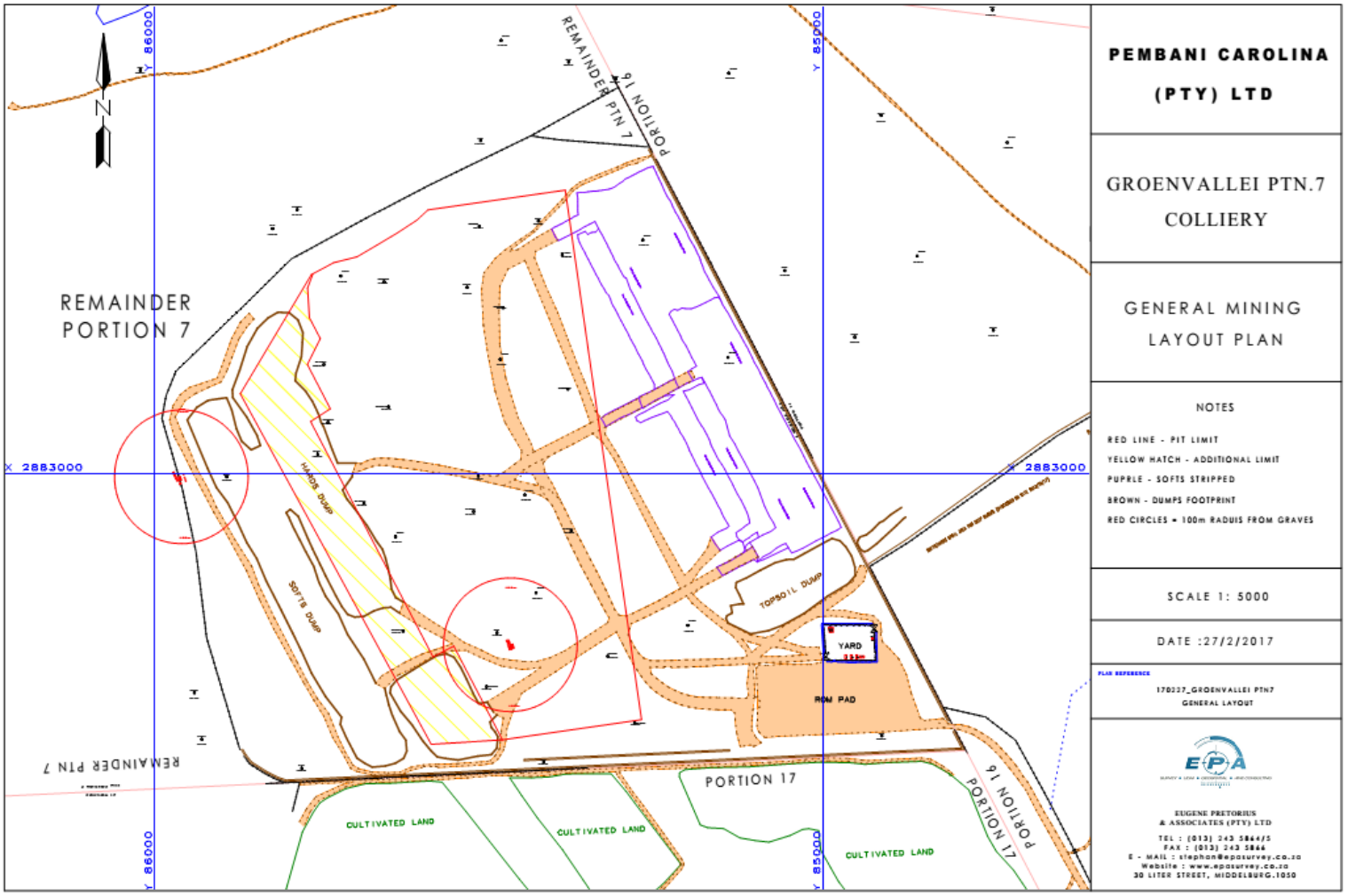


Figure 11: Mining layout for Portion 7 of Groenvallei 40IT

2.1 LISTED AND SPECIFIED ACTIVITIES

The EA in terms of the NEMA for the Pembani Colliery was originally issued on 6 August 2012 and amended on 31 July 2013 by the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET), now the Mpumalanga Department of Agriculture, Rural Development, Land, and Environmental Affairs (MDARDLEA). The listed activities in terms of Chapter 3 of the National Environmental Management Act (NEMA), 1998 approved as part of the EA includes:

- Activity 9, 11, 12, 18, 22, 23, 28, 47, 56 of Government Notice (GN) R544;
- Activity 5, 15, 20 of GN R545; and
- Activity 4 (a), 10 (a) and 12 of GN R546.

These approved activities are described further in Table 7 below.

In terms of the NEMA 2014 EIA Regulations, GNR 984 Listed Activity 17 specifies that any activity which requires a mining right as contemplated in Section 22 of the MPRDA triggers the requirement for Environmental Authorisation. As this is a new requirement and according to the 2014 amendment to the MPRDA, the currently approved EMPR is deemed to be an EA, the Pembani Colliery is therefore considered to have an authorisation for this Listed Activity. Further, Regulation 52 (2) of GNR 982 states that “Any authorisation issued in terms of the previous NEMA Regulations must be regarded to be an environmental authorisation issued in terms of these regulations”.

Table 7: Approved listed activities for the Pembani Colliery

Name of Activity	Aerial Extent of Activity (Ha or m^2)	Listed Activity	Applicable Listing Notice
The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water - (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more, excluding where: a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or b. where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.	This will occur within the 1417.618 ha mining footprint.	X	GNR 544 Activity 9
The construction of: (i) canals; (ii) channels; (iii) bridges; (iv) dams; (v) weirs; (vi) bulk storm water outlet structures; (vii) marinas;	This will occur within the 1417.618 ha mining footprint.	X	GNR 544 Activity 11

Name of Activity	Aerial Extent of Activity (Ha or m^2)	Listed Activity	Applicable Listing Notice
(viii) jetties exceeding 50 square metres in size; (ix) slipways exceeding 50 square metres in size; (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 square metres or more. where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.			
The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more, unless such storage falls within the ambit of activity 19 of Notice 545 of 2010;	92.199 ha	X	GNR 544 Activity 12
The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 cubic metres from: (i) a watercourse; (ii) the sea; (iii) the seashore;	This will occur within the 1417.618 ha mining footprint.	X	GNR 544 Activity 18

Name of Activity	Aerial Extent of Activity (Ha or m^2)	Listed Activity	Applicable Listing Notice
(iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater- but excluding where such infilling, depositing, dredging, excavation, removal or moving; (a) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or (b) occurs behind the development setback line.			
The construction of a road, outside urban areas, (i) with a reserve wider than 13,5 meters or, (ii) where no reserve exists where the road is wider than 8 metres, or for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010.	1180.55 ha	X	GNR 544 Activity 22
The transformation of undeveloped, vacant or derelict land to – (i) residential, retail, commercial, recreational, industrial or institutional use, inside an urban area, and where the total area to be transformed is 5 hectares or more, but less than 20 hectares, or (ii) residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares; -	This will occur within the 1417.618 ha mining footprint.	X	GNR 544 Activity 23

Name of Activity	Aerial Extent of Activity (Ha or m^2)	Listed Activity	Applicable Listing Notice
[except where such transformation takes place for linear activities] except where such transformation takes place – (i) for linear activities; or (ii) for purposes of agriculture or afforestation, in which case Activity 16 of Notice No. R. 545 applies.			
The expansion of or changes to existing facilities for any process or activity where such expansion or changes to will result in the need for a [new, or amendment of, an existing] permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.	This will occur within the 1417.618 ha mining footprint.	X	GNR 544 Activity 28
The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres – excluding widening or lengthening occurring inside urban areas.	1180.55 ha	X	GNR 544 Activity 47

Name of Activity	Aerial Extent of Activity (Ha or m^2)	Listed Activity	Applicable Listing Notice
Phased activities for all activities listed in this Schedule, which commenced on or after the effective date of this Schedule, where any one phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold; - excluding the following activities listed in this Schedule: 2; 11(i)-(vii); 16(i)-(iv); 17; 19; 20; 22(i) & 22(iii); 25; 26; 27(iii) & (iv); 28; 39; 45(i)-(iv) & (vii)-(xv); 50; 51; 53; and 54.	This will occur within the 1417.618 ha mining footprint.	X	GNR 544 Activity 56
The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.	This will occur within the 1417.618 ha mining footprint.	X	GNR 545 Activity 5
Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for: (i) linear development activities; or	This will occur within the 1417.618 ha mining footprint.	X	GNR 545 Activity 15

Name of Activity	Aerial Extent of Activity (Ha or m^2)	Listed Activity	Applicable Listing Notice
agriculture or afforestation where activity 16 in this Schedule will apply.			
Any activity which requires a mining right or renewal thereof as contemplated in sections 22 and 24 respectively of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	17 777 ha	X	GNR 545 Activity 20
The construction of a road wider than 4 metres with a reserve less than 13,5 metres. **(a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape provinces:** i. In an estuary; ii. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves;	1180.55 ha	X	GNR 546 Activity 4(a)

Name of Activity	Aerial Extent of Activity (Ha or m^2)	Listed Activity	Applicable Listing Notice
(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined. iii. In urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the xcompetent authority or zoned for a conservation purpose; (cc) seawards of the development setback line or within urban protected areas.			
The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. **(a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape provinces:** i. In an estuary; ii. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas;	1.9 ha	X	GNR 546 Activity 10 (a)

Name of Activity	Aerial Extent of Activity (Ha or m^2)	Listed Activity	Applicable Listing Notice
(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; (jj) Within 500 metres of an estuary. iii. In urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; (cc) Within 500 metres of an estuary.			

Name of Activity	Aerial Extent of Activity (Ha or m^2)	Listed Activity	Applicable Listing Notice
The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation. **(a)** Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; **(b)** Within critical biodiversity areas identified in bioregional plans; **(c)** Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas.	This will occur within the 1417.618 ha mining footprint.	X	GNR 546 Activity 12

It is, therefore, understood that insofar as the proposed additional mining areas, within the existing Mining Right are concrede-, that all the relevant NEMA listed activities have been authorised. Consequently, these additional mining areas and changes to the Mine Works Programme (MWP) are subject to an Amendment Application process. This EIA process will serve to support the amendment application.

With respect to the addition of Zandvoort into the Mining Right, it is understood that all the relevant NEMA listed activities are captured and approved in the current NEMA EA, except Activity 17 of GNR 984. Activity 17, GNR 984 specifies that any activity which requires a mining right as contemplated in Section 22 of the MPRDA triggers the requirement for an Environmental Authorisation. In order for Pembani to include Zandvoort into the existing Mining Right area, Pembani therefore, needs to apply for the activity indicated below in Table 8 below.

Table 8: Listed Activities

Name of Activity	Aerial Extent of Activity (Ha or m^2)	Listed Activity	Applicable Listing Notice
Underground mining (Portion 1 and RE of the farm Zandvoort 10IT)	471.3849 ha	X	R.984 (2014) LA 17

The proposed project entails only the additional underground mining within the above mentioned areas. No additional infrastructure / surface structures will be constructed on the farm Zandvoort.

Below is a plan, Figure 12, indicating the location of the aforesaid main and listed activitity and the location of the proposed additional mining areas. In addition, as indicated in Figure 11 above, mining will also be conducted on Portion 7 of Groenvallei 40 IT.

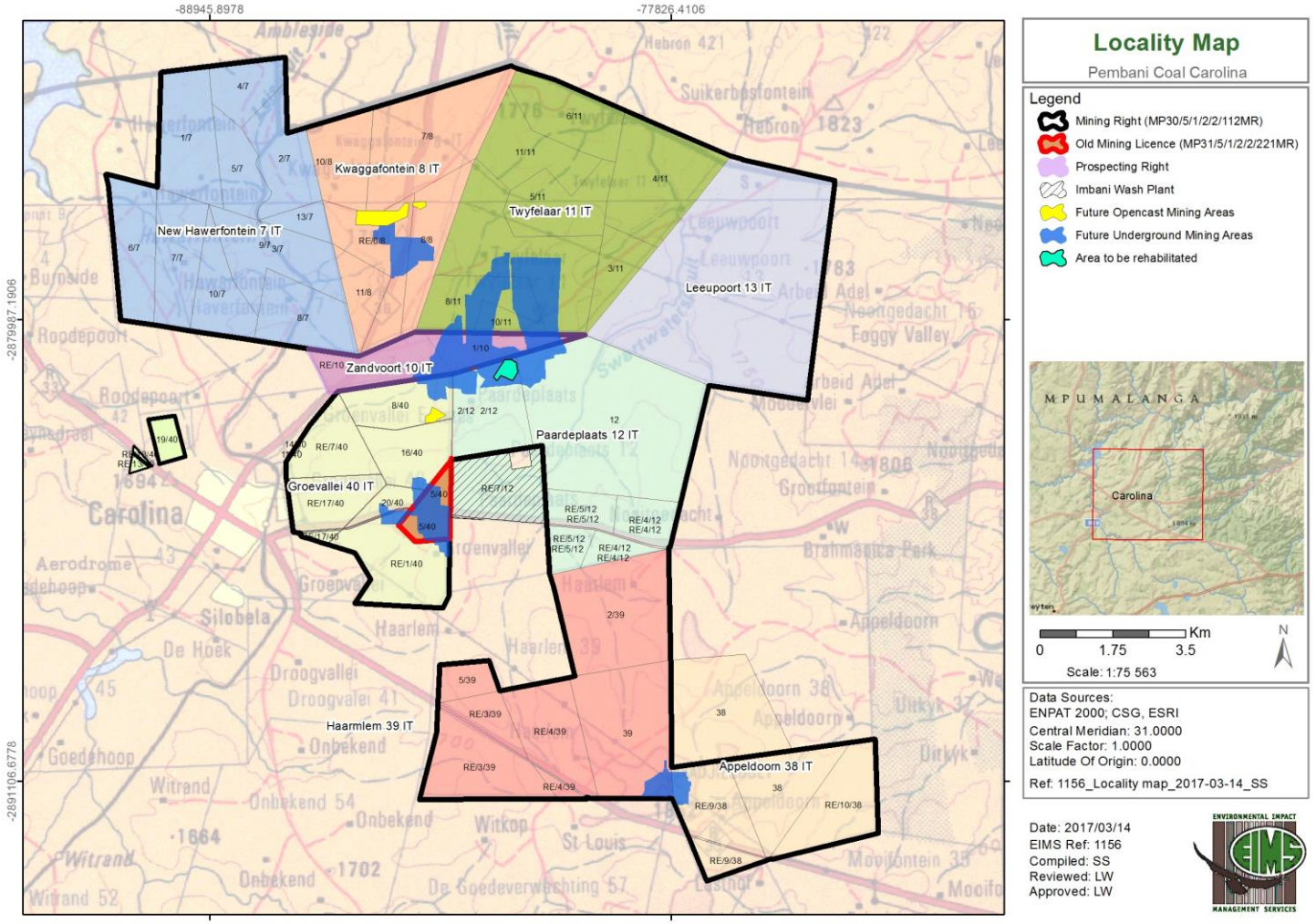


Figure 12: Plan of Listed Activity and location of the proposed additional mining areas.

2.2 DESCRIPTION OF ACTIVITIES TO BE UNDERTAKEN

It is the intention of this Environmental Impact Assessment Report to provide the necessary information regarding the proposed inclusion of additional areas within the existing Pembani Colliery Mining Right, as well as to provide information on the proposed changes with regards to amendment of the existing MWP to include additional underground and opencast mining of coal resources at Pembani Colliery. The additional areas to be included are described in detail above, and include interalia Portions 1 and Re of the farm Zandvoort 10 IT. The proposed amendment to the mine works programme (within the existing mining right) includes:

- New underground mining operations: Portions RE of 6, 7, 8 and 10 of the farm Kwaggafontein 8 IT; Portions of the farm Haarlem 39 IT; Portion RE/9 of the farm Appeldoorn 38 IT; Portions Re of 1, 5, 8, 16 and 20 of the farm Groenvallei 40 IT; Portions 2, 7, 8, 9 and 10 of the farm Twyfelaar 11 IT; and Portions 2 and 12 of the farm Paardeplaats 12 IT.
- New opencast mining operations: Portions RE of 6, 7, 8 and 10 of the farm Kwaggafontein 8 IT; Portion 8 of the farm Groenvallei 40 IT and Portion 2 of the farm Paardeplaats 12 IT.

The Pembani Colliery is an existing mine which has been in operation for several years. As such the construction of the majority of the mine infrastructure has been completed, including mine offices, a wash plant, workshop facilities, dirty water containment facilitires, etc. Extensive opencast mining has also taken place, although the mine has only recently commenced with underground mining. Due to the large area under the mining right, the mining activities (opencast and underground) have and will be approached as a phased development over the LoM (30 years). The activities associated with each phase of the mining operation are described in Table 9:

Table 9: Activities associated with the mining operation

Main Activity/Action/Process	Ancillary Activity
Planning and Design	
General mine management	Employment; Human Resource Management; and Interaction with local Community.
Drilling for monitoring boreholes	Drilling
Drilling for continued resource evaluation	Drilling
Site visits	Vehicle and foot traffic on site
Construction	

Main Activity/Action/Process	Ancillary Activity
General mine management	Employment Human Resource Management Interaction with local Community
Drilling monitoring boreholes	Drilling
Drilling for continued resource evaluation	Drilling
General construction management	Human Resource Management Employment Interaction with local Community
Site establishment – Contractors Camp	Construction camp sewage management Dust suppression Earthworks Fencing Fuel Storage and refuelling Hazardous substances management Site security Soil Management Truck and heavy machinery operation Utilization of portable toilets and generation of sewage Vegetation clearance Waste Management
Construction of mineral processing facilities	Concrete works Dust suppression Earthworks Fencing Fuel Storage and refuelling Hazardous substances management

Main Activity/Action/Process	Ancillary Activity
	Power supply connections Soil Management Vegetation clearance Waste Management
Mine area site preparation	Clearance and preparation of soil stockpile areas Dust suppression Establishment of storm water management infrastructure for road network Fuel Storage and refuelling Road construction Truck and heavy machinery operation
Site establishment – Permanent site office infrastructure	Concrete works Dust suppression Earthworks Fencing Fuel Storage and refuelling Hazardous substances management Power supply connections Site security Soil Management Truck and heavy machinery operation Utilization of portable toilets and generation of sewage Vegetation clearance Waste Management
Water management infrastructure construction	Construct the dirty and clean water management features Construction of culverts, berms and crossings Construction of PCD's Dust suppression Installation of pipelines for water management Installation of pumps, flow meters Truck and heavy machinery operation Vegetation clearance

Main Activity/Action/Process	Ancillary Activity
	Rehabilitation of Vegetation where necessary
Operation	
General mine management	Employment Human Resource Management Interaction with local Community
Drilling monitoring boreholes	Drilling
Drilling for continued resource evaluation	Drilling
Maintenance and operation of site infrastructure and facilities	Alien vegetation management Maintenance and management of portable toilets by contractor Operation of generators if and when required Power line supply Sewage and sanitation Site security Storage and handling of diesel/hydrocarbons Storage and handling of explosives Waste management Water management
Opencast mining	Blasting (overburden and coal) Dust suppression Erection of in pit infrastructure Fuel Storage and refuelling Hauling Coal for mineral processing Pumping of in-pit water/Dewatering Raw coal stockpiling Removal of coal seam - Strip Mining - Truck and Shovel Soil Stockpile Management Storage of in pit water in sump Truck and heavy machinery operation Use and maintenance of portable toilets Vegetation clearance
Underground mining	Blasting Construction of underground Adits from opencast pits Dewatering Discard trucked to co-disposal dump facility Fuel Storage and refuelling

Main Activity/Action/Process	Ancillary Activity
	Hauling Coal Offsite Hauling coal on site for mineral processing Installation of underground mine infrastructure Mine ventilation Removal of coal seams - Bord and pillar mining Soil management Temporary stockpiling of RoM coal Use and maintenance of portable toilets
Mineral processing	Coal Processing - washing Coal stockpile management Dust suppression Fuel Storage and refuelling Hauling processed coal Operation of co-disposal facility Slurry disposal at co-disposal facility Water management
Decommissioning	
General mine management	Employment Human Resource Management Interaction with local Community
Drilling monitoring boreholes	Drilling
General decommissioning activities	Dust suppression Recycling of recyclable/reclaimable waste Removal of waste
Decommissioning of co-disposal dump	Profiling of co-disposal dump and preparation for final rehabilitation Truck and heavy machinery operation
Infrastructure removal	Decommissioning/removal of water pipelines Disconnection of services (power supply, water connections) Dismantling, removal and rehabilitation of unnecessary infrastructure Final removal of all berms, trenches and any dams no longer required Removal of fencing
Filling opencast voids	Filling the final opencast voids

Main Activity/Action/Process	Ancillary Activity
Decommissioning of underground mine infrastructure	Sealing and closure of underground mining sections Sealing shafts and adits
Rehabilitation and Closure	
General mine management	Employment Human Resource Management Interaction with local Community
Drilling monitoring boreholes	Drilling
General surface rehabilitation	Profiling of all areas Replacement of subsoil and topsoil Ripping of roads and other compacted areas Managing the site for all post mining impacts to prevent any further pollution Vehicle and foot traffic on site
Storm water management	Construction of contour berms or other erosion control measures
Re-vegetation	Dust suppression Fertilization Seeding with local indigenous species
Post closure monitoring and maintenance	Alien vegetation management Environmental monitoring of rehabilitated areas Maintenance of storm water and erosion control measures
Water treatment (as required by WUL)	Construction of water treatment plant Operation of water treatment plant
Application for closure certificate	Operation of water treatment plant

2.3 MINING OPERATIONS

Below is a description of the mining operations including the mineral resource and the mining methods for Pembani.

2.3.1 THE MINERAL RESOURCE

The Pembani Colliery is situated within the northern part of the Ermelo Coalfield, which forms part of the coal-bearing Vryheid Formation of the Ecca Group. The Ecca Group forms part of the larger Karoo Super group. The coal seams present, within the Ermelo Coalfield, are named from the base to the top, E to A. In the northern parts of the coal field the E Seam attains a thickness of over 3m and consists of mainly bright coal and ranges from the surface to about 100 m. The less prominent D Seam (< 0.6 m) is usually too thin to be of economic value although being predominantly bright

coal and ranges from surface to about 70 m. The C Seam is usually sub-divided into the C Upper and the C Lower due to several plies that vary in thickness. The C Lower is usually thin and seldom thicker than 0.6 m however thickens towards the Dirkiesdorp District reaching thicknesses of up to 3 m. In contrast to the other seams the C Upper is well developed in the entire coal field but is of poor quality and tends to be torbanitic over large areas. Thicknesses usually vary from 0.4 m – 4 m depending on the area. The B Seam is usually split into the B, B1, and BX however in the Ermelo district only the B (Lower) and the BX (Upper) are considered feasible for mining. The B Seam may reach thicknesses of up to 3 m and consists of mainly dull coal (high sulphur content), capped by a glauconitic sandstone. The A Seam is of moderate to low quality across the coal field and occurs as outliers in the central and northern parts of the coal field (Greenshields, 1986).

The B Seam and the E Seam are the main economic coal seams present within the mining area and these are exploited by means of opencast and underground mining operations. The average depth of the E seam is 53 m and 27.6 m for the B seam.

2.2.2 MINING METHOD TO BE EMPLOYED

The Pembani Colliery has access to extensive coal reserves which are to be exploited by both above ground (opencast mining) and below ground mining methods (bord and pillar underground mining). Extensive opencast mining has also taken place, although the mine has only recently commenced with underground mining. The mining methods that are currently being employed and which are yet to be employed in the future are discussed in the sections that follow.

2.2.2.1 OPENCAST MINING

Historically extensive opencast mining has taken place at Pembani Colliery, during which time a number of opencast pits were mined without progressive rehabilitation being undertaken. As such in addition to the current opencast mining which follows the strip mining approach with progressive rehabilitation, there are historical opencast pits in various stages of rehabilitation.

Currently limited opencast mining is undertaken in the form of strip mining where the strips are laid out to follow the surface contours. As the strips progress, the previous pit is rehabilitated, thus resulting in minimal surface disturbance. A contractor (Professional Opencast Mining Services (POMS)) is currently conducting the opencast operations. Certain temporary infrastructure associated with the opencast mining activities (such as storm water management infrastructure) will move as the opencast mining progresses along the coal seams to the new pit areas. The coal is transported by truck to the existing Imbani Wash Plant where wet processing of the coal takes place. Further detail about the various mining areas at Pembani Colliery is provided in Section 2.2.3 of this report.

2.2.2.2 UNDERGROUND MINING

Further to the opencast, mining the remainder of the deeper coal reserves are mined using the bord and pillar underground mining method. Underground mining has been initiated recently (in 2015) and is undertaken by Pembani themselves (and not a contractor). At present, the

underground reserves are accessed via the existing Groenvallei 4 pit (highwall entrance). The construction of the contractor camp facility for this adit was underway at the time of writing this report and the typical layout and design of this infrastructure is illustrated in Figure 13 below.

It is anticipated that similar infrastructure will be constructed for any future adits/shafts. The entire infrastructure will be situated around the entrance to the underground workings (either box-cut or highwall). The entire area at each underground operation within the security fence will cover less than 20 ha. The underground infrastructure shall typically include the following:

- Ventilation fans
- Short Conveyors (bringing coal to surface)
- ROM stockpiles;
- Sub Station;
- Parking Area;
- Lamp Room;
- Stores;
- Cable Shop;
- Workshop;
- Washbay;
- Refueling Bay;
- Stone Dust Shed;
- 10m x 10m sump;
- Service Water Dams;
- Potable Water Dam.

Coal will be transported to the surface via conveyor for temporary storage at the RoM stockpile. All coal will either be directly transported by means of coal trucks to the processing plant or will be crushed by means of a mobile crusher and directly sold to Eskom and/or other clients from pre-qualified stockpiles situated near the underground access.

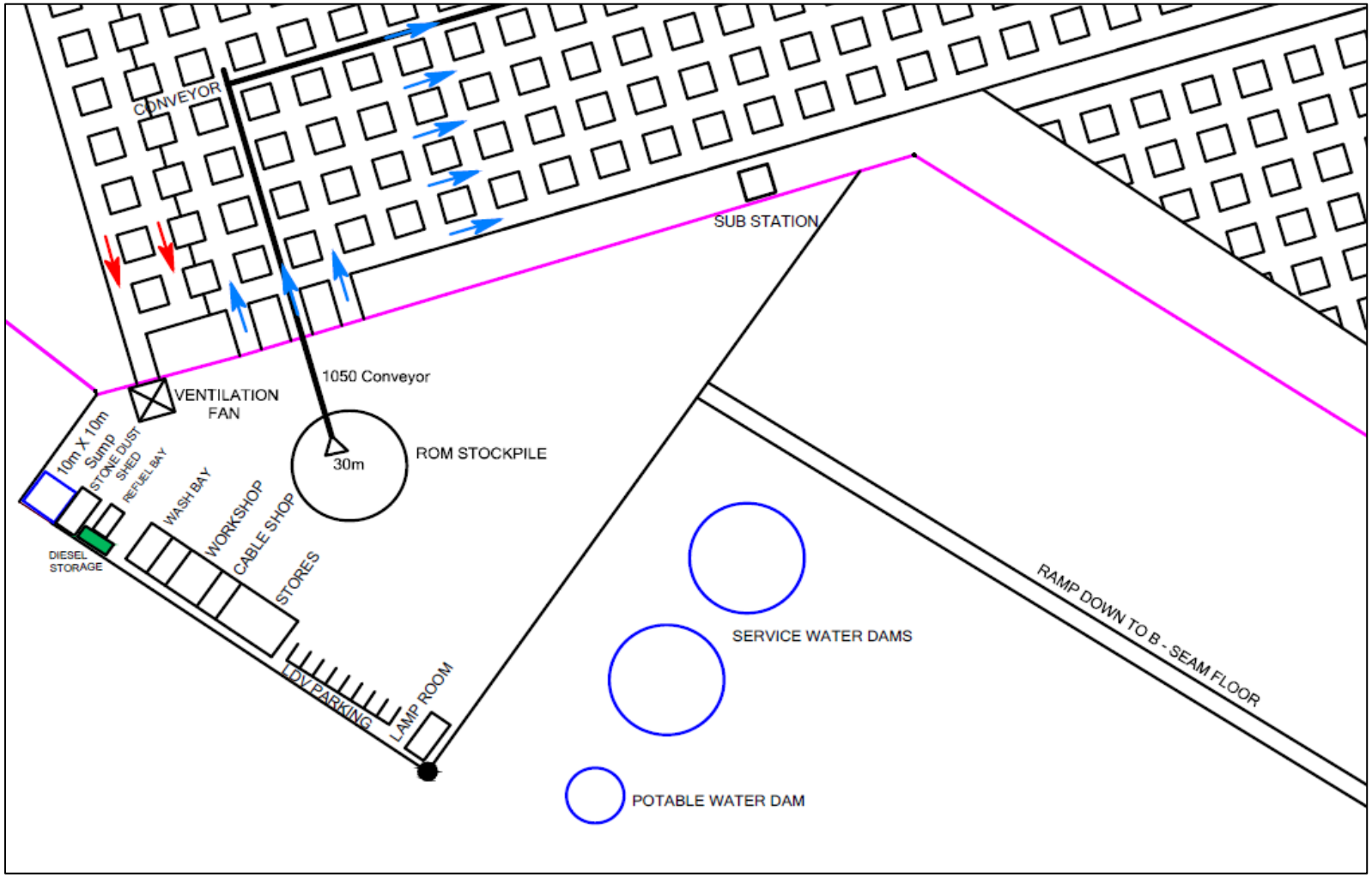


Figure 13: Mine Infrastructure Dedicated to each Underground Operation (Typical drawing)

2.2.3 MINE AREAS

The mining plan layout as indicated in Figure 14 illustrates the various underground and opencast mine areas. The mining areas are grouped into sections according to their farm name. Table 10 below summarises these sections, indicating whether these are current, future and past mining areas. These mine areas indicated in Table 9 below, are referred to by different names in different studies; however, for the purposes of this report the mine areas will be referred to as named in Figure 14.

Table 10: Mine Areas

Mining Area	Description /Status:
Mined Out	
TZP 1	Twyfelaar-Zandvoort-Paardeplaats Section. Area mined out and rehabilitated.
GV 1	Groenvallei Section. Mined via opencast methods, this area is currently being rehabilitated.
GV 5	Groenvallei Section. Area mined out and rehabilitated. Water use activities in this area are largely related to infrastructure.
HA 1	Haarlem Section. Area mined out and rehabilitated.
HA 2	Haarlem Section. Area mined out and rehabilitated.
HA 3	Haarlem Section. Mined via opencast methods, this area is currently being rehabilitated.
HA 4	Haarlem Section. Mined via opencast methods, this area is currently being rehabilitated.
HA 5	Haarlem Section. Mined via opencast methods This area has been rehabilitated.
TZP 3 (consists of a east and west pit)	Twyfelaar-Zandvoort-Paardeplaats Section. Rehabilitation to be done.
TZP 5	Twyfelaar-Zandvoort-Paardeplaats Section. This pit is mined out. This area is currently being rehabilitated.
Current Operational Areas	

TZP 4	Twyfelaar-Zandvoort-Paardeplaats Section. This pit is currently active. Mining is via opencast rollover methods. This section may be utilised to access the TZP underground.
GV 7	Groenvallei Section. Opencast mining has commenced however, activities have been halted and the area put on care and maintenance due to market conditions. This pit is planned to be mined again in the near future via opencast rollover methods. This pit may be used to access the underground sections at Groenvallei.
Future Mine Areas	
KW 1	Kwaggafontein Section. Future opencast area.
KW 2	Kwaggafontein Section. Future opencast area. Further exploration drilling has been conducted and the mine is awaiting the report with the results.
KW Underground	Kwaggafontein Section. Future underground area.
TZP Underground	Twyfelaar-(proposed) Zandvoort-Paardeplaats Section. Future underground area. This will consist of underground mining areas that will target the B and E coal seams on the farmTwyfelaar and Zandvoort. The current underground mining at Paardeplaats has been placed on care and maintenance, due to pit room and economic factors. Further exploration drilling is required.
TZP 2	Twyfelaar-(proposed) Zandvoort-Paardeplaats Section. Future opencast area.
GV Underground	Groenvallei Section. Future underground area.
HA Underground	Haarlem Section. Future underground area.

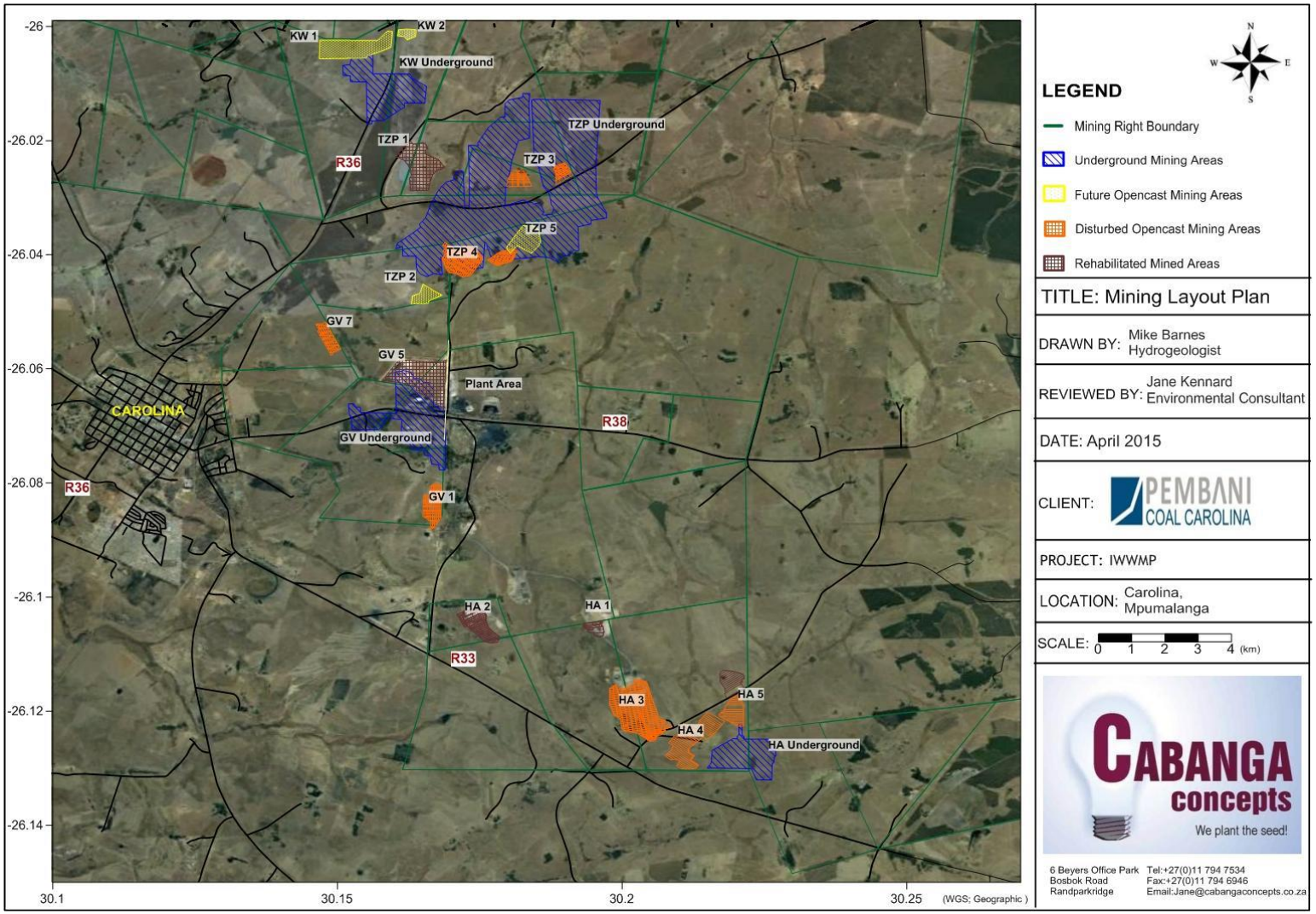


Figure 14: Mining plan layout as per the 2015 IWWMP

2.2.3.1 CURRENT MINE AREAS

Current mining activities are focused at the Twyfelaar-Zandvoort-Paardeplaats (TZP) section, specifically TZP 4 and TZP 5 (Figure 15) where rollover opencast mining is taking place and access to the TZP underground section has been constructed. The POMS contractors camp is situated on Portion 2 of the farm Paardeplaats 12 IT. This is the site office and hard park indicated in the figure below. The contrctors camp acts as a base of operations fro the opencast mining operation and houses infrastructure such as a workshop, office buildings, and washbay. The main fuel storage is situated at the POMS contractors camp and the majority of plant is parked here when not in use.

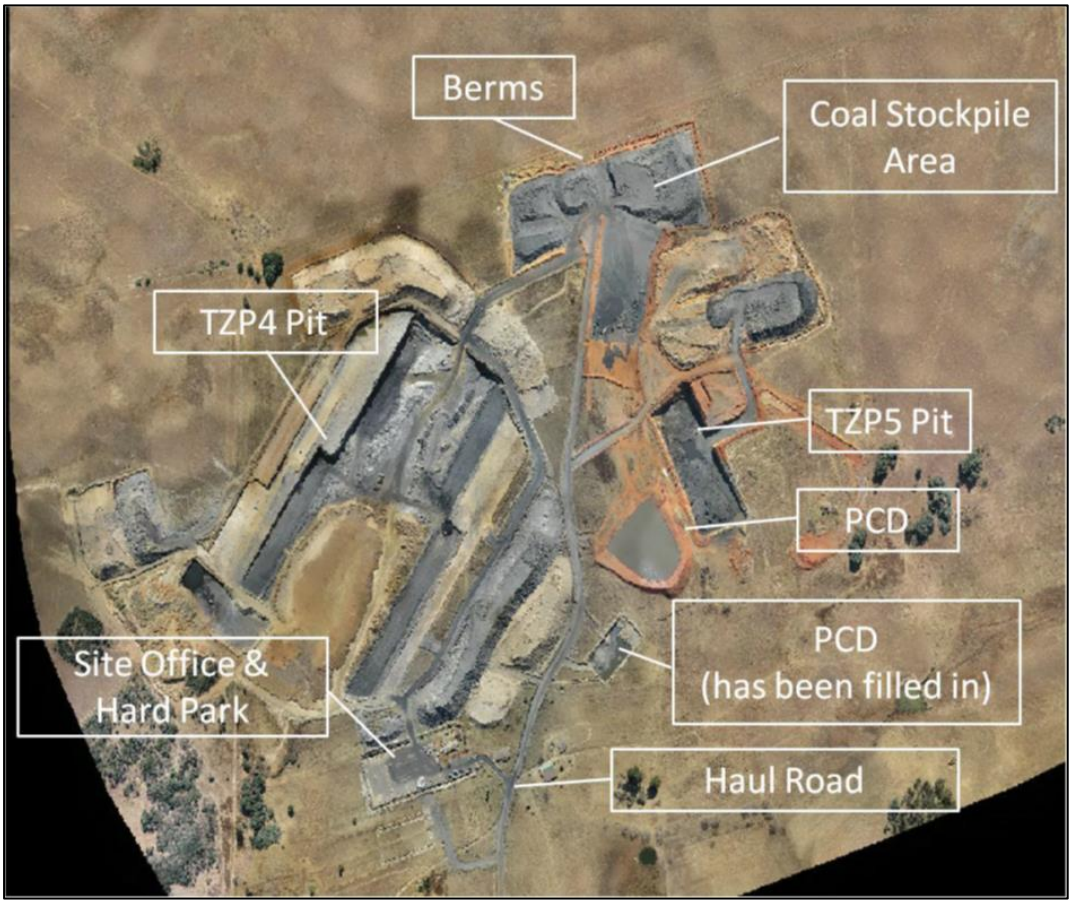


Figure 15: TZP 4 and TZP 5

Opencast mining has commenced at TZP 3 (Figure 16) and Groenvallei 7 (Figure 17) however, due to the nature of the coal and stripping ratio, mining operations have halted and these areas have been put onto care and maintenance. It is likely that mining in these areas will be resumed in the near future. In addition; the Groenvallei underground may be accessed via the Groenvallei 7 or the Groenvallei 5 opencast workings.

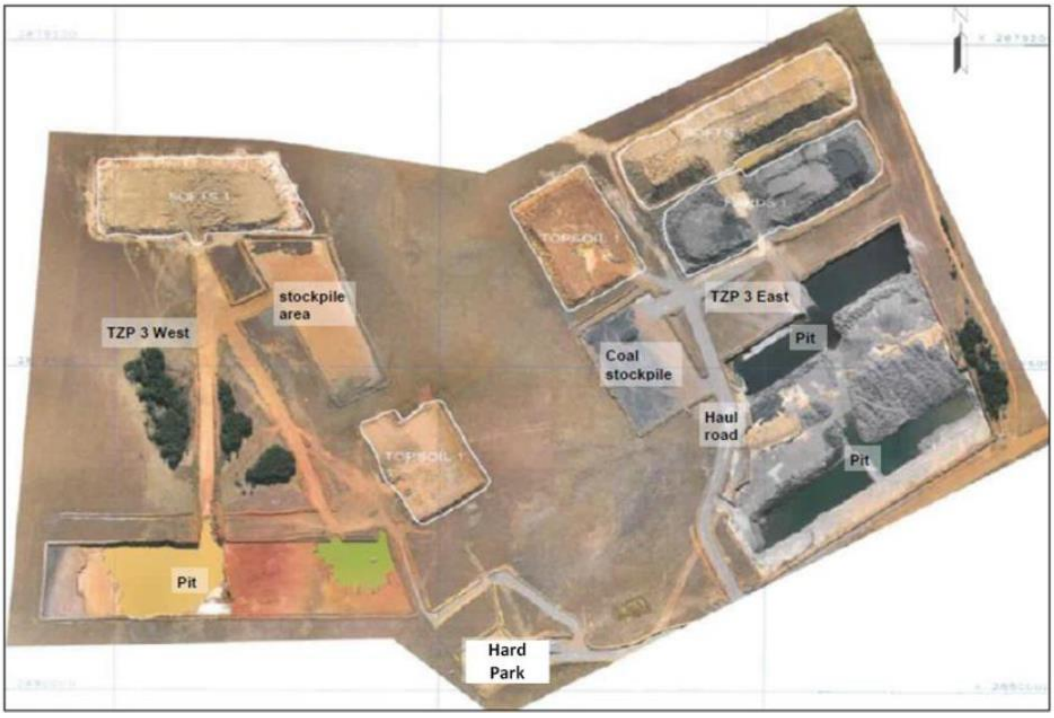


Figure 16: TZP 3

Figure 17: Groenvallei 7

2.2.3.2 PLANNED MINE AREAS

Future mine areas will largely focus on the underground mining of reserves, with some opencast mining proposed at Kwaggafontein 1 and 2, as well as at TZP 2.

Various stockpiles are required on site. Long-term stockpiles include topsoil, subsoil, soft overburden and hard overburden stockpiles, all of which will be erected as close as possible to the final void to aid in infilling and rehabilitation of final voids.

In addition, the mine will have duff, product and ROM coal stockpiles which will be temporary in nature. Coal within these stockpiles will be moved on a “first-in-first-out” basis to reduce the risk of spontaneous combustion.

2.2.3.3 REHABILITATION OF PAST EXCAVATIONS

In the past, discard was placed into the various opencast pits to aid with the rollover rehabilitation. Following a directive from the Inkomati-Usuthu Catchment Management Agency (IUCMA) Pembani has commenced with the removal of discard from these pits.

Rollover rehabilitation is followed as far as practically possible, with the placement of material in the same sequence as that of the original material i.e.: hards, softs, sub-soil and finally topsoil.

Underground mining access will be sealed. Rehabilitation will then follow the same process as that for opencast as most underground areas will be accessed from opencast walls.

2.2.4 MINE PRODUCTION RATE

Estimates of the predicted production rates for each operational area are provided in the tables that follow.

Table 11: TZP5 Opencast Production

PEMBANI TZP5 OP					
OC Model: January 2015					
CAPE LO31					
List of Assumptions:					
Type of mining operation	Openpit Truck and Loader				
Mineable coal seams	BU and BL seperately				
Maximum depth of coal	0	m			
Minimum mining height	0.5	m	*BU and BL combined.*		
Maximum strip ratio	6:1	bcm / t			
Coal qualtiy cut-offs					
Minimum RAW CV	20	Mj/kg			
Minimum RAW DAFVM	27	%			
Geological Loss	10.0	%	*As per Kobus Resource Report*		
Mining Loss	3.0	%	*Equavalent to 10cm*		
Contamination	0	%	*No contamination applied*		
Mine design criteria					
Strip width	35	m			
Blast block length	100	m			
Mining right boundary	9	m			
Boundary from Graves	100	m			
Wetland buffer zone	100	m			
Production target REV01					
SBL plant feed	70,000	romt per month			
SBU as result of SBL operation					
Total waste production as result of Coal production					

Table 12: SBT Underground Production

PEMBANI SBT UNDERGROUND					
UG Model: January 2015					
CAPE LO31					
List of Assumptions:					
Type of mining operation	Board and Pillar underground operation				
Mineable coal seams	SBT		*Combined SBU and SBL coal seams*		
Extraction of Pillars	No				
Minimum depth of coal	20	m	*Depth from Topo to SBT seam roof*		
Minimum mining height	1.5	m	*BU and BL combined.*		
Coal qualtiy cut-offs					
Minimum RAW CV	20	Mj/kg			
Minimum RAW DAFVM	27	%			
Geological Loss	20	%	*As per Kobus Resource Report*		
Mining Loss	5	%			
Contamination	10	%			
Mine design criteria					
Board (Road) width	6.5	m			
Number of Roads	9				
Factor of Safety	2				
Factor of Safety formula	Salamon & Munro				
Mining section type	CM (CM factor applied to SF formula)				
Resulting Pillar center	13	m			
Mining right boundary	9	m			
Boundary from Major dyke / Fault	20	m	*either side of structure*		
Pillar from OC operation	25	m			
Production targets REV01					
TZP4-S					
Number of production sections	1				
Production per section	40,000	romt per month			
TZP4-N					
Number of production sections	2				
Production per section	24,000	romt per month			
HAARLEM					
Number of production sections	1				
Production per section	45,000	romt per month			

Table 13: E-Seam Openpit Production

PEMBANI E-SEAM OPENPIT			
CONCEPTUAL STUDY			
ASSUMPTIONS			
Model and Geological data			
Geological model: Jan2015			
Mining model update: Feb2015			
Schedule Rev01: 25-02-2015. Life-of-Mine schedule. Target SE tonnage 25,000romt p mth			
Only Openpit R1-West was scheduled. R1-East and R4 are total Reserve quantities			
Losses			
Geological Loss	10	%	*Ave as per KD resource*
Mining Loss	5	%	*Ave to 10cm on total sbt*
No contamination applied			
Design			
Strip width	35	m	
Blast block width	100	m	
Mineable Coal seams	SE		
Cut-offs applied			
Minimum mining ST	0.50	m	
Maximum RAW CV	20.0	%	
Minimum RAW DAFVM	27.0	%	
Maximum Strip Ratio	9:1	waste bcm : coal t	
Barrier either side of Roac	50	m (applied from CL of road)	

Table 14: SE Underground Production

PEMBANI SE UNDERGROUND					
UG Model: January 2015					
CAPE LO31					
List of Assumptions:					
Type of mining operation	Board and Pillar underground operation				
Mineable coal seams	SE				
Extraction of Pillars	No				
Minimum depth of coal	20	m	*Depth from Topo to SE seam roof*		
Minimum mining height	0.8	m			
Coal qualtiy cut-offs					
Minimum RAW CV	27.2	Mj/kg			
Minimum RAW DAFVM	27	%			
Geological Loss	20	%	*As per Kobus Resource Report*		
Mining Loss	5	%			
Contamination	10	cm			
Mine design criteria					
Board (Road) width	6.5	m			
Number of Roads	9				
Factor of Safety	2				
Factor of Safety formula	Salamon & Munro				
Mining section type	Drill and Blast				
Resulting Pillar center	13	m			
Mining right boundary	9	m			
Boundary from Major dyke / Faults	20	m	*either side of structure*		
Pillar from OC operation	25	m			
Production targets					
Number of production sections	Vary				
Production per section	7,500	romt per month - average with Contamination			

2.2.5 MINE SCHEDULE

The LoM production schedules for the different production areas are presented in Figure 18 to Figure 22 below. Some areas may be mined simultaneously and some will be mined subsequently to other areas to maintain favourable production levels.

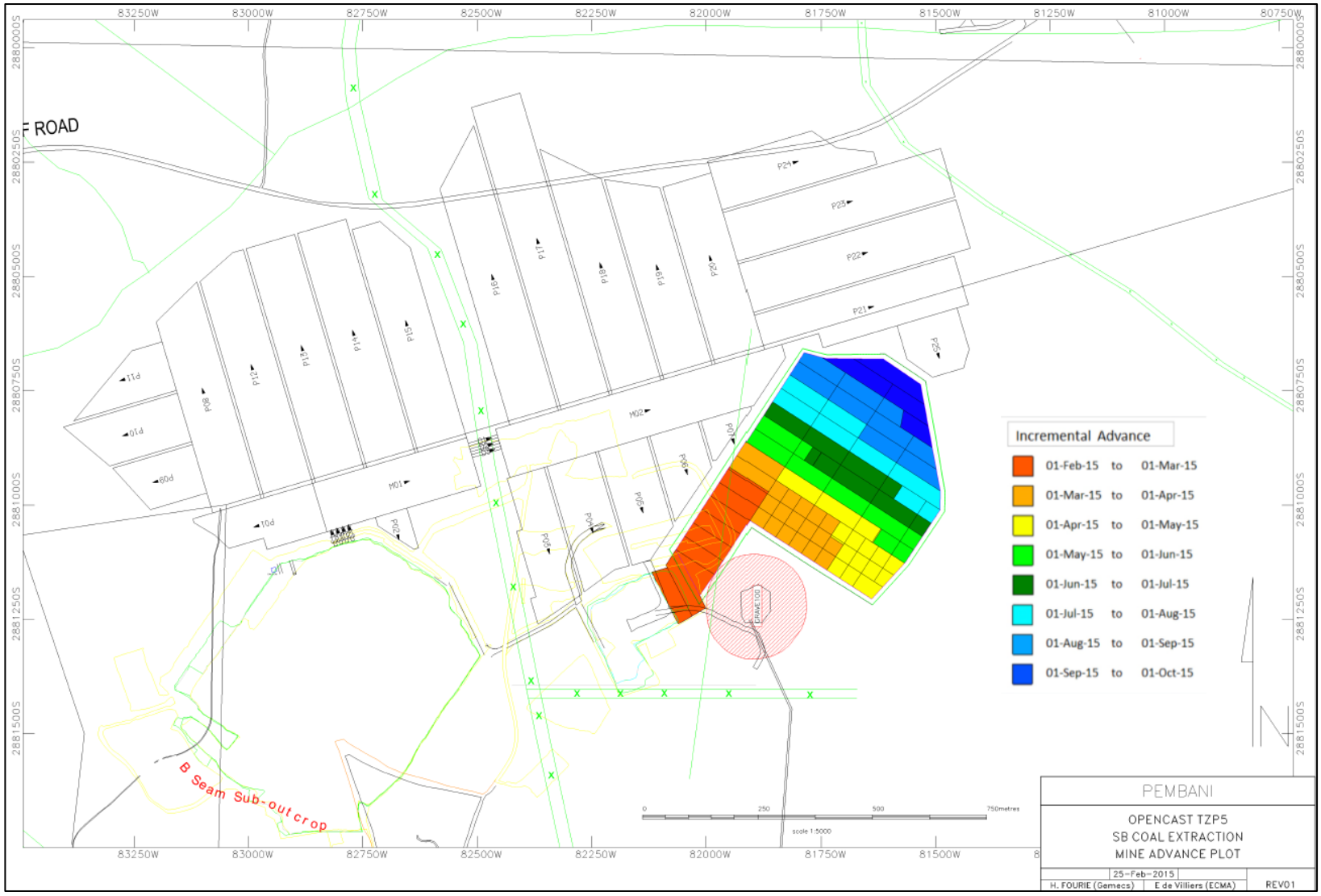


Figure 18: LoM Progressive Plot – TZP 5 OC B Seam

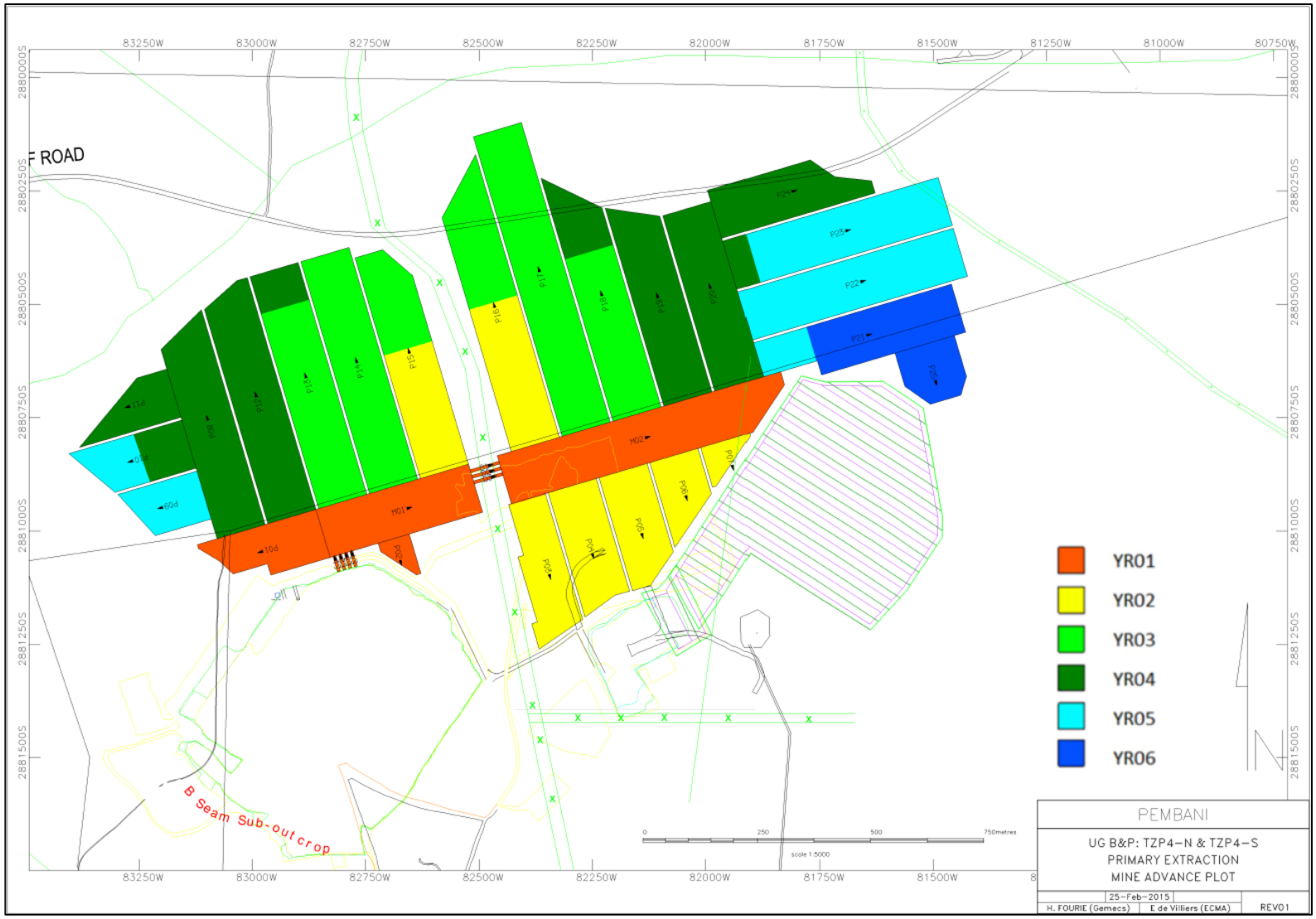


Figure 19: LoM Progressive Plot – TZP 4 UG B Seam

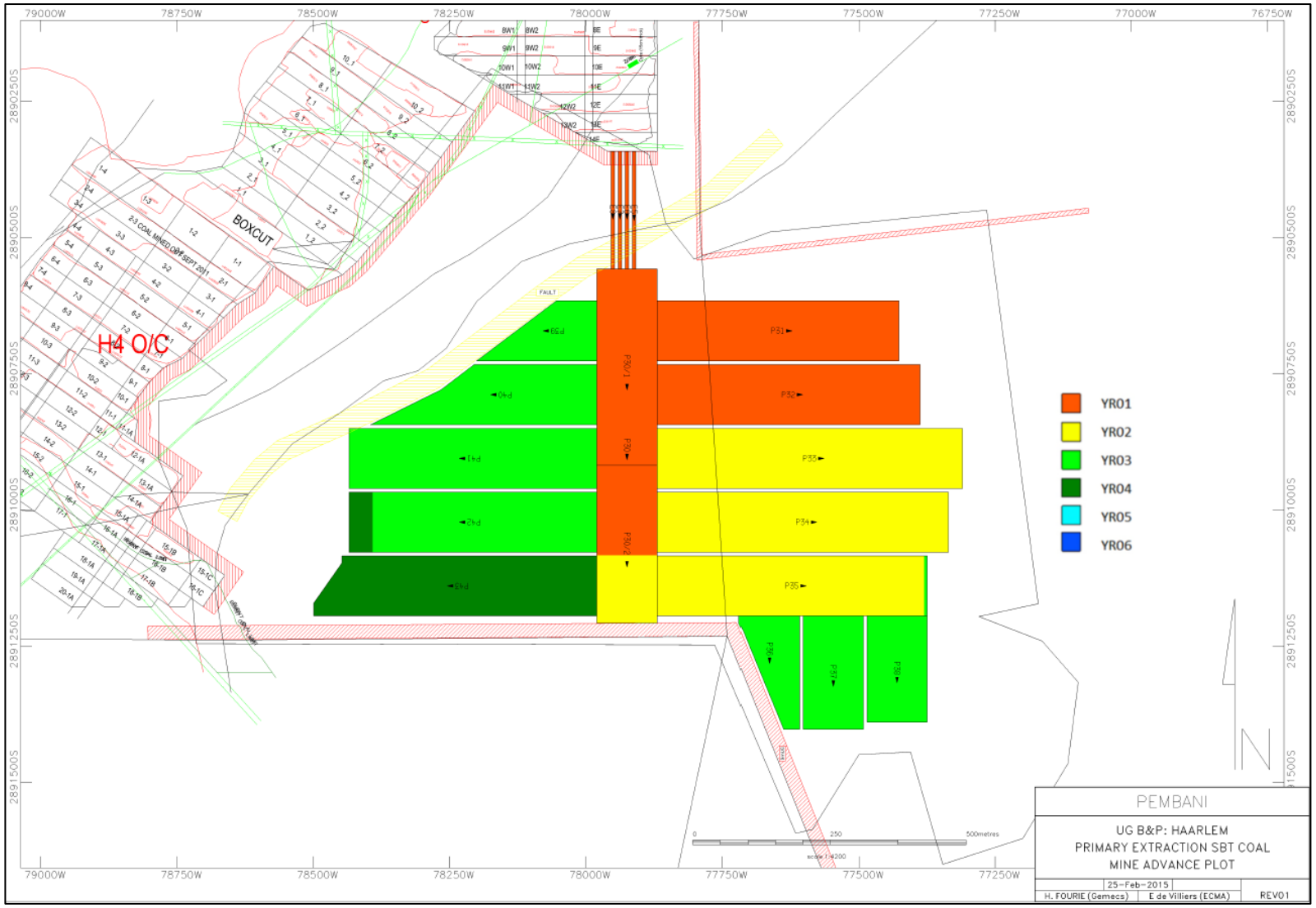


Figure 20: LoM Progressive Plot – Haarlem B Seam UG

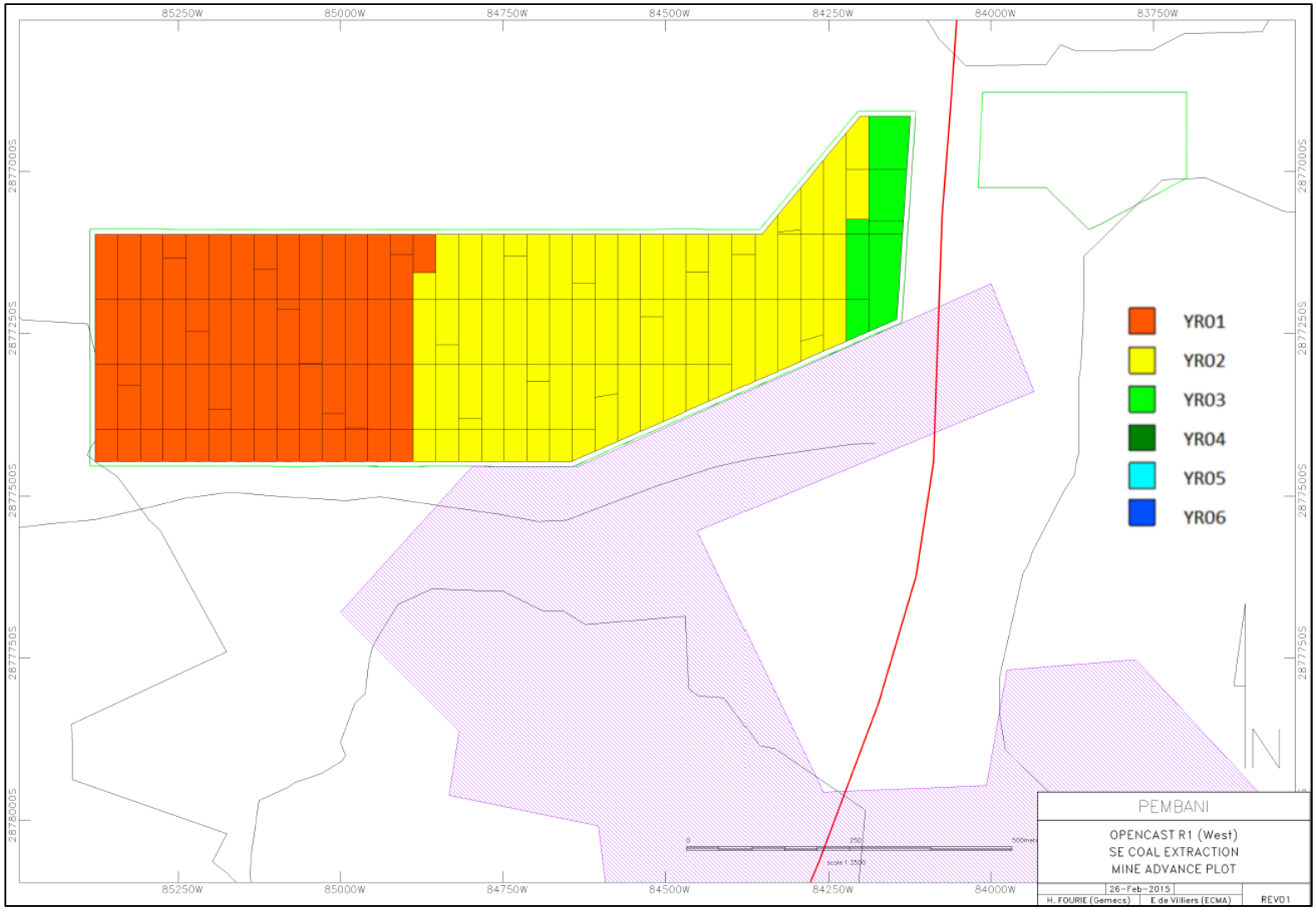


Figure 21: LoM Progressive Plot –R1W Area E Seam Opencast

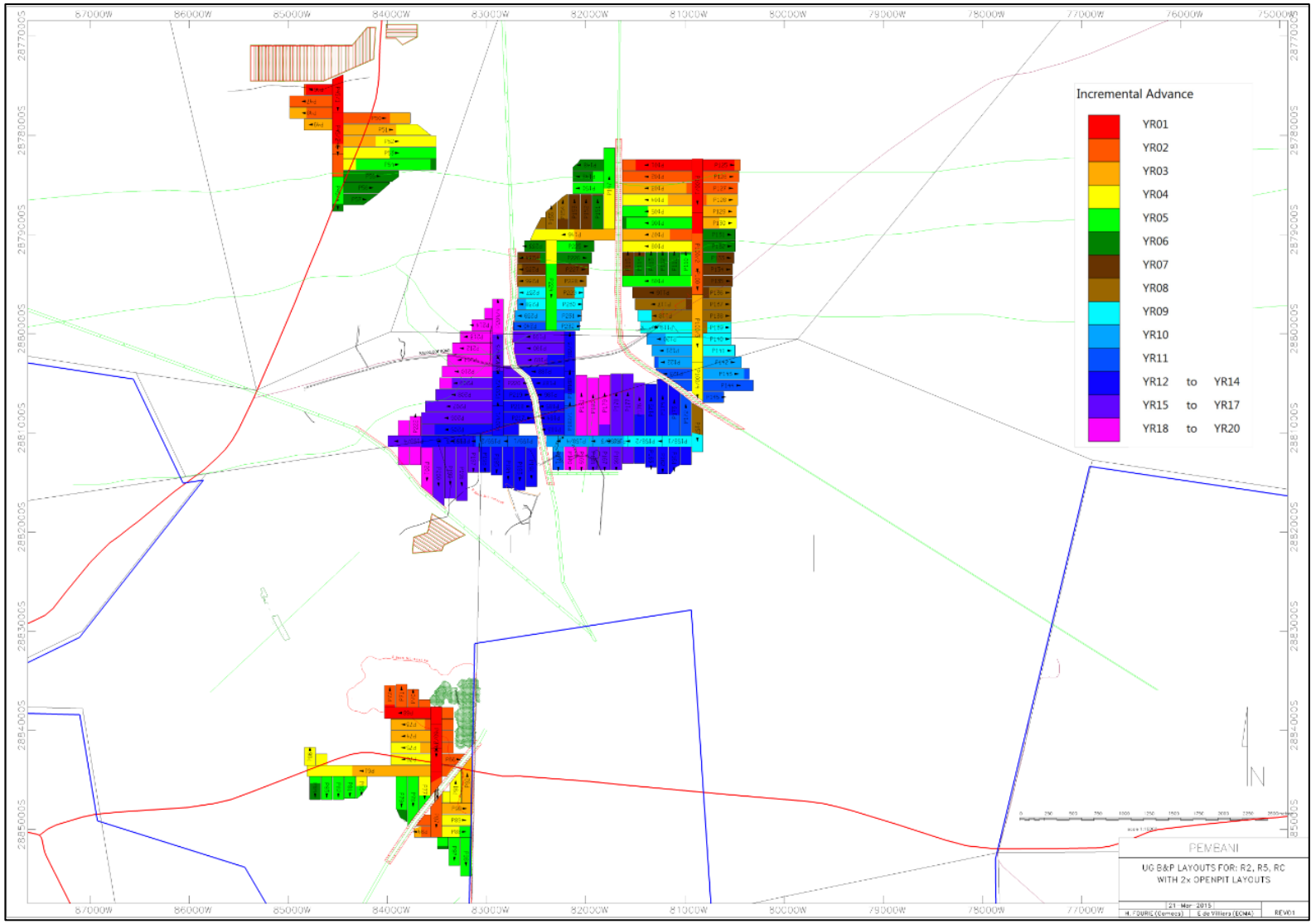


Figure 22: LoM Progressive Plot –All E-Seam Underground areas as if mined simultaneously

2.2.6 MINERALS PROCESSING

The processing of raw coal is undertaken at the Imbani Wash Plant. The Imbani Wash Plant is located on the farm Paardeplaats (Portion 7 of Portion 3). This plant was previously owned and operated by Siphete Coal (previously called Carolina Coal) however; this plant was purchased by Pembani in 2003. The plant consists of a crusher, screener and wash plant.

Raw coal is fed from a RoM stockpile into a crusher, and crushed to market related sizing. The <3mm particles are screened out and the >3mm are washed in a dense medium separation plant (DMS) at the Imbani Wash Plant. The underflow from the DMS is discarded to the discard bin, whereas the overflow forms part of the product line. The <3mm coal is put through a cyclone and the >1 mm is added to the product line as duff. Duff is fine dry coal (usually anthracite) obtained through coal processing operations. The size range for duff is 4.8 mm to 0 mm.

During the beneficiation process, the slurry produced contains approximately 80% water and 20% solids. Slurry is routed to a filter press, where the slurry is dried to a filter cake before being added to the saleable product. During emergencies and maintenance, the slurry is disposed of onto the existing co-disposal facility. Here the supernatant water is piped off for reuse at the wash plant.

Discard that is not sold immediately is placed onto the co-disposal facility located on Portion 7 of Portion 3 of the farm Paardeplaats 12 IT. Once the slurry on the co-disposal facility has dried it is reclaimed for sale.

The water requirements of the plant are approximately 0.25m^3 per run of mine feed ton. Currently the plant feed is approximately2, 640 tons per day. The water requirements for the wash plant are met from dewatering of the various opencast pits. Water from the pits is pumped to the reservoirs before being fed to the raw water dam which in turn feeds the plant. Water is also obtained from the plant PCDs. Water is recycled as far as possible. Run of mine coal and washed product is stockpiled within the dirty footprint area of the plant.

Figure 23: Imbani Wash Plant

In addition, discard has previously been trucked to opencast pits on site and placed at the base of the pits. Discard that is not sold immediately is now placed onto the co-disposal facility located on Portion 7 of Portion 3 of the farm Paardeplaats 12 IT. Once the slurry on the co-disposal facility has dried it is reclaimed for sale. The processing plant operates 24 hours a day. From the plant, the coal is transported to local markets or the Droogvallei siding for rail transportation to distribution centres or end users.

Pembani intends to install a coal to energy power plant on site. Waste coal or discard that is not suitable for market will be sent to the power plant where it will be converted to gas which in turn will be utilised by a gas turbine to generate electricity for Pembani's operations. This facility will trigger listed activites and, prior to commencement, will be subject to an additonal environmental impact assessment.

2.2.7 WASTE

Waste generated from the mining areas includes minimal construction and domestic waste, some hydrocarbon and explosive waste and sewage. These are all collected and disposed of as part of the mines waste management plan and or managed by contractors. Waste is recycled as far as possible. Portable toilets are used at the mining areas.

2.2.7.1 DOMESTIC/GENERAL WASTE

General waste includes domestic refuse, office waste, soiled paper, non-hazardous plastic containers, detergent containers (washing-up liquid etc.) and cardboard. This waste will be collected in clearly demarcated bins situated around the site. The waste will be trucked to the Carolina municipal dump/landfill site on a weekly basis. No littering or dumping will be tolerated on site. Chemical toilets (Porta-potties) are utilised at the mining area. The chemical toilets are emptied regularly by the chemical toilet supply company and the waste is disposed of in the correct manner at the respective registered

sewage treatment works. Pembani ensures a cradle-to-grave policy (see Section 23.6 for definition) with regards to following up on correct disposal by contractors managing their portable toilets and general waste disposal.

2.2.7.2 INDUSTRIAL WASTE (SCRAP METAL)

Scrap metal includes any ferrous metals and non-ferrous metals not contaminated with hazardous material which should be placed in an appropriately labelled bin at the mine and transferred to central collection and recycling point and sold as scrap metal or removed and transported to an appropriate landfill site.

2.2.7.3 HAZARDOUS INDUSTRIAL WASTE

Hydrocarbon waste includes used oil and grease, filters, contaminated containers, rags, equipment and soil, engine oil, transmission oil, hydraulic oil, transformer oil, or oil of any kind. All used oil generated at the Service Bays and Workshops is stored in designated storage tanks and periodically transferred to collection and storage points for collection and disposal by an authorised contractor.

2.2.8 MINE RESIDUE

Mine residue (slurry and discard) are generated at the Imbani Wash Plant area. Slurry is routed to a filter press, where the slurry is dried to a filter cake before being added to the saleable product. During emergencies and maintenance, the slurry is disposed of onto the existing, licensed co-disposal facility. Here the supernatant water is piped off for reuse at the wash plant.

Discard that is not sold immediately is placed onto the co-disposal facility located on Portion 7 of Portion 3 of the farm Paardeplaats 12 IT. Once the slurry on the co-disposal facility has dried it is reclaimed for sale. Pembani also intends to install a coal to energy power plant. This power plant will receive discard that would otherwise be placed onto the co-disposal, and generate electricity to power the wash plant and administration area.

2.2.9 SOIL STOCKPILES

Various stockpiles are required on site. Long-term stockpiles include topsoil, subsoil, soft overburden and hard overburden stockpiles, all of which will be erected as close as possible to the final void to aid in infilling and rehabilitation of final voids. In addition, the mine will have duff, product and RoM coal stockpiles which will be temporary in nature. Coal within these stockpiles is moved on a “first-in-first-out” basis to reduce the risk of spontaneous combustion.

The extraction of coal requires temporary coal stockpiles at the each of the mine sections, these stockpiles are estimated to be between 22,500 and 31,500 tons. The coal stockpile areas are compacted and made as impermeable as possible to limit seepage through the stockpiles into the strata below. The stockpile areas are lightly sloped to drain water away from the pits and towards the PCDs. Dirty water trenches are placed downslope of these stockpiles to collect and divert dirty water runoff. Where necessary (in areas where upslope areas are clean areas), upslope berms of soil are placed around these stockpiles to divert clean water.

2.2.10 ADMINISTRATION BUILDINGS, ENGINEERING BAYS, WORKSHOPS, AND OTHER BUILDINGS

2.2.10.1 ADMINISTRATION BUILDINGS

The main offices, ablution facilities and change house are located at the Imbani Wash Plant. A number of administrative buildings are also located at the POMS constractors camp. Temporary containers are utilised as administration blocks at the various pit areas.

2.2.10.2 WORKSHOP

Workshops are utilised for the servicing of diesel driven equipment on site within the POMS contractors camp. Workshops will also be constructed at the underground mining contractors camp at the underground access points. Workshops are constructed with with impervious concrete slabs fitted with oil and silt traps. In addition, all wash bays will be required to have the necessary oil management facilities such as oil and silt traps.

2.2.10.3 ABLUTION FACILITIES

Portable chemical toilets are utilised at the mining areas. The chemical toilets are emptied regularly by the chemical toilet supply company and the waste is disposed of in the correct manner at a registered sewage treatment works. One septic tank/french drain exists at the Imbani Wash Plant area, and services the change house, security house and administration block.

2.2.11 DANGEROUS GOOD STORAGE

2.2.11.1 DIESEL SUPPLY

Mining equipment, including drills, trucks and shovels, front-end loaders and 30 ton trucks for coal haulage are diesel operated. At the Imbani Wash Plant the hydrocarbons (and used hydrocarbon drums and rags) and diesel bowsers are stored within bunded areas designed to applicable standards, with a bunding volume of 110% of total storage volume. The bunded area is fitted with a tap which is only opened under controlled circumstances to release any water that has accumulated within the bunding. The hydrocarbons from these oil traps are cleared out at regular intervals and incorporated into hydrocarbon waste drums which are stored within the same bunded area until removal from site by a registered contractor for hydrocarbon waste. All water from the bunded areas is considered hazardous waste and must be disposed of accordingly. Spillage kits and handling and emergency procedures are available on site.

2.2.11.2 EXPLOSIVES

The biggest consumable during the mining operation is the explosives required to break the hard overburden. Drill rods and drill bits will be used to drill the hard overburden above the coal seam. Explosives are kept in an explosive magazine on site.

2.2.12 WATER SUPPLY

2.2.12.1 POTABLE WATER SUPPLY

For the main offices, potable water is purchased off site and trucked to the premises. A borehole is used to supply potable water for the mine contractors. Filtered water from the raw water dam supplies the change house and admin block. A borehole is utilised at TZP 4 to supply the mine contractors with potable water. A potable water tank is located at the entrance to the underground workings at TZP 4.

2.2.12.2 PROCESS WATER SUPPLY

Water will be recycled onsite as far as possible. Process water needs, such as dust suppression and water for the wash plant and/or for drilling will be supplied from the PCDs or in-pit sumps. Figure 24 shows the Mine Water Reticulation Diagram.

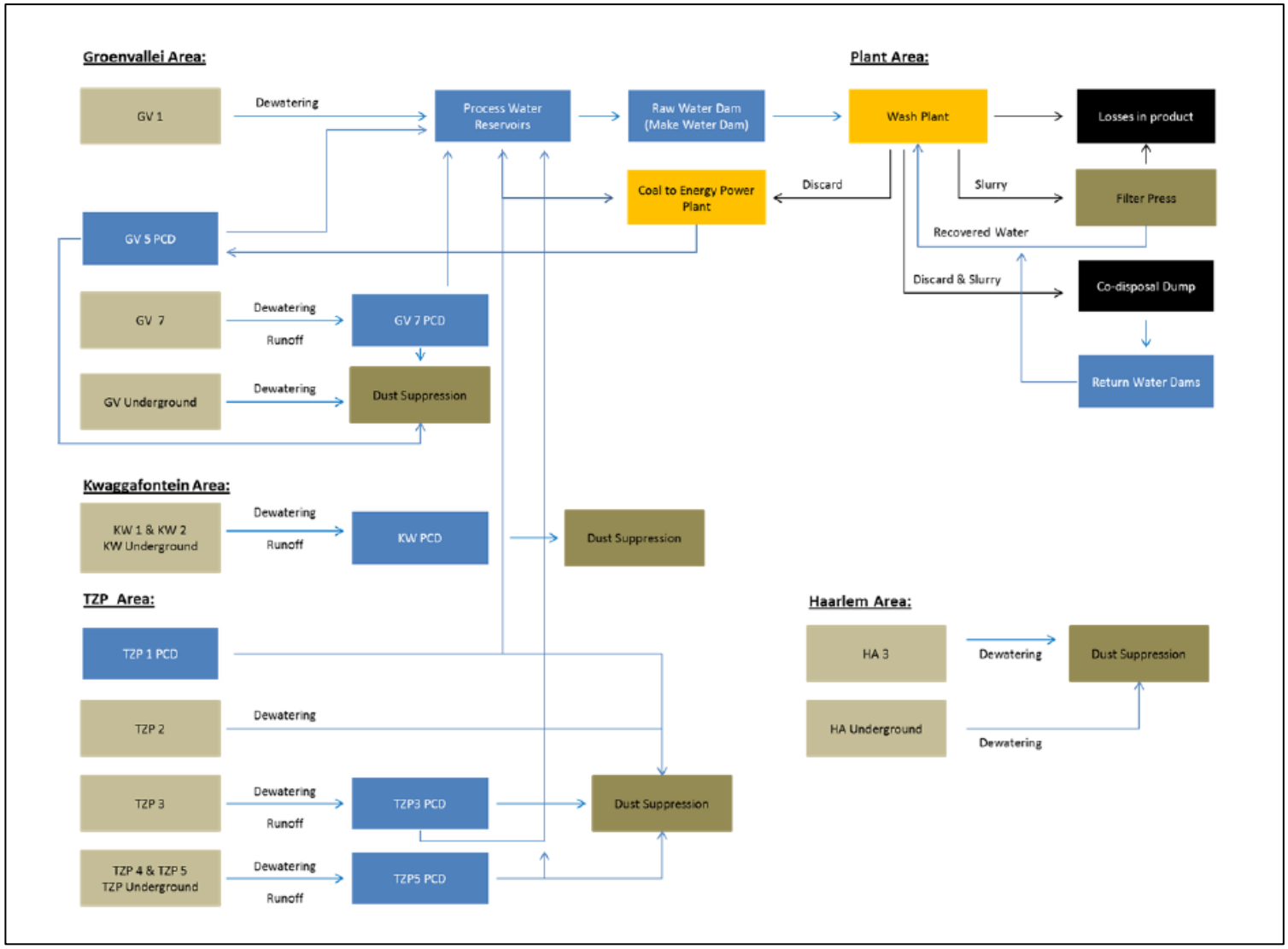


Figure 24: Mine water reticulation diagram

2.2.13 CLEAN AND DIRTY WATER PROCESSES

In general storm water management and drainage infrastructure onsite accommodates a 1:50 year storm event as required by legislation. Clean and dirty water is separated and all dirty water is channelled into dirty water containment facilities at the Imbani Wash Plant area. Dirty water runoff at the opencast areas drains into in-pit sumps and from these is pumped to the PCDs. Clean water is diverted around various dirty footprints by means of channels and berms to the natural environment.

2.2.13.1 CLEAN WATER PROCESSES

All storm water falling within the Imbani Wash Plant's 15 ha dirty footprint area is stored within the dirty water system for use within the plant. Clean water is diverted around the property. Clean water diversion berms are situated up slope and interception trenches and drains are cut down slope of the dirty footprint area. Active mining areas have berms and trenches constructed around their facilities to keep clean water runoff from entering mine workings and to divert clean water around the site.

2.2.13.2 SUMPS AND PUMPS

Dewatering activities are carried out on site to allow for the safe continuation of mining. Diesel pumps are utilised to dewater the opencast pits and underground worrkingd and dispose of mine affected water into the relevant PCD and/or pumped to the process water reservoirs for use at the Imbani Wash Plant.

2.2.13.3 POLLUTION CONTROL DAM (PCD) AND ASSOCIATED DIRTY WATER MANAGEMENT

Currently there are seven (7) dirty water dams on site (the two reservoirs, the raw water dam, the plant dam, the 2 return water dams at the base of the co-disposal facility and the PCD at TZP 5). Further details of these dams include:

- The two reservoirs receive water from the dewatered current and future opencast area and future underground workings, this water is then pumped to the raw water dam (also known as the make water dam) which feeds the wash plant;
- The plant dam collects contaminated storm water runoff from the plant and stockpiling area. This water is allowed to evaporate and/or reused within the wash plant;
- Water from the co-disposal facility reports to the dual return water dams for evaporation; and
- A small PCD has been constructed at TZP 5 to receive contaminated storm water runoff from the stockpile area, as well as to manage water dewatered from the opencast pits at TZP 4 and 5.

Lined PCDs will also be constructed at the various opencast areas to manage dirty water runoff and ingress into the pits/workings. These PCDs will be approximately 50 000 m^3 and will be constructed in accordance with the designs included in the 2015 Integrated Water and Waste Management Plan (IWWMP). The position of these PCDs have been determined based on the results of the groundwater study and the potential decant points as identified, this way the position of the dams will be suitable for operational and closure management objectives.

2.2.13.4 STORMWATER MANAGEMENT PLAN

The stormwater management plan is indicated in Figure 25 below.

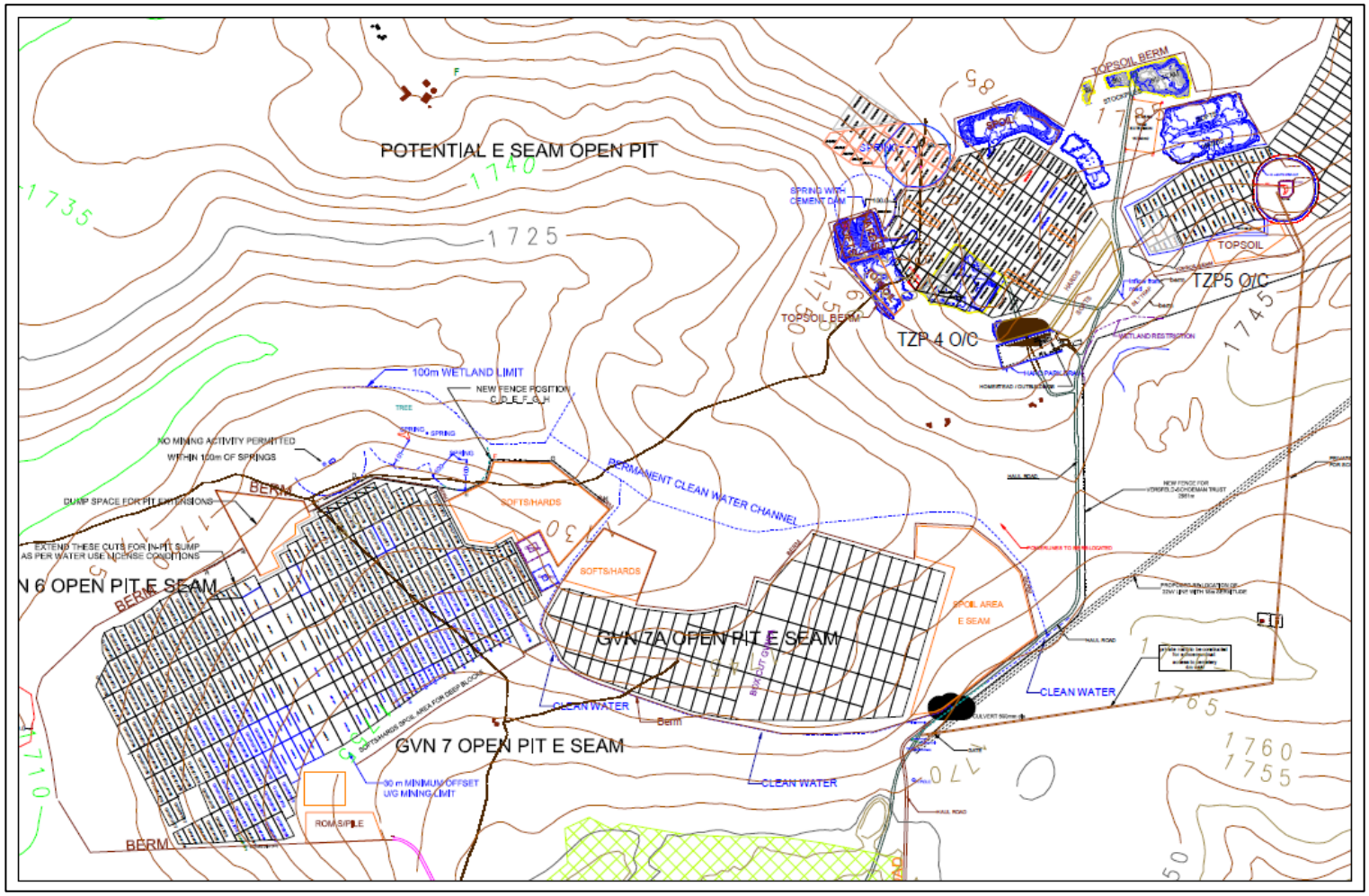


Figure 25: Stormwater Management Plan

2.2.13.5 WATER AND SALT BALANCE

The water balance is based on the fact that there will only be one active opencast and underground mining area at a time. This is as a result that different mining areas will commence and be decommissioned at different times during the remaining 10 year LoM.

For the water balance the following assumptions have been made:

- It is assumed that rainfall will only enter the active mining areas. Opencast (300m x 100m). Underground Adit (50m x 50m).
- It is assumed that rainfall and groundwater seepage in the workings will migrate to the lowest point in the workings and be temporary stored in a sump (25m x 25m).
- It is assumed that dust suppression will be at a rate of 0.0025m/m^2/day.
- It is assumed that each ROM stockpiling area will be 3m high and cover an area of 10000m^2.
- It is assumed that each person consumes 25l per day.

The water balance for Pembani is indicated in Table 15 below.

Table 15: Daily Water Balance

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	Quantity (m^3/day)	Water Circuit/stream	Quantity (m^3/day)	
Mining Areas					
Opencast Mine	Fissure water into mine workings (dewatering)	160.0	Mine PCD	79.1	
	Rainwater	61.2	Dust suppression	140.0	
			Environmental Loss	2.1	
	Total	**221.2**		**221.2**	**0.0**
Underground Mine	Fissure water into mine workings (dewatering)	160.0	Mine PCD	12.4	
	Rainwater	5.1	Dust suppression	152.7	
	Total	**165.1**		**165.1**	**0.0**
Opencast RoM Stockpile	Rainwater	20.4	Mine PCD	18.3	
			Environmental Loss	2.0	
	Total	**20.4**		**20.4**	**0.0**
Underground RoM Stockpile	Rainwater	20.4	Mine PCD	18.3	
			Environmental Loss	2.0	
	Total	**20.4**		**20.4**	**0.0**
	Direct rainfall	35.9	Environmental Loss	58.9	

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	Quantity (m^3/day)	Water Circuit/stream	Quantity (m^3/day)	
Mine PCD	Runoff from RoM stockpile	36.7	Process Water Reservoirs	105.1	
	Opencast and underground workings	91.4			
	Total	**164.0**		**164.0**	**0.0**
Contractors Offices (Borehole)	Drinking Water	0.5	Portable toilets (removed from site)	0.1	
			Human consumption	0.4	
	Total	**0.5**		**0.5**	**0.0**
Process Water Reservoirs	Rainwater	2.0	Environmental Loss	3.2	
	Excess water from Mine PCD	105.1	Make water dam	7.8	
			Coal to Power Plant	96.0	
	Total	**107.1**		**107.1**	**0.0**
Wash Plant Area					
Washing and Screening Plant	Make water dam	7.6	Co-disposal (Discard)	44.6	
	Plant PCD	624.8	Slurry (Filter press)	39.6	
	Filter press	39.6	Loss in product (Product stockpile)	107.3	
			Environmental Loss	100.1	
			Plant Pollution Control	380.5	

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	Quantity (m^3/day)	Water Circuit/stream	Quantity (m^3/day)	
	Total	**672.0**		**672.0**	**0.0**
Product Stockpiles (dirty water area at plant)	Rainwater	142.7	Plant Pollution Control	142.7	
	Total	**142.7**		**142.7**	**0.0**
Make Water Dam	Process water reservoirs	7.8	Treated water to change house	0.2	
			Washing and Screening Plant	7.6	
	Total	**7.8**		**7.8**	**0.0**
Plant Pollution Control	Direct rainfall	17.9	Environmental Loss	28.7	
	Runoff from product stockpile	142.7	Washing and Screening Plant	624.8	
	Seepage from product stockpile	107.3	Dust suppression	10.5	
	Seepage from discard stockpile	15.6			
	Spillage from plant	380.5			
	Total	**663.9**		**663.9**	**0.0**
Change Houses	Process water reservoirs	0.2	French drain	0.4	
	Offices (ablutions)	0.2			
	Total	**0.4**		**0.4**	**0.0**

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	Quantity (m^3/day)	Water Circuit/stream	Quantity (m^3/day)	
Offices	Drinking water (trucked in)	0.5	Change house (French drain)	0.2	
			Human consumption	0.3	
	Total	**0.5**		**0.5**	**0.0**
Coal to Power Plant	Process water reservoirs	96.0	Consumed	96.0	
	Total	**96.0**		**96.0**	**0.0**
Co-Disposal					
Co-disposal	Discard	29.0	Environmental Loss	55.2	
	Rainfall	38.7	Co-disposal Return Water Dams	12.4	
	Total	**67.7**		**67.7**	**0.0**
Co-disposal Return Water Dam B	Direct rainfall	4.9	Environmental Loss	9.0	
	Seepage (co-disposal)	6.2	Dust suppression	2.1	
	Total	**11.1**		**11.1**	**0.0**
Co-disposal Return Water Dam A	Direct rainfall	6.9	Environmental Loss	12.4	
	Seepage (co-disposal)	6.2	Dust suppression	0.8	
	Total	**13.2**		**13.2**	**0.0**
Total Water Balance		**2 373.89**		**2 373.89**	**0.00**

2.2.13.6 DUST SUPPRESSION

Water for dust suppression will be sourced from the various PCDs, and/or extracted from the pits directly. Dust suppression is estimated at 110 700 m^3 per annum. Water for dust suppression will only be used within the dirty footprint of the mine, to prevent contamination of clean areas with dirty water.

2.2.14 ROAD, RAIL, AND POWER

A number of haul and access roads have been constructed on site. Storm water is managed on the roads with a system of berms which direct the runoff to small settlement ponds (approximately 1.5 m^2 in size) to allow for the settlement of fines thereby reducing silt laden runoff.

Electricity at the plant area is currently sourced from Eskom. However, it is anticipated that a coal to power plant will be installed in the near future (maximum footprint of 200m x 40m). The anticipated power output will be between 5 and 52MW depending on the size of the plant installed.

Mining will be done with diesel driven equipment. Diesel generators will be utilised within the mining areas for lighting and pumping etc. There is no railway system at Pembani Colliery as coal is transported via truck.

2.2.15 GASEOUS EMISSIONS

Greenhouse Gases (GHG's) are gaseous molecules in the atmosphere that absorb and emit thermal infrared radiation. Water vapour (H_2O), carbon dioxide (CO_2), and methane (CH_4) are three of the primary GHG's in the Earth's atmosphere. The geological processes of coal formation produce CH_4 and CO_2.

CH_4 is the major GHG emitted from coal mining and handling (Department of Environmental Affairs, 2013). In underground mines, ventilation of the mines causes significant amounts of CH_4 to be pumped into the atmosphere. Such ventilation is the main source of CH_4 emissions in hard coal mining activities. CH_4 releases from surface coal mining operation are low. In addition, CH_4 can continue to be emitted from abandoned coal mines after mining has ceased.

Vehicles and machinery will emit fumes, but will be serviced and maintained regularly to keep these emissions within the relevant vehicle/machine's specifications. The liberation of CH_4 during the coal mining is the most significant source of GHG emissions from Pembani Colliery operations (expressed as tCO_2eq), accounting for 75% of the total GHG emissions. The burning of fuels is the second most significant source, accounting for 25%. The contribution of explosives to the total GHG emissions from the operations is very small, accounting for less than 0.1%.

According to the Greenhouse Gas Emissions Inventory and Estimated Carbon Tax Assessment undertaken in 2015, the Pembani Colliery emits a total of 32 843.25 tCO_{2eq} per annum based on the figures provided for 2014/2015.

2.2.16 TRANSPORTATION OF RUN OF MINE

Coal is transported to the processing plant via truck. The processing plant operates 24 hours a day. From the plant, the coal will be transported to local markets or the Droogvallei siding for rail transportation.

2.2.17 LIST OF MAIN MINING ACTIONS, ACTIVITIES, AND PROCESSES OCCURRING ON SITE

The main activities and processes occurring on site are listed in Table 16 below. All actions, activities and processes have been grouped into each of the relevant project phases namely: planning and design, construction, operation, decommissioning, and rehabilitation and closure. For the purpose of this report, the following broad definitions apply:

- Planning and design refers to the phase in which planning takes place;
- Construction refers to the phase in which the site is prepared and infrastructure is established;
- Operation refers to the phase in which physical mining and production takes place;
- Decommissioning refers to the phase in which infrastructure is removed and rehabilitation efforts are applied and their success monitored; and
- Rehabilitation and closure refers to the phase in which maintenance and rehabilitation monitoring are undertaken to ensure that the mines closure objectives are met.

Table 16: List of main actions, activities, and processes on site per phase

Main Activity/Action/Process	Ancillary Activity	Planning	Construction	Operation	Decommissioning	Rehabilitation and Closure
General mine management	Human Resource Management					
	Employment					
	Interaction with local Community					
Drilling monitoring boreholes	Drilling					
Drilling for continued resource evaluation	Drilling					
Site visits	Vehicle and foot traffic on site					
General construction management	Human Resource Management					
	Employment					
	Interaction with local Community					
Site establishment – Contractors camp	Construction camp sewage management					
	Dust suppression					
	Earthworks					
	Fencing					
	Fuel Storage and refuelling					
	Hazardous substances management					
	Site security					
	Soil Management					
	Truck and heavy machinery operation					

Main Activity/Action/Process	Ancillary Activity	Planning	Construction	Operation	Decommissioning	Rehabilitation and Closure
	Utilization of portable toilets and generation of sewage					
	Vegetation clearance					
	Waste Management					
Construction of mineral processing facilities	Concrete works					
	Dust suppression					
	Earthworks					
	Fencing					
	Fuel Storage and refuelling					
	Hazardous substances management					
	Power supply connections					
	Soil Management					
	Vegetation clearance					
	Waste Management					
Mine area site preparation	Clearance and preparation of soil stockpile areas					
	Dust suppression					
	Establishment of storm water management infrastructure for road network					
	Fuel Storage and refuelling					
	Road construction					
	Truck and heavy machinery operation					
Site establishment – Permanent site office infrastructure	Concrete works					
	Dust suppression					
	Earthworks					
	Fencing					
	Fuel Storage and refuelling					

Main Activity/Action/Process	Ancillary Activity	Planning	Construction	Operation	Decommissioning	Rehabilitation and Closure
	Hazardous substances management					
	Power supply connections					
	Site security					
	Soil Management					
	Truck and heavy machinery operation					
	Utilization of portable toilets and generation of sewage					
	Vegetation clearance					
	Waste Management					
Water management infrastructure construction	Construct the dirty and clean water management features					
	Construction of culverts, berms and crossings					
	Construction of PCD's					
	Dust suppression					
	Installation of pipelines for water management					
	Installation of pumps, flow meters					
	Truck and heavy machinery operation					
	Vegetation clearance					
Maintenance and operation of site infrastructure and facilities	Alien vegetation management					
	Maintenance and management of portable toilets by contractor					
	Operation of generators if and when required					
	Power line supply					

Main Activity/Action/Process	Ancillary Activity	Planning	Construction	Operation	Decommissioning	Rehabilitation and Closure
	Sewage and sanitation					
	Site security					
	Storage and handling of diesel/hydrocarbons					
	Storage and handling of explosives					
	Waste management					
	Water management					
Opencast mining	Blasting (overburden and coal)					
	Dust suppression					
	Erection of in pit infrastructure					
	Fuel Storage and refuelling					
	Hauling Coal for mineral processing					
	Pumping of in-pit water/Dewatering					
	Raw coal stockpiling					
	Removal of coal seam - Strip Mining - Truck and Shovel					
	Soil Stockpile Management					
	Storage of in pit water in sump					
	Truck and heavy machinery operation					
	Use and maintenance of portable toilets					
	Vegetation clearance					
Underground mining	Blasting					

Main Activity/Action/Process	Ancillary Activity	Planning	Construction	Operation	Decommissioning	Rehabilitation and Closure
	Construction of underground Adits from opencast pits					
	Dewatering					
	Discard trucked to co-disposal dump facility					
	Fuel Storage and refuelling					
	Hauling Coal Offsite					
	Hauling coal on site for mineral processing					
	Installation of underground mine infrastructure					
	Mine ventilation					
	Removal of coal seams - Bord and pillar mining					
	Soil management					
	Temporary stockpiling of RoM coal					
	Use and maintenance of portable toilets					
Mineral processing	Coal Processing - washing					
	Coal stockpile management					
	Dust suppression					
	Fuel Storage and refuelling					
	Hauling processed coal					
	Operation of co-disposal facility					
	Slurry disposal at co-disposal facility					
	Water management					
	Dust suppression					

Main Activity/Action/Process	Ancillary Activity	Planning	Construction	Operation	Decommissioning	Rehabilitation and Closure
General decommissioning activities	Recycling of recyclable/reclaimable waste					
	Removal of waste					
Decommissioning of the co-disposal dump	Profiling of co-disposal dump and preparation for final rehabilitation					
	Truck and heavy machinery operation					
Infrastructure removal	Decommissioning/removal of water pipelines					
	Disconnection of services (power supply, water connections)					
	Dismantling, removal and rehabilitation of unnecessary infrastructure					
	Final removal of all berms, trenches and any dams no longer required					
	Removal of fencing					
Back filling opencast voids	Filling the final opencast voids					
Decommissioning of underground mine infrastructure	Sealing and closure of underground mining sections					
	Sealing shafts and adits					
General surface rehabilitation	Profiling of all areas					
	Replacement of subsoil and topsoil					

Main Activity/Action/Process	Ancillary Activity	Planning	Construction	Operation	Decommissioning	Rehabilitation and Closure
	Ripping of roads and other compacted areas					
Storm water management	Construction of contour berms or other erosion control measures					
Re-vegetation	Dust suppression					
	Fertilization					
	Seeding with local indigenous species					
Post closure monitoring and maintenance	Managing the site for all post mining impacts to prevent any further pollution					
	Vehicle and foot traffic on site					
	Alien vegetation management					
	Environmental monitoring of rehabilitated areas					
	Maintenance of storm water and erosion control measures					
Water treatment (as required by WUL)	Construction of water treatment plant					
	Operation of water treatment plant					
Application for closure certificate	Operation of water treatment plant					

3 POLICY AND LEGISLATIVE CONTEXT

A summary of the applicable legislation is provided in Table 17 below. More detail on the legislative framework is presented in Section 4.1 below.

Table 17: Applicable Legislation and guidelines

Applicable Legislation and Guidelines	Reference Where Applied
(A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process);	
APPLICABLE LEGISLATION	
Constitution of the Republic of South Africa, Act 108 of 1996 The constitution of any country is the supreme law of that country. The Bill of Rights in chapter 2 section 24 of the Constitution of South Africa Act (Act 108 of 1996) makes provisions for environmental issues and declares that: "Everyone has the right - (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development" Therefore, the EIA is conducted to fulfill the requirement of the Bill of Rights.	Throughout the SR and EIR process
National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) and the EIA Regulations (2014) thereunder: The NEMA (1998) requires that a project of this nature (inclusive of a Mining Right) must undergo a Scoping and Environmental Impact Assessment; an Environmental Management Programme must also be compiled. Regulations applicable to this project include the following: • EIA Regulations R.982 (2014) in terms of NEMA. • Listing Notice 2: R.984 (2014) in terms of NEMA.	Throughout the SR and EIR process
Minerals and Petroleum Resources Development Act (MPRDA) (Act no 28 of 2002), as amended and Mineral and Petroleum Resource Development Regulations, 2004, (MPRDR) as amended:	Throughout the SR and EIR process

Applicable Legislation and Guidelines	Reference Where Applied
The MPRDA (2002) requires an applicant who wishes to proceed with a mining project to obtain a Mining Right, part of which requires the applicant to obtain Environmental Authorisation in terms of the NEMA (1998).	
National Water Act (NWA) (Act 36 of 1998): The NWA recognises that water is a scarce and unevenly distributed national resource which must managed encompassing all aspects of water resources. In terms of Chapter 4 of the NWA, activities and processes associated with the proposed Braeside Aggregate Quarry and associated infrastructure, are required to be licensed by the Department of Water and Sanitation (DWS). An Integrated Water Use Licence Application (IWULA) will be lodged with the DWS in terms of Section 21 of the NWA, which lists several water uses requiring authorisation. Furthermore, an Integrated Water and Waste Management Plan (IWWMP) has been compiled and submitted in support of the IWULA. **A Water Use Licence was issued on the 07 July 2016.**	Throughout the process – all water related aspects
National Heritage Resources Act, 1999 (Act no 25 of 1999): The National Heritage Resources Act aims to promote good management of cultural heritage resources and encourages the nurturing and conservation of cultural legacy so that it may be bestowed to future generations. Due to the extent of the project, it is likely that some heritage resources are likely to occur within the project boundary area.	Heritage specialist study, Palaeonotlogical Study, EIA, EMP.
Specific Environmental Management Acts (SEMAs): The SEMAs refer to specific portions of the environment where additional legislation over and above the NEMA (1998) is applicable. SEMAs relevant to this application include the following: • National Environmental Management: Protected Areas Act, 2003 (Act no 57 of 2003). • National Environmental Management: Biodiversity Act, 2004 (Act no 10 of 2004). • National Environmental Management: Air Quality Act, 2004 (Act no 39 of 2004). • National Environmental Management: Waste Act, 2008 (Act no 59 of 2008).	Specialist studies, Baseline description and EMP

Applicable Legislation and Guidelines	Reference Where Applied
APPLICABLE GUIDELINES	
Integrated Environmental Management Information Guidelines series: This series of guidelines was published by the Department of Environmental Affairs (DEA), and refers to various environmental aspects. Applicable guidelines in the series include: • Guideline 4: Strategic Environmental Assessment (SEA). • Guideline 7: Public Participation. • Guideline 9: Need and desirability.	The guidelines will be used throughout the Scoping and Environmental Impact Report process.
Best Practise Guideline (BPG) series: The BPG series is a series of publications by the then Department of Water Affair and Forestry (now DWS – Department of Water and Sanitation) providing best practice principles and guidelines relevant to certain aspects of water management. Best practice guidelines relevant to this project include the following: • BPG A4: Pollution Control Dams. • BPG H1: Integrated Mine Water Management. • BPG H2: Pollution Prevention and Minimisation of Impacts. • BPG H3: Water Reuse and Reclamation. • BPG H4: Water treatment. • BPG G1: Storm Water Management. • BPG G2: Water and Salt balances. • BPG G3: Water Monitoring Systems. • BPG G4: Impact Prediction	Surface water and groundwater specialist studies, EIA and EMP.

In addition to the above, there are various pieces of legislation which govern certain aspects of the mining operations and these are summarised in Table 18 below, together with the main legislative requirements mentioned above.

Table 18: Applicable legislation and guidelines

Applicable Legislation and Guidelines	Reference Where Applied	How does this Development Comply with and Respond to the Legislation and Policy Context
Minerals and Petroleum Resources Development Act (Act 28 of 2002) Section 102	Throughout the Scoping report and EIR. The legal framework for the MPRDA process is described in section 3 of this report.	A Mining Right is held by the Owner of the mine. The mine is in the process of converting another old order right into a new order right. This report is being submitted as part of an environmental authorization process to incorporate the proposed Portion 1

Applicable Legislation and Guidelines	Reference Where Applied	How does this Development Comply with and Respond to the Legislation and Policy Context
		and RE of the farm Zandvoort 10 IT into the existing mining right area (MP 30/5/1/2/2/112 MR) and to amend the existing mining works programme (within the approved mining right boundary) to include the mining of additional coal resources
National Environmental Management Act (Act 107 of 1998)	This entire report has been compiled in consultation with the NEMA and adheres to the relevant NEMA regulations and guidelines. The legal framework for the NEMA process is described in section 3 of this report.	In terms of the NEMA, the mine has obtained environmental authorization for the existing mining activities currently underway (17/2/3/GS-44).
National Environmental Management Biodiversity Act (Act 10 of 2004)	A framework for management of alien invasive species is presented in section 26.9 of this report.	The management of alien invasive species is governed under the NEMBA. This report includes a framework for the management of alien and invasive species. The mine will be required to develop a detailed alien invasive species management plan.
National Environmental Management Waste Act (Act 26 of 2014)	A framework for management of waste is presented in section 26.9 of this report.	In terms of the NEMWA, the mine is considered to be undertaking existing lawful activities with regards to waste management.
National Environmental Management: Air Quality Act (Act 39 of 2004)	The framework for an air quality management programme is presented in section 26.9 of this EMPR.	Pembani Coal Carolina (Pty) Ltd appointed an independent specialist to undertake a Greenhouse Gas Emissions Inventory.

Applicable Legislation and Guidelines	Reference Where Applied	How does this Development Comply with and Respond to the Legislation and Policy Context
		The Pembani Colliery undertakes dust monitoring to estimate the impact of fugitive emissions.
National Water Act (Act 36 of 1998) Section 21	The Pembani Colliery has an established water monitoring programme.	In terms of the National Water Act, the mine has an existing Water Use Licence (05/X11D/AGJ/466) for Section 21 (a), Section 21(j), and Section 21(g) water uses. The mine also applied for an amendment to the existing licence (16/2/7X100/C180) to licence additional water uses, including Section 21(c) and Section 21(i) water uses. The IWUL was granted on 07 July 2016 (Licence No. 05/X11B/ACGIJ/4704
National Heritage Resources Act (Act 25 of 1999)	The framework for a Heritage Management Plan is provided in section 26.9 of this EIR and EMPR.	A specialist heritage impact study was undertaken in support of the 2006 mining right application. A second study was conducted in 2013. Additionally, a specialist heritage impact assessment was undertaken over the farm Zandvoort 10 IT as part of the S102 application, as well as for Kwaggafontein 8IT as part of this EIR and EMPR. Appropriate mitigation measures are included in this report to ensure heritage resources are adequately protected. It is further anticipated that a heritage management procedure shall be developed by the mine.
Department of Water Affairs and Forestry (DWAF). 2006 Best practise guidelines.	This report has been drafted in consultation with the Department of Water Affairs	Mitigation measures have been included in this EIR and EMPR that all dirty water infrastructure at the

Applicable Legislation and Guidelines	Reference Where Applied	How does this Development Comply with and Respond to the Legislation and Policy Context
	and Forestry (DWAF). 2006 Best practise guidelines.	Pembani Colliery is designed by professional engineers and adheres to the principles of the DWAF best practice guidelines.
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. Pretoria. 100 pages.	This report has been drafted in consultation with the Mining and Biodiversity Guideline.	The assessment of risks and impacts along with the mitigation measures developed is in accordance with the Mining and Biodiversity Guideline. The overall guiding principles of the environmental management for the mine as set out in the ESMS presented in this report adheres to the principles and guidelines of the Mining and Biodiversity Guideline as far as is feasible and relevant for an existing mining operation.
Carbon Tax	Relevant information from the Greenhouse Gas Emissions Inventory and Estimated Carbon Tax Assessment has been incorporated into this report in keeping with responsible air quality management as per the IFC guidelines.	In the 2015 Budget Speech (25 February) by Nhlanhla Nene (Minister of Finance) it was stated that carbon tax will be introduced in 2016. In preparation of the proposed carbon taxation, Pembani appointed an Independent specialist to undertake a Greenhouse Gas Emissions Inventory and Estimated Carbon Tax Assessment for the Pembani Colliery. Relevant information from this study has been incorporated into this report in keeping with responsible air quality management as per the IFC guidelines.

Applicable Legislation and Guidelines	Reference Where Applied	How does this Development Comply with and Respond to the Legislation and Policy Context
World Bank Equator Principles (III)	The EIA process was undertaken in accordance with the principles included in the Equator Principles and IFC Performance Standards. Similarly, the ESMS framework presented in this report complies with the principles of the above mentioned guidelines.	This report has been drafted in with due consideration to the Equator Principles.
International Finance Corporation (IFC) Performance Standards	The EIA process was undertaken in accordance with the principles included in the Equator Principles and IFC Performance Standards. Similarly, the ESMS framework presented in this report complies with the principles of the above mentioned guidelines.	This report has been drafted with due consideration of the IFC Performance Standards.
World Bank Environmental, Health and Safety (EHS) Guidelines – General and Mining Guidelines	The EIA process was undertaken in accordance with the principles included in the Equator Principles and IFC Performance Standards. Similarly, the ESMS framework presented in this report complies with the principles of the above mentioned guidelines.	This report has been drafted with due consideration of the World Bank Environmental, Health, and Safety (EHS) guidelines.

3.1 APPLICABLE NATIONAL LEGISLATION

The legal framework within which the Pembani Colliery is governed by many Acts, Regulations, Standards, Guidelines and Treaties on an international, national, provincial and local level. Legislation applicable to the project includes (but is not limited to):

3.1.1 THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT

In support of the amendment to the mining right submitted by Pembani Coal Carolina (Pty) Ltd., the applicant is required to conduct a Scoping Report, EIA /EMP and I&AP consultations that need to be submitted to the DMR for adjudication. The Scoping Report has been compiled in accordance with Section 49 of the MPRDA in order to satisfy the criteria for a Scoping Report. The Final Scoping Report was submitted to the DMR for review. This EIR report is being compiled in accordance with Section 50 of the MPRDA in order to satisfy the criteria for an EIR and Section 51 for the EMPR. Pending presentation of the results of the study and inclusion of comment from I&AP's, the Final EIR and EMPR will be submitted to the DMR for review.

3.1.2 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT

The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA Environmental Impact Assessment (EIA) regulations, the proponent is required to appoint an environmental assessment practitioner (EAP) to undertake the EIA, as well as the public participation process. In South Africa, EIA became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant environmental authorisation. On 21 April 2006 the Minister of Environmental Affairs and Tourism promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended in June 2010 and again in December 2014. The December 2014 Nema regulations are applicable to this project.

The objective of the Regulations is to establish the procedures that must be followed in the consideration, investigation, assessment and reporting of the activities that have been identified. The purpose of these procedures is to provide the competent authority with adequate information to make decisions which ensure that activities which may impact negatively on the environment to an unacceptable degree are not authorized, and that activities which are authorized are undertaken in such a manner that the environmental impacts are managed to acceptable levels.

A Scoping and EIA process is reserved for activities which have the potential to result in significant impacts which are complex to assess. Scoping and EIA accordingly provides a mechanism for the comprehensive assessment of activities that are likely to have more significant environmental impacts.

WWC was granted EA, Authorisation Number 17/2/3 GS – 44 on 6 August 2012, in terms of:

- Items 9, 12, 22, 47 and 56 of Government Notice R544;
- Items 5, 15, 20 and 4(a) of Government Notice R545; and
- Items 10(a) and 12 of Government Notice R546 of 18 June 2010, in terms of Chapter 5 of the NEMA, respectively.

The EA was to undertake the following activities:

- Construction of pollution control dams and dirty water storage reservoirs with a combined capacity of 50 000 m^3 or more. The dam wall height falls below 5m;
- Construction of access roads and haul roads where the road is wider than 8m;
- Extending of existing farm roads/ haul roads by more than 1km;
- Physical alteration of vacant agricultural land for mining. The total area to be transformed exceeds 20 hectares;
- Construction of a fuel storage facility; and
- Construction of clean and dirty water canals in and around the mining areas with a width of more than 36 cm.

An amendment to the EA, Authorisation Number 17/2/3 GS – 44 was granted on 15 March 2013, due to the exclusion of activities and farm portions, by the then Department of Economic Development, Environment and Tourism (DEDET) (now MARDLEA), with the original EA. The amended activities include:

- Items 11, 18 and 28 of Government Notice R544.

It is, therefore, understood that insofar as the proposed additional mining areas, within the existing Mining Right are concrede-, that all the relevant NEMA listed activities have been authorised.

As part of this Environmental Authorisation, a review of the mines activities was undertaken and in terms of the NEMA, the following listed activity is herewith applied for to amend the current Mining Right to include Zandvoort into the current Mining Right:

- Listed Activity 17 of GNR 984 (2014)**.**

3.1.3 THE NATIONAL WATER ACT

The National Water Act, 1998 (Act 36 of 1998) (NWA) makes provision for two types of applications for water use licences, namely individual applications and compulsory applications. The NWA also provides that the responsible authority may require an assessment by the applicant of the likely effect of the proposed licence on the resource quality, and that such assessment be subject to the EIA regulations. A person may use water, if the use is-

- Permissible as a continuation of an existing lawful water use (ELWU);
- Permissible in terms of a general authorisation (GA);
- Permissible under Schedule 1; or

- Authorised by a licence.

The NWA defines 11 water uses. A water use may only be undertaken if authorised by the Department of Water and Sanitation (DWS). Water users are required to register certain water uses that actually took place on the date of registration, irrespective of whether the use was lawful or not. The water uses for which an authorisation issued can be issued includes:

- taking water from a water resource;
- storing water;
- impeding or diverting the flow of water in a watercourse;
- engaging in a stream flow reduction activity contemplated in section 36;
- engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduits;
- disposing of waste in a manner which may detrimentally impact on a water resource;
- disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- altering the bed, banks, course or characteristics of a watercourse;
- removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- using water for recreational purposes.

WWC was granted an Integrated Water Use Licence (IWUL) in terms of Chapter 4 of the NWA, Licence No: 05/X11D/AGJ/466 and File No: 16/2/7/X100/C180, dated 1 April 2011, for the following water uses:

- Section 21(a): Taking of water from a water resource;
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource; and
- Section 21(j): Removing, discharging or disposing of water found underground.

Further to the issued IWUL, additional water uses were identified and an Integrated Water Use License Application (IWULA) was compiled and submitted to the DWS (previously the Department of Water Affairs (DWA)). The IWUL was granted on 07 July 2016 (Licence No. 05/X11B/ACGIJ/4704) The following water uses are included additionally in the new IWULA:

- Section 21(c): Impeding or diverting the flow of water in a watercourse;
- Section 21(i): Altering the bed, banks, course or characteristics of a watercourse; and
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource.

The IWUL granted on 07 July 2017, (Licence No. 05/X11B/ACGIJ/4704), incorporates both Zandvoort, and the proposed changes to the MWP.

3.1.4 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT

The applicable waste act is no. 59 of 2008: National Environmental Management: Waste Act, 2008 (NEM:WA). The NEM:WA aims to regulate waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. Furthermore, the NEM:WA provides for specific waste management measures to be implemented; as well as providing for the licensing and control of waste management activities. No waste management licenses in terms of NEM:WA have been applied for or granted to date by Pembani Colliery. Waste management activities may be applicable to the proposed expansion of the co-disposal dump; the proposed return water dam (RWD); stockpiles and pollution control dams (PCDs). However, as these overlap with identified uses in terms of the NWA it may be possible to apply for exemption from the provisions of the NEM:WA.

3.1.5 THE NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT

The applicable air quality act is no. 39 of 2004: National Environment Management: Air Quality Act, 2004 (NEM:AQA). The environmental regulations and guidelines governing the emissions and impact of the mining operations on air quality need to be considered prior to potential impacts and sensitive receptors being identified.

Air quality guidelines and standards are fundamental to effective air quality management, providing the link between the source of atmospheric emissions and the user of that air at the downstream receptor site. The ambient air quality limits are intended to indicate safe daily exposure levels for the majority of the population, including the very young and the elderly, throughout an individual's lifetime. Air quality guidelines and standards are normally given for specific averaging periods. These averaging periods refer to the time-span over which the air concentration of the pollutant was monitored at a location. Generally, five averaging periods are applicable, namely an instantaneous peak, 1-hour average, 24-hour average, 1-month average, and annual average. The application of these standards varies, with some countries allowing a certain number of exceedances of each of the standards per year.

3.1.6 THE NATIONAL HERITAGE RESOURCES ACT

The National Heritage Resources Act (NHRA) (Act 25 of 1999) stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, "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…" The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, MPRDA and the DFA legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are

granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008b):

The NEMA 23(2)(b) states that an integrated environmental management plan should, "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage".

A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b)and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 (Fourie, 2008b).

The MPRDA defines 'environment' as it is in the NEMA and, therefore, acknowledges cultural resources as part of the environment. Section 39(3)(b) of this Act specifically refers to the evaluation, assessment and identification of impacts on all heritage resources as identified in Section 3(2) of the National Heritage Resources Act that are to be impacted on by activities governed by the MPRDA. Section 40 of the same Act requires the consultation with any State Department administering any law that has relevance on such an application through Section 39 of the MPRDA. This implies the evaluation of Heritage Assessment Reports in Environmental Management Plans or Programmes by the relevant heritage authorities (Fourie, 2008b).

In accordance with the legislative requirements and EIA rating criteria, the regulations of the South African Heritage Resources Agency (SAHRA) and Association of Southern African Professional Archaeologists (ASAPA) have also been incorporated to ensure that a comprehensive and legally compatible Heritage Scoping Report (HSR) is compiled.

3.2 APPLICABLE INTERNATIONAL CONSIDERATIONS

3.2.1 EQUATOR PRINCIPALS

The Equator Principles is a credit risk management framework for determining, assessing and managing environmental and social risk in project finance transactions. The signatories of the Equator Principles believe that adoption of, and adherence to, these principles offers significant benefits to the financiers, their customers and other stakeholders. These principles will foster the ability of financiers to document and manage their risk exposures to environmental and social matters associated with the projects they finance, thereby allowing them to engage proactively with their stakeholders on environmental and social policy issues.

Adherence to these principles will allow the financiers to work with their customers in their management of environmental and social policy issues. The adopting institutions view these principles as a

framework for developing individual, internal practices and policies, and are doing so voluntarily and independently.

The latest set of principles (Equator Principles III or EPIII) came into effect on 4th June 2013. The new EPIII should be applied to all new transactions from 01 January 2014. This review utilised the EPIII and will thus allow the project to align themselves with the latest set of standards. The principles are listed below with a very brief summary:

Principle 1: Review and Categorisation: including legal review and due diligence;

Principle 2: Social and Environmental Assessment: includes a requirement to carry out a comprehensive environmental and social assessment to identify and address (including mitigation) environmental and social issues;

Principle 3: Applicable Environmental and Social Standards: including alignment with the IFC Performance standards and applicable industry specific EHS Guidelines and compliance with relevant host country laws, regulations and permits that pertain to social and environmental matters;

Principle 4: Environmental and Social Management System and Equator Principles Action Plan: Typically requires development of a Social and Environmental Management System that addresses the management of the impacts, risks, and corrective actions required. An action plan must be developed to address gaps identified in the Independent review.

Principle 5: Stakeholder Engagement: includes the requirement to ensure that the public is provided with free, prior and informed consultation and facilitate their informed participation as a means to establish whether a project has adequately incorporated affected communities' concerns.

Principle 6: Grievance Mechanism: requires assurance that consultation, disclosure and community engagement continues throughout construction and operation of the project.

Principle 7: Independent Review: Requires that an independent social or environmental expert not directly associated with the borrower will review the assessment and consultation process documentation in order to ensure compliance with these principles.

Principle 8: Covenants: This typically refers to obligations on the person lending or applying for finance. This review will assist in determining the applicable covenants for this project.

Principle 9: Independent Monitoring and Reporting: Requires that monitoring is carried out by an independent environmental and/or social expert. Allocation should be made for such an independent person in the EMP's for construction and operation.

Principle 10: Reporting and Transparency: The client will ensure that the ESIA is accessible and available online. The client will also report on GHG emissions for project emitting over 100 000 tonnes

of CO_2 equivalent annually. Each EPFI adopting the Equator Principles commits to report publicly at least annually about its Equator Principles implementation processes and experience.

3.2.2 IFC STANDARDS

The International Finance Corporation (IFC) Performance Standards are directed at providing guidance on how to identify risks and impacts and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation in order to achieve its overall development objectives. The Environmental Health Standard Guidelines (EHS) provide performance levels and measures for compliance with the Performance Standards.

In addition to meeting the IFC Performance Standards, clients must comply with applicable national law, including those laws implementing host country obligations under International law. When host country regulations differ from the levels and measures presented in the EHS, projects are expected to achieve whichever is more stringent. This review is based on the 2012 IFC Performance Standards. The IFC Performance Standards are listed below with very brief summaries:

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts: Requires the development of an Environmental and Social Management System (ESMS) to address the management and mitigation of risks and impacts identified, and corrective actions required. The ESMS entails a methodological approach to managing environmental and social risks and impacts in a structured way on an ongoing basis. An effective ESMS appropriate to the nature and scale of the project promotes sound and sustainable environmental and social performance.

Performance Standard 2: Labour and Working Conditions: Requires the implementation of human resources policies and procedures relevant to the size and workforce of the client, and is consistent with the requirements of the Performance Standards. The pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers.

Performance Standard 3: Resource Efficiency and Pollution Prevention: Generally requires the application of technically and financially feasible resource efficiency and pollution prevention principles and techniques to avoid or minimise adverse impacts on human health and the environment. Reference should be made to the EHS guidelines or other internationally recognised sources during the evaluation and selection process.

Performance Standard 4: Community Health, Safety, and Security: Requires the identification of risks and impacts to the health and safety of Affected Communities and the proposal of mitigation measures commensurate with magnitude and nature.

Performance Standard 5: Land Acquisition and Involuntary Resettlement: Requires the consideration of alternative project designs to minimise or avoid physical or economic displacement and to balance environmental, social, and financial costs and benefits. Compensation for the loss of assets will be provided in the event that displacement cannot be avoided.

Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Consideration of direct and indirect impacts on biodiversity and ecosystem services and identification of any significant residual impacts is required. A practice of adaptive management should be adopted to ensure that mitigation and management measures are implemented in response to changing conditions and monitoring during the project life-cycle.

Performance Standard 7: Indigenous Peoples: Identification of Indigenous Peoples that could be affected by the project is required. Adverse impacts are to be avoided where possible, with minimisation, restoration, and / or compensation being provided when avoidance is not possible. An engagement process with Affected Communities is required as per Performance Standard 1.

Performance Standard 8: Cultural Heritage: The client is required to comply with applicable legislation regarding the protection of cultural heritage, including the implementation of the host country's obligations under the Convention Concerning the Protection of the World Cultural and Natural Heritage. Internationally recognised methods for the protection, field study, and documentation of cultural heritage are to be implemented.

4 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

As an existing operational mine, the need and desirability of the current mining operations has been described in several previous environmental authorisation processes. The extension of the proposed underground mining operations to Zandvoort, as well as the proposed changes to the Mining Works Programme to include additional underground and opencast mining within the existing Mining Right, will allow the continued contribution of the mine to favourable economic impacts on both the local and regional economies.

The extension of proposed underground mining to Zandvoort is preferred as the current Pembani operations (opencast and underground) are located adjacent to this property. The close proximity of the current operations allows for an extension of the underground mining without the need to undertake opencast operations or establish additional surface infrastructure.

This extension of the proposed underground workings will lead to improved positive economic impacts in the form of capital injections into the local and regional economy resulting in increased commercial activity. The increased coal produced will ensure consistent product for both the local market (such as Eskom) and export market.

In addition, the current and proposed extension of mining operations at Pembani will provide for additional employment opportunities for a workforce recruited from the surrounding area which houses many historically disadvantaged South Africans requiring employment. As per Pembani's current policy, priority will be given to recruiting additional local people for employment opportunities associated with mining activities. The extension of underground mining will therefore allow for the direct employment of approximately 203 employees, an increase from 171 currently employed and extend employment opportunities for those currently employed by Pembani.

In summary, the extension of the proposed underground mining to Portions RE and 1 of Zandvoort 10 IT and the amendment to the Mining Works Programme will allow for the following:

- Extension of LoM and associated extension of existing employment opportunities;
- Provision of additional employment opportunities;
- Continued and improved contributions to the local and export market;
- Continued contribution of rates and taxes to the Regional Services Council of Carolina; and
- Continued and improved investment in social capital through the undertaking of Pembani's approved Social and Labour Plan (SLP) promoting local economic development in the surrounding area.

5 MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT

5.1 DETAILS OF DEVELOPMENT FOOTPRINT ALTERNATIVES

As an existing operational mine, Pembani has been subject to several previous environmental processes. These processes have, where relevant, considered alternatives in the form of both development and land use alternatives prior to approval.

5.1.1 DETAILS OF DEVELOPMENT FOOTPRINT ALTERNATIVES

Given that both opencast and underground mining operations are currently underway and that the land use of the application area is now considered to be predominantly one of mining and related activities, there is no practical development alternative for the current Pembani Colliery mining area. The proposed inclusion of Zandvoort into the Pembani Colliery mining area has been explored, taking into consideration economic viability, practicality, and environmental characteristics.

The proposed amendment of the existing MWP to include the mining of additional coal resources including new underground mining operations on Portions RE of 6, 7, 8 and 10 of the farm Kwaggafontein 8 IT; Portions of the farm Haarlem 39 IT; Portion RE/9 of the farm Appeldoorn 38 IT; Portions Re of 1, 5, 8, 16 and 20 of the farm Groenvallei 40 IT; Portions 2, 7, 8, 9 and 10 of the farm Twyfelaar 11 IT; and Portions 2 and 12 of the farm Paardeplaats 12 IT, and new opencast mining operations on Portions RE of 6, 7, 8 and 10 of the farm Kwaggafontein 8 IT; Portion 8 of the farm Groenvallei 40 IT and Portion 2 of the farm Paardeplaats 12 IT all fall within the approved mining right boundary of Pembani.

Based on the below considerations, no further development alternatives can be considered or assessed as no other development alternative can be considered feasibleIn areas where mining operations have ceased, rehabilitation should be undertaken to return the land to usable and viable land uses, as defined in the closure planning.

5.1.1.1 CONSIDERATION OF PROPERTY

The proposed inclusion of Zandvoort has been selected based on the results of prospecting activities undertaken on the property which indicate a viable coal deposit that can be economically exploited. It is also important to note that the properties are adjacent to those already included in the approved mining right and from a mining perspective are ideal for extension purposes.

The proposed amendment of the existing MWP incudes areas that are already included in the existing Mining Right of Pembani.

5.1.1.2 TYPE OF ACTIVITY

The appropriateness of undertaking opencast mining methods for Zandvoort and Portions RE of 6, 7, 8 and 10 of the farm Kwaggafontein 8 IT; Portions of the farm Haarlem 39 IT; Portion RE/9 of the farm

Appeldoorn 38 IT; Portions Re of 1, 5, 8, 16 and 20 of the farm Groenvallei 40 IT; Portions 2, 7, 8, 9 and 10 of the farm Twyfelaar 11 IT; and Portions 2 and 12 of the farm Paardeplaats 12 IT has also been evaluated but determined to be uneconomical due to the fact that the reserves can be reached through the extension of the existing underground mine working on adjacent properties.

The option of the proposed underground mining only on Zandvoort and Portions RE of 6, 7, 8 and 10 of the farm Kwaggafontein 8 IT; Portions of the farm Haarlem 39 IT; Portion RE/9 of the farm Appeldoorn 38 IT; Portions Re of 1, 5, 8, 16 and 20 of the farm Groenvallei 40 IT; Portions 2, 7, 8, 9 and 10 of the farm Twyfelaar 11 IT; and Portions 2 and 12 of the farm Paardeplaats 12 IT allows for the continuation of the existing land use, which in turn allows for the concurrent existence of both land uses, namely agriculture and mining, which will result in fewer socio-economic disruptions to the livelihoods of people living and working in the area.

In addition, the proposed underground extension of mining operations allows for a reduction in the temporal and spatial scales of mining related impacts as the mining operations will not result in any surface disturbance or require additional infrastructure to be placed on site. The reduction in these impact scales is significant in terms of cumulative impacts and improves the Applicants' capacity to manage the environmental impacts, as well as remediate environmental pollution and contamination.

Opencast mining operations on Portions RE of 6, 7, 8 and 10 of the farm Kwaggafontein 8 IT; Portion 8 of the farm Groenvallei 40 IT and Portion 2 of the farm Paardeplaats 12 IT will allow for mining in smaller areas where certain underground mining techniques would not be appropriate.

5.1.1.3 DESIGN OR LAYOUT OF THE ACTIVITY

The proposed extension of underground mining activities to Zandvoort and Portions RE of 6, 7, 8 and 10 of the farm Kwaggafontein 8 IT; Portions of the farm Haarlem 39 IT; Portion RE/9 of the farm Appeldoorn 38 IT; Portions Re of 1, 5, 8, 16 and 20 of the farm Groenvallei 40 IT; Portions 2, 7, 8, 9 and 10 of the farm Twyfelaar 11 IT; and Portions 2 and 12 of the farm Paardeplaats 12 IT correlates to the location of a viable mineral resource that can be accessed from existing mine workings. Opencast mining operations on Portions RE of 6, 7, 8 and 10 of the farm Kwaggafontein 8 IT; Portion 8 of the farm Groenvallei 40 IT and Portion 2 of the farm Paardeplaats 12 IT will allow for mining in smaller areas where certain underground mining techniques would not be appropriate. As such there are no design or layout alternatives to consider.

5.1.1.4 TECHNOLOGY TO BE USED IN THE ACTIVITY

As an existing operational mine, the Pembani Colliery has been subject to several previous environmental processes. These processes have, where relevant, considered technology alternatives prior to approval and are currently in use at the Pembani Colliery. As such no further technology alternatives are considered.

5.1.1.5 OPERATIONAL ASPECTS OF THE ACTIVITY

As an existing operational mine, the Pembani Colliery has been subject to several previous environmental processes. These processes have, where relevant, considered operational aspect

alternatives prior to approval. Given that both opencast and underground mining operations are currently underway, and that the land use of the application area is now considered to be predominantly one of mining and related activities, there is no practical operational aspect alternative for the mining area.

5.1.1.6 NO-GO

The implication of not implementing the proposed extension of mining to Zandvoort, and of amending the existing mining works programme (within the approved mining right boundary) to include the mining of additional coal resources, both underground and opencast on the areas, as indicated in the MWP, includes a reduction in the existing mining operations overall LoM, as well as compromising the ability of Pembani to ensure consistent coal supply to Eskom for electricity generation and extended local and regional economic benefits.

The area is currently viewed as a mining area and if the No go option is used then most likely the mine wil cease to operate and the existing mining areas will be rehabilitated. An opportunity will still remain for a future mine applicant to apply for rights to access the coal reserves remaining and thereby re-activitate mining ad the associated environmental impacts.

5.2 PUBLIC PARTICIPATION PROCESS

5.2.1 HISTORICAL PUBLIC PARTICIPATION

A full Public Participation Process (PPP) was undertaken in 2004 by Digby Wells for the mining operation and all its associated activities during the compilation of the EIA/EMP as per the MPRDA. Whereby the following steps were undertaken:

- A number of Interested and Affected Parties I&APs) were identified and an Interested and Affected Party (IandAP) register was opened and maintained. These included farmers, farm labourers, communities, individuals and organisations;
- A Background Information Document (BID) was compiled containing information on the proposed project, and this was circulated to all IandAPs along with registration forms;
- Notices were erected by means of advertisements as well as posters informing people of the project, and requesting the public to register as IandAPs;
- An authorities meeting was held; and
- A PPP meeting was held.

Further to the initial PPP, numerous additional authorisation processes have been undertaken and have included additional PPP for consideration by authorities in the decision making process for these applications.

The Public Participation Processes followed thus far for Pembani Colliery includes the following:

- Public Participation for the original MPRDA Mining Right Application EIA in 2006;
- Public Participation for the EIA/EMP amendment for the Groenvallei 5 Underground Mining and the adjacent Imbani Washplant undertaken in July 2009;
- Public Participation for the NEMA S24G EIA in 2011.
- Partial Public Participation Process conducted for the EIA/EMP for Mining Related Activities at the Worldwide Coal Carolina Colliery: Appeldoorn 38 IT, Groenvallei 40 IT, Haarlem 39 IT, Kwaggafontein 8 IT, Paardeplaats 12 IT and Twyfelaar 11 IT in 2012.
- Public Participation for the WUL in 2016.
- Public Participation for the Section 102 Application and EMPR in 2016.
- Public Participation for the Basic Assessment in 2016.

Pembani has maintained an open and transparent relationship with the Interested and Affected Parties (I&APs). A summary of the results of previously conducted public consultation is provided below, however the reader is directed to the original reports for the details of previous public participation:

- Depletion of indigenous vegetation due to mining activities;
- Destruction of red data species, and species which are of medicinal value;
- Damage of wetlands systems;
- The degradation of local roads associated with transporting the coal via road trucks;
- The presence of alien plant species, which should be removed by the mine;

- Negative impacts on water quality and quantity in the local area;
- Dust and noise pollution;
- Disruption of the aesthetic beauty of the area;
- Degradation of grazing land;
- Damage to buildings due to blasting;
- Negative impact on fish farming (particularly trout) due to pollution;
- Influx of job-seekers into the area;
- Increase in social ills (such as crime, abuse etc);
- The loss of Carolina as a possible tourist destination; and
- Potential negative impact on the natural gas pipeline from Mozambique.
- The impact of blasting on property;
- Lack of rehabilitation being conducted by the mine;
- Impacts on the water resources and the decanting of water.
- The validity of the prospecting right for Zandvoort 10IT has been queried; and
- The perceived / real lack of compliance shown by the mine in the past.

These issues and concerns have all been noted, and will be addressed in this EIR and EMPR.

5.2.2 PUBLIC PARTICIPATION METHODOLOGY

The Public Participation Process (PPP) is a requirement of several pieces of South African Legislation and aims to ensure that all relevant Interested and Affected Parties (I&APs) are consulted, involved and their opinions are taken into account and a record included in the reports submitted to Authorities. The process ensures that all stakeholders are provided this opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the proposed project needs to be managed sensitively and according to best practises in order to ensure and promote:

- Compliance with international best practise options;
- Compliance with national legislation;
- Establish and manage relationships with key stakeholder groups; and
- Encourage involvement and participation in the environmental study and authorisation/approval process.

As such, the purpose of the PPP and stakeholder engagement process is to:

- Provide an opportunity for I&APs to obtain clear, accurate and comprehensible information about the proposed activity, its alternatives or the decision and the environmental impacts thereof.
- Provide I&APs with an opportunity to indicate their viewpoints, issues and concerns regarding the activity, alternatives and / or the decision.
- Provide I&APs with the opportunity to suggest ways of avoiding, reducing or mitigating negative impacts of an activity and enhancing positive impacts.

- Enable the Applicant to incorporate the needs, preferences and values of I&APs into the activity.
- Provide opportunities to avoid and resolve disputes and reconcile conflicting interests.
- Enhance transparency and accountability in decision-making.
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent environmental impacts associated with the project.

The PPP for this project has been undertaken in accordance with the requirements of the MPRDA and NEMA, in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project.

5.2.2.1 IDENTIFICATION OF I&AP'S

The I&AP databases compiled from various past environmental authorisation processes have been updated to compile a new register of key I&AP's identified for notification of the Environmental Auhtorisation Application. The I&AP database includes amongst others landowners, communities, regulatory authorities and other specialist interest groups.

5.2.2.1.1 LIST OF AUTHORITIES IDENTIFIED AND NOTIFIED

The following Regulatory Authorities have been identified over the life of project, and are included in the updated I&AP register:

- The Albert Luthuli Local Municipality;
- The Gert Sibande District Municipality;
- The Department of Mineral Resources (DMR);
- Mpumalanga Department of Agriculture, Rural development, Land and Environmental Affairs (DARDLEA);
- The Department of Water and Sanitation (DWS);
- The Mpumalanga Parks Board (MPB);
- The South African Heritage Resources Agency (SAHRA); and
- The Department of Public Works, Roads and Transport.
- Department of Rural Development and Land Reform.

Please see the I&AP database attached in Appendix B.

5.2.2.1.2 LIST OF KEY STAKEHOLDERS IDENTIFIED AND NOTIFIED

A number I&APs were identified and an updated I&AP register was opened and maintained. These included farmers, communities, individuals and organisations.

- Endangered Wildlife Trust;
- Wildlife and Environment Society of South Africa (WESSA);
- Mpumalanga Wetland Forums;

- Federation for Sustainable Development;
- NAFU Mpumalanga;
- Agricultural Research Council;
- SANBI Working for Wetlands;
- Ekangala Grassland Trust; and
- South African Crane Working Group.

Please see the updated I&AP database attached in Appendix B for the full list of stakeholders identified and notified of the proposed Environmental Authorisation application process.

5.2.2.1.3 LIST OF SURFACE RIGHTS/LAND OWNERS IDENTIFIED AND NOTIFIED

Please see the updated I&AP database attached in Appendix B for the full list of surface rights/land owners identified and notified, as well asTable 6 of this report.

5.2.2.2 NOTIFICATION OF I&AP'S FOR THE SCOPING PHASE

As part of this Environmental Authorisation application, an additional public participation process has been undertaken whereupon I&AP's have had an opportunity to comment on the Scoping Report. All registered I&AP's, including regulatory authorities and existing engagement structures have been notified of the availability of the Scoping Report for review and comment by means of registered post, facsimile, and e-mail. I&AP's have been afforded a 30 day review period, the results of which were included in the final submission to DMR.

5.2.2.2.1 REGISTERED LETTERS, FAXES, AND EMAILS

Letters, emails and facsimiles were composed and sent to the identified authorities, adjacent landowners, ward councillors and registered I&APs of the proposed Pembani Project. Examples of the letters, emails and facsimiles that were sent out during the Scoping Phase notification are attached in Appendix C. The letters, emails and facsimiles introduced the addressee to the proposed amendment to the existing Mining Right and the proposed amendment to the MWP. The letters were sent by registered mail.

5.2.2.2.2 NEWSPAPER ADVERTISEMENTS

Two advertisements, one in English and one in Afrikaans, describing the Mining Right amendment and EA Application process have been placed in newspapers with adequate circulation in the area. The advertisements have been placed in "The Highvelder" on 17 November 2016. The newspaper adverts included the following information:

- Project name;
- Applicant name;
- Project location;
- Description of the Environmental Authorisation Application process;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

I&AP's were provided a period of 30 days, from the 17 November 2016 to the 09 January 2017, to register as I&AP's for the proposed project. All registered I&AP's were further notified of the availability of the Scoping Report for review and comment. The Scoping Report was made available for 30 days from the 1st February 2017 to the 3rd March 2017, for review and comment. Comments obtained during the Scoping phase process and the responses of the EAP to date have been included in the summary table below (Table 19) and will be updated in the EIR to be submitted to the DMR.

5.2.2.2.3 SITE NOTICES

Twenty (20) site notices (English and Afrikaans) were placed along and within the perimeter of the proposed project area on 17 November 2016. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location;
- Description of the Environmental Authorisation Application process;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

Please refer Appendix C for proof of site notice placement.

5.2.2.3 NOTIFICATION OF I&APS FOR THE ENVIRONMENTAL IMPACT ASSESSMENT PHASE

The Draft Environmental Impact Report will be made available for public review and comment for a total period of 30 days, from the 15 April 2017 to the 19 May 2017. All registered I&AP's will be notified of the availability of the Draft Environmental Impact Report and where to locate it. I&AP's will also be informed of the timeframes for comment to be submitted to EIMS.

Notification regarding the availability of the Draft Environmental Impact Report, a component of the PPP, will be given in the following manner:

- Notification letters (in English), faxes, and/or emails will be distributed to all pre-identified and registered I&APs, as well as adjacent and surrounding landowners;
- Notification documents will include details on the duration of the Draft Environmental Impact Report review period, as well as details on the availability of the report for public review;

Copies of the Draft Environmental Impact Report will be made available at public areas for perusal and comment by all I&APs. Comment received from I&APs will be included in the Issues and Responses Report (IRR) to be submitted to DMR for consideration as part of the Final Environmental Impact Report.

5.2.2.4 CONSULTATION MEETINGS

This section briefly outlines the consultation meetings that will be scheduled to be held for the project.

5.2.2.4.1 AUTHORITY MEETINGS

An Authority meeting was scheduled on 22 October 2016 before the start of the process in order to determine the way forward with the proposed Pembani Project. Should any Authority require a meeting further during the process, one will be arranged. The purpose of the Authority meeting was to explain the project in detail to authorities and clarify the process going forward.

5.2.2.4.2 PUBLIC OPEN DAYS

As part of the Section 102 amendment Application that was submitted to the DMR in October 2016, together with the supporting EMPR, a PPP was undertaken and, therefore, a public open day is currenty not proposed to be held for the project.

5.2.2.5 HOW ISSUES RAISED WERE ADDRESSED

The 30 day commenting and review period of the Scoping Report took place from the 1st February 2017 to 3rd March 2017. All comments received during the initial call to register and Scoping Report comment periods have been included in the Final Scoping Report for submission to the authorities. Table 19 contains the comments and responses during the consultation process of the Scoping phase and will be updated following the PPP to be undertaken as part of the EIA/EMPR phase.

5.3 SUMMARY OF ISSUES RAISED BY I&AP'S

The Integrated PPP was initiated on 17 November 2016. I&AP's were given until 09 January 2017 (a period of 30 days plus to include the exclusion period of 16 December to 2 Janaury) to register and have been provided a 30 day review period to comment on the Draft Scoping Report. All comments or issues received from I&AP's thus far have been included in the Issues and Response Report (IRR) provided in Table 19 below. Any issues received after the Scoping Report is submitted to the DMR, will still be responded to and included in the final EIA report for submission to the authority. Furthermore, the comments received for the Section 102 Application and that were provided in the EMPR that was submitted to the DMR in October 2016, have also been included in Table 19 below, as the comments and issues that were raised by the I&APs for the Section 102 amendment Application process are considered to be relevant to the current project. The main concerns raised by I&APs to date include:

- The impact of blasting on property;
- Lack of rehabilitation being conducted by the mine;
- Impacts on the water resources and the decanting of water.
- The validity of the prospecting right for Zandvoort 10IT has been queried; and
- Several comments related to the perceived / real lack of compliance shown by the mine in the past.

Table 19: Summary of issues and responses raised by I&AP's

I&AP	Consulted	Date	Issues Raised	Response to Issue	Ref
Key Stakeholders					
Landowner/s					
Mr. Anthon Benadie	X	2015-07-08	Mr. Benadie thanked EIMS for the heritage scoping level report and the soil, land use, and capability report. To his understanding this reports are not the finalised reports and that Pempani/Environmental Impact Management Services (Pty) Ltd will provide	EIMS advised that Mr. Benadie will be provided with the finalised specialist reports once they have been completed and he will also be informed of the	Appendix D

			me with the finalised reports when they apply for the section 102 amendment. He would appreciate it, if EIMS could inform him the same day Pembani Carolina coal applies for the 102 amendment in terms of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002, MPRDA). He noticed in the water use licence document that was supplied to him on Monday (06/07/2015) that there is a water use licence on Zandvoort. Can EIMS please advise him to why he never knew about this? He wants the copy of the owners consent document that Pembani used for this water use license on Zandvoort. Can EIMS also provide me with the following documents? (a) Copy of the mining rights on Paardeplaats and Twyfelaar. Copy of the authorisation documents for the use of the Kalkkloof road on Zanvoort. The road is a registered servitude on Zandvoort. Can you also provide me with the documents for the authorisation to use the private farm/dirt road from the Kalkkloof road to Twyfelaar. There is no servitude for this road on Zandvoort.	submission of the Section 102 Application on the day that it is handed in to the DMR. Please note that EIMS was not involved in the Water Use Licence Application, we will however request the information regarding the landowner consent letter from Pembani for Mr. Pretorius. EIMS will also request the mining rights and the authorisation for use of the Kalkkloof Road and EIMS will revert back to you with information regarding these as soon as possible.	
Mr. Anthon Benadie	X	2015-09-16	Mr. Benadie communicated the concern to EIMS that there is undermining at Zandvoort.	Pembani Colliery confirmed on a formal letter that the mining	Appendix D

				occurs within the approved Mining Right area and that there is no undermining taking place at Zandvoort 10IT Portions 1 and Re.	
Mr. Anthon Benadie	x	2015-11-06	May you please explain in detail the process involved with the application of the section 102. At what stage are the proceedings now. We understood that the application was already filed, but you mentioned that you are still waiting on a reply from the correct authority before you can file. Will you please explain this in full. (b) We also request 2 hardcopies of all documents. You mentioned that you have to request this from your client first. Will you please update us as soon as possible on both requests.	As requested previously through correspondence with Dr Pretorius and yourself, documentation regarding Pembani's Section 102 application is available for your perusal. Due to the number of documents and their size it is not feasible to email them directly to you. Please can you therefore indicate whether you would prefer these documents to be uploaded to a Dropbox folder or sent to you using a large file transfer site? Please note that this information is provided only for use in evaluating Pembani's Section 102 application and for no other purposes.	Appendix D

Mr Anthon Benadie	X	2016-06-30	Mr Benadie requested a copy of the acknowledgement letter received from DMR for the submission of the Section 102 application. Mr Benadie also said the some of the appendices would not download.	EIMS thanked Mr. Benadie for his call and emailed the acknowledgement letter that Pembani Colliery received from the Department of Mineral Resources (DMR) on 22 March 2016. The letter was signed by Mr. Sam Mathavhela, the Regional Manager, of the DMR. The links on the website (www.eims.co.za) for Appendices I, K and Q of the amended EMPR have been sorted and should now download as well. EIMS advised that a CD, with the EMPR and the appendices, had been posted to Mr. Benadie with the notification letter to via registered post on 17 June 2016. EIMS also said that a CD could be couriered to him and that Mr. Benadie should then send EIMS the phycial address.	Appendix D

Mr Anthon Benadie	X	2016/07/28	Mr Benadie sent a letter (attached in Annexure F of the IRR attached as Appendix D of this report) with the below matters: (c) A letter dated 15 June 2016 written by Environmental Impact Management Services (EIMS) was addressed to me as an interested and affected party in respect of the proposed amendment to the Environmental Management Programme Report (EMPR) in support of a Section 102 Application in terms of the Mineral and Petroleum, Resources Development Act, Act 28 of 2002 (MPRDA) by Pembani Coal Carolina Proprietary Limited (Pembani Coal). I attach hereto a copy of the aforesaid letter marked as annexure "A". Accordingly, the above-mentioned application for the proposed amendment to the EMPR by Pembani Coal in terms of the requirements of the MPRDA has relevance.	EIMS responded as per the below (refer to letter Attached as Annexure F in the IRR attached as Appendix D of this report). EIMS sent notifications (registered letters, emails and faxes) to all Interested and Affected Parties (I&APs), as well as all stakeholders and organs of state as per the requirements of the Mineral and Petroleum, Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) and the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations, as well as the regulations and guidelines under these acts, need to be notified of the project.	Appendix D
Mr Anthon Benadie	X	2016/07/28	The Johannes Stephanus Trust with registration number MT8191/1995 and registered owner of the property known as Portion 1 and RE of the farm Zandvoort 10 IT is in principle opposed to and strongly objects	EIMS notes this comment. Furthermore, all correspondence with Interested and Affected Parties (I&APs) and or stakeholders /	Appendix B

			to the amendment to the EMPR and granting of Mining Rights to Pembani Coal for mining coal on and or under Portion 1 and RE of the farm Zandvoort 10 IT (Zandvoort 10 IT) for the following reasons as set out herein under.	landowners, such as yourself, will be included in Section 5.3 under "Summary of issues raised by I&APs" of the Final EMPR. All issues and concerns that have been sent through to EIMS will also be included in the Issues and Response Report (IRR) that will be included as part of an Appendix of the Final EMPR that will be submitted to the DMR.	
Mr Anthon Benadie	X	2016/07/28	The application for the amendment to the EMPR pre-supposes that Pembani Coal holds a valid and existing prospecting right over the farm Zandvoort 10IT as per the letter dated 15 June 2016 by EIMS.	EIMS is of the understanding that the Prospecting Right for Zandvoort has lapsed, and that following consultation with the DMR, Pembani Colliery has submitted a new application to the DMR. You will be notified of further development and opportunity to participate in consequent environmental approval application processes, with regards to this.	Appendix D

Mr Anthon Benadie	X	2016/07/28	On 29 March 2007 a prospecting right (MP/30/5/1/1/2/415PR) was granted over the Farm Zandvoort 10 IT to Ingwe Collieries Limited (Registration number:1963/000537/06), which would commence on 8 March 2007 and continue for a period of three (3) years. A copy of the prospecting right is attached hereto as Annexure "B".	Please refer to the previous response provided with regards to the Prospecting Right.	Appendix D
Mr Anthon Benadie	X	2016/07/28	Section 18(4) of the MPRDA clearly states that a "prospecting right may be renewed once in a period not exceeding three years"	Please refer to the previous response provided with regards to the Prospecting Right.	Appendix D
Mr Anthon Benadie	X	2016/07/28	On 22 March 2013 the prospecting right was renewed for a period of three (3) years commencing on 15 February 2013 and ending on 14 February 2016. This is prima facie proof that the prospecting right has lapsed.	Please refer to the previous response provided with regards to the Prospecting Right.	Appendix D
Mr Anthon Benadie	X	2016/07/28	On 23 August 2013 the aforesaid prospecting right was ceded to Pembani Coal.	Please refer to the previous response provided with regards to the Prospecting Right.	Appendix D
Mr Anthon Benadie	X	2016/07/28	In light of what is set out above Pembani Coal does not hold a prospecting right over the farm Zandvoort 10 IT as stated in the proposed amendment to the EMPR as the prospecting right lapsed on 15 February 2016.	Please refer to the previous response provided with regards to the Prospecting Right. The amended EMPR to be submitted to the DMR will reflect that the Prospecting Right for	Appendix D

				Zandvoort has lapsed, and that following consultation with the DMR, Pembani Colliery has submitted a new application to the DMR.	
Mr Anthon Benadie	X	2016/07/28	The EMPR can only be extended to property over which Pembani Coal holds a mineral right. As such seeing as no form of mineral right is held by Pembani Coal over Zandvoort 10 IT and accordingly the application for amendment of the EMPR should not be considered or approved.	The amended EMPR will still be submitted to DMR as the updated EMPR aims to consolidate the numerous authorisation processes that been undertaken to date to produce a single overarching EMPR for holistic management of the Pembani Colliery going forward.	Appendix D
Mr Anthon Benadie	X	2016/07/28	In addition to the above the applicant has not complied with NEMA and the MPRDA with reference to the manner in which it must exercise its existing EIA and EMPR pertaining to its existing mining right. In support of the aforesaid I attached hereto, marked as annexure "C", a field assessment prepared by Mr Johan Mare of M2 Environmental Connections on 4 June 2016 titled: "Zandvoort Field Assessment in Response to Claim of Water Resource Pollution."	Regulation 34(1) GNR 982 (2014) requires that a holder of an Environmental Authorisation (EA) must ensure compliance with the conditions of an EA and associated EMPR and submit an independent environmental audit report to the competent authority at the intervals indicated in the EA. Enforcement of the	Appendix D

				requirements of the various permits and authorisations lies with the relevant Competent Authorities.	
Mr Anthon Benadie	X	2016/07/28	Regulation 51 of the Regulations to the MPRDA provides detail regarding the contents of an EMPR. The Regulation provides that the EMPR must contain an outline of the implementation programme, which includes detailed descriptions of the technical options chosen for each identified impact action plans linked to time schedules to achieve the set goals. The Regulation requires that the EMPR must contain sufficient detail to enable readers to ascertain the specific actions that Pembani Coal commits itself to undertake in order to address every identified impact. Pembani Coal fails to commit itself to address long-term residual impact stemming from Acid Mine Drainage as water treatment is to be considered as "if required".	As per Section 26.9 of the amended EMPR, conditions of the IWUL must be implemented by Pembani Colliery. Pembani Colliery has received an updated Integrated Water Use Licence (IWUL), dated 07/07/2016. Condition 5.2 of Appendix V of the IWUL requires that Pembani Colliery "shall make full financial provision for all investigations, designs, construction, operation and maintenance for a water treatment plant should it become a requirement as a long-term water management strategy."	Appendix D
Mr Anthon Benadie	X	2016/07/28	Mr Benadie sent a letter (attached in Annexure F of the IRR attached as Appendix D of this report) with the below matters:	EIMS responded as per the below (refer to letter Attached as Annexure F in the IRR attached as Appendix D of this report).	Appendix D

			A letter dated 15 June 2016 written by Environmental Impact Management Services (EIMS) was addressed to me as an interested and affected party in respect of the proposed amendment to the Environmental Management Programme Report (EMPR) in support of a Section 102 Application in terms of the Mineral and Petroleum, Resources Development Act, Act 28 of 2002 (MPRDA) by Pembani Coal Carolina Proprietary Limited (Pembani Coal). I attach hereto a copy of the aforesaid letter marked as annexure "A". Accordingly, the above-mentioned application for the proposed amendment to the EMPR by Pembani Coal in terms of the requirements of the MPRDA has relevance.	EIMS sent notifications (registered letters, emails and faxes) to all Interested and Affected Parties (I&APs), as well as all stakeholders and organs of state as per the requirements of the Mineral and Petroleum, Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) and the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations, as well as the regulations and guidelines under these acts, need to be notified of the project.	
Mr Anthon Benadie	X	2016/07/28	The requirements of section 23 and 24 of NEMA read together with sections 38 and 39 of the MPRDA that environmental issues be subject to a decision process that involves integrated environmental management was evidently not respected in the compilation of the amended EMPR. This is apparent from the numerous deficiencies in the document as set out below.	It is understood that the relevant requirements of both the NEMA and MPRDA have been addressed in the amended EMPR.	Appendix D

Mr Anthon Benadie	X	2016/07/28	The purpose of the proposed amendment to the EMPR is to seek approval to extend the Mining Right Area of Pembani Coal's footprint to include the farm Zandvoort 10 IT. The mine erroneously assumes that it holds the prospecting right for the property, which is not correct	Please refer to the previous response provided with regards to the Prospecting Right.	Appendix D
Mr Anthon Benadie	X	2016/07/28	Although the mine has been operational for many years it did not succeed in obtaining an Integrated Water Use Licence for all its water uses on all relevant properties where these water uses are executed. The mine has therefore operated illegally in terms of the requirements of the National Water Act. 1998 (Act 36 of 1998).	It is our understanding that Pembani Coal is responsible for ensuring compliance with all relevant legislation and any permits, licences and/or authorisations it may hold. The relevant regulating authorities are responsible for enforcing these legal requirements. Pembani Colliery has received an updated Integrated Water Use Licence (IWUL), dated 07/07/2016.	Appendix D
Mr Anthon Benadie	X	2016/07/28	Pembani Coal states in the proposed amendment to the EMPR that it follows a progressive rehabilitation approach but acknowledges that it has historic open pits that still need to be rehabilitated.	Please note that the amended Environmental Management Programme Report (EMPR) does provide for rehabilitation. Please refer to Section 27.3 and Figure 70 of the amended EMPR, which	Appendix D

				refers to the rehabilitation plan that Pembani Colliery should be implementing. The DMR is responsible for enforcing the mines environmental obligations and your concerns will be included in the submission that EIMS will make to the DMR.	
Mr Anthon Benadie	X	2016/07/28	Surface water quality degradation is correctly identified as a key impact but the supporting document is a specialist study conducted during 2005. This study is outdated and should be redone to provide more accurate and up to date information having regard to an onsite inspection.	The impact on surface water features was assessed in the 2005 report and considering that the Zandvoort will be underground mining only it is not anticipated that there will be significant changes to the findings of this previous assessment. Please note that the amended EMPR includes the whole of Pembani Colliery and aims to consolidate the numerous authorisation processes that have been undertaken to date to produce a single overarching	Appendix D

				EMPR for holistic management of the Pembani Colliery	
Mr Anthon Benadie	X	2016/07/28	Wetland findings as contained in the specialist studies of 2011 were ignored by the mine as it failed to apply timeously for section 21 (c) and 21(i) of the National Water Act, Act 36 of 1998 water uses to undermine wetlands or to mine in close proximity to wetlands.	As mentioned previously, Pembani Colliery applied for and was granted an updated IWUL on 07 July 2016. The IWUL, (Licence No. 05/X11B/ACGIJ/4704) has authorised Water Uses in terms of Section 21(c) and 21(i).	Appendix D
Mr Anthon Benadie	X	2016/07/28	The mine has a long history of non-compliance with environmental legislation and only acted to implement mitigatory measures upon instruction by the regulatory authorities as per issued Notices of Intend to Direct, Directives and Section 24(G) of NEMA rectifications.	It is understood that the decision making authority (DMR) is aware of the historical performance of the mine and will consider such in their consideration of this application. Your concerns regarding past performance will be included in the submission made to the DMR.	Appendix D
Mr Anthon Benadie	X	2016/07/28	It is stated in the report that Pembani Coal has commenced with underground mining on the known as Portion 2 of the farm Paardeplaats. Undermining of this property during 2015 implies undermining of wetlands without authorisation.	As mentioned previously, Pembani Colliery applied for and was granted an updated IWUL on 07 July 2016. The IWUL, (Licence No. 05/X11B/ACGIJ/4704) has	Appendix D

				authorised Water Uses in terms of Section 21(c) and 21(i).	
Mr Anthon Benadie	X	2016/07/28	It is stated in the report that the management of clean and dirty water processed adheres to GN 704 regulations. This statement is questioned based on the numerous spills and discharges experienced at the mine and reported by adjacent landowners.	Thank you for the comment. EIMS compiled the amended EMPR based on information provided by the mine and the specialist studies at the time of compiling the document. Your comment will be included in Section 5.3 under "Summary of issues raised by I&APs" of the Final EMPR. All issues and concerns that have been sent through to EIMS will also be included in the Issues and Response Report (IRR) that will be included as part of an Appendix of the Final EMPR that will be submitted to the DMR. Section 2.2.13 of the EMPR provides an overview of the current Clean and Dirty Water Processes on the mine. Section 26.9 of the EMPR- Impact Management Objectives	Appendix D

				(surface water) requires the following: "The mine shall ensure that a detailed storm water management is approved and implemented for the mining area. Clean and dirty water system infrastructure must be installed as per the detailed storm water management plan which must take into consideration the design capacities and locations restrictions stipulated in GN 704 of the NWA". Furthermore, Conditions 2.4 and 2.5 of Appendix III of the IWUL, dated 07 July 2016, require that "as-built" plans must be submitted to the Chief Executive Officer and that a stormwater management plan must be designed. All the conditions under 3.1 of Appendix III of the IWUL refer to stormwater measures that need to be implemented by Pembani	

				Colliery. As mentioned previously, Section 26.9 of the amended EMPR states that the conditions of the IWUL must be met. Pembani Colliery needs to submit an independent annual audit on compliance with the conditions of the IWUL as per Condition 12 of Appendix 1 of the IWUL, dated 07 July 2016.	
Mr Anthon Benadie	X	2016/07/28	The requirements of section 23 and 24 of NEMA read together with sections 38 and 39 of the MPRDA that environmental issues be subject to a decision process that involves integrated environmental management was evidently not respected in the compilation of the amended EMPR. This is apparent from the numerous deficiencies in the document as set out below.	It is understood that the relevant requirements of both the NEMA and MPRDA have been addressed in the amended EMPR.	Appendix D
Mr Anthon Benadie	X	2016/07/28	The water balance of the mine needs to be refined in accordance with the requirements as contained in BPG: G2 (Water and Salt Balances).	Condition 3.1 of Appendix IV of the IWUL dated 07July 2016, states that the "licensee shall update the water balance annually." Section 26.9 of the amended EMPR states that the conditions of the IWUL must be met. The EMPR will be	Appendix D

				amended to reflect the need to consider BPG: G2 in this annual updating of the water balance process	
Mr Anthon Benadie	X	2016/07/28	There is no correlation between the soil studies conducted by Digby Wells and Associated and the study conducted by the Agricultural Research Council.	The soil study conducted by Digby Wells and Associates was used for information purposes only. The study conducted by the Agricultural Research Council was specific to Zandvoort.	Appendix D
Mr Anthon Benadie	X	2016/07/28	The report does not make provision for a sound rehabilitation plan for the predicted post-mining acid mine drainage decant.	Section 26.3.1 to 26.6 of the amended EMPR addresses Acid Mine Drainage (AMD), while in Section 26.9 there is the commitment that “The mine shall appoint specialist to develop detailed, site specific AMD management plan”. Rehabilitation in terms of AMD is also discussed in Section 26.9.	Appendix D
Mr Anthon Benadie	X	2016/07/28	The site layout for the various discard dumpsites and dirty water containment facilities are inappropriate as it is situated close to proximity to	Section 4 of Appendix 3 of the IWUL dated 07 July 2016 refers to rehabilitation of water courses. As indicated in Section	Appendix D

			a network of wetlands, seepage wetlands and clusters as well as pans, rivers and water courses.	26.9 of the amended EMPR conditions of the IWUL must be implemented by Pembani Colliery.	
Mr Anthon Benadie	X	2016/07/28	Moreover, section 3(1) of the Promotion of Administrative Justice Act, Act 3 of 2000 (PAJA) – which gives effect to section 33(1) of the Constitution of the Republic of South Africa, provides that "everyone has the right to administrative action that is lawful, reasonable and procedurally fair"- states that "administrative action which materially and adversely affected the rights or legitimate expectations of any person must be procedurally fair". Section 3(2)(b) of PAJA sets out the minimum standards for procedural fairness, requiring an administrator to give a person adversely affected by administrative action: Adequate notice of the nature and purpose of the proposed action; A reasonable opportunity to make representations; Clear statement of administrative actions; Adequate notice of any right of review or internal appeal; (d) Adequate notice of the right to request reasons.	This comment is noted and will be included in Section 5.3 under "Summary of issues raised by I&APs" of the Final EMPR. All issues and concerns that have been sent through to EIMS will also be included in the Issues and Response Report (IRR) that will be included as part of an Appendix of the Final EMPR that will be submitted to the DMR. Please also be advised that as per Section 68 of the Mineral and Petroleum Resources Development Amendment Act (Act 49 of 2008) that Section 96 of the principal Act (MPRDA, 2002) is amended and that you have the right to appeal the decision made by the DMR with	Appendix D

				regards to the Section 102 and the amended EMPR: "(1) Any person whose rights or legitimate expectations have been materially and adversely affected or who is aggrieved by any administrative decision in terms of this Act may appeal within 30 days becoming aware of such administrative decision in the prescribed manner to— (a) the Director-General, if it is an administrative decision by a Regional Manager or [an officer] any officer to whom the power has been delegated or a duty has been assigned by or under this Act; (b) the Minister, if it is an administrative decision that was taken by the Director-General or the designated agency.''	
Mr Anthon Benadie	X	2016/07/28	No consideration is given by Pembani Coal to section 48(1)(c) of the MPRDA insofar it relates to	Pembani Colliery is an existing mine with the required	Appendix D

			land reserved in terms of the National Environmental Management: Protected Areas Act, Act 57 of 2003 and classified in the Mpumalanga Biodiversity Conservation Plan as terrestrial biodiversity areas where mining should be prohibited or restricted.	environmental authorisations. The amended EMPR aims to consolidate the numerous authorisation processes that been undertaken to date to produce a single overarching EMPR for holistic management of the Pembani Colliery going forward. The proposed inclusion of Zandvoort is for underground mining only and as indicated in the Ecological Study, conducted in 2015, will have a minimal impact on the terrestrial biodiversity. The Ecology study (refer to Appendix J2 of the amended EMPR) does take the Mpumalanga Biodiversity Conservation Plan into account. It is our understanding that the application area does not fall within and of the areas referred to in Section 48(1)(c) of the MPRDA. Please advise if you are aware of any specific	

				restriction applicable to this application area?	
Mr Anthon Benadie	X	2016/07/28	The Mpumalanga Biodiversity Conservation Plan (2006) (MBCP) was developed by the Mpumalanga Department of Agricultural and Land Administration in association with Mpumalanga Tourist and Parks Agency to guide conservation and land use decisions in support of sustainable development in the Province.	Both the Mpumalanga Department of Agriculture, Rural Development and Land Administration, as well as the Mpumalanga Tourist and Park Agency have been notified of the proposed project and were invited to comment on the amended EMPR. Please also refer to responses above.	Appendix D
Mr Anthon Benadie	X	2016/07/28	The Carolina area is classified in the MBCP's terrestrial biodiversity assessment as of "irreplaceable" value.	Please refer to responses above. Figure 6 of the Ecology Report attached in Appendix J2 indicates the MBCP of the study area.	Appendix D
Mr Anthon Benadie	X	2016/07/28	The MBCP Aquatic Assessment also rate the Carolina area of irreplaceable biodiversity value.	Please refer to response above.	Appendix D
Mr Anthon Benadie	X	2016/07/28	NFEPA's and wetland clusters must therefore be maintained if they are in a good ecological donation and rehabilitated to the best attainable ecological condition if they are in a sub-standard condition.	Please refer to Section 5.7.9 of the amended EMPR which discusses the wetlands, as well as Section 7 which includes the impacts on the wetlands and	Appendix D

				mitigation measures, as well as refer to the rehabilitation of wetlands.	
Mr Anthon Benadie	X	2016/07/28	A great concern is the matter of Acid Mine Drainage (AMD) and the associated residual impacts that it will have on the wetlands in the area and the pollution of water resources in this sensitive water scarce area. I cannot support nor endorse the destruction of wetlands as well as the water resources that has been classified in terms of the National Freshwater Ecosystem Priority Areas (NFEPA). Undermining of the farm Zandvoort 10IT is highly likely to have a long-term negative impact on the wetlands, pan and water resources in the area.	Please refer to the response above. Please also note that Condition 4 of the IWUL dated 07 July 2016, requires that the Licencee embark on a long-term rehabilitation and management programme with regards to water courses. As per Section 26.9 of the amended EMPR, conditions of the IWUL must be implemented	Appendix D
Mr Anthon Benadie	X	2016/07/28	The water balance of the mine needs to be refined in accordance with the requirements as contained in BPG: G2 (Water and Salt Balances).	Condition 3.1 of Appendix IV of the IWUL dated 07July 2016, states that the “licensee shall update the water balance annually.” Section 26.9 of the amended EMPR states that the conditions of the IWUL must be met. The EMPR will be amended to reflect the need to consider BPG: G2 in this annual	Appendix D

				updating of the water balance process	
Mr Anthon Benadie	X	2016/07/28	Due to the sensitivity of the aquatic ecosystems, the hydrological importance of the area and the potential significant impact of the extension of the mine to include underground mining on these ecosystem, mainly through the dewatering of the wetlands and pan in the area, the proposed amendment to the EMPR cannot be considered without consultation with downstream water users dependent on the water, and a quantification of the dewatering effect on economic (agricultural) activities downstream of the impact area.	Comment noted. As per Condition 6,.1 of Appendix V of the IWUL dated 07 July 2016, "The Licensee must prevent adverse effect on other water users. All complaints must be investigated by a suitable qualified person and if investigations prove that the Licensee has impaired the rights of other water users, the Licensee must initiate suitable compensative measures." All other conditions of the IWUL, dated 07 July 2016 will also be applicable. As per Section 26.9 of the amended EMPR, conditions of the IWUL need to be implemented.	Appendix D
Mr Anthon Benadie	X	2016/07/28	As the relevant decision making authority in terms of the constitutional legal responsibility to ensure that administrative actions do not significantly affect the environment as set out in section 2(1) of NEMA, there is in fact no choice but to apply	Please refer to response above.	Appendix D

			the risk-adverse and cautious approach and for the DMR to reject the proposed amendment to the EMPR.		
Mr Anthon Benadie	X	2016/07/28	Due to the sensitivity of the aquatic ecosystems, the hydrological importance of the area and the potential significant impact of the extension of the mine to include underground mining on these ecosystem, mainly through the dewatering of the wetlands and pan in the area, the proposed amendment to the EMPR cannot be considered without consultation with downstream water users dependent on the water, and a quantification of the dewatering effect on economic (agricultural) activities downstream of the impact area.	Comment noted. As per Condition 6,.1 of Appendix V of the IWUL dated 07 July 2016, "The Licensee must prevent adverse effect on other water users. All complaints must be investigated by a suitable qualified person and if investigations prove that the Licensee has impaired the rights of other water users, the Licensee must initiate suitable compensative measures." All other conditions of the IWUL, dated 07 July 2016 will also be applicable. As per Section 26.9 of the amended EMPR, conditions of the IWUL need to be implemented.	Appendix D
Mr Anthon Benadie	X	2016/07/28	The Johannes Stephanus Trust and I hereby request a response to the aforementioned concerns within five (5) working days in order to have sufficient time to consider the response and	Please note that the comment period for the proposed amendment to the Environmental Management	Appendix D

			if required, to lodge further objections should the need arise.	Programme (EMPR) and submission of the Section 102 for the inclusion of Zandvoort into the Pembani Colliery's existing Mining Right closed on 01 August 2016. However, in an effort to accommodate you, EIMS will extend the comment period for you, until close of business on Wednesday 10th August 2016.	
Mr Anthon Benadie	X	2016/07/28	I wish to specifically record that I reserve my right to elaborate on the nature and scope of my objection receipt of any response and or further documentation in respect of the proposed amendment to the EMPR.	As indicated above, EIMS will extend the comment period for you, for a further week, until close of business on Friday 12th August 2016.	Appendix D
Mr Anthon Benadie	X	2016/08/10	With regards to our telephone conversation earlier today, I would like to confirm that EIMS will extend the comment period (amendment of EMPR) till Friday 19th August 2016. Could EIMS provide me with the following documents / proof. 1. The new authorised (updated) Water Use Licence. 2. Proof of consent for the WUL from the landowner (Zandvoort 10IT Portion 1 and Zandvoort 10IT	Please be advised that EIMS will extend the comment period for the amended EMPR to Wednesday, 17 August 2016, as EIMS had originally provided a comment period of 45 days, from 15 June 2016 until 01 August 2016, which has already been extended once to 12 August 2016. Please note	Appendix D

			Remaining Extent) according to the National Water Act 36 of 1998 clause 24. 3. Proof of the new Prospecting Right Application (Invoice number, file reference, time and date).	that all your comments pertaining to the S102 application and amended EMPR must be received no later than close of business on the 17th August 2016. Please also receive attached to this email the following requested information i.e.: The Updated Water Use Licence (WUL), dated 07 July 2016 (Licence No. 05/X11B/ACGIJ/4704). Proof of the application for the prospecting right submitted to the Department of Mineral Resources. Regarding the proof of landowner consent, and any other supporting documentation that was submitted to the DWS in support if the water use licence, we would request that you direct this enquiry directly to Pembani. EIMS was not	

				involved in the compilation and submission of the Water Use licence and does not have copies of this information. We will also submit your request for such directly to the mine for consideration.	
Mr Anthon Benadie	X	2016/08/10	Mr. Benadie would like to enquire whether a public participation process will follow for the proposed Basic Assessment process for the Prospecting Right and Environmental Authorisation Application. Please provide me with the Public meeting schedules and register me as an affected party for input and objections.	EIMS thanked Mr. Benadie for the email.and advised that he must note that with regards to the Section 102 Application and the EMPR amendment, EIMS will include all correspondence with Interested and Affected Parties (I&APs) in Section 5.3 under “Summary of issues raised by I&APs” of the Final EMPR. All issues and concerns that have been sent through to EIMS will also be included in the Issues and Response Report, which will be included as part of an Appendix of the Final EMPR that will be submitted to the DMR.	Appendix D

				Regarding the pending Basic Assessment process for the Prospecting Right and Environmental Authorisation Application, EIMS will register you as an I&AP and notify you of the consultation process in due course.	
Mr Anthon Benadie	X	2016-11-18	Mr Benadie requested the updated MWP, as well as the mining works programme previously submitted with the Mining Right Application.	EIMS sent Mr Benadie the following: As requested, please find herewith attached the current proposed future and underground mining plan, which forms part of the Section 102 application (titled “Mine Plan for Section 102 application”) submitted to the Department of Mineral Resources (DMR). The Pembani Coal Water Management Plan that was included in the 2015 Integrated Water and Waste Management Plan (IWWMP) and approved as part of the Integrated Water	Sections 2 and 3.

				Use Licence (IWUL) in July 2016, is also included.	
Mr. Anthon Benadie	2017-03-03	Email	Name Anthon Benadie Telephone 082 515 6663 Reference Ref#: 1156 Date 03 March 2017 ENVIRONMENTAL IMPACT MANAGEMENT SERVICES (EIMS) Attention: Sonja van de Giessen E-mail: sonja@eims.co.za Ref#: 1156 Dear Madam COMMENTS TO THE SCOPING REPORT FOR THE AMENDMENT OF THE MINING RIGHT AND ENVIRONMENTAL AUTHORISATION APPLICATION WHICH PEMBANI COAL CAROLINA PROPRIETARY LIMITED INTENDS TO SUBMIT TO THE DEPARTMENT OF MINERAL RESOURCES – REFERENCE NUMBER MP30/5/1/2/2/112MR 1.1 Please provide me with the Compliance Audit report for the EMP during 2016. Doesthis report include mining activities at Paardeplaats 12IT Portion 2 [opencast pits TZ-5 and TZ-4 and underground mining project]; Kwaggafontein 8IT	14 March 2017 EIMS Ref #: 1156/LW/svdg Reference #: MP 30/5/1/2/2/112 MR Dear Mr Benadie: Johannes Stephanus Trust Registration No. MT8191/1995 ATTENTION: Mr. Anthon Benadie Dear Sir: INTERESTED AND AFFECTED PARTIES COMMENTS ON THE AMENDMENT OF THE SCOPING REPORT FOR PEMBANI COLLIERY The above project and your letter received via email on the 03 March 2017 refers: Please refer to the table below for responses to your submission. Where relevant EIMS will, address the above points in the	Sections 8.3 and 10 and Appendices J, K, L and M

			and on Paardeplaats 12IT Remaining Extent [opencast pit]? 1.2 Please provide all and any correspondence between the DMR and the Applicants/ Consultants as well as any correspondence which bears any reference to or refers in any way to the Section 102 application. 1.3 Pleases provide me with the Integrated Water and Waste Management Plan which was submitted in support of the IWWMP. 2. The wording and the figures in the Scoping Report does not correspond. Scoping report states that underground operation will be conducted, but figures show opencast mining activities. 3. Scoping Report states that an EMP amendment for the inclusion of underground mining was submitted at the DMR on 28 July 2009. The underground working at Paardeplaats 12IT Portion 2 is directly next to the Farm Zandvoort 10IT. As an I&A party, I was never informed or consulted in this regard because this underground operation directly affects the farm Zandvoort 10IT. I never had the privilege to comment on this activity. I would like a copy of this amended EMP (2009).	Final EIR and EMPR to be submitted to the DMR. 1.1 Pembani Colliery is required to undertake periodic compliance audits of the operations. Such audits must be undertaken and submitted to the relevant Competent Authorities. Enforcement of the requirements of the various permits and authorisations lies with the relevant Competent Authorities. Regulation 34(1) GNR982 requires that a holder of an Environmental Authorisation (EA) must ensure compliance with the conditions of an EA and associated EMPR and submit an independent environmental audit report to the competent authority at the intervals indicated in the EA. Further, in accordance with Regulation 34(6) GNR982 the holder of an environmental authorisation	

			4.1 NWA IWULA (IWUL) 05/X11D/AGJ/466, amendment application (IWUL) 16/2/7X100/C180 Submitted in 2014 and granted on 07 July 2016 (licence no. 05/X11B/ACGIJ/4704). I was neither informed nor consulted and never signed any consent document. The National Water Act 36 (NWA) of 1998 clause 24 states that a licence can only be granted to use water found underground on land not owned by the applicant if the owner of the land consents. 4.2 The quantity of the water on/under Zandvoort 10IT has decreased significantly as a result of the dewatering of the underground workings at Paardeplaats 12IT as well as the decanting [drawdown cone] of water at opencast pits on Paardeplaats 12IT, Portion 2 and Paardeplaats 12IT Remaining Extent. 5. Table 6 states that Pembani Colliery is located on Zandvoort 10IT portion 1 and Remaining Extent. It also states that there are existing authorisations on the property. These statements are not true. 6.1 Section 3.2 states that the intention of the Scoping Report is to provide the necessary information regarding the proposed inclusion of additional areas within the existing Pembani	must make these audit reports available to anyone on request. It is therefore EIMS's understanding that any Independent Audit Reports compiled in compliance with the requirements of an EA should be made available to the public in accordance with these provisions. This request has been submitted to Pembani Colliery for consideration. 1.2 Please contact the mine directly for correspondence between the DMR and Pembani Colliery regarding the Section 102 Application. Please refer to the attached correspondence between EIMS and the DMR. 1.3 It is EIMS's understanding that the IWWMP was provided to you in August 2016. However, please find the IWWMP attached as requested.	

			Colliery Mining Right, as well as to provide information on the proposed changes with regards to amendment of the existing MWP to include additional underground and opencast mining of coal resources at Pembani Colliery. According to the Scoping Report, Pembani is currently mining Pits TZP-4 and TZP-5 on Paardeplaats 12IT, portion 2 via opencast rollover methods. The Scoping Report together with MWP also shows that there will be future opencast pits KW 1 and KW 2 with underground mining of area KW-Underground at Kwaggafontein 8IT. 6.2 According to the Section 102 of the MPRD Act 28 of 2002 a mining right, mining works program (MWP), EMP or an EA in terms of NEMA (1998) may not be amended or varied without the written consent of the Minister. 6.3 Pits TZP-4 and TZP-5 is already mined and mining was done without an amended MWP and EMPR. Scoping Report states that pit TZP-4 is currently active and mining is via opencast rollover methods. This statement is not true because this was done in 2014-2015. Pembani Colliery has already mined this area and there is already a highwall infrastructure for underground mining and is currently active.	2. It is EIMS's understanding that the wording and figures in the Scoping report do correspond. Please advise EIMS of the section in the Scoping Report where these do not correspond. 3. Comment noted. EIMS was not involved in the 2009 EMP amendment and cannot comment on this. It is further understood that the underground mining on Paardeplaats Portion 2 was included in the original Mining Right (112MR) and EMPR (2006). Your comment will be included in Section 8.3 of the Scoping Report, as well as the Issues and Response Report to be submitted to the DMR. Your request for a copy of the EMP (2009) has been submitted to Pembani for consideration and action.	

			6.4 Areas KW 1, KW2 and KW-underground are already active mining areas without an amended MWP and EMPR. This means Pembani is mining illegally because they contravene section 102 of the MPRD Act 28 of 2002. 6.5 I was also not informed and consulted about pit TZP 5 and TZP4 [These mining areas are adjacent to the farm Zandvoort 10IT]. 7.1 The open pits that are being mine on Paardeplaats 12IT Remaining Extend, east of pit TZP5 are not even mentioned in this Scoping Report. It is not even in the MWP which Pembani wants to amend. What is going on here? I was neither informed nor consulted about this open cast mining activity. Blasting was done there without informing me. The border fence was damaged; the farm is covered with fly rock [carbonaceous material] and the farm burned down because of this activity. Figure 15 in the Scoping Report portion P25 and part of portion P21 refers to that area for future underground mining, but Pembani has already mined that area. I was also not informed or consulted on this matter. 7.2 I would like to receive proof from EIMS and Pembani that they aren't already mining under	4.1 Comment noted. EIMS was not involved in the 2016 IWUL application and cannot comment on this. However, the comment will be included in Section 8.3 of the Scoping Report, as well as the Issues and Response Report to be submitted to the DMR. With regards to the landowner consent form, please contact the mine directly. 4.2 Comment noted. As per Condition 6,.1 of Appendix V of the IWUL dated 07 July 2016, *"The Licensee must prevent adverse effect on other water users. All complaints must be investigated by a suitable qualified person and if investigations prove that the Licensee has impaired the rights of other water users, the Licensee must initiate suitable compensative measures."*	

			Zandvoort 10IT as the information in the Scoping report and MWP doesn't correlated with their mining activities. Future mining areas mentioned in this Scoping Report was already mined. [TZP4, TZP5, P25, P21 and KW1, KW2, KW-underground currently active]. 8. Scoping report states that Kwaggafontein 8IT was not included in the previous heritage studies, and that other site specific studies was also not completed but will be included in the EIA. How is this possible that Pembani Colliery is already mining on Kwaggafontein? 9. Section 8 of Scoping Report states that Pembani Colliery had the following Public Participation Processes (PPP). - PPP for the WUL in 2016. Only knew about this after the water use licence was given to Pembani Colliery. - PPP for the section 102 and amendment of the EMPR in 2016. (only PPP was for the amended EMPR) - PPP for mining related activities on Paardeplaats 12 IT and Twyfelaar 11 IT in 2012.	All other conditions of the IWUL, dated 07 July 2016 will also be applicable. It will be included in the EMP, that the conditions of the IWUL need to be implemented. Please also refer to the groundwater study attached as Appendix F to the Scoping Report. 5. It is EIMS's understanding that Pembani has a NEMA authorisation (EA)17/2/3 GS-44 which includes Zandvoort, as well as a prospecting right, and an IWUL. A copy of the IWUL and NEMA authorisation are attached. 6.1 Comment noted and will be included in Section 8.3 of the Scoping Report, as well as the Issues and Response Report to be submitted to the DMR for adjudication. 6.2 Refer to Point 1 above.	

			I was not aware of any PPP. I was not consulted and did not receive any notices to comment on this. 10.1 Section 8.2 in the Scoping Report states that the section 102 amendment application was submitted to the DMR in October 2016. I was only informed about the amended EMPR. 10.2 Table 14 states that the comments were for the Section 102 application. I only commented on the Amended EMPR and never received a copy of the original Section 102 application which was handed in at the DMR in 22 March 2016 and not October 2016. Was not consulted or given the opportunity to comment on the Section 102 application. 10.3 Also not all correspondence was added in the Scoping Report. 10.4 Still waiting for a response about the use of the Kalkkloof Road and how Pembani can take water under Zandvoort 10IT without an approval from the land owner. 11. There is no mention in the Scoping Report and MWP of the processing of coal right next to the border fence of the farm Zandvoort 10IT. This activity is done within a delineated wetland area. I was neither informed nor consulted on this matter.	6.3 It is understood that TZP 4 and TZP5 areas were included as designated open cast areas in the original 2006 EMP. EIMS used the 2015 MWP for the compilation of the information in this section of the Scoping Report. EIMS has asked Pembani to provide an update on this. The update information will be included in the Final Scoping Report to be submitted to the DMR. 6.4 Since the Draft Scoping Report that was placed out for public review on 01 February 2017, it has come to the EAPs attention that Pembani has started clearing the ground on the farm Kwaggafontein 8 IT in preparation for opencast mining. The Heritage Impact Assessment and Ecological Assessment were immediately commissioned and will be included in the EIR.	

			This activity is polluting the wetland area on Zandvoort 10IT. Pembani must send out specialist to assess the damage that has occurred already and implement strategies to prevent further pollution and degradation of that area. 12. Underground mining [TZP] will have a long-term negative impact on the Farm Zandvoort 10IT [wetlands, pans, fountains and other water resources]. According to the Groundwater Desk Study, it will take a minimum of 161 years after mining has stopped for the groundwater level under the farm Zandvoort 10IT to recover. There will be an 80m drawdown of the groundwater level. Springs NB31 and NB32 drawdown water level will be 39m and 53m. This means that the springs and wet lands on the farm will be severely affected. The Groundwater Desk Study also states that vertical cracks connecting the underground mine to the surface will allow decant at any point within the mining area. Point ZTP-1B is currently decanting into a wetland on Zandvoort 10IT. 13. The Desk Study also states that underground mining will have a permanent impact on the geology of the application area.	Your comment, together with confirmation that mining activities have started at Kwaggafontein, will be included in the Scoping Report to be submitted to the DMR, for consideration and adjudication. We will await the DMR's instruction in this regard. Please note that an EIA was done on the property and Pembani has a NEMA authorisation, as well as a Mining Right for the property. According to the mine mining activities started in October 2016 at Kwaggafontein. 6.5 Comment noted. EIMS was not involved in the process at this time can cannot comment on this. However, your comment will be included in Section 8.3 of the Scoping Report, as well as the Issues and response Report to be submitted to the DMR for	

			14. It is not mentioned in the Scoping report of how the landowners on Zandvoort 10IT will be compensated for the loss of water. It will take 161 years for the water to recover on Zandvoort 10IT and no borehole can be drilled during and after the 161 years because of the polluted groundwater. This means that the farm will no longer be economically viable to support sustainable farming. 15. The following studies for the EIA must be done on Zandvoort 10IT: - Surface water study. There was no specialist on the farm to do a proper surface water study. Water sources on Zandvoort 10IT Portion 1 are not even mentioned in the Scoping Report. The water sources on Portion 1 are directly in the proposed mining area (TZP) - Groundwater study. The desk study is unacceptable. Need tp clearly identify the impact the underground operation will have. My understanding is that the neighbours bborehole that is close to my fountains has run dry with the current mining projects. - Wetland study with a wetland rehabilitation plan. Scoping Report with the desk study (groundwater)	adjudication. It is understood that TZP 4 and TZP5 areas were included as designated open cast areas in the original 2006 EMP. 7.1 The relevant section of the scoping report will, be amended to include these areas (specifically Table 8). Please also note that according to Section 54(7) of the MPRDA (2002): “The owner or lawful occupier of land on which reconnaissance, prospecting or mining operations will be conducted must notify the relevant Regional Manager if that owner or occupier has suffered or is likely to suffer any loss or damage as a result of the prospecting or mining operation, in which case this section applies with the changes required by the context.”	

			clearly shows that there are wetlands and it will be affected. - Surface water study incorportated with the new finidings on the wetland study. Geological study. Structure of over burden to underground mining. 16. I wish to specifically record that I reserve my rights to elaborate on the nature and scope of my object upon receipt of any response and/or further documentation in respect of the proposed Scoping Report for the Section 102 application.	The mine has advised that ZP 5 East has been mined out, however, do not agree with the statement regarding the farm burning down. Fly rock has been cleaned up and the property fence was repaired. 7.2 It is EIMS's understanding that mining has not commenced on the farm Zandvoort. EIMS will request that Pembani Colliery provides feedback on this and will send this through to you as soon as we have heard from the mine. Please also refer to Points 6.3 and 6.4 above. The mine has also confirmed that PCC has not undermined Zandvoort. Quarterly plans are submitted to the Plan Inspector at the DMR. Copy of such plans can be made available If required. 8. During the compilation of the Scoping Report, it came to the	

				attention of EIMS that certain specialist studies had not been previously conducted on this area and as such these were commissioned. However, the mine does have an Environmental Authorisation, as well as a Mining Right for Kwaggafontein. Please also refer to Point 6.4 above. 9. EIMS was not involved in the PPP for the IWUL in 2016 or the mining related activities in 2012 and cannot comment on this. However, your concern with regards to the issue will be included in Section 8.3 of the Scoping Report, as well as the Issues and Response Report to be submitted to the DMR. With regards to the PPP for the Section 102 and the EMPR, please refer to Point 10.1 below. 10.1 The amended EMPR, which was one of the supporting	

				documents for the Section 102 Application, and which contains the relevant information pertaining to the environmental impacts and assessment, was made available to all registered I&APs for a period of 45 days. In addition, a further comment period of 16 days was provided to yourself at the time, following your request for such. The notification documents submitted during this public consultation process made specific note that the Amended EMPR was to be submitted in support of a S102 Application. 10.1 Please refer to 10.1 above. The S102 Application Form was made available on the EIMS website and Mr Benadie was specifically notified of its availability. 10.3 It is EIMS's understanding that all comments and responses received throughout	

				the original EMPR review period, as well as the latest Scoping Report process have been captured in the Issued and Responses Report submitted with the Scoping Report. EIMS will ensure that all correspondence received by 03 March 2017 is include in the Final Scoping Report to be submitted to the DMR for adjudication. 10.4 The comment is noted. Regarding the proof of landowner consent, and any other supporting documentation that was submitted to the DWS in support if the water use licence, we would request that you direct this enquiry directly to Pembani. EIMS was not involved in the compilation and submission of the Integrated Water Use Licence (IWUL) and does not have copies of this information. We will also submit	

				your request for such directly to the mine for consideration. Based on the consultation received from Mr Benadie during the previous process it is understood that the comment relating to the Kalkkloof road included the following: "*Copy of the authorisation documents for the use of the Kalkkloof road on Zandvoort. The road is a registered servitude on Zandvoort. Can you also provide me with the documents for the authorisation to use the private farm/dirt road from the Kalkkloof road to Twyfelaar. There is no servitude for this road on Zandvoort*". This request has been submitted to Pembani to respond to. According to the mine this is an existing public road. 11. Please provide detail on the location and nature of the	

				processing being referred to, and the associated pollution? It is EIMS's understanding that water use licences are in place for all wetland areas (i.e. c and i water uses are licenced) directly affected by the mining operations. This includes wetlands in the vicinity of TZP 4 and TZP5. It is further understood that the Pembani WUL includes the proposed undermining of the wetland situated on the farm Zandvoort. Please refer to Section 10. of the Scoping report where the impacts on wetlands and other water resources are discussed. It is understood that Pembani is implementing routine monitoring of the water resources. Please provide detail regarding the pollution being referred to? 12. The IWUL dated 07 July 2016 has been approved by the Department of Water and	

				Sanitation with Sections 2 and 3 of the IWUL providing conditions that Pembani Colliery must implement with regards to the hydrological system. Please also note that Condition 4 of the IWUL dated 07 July 2016, requires that the Licencee embark on a long-term rehabilitation and management programme with regards to water courses. The EIR and EMPR will state that the conditions of the IWUL must be implemented. This was also included in the amended EMPR in Sections 5, 6, 14 and 26. Mitigation measures for decant will be included in the EMPR. This will include Control/Remedy through interception of decant and treatment of polluted water where required, and avoid with the implementation of preventative measures (soil	

				management, progressive rehabilitation) According to the Groundwater study "The Kwaggafontein, Groenvallei and TZP E Seam underground mining areas would take 35, 80 and 120 years to flood in the post mining environment." The groundwater study was not a desktop study. Section 9 deals with water quantities and Section 10.28 of the Scoping Report has identified the impact associated with decant and Section 10.42 identifies mitigation measure to be implemented for decant. This will be expanded during the EIA phase. Please refer to Point 7.1 above and Section 54(7) of the MPRDA. 13. This comment is noted and will be included in Section 8.3 of the Scoping report to be	

				submitted to the DMR, as well as the Issues and Response Report. All Impacts will be further assessed during the EIA phase of the project and mitigation measures will be identified if applicable. The study conducted was a complete study. 14. Comment noted. As per Condition 6,.1 of Appendix V of the IWUL dated 07 July 2016, *"The Licensee must prevent adverse effect on other water users. All complaints must be investigated by a suitable qualified person and if investigations prove that the Licensee has impaired the rights of other water users, the Licensee must initiate suitable compensative measures."* It will be included in the EMPR that the condition of the IWUL need to be met. Please also	

				refer to Section 7 of the amended EMPR. Please also refer to Point 7.1 above. 15. The impact on surface water features was assessed in the 2005 report and considering that Zandvoort will be underground only it is not anticipated that there will be significant changes to the findings of this previous assessment. Furthermore, a complete geohydrological study was conducted for the submission of the IWWMP, which assessed the impacts on the surface water. It is understood that the potential impacts of the mining on the surrounding water resources (surface and groundwater) have been identified and assessed in the relevant groundwater and surface water studies. Please refer to Section 10 of the	

				Scoping Report. A wetland delineation study was conducted. Please refer to the specialist reports attached to the Scoping Report (Appendices F, I and J). Please refer to Point 12 and 14 above. 16. Please note that the comment period for the Scoping Report for the inclusion of Zandvoort into the Pembani Colliery's existing Mining.	
Lawful Occupier/s					
Mr. Johan Bensch	x	2016-07-30	Mr. Bensch sent an email in Afrikaans advising that he is renting land on Zandvoort from the Fanie Davel Trust. He would like to know what happens if there is a shortage of water due to underground mining. Will Pembani supply him with water as they are dependent on water from the fountain. He would also like to ensure that the fences on the mine boundary are maintained and that firebreaks are made in order to prevent fires. He is prepared to work with the mine and has a rental contract for	EIMS thank Mr Bensch for the email that he sent to EIMS and his concerns regarding a possible shortage of water, maintenance of fences and firebreaks on Zandvoort. EIMS advised Mr. bensch that he should please note that the amended Environmental Management Programme	Appendix D

			five years with the option of extending this for another five years.	Report (EMPR), which will be submitted to the Department of Mineral Resources (DMR) for adjudication, does include a discussion of fire and firebreaks, including proposed fire prevention measures to be implemented in consultation with adjacent landowners, under Section 31.2.1.1. Furthermore, all correspondence with Interested and Affected Parties (I&APs), such as yourself, will be included in Section 5.3 under "Summary of issues raised by I&APs" of the Final EMPR. All issues and concerns that have been sent through to EIMS will also be included in the Issues and Response Report (IRR) that will be included as part of an Appendix of the Final EMPR that will be submitted to the DMR. Pembani Colliery has also been issued with an updated	

				Integrated Water Use Licence (IWUL), dated 07 July 2016. According to Appendix 2 Point 1.3 and Appendix 5 Point 1.3 of the IWUL, the licensee shall provide any water user with potable water whose water supply is impacted. Section 26.9 of the amended EMPR refers that the conditions of the IWUL need to be implemented. With regards to your concern regarding the fences, EIMS will bring this to the attention of the mine and if possible provide you with a contact person at Pembani Colliery. Again please note that all of this correspondence is included in the amended EMPR, as well as the IRR.	
Mr. HP Visagie	x	2016/08/01	Mr. Visagie rents the croplands on the farm Zandvoort 10IT. He does not have objections to the proposed coal mining at Zandvoort, but would like to bring it to the attention that fly rock during blasting may make it difficult to harvest the soya as	Thank you for sending through the email raising your concerns with regards to the possibility or rocks falling into the croplands during blasting activities, which	Appendix D

			any stones can damage the harvester and no can also result in loss due to small stones occurring in the soya, which can then not be sold. He trusts that the mine will work with him regarding this matter.	may result in damage to the harvester, as well as stones coming in the soya harvest. Please note that the amended Environmental Management Programme Report (EMPR) addresses fly rocks and mitigation types in Section 7 of the report, while Section 26 of the amended EMPR includes the Environmental Management System that needs to be implemented with regards to blasting and fly rocks. EIMS included these extractions from the amended EMPR. Furthermore, all correspondence with Interested and Affected Parties (I&APs), such as yourself, will be included in Section 5.3 under "Summary of issues raised by I&APs" of the Final EMPR. All issues and concerns that have been sent through to EIMS will also be included in the Issues	

				and Response Report (IRR) that will be included as part of an Appendix of the Final EMPR that will be submitted to the DMR.	
Mr Garry van Rensburg	X	2016-11-21	Mr van Rensburg requested the following information: 1. An approved Mine Work Programme (The plan) showing the exact mining operations with clean and dirty water systems, mine dump placements on Groenvlei 7 and 8. 2. The New Mine Work Programme (The Plan) containing all the above information for which you are doung application for the 102 for Groenvlei 7 and 8.	EIMS thanked Mr. van Rensburg for his email and attached the previous mine plan (titled “Plan 2 Land Tenure”) indicating the mining operations for Pembani Colliery, as well as the current proposed future and underground mining plan, which will form part of the Section 102 application (titled “Mine Plan for Section 102 application”) to still be submitted to the Department of Mineral Resources (DMR). (e) The Pembani Coal Water Management Plan that was included in the 2015 Integrated Water and Waste Management Plan (IWWMP) and approved as part of the Integrated Water Use Licence	Sections 2 and 3.

				(IWUL) in July 2016, is also included.	
Gillian van Rensburg	2017-03-03	Email	Attached my Pembani 102 Objection 1.Pembani has polluted the wetland on Portion 8 of Groenvallei. They said they would appoint a wetland specialist 6 months ago. To date we are still waitin 2. They mined within 60m of the borehole on Portion 8, causing it's collapse. 3. The underground workings at Paardeplaats is busy dewatering Portion 8, starving the wetland of water. 4. The pipeline from Portion 7 is leaking excessively, releasing contaminated mine water into the non-mined areas. 5. The berms around stock piles on Portion 7 have been breached for the last year. No care maintenance takes place. 6. Not all washplant discard has been removed from the pit on Portion 7. 7. No significant rehabilitation has taken place for more than 2 years on Portion 7. It has been mined and must be rehabilitated It is clear, as indicated by the above points, that Pembani is not a responsible miner and that their	14 March 2017 EIMS Ref #: 1156/LW/svdg Reference #: MP 30/5/1/2/2/112 MR Dear Mr van Rensburg: **ATTENTION: Mr. van Rensburg** Dear Sir: INTERESTED AND AFFECTED PARTIES COMMENTS ON THE AMENDMENT OF THE SCOPING REPORT FOR PEMBANI COLLIERY The above project and your email received via email on the 03 March 2017 refers: Please refer to the table below for responses to your submission. Where relevant EIMS will, address the above points in the Final EIR and EMPR to be submitted to the DMR.	Sections 2 and 3, 8.3 and Appendix D

			actions negatively effect the environment and the community living in close proximity to their mining activities. Why is there a 102 application for activities which have ALREADY taken place? I hereby put on record our STRONG objections to any further enlargement of the mining footprint. Pembani must come up to date with their rehabilitation and rectify the damage caused by their past and ongoing negligence. These photos show berms that have been breached on Portion 7 of Groenvallei for more that a year. Yours faithfully, Garry van Rensburg Van Rensburg Family Trust 	1. EIMS has requested the mine to provide feedback with regards to this and will get back you once the mine has advised with regards to the matter. *2.* EIMS has communicated this to the mine. As per Condition 4 of the Integrated Water Use Licence (IWUL), dated 07 July 2016 the Water Use Licence "the Licensee shall provide any water user whose water supply is impacted on with potable water." Furthermore, as per Condition 6,.1 of Appendix V of the IWUL dated 07 July 2016, *"The Licensee must prevent adverse effect on other water users. All complaints must be investigated by a suitable qualified person and if investigations prove that the*	

				*Licensee has impaired the rights of other water users, the Licensee must initiate suitable compensative measures."* Please also note that according to Section 54(7) of the MPRDA (2002): *"The owner or lawful occupier of land on which reconnaissance, prospecting or mining operations will be conducted must notify the relevant Regional Manager if that owner or occupier has suffered or is likely to suffer any loss or damage as a result of the prospecting or mining operation, in which case this section applies with the changes required by the context."* It will be included in the EMPR that the condition of the IWUL need to be met. Please also refer to Section 7 of the amended EMPR.	

				• According to the mine, they have not been able to gain access to investigate this allegation. This borehole has not been used for a while now and water samples could not be taken from this borehole. 3. As indicated in Point 2 above, Pembani Colliery has received an IWUL, dated 07 July 2016. The IWUL includes the dewatering at Paardeplaats to allow the mine to operate. The impacts of the dewatering, were include in the Integrated Water and Waste Management Plan (IWWMP) submitted to the Department of Water and Sanitation (DWS) in support of the IWUL application. The impacts of dewatering are assessed in Section 10 of the Scoping Report, as	

				well as in the groundwater study, attached as Appendix F. As per Condition 6,.1 of Appendix V of the IWUL dated 07 July 2016, *"The Licensee must prevent adverse effect on other water users. All complaints must be investigated by a suitable qualified person and if investigations prove that the Licensee has impaired the rights of other water users, the Licensee must initiate suitable compensative measures."* • All other conditions of the IWUL, dated 07 July 2016 will also be applicable. It will be included in the EMP, that the conditions of the IWUL need to be implemented. Please also refer to the groundwater study attached as Appendix F to the Scoping Report, as well as Sections 10.2 and 10.4 of the Scoping Report.	

				The impacts on wetlands and groundwater have been assessed in the Scoping Report. Please refer to section 10 of the Scoping Report. 4. Conditions 2.4 and 2.5 of Appendix III of the IWUL, dated 07 July 2016, require that “as-built” plans must be submitted to the Chief Executive Officer and that a stormwater management plan must be designed. All the conditions under 3.1 of Appendix III of the IWUL refer to stormwater measures that need to be implemented by Pembani Colliery. EIMS will include the condition in the Environmental Management Programme (EMP) that the conditions of the IWUL need to be met as per the requirements of the NWA (1998), as well as	

				the requirements of the NEMA (1998) to not pollute the environment. EIMS will address this further during the EIA phase. EIMS has informed the mine of this. The mine has advised EIMS that the pipeline route was inspected and a leak was found. The pipe was perished by a sharp object and has been repaired. This is not the first time that this has happened and discussions will be held with the community living in close proximity to the pipeline. 5. Please see the response in Point 6 below. EIMS has been advised by Pembani Colliery that there is an intention to continue open cast mining on Portion 7 of Groenvallei (refer to attached plan). It is EIMS's understanding that open cast mining on Ptn 7 of Groenvallei	

				was approved under the Mining Right and associated EMPr (EMPR) (refer to Plan 2 Land Tenure attached to the email). Please also note that Condition 4 of the IWUL dated 07 July 2016, requires that the Licencee embark on a long-term rehabilitation and management programme with regards to water courses. EIMS will include a condition in the Environmental Management Programme (EMP) that the conditions of the IWUL need to be met. Rehabilitation will also be addressed in the (Environmental Impact Assessment Report) EIAR and EMPR. Please also note that the conditions of the amended EMPR require: • Provision must be made for the long-term treatment and/or management of	

				water collecting in mined out voids. 6. Develop an Integrated Rehabilitation and Closure Plan that complies with the framework, guidelines and principles presented in the amended EMPR and be implemented within one year of the amended EMPR being approved. 7. The Section 102 Application is for the inclusion of Zandvoort into the existing Mining Right of Pembani Colliery and for the amendment of the MWP. As part of the process the Applicant needs to undergo a Scoping and Environmental Impact Assessment process. EIMS used the 2015 MWP for the compilation of the information in this section of the	

				Scoping Report. EIMS has asked Pembani to provide an update on this. 8. This comment is noted and will be included in Section 8.3 of the Scoping Report as well as in the Issues and Response Report to be submitted to the DMR. Pembani Colliery is required to undertake periodic compliance audits of the operations. Such audits must be undertaken and submitted to the relevant Competent Authorities. Enforcement of the requirements of the various permits and authorisations lies with the relevant Competent Authorities 9. The S102 EMPR includes a condition that 'an Integrated Rehabilitation and Closure Plan must be developed by a specialist for	

				implementation within one year of the approval of the EMPR. The Plan shall be viewed as a dynamic document and shall be subjected to independent review on an annual basis along with the quantum for financial provision.' EIMS will address this further during the EIA phase of the project. This will be included in the EIAR, as well as the EMPR to be submitted as part of the current process.	
Garry van Rensburg	X	2017/03/15	Good day I refer to you email dated 2017-03-14. I refer to my point no. 5 in my original email. The point has not been represented in your summary. The Integrated Water and Waste Management Plan (IWWMP) which was submitted to the Department of Water and Sanitation in support of the IWUL application - Please provide me with a copy thereof.	Good day Mr. van Rensburg, Thank you for your email. Please be advised that EIMS did include your letter as an Appendix to the Issues and Response Report that was submitted with the Scoping Report to the Department of Mineral Resources (DMR) for adjudication and will ensure	Sections 2 and 3, 5.8 and Appendices D and M.

			Yours Sincerely, Garry van Rensburg	that point 5 is included in the relevant section of the Environmental Impact Assessment Report, as well as in the Issues and Response Report. As per Condition 3.7 of Appendix V for the Section 21(g) Water Uses of the Integrated Water Use Licence (IWUL) (Licence No. 05/X11B/ACGIJ/4704, dated 7 July 2017), Pembani is required to ensure that *"Stormwater control works must be constructed, operated and maintained in a sustainable manner throughout the impacted area."* EIMS will bring it to the attention of the mine that the berms around the stockpiles on Portion 7 of Groenvallei 40IT have been breached.	

				It will be included in the Environmental Management Programme (EMP) that all conditions of the IWUL need to be implemented. Please also find attached a copy of the Integrated Water and Waste Management Plan (IWWMP) that was submitted to the Department of Water and Sanitation as part of the IWUL application. Should you have any further queries, please do not hesitate to contact me.	
Adjacent Landowners					
Ms. Marietha Prinsloo	x	2016-07-30	Ms. Prinsloo from MJ Pieterse Trust Farms on Portion 5 of Twyfelaar 11IT. Her property is close to Zandvoort. She is worried that if Pembani Colliery mines on Zandvoort that she will have more damage to the buildings on her property. The house and outer buildings have already been damaged due to mining activities on Twyfelaar and Paardeplaats. She is also worried about the water. At Twyfelaar there is a big hole filled with acid water	Thank you for the email that was sent to EIMS regarding your concerns of the proposed mining at Zandvoort and the impact of the blasting on your property located on Portion 5 of the farm Twyfelaar 11IT. Please provide EIMS with the details of the inspection, names of the	Appendix D

			to which nothing is done. Pembani has ceased work at the mine. What will happen now. The rainy season is on its way. The Tyfelaar mine has been open for years now and where Pembani has finished mining no thing has been rehabilitated. Now they want to open another mine withouth completing the previous one. Pembani, when it was still known as Worldwide Coal, hired professional people to conduct a survey and inspection of Ms. Pieterse's house. Pembani Colliery should still have the photos and the report. This should be suitable to use as evidence for the damage done to the property by the mining operations. Walls have big cracks and the windowframes are cracks. Ms. Pieterse would just like to protect her property. When Pembani has finished mining one day she may sit without good drinking water and a broken house.	people and date, that was conducted on your house previously, as well as any other relevant information at your earliest convenience, so that EIMS can correspond with the mine regarding this matter. The amended Environmental Management Programme Report (EMPR), which will be submitted to the Department of Mineral Resources (DMR) for adjudication, does include mitigation measures for blasting. Please refer to Section 5.8.19 of the amended EMPR for the mitigation measures included. Furthermore, all correspondence with Interested and Affected Parties (I&APs), such as yourself, will be included in Section 5.3 under "Summary of issues raised by I&APs" of the Final EMPR. All issues and concerns that have been sent through to EIMS will	

				also be included in the Issues and Response Report that will be included as part of an Appendix of the Final EMPR that will be submitted to the DMR. Please note that the amended EMPR does provide for rehabilitation. Please refer to Section 27.3 and Figure 70 of the amended EMPR, which refers to the rehabilitation plan that Pembani Colliery should be implementing. The DMR is responsible for enforcing the mines environmental obligations and your concerns will be included in the submission that EIMS will make to the DMR. The amended EMPR also deals with Acid Mine Drainage under Section 26. 3 to Section 26.6, as well as in the table under Section 26.9.	

Mr. Bassson	X	2016-06-27	Mr. Basson referred to the letter he received in the post and wanted to confirm that it was not his property that was affected by the proposed Zandvoort project and wanted to know if EIMS is independent.	EIMS thanked Mr. Basson for the telephone call and advised that the project was for the proposed inclusion of Portions 1 and RE of the farm Zandvoort 10 IT into the existing Mining Right of Pembani Colliery. EIMS confirmed that EIMS was working as an independent EAP.	Appendix D
Mr. Pieter Hanekom	x	2016-07-08	Mr. Hanekom referred to the Site Notice placed outside his farm. Mr. Hanekom wanted to confirm where the development was taking place.	EIMS thanked Mr. Hanekom for the telephone call and advised that the site notice was for inclusion of Portions 1 and RE of the farm Zandvoort 10 IT into the existing Mining Right of Pembani Colliery.	Appendix D
Mrs Marianne Greyling	x	2016-07-14	Mrs Greyling wanted confirmation of the email address.	EIMS thanked Mrs. Greyling for the telephone call and confirmed the email address for the project to be pembani@eims.co.za and provided an alternative email.	Appendix D
Mrs Marianne / Mr. Lourens Greyling	x	2016-07-18	Mr and Mrs Greyling sent an email regarding the damage done to some of the buildings on their farm during the mining activities of Pembani Colliery on the farms Zandvoort and Paardeplaats, lately.	EIMS thanked Mr and Mrs Greyling for their emails that they have sent with regards to the blasting at Pembani Colliery	Appendix D

			Stone buildings were erected to provide accommodation for hikers as early as 1991 together with existing dairy buildings, erected in 1954. Some of the buildings date from the previous century and are of historical importance. None of these buildings have ever shown signs of structural deterioration up to the stage when Pembani started mining in the area at a distance of about 2km as the crow flies. The buildings are constructed on a diabase outcrop, which Mr Greyling believes, carry the shockwaves of blasting over a distance. The farmhouse which is a distance away from the outcrop is probably cushioned by weathered rock material consisting of mainly weathered diabase and shale and has up to now only shown a very small crack in one of the walls. The other buildings have large cracks running from top to bottom and after some of the blasts pieces of plaster can be found on the floors and enlargement of the cracks can be seen. Photos were also attached to the email. Mr Greyling thus objects to the proposed continuation of mining activities as it is causing harm to the environment.	for the underground mining of coal and the impact of this on the camping site on your property, Twyfelaar 11 IT, part of Portion 5 and Portion 6. EIMS requested that they provide the name of the person that they previously contacted at Pembani Colliery and the date, as well as any other relevant information at their earliest convenience, so that EIMS can correspond with the mine regarding this matter. EIMS advised Mr and Mrs Greyling that the amended EMPR, which will be submitted to the Department of Mineral Resources (DMR) for adjudication, does include mitigation measures for blasting, and referred them to Section 5.8.19 of the amended EMPR for the mitigation measures included. Furthermore, EIMS	

				advised them that all correspondence with Interested and Affected Parties (I&APs), will be included in Section 5.3 under “Summary of issues raised by I&APs” of the Final EMPR. All issues and concerns that have been sent through to EIMS will also be included in the Issues and Response Report that will be included as part of an Appendix of the Final EMPR that will be submitted to the DMR. The amended EMPR does provide for rehabilitation. Please refer to Section 27.3 and Figure 70 of the amended EMPR, which refers to the rehabilitation plan that Pembani Colliery should be implementing. Pembani Colliery falls under the DMR situated in eMalahleni. The Regional Manager is Mr. Sam	

				Mathavhela, who can be contacted on 013- 653 0500.	
Ms. Marietha Prinsloo	x	2016-07-30	Ms. Prinsloo from MJ Pieterse Trust Farms on Portion 5 of Twyfelaar 11IT. Her property is close to Zandvoort. She is worried that if Pembani Colliery mines on Zandvoort that she will have more damage to the buildings on her property. The house and outer buildings have already been damaged due to mining activities on Twyfelaar and Paardeplaats. She is also worried about the water. At Twyfelaar there us a big hole filled with acid water to which nothing is done. Pembani has ceased work at the mine. What will happen now. The rainy season is on its way. The Tyfelaar mine has been open for years now and where Pembani has finished mining no thing has been rehabilitated. Now they want to open another mine withouth completing the previous one. Pembani, when it was still known as Worldwide Coal, hired professional people to conduct a survey and inspection of Ms. Pieterse's house. Pembani Colliery should still have the photos and the report. This should be suitable to use as evidence for the damage done to the property by the mining operations. Walls have big cracks and the windowframes are cracks.	Thank you for the email that was sent to EIMS regarding your concerns of the proposed mining at Zandvoort and the impact of the blasting on your property located on Portion 5 of the farm Twyfelaar 11IT. Please provide EIMS with the details of the inspection, names of the people and date, that was conducted on your house previously, as well as any other relevant information at your earliest convenience, so that EIMS can correspond with the mine regarding this matter. The amended Environmental Management Programme Report (EMPR), which will be submitted to the Department of Mineral Resources (DMR) for adjudication, does include mitigation measures for blasting. Please refer to Section	Appendix D

			Ms. Pieterse would just like to protect her property. When Pembani has finished mining one day she may sit without good drinking water and a broken house.	5.8.19 of the amended EMPR for the mitigation measures included. Furthermore, all correspondence with Interested and Affected Parties (I&APs), such as yourself, will be included in Section 5.3 under "Summary of issues raised by I&APs" of the Final EMPR. All issues and concerns that have been sent through to EIMS will also be included in the Issues and Response Report that will be included as part of an Appendix of the Final EMPR that will be submitted to the DMR. Please note that the amended EMPR does provide for rehabilitation. Please refer to Section 27.3 and Figure 70 of the amended EMPR, which refers to the rehabilitation plan that Pembani Colliery should be implementing. The DMR is responsible for enforcing the	

				mines environmental obligations and your concerns will be included in the submission that EIMS will make to the DMR. The amended EMPR also deals with Acid Mine Drainage under Section 26. 3 to Section 26.6, as well as in the table under Section 26.9.	
Mr. JF Goss	x	2016-07-27	Mr Goss is the owner of Portion 12 and 14 and part of Portion 11 of the farm Groenvallei 40 IR. He sent a letter in Afrikaans objecting against any further development from Pembani Coal Carolina until the rehabilitation programme has been completed in totality especially on Groenvallei 40. Mr. Goss would also like to know what the impact of blasting at Zandvoort will be on his house and the outside buildings, as the mining activities have already damaged his house and the outside activities. At the time of his house being damaged he was unfortunately in Mozambique and by the time he had come back his wife had already started with repair work. Mr. Goss submitted a complaint to the manager at that time, Jabo, who sent a consultant to his property to investigate. The wall	EIMS thanked Mr. Goss for sending through the email regarding the objection of further development by Pembani Coal, Carolina. EIMS advised that the amended Environmental Management Programme Report (EMPR) does provide for rehabilitation. Please refer to Section 27.3 and Figure 70 of the amended EMPR, which refers to the rehabilitation plan that Pembani Colliery should be implementing. The DMR is responsible for enforcing the	Appendix D

			had not yet been painted and it was clear where the cracks were and the extent of these cracks. The consultant said that as repair work had already been done and as there are no previous photos of the house, nothing can be done with regards to the complaint. He took various photos in and around the house and recommended that records should be taken of extraordinary vibrations and tremors, and to report this to Jabo, which they did. However, no further investigations have been undertaken with regards to the damage on the house and outside builings. All the damage is for his own account and he refuses to repeat this.	mines environmental obligations and your concerns will be included in the submission that EIMS will make to the DMR. EIMS requested that Mr Goss provide the date that the consultant was sent to his property to investigate the impact of the blasting on the buildings of your property, as well as any other relevant information that was gathered during the investigation at his earliest convenience, so that EIMS can correspond with the mine regarding this matter. The amended EMPR, which will be submitted to the Department of Mineral Resources (DMR) for adjudication, does include mitigation measures for blasting. Please refer to Section 5.8.19 of the amended EMPR for the mitigation measures included. Furthermore, all	

				correspondence with Interested and Affected Parties (I&APs), such as yourself, will be included in Section 5.3 under "Summary of issues raised by I&APs" of the Final EMPR. All issues and concerns that have been sent through to EIMS will also be included in the Issues and Response Report that will be included as part of an Appendix of the Final EMPR that will be submitted to the DMR. EIMS advised that should Mr. Goss require the email to be translated into Afrikaans, to please contact EIMS. Any further queries, comments or concerns could be sent through to EIMS.	
Mr. Garry van Rensburg	x	2016/08/01	Mr Garry van Rensburg sent an email in Afrikaans objecting to the Section 102 Application that Pembani has submitted as: Pembani does not follow through with agreements made with the landowners,	Thank you for sending through your objections with regards to the proposed inclusion of Zandvoort into the Mining Right of Pembani Colliery to EIMS.	Appendix D

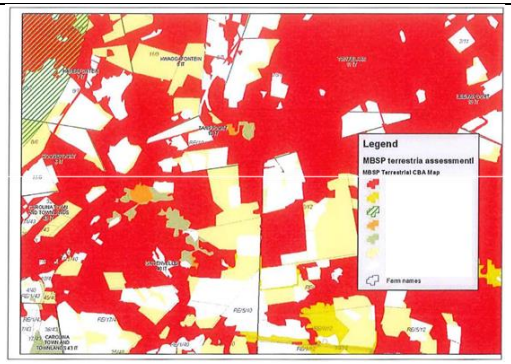
			Do not respect the National Water Act. Pembani is currently polluting a wetland. Rehabilitaton is not high on their agenda. Incompetent management digs holes for which there is no money to close up.	Please note that the amended Environmental Management Programme Report (EMPR) recommends that a grievance mechanism shall be developed by Pembani Colliery and be implemented (Refer to Section 30.1.2) and that the mine needs to address these grievances and adjust the management programme accordingly (Refer to Section 29.9) of the amended EMPR. Pembani Colliery has also been issued with an updated Integrated Water Use Licence (IWUL), dated 07 July 2016. Appendix 1 Point 2 of the IWUL indicates that “the responsibility of complying with the provision of the licence is vested in the Licensee and not any other person or body.” Furthermore, Appendix 1 Point 14 of the IWUL states that “any incident that caused or may cause water	

				pollution must be reported to the Chief Executive Officer or his/her designated representative within 24 hours." According to Section 26.9 of the amended EMPR refers that the conditions of the IWUL need to be implemented. Pambeni Colliery must, therefore, comply to the conditions set out	
Mr. Jan Goss	x	2016/08/11	Mr. Goss advised that they have gone through all of their correspondence regarding the blasting, and have to accept that everything was discussed verbally with the former manager, Jabo Radebe and the consultant. They did attach notes (attached in Annexure F to this IRR report) on which severe vibrations have been noted. Mr Goss did not receive any written comments from the consultant. In the meantime, Mr Goss has decided not to go ahead with renovations, expecting further damage and the cracks in the house which were repaired are clearly visible. The one wall of the workshop was cracked vertically from to to bottom, which Mr Goss has not attempted to repair. One wall of the garaged cracked at the joint at the one corner and eventually collapsed, which had to be	EIMS thanked Mr Goss for sending through the notes regarding the mine blasting that were noted in 2014. EIMS will correspond with the mine regarding the blasting. Furthermore, EIMS will include all comments and issues in Section 5.3 under "Summary of issues raised by I&APs" of the Final EMPR. All issues and concerns that have been sent through to EIMS will also be included in the Issues and Response Report that will be included as part of an	Appendix D

			rebuild. The debris is still lying next to the building. It was obvious that immedicately after submitting his complaints to Jabo, the severity of the blastings decreased considerably.	Appendix of the Final EMPR that will be submitted to the DMR.	
Municipal Councillor					
Municipal Councillors have been consulted. No comments received to date.					
Municipality					
Municipality has been consulted. No comments received to date.					
Organs of State (i.e. roads department, Eskom, Telkom)					
Organs of state have been consulted. No comments received to date.					
Communities					
No comments received to date.					
Department of Land Affairs					
Department has been consulted. No comments received to date.					
Traditional Leaders					
No traditional leaders have been identified within the proposed project area.					
Department of Environmental Affairs					
Department has been consulted. No comments received to date.					
Other Competent Authorities					
Frans Krige	2017-02-01	Email	Mnr. Krige requested that a CD copy of the Scoping Report be sent to Komilla Narasoo (MTPA) so that she can register it and distribute it for comments.	EIMS thanked Mnr. Krige for his response and informed him that a CD copy has been couried to the MTPA in Nelspruit and will arrive shortly.	

Komilla Knarasoo	2017-02-15	Email	Attached herewith is a signed copy of a non-objection with MTPA comments. Correspondence references EIMS Ref 1156 & DMR MP 30/5/1/2/2 (112) MP. Dear Me. Van de Giesse SUBJECT: THE MTPA COMMENTS ON THE SCOPING REPORT FOR THE PEMBANI COAL CAROLINA AMENDMENT TO THE MINING RIGHT AND AN AMENDMENT TO THE MINE WORKS PROGRAM ON PORTION 1 AND THE RE OF THE FARM ZANDVOORT 10 IT NEAR CAROLINA IN MPUMALANGA PROVINCE. MPJ0/5/1/2/2/112/MP. With reference to your correspondence reference EIMS ref: 156 and DMR MP 30/5/1/2/2/112 MP of date, February 2017 our comments: The MTPA has no objection against the proposal and the authorisation of EA and mine works program. MTPA is however concerned about the above ground infrastructure such as the pollution control facilities and dewatering effect that may affect the terrestrial biodiversity CBA areas of the particular portions of the farm Zandvoort 10 IT. Included is figure 1, a Mpumalanga Biodiversity Sector Plan Map (MBSP 2014) that indicates the	Good day Ms. Komilla, Please find attached a letter in response to the MTPA's comments regarding the above project: Response to the MTPA comments on the Scoping Report for the Pembani Coal Carolina Amendment to the Mining Right and an Amendment to the Mine Works Program on Portion 1 and the Re of the farm Zandvoort 10 IT near Carolina in Mpumalanga Province. MP30/5/1/2/1/112MP The letter received from the Mpumalanga Tourism and Parks Agency (MTPA), dated 15 February 2017, regarding the above project has reference. Thank you for the MTPAs comments on the Scoping Report. Environmental Impact	

			sensitive grassland areas marked as CBA irreplaceable. Negative impacts such as: 1. Downstream decanting of AMD, 2. Spilling of pollution control facilities, 3. And the modification of natural grasslands should be avoided at all costs. MTPA strongly support the recommendation to implement stringent measures to contain and reuse as much water as possible within the mine process water system and to investigate the possibility of active purification of dirty water and underground dewatering activities. Close monitoring of water quality during the mining phase and for a very long period thereafter must take place Rehabilitation should not focus only on the post-mining landform design but should include a comprehensive freshwater flow plan and indigenous re-vegetation and bioremediation of the rehabilitated areas. All exotic plant invaders should be removed from the site. Your cooperation will be appreciated. Kind Regards MR. J.J.EKSTEEN MANAGER SCIENTIFIC SERVICES	Management Services (EIMS) has included the Mpumalanga Biodiversity Sector Plan Map for the farm Zandvoort 10 IT (Figure 46) in the Scoping Report. EIMS will address the MTPA's concerns with regards to the negative impacts identified by the MTPA, the water monitoring and the rehabilitation in the Environmental Impact Assessment and Environmental Management Programme Reports, which will be made available for public review shortly. Should you require further information, please do not hesitate to contact me. Kind regards, Sonja van de Giessen	

			 MBSP figure 1. The terrestrial CBA irreplaceable areas on the farm Zantvoort 10 IT.		
SAHRA	X	2017-03-24	In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999) Attention: Pembani Coal Carolina (Pty) Ltd Pembani has an existing Mining Right (MP 30/5/1/2/2/112 MR) and would like to amend the Mining Right to incorporate Portions Re. and 1 of the Farm Zandvoort 10 IT, into the existing Mining Right. Furthermore, Pembani proposes to amend their existing mining works programme (MWP) (within the approved mining right boundary) to include the mining of additional coal resources. Carolina, Mpumpalanga.	Dear Nokukhanya Thank you for the letter that has been sent from SAHRA to EIMS for the Pembani Scoping Report. Please be advised that a palaeontologist has been appointed and the result of the study will be included in the Environmental Impact Assessment Report.	Sections 5.4 and 5.7 and Appendix D and I5.

			Pembani Coal Carolina (Pty) Ltd is proposing to amend their mine right area to include Portion 1 and the remainder of the farm Zandvoort 10 IT in the New Order Mine Right and change the other existing open cast mining areas from the Old Mine Right licence to the New Order Mine Right. The farm Zandvoort 10 IT is being included in order to mine additional coal reserves from their existing underground mine operations. The section to be mined is named Pembani Section 102 which is 471 ha in extent and no additional infrastructure will be constructed. The mine is in the Albert Luthuli Local Municipality of the Mpumalanga Province. The other areas within the existing mine right area have already received their environmental authorisation with only Zandvoort 10 IT requiring environmental authorisation. Environmental Impact Management services (Pty) Ltd (EIMS) has conducted and compiled a Scoping report for the proposed amendment of Pembani Coal Mine right and mine work programme for listed activities in then Environmental Impact Assessment Regulation of 2014 (as amended) in support of an Environmental Authorisation in terms of National Environmental Management Act, act		

			107 of 1998 (NEMA) and Mine Right Application in terms of Section 27 of Minerals and Petroleum Resources Development Act, Act 28 of 2002 (as amended) (MPRDA). EIMS has appointed PGS Heritage to conduct a Heritage Impact Assessment (HIA) for the proposed mine right amendment area on behalf of their client Pembani Coal Carolina (Pty) Ltd and Dr Gideon Groenewald has been subcontracted by PGS Heritage to conduct a Palaeontological ImpactAssessment, as part of the HIA in terms of Section 38(4) of the National Heritage Resources Act, Act 25 of 1999 (NHRA). Fourie, W. August 2015. Pembani Coal Mine Proposed Underground Mining on the Farm Zandvoot 10 It, near Carolina, Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province. Heritage Study: Impact Assessment Report. The author undertook a field assessment of the Pembani 102 section of the Pembani Coal Mine and seven heritage sites were identified of which four formed part of the same farmstead. The farm stead consists of the farmhouse (Site 4), shed (Site 7), rondeval (Site 5) and garage (Site 6). The farmstead was originally constructed in 1911 and		

			the farmhouse, shed and rondeval are thought to be the original buildings aged over 100 years. A historic cemetery (Site 2) was also identified, one possible informal grave (Site 3) and an old farm dipping structure (Site 1). The author states that all these sites may be related to the same farmstead as Site 4. As the farmhouse, rondeval and shed are older than 100 years and are in a derelict condition. They are classified as an archaeological site and generally protected from damage or alteration under section 35 of the NHRA and the author listed them as being of medium significance. The dipping structure is constructed after 1911 and built using sandstone blocks. This site is listed as medium significance and protected under section 34 of the NHRA. The informal grave and the formal cemetery of the Davel family are of High Significance locally and protected from damage under 36 of the NHRA. The author recommends that the sites be conserved in situas the mining activities on the farm will be underground mining and no impact on surface sites is foreseen. The author recommends a low level monitoring procedure to be established before the construction phase, the ECO along with an		

			archaeologist will do so by creating a photographic montage of each heritage feature, taking photos of each heritage feature at several fixed points, as a baseline status quo report which must be submitted to SAHRA. This will enable an objective monitoring process to monitor any changes or damage throughout the underground mining operation. Once established, the ECO must take over monitoring of the sites and submits a report on the results of the monitoring plus photos to SAHRA. Groenewald, G. June 2015. Palaeontological Desktop Assessment for the Proposed Mining of the Farm Zandvoort 10 in the Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province. The author was subcontracted by PGS to undertake a desktop study of the proposed Pembani 102 section of the coal mine and the study outlines that the area is underlain by Carboniferous to Permian aged rocks of the Dwyka Group; sandstone, shale and coal beds of the Vryheid Formation (Ecca Group, Karoo Supergroup); and Jurassic dolerite sills. The rocks of the Vryheid Formation have a very high		

			palaeontological sensitivity, the Dwyka Group was given low palaeontological sensitivity and the dolerite rocks have a very low palaeontological sensitivity. The heritage report provides recommendations as follows: 1. The EAP as well as the ECO for this project must be made aware of the fact that the Ecca Group sediments contain significant fossil remains, albeit mostly trace fossil and plant fossil assemblages. 2. In areas that are allocated a Very High and High Palaeontological sensitivity and specifically where deep excavation into bedrock is envisaged (following the geotechnical investigation), or where fossils are recorded during the geotechnical investigations, a qualified palaeontologist must be appointed to assess and record fossils at specific footprints of infrastructure developments (Phase 1 PIA)		

5.4 ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT ALTERNATIVES

5.4.1 THE BASELINE RECEIVING ENVIRONMENT

This section describes the baseline receiving environment of the mining area. Information in this section has been extracted from the previous environmental assessments undertaken, as well as additional specialist studies undertaken on Zandvoort in 2015 and specialist studies undertaken on Kwaggafontein in 2017. As such, the descriptions below of environmental features represent a consolidation of relevant information and extend to the entire mining area. For ease of reference the table below indicates the specialist studies already completed and also indicates over which properties specialist study and assessment was undertaken.

Specialist Study	Consultant	Properties Assessed
Heritage	Clean Stream Environmental Services (2003)	Portion 5 (a Portion of Portion 1) of Groenvallei 40 IT
	Digby Wells (2004)	Portions 3, 4, 8, 9, and 10 of Twyfellaar 11 IT; Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT; Portions RE and 2 of Paardeplaats 12 IT; Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT; Leeuwpoort 13 IT; Portions RE of Portion 1, 2, and 3 of Hawerfontein 7 IT; and Portion RE of Kwaggafontein 8 IT
	Dr A.C. Van Vollenhoven (2013)	Portions RE and 2 of Paardeplaats 12 IT; and Portion 5 (a Portion of Portion 1) of Groenvallei 40 IT

Specialist Study	Consultant	Properties Assessed
	PGS (2015)	Portions RE and 1 of Zandvoort 10 IT
Heritage	PGS (2017)	Kwaggafontein 8 IT
Palaeontological	Banzai Environmental (2017)	Kwaggafontein 8 IT and Zandvoort 10 IT
Biodiversity (Fauna, Flora & Wetlands)	Clean Stream Environmental Services (2003)	Portion 5 (a Portion of Portion 1) of Groenvallei 40 IT
	Digby Wells (2004)	Portions 3, 4, 8, 9, and 10 of Twyfellaar 11 IT; Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT; Portions RE and 2 of Paardeplaats 12 IT; Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3 ,4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT; Leeuwpoort 13 IT; Portions RE of Portion 1, 2, and 3 of Hawerfontein 7 IT; and Portion RE of Kwaggafontein 8 IT
	Strategic Environmental Focus (2011)	Portions 3, 4, 8, 9, and 10 of Twyfellaar 11 IT; Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT; Portions RE and 2 of Paardeplaats 12 IT; Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT;

Specialist Study	Consultant	Properties Assessed
		Leeuwpoort 13 IT; Portions RE of Portion 1, 2, and 3 of Hawerfontein 7 IT; Portion RE of Kwaggafontein 8 IT; and Portions RE and 1 of Zandvoort 10 IT
	David Hoare (2015)	Portions RE and 1 of Zandvoort 10 IT
	The Biodiversity Company (2017)	Kwaggafontein 8 IT
Ground Water	Clean Stream Environmental Services (2003)	Portion 5 (a Portion of Portion 1) of Groenvallei 40 IT
	Future Flow (2011)	Portions 3, 4, 8, 9, and 10 of Twyfellaar 11 IT; Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT; Portions RE and 2 of Paardeplaats 12 IT; Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT; Leeuwpoort 13 IT; Portions RE of Portion 1, 2, and 3 of Hawerfontein 7 IT; Portion RE of Kwaggafontein 8 IT; and Portions RE and 1 of Zandvoort 10 IT
	Cabanga Concepts (2014)	Portions 3, 4, 8, 9, and 10 of Twyfellaar 11 IT; Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT;

Specialist Study	Consultant	Properties Assessed
		Portions RE and 2 of Paardeplaats 12 IT; Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT; Leeuwpoort 13 IT; Portions RE of Portion 1, 2, and 3 of Hawerfontein 7 IT; Portion RE of Kwaggafontein 8 IT; and Portion RE and 1 of Zandvoort 10 IT
	Future Flow (2015)	Portions 3, 4, 8, 9, and 10 of Twyfellaar 11 IT; Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT; Portions RE and 2 of Paardeplaats 12 IT; Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT; Leeuwpoort 13 IT; Portions RE of Portion 1, 2, and 3 of Hawerfontein 7 IT; Portion RE of Kwaggafontein 8 IT; and Portions RE and 1 of Zandvoort 10 IT
Surface Water	Clean Stream Environmental Services (2003)	Portion 5 (a Portion of Portion 1) of Groenvallei 40 IT
	Digby Wells (2004)	Portions 3, 4, 8, 9, and 10 of Twyfellaar 11 IT;

Specialist Study	Consultant	Properties Assessed
		Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT; Portions RE and 2 of Paardeplaats 12 IT; Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT; Leeuwpoort 13 IT; Portions RE of Portion 1, 2, and 3 of Hawerfontein 7 IT; and Portion RE of Kwaggafontein 8 IT.
	Cabanga Concepts (2014)	Portions 3, 4, 8, 9, and 10 of Twyfellaar 11 IT; Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT; Portions RE and 2 of Paardeplaats 12 IT; Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT; Leeuwpoort 13 IT; Portions RE of Portion 1, 2, and 3 of Hawerfontein 7 IT; Portion RE of Kwaggafontein 8 IT; and Portions RE and 1 of Zandvoort 10 IT
Socio-Economic	Digby Wells (2004)	Portions 3, 4, 8, 9, and 10 of Twyfellaar 11 IT; Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT; Portions RE and 2 of Paardeplaats 12 IT;

Specialist Study	Consultant	Properties Assessed
		Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT; Leeuwpoort 13 IT; Portions RE of Portion 1, 2, and 3 of Hawerfontein 7 IT; and Portion RE of Kwaggafontein 8 IT.
Soils	Clean Stream Environmental Services (2003)	Portion 5 (a Portion of Portion 1) of Groenvallei 40 IT
	Rehab Green Monitoring Consultants (2004)	Portions 3, 4, 8, 9, and 10 of Twyfellaar 11 IT; Portions 1, 6, 7, 8, 16, and 17 of Groenvallei 40 IT; Portions RE and 2 of Paardeplaats 12 IT; Portions RE, 1, and 2 of Droogvallei 41 IT; Portions RE, 2, 3, 4, and 5 of Haarlem 39 IT; Portions RE and 9 of Appeldoorn 38 IT; Leeuwpoort 13 IT; Portions RE of Portion 1, 2, and 3 of Hawerfontein 7 IT; and Portion RE of Kwaggafontein 8 IT.
	Agricultural Research Council (2015)	Portions RE and 1 of Zandvoort 10 IT

For further information, please refer to the above mentioned previous studies and assessments undertaken which are attached as appendices to this report.

5.4.2.1 TOPOGRAPHY

The gently undulating highland topography is typical of the central Mpumalanga Province, with fairly broad to narrowly incised valleys of the headwater drainages, with average height of 1600 in the north west and 1 080 metres above sea level in the south (Figure 26). There are a number of marshy areas or vleis in the upper parts of the valleys and numerous pans, which vary from insignificant vegetated depressions to large deeply etched features with bare clayey floors.

The study area stretches over a wide region and comprises of various topographical features. Several watersheds, pans, hills and valleys are incorporated within the mining area. These topographical features also play a role in how the coal is mined in the region.

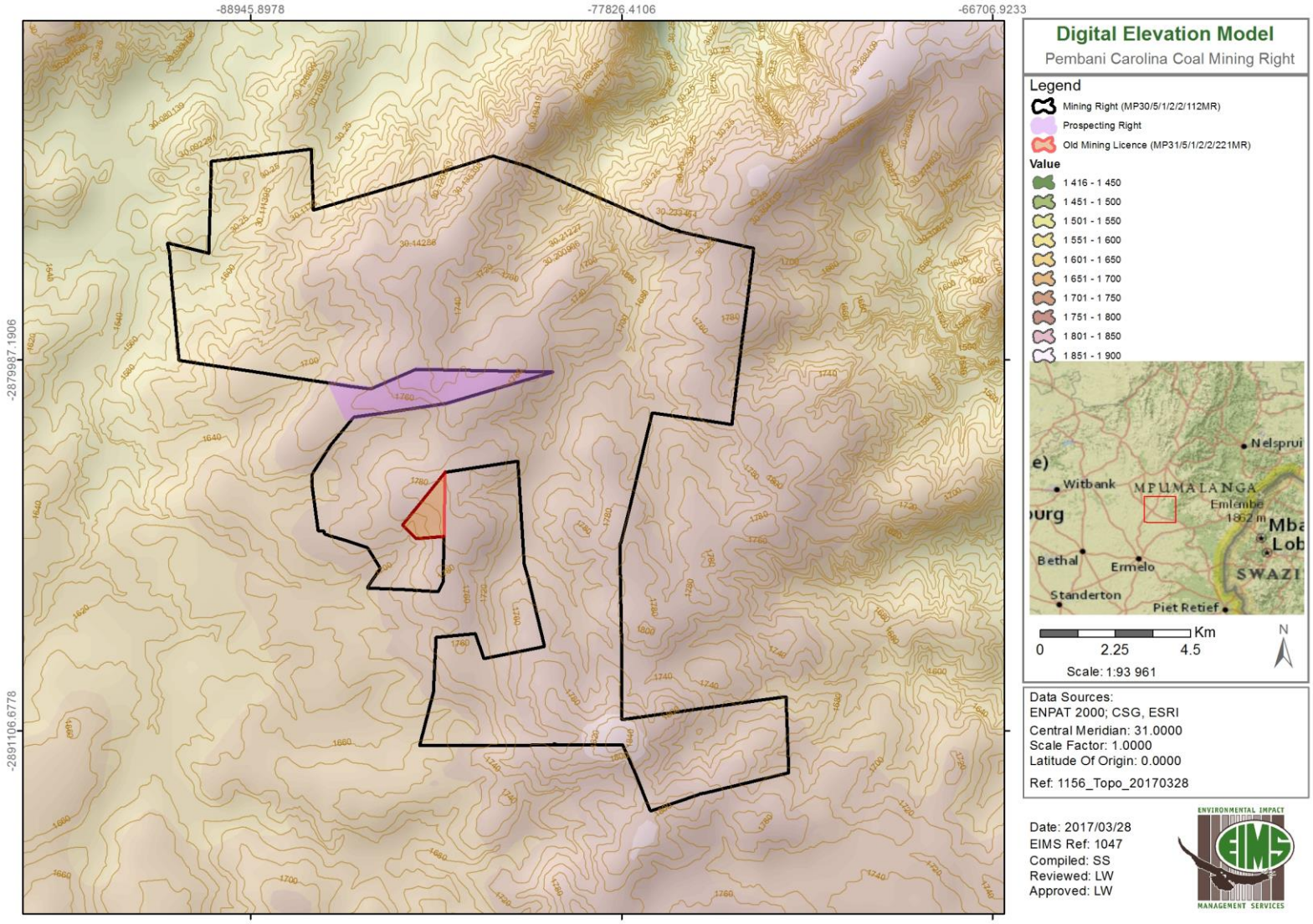


Figure 26: Digital Elevation Model (20 m contours) of the application area

5.4.2.2 GEOLOGY

The stratigraphy and depositional environment in the area is similar to that of the whole of the Eastern Transvaal coal field. The coalfield is underlain by pre-Karoo rocks which were subjected to glaciation which resulted in the deposition of tillite of the Dwyka formation over most of the area.

The Ecca group, which contains the coal-bearing Vryheid formation, rests on the Dwyka formation. The Vryheid formation contains five bituminous coal seams, named E, D, C, B and A (with E being at the bottom and A at the top) which are separated by mainly arenaceous sediments. The Vryheid formation reaches a maximum thickness of 120m. After being deposited, the Ecca sediments were subject to faulting and intrusion by dolerite sills and dykes.

The coal seams are numbered from E seam at the base to A seam at the top of the sequence. The E seam varies in thickness from 0.3 meters to 2.02 meters. This seam is a high quality low ash, low phosphorus highly volatile bituminous coal. Its deposition and lateral extent appears to be determined by palaeotopography. The E seam is overlain by a persistent shale member, followed by sandstones.

The D seam is thin and uneconomic and is made up of four members locally, but usually has two leaves separated by a thin shale parting. The seam, although laterally continuous, seldom exceeds 0,5 m in thickness in total. The D seam is overlain by a sandstone layer followed by a persistent shale layer, followed by further sandstone and another persistent shale layer.

The C seam contains the highest quality of coal but is not well developed in the Carolina area and can be narrow in places. The C seam, which averages 1,8 m in thickness, is usually composed of a C Upper (CU) and C Lower (CL) seam, separated by a parting of variable lithological composition. Locally the CU seam may split into two recognisable zones. It is overlain by a sandstone layer of variable thickness.

The B upper seam is low quality high ash coal. The B seam group is generally represented by two seams, termed the B and the BL1, separated by a sandstone parting. Locally the B seam may include the thin BX seam lying above the B seam. The B seam is overlain by sandstone which in turn is overlain by a persistent shale member. Thereafter there is an alternating sequence of sandstone and shale developments.

The A seam is seldom preserved as it has been removed by recent erosion. It is usually overlain by a glauconitic sandstone layer. The Beaufort group sediments do not occur in this area as they have been removed by erosion.

The Pembani Colliery is situated within the northern part of the Ermelo Coalfield, which forms part of the coal-bearing Vryheid Formation of the Ecca Group. The B Seam and the E Seam are the main economic coal seams present within the mining area and are exploited by means of opencast and underground mining operations. The average depth of the E seam is 53 metres (m) and 27.6 m for the B seam.

5.4.2.3 CLIMATE

The area falls within the central Mpumalanga climatic zone, or the “Highveld” climatic region which is characterized by warm summers with rainfall and warm (during the day) to cold (at night), dry winters with sharp frosts. A well-formed overland anticyclone high-pressure system in winter maintains dry air over the region and sharp frosts occur.

Table 20 below shows the mean minimum and maximum temperatures for the area. The hottest months are December/January and the coldest June/July.

Table 20: Mean monthly maximum and minimum temperatures and relative humidity

Month	Mean Max (ºC)	Mean Min. (ºC)	Daily Mean (ºC)
January	24.3	13.4	18.9
February	23.7	13.1	18.5
March	23.0	12.0	17.5
April	20.7	8.7	14.7
May	18.9	5.3	12.3
June	16.5	1.8	9.1
July	16.9	2.6	9.8
August	19.1	4.4	11.8
September	22.1	7.3	14.5
October	23.2	9.5	16.6
November	23.2	11.5	17.3
December	23.6	12.2	17.9
ANNUAL AVERAGE	21.3	8.5	14.9

Pembani lies within an area of 700-800 mm mean annual precipitation. Table 21 shows the mean monthly and annual rainfall for the area. Rainfall occurs mainly in the form of showers and thunderstorms from October to March with maximum events occurring December to January. The winter months are typically dry with the combined rainfall for June, July and August making up only 3.9% of the annual average total of 744 mm. Rainstorms are often violent with up to 80 mm falling in one day, lightening, and strong winds and at times hail.

Table 21: Mean Monthly and Annual Rainfall for the Site

Month	Mean (mm)	Annual Rainfall %
January	128.51	17.25
February	98.41	13.21
March	80.83	10.85
April	44.33	5.95
May	17.14	2.30
June	8.49	1.14
July	7.3	0.98
August	8.34	1.12
September	30.25	4.06
October	74.95	10.06
November	124.19	16.67
December	121.66	16.33
ANNUAL MEAN	744	100

Table 22 below shows the maximum rainfall intensities per month. The highest rainfall intensities occur in the summer months.

Table 22: Rainfall intensities (in mm)

Month	60 Min (mm)	24 Hours(mm)	24 Hours – 50 Year
January	63.6	74.4	60.2
February	49.8	80.0	57.0
March	26.0	42.0	56.6
April	25.0	48.2	56.9
May	18.5	22.0	26.6
June	6.4	37.5	14.6
July	7.8	23.4	22.6
August	11.5	17.4	27.2
September	22.0	54.0	61.2
October	22.0	51.5	89.4
November	50.1	53.0	64.6
December	44.0	48.0	68.6

The area is somewhat windier than is typical for the Eastern Mpumalanga Highveld because of its position near the escarpment. Wind speed averages around 3.1 m/s. September to December are the windiest months and average wind gust speed ranges between 12 and 14 m/s. Average wind gust speeds for the remainder of the year range between 10 and 12 m/s. Strong winds come predominantly from the northwest and northeast, however topography does affect wind direction in a specific location. Surface inversions occur during 80% of nights in winter and about 40% of nights in summer to a depth of 100-150 m above the surface. Nocturnal stability regularly occurs close to the ground causing stagnation and slow catabolic drift, particularly in winter.

Table 23 below shows the mean monthly evaporation for the area. The trends follow expectation for the Highveld climatic zone with higher evaporation in the summer and lower evaporation in winter. Evaporation is fairly high compared with the other Highveld areas due to windier conditions.

Table 23: Mean average evaporation (in mm)

Mean			
Month	**S Pan (%)**	**S Pan (mm)**	**Lake Evaporation (mm)**
January	11.28	164	138
February	9.67	140	123
March	9.49	138	121
April	7.2	104	92
May	6.28	91	79
June	5.16	75	64
July	5.57	81	67
August	7.05	102	83
September	8.5	123	100
October	9.5	138	112
November	9.48	137	112
December	10.77	156	129
Annual Total	100	1449	1220

5.4.2.4 SOILS

The original soil assessment for areas affected by the original mining footprint of the Pembani Colliery was undertaken by Rehab Green Monitoring Consultants cc in 2004. ARC undertook an additional assessment for Zandvoort in 2015, for the purpose of supporting the S102 consolidation.

Seventeen (17) soil units were identified in the 2005 assessment and are summarized in terms of the dominant and sub-dominant soil form and families, average depth, topsoil and sub-soil texture and a description of the dominant soil form horizons is provided in Table 24 below. Six (6) soil units were identified in the 2015 Zandvoort assessment and are assessed in terms of the dominant and sub-dominant soil form and families, average depth, characteristics, and agricultural potential in Table 25 below.

The soils of the mining area were classified according to the Taxonomic System for South Africa (Soil Classification Group, 1991). The soils were investigated using a hand auger on a 150 x

150 m predefined grid. At each observation point, soil physical characteristics such as depth, colour, texture and structure were noted. The study area for the soils was divided into nine areas:

- Portions 6, 7, 8, and 17 of Groenvallei 40 IT;
- Portion RE of Portion 1 of Groenvallei 40 IT;
- Portions 1 and 4 of Haarlem 39 IT;
- Portion 5 of Haarlem 39 IT;
- Portions RE and 4 of Haarlem 39 IT and Portions 3 and 9 of Appeldoorn 38 IT;
- Portions RE and 2 of Paardeplaats 12 IT;
- Portion 8 of Twyfelaar 11 IT;
- Portions 9, and 10 of Twyfelaar 11 IT; and
- Portions RE and 1 of Zandvoort 10 IT.

Although a site specific study has not been completed on Kwaggafontein, it is assumed from the regional soil map (Figure 27) that the soils on Kwaggafontein are not anticipated to be significantly different from other studies and, therefore, the basis and recommendations of the soil studies will also apply on Kwaggafontein.

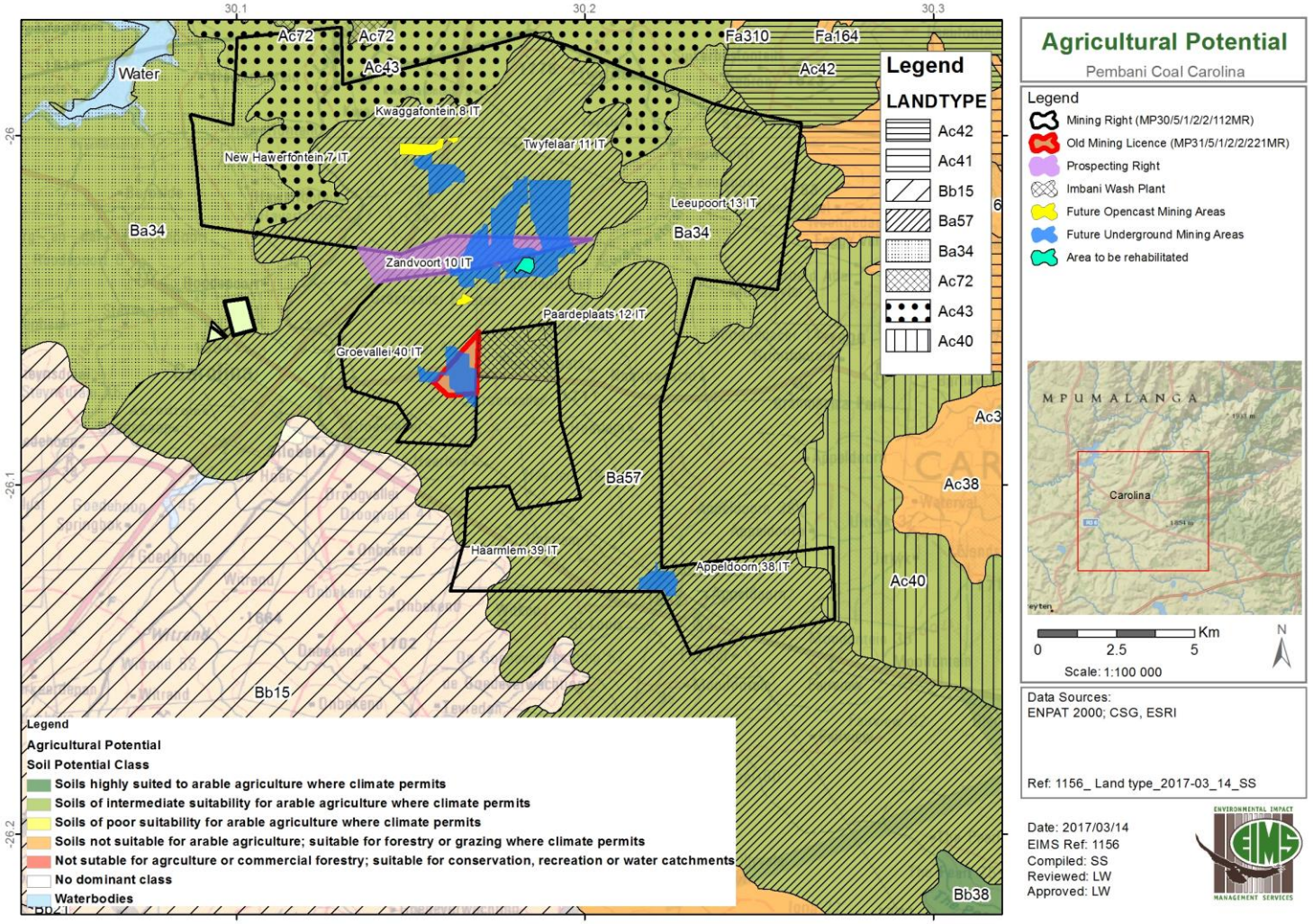


Figure 27:Regional soils and agricultural potential for Pembani

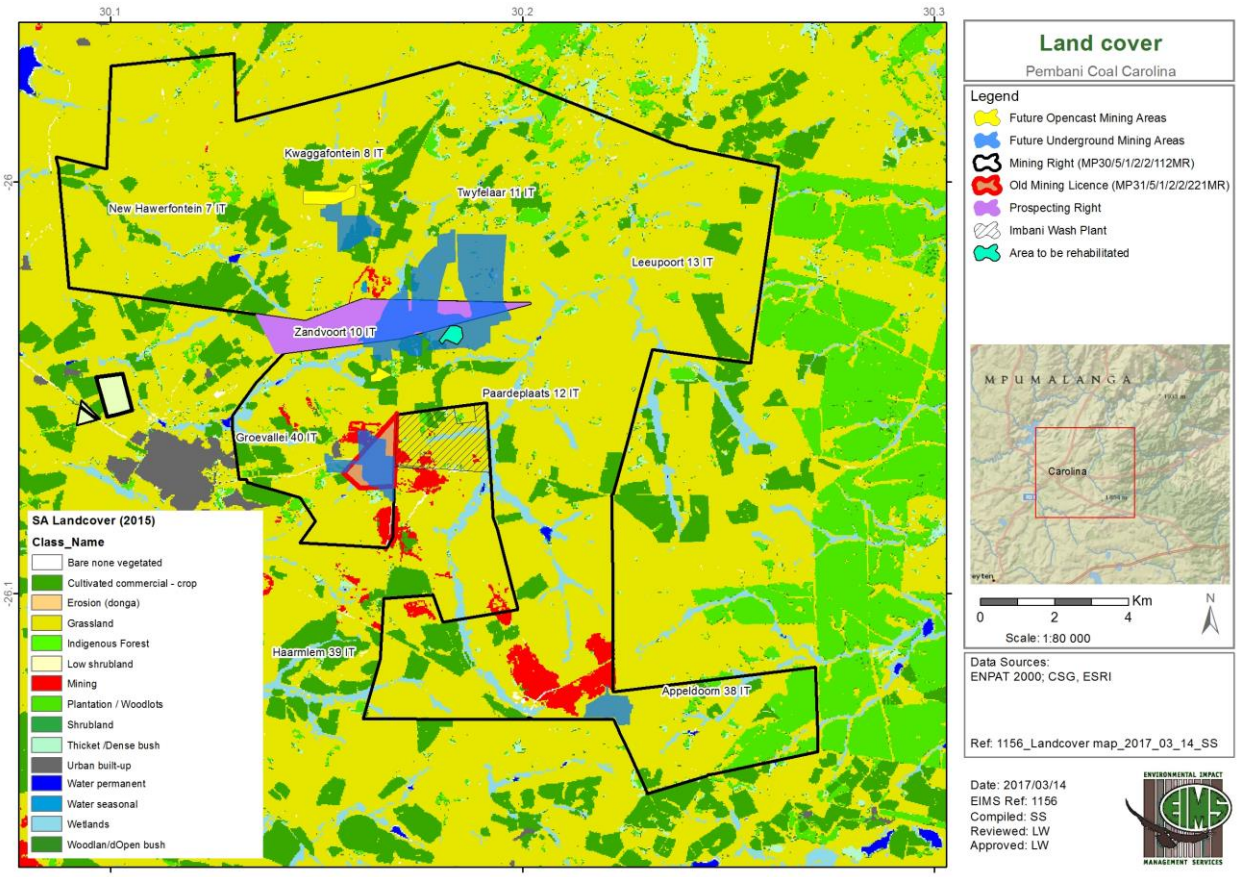


Figure 28: Land cover within the Pembani Colliery

Figure 28 indicates the land cover of the of the areas, including the proposed additional mining areas on portions of the farms Kwaggafontein, Paardeplaats, Twyfelaar, Haarlem, Groenvallei and Appeldoorn, which lie within the existing mining right of Pembani Colliery, as well as the land cover for Zandvoort, which is to be included into the existing mining right. The figures below (Figure 29 to Figure 37 indicate the farms assessed, as well as the main soil types found on these properties).

Table 24: Soil units (2005)

Unit	Dominant Soil Form and Family	Other Forms and Families	Average Depth (mm)	Topsoil Texture	Sub-soil Texture	Summarized Description of Dominant Soil Form
Av	Avalon 1100	Clovelly 1100 Glencoe 1100 Dresden 1000	400-600	Sandy loam	Sandy loam – Sandy clay loam	Shallow; Greyish brown topsoil; Yellowish brown sub-soil on mottled soft plinthite; Structureless; Non-calcareous; Moderate arable potential.
Cv	Clovelly 1100	Avalon 1100 Glencoe 1100	800-1200	Sandy loam	Sandy loam – Sandy clay loam	Moderately deep to deep; Greyish brown topsoil; Yellowish brown sub-soil on weathered rock; Structureless; Non-calcareous; Moderate to high arable potential.
Cv1	Clovelly 1100	Avalon 1100 Glencoe 1100 Dresden 1000	600-900	Sandy loam	Sandy loam – Sandy clay loam	Moderately deep; Greyish brown topsoil; Yellowish brown sub-soil on weathered rock; Structureless; Non-calcareous; Moderate arable potential.
Cv2	Clovelly 1100	Avalon 1100 Glencoe 1100 Dresden 1000	400-600	Sandy loam	Sandy loam – Sandy clay loam	Shallow; Greyish brown topsoil; Yellowish brown sub-soil on weathered rock; Structureless; Noncalcareous; Moderate arable potential.

Unit	Dominant Soil Form and Family	Other Forms and Families	Average Depth (mm)	Topsoil Texture	Sub-soil Texture	Summarized Description of Dominant Soil Form
Dr	Dresden 1000	Wasbank 1000 Dresden 2000 Glencoe 1100	100-300	Sandy loam	-	Very Shallow; Yellowish brown topsoil underlain by hard plinthite; Structureless; Non-calcareous; Low arable potential.
Exc/ Dist	Hutton 1100	Grencoe 1100 Dresden 1000 Wasbank 1000	0-800	Sandy loam	Sandy loam – Sandy clay loam	Old mine area, partly excavated and disturbed, partly covered with topsoil stockpiles and mine residue deposits. Usable topsoil at some areas.
Gc	Glencoe 1100	Clovelly 1100 Avalon 1100 Dresden 1000	400-600	Sandy loam	Sandy loam – Sandy clay loam	Shallow; Greyish brown topsoil; Yellowish brown sub-soil on hard plinthite; Structureless; Noncalcareous; Low arable potential.
Gc1	Glencoe 1100	Clovelly 1100 Avalon 1100 Dresden 1000	500-900	Sandy loam	Sandy loam – Sandy clay loam	Moderately deep; Greyish brown topsoil; Yellowish brown sub-soil on hard plinthite; Structureless; Non-calcareous; Moderate arable potential.

Unit	Dominant Soil Form and Family	Other Forms and Families	Average Depth (mm)	Topsoil Texture	Sub-soil Texture	Summarized Description of Dominant Soil Form
Gc2	Glencoe 1100	Clovelly 1100 Avalon 1100 Dresden 1000	300-500	Sandy loam	Sandy loam – Sandy clay loam	Shallow; Greyish brown topsoil; Yellowish brown sub-soil on hard plinthite; Structureless; Non-calcareous; Low arable potential.
Hu	Hutton 2100	Hutton 2200 Dresden 1000	600-900	Sandy loam	Sandy loam – Sandy clay loam	Moderately deep; Reddish brown topsoil; Yellowish red to red sub-soil; Structureless; Noncalcareous; Moderate arable potential.
Hu1	Hutton 1200	Hutton 2200 Dresden 1000	1000-1500	Sandy loam	Sandy loam – Sandy clay loam	Deep; Reddish brown topsoil; Yellowish red to red sub-soil; Structureless; Non-calcareous; High arable potential.
Hu2	Hutton 1200	Hutton 2200 Dresden 1000	300-500	Sandy loam	Sandy loam – Sandy clay loam	Shallow; Reddish brown topsoil; Yellowish red to red sub-soil; Structureless; Non-calcareous; Low arable potential.
Ka	Katspruit 1000	Longlands 1000 Kroonstad 1000	200-400	Sandy clay	Clay	Shallow; Dark greyish brown topsoil underlain by a grayish non-structured to structured clay horizon. No arable potential.

Unit	Dominant Soil Form and Family	Other Forms and Families	Average Depth (mm)	Topsoil Texture	Sub-soil Texture	Summarized Description of Dominant Soil Form
		Wasbank 2000				
Kd	Kroonstad 1000	Longlands 1000 Katspriut 1000 Wasbank 2000	400-600	Loamy sand	Loamy sand	Shallow; Dark greyish brown topsoil; Bleached greyish brown to light gray sub-soil which overlies a grayish structured clay horizon. Low arable potential.
Lo	Longlands 1000	Wasbank 1000 Dresden 2000 Kroonstad 1000	400-600	Loamy sand	Loamy sand	Shallow; Dark greyish brown topsoil; Bleached greyish sub-soil on mottled soft plinthite; Structureless; Non-calcareous; Low arable potential.
Ms/R	Mispah 1100	Dresden 1000 Clovelly 1100	0-250	Sandy loam	-	Very Shallow; Yellowish brown topsoil underlain by hard rock; Structureless; Non-calcareous; Low arable potential. Rock outcrops also occurs.
Wa	Wasbank 1000	Longlands 1000 Dresden 2000	500-900	Loamy sand	Loamy sand	Shallow to moderately deep; Greyish brown topsoil, Bleached light grey sub-soil on hard plinthite; Structureless; Non-calcareous; Low arable potential.

Table 25: 2015 Zandvoort soils

Map unit	Dominant soils	Sub-dominant soils	Depth (mm)	Characteristics	Agric. Potential	Area (ha)
Hu	Hutton	Lichtenburg, Clovelly	600-1200+	Reddish-brown, structureless, sandy loam topsoil on red, structureless to weakly structured, sandy clay loam to clay loam subsoil, on weathering rock, cemented ferricrete greyish (or occasionally on mottled soft plinthite).	Moderate to high	143.7
Av	Avalon	Clovelly, Glencoe, Hutton	600-900	Brown, structureless, loamy sand to sandy loam topsoil on yellow to yellow-brown (occasionally reddish-brown), structureless to weakly structured, loamy sand to sandy loam subsoil, on greyish, mottled soft plinthite (occasionally on cemented ferricrete or weathering rock)	Moderate to high	46.1
Gc	Glencoe	Avalon, Dresden	450-800	Brown, structureless, loamy sand to sandy loam topsoil on yellow to yellow-brown (occasionally greyish-brown), structureless to weakly structured, loamy sand to sandy clay loam subsoil, on cemented ferricrete or greyish, mottled soft plinthite	Low to moderate	150.1
Ms	Mispah	Dresden, Glencoe	50-350	Brown (occasionally reddish-brown), structureless, loamy sand to sandy loam topsoil on cemented ferricrete or weathered rock. Cemented ferricrete and rock outcrops occur in places.	Low	131.1
Lo/W	Longlands	Westleigh, Kroonstad, Katspruit	250-900	Dark greyish-brown to black, structureless to weakly structured, sandy loam to sandy clay loam topsoil on grey, weakly structured, sandy clay loam to sandy clay, mottled subsoil, often wet. Occurs in lower-lying parts and close to stream channels.	Very low	105.5
Pan/W	Katspruit	-	0-50	Surface water in closed pan; dark-brown to black, clay soils with mottled, gleyed subsoil around the pan.	None	13.8
					Total	**590.3**

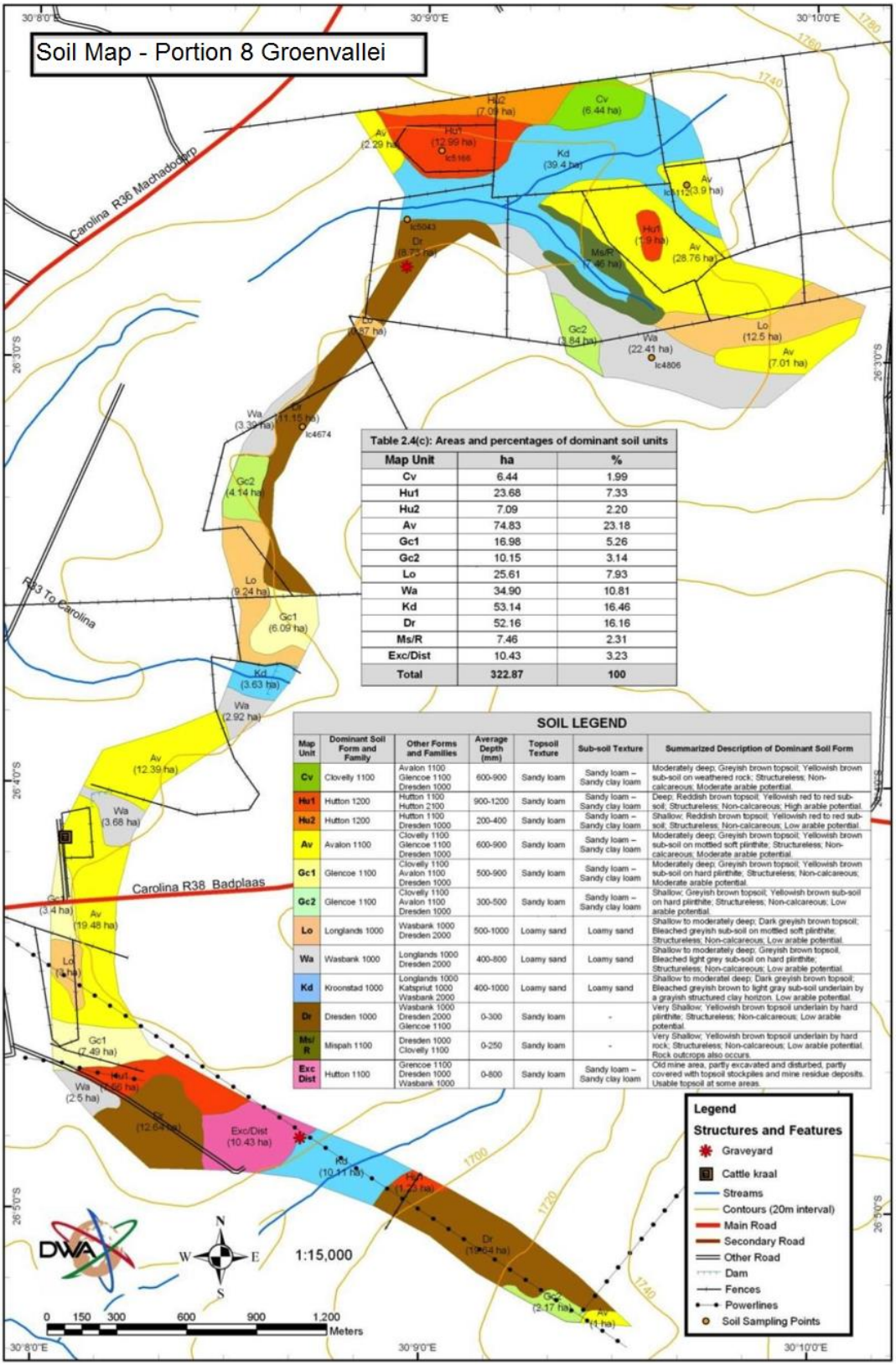


Figure 29: Affected soils located on Portions 6, 7, 8, and 17 of the farm Groenvallei 40 IT

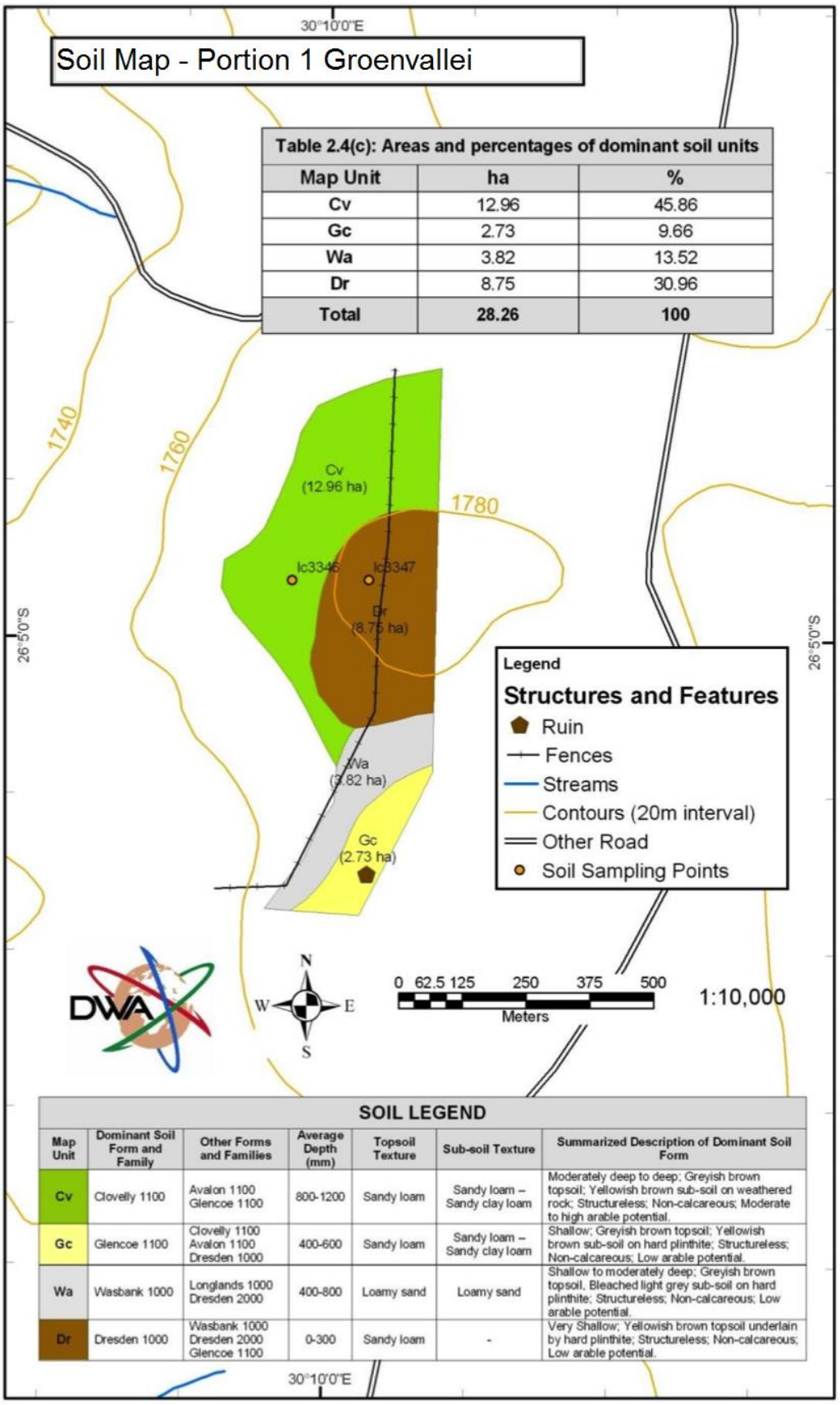


Table 2.4(c): Areas and percentages of dominant soil units

Map Unit	ha	%
Cv	12.96	45.86
Gc	2.73	9.66
Wa	3.82	13.52
Dr	8.75	30.96
Total	**28.26**	**100**

SOIL LEGEND

Map Unit	Dominant Soil Form and Family	Other Forms and Families	Average Depth (mm)	Topsoil Texture	Sub-soil Texture	Summarized Description of Dominant Soil Form
Cv	Clovelly 1100	Avalon 1100 Glencoe 1100	800-1200	Sandy loam	Sandy loam – Sandy clay loam	Moderately deep to deep; Greyish brown topsoil; Yellowish brown sub-soil on weathered rock; Structureless; Non-calcareous; Moderate to high arable potential.
Gc	Glencoe 1100	Clovelly 1100 Avalon 1100 Dresden 1000	400-600	Sandy loam	Sandy loam – Sandy clay loam	Shallow; Greyish brown topsoil; Yellowish brown sub-soil on hard plinthite; Structureless; Non-calcareous; Low arable potential.
Wa	Wasbank 1000	Longlands 1000 Dresden 2000	400-800	Loamy sand	Loamy sand	Shallow to moderately deep; Greyish brown topsoil, Bleached light grey sub-soil on hard plinthite; Structureless; Non-calcareous; Low arable potential.
Dr	Dresden 1000	Wasbank 1000 Dresden 2000 Glencoe 1100	0-300	Sandy loam	-	Very Shallow; Yellowish brown topsoil underlain by hard plinthite; Structureless; Non-calcareous; Low arable potential.

Figure 30: Affected soils located on Portion RE of Portion 1 of the farm Groenvallei 40 IT

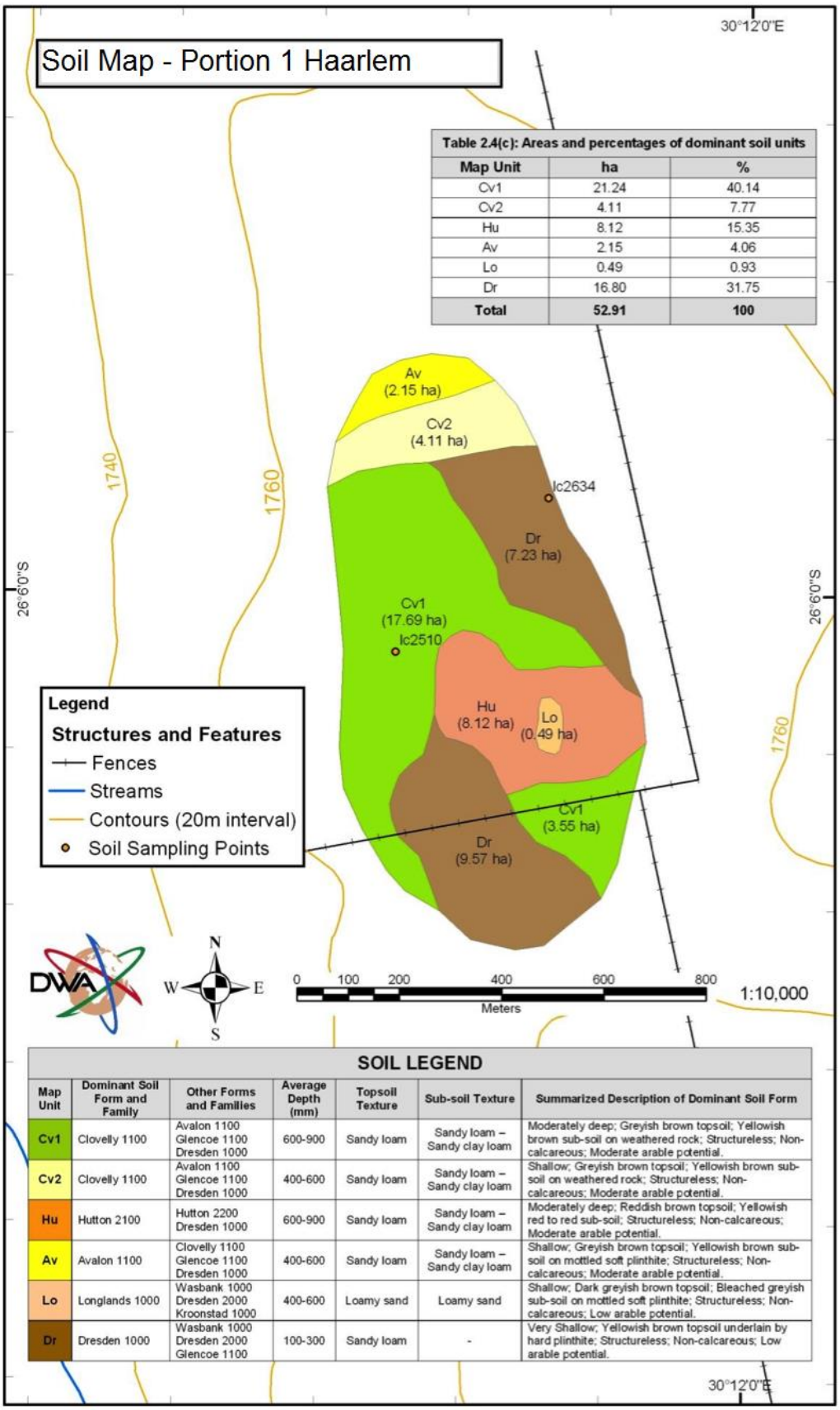
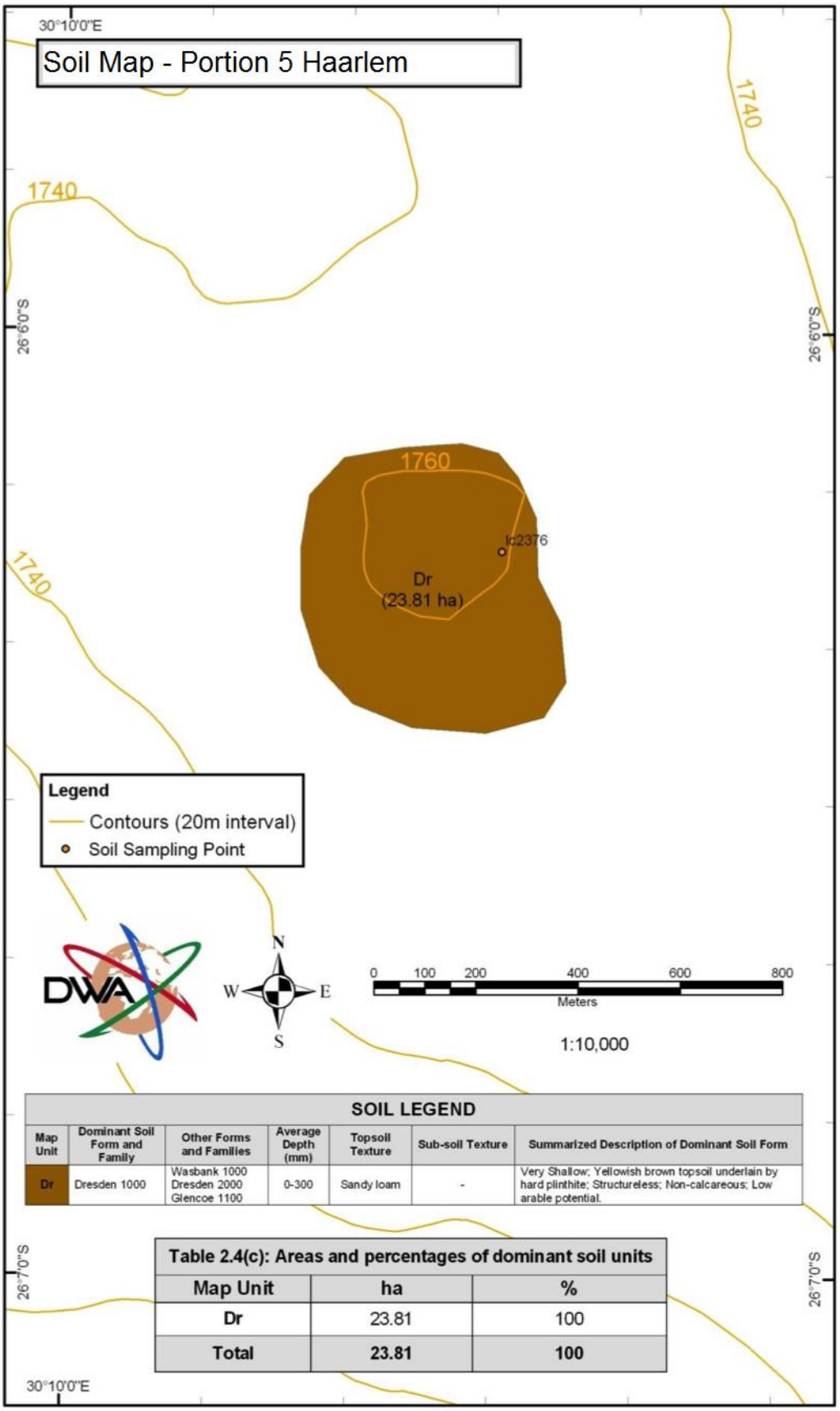


Figure 31: Affected soils located on Portions 1 and 4 of the farm Haarlem 39 IT



SOIL LEGEND

Map Unit	Dominant Soil Form and Family	Other Forms and Families	Average Depth (mm)	Topsoil Texture	Sub-soil Texture	Summarized Description of Dominant Soil Form
Dr	Dresden 1000	Wasbank 1000 Dresden 2000 Glencoe 1100	0-300	Sandy loam	-	Very Shallow; Yellowish brown topsoil underlain by hard plinthite; Structureless; Non-calcareous; Low arable potential.

Table 2.4(c): Areas and percentages of dominant soil units

Map Unit	ha	%
Dr	23.81	100
Total	**23.81**	**100**

Figure 32: Affected soils located on Portion 5 of the farm Haarlem 39 IT

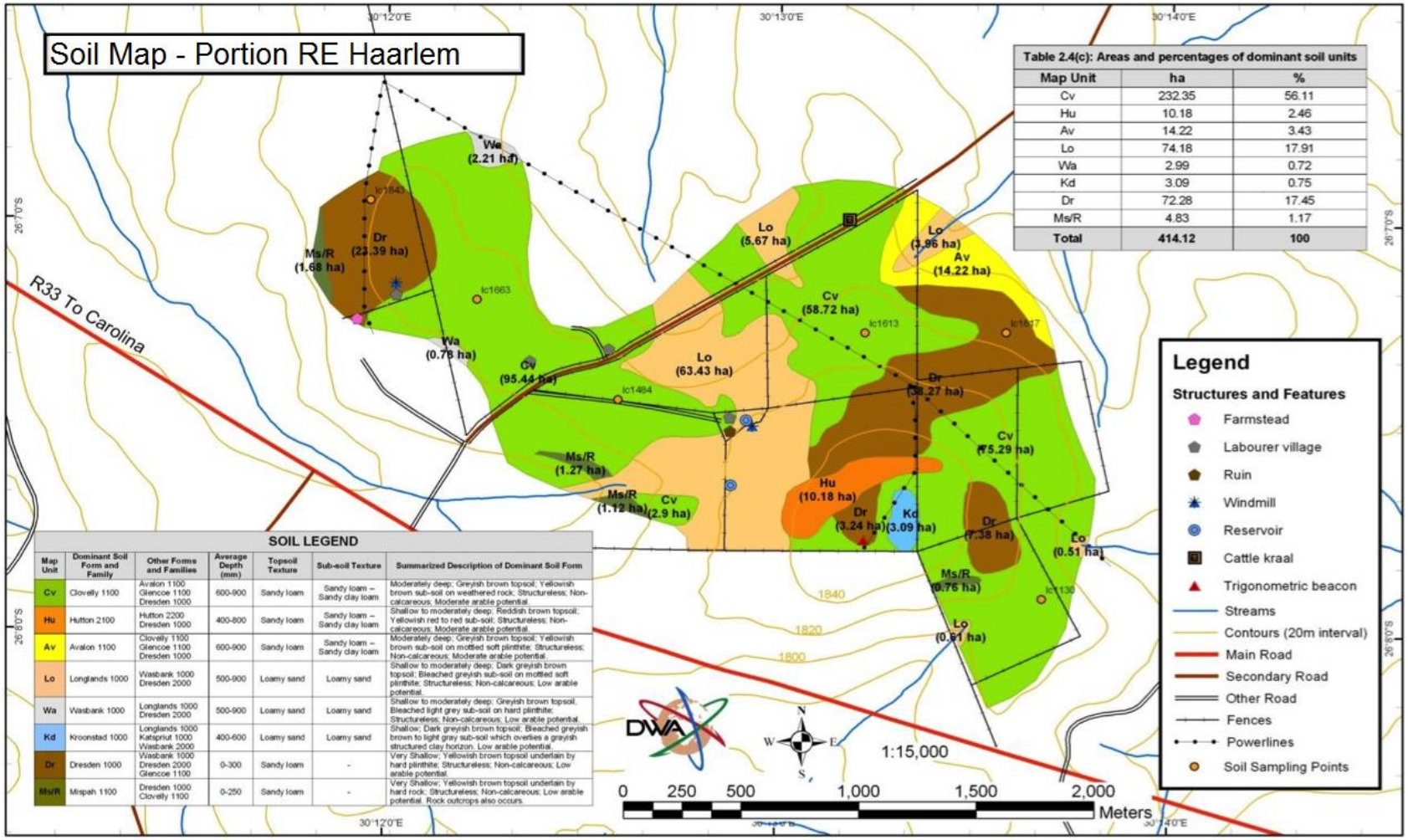


Figure 33: Affected soils located on Portions RE and 4 of the farm Haarlem 39 IT and Portions 3 and 9 of the farm Appeldoorn 38 IT

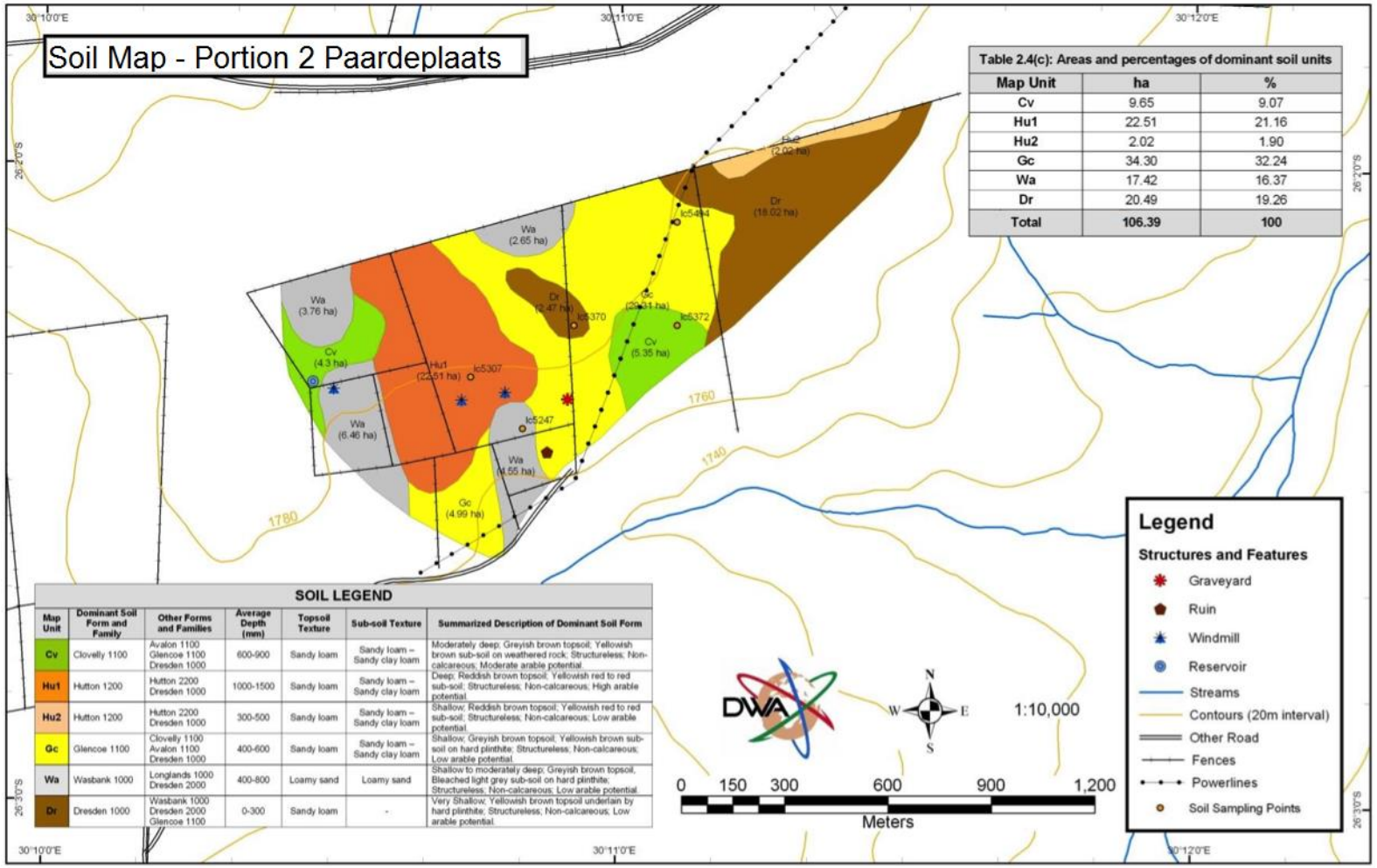


Figure 34: Affected soils located on Portions RE and 2 of the farm Paardeplaats 12 IT

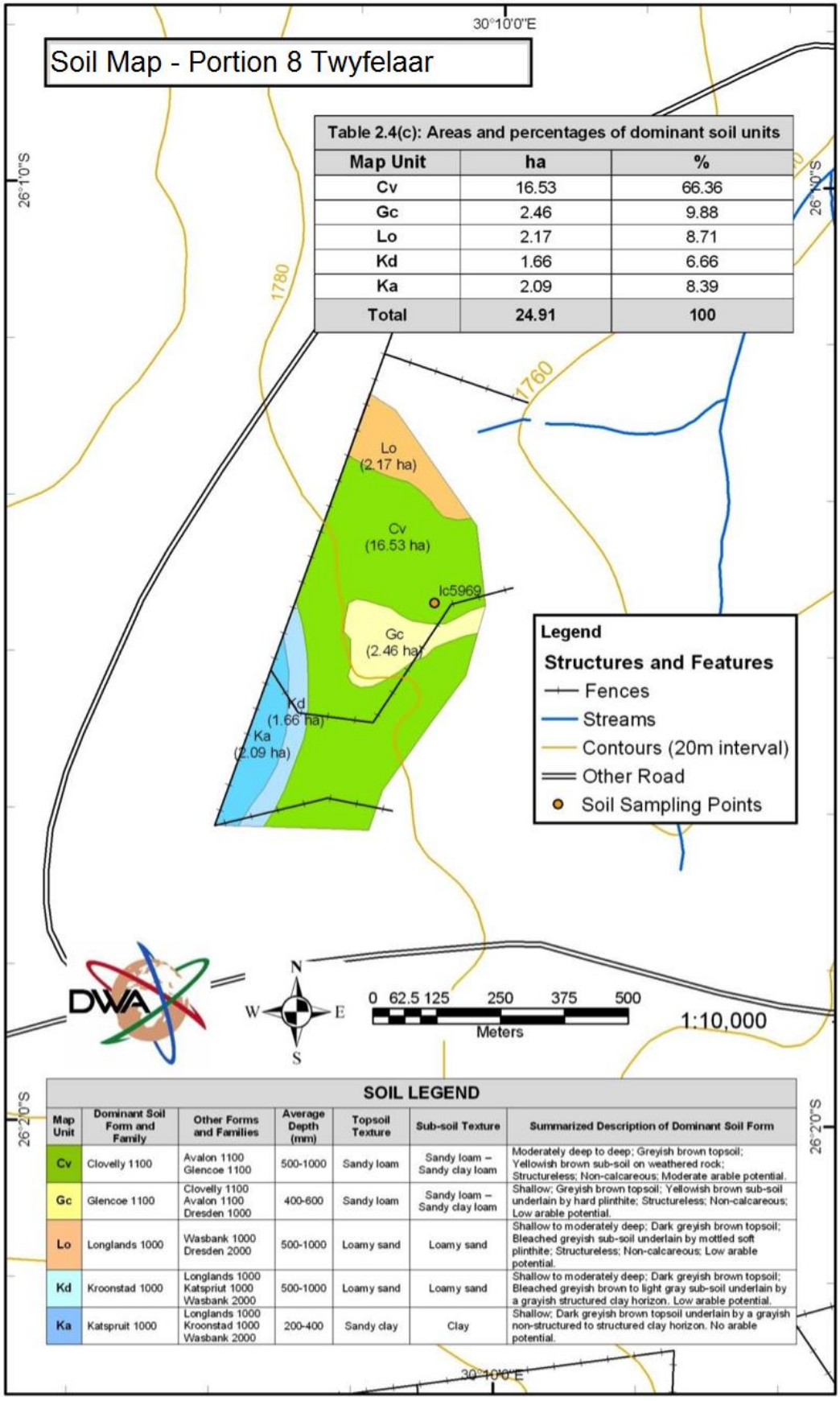


Table 2.4(c): Areas and percentages of dominant soil units

Map Unit	ha	%
Cv	16.53	66.36
Gc	2.46	9.88
Lo	2.17	8.71
Kd	1.66	6.66
Ka	2.09	8.39
Total	**24.91**	**100**

SOIL LEGEND

Map Unit	Dominant Soil Form and Family	Other Forms and Families	Average Depth (mm)	Topsoil Texture	Sub-soil Texture	Summarized Description of Dominant Soil Form
Cv	Clovelly 1100	Avalon 1100 Glencoe 1100	500-1000	Sandy loam	Sandy loam – Sandy clay loam	Moderately deep to deep; Greyish brown topsoil; Yellowish brown sub-soil on weathered rock; Structureless; Non-calcareous; Moderate arable potential.
Gc	Glencoe 1100	Clovelly 1100 Avalon 1100 Dresden 1000	400-600	Sandy loam	Sandy loam – Sandy clay loam	Shallow; Greyish brown topsoil; Yellowish brown sub-soil underlain by hard plinthite; Structureless; Non-calcareous; Low arable potential.
Lo	Longlands 1000	Wasbank 1000 Dresden 2000	500-1000	Loamy sand	Loamy sand	Shallow to moderately deep; Dark greyish brown topsoil; Bleached greyish sub-soil underlain by mottled soft plinthite; Structureless; Non-calcareous; Low arable potential.
Kd	Kroonstad 1000	Longlands 1000 Katspriut 1000 Wasbank 2000	500-1000	Loamy sand	Loamy sand	Shallow to moderately deep; Dark greyish brown topsoil; Bleached greyish brown to light gray sub-soil underlain by a grayish structured clay horizon. Low arable potential.
Ka	Katspruit 1000	Longlands 1000 Kroonstad 1000 Wasbank 2000	200-400	Sandy clay	Clay	Shallow; Dark greyish brown topsoil underlain by a grayish non-structured to structured clay horizon. No arable potential.

Figure 35: Affected soils located on Portion 8 of the farm Twyfelaar 11 IT

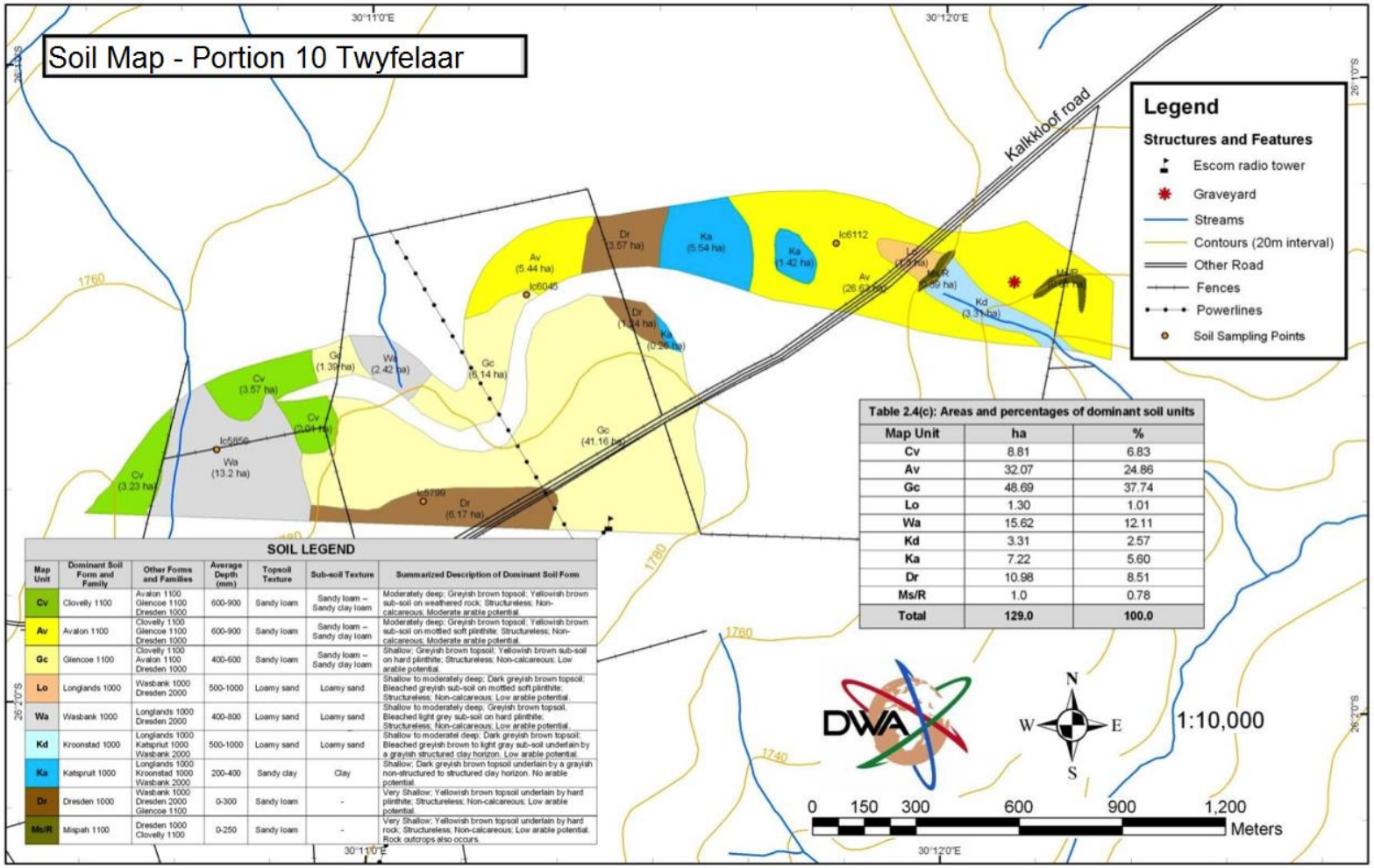


Table 2.4(c): Areas and percentages of dominant soil units

Map Unit	ha	%
Cv	8.81	6.83
Av	32.07	24.86
Gc	48.69	37.74
Lo	1.30	1.01
Wa	15.62	12.11
Kd	3.31	2.57
Ka	7.22	5.60
Dr	10.98	8.51
Ms/R	1.0	0.78
Total	**129.0**	**100.0**

SOIL LEGEND

Map Unit	Dominant Soil Form and Family	Other Forms and Families	Average Depth (mm)	Topsoil Texture	Sub-soil Texture	Summarized Description of Dominant Soil Form
Cv	Clovelly 1100	Avalon 1100 Glencoe 1100 Dresden 1000	600-900	Sandy loam	Sandy loam – Sandy clay loam	Moderately deep; Greyish brown topsoil; Yellowish brown sub-soil on weathered rock; Structureless; Non-calcareous; Moderate arable potential.
Av	Avalon 1100	Clovelly 1100 Glencoe 1100 Dresden 1000	600-900	Sandy loam	Sandy loam – Sandy clay loam	Moderately deep; Greyish brown topsoil; Yellowish brown sub-soil on mottled soft plinthite; Structureless; Non-calcareous; Moderate arable potential.
Gc	Glencoe 1100	Clovelly 1100 Avalon 1100 Dresden 1000	400-600	Sandy loam	Sandy loam – Sandy clay loam	Shallow; Greyish brown topsoil; Yellowish brown sub-soil on hard plinthite; Structureless; Non-calcareous; Low arable potential.
Lo	Longlands 1000	Wasbank 1000 Dresden 2000	500-1000	Loamy sand	Loamy sand	Shallow to moderately deep; Dark greyish brown topsoil; Bleached greyish sub-soil on mottled soft plinthite; Structureless; Non-calcareous; Low arable potential.
Wa	Wasbank 1000	Longlands 1000 Dresden 2000	400-800	Loamy sand	Loamy sand	Shallow to moderately deep; Greyish brown topsoil, Bleached light grey sub-soil on hard plinthite; Structureless; Non-calcareous; Low arable potential.
Kd	Kroonstad 1000	Longlands 1000 Katspruit 1000 Wasbank 2000	500-1000	Loamy sand	Loamy sand	Shallow to moderatel deep; Dark greyish brown topsoil; Bleached greyish brown to light gray sub-soil underlain by a grayish structured clay horizon. Low arable potential.
Ka	Katspruit 1000	Longlands 1000 Kroonstad 1000 Wasbank 2000	200-400	Sandy clay	Clay	Shallow; Dark greyish brown topsoil underlain by a grayish non-structured to structured clay horizon. No arable potential.
Dr	Dresden 1000	Wasbank 1000 Dresden 2000 Glencoe 1100	0-300	Sandy loam	-	Very Shallow; Yellowish brown topsoil underlain by hard plinthite; Structureless; Non-calcareous; Low arable potential.
Ms/R	Mispah 1100	Dresden 1000 Clovelly 1100	0-250	Sandy loam	-	Very Shallow; Yellowish brown topsoil underlain by hard rock; Structureless; Non-calcareous; Low arable potential. Rock outcrops also occurs.

Figure 36: Affected soils located on Portions 9 and 10 of the farm Twyfelaar 11 IT

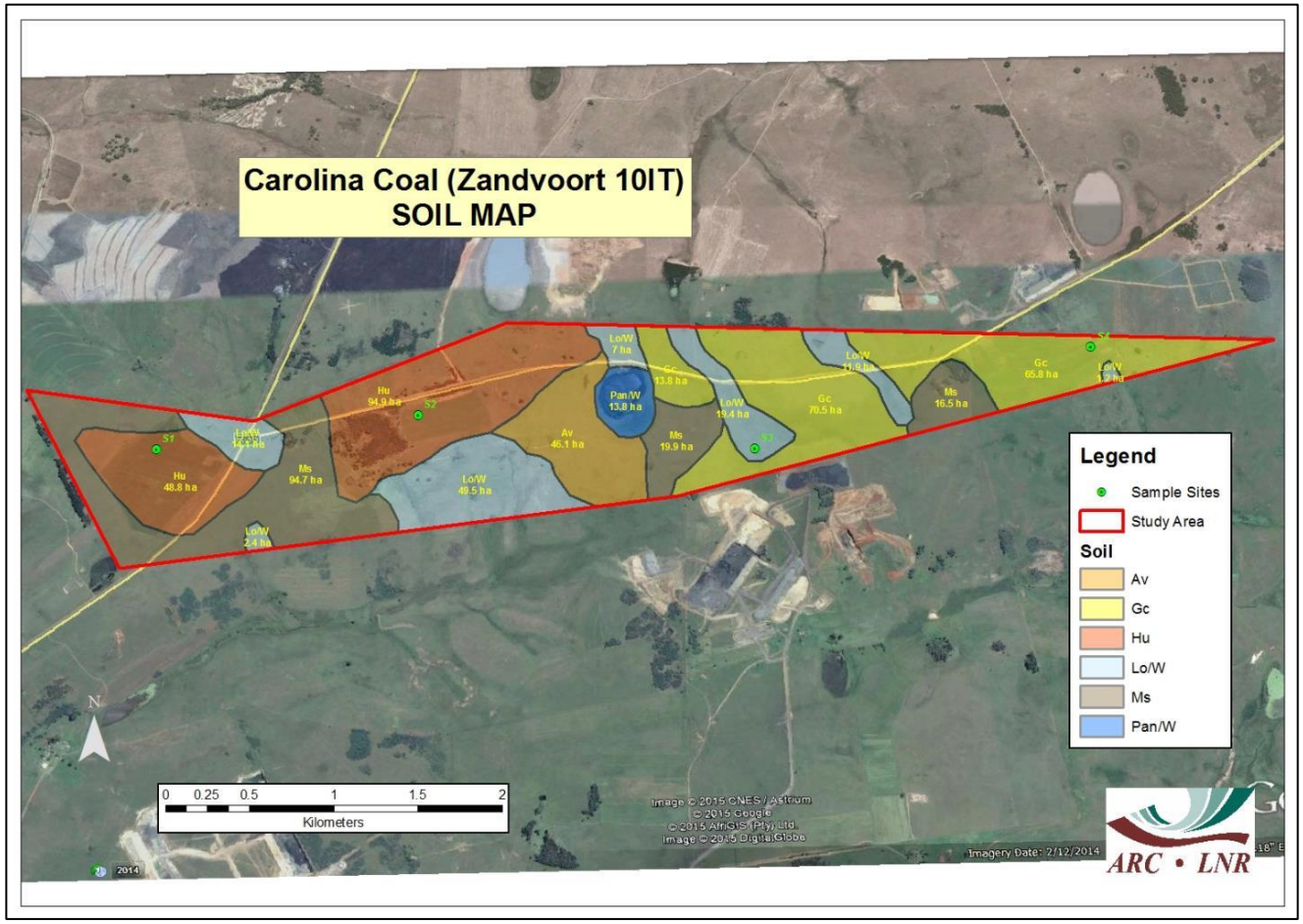


Figure 37: Soils located on Portions RE and 1 of the farm Zandvoort 10 IT

5.4.2.5 LAND CAPABILITY

Land capability was investigated as part of the soil studies in 2005. Land capability was assessed according to the definitions of the Chamber of Mines of South Africa, 1981. (Guidelines for the rehabilitation of disturbed land by surface coal mining in South Africa. Johannesburg). The soil units were classified in terms of four land capability classes: arable land, grazing land, wetlands and wilderness land. The area and percentage of each land capability class was assessed and individually discussed for each soil area evaluated. Additionally, Zandvoort was assessed during 2015 for the S102 application.

During the 2004 study, the land capability within the proposed mining area was determined to consist predominantly of areas with arable and grazing potential. Several areas of the land capability class weland were identified. Due to the widespread cultivated land within the study area, the wilderness land capability class was considered to be limited.

The baseline land capability of Zandvoort, as defined by the relevant guidelines (Coaltech, 2007), identifies most of the soils as falling into the arable class, due to their favourable depth, texture and natural drainage (see Figure 42). The Hu map unit, being somewhat deeper, will have a slightly higher arable capability than either the Gc or Av map unit. The Ms map unit, due to its severely restricted depth to a hard layer, is unsuited for cultivation, so that the land capability class is grazing. The Lo/W unit consists of soils in the land capability class of wetland, due to the position in the landscape, which causes gleyed subsoil material with signs of wetness to occur. The Pan/W unit has surface standing water due to almost continuous wetness.

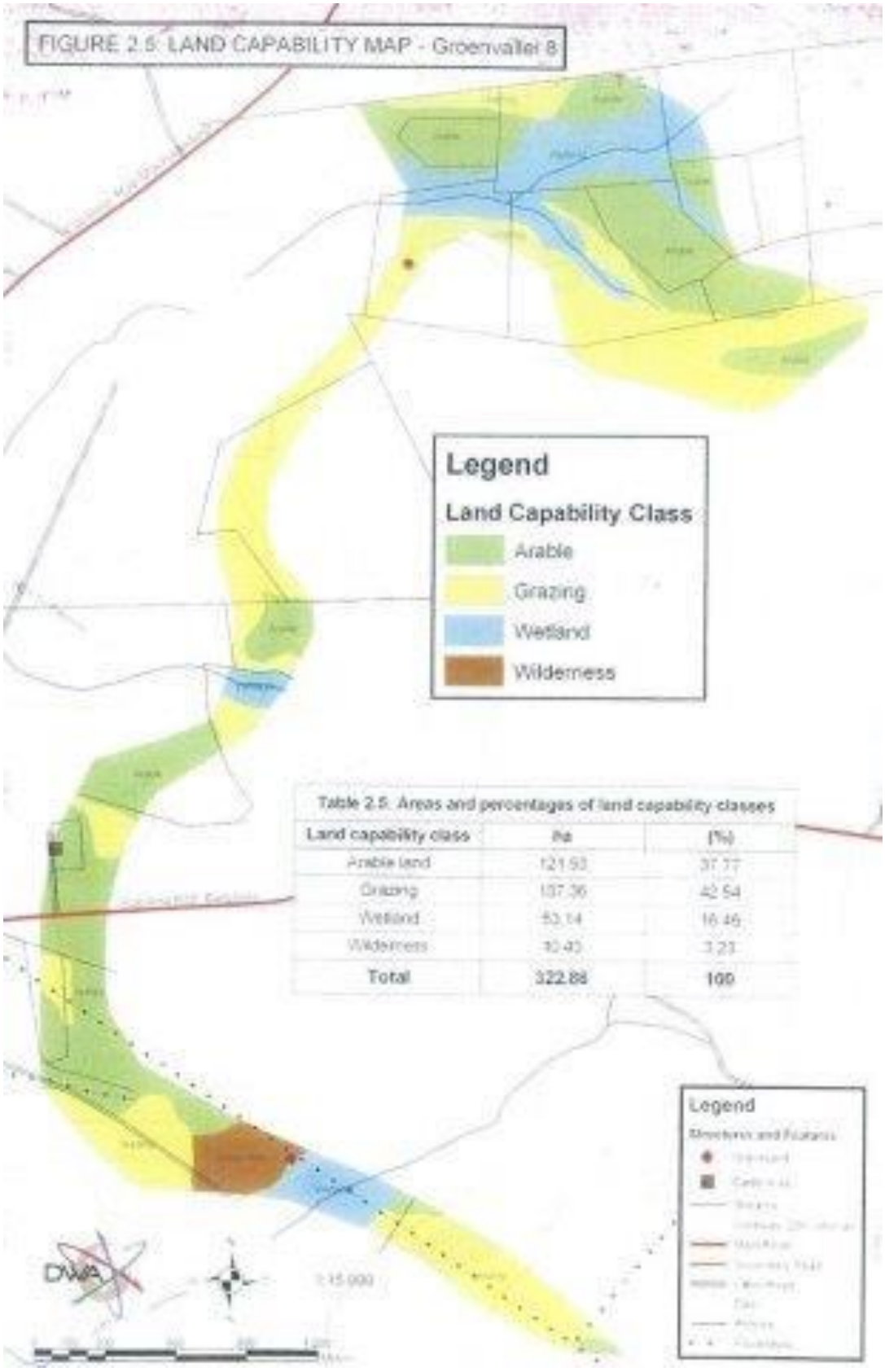


Figure 38: Land capability for Groenvallei 40IT

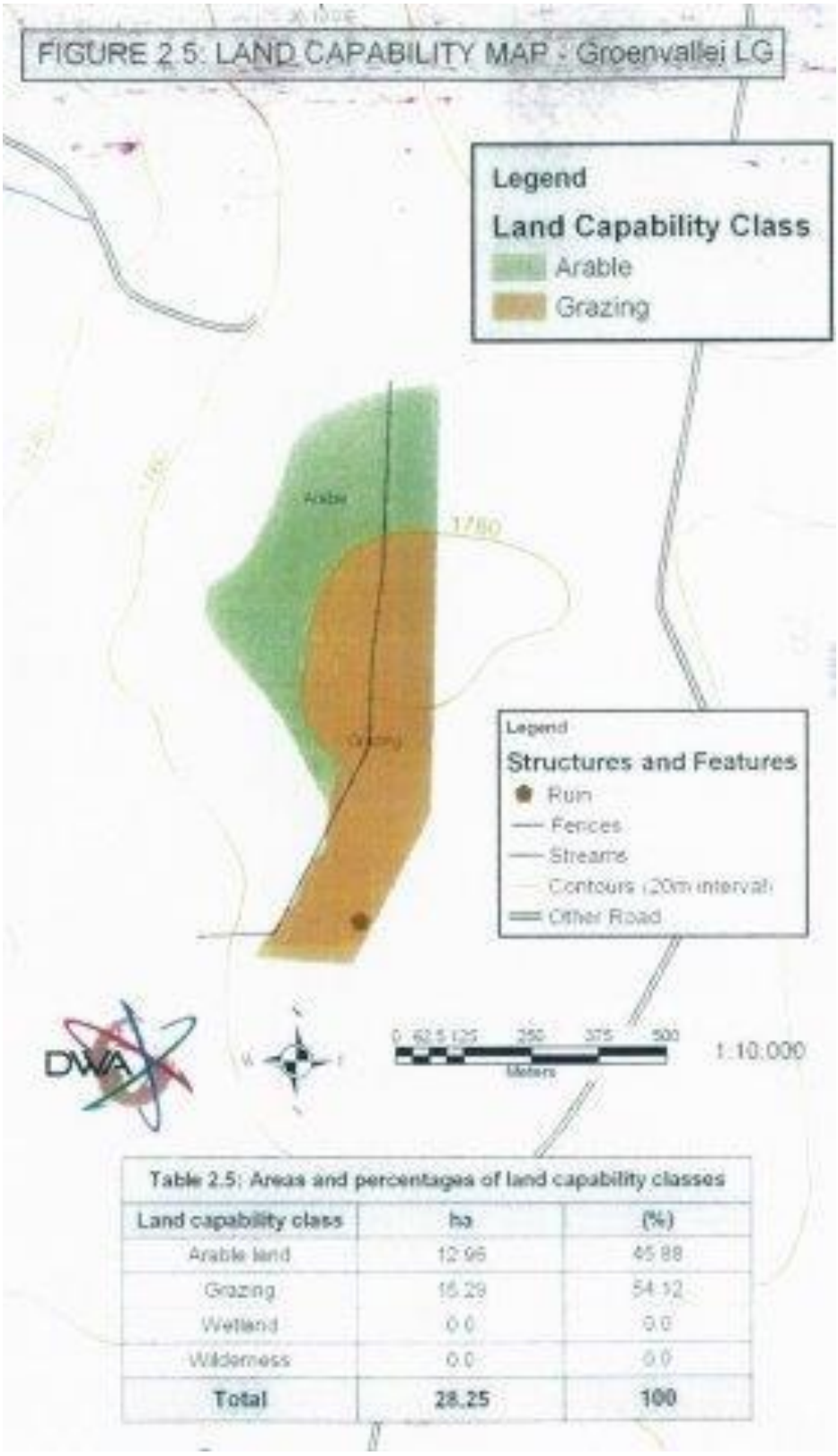


Table 2.5: Areas and percentages of land capability classes

Land capability class	ha	(%)
Arable land	12.96	45.88
Grazing	15.29	54.12
Wetland	0.0	0.0
Wilderness	0.0	0.0
Total	**28.25**	**100**

Figure 39: Land capability indicated on Groenvallei

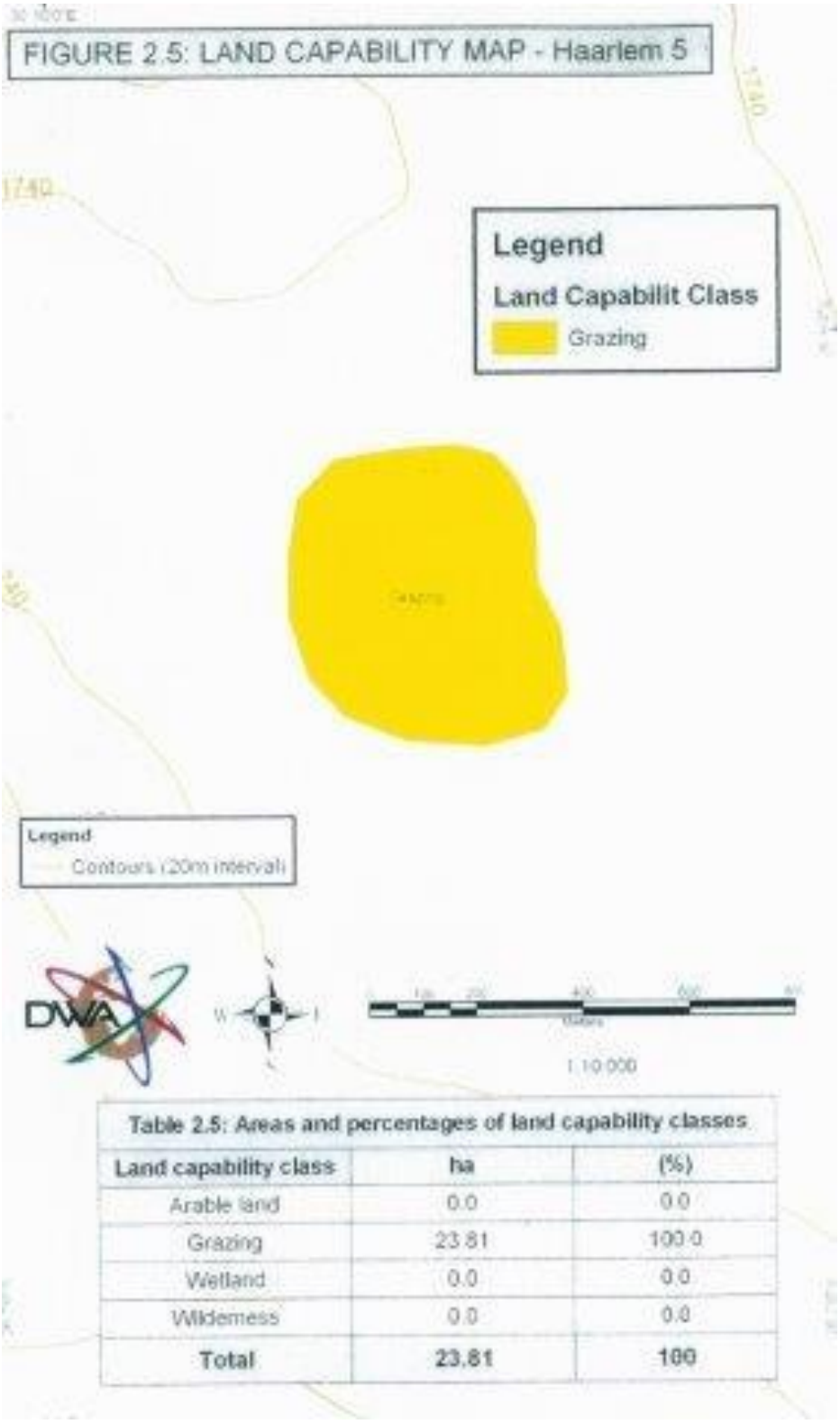


Table 2.5: Areas and percentages of land capability classes

Land capability class	ha	(%)
Arable land	0.0	0.0
Grazing	23.81	100.0
Wetland	0.0	0.0
Wilderness	0.0	0.0
Total	**23.81**	**100**

Figure 40: Land capability indicated on Haarlem

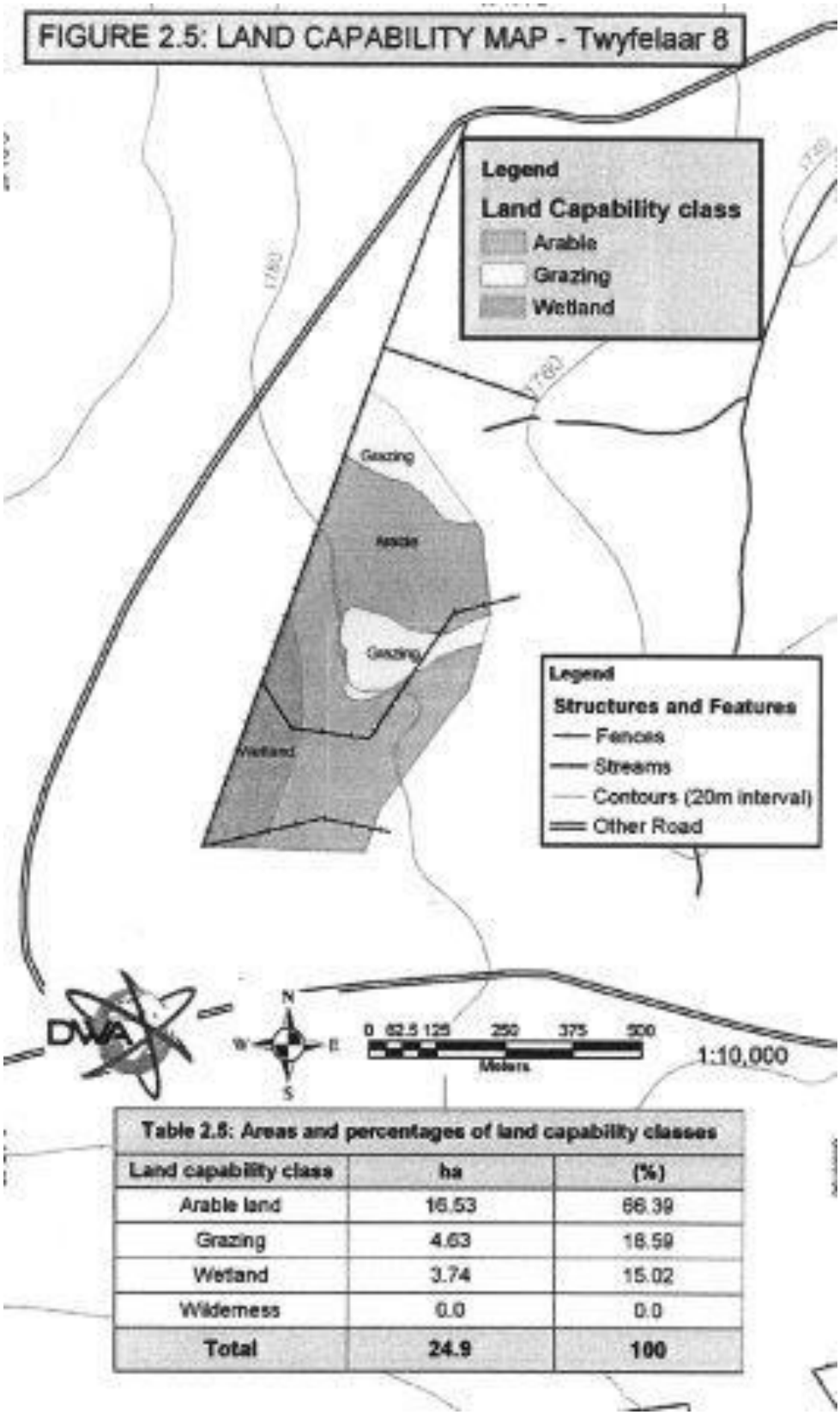


Table 2.5: Areas and percentages of land capability classes

Land capability class	ha	(%)
Arable land	16.53	66.39
Grazing	4.63	18.59
Wetland	3.74	15.02
Wilderness	0.0	0.0
Total	**24.9**	**100**

Figure 41: Land capability indicated on Twyfelaar

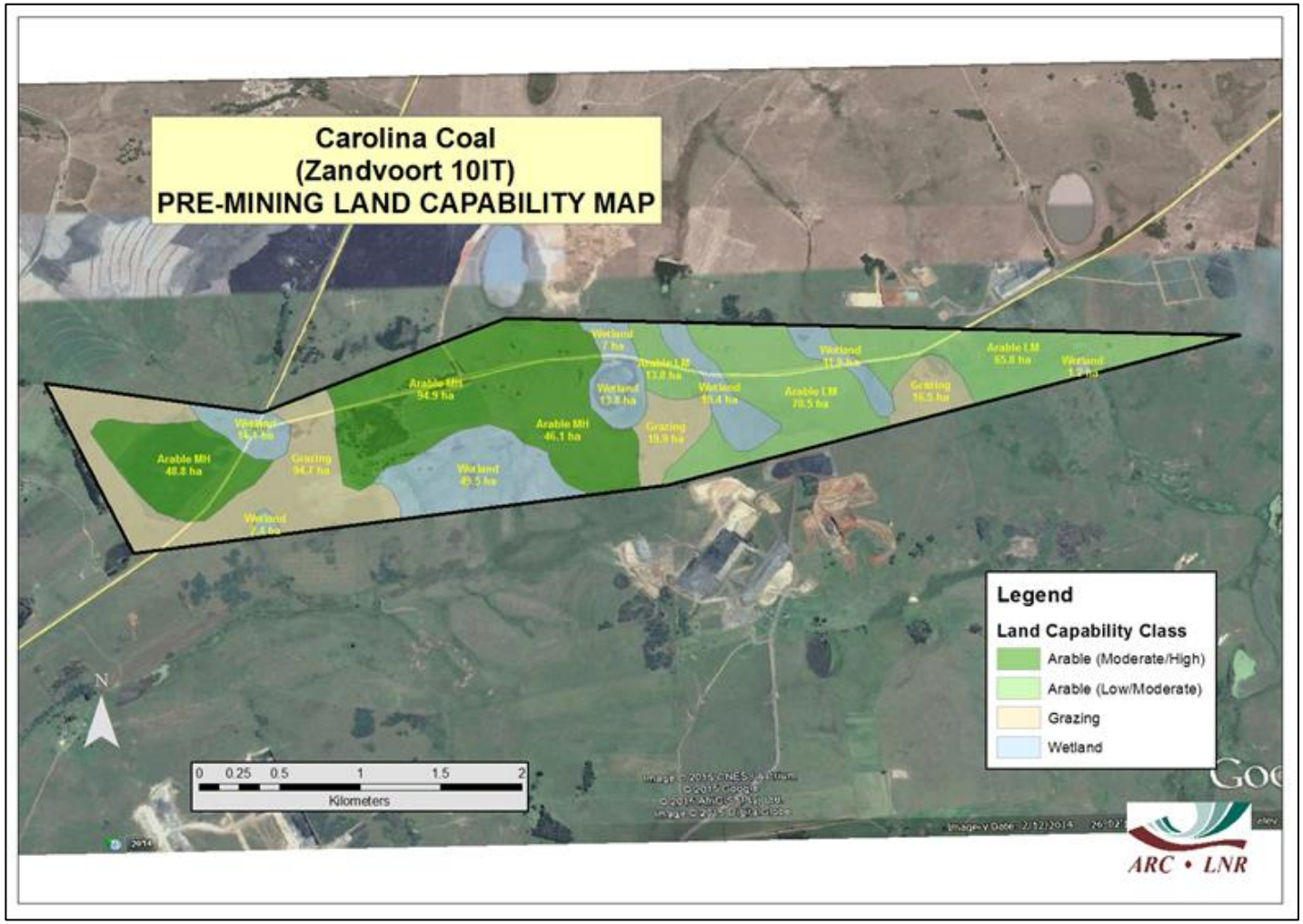


Figure 42: Zandvoort pre-mining land capability

5.4.2.6 LAND USE

The current land use of the Pembani Colliery is mining however a land use evaluation was undertaken in 2005, for the mining right EMPR. Additionally, for the S102 application, a land use assessment was undertaken in 2015 for Zandvoort. The observations from both of these are summarised in Table 26 below and is indicated in Figure 43 to Figure 46 below.

Table 26: Mining Right Land use per area

Area	Current Land Use	ha	(%)
Portions 6, 7, 8, and 17 of Groenvallei 40 IT	Maize	14.5	4.49
	Dry beans	11.52	3.57
	Pastures	24.85	7.7
	Grazing	260.29	80.62
	Fallow land	7.55	2.34
	Informal settlement	4.14	1.28
Portion RE of Portion 1 of Groenvallei 40 IT	Grazing	28.25	100
Portions 1 and 4 of Haarlem 39 IT	Grazing	43.24	81.72
	Pastures	9.67	18.28
Portions RE and 4 of Haarlem 39 IT and Portions 3 and 9 of Appeldoorn 38 IT	Grazing	411.29	99.32
	Pastures	2.81	0.68
Portion 5 of Haarlem 39 IT	Grazing	23.81	100
Portions RE and 2 of Paardeplaats 12 IT	Maize	16.65	15.65
	Pastures	4.75	4.46
	Grazing	82.3	77.36
	Fallow land	2.69	2.53
Portion 8 of Twyfelaar 11 IT	Grazing	11.95	47.99
	Pastures	12.95	52.01
Portions 9 and 10 of Twyfelaar 11 IT	Grazing	129	100
Portions RE and 1 of Zandvoort 10 IT	Arable	339.9	57.64
	Grazing	131.1	22.23
	Wetland	118.7	20.13
	Total	**1 639**	**(%)**

The predominant pre-mining land use of the above areas consisted of unimproved grassland for grazing with some small areas of cultivation. According to the 2015 study, the prevailing agricultural potential of most of the Zandvoort area is moderate to high, defined mainly by the available soil depth. The majority of the soils in the area have an average effective soil depth of less than 900 mm, which is generally adequate for most crops. Where subsurface restrictions, such as rock or hard plinthite, gleyed waterlogged clay or a water table, are present at shallow depth (generally less than 500 mm from the surface), then the arable agricultural potential will be significantly restricted.

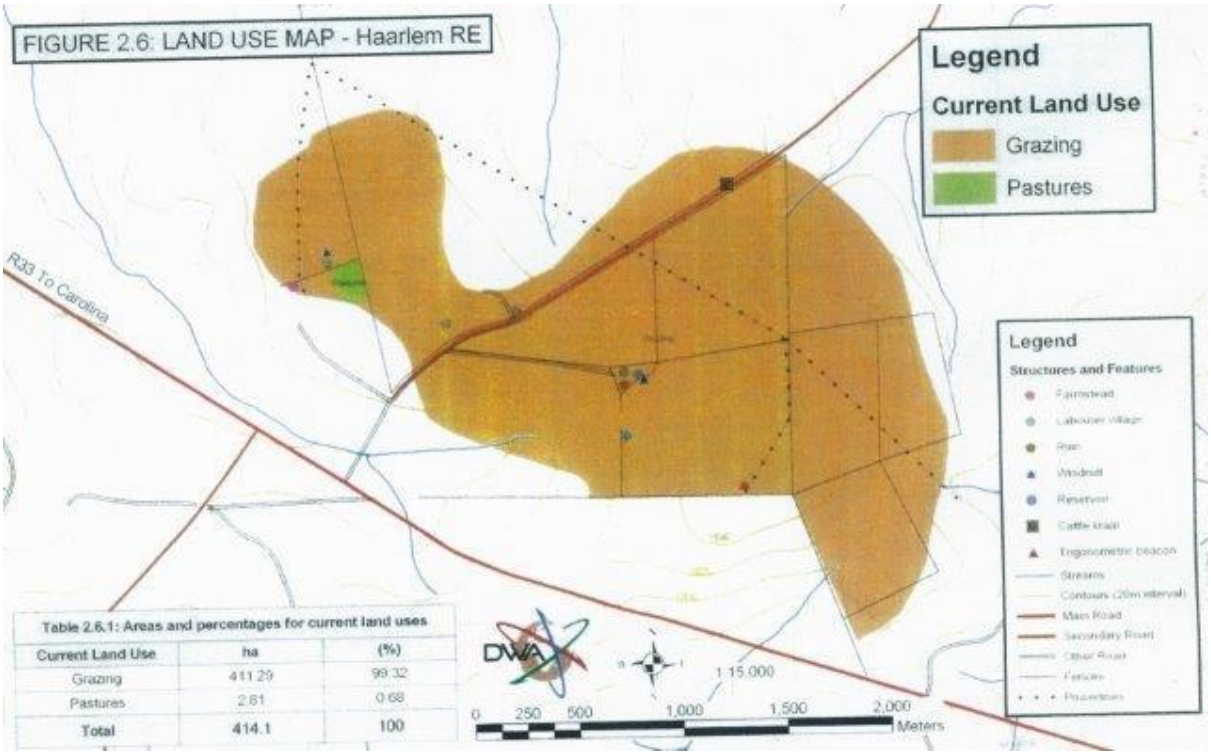


Figure 43: Land use for Haarlem 39IT

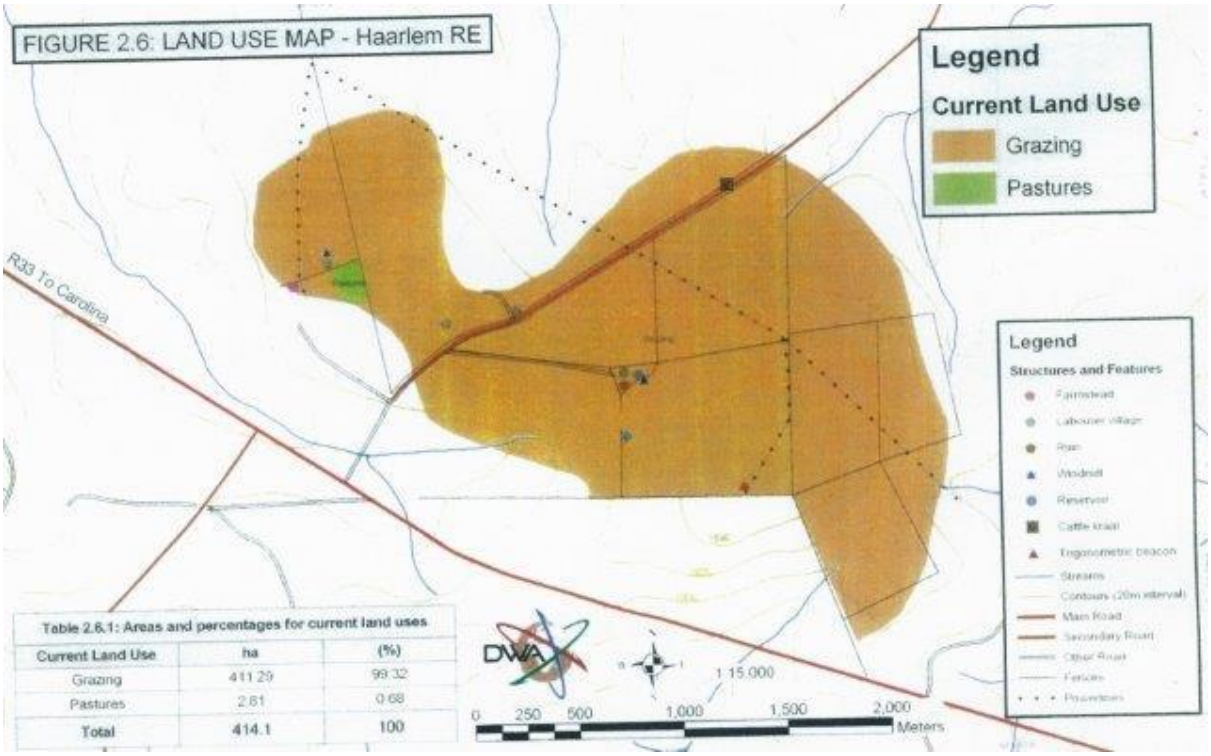


Figure 44: Land use on Haarlem Re

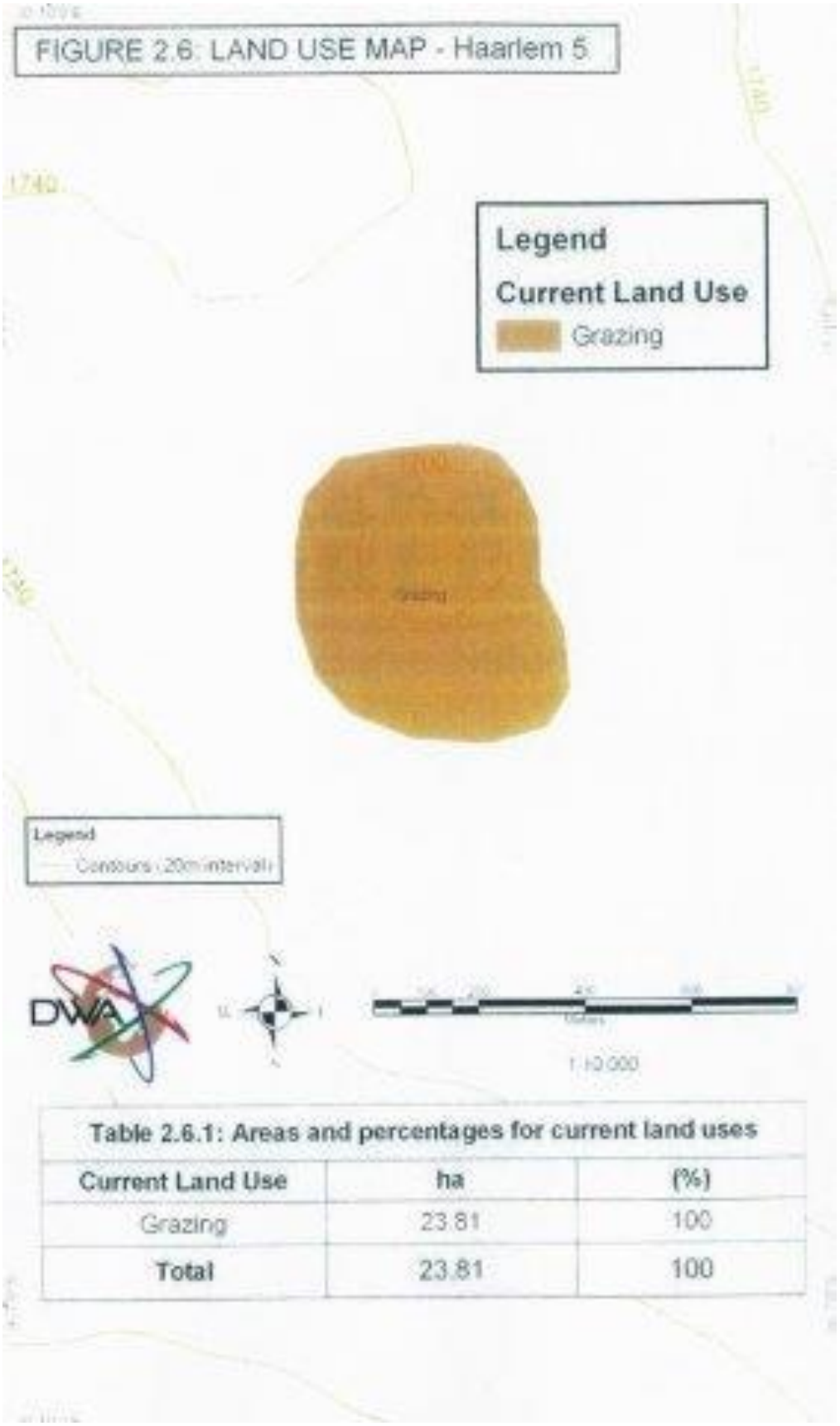


Table 2.6.1: Areas and percentages for current land uses		
Current Land Use	**ha**	**(%)**
Grazing	23.81	100
Total	23.81	100

Figure 45: Land use on Haarlem

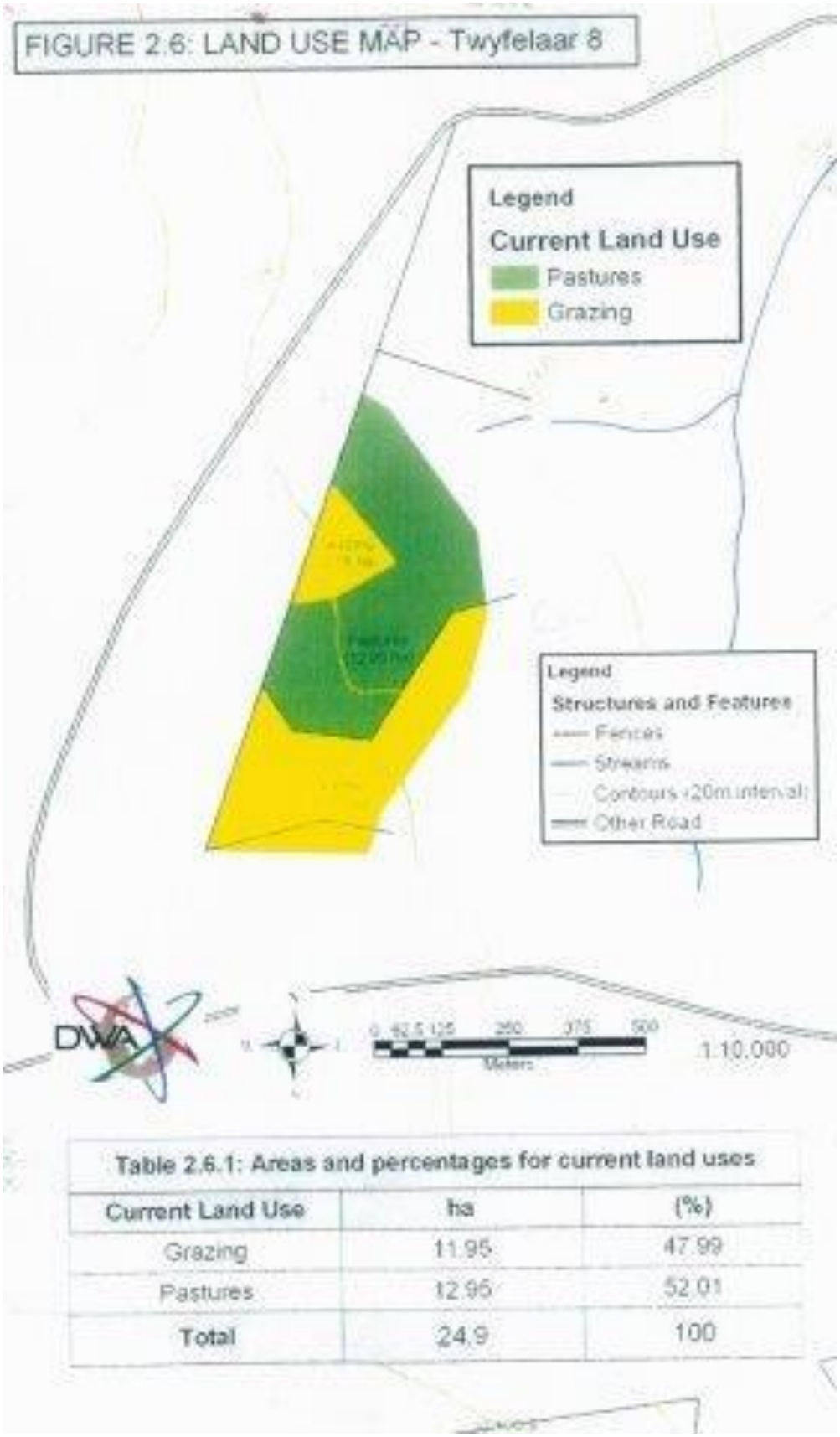


Table 2.6.1: Areas and percentages for current land uses

Current Land Use	ha	(%)
Grazing	11.95	47.99
Pastures	12.95	52.01
Total	24.9	100

Figure 46: Land use on Twyfelaar

5.4.2.7 FLORA

According to the ecology study undertaken in 2004 the mining right area is classified as a Grassland Biome and can be divided into three vegetation units namely (Figure 47):

- The Eastern Highveld Grassland vegetation unit;
- Eastern Temperate Freshwater wetlands (not visible on map); and
- KaNgwane Montane Grassland.

According to the draft National list of threatened ecosystems all three of the vegetation units are listed as vulnerable (Government Gazette No. 32689, 2009). Eastern Highveld Grassland occurs in the Gauteng and Mpumalanga Provinces and is by far the most dominant vegetation unit within the mining right. The species composition of this grassland unit comprises highveld grasses such as *Themeda triandra* (Red Grass), *Aristida congesta, Digitaria* species as well as *Tristachya leucothrix* and *T. rehmanni* (Mucina & Rutherford, 2006). The landscape usually includes undulating plains that support short, dense grassland, scattered rocky outcrops with sour grasses and tree species such as *Acacia caffra* (Sweet Thorn), *Celtis africana* (White Stinkwood) and *Diospyros lycioides subsp. lycioides* (Blue Bush). Only a small portion of Eastern Highveld Grassland is conserved in statutory reserves like the Nooitgedacht Dam or in private reserves. Almost half of this vegetation type has been transformed by cultivation, plantation, mining and the building of dams and it is therefore classified as an Endangered vegetation type (Mucina & Rutherford, 2006). Eastern Temperate Freshwater wetlands also form an important component within the mining right and are found around various types of waterbodies and sources embedded within the grassland biome. The waterbodies support zoned systems of aquatic and hygrophilous vegetation of temporarily flooded grasslands and ephemeral herblands. Important species within this unit include: *Cyperus congestus, Agrostis lachnantha, Carex acutiformis, Eleocharis palustris, Eragrostis plana, Fuirena pubescens, Helictotrichon turgidulum, Hamarthria altissima, Imperata cylindrical, Leersia hexandra, Paspalum dilatum, P. urvillei, Pennisetum thunbergii, Schoenoplectus sphacelata, Centella asiatica, Ranunculus multifidus, Phragmites australis, Schoenoplectus corymbosus, Typha capensis, Rorippa fluviatilis, Disa zuluensis, Nerine platypetala and Crassula tuberella*. KaNgwane Montane Grassland situated in the northern section of the mining right area contains several biogeographically important and endemic taxa (Mucina & Rutherford, 2006).

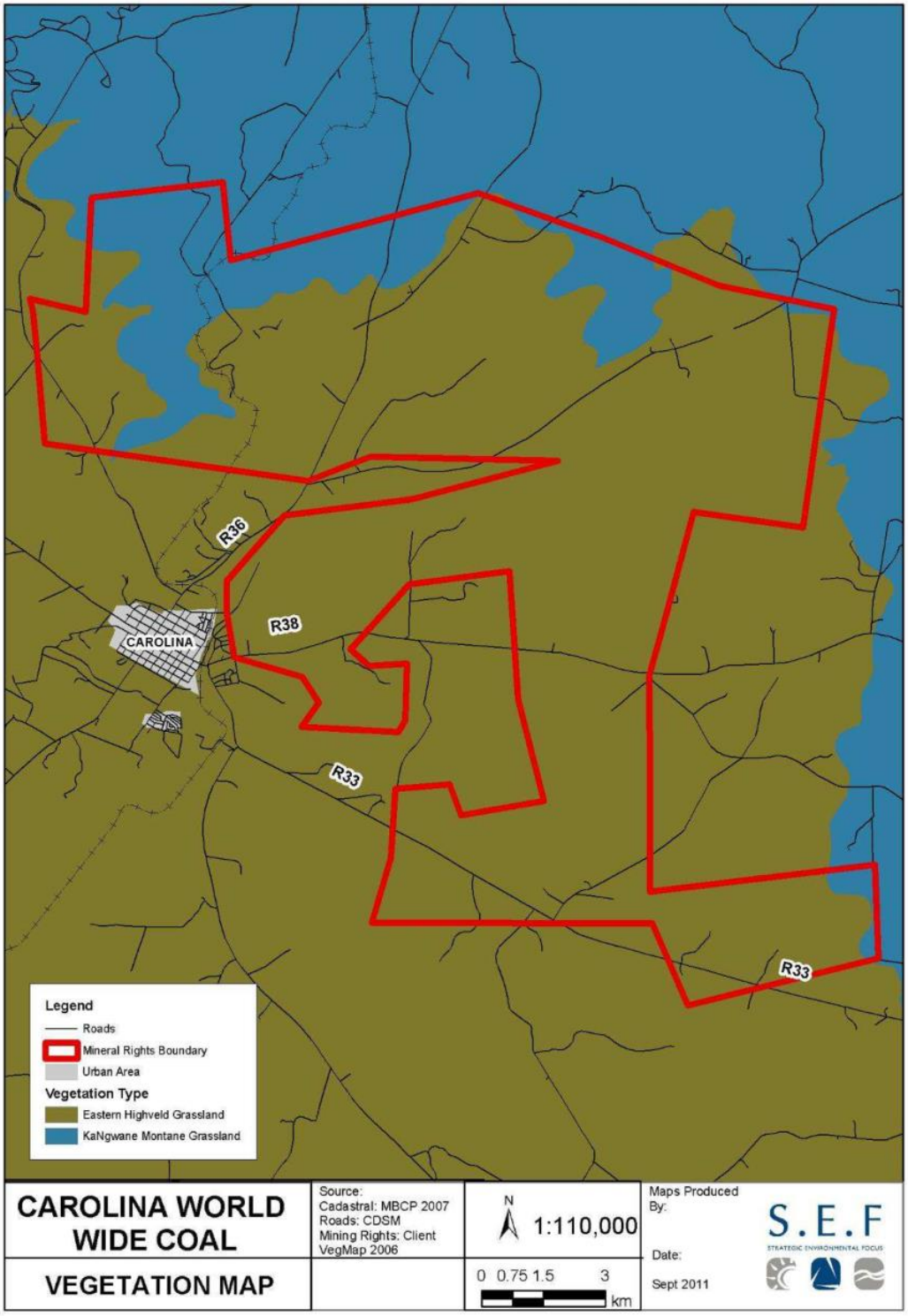


Figure 47: Vegetation units within the Pembani Colliery

The area that was surveyed in 2004 consists of a mosaic of cultivated fields, old fields, pastures and areas of natural vegetation. The majority of the surface is dedicated to agricultural practices. Due to the presence of pans wetland vegetation was also found at certain sites. The natural vegetation consists mainly of short, open grassland dominated by various grass species and some herbs. There are some sites where wattle trees have developed into small bushclumps. Separate dense stands of *Eucalyptus camaldulensis* / *Eucalyptus grandis* and

Populus sp. are also present at certain sites. During the survey 294 plant species were recorded. This included 45 tree, shrub and shrublet species, 71 grass species and 177 herb species. Thirty-two exotic and / or invader species, four Red data plants and 104 plants that have medicinal, cultural or magical uses were recorded. Four species recorded have Red Data Status: *Nemesia fruticans*, *Eucomis autumnalis* (subsp.) *clavata*, *Lobelia erinus* and *Urginea modesta*. Many different plant communities were identified at the site of the proposed mining activities.

The 2015 ecology study for Zandvoort identified one broad vegetation unit occurring within the study area, namely Eastern Highveld Grassland, as indicated in Figure 48 below. This vegetation type is classified in the scientific literature as Endangered and is listed in the National List of Ecosystems that are Threatened and in need of Protection as Vulnerable.

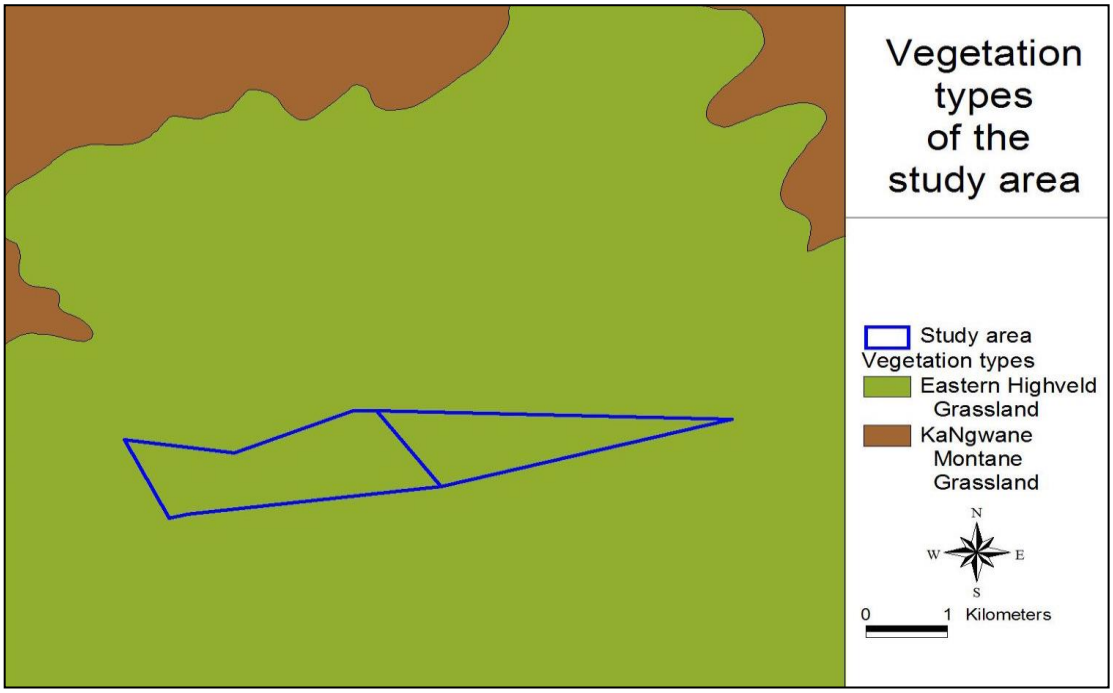


Figure 48: Zandvoort vegetation unit

The 2017 Biodiversity Study conducted for Kwaggafontein also identified the one broad vegetation unit occurring within the study area, namely Eastern Highveld Grassland, as indicated in Figure 49 below.

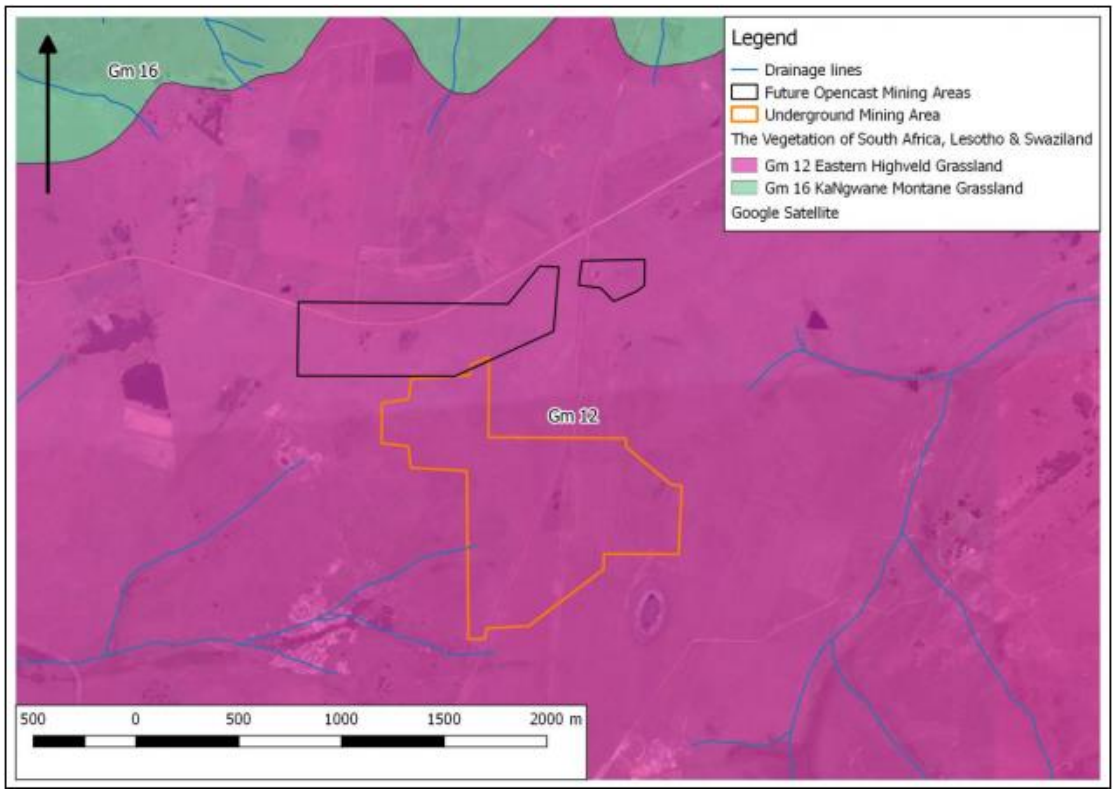


Figure 49: Vegetation type indicated for Kwaggafontein

Plant species of conservation concern that have a probability of occurring on the Zandvoort site and are, therefore, of concern for development of this site are as follows: *Alepidea longeciliata* (EN), *Boophone disticha* (Declining), *Callilepis leptophylla* (Declining), *Crinum bulbispermum* (Declining) and *Crinum macowanii* (Declining). There is suitable habitat for these species on site within untransformed terrestrial vegetation. There is, therefore, a moderate to high probability that they will be directly affected by the proposed project. There are no protected tree species that occur in the study area and which could occur in the types of habitats that are available on site. Additionally to the above species, plant species of concern that have a probability of occurring on the Kwaggafontein site are as follows: *Asclepias dissona N.E.Br* (Vulnerable) *Khadia carolinensis L. Bolus* (Vulnerable) and *Callilepis leptophylla Harv* (Declining).

A detailed habitat map of the Zandvoort site was compiled (refer to Figure 50 below). This shows that the site has more natural than disturbed habitat and that the natural habitat consists primarily of grasslands and various wetlands. There is also a rocky ridge that runs through the site. The floristic survey was undertaken at the incorrect time of the year to properly characterise species composition, but initial indications are that there is a diversity of floristic communities on site and that these potentially harbour high species richness.

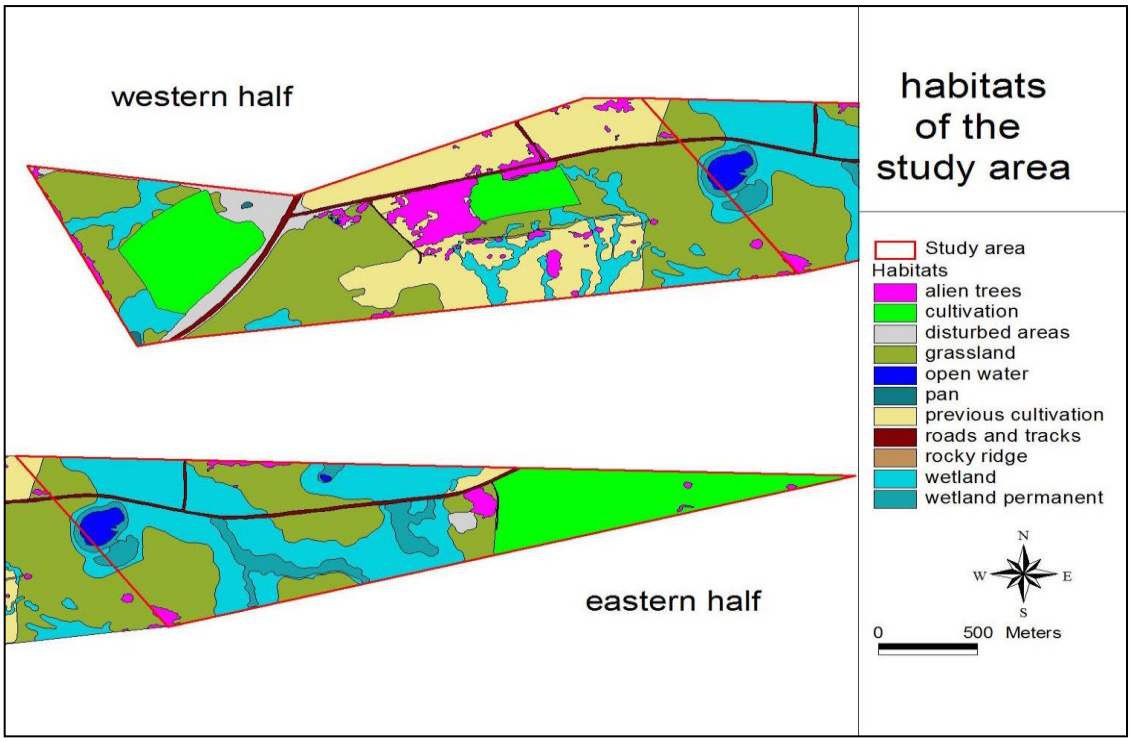


Figure 50: Zandvoort habitats

According to the Mpumalanga Biodiversity Conservation Plan (MBCP), remaining areas of natural vegetation on site are classified as Highly Significant or No natural habitat remaining. This is the third highest biodiversity value attributed to any areas, according to this conservation plan. Protected areas are afforded the highest conservation status, followed by Irreplaceable areas, which are considered to be the highest priority for conservation. Areas classified as Highly Significant either have high intrinsic biodiversity value or are the next priority for conservation. This indicates that remaining areas of natural vegetation on site are considered to be of moderately high to high conservation value.

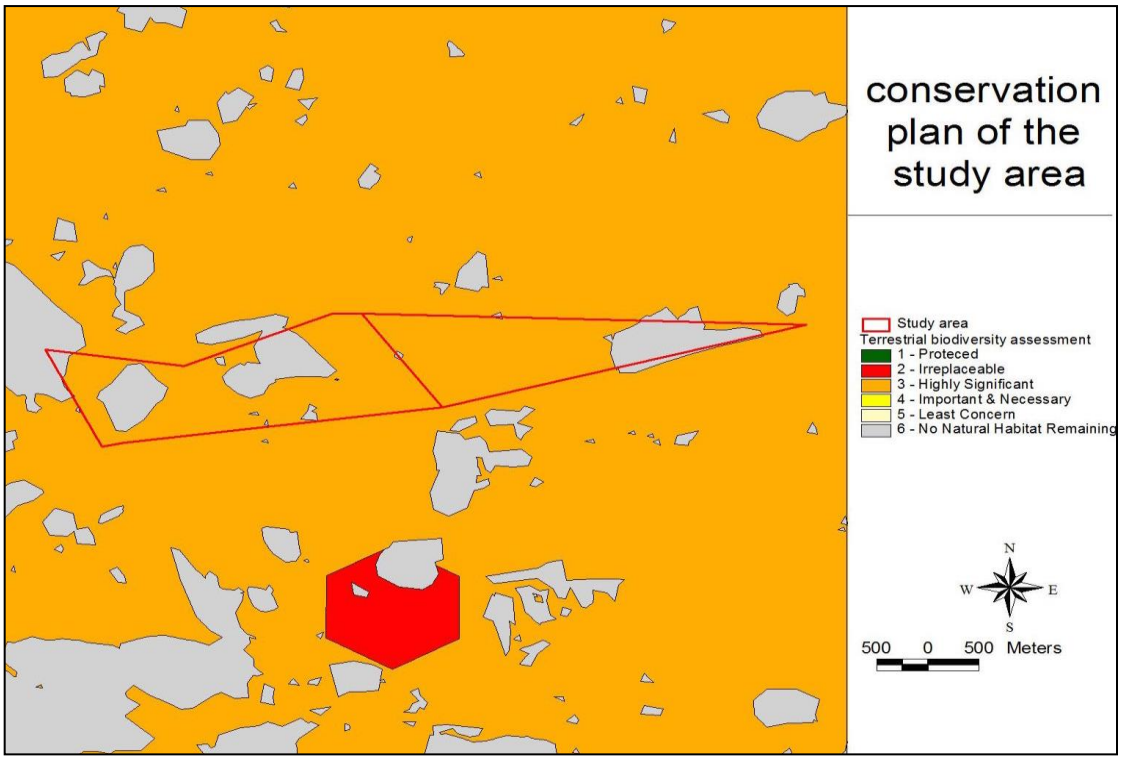


Figure 51: MBCP of Zandvoort

According to the recently compiled Mpumalanga Biodiversity Sector Plan (MBSP) the Zandvoort site contains areas within two main categories, namely Modified Areas and Critical Biodiversity Areas. The Critical Biodiversity Areas are all remaining natural areas on site, except for the central pan and a small part of the surrounding area that are mapped as Other natural areas and Ecological Support Areas respectively. This classification in the Mpumalanga Biodiversity Sector Plan indicates that all remaining areas of natural habitat on site are considered to have high biodiversity value and are critical for meeting conservation targets within the Province.

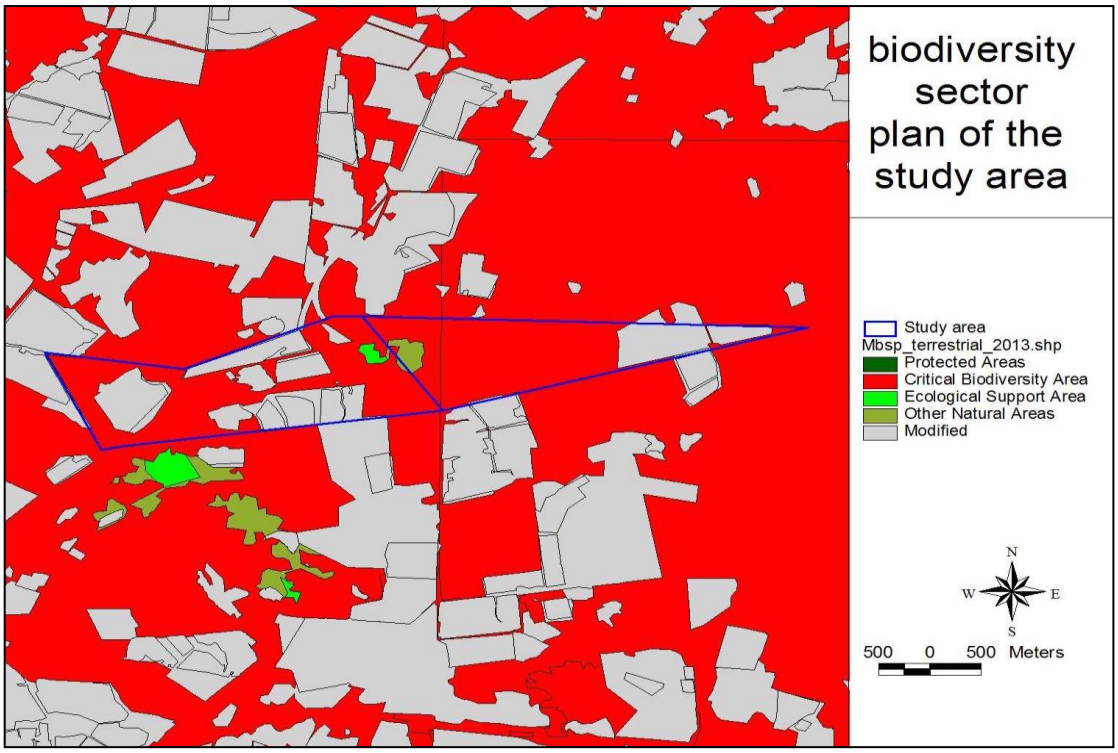


Figure 52: Mpumalanga Biodiversity Sector Plan of Zandvoort

There are sensitive biodiversity receptors within the study area, however none of these will be negatively impacted by the Zandvoort project. This is due to the fact that there will be no surface disturbance of the site (only underground mining to be undertaken). No further studies are recommended.

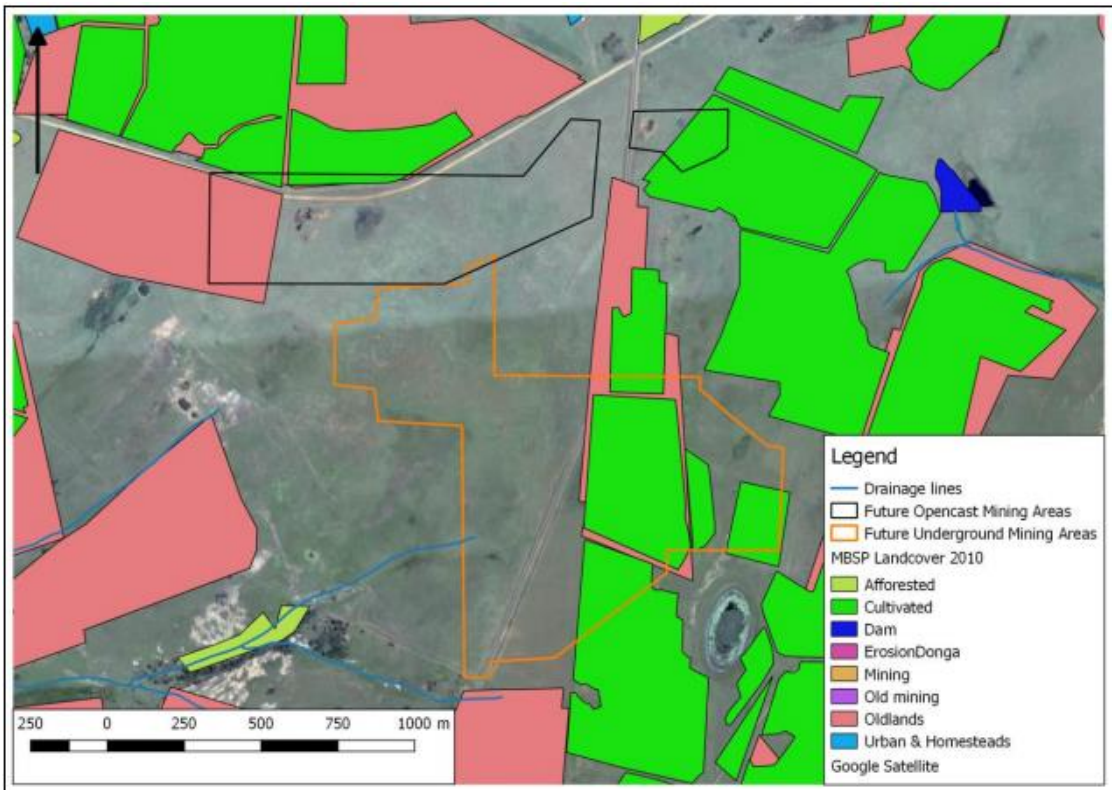


Figure 53: Kwaggafontein Project ares superimposed on the MBSP land cover map

Based on the MBSP land cover map (refer to Figure 53 above), the opencast mining area of Kwaggafontein overlaps with natural areas, old lands and culitivated fields, while the underground mining area overlaps with natural areas, cultivated field and old lands.The Mpumalanga Biodiversity Sector Plan for the entire Pembani Colliery mining right area is indicated in Figure 54 below.

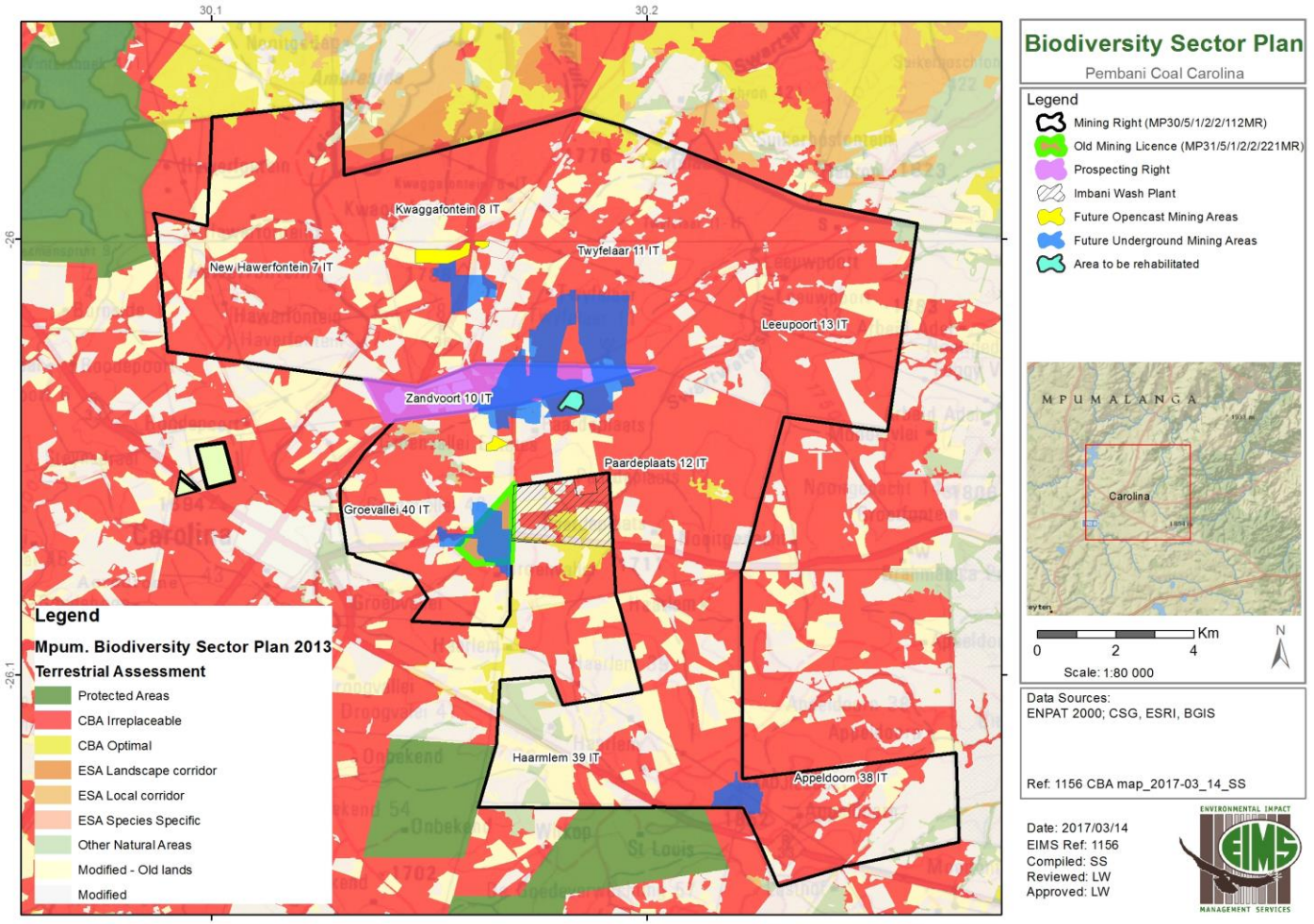


Figure 54: Biodiversity Sector Plan for Pembani Colliery

5.4.2.8 FAUNA

A desktop study and on site animal survey were undertaken in 2004 (Appendix J1) to ascertain what species of animals (mammals, birds, reptiles and amphibians) could potentially occur at the proposed Pembani Colliery and in the surrounding area. In this study the potential for each species to occur at the site and in the surrounding areas was based primarily on distribution maps. Habitat preferences were taken into account to a degree, but certain animals may use this site primarily as a thoroughfare, in which case the habitat does not have to be ideal.

The desktop study for mammals revealed that a total 125 different mammal species can possibly be present in the proposed areas of development. These 125 species of mammals represent 25 species from the Order Artiodactyla, 25 species from the Carnivora, 18 species of bats (Chiroptera), 15 species from Insectivora, five species of primates (Primata), four species of the order Lagomorpha and 29 rodents (Rodentia) could potentially occur in the region of the proposed mining development. Four other species, representing four separate orders, could also occur in this region.

Of these mammals 24 are rare and endangered (Friedmann & Daly, 2004; Hoare, 2015). The Rough-haired Golden Mole is critically endangered and the Oribi, Tsessebe, Samango Monkey and Whitetailed Rat are endangered. It is, however, unlikely that the Samango Monkey will occur at this site as it does not support any suitable habitat. Fifteen Red Data species are near threatened and include many bat species such as Geoffrey's Horseshoe Bat, Darling's Horseshoe Bat, Lesser Long-fingered Bat, Schreiber's Long-fingered Bat, Temminck's Hairy Bat, Welwitsch's Hairy Bat and Lander's Horseshoe Bat. The potential for these bat species to occur at this site will depend largely on the availability of roosting sites. The other near threatened species are the Brown Hyaena, Serval, Side-striped Jackal, Honey Badger, Spotted-necked Otter, South African Hedgehog, Highveld Golden Mole and the Water Rat. The vulnerable species include the Black Rhinoceros, Maquassie Musk Shrew and the Pangolin. The Black Rhinoceros is a browser which predominantly consumes the leaves of members of the *Acacia* genus and is generally found where dense stand of these occur. It is therefore assumed that this species will not occur at the site.

A species list of bird species that can possibly be present within the entire area (Grid 2630AA) was drawn up from the Roberts' Multimedia of Birds of Southern Africa (2003). Potentially 361 species of birds could occur in the region of the proposed area of development within Grid 2630AA (Roberts, 2003).

There are 42 species of snakes, 22 species of lizards, a single species of tortoise and single species of terrapin that could potentially occur in the proposed area of development.

A desktop study of frogs that can possibly be present within the proposed area was done in order to list all frogs that can possibly be present within the area. A total of 21 species of frog could possibly be present in the proposed area of development and it surroundings (Carruthers, 2001).

A total of 6 different mammal species, 69 different bird species, three different reptile species, which represents one snake and two skinks, nine frog species and 35 different species of insects, of which 6 are different butterfly species, were recorded during the survey. No red data animal species, except for one bird species namely the blue Korhaan, were recorded during the animal survey.

In order to compile a list of bird species that could potentially occur at the site and in the surrounding areas Robert's Multimedia of Birds (2003) was consulted. A list of all birds officially recorded for grid 2630AA (in which the site is situated) was extracted. This list shows that 361 species of birds could occur in this grid. The actual occurrence of many of these species will depend on the availability of suitable habitat. Thirty-eight of these 361 birds have Red Data status. Four are critically endangered: the Eurasian Bittern, Wattled Crane, Rudd's Lark and the White-winged Flufftail. There is both open water and water covered by wetland vegetation so the occurrence of these species is not unlikely, based on habitat availability and distribution maps. The Botha's Lark is endangered and the other 33 species are near threatened or vulnerable, including the blue Korhaan, which was one of the 69 different bird species sighted during the animal survey.

There are 42 species of snakes, 22 species of lizards, one species of tortoise and one species of terrapin that could potentially occur in the area. During the desktop study, it was found that of the reptiles that could potentially occur here two snake species have Red Data status: the Southern African Python (vulnerable) and the Aurora House Snake (rare). A desktop study revealed that 21 species of frog could potentially be present in the area. Of these the Giant Bull Frog is listed as threatened in the Red Data Book. No Red Data species were observed during the animal survey.

The field survey was conducted in March and April 2004. Environmental conditions were not ideal for insects and butterfly sampling due to the rainy conditions. All mammals seen by the specialists from Digby Wells during the field survey were recorded. Interviews were also held with some of the farmers and all species seen by these farmers were also recorded.

Eight mammal species were recorded during the field survey. None of these have Red Data status. Burrows and holes of small mammals, which could belong to mice, rats, or suricates, to name a few, were abundant in the old fields and in the areas of natural vegetation. Individual suricates, mongoose, duikers (abundant) and steenbok were observed. Evidence of porcupine was also observed during the survey.

Sixty-nine bird species were observed and identified. Most of these birds were observed in close proximity to the pans and streams, natural vegetation, pastures and old fields. Not many were seen in the areas supporting crops. The Blue Korhaan (*Eupodotis caerulescens*), which has Red Data status, was seen during the survey.

One snake was encountered during the field survey. This was probably a Green Water Snake (*Philothamnus sp*.) but this could not be confirmed due to the quick disappearance of this snake

into the grass near a small pan. Two skink species, the Spotted Skink (*Trachylepis punctatissima*) and the Variable Skink (*Trachylepis varia*) were also observed during the survey. No other reptiles were observed or recorded during the survey. No Red Data status reptiles were found during the animal surveys.

The terrestrial macroinvetebrate sampling yielded quite good results. A total number of 258 individuals of 7 different orders, 15 different families and 35 different species were recorded. Six of the 258 individuals were different butterfly species. A total of 8 individual spiders belonging to the same genus and species were recorded and only one tick was recorded during the animal survey.

An additional faunal assessment was undertaken for Zandvoort during 2015 (Appendix J2). The findings of this study were based on a desktop assessment, mapping from aerial imagery, and a field survey. The key habitats identified for faunal species on Zandvoort are grassland and wetland.

A total of 100 mammal species have a geographical distribution that includes the general study area in which the site is found. Of the species currently listed as threatened or protected, the following are considered to have a medium to high probability of occurring on site, based on habitat suitability: Honey Badger, Highveld Golden Mole, South African Hedgehog and Temminck's Ground Pangolin. The site is not considered to be important for the protection of any of these species. No mammal species are likely to be significantly negatively impacted by development on site.

A total of 19 frog species have a geographical distribution that includes the general study area in which the site is found. Of the frog species that could potentially occur in the study area, none have been listed in a threat category. There are, therefore, no frog species of conservation concern that could be negatively impacted by development on site.

A total of 64 reptile species have a geographical distribution that includes the general study area in which the site is found. Of the reptile species that have a geographical distribution that includes the study area, the Striped Harlequin Snake, Yellow-bellied House Snake, African Rock Python and Breyer's Long-tailed Seps have been listed in a threat category. The African Rock Python is considered unlikely to occur on site due to the absence of suitable habitat. The other three species could potentially occur in the grassland of the study area, but the chances of finding any of these species is slim, even if they occur there. There are, therefore, three reptile species of conservation concern that could potentially occur in the study area.

A total of 352 bird species have a geographical distribution that includes the general study area in which the site is found. A number of the bird species with a geographical distribution that includes the site have been listed in the Eskom Red Data Book of the Birds of South Africa, Lesotho and Swaziland. These are the African Marsh Harrier, Barrow's Korhaan, Blackbellied Bustard, Blackwinged Lapwing, Blackwinged Pratincole, Blue Crane, Blue Korhaan, Corn Crake, African Grass Owl, Grey-crowned Crane, Lanner Falcon, Lesser Kestrel, Pallid Harrier,

Secretarybird, Southern Bald Ibis, Denham's (Stanley's) Bustard and the Yellowbreasted Pipit. It is concluded that the site contains habitat that is suitable for various bird species, many of which are of conservation concern. It is possible that some of these species are likely to be significantly negatively impacted by development of mining on site. Two species of concern were seen on site, namely the Southern Bald Ibis and the Secretarybird.

The site is not within an Important Bird Area (IBA), but there are three IBAs within relatively close proximity to the site, namely the Steenkampsberg IBA, 20 km to the north of the site, the Chrissie Pans IBA, 20 km to the south of the site, and the Amersfoort-Bethal-Carolina District IBA, 8 km to the south-east of the site. The general region is therefore probably important with respect to bird biodiversity.

The Amersfoort-Bethal-Carolina District IBA is the one that most closely matches the study area in terms of physical attributes and consists of a combination of grasslands, streams, pans, rocky slopes, gulleys and ravines. This site holds a large proportion of the global population of Botha's Lark (*Spizocorys fringillaris*). The grassland areas also hold Denham's Bustard (*Neotis denhami*), White-bellied Bustard (*Eupodotis senegalensis*), Buff-streaked Chat (*Saxicola bifasciata*), Sentinel Rock Thrush (*Monticola explorator*) and Southern Bald Ibis (*Geronticus calvus*). The Lesser Kestrel (*Falco naumanni*), Black-winged Pratincole (*Glareola nordmanni*) and (less frequently) Pallid Harrier (*Circus macrourus*) can be seen quartering the grasslands. Occasionally, all of South Africa's crane species can be found in the grasslands or cropfields within the site (BirdLife International 2015).

The main threats to birds and their habitats in this IBA have been identified and include agriculture, alien species invasions, habitat transformation, pollution, residential and commercial development and utilities.

There are sensitive biodiversity receptors within the study area, however none of these will be negatively impacted by the proposed project. This is due to the fact that there will be no surface disturbance of the site (only underground mining to be undertaken). No further studies are recommended.

In 2017, an additional biodiversity study was undertaken for Kwaggafontein as it was determined during the Scoping phase that a biodiversity study had not been previously been undertaken for Kwaggafontein, and it was noted by the specialist that mining has already begun on Kwaggafontein (Appendix J3). A total of 29 bird species were recorded in the project area during the January 2017 survey. No regionally or globally important bird species were recorded during the survey. Due to the degree of anthropogenic disturbance of the area surrounding the project area the likelihood of occurrence of a bird species of conservation concern on anything other than an incidental basis is considered to be low.

Mammal diversity on the Kwaggafontein site was low with no mammals observed, however, tracks and signs of 5 species were observed during the survey. Although the likelihood of additional mammal species occurring on the site is good, diversity is expected to remain low

due to the degree of disturbance of the site. Tracks of *Leptailurus serval* (Serval), a species which is regionally listed as Near Threatened (NT) was observed in close proximity to the current opencast mining activities.

No reptile or amphibian species were recorded on the Kwaggafontein site during the January 2017 survey. The likelihood of some reptile and amphibian species occurring on the site is good, however diversity is expected to be low due to the high human density and the degree of disturbance and development of the areas around the site

5.4.2.9 SURFACE WATER

Surface water resources includes rivers, streams, drainage lines, flow paths of storm water runoff, as well as water collection and channelling through the use of irrigation furrows, canal, channels, and dams. Mining activities have the potential to alter surface water drainage patterns through actual mining methods employed as well as the placement of infrastructure. In addition, these activities also have the potential to result in the pollution and/or contamination of surface water resources through geological exposure, seepage, spillages and waste streams both mineralised and non-mineralised. A baseline surface water report was completed by Digby Wells in 2005 prior to the commencement of mining. The information below has largely been extracted from this report. For further information, please refer to the full surface water scoping report which is included in Appendix L.

5.4.2.9.1 WATER MANAGEMENT AREA

Pembani falls within the X11 and X12 sub-catchments of the Eastern Escarpment primary drainage region. Affected water courses include tributaries to the Boesmanspruit, the Swartwaterspruit and the Buffelspruit as well as the stream that drains to the Transnet dam adjacent to Carolina. Drainage is predominantly to the north and east towards the Komati River. Figure 55 below indicates the relevant catchment areas and the location of the mining areas, while Figure 56 indicates all the surface water bodies in relation to the mining areas. Figure 57 to Figure 59 indicate the surface water catchment boundaries and floodlines.

5.4.2.9.2 MEAN ANNUAL RUN-OFF

The surface water report indicates the streams that could be affected by the opencast mining and their relevant catchment areas. The annual runoff for these eight (8) affected streams was determined using the quaternary catchment information for the WRC Report No 298/6.1/94 volume VI. These are summarised in Table 27 below.

Table 27: Mean annual run-off

Area	Stream No.	Catchment (km^2)	MAR (Million m^3)	Tributary to Major Stream	Quaternary Catchment
Appeldoorn 38 IT and Haarlem 39 IT	Stream 1	0.788	0.41	Buffelspruit	X12A
Haarlem 39 IT	Stream 2	1.069	0.105	Swartwaterspruit	X11E
Groenvallei 40 IT	Stream 3	5.238	0.23	Boesmanspruit	X11B
Groenvallei 40 IT, Zandvoort 10 IT	Stream 8	1.263	0.055	Boesmanspruit	X11B
Groenvallei 40 IT and Paardeplaats 12 IT	Stream 4	5.8	0.255	Boesmanspruit	X11B
Twyfelaar 11 IT, Zandvoort 10 IT	Stream 5	0.663	0.065	Swartwaterspruit	X11E
Twyfelaar 11 IT	Stream 6	0.133	0.013	Swartwaterspruit	X11E
Twyfelaar 11 IT	Stream 7	0.969	0.095	Swartwaterspruit	X11E

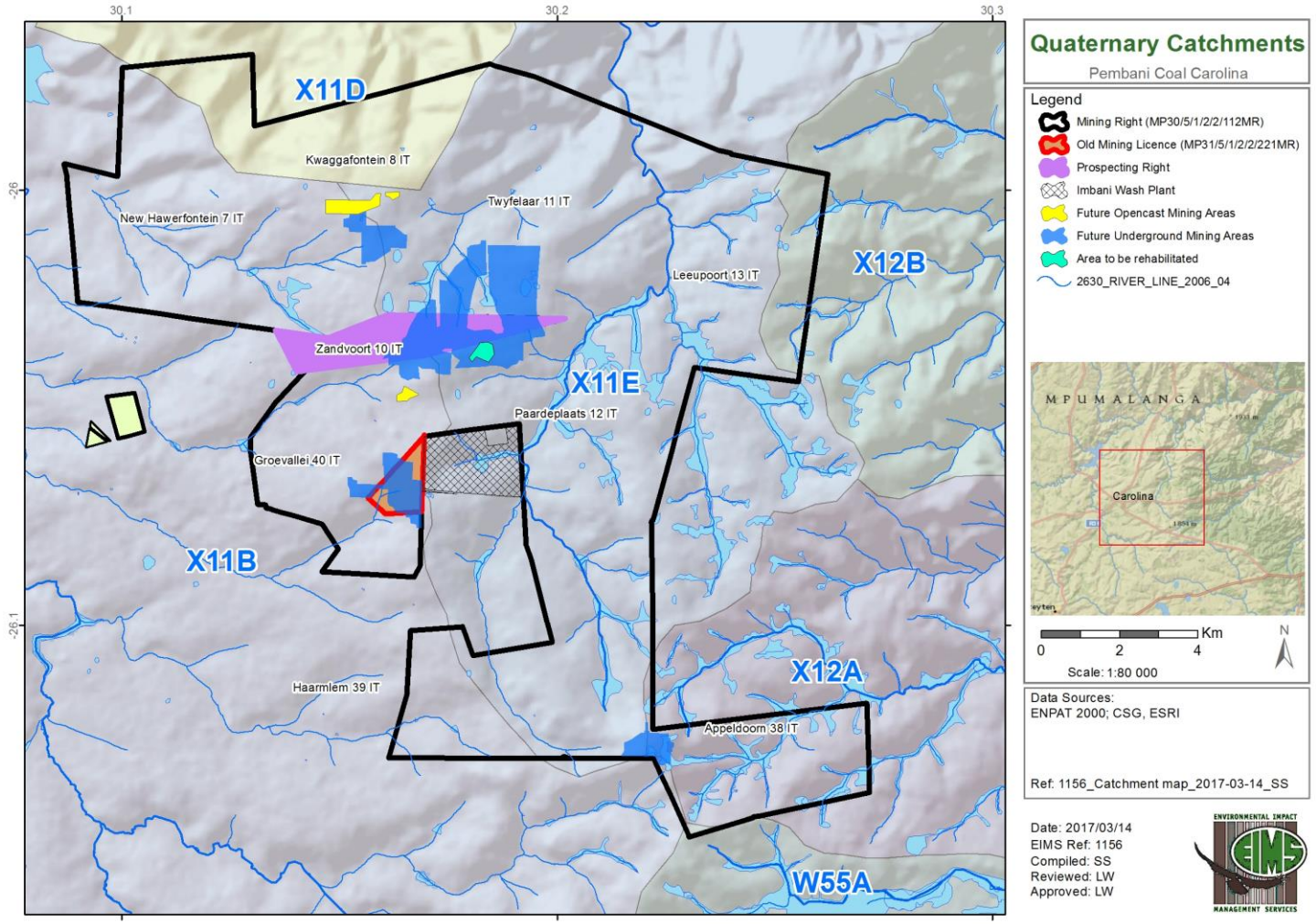


Figure 55: Catchment Areas

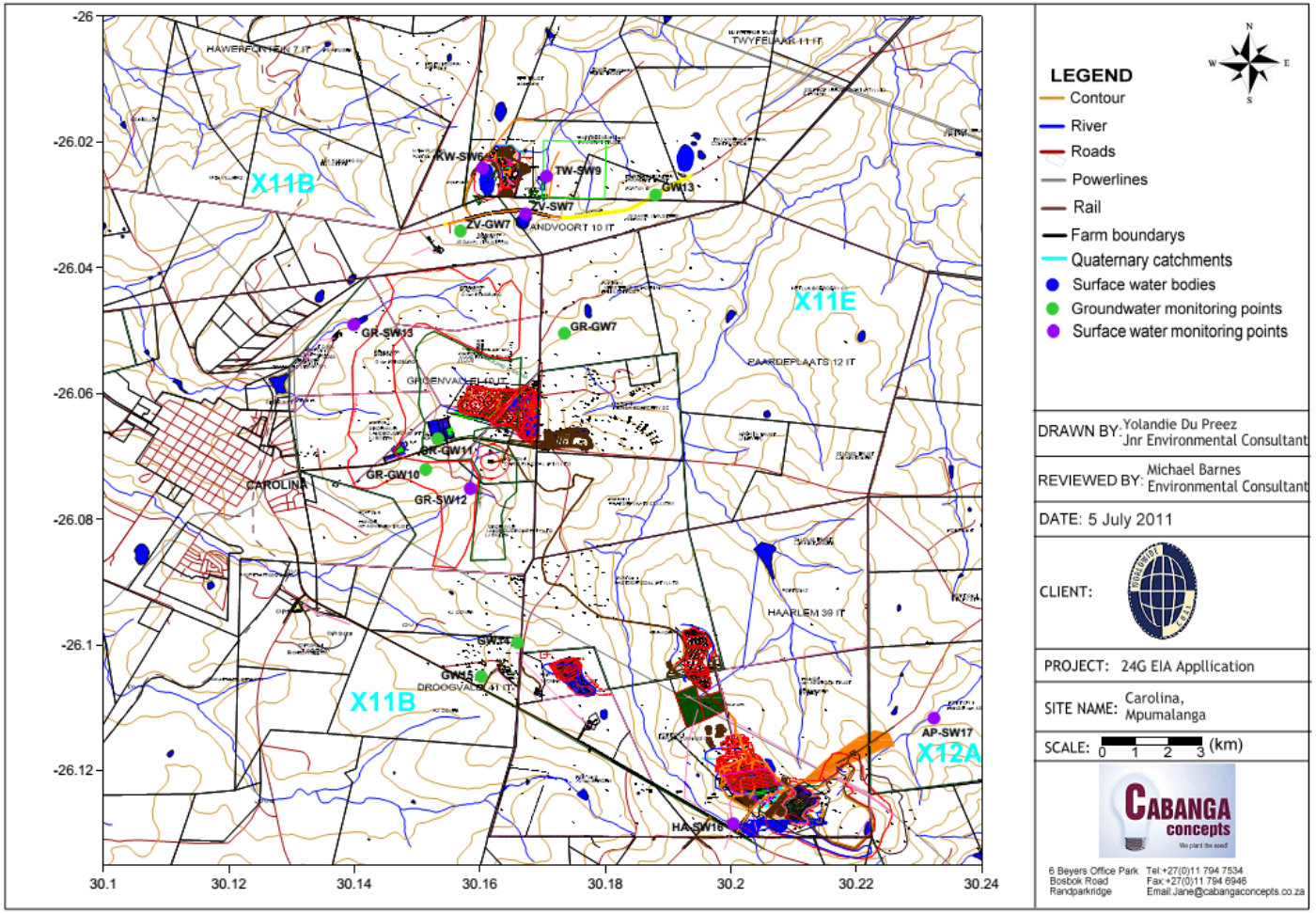


Figure 56: Surface water bodies in relation to mining

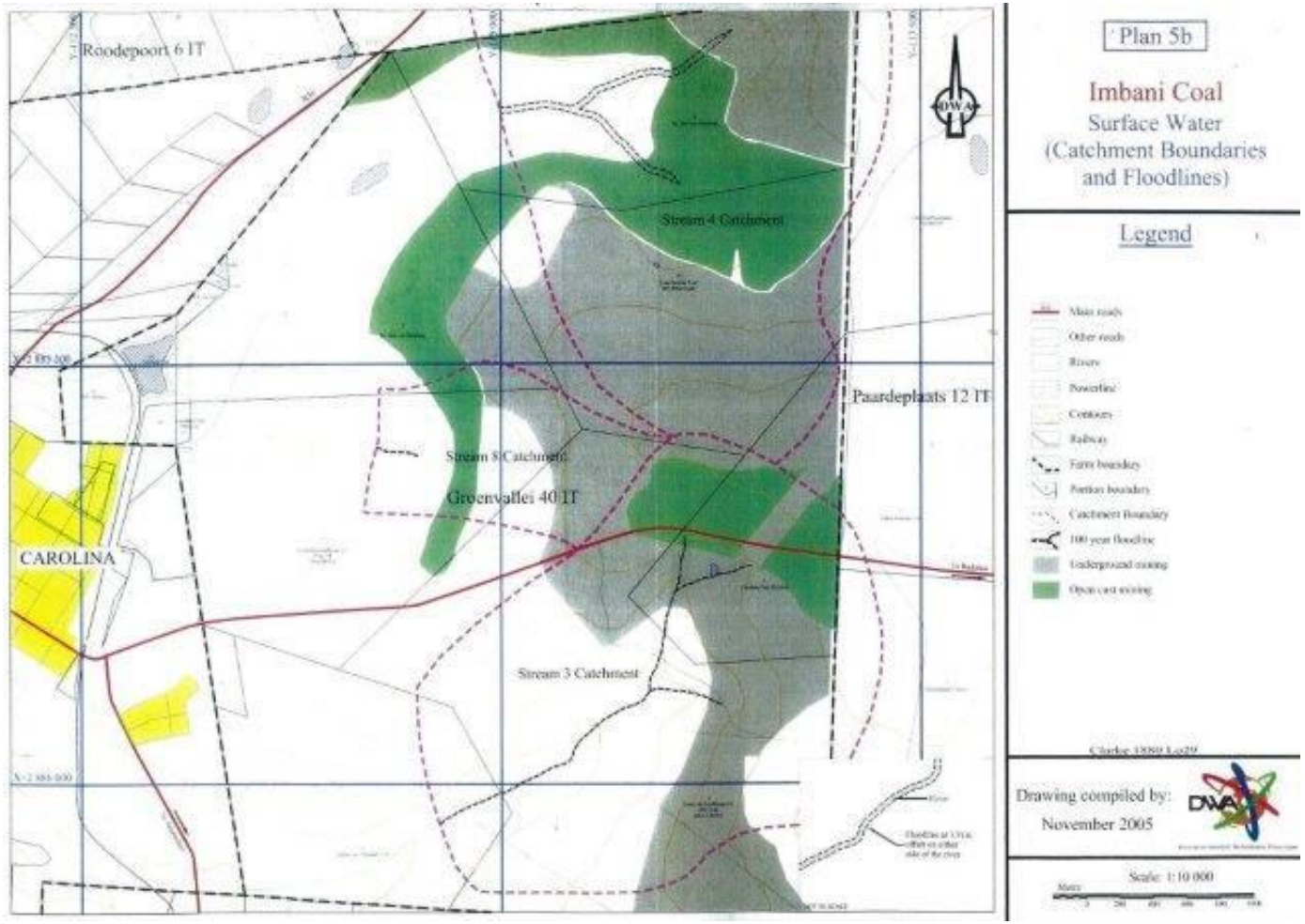


Figure 57: Surface water bodies and floodlines

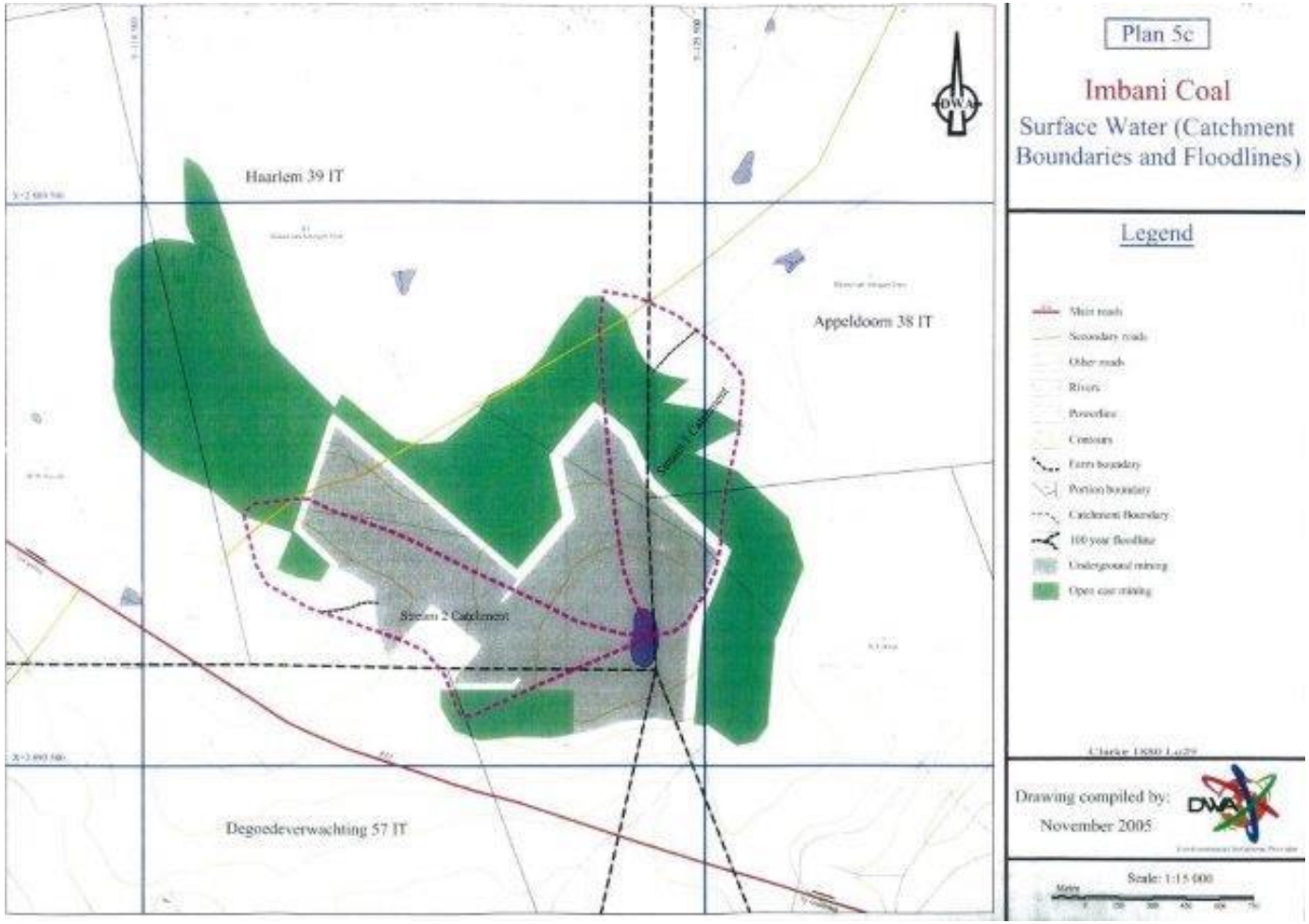


Figure 58: Surface water bodies and floodlines

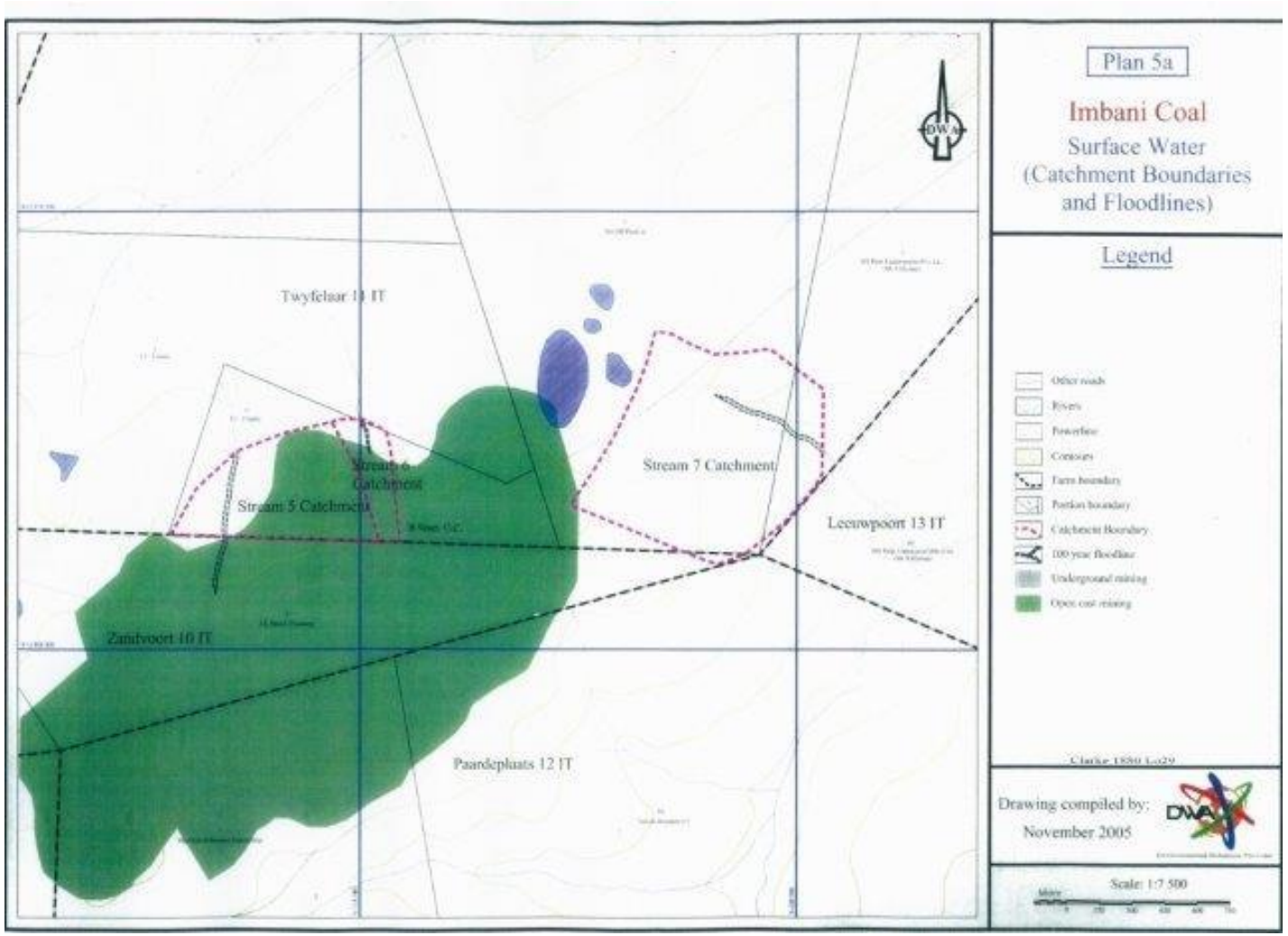


Figure 59: Surface water bodies and floodlines

5.4.2.9.3 NORMAL DRY WEATHER FLOW

Due to the fact that most of the streams are situated very close to the watersheds of their relevant catchments, no flow is expected during the dry season.

5.4.2.9.4 FLOOD PEAKS

Flood peaks were determined for affected streams using the Rational Method. These are summarised in Table 28 below.

Table 28: Flood peak flows at recurrence intervals based on years

Floods in (m^3/s)	1:50	1:100
Stream 1	18.29	23.67
Stream 2	25.24	32.66
Stream 3	41.65	51.44
Stream 4	51.58	63.68
Stream 5	9.72	11.83
Stream 6	3.137	4.078
Stream 7	22.023	28.14
Stream 8	24.62	30.775

5.4.2.9.5 SURFACE WATER QUALITY

Pembani has an established surface water monitoring programme in place since March 2010, although sporadic sampling was also conducted prior to this.

Previously five up gradient sample sites' (PA-SW10, GR-SW13, HA-SW16, AP-SW17, and SS-SW20) water quality data over a year's period was averaged in order to obtain the Background Water Quality Limits. It must be noted that the Background Water Quality Limits are far more stringent than the SANS 241-1:2011 Drinking Water Standards, but are meant to represent up gradient surface water qualities in the area.

The water monitoring programme now consists of 30 surface water monitoring sites Surface water monitoring sites include surrounding rivers, dams and pans. The surface water points are sampled on a monthly basis. The monitoring points can be seen in Figure 60 below.

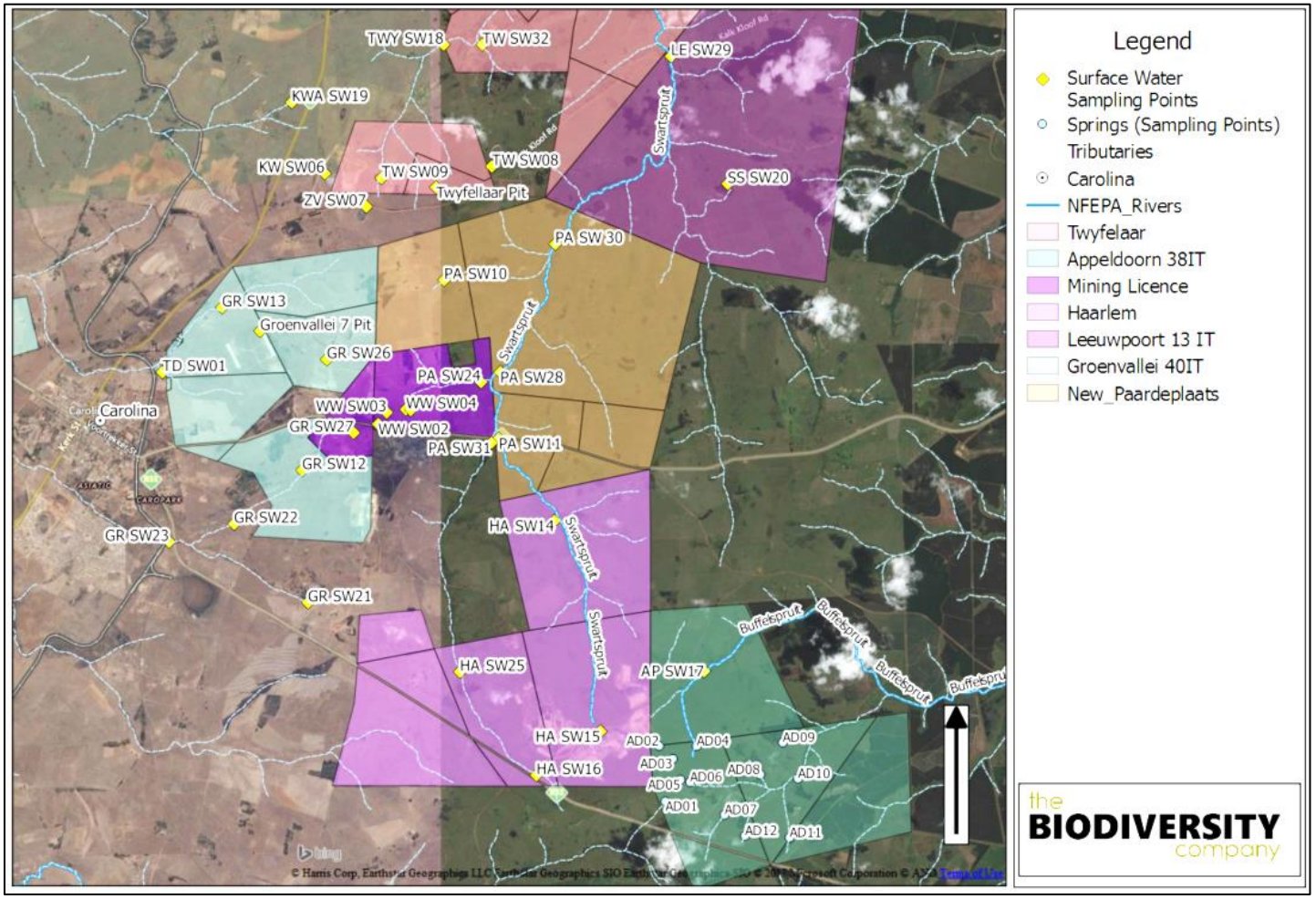


Figure 60: Surface water monitoring points

Water samples were compared to the SANS 241-1:2011 Drinking Water Standards and Background Water Quality Limits (upgradient water sampling points).

In several of the surface water samples (both up and down gradient) there were elevated concentrations of metals, namely iron and aluminium. The elevated concentration of iron and aluminium in the water is a result of water-rock interactions. This is a natural process and in many instances not related to mining. Sulphate concentrations in several of the samples exceed the SANS Drinking Water Standards. Several samples indicate water quality deterioration from mining operations in the area other than the Pembani Colliery.

5.4.2.9.6 RECEIVING WATER QUALITY OBJECTIVES AND RESERVES

A study to determine the Water Resource Classes and Associated Resource Quality Objectives in the Inkomati Water Management Area is currently underway by the IUCMA.

The Swartspruit and Buffelspruit carry a Mpumalanga Highlands 1 river signature, which has a conservation status of Endangered, while the Boesmanspruit carries a Highveld 2 river signature with a Critically Endangered status (Nel *et al*., 2004). According to National Freshwater Ecosystem Priority Areas (NFEPA - Nel *et al*., 2011) both the Buffelspruit and the Boesmanspruit systems have a PES in a C-category, which translates to a Moderately Modified system. With regards to the associated quaternary catchments and sub-quaternary catchments the desktop PES in 2011 (DWA, 2011) was in a C-category, which implies a Moderately Modified ecosystem state (DWAF, 2000). The sub-quaternary reaches in the study area all showed High and Very High Ecological Importance (EI) and Ecological Sensitivity (ES). The high scores for EI and ES are attributed to the general sensitivity aquatic and riparian communities in the reaches (flow and water quality).

Sites on the Swartspruit (SS1 and SS3) and the associated tributaries (TS1 and TS2) are located in the Freshwater Ecosystem Priority Area (FEPA). These systems were identified as being in a Good condition (NFEPA – Nel et al., 2011) and therefore need to be maintained in order to contribute to the biodiversity of the area. Concurrently, site BS1 (Buffelspruit catchment) is located in an Upstream Management Area. Anthropogenic activities taking place in these areas need to be monitored in order to prevent the degradation of FEPA's and Fish Support Areas located downstream. Sites TB1 and TB2, tributaries of the Boesmanspruit, are located in a Fish Support Area (Nel *et al*., 2011). According to Nel *et al*. (2011), fish sanctuaries for rivers in a good condition (A or B ecological category) were identified as FEPAs, whereas the remaining fish sanctuaries associated with rivers with an ecological condition lower than an A or B were identified as Fish Support Areas.

5.4.2.9.7 SURFACE WATER USER SURVEY

Surface water use in the area includes livestock watering, irrigation for crops and forestry and water supply for mining activities and domestic consumption. There are several registered users of water in the area.

5.4.2.10 GROUND WATER

Groundwater is defined as water located beneath the ground surface in lithological formations. Mining activities have the potential to impact on ground water resources through potential pollution and/or contamination as a result of activities such as the actual mining method employed and resultant geological exposure of oxidising materials, seepage, spillages and both mineralised and non-mineralised waste streams. Additional impacts related to mining activities also include dewatering cones of depression and loss of water supply to surrounding land users. The groundwater studies conducted for Pembani Colliery are attached in Appendix K.

5.4.2.10.1 AQUIFER CHARACTERISATION

Two aquifers occur in the area. These two aquifers are associated with a) the upper weathered material, and b) the underlying competent and fractured rock material.

Upper weathered material aquifer

The upper aquifer forms due to the vertical infiltration of recharging rainfall through the weathered material being retarded by the lower permeability of the underlying competent rock material. Groundwater collecting above the weathered / unweathered material contact migrates down gradient along the contact to lower lying areas. In places where the contact is near surface the groundwater can daylight on surface as springs or seepage into the various perennial and non-perennial pans that exist in the study area. Shallow seepage also contributes baseflow to the rivers and streams that occur in the area.

Exploration drilling logs from 607 boreholes show that the upper aquifer has an average depth of approximately 6.95 m, and can range between 1.5 and 26 m in thickness. These minimum and maximum values are not absolute values for the entire study area. Lesser thicknesses can occur at the numerous springs that occur in the area where daylighting of groundwater is evident and near the Swartwaterspruit and its many tributaries that drain the study area. Deeper weathering can also occur in higher lying areas, and in zones associated with fracturing. However, the mentioned values are considered to provide a good general indication of the site conditions.

It is considered that effectively 3 % of the mean annual rainfall eventually reaches the groundwater table in the form of recharge to the aquifers. No aquifer tests were done that specifically targeted this aquifer, however, previous experience in similar environments in the Witbank Coal Fields show that typical transmissivity values for this aquifer range between 0.5 and 2 m^2/day.

Lower fractured rock aquifer

Although the lower permeability unweathered rock material will retard vertical infiltration of groundwater a percentage of the water in the upper aquifer will recharge the lower aquifer. Direct recharge from rainfall can occur along the banks of the Swartwaterspruit and Boesmanspruit and their various tributaries where the fractured, competent rock outcrops. In

areas where the stream base is located directly on top of the competent rock the aquifer can be directly recharged from the surface water bodies.

The competent rock is subjected to fracturing associated with tectonic movements that took place during intrusion of the dolerite dykes into the older Karoo aged sandstone and shale. Groundwater flows in the lower aquifer are associated with the secondary fracturing in the competent rock and as such will be along discrete pathways associated with the fractures. Faults and fractures in the sandstone and shale can be a significant source of groundwater depending on whether the fractures have been filled with secondary mineralisation.

The transmissivities of the aquifer were characterised through aquifer testing. In summary, it can be said that the general transmissivity of this aquifer ranges between 0.1 and 5 m^2/day. Fracture zones can have transmissivities of up to 10 to 15 m^2/day as can be seen from the GCS study that was done in 2008. These values are typical of the area and general geology.

Aquifer Classification

The general regional aquifer is classified as a minor aquifer, but of high importance to the local landowners as it is their only source of water.

Groundwater zone

The proposed mining area is situated on Karoo aquifers. Aquifer yields are typically low but groundwater is often considered to be vital as a water resource for domestic and stock watering. The perched aquifer is poorly developed in the Mining Right and may be regarded as the only possible primary type aquifer. This aquifer will only manifest during the wetter summer months when significant seepage in the shallow weathered zone occurs.

A number of dykes, sills and fracture zones exist within the mining areas. All significant groundwater strikes, indicating the presence of aquifers, occurred in fractures or fracture zones caused by faulting, bedding plane fractures or small discontinuity fractures developed on hard rock/soft rock interfaces or in unweathered bedrock. The aquifer yields are low, indicating poor fracture development, even in the dolerite sills. Information indicates that these fractures and the shallow parts of the dykes are water-bearing and that, with increasing depths, the dykes tend to be less permeable. The thicker dykes may also act as barriers to groundwater through-flow, resulting in the compartmentalization of the local groundwater systems. Based on the previous findings of the borehole drilled and tested, the following conclusion can be made:

- The borehole yields are generally low (< 0.1m^3/h);
- The aquifer permeability decreases with depth.

5.4.2.10.2 GROUNDWATER USE

Groundwater forms the sole source of water supply to the local landowners. Groundwater is abstracted through boreholes, windmill, and hand pumps for domestic and stock watering. Abstraction values could only be obtained from 26 boreholes, however a total of 42 boreholes are being actively used. Abstraction volumes from the 26 boreholes, identified during the

hydrocensus, are calculated around 50 m^3 of water used daily. The average abstraction rate is 2 m^3 of water each day. If this average volume is applied to the 16 unknown abstraction volumes, then the total abstraction rate for the area is 82 m^3 of water daily.

The sub-catchments within which the study area falls measure approximately 1,083 km^2. Applying an average rainfall of 744 mm/annum, as obtained from the Pembani Colliery IWWMP (Cabanga Concepts, 2015), and an average recharge from rainfall of 3 %, it is calculated that the average annual recharge to the sub-catchments from rainfall is 24.17Mm^3 per annum (67 146 m^3/day). It can thus be calculated that less than 1 % of the recharged water is abstracted for private and stock watering use.

5.4.2.10.3 GROUNDWATER QUALITY

Pembani has an established groundwater monitoring programme in place. In total 44 groundwater points are monitored on a quarterly basis, of these 26 points are boreholes whilst 18 points are springs. Figure 61 illustrates the location of the various groundwater monitoring points.

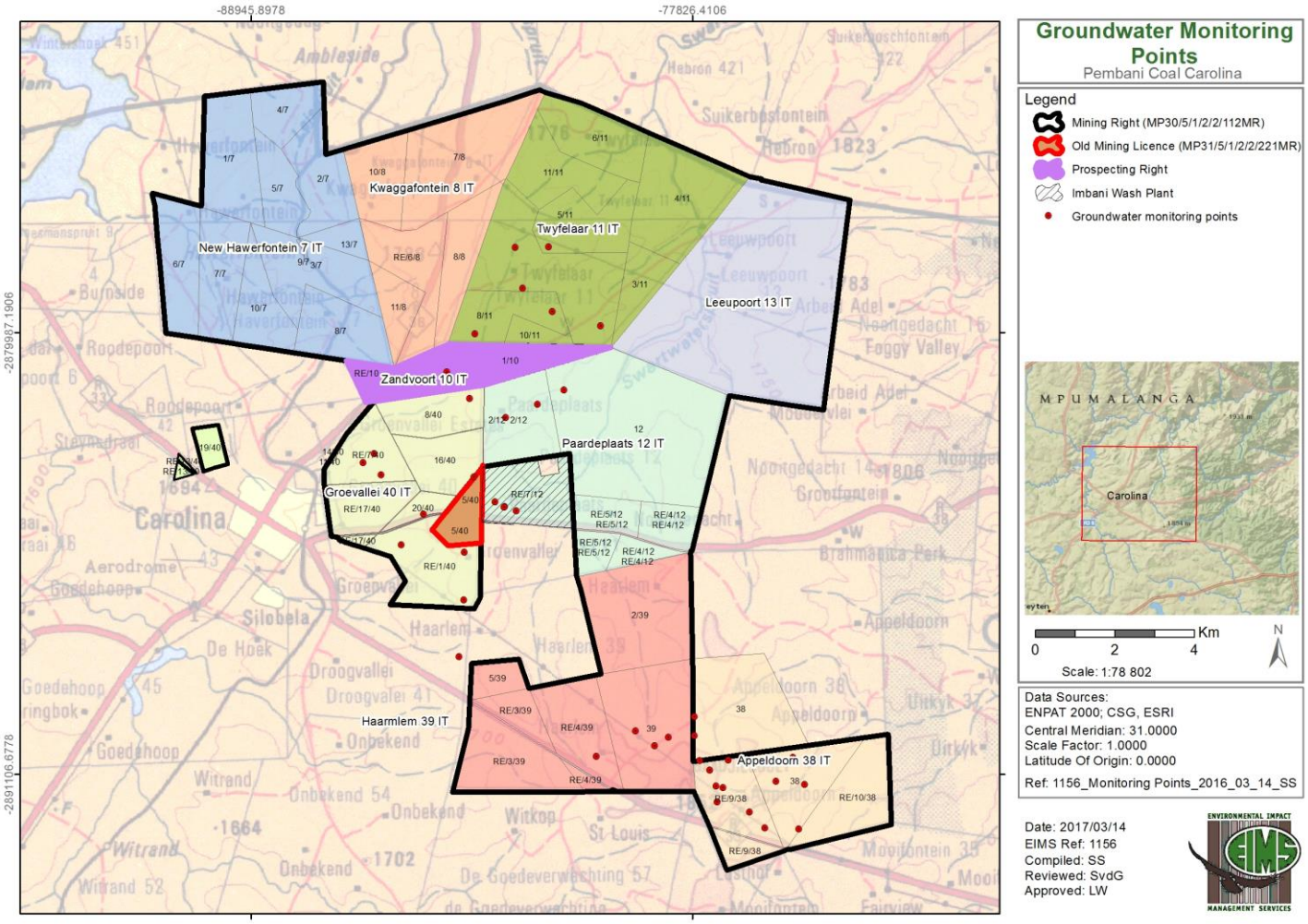


Figure 61: Groundwater monitoring points

In several of the groundwater samples (both up and down gradient) there were elevated concentrations of metals, namely iron and aluminium. The elevated concentration of iron and aluminium in the water is a result of water-rock interactions. This is a natural process and in many instances not related to mining. Sulphate concentrations in several of the samples exceed the SANS Drinking Water Standards. Several samples indicate water quality deterioration from mining operations in the area other than the Pembani Colliery.

5.4.2.10.4 HYDROCENSUS

The depth to groundwater level in the area was measured during the hydrocensus. A total of 113 boreholes were visited and a further 34 springs were recorded where the groundwater level can be accepted to be at surface. From the 113 visited boreholes the depth to groundwater level was measured in 73 boreholes with the other boreholes being closed by various means which prevented the depth to groundwater level to be measured. The boreholes are usually closed due to the equipment installed in the boreholes.

The average depth to groundwater level is calculated to be 6.3 m. A 98 % correlation is achieved when plotting topographical versus groundwater level elevations. From The regional groundwater level in the area vary from approximately 5 meters below surface in the topographically lower lying areas to a maximum of approximately 22 meters below natural ground level. Deeper groundwater levels, in the form of large troughs, prevail in close proximity and below the plantations (JCI, 1997). These levels extend to 30m below the natural ground level.

The depth to groundwater level in the area was measured during the hydrocensus. A total of 81 boreholes were visited and a further 15 springs were recorded where the groundwater level can be accepted to be at surface. From the 81 visited boreholes the depth to groundwater level was measured in 58 boreholes with the other boreholes being closed by various means which prevented the depth to groundwater level to be measured. The boreholes are usually closed due to the equipment installed in the boreholes.

The depth to groundwater level in general ranges between artesian (at or above surface) and 34 m below surface. The majority of groundwater depths are recorded at less than 7 mbgl.

Plotting the groundwater level elevation against topography normally indicates areas where external influences such as large scale mine dewatering influences the groundwater levels. A 96 % correlation is achieved for the aquifer. From this it is concluded that the groundwater levels mimic topography and is largely un-influenced by mining activities in the area.

Groundwater flow directions are directed towards the low lying surface water channels. Calculations show that based on the available data the groundwater gradient range between 1:300 in the high lying plateau areas to 1:50 along the slopes around the streams.

A hydrocensus was conducted and completed during July 2004 and 2012. Several groundwater users were identified. The hydrocensus found thirty boreholes and twenty-three springs on the proposed affected properties. The information from this survey is presented in Table 29. The

yields of boreholes were reported by farmers and are in the range of 1 000 l/d to 20 000 l/d, hence possible future irrigation (small scale) in the area. According to Hogdson and Krants 1998, the weathered aquifer yields are generally between 100 and 2 000 l/hr (0.0002 and 0.55 l/s) and the fractured aquifer has a mean yield of 0.35 l/s. The information obtained from the farmers, therefore implies an overestimation of yields from the relevant boreholes.

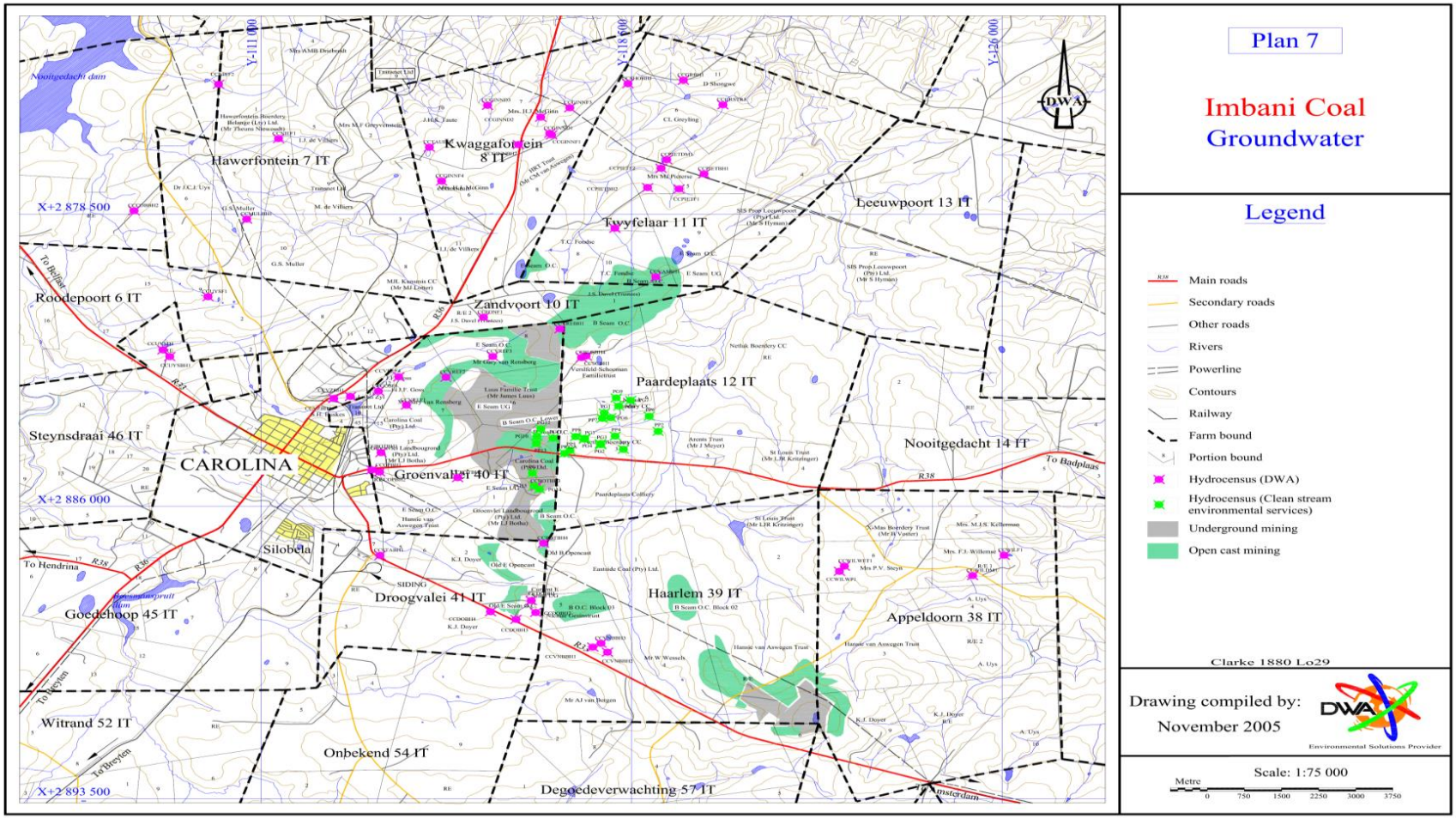


Figure 62: Groundwater hydrocensus borehole locations

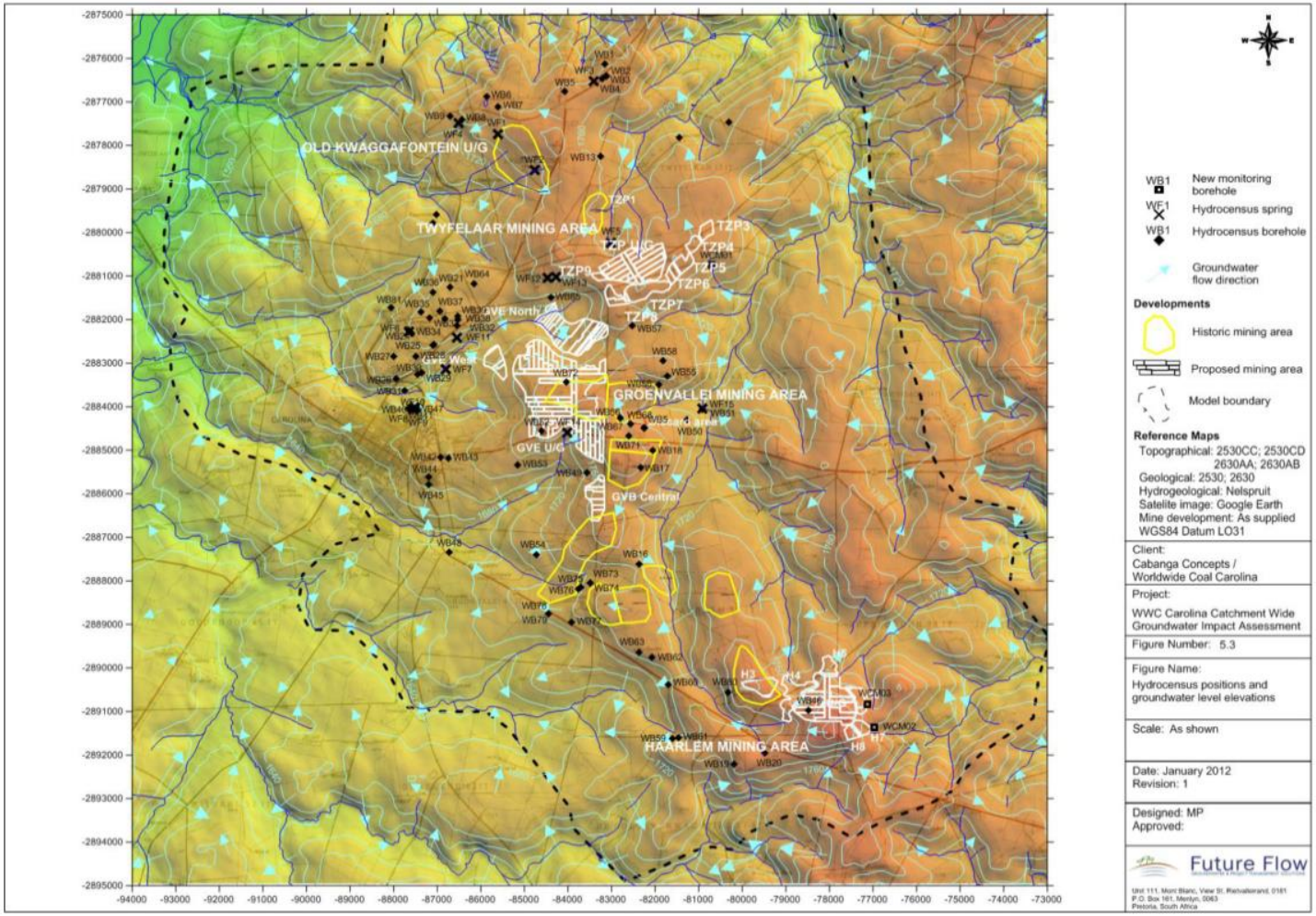


Figure 63: Ground water flow direction

Table 29: Hydrocensus Results

X	Y	Z	Name	Water level	PH	Use	Volume	Sample ID	Casing Stickup	BH Depth	Registered Water User	Abstraction Rate
-86703.504	-2884416.978	1632 m	CCBOTBH1			Domestic	1000l/d	CCGV026GW	0.2m			
-85142.318	-2885034.901	1659 m	CCBOTBH2			Domestic	500l/d	CCGV027GW	0.1m			
-83547.960	-2885231.776	1680 m	CCBOTBH3			Domestic	1000l/d	CCGV028GW	0.35m			
-83380.521	-2886690.973	1721 m	CCBOTBH4	12.9 m		Domestic		CCGV029GW	0.85m		Yes	
-82684.368	-2881916.862	1637 m	CCBUSBH4			Domestic		CCGV023GW	0.42m		No	
-90203.538	-2870270.018	1402 m	CCCOBBH1		7	Domestic	1000l/d	CCNG008GW	0m			500l/h
-91792.345	-2878289.309	1464 m	CCCOBBH2		7.3	Domestic + Chickens		CCBN009GW	0.27m		No	2000l/h
-83605.181	-2888167.088	1665 m	CCDOBH1		7	Domestic	700l/d	CCDG003GW	0.22m			
-83511.190	-2888471.171	1657 m	CCDOBH2		7.1	Domestic	700l/d	CCDG003GW	0.5m			
-83908.193	-2888652.102	1641 m	CCDOBH3	6.5m		Test Pit			0.27m	20m	Yes	
-84424.625	-2888463.764	1640 m	CCDOBH4	1.8m	7.2	Test Pit		CCDG004GW	0.26m	20m		
-84683.715	-2880913.693	1700 m	CCFONF1		6.3	Domestic	500l/d	CCZV016GW			No	
-85584.375	-2877433.984	1759 m	CCGINNBH1		6.6	Domestic			0.15m			
-84044.587	-2876472.288	1765 m	CCGINNBH2			Domestic	50l/d		0.2m	20m		

X	Y	Z	Name	Water level	PH	Use	Volume	Sample ID	Casing Stickup	BH Depth	Registered Water User	Abstraction Rate
-83414.630	-2876175.764	1759 m	CCGINND1	0m	6.9	Live stock watering						
-83603.508	-2875764.819	1720 m	CCGINND2	0m	7.1	Live stock watering						
-84684.877	-2875477.060	1712 m	CCGINND3	0m	5.1	Bass Dam						
-83376.311	-2876217.621	1764 m	CCGINNF1	0m	7.2	Domestic						
-83019.282	-2875514.033	1744 m	CCGINNF3	0m	7	Live stock watering						
-85584.375	-2877433.984	1752 m	CCGINNF4	0m	7	Live stock watering						
-86779.018	-2882843.083	1637 m	CCGOSF1	0m	6.9	Domestic	800l/d	CCGV006GW			No	
-80732.631	-2874771.830	1605 m	CCGRBH1		7	Domestic	1000l/d	CCTF014GW	0.27m	25m	Yes	
-79923.678	-2875390.626	1604 m	CCGRSTR1	0m	7	Irrigation	500l/d	CCTF019SF				
-89511.321	-2878469.605	1518 m	CCMULBH1		Borehole collapsed							
-88898.656	-2876395.781	1571 m	CCNIEF1	0m	7.5	Domestic	700l/d	CCHF021GW			Yes	
-90133.798	-2875020.402	1536 m	CCNIEF2	0m	7.2	Domestic		CCHF022GW				
-86883.673	-2884862.465	1682 m	CCOPBH1			Domestic		CCGV020GW	0.5m		No	
-86722.220	-2884913.464	1682 m	CCOPBH2			Domestic		CCGV020GW	0.1m		No	
-80279.295	-2877167.690	1742 m	CCPIETBH1		8	Live stock watering	1000l/d					

X	Y	Z	Name	Water level	PH	Use	Volume	Sample ID	Casing Stickup	BH Depth	Registered Water User	Abstraction Rate
-81414.452	-2877536.996	1730 m	CCPIETBH2		6.5	Domestic	700l/d	CCTF001GW	0.2m	9.2m		
-81038.444	-2876815.619	1691 m	CCPIETDM1	0m	7.7	Live stock watering						
-80777.502	-2877561.854	1714 m	CCPIETF1	0m	7.6	Live stock watering						
-81149.219	-2877036.782	1694 m	CCPIETF2	0m	7.5	Live stock watering						
-82591.559	-2881873.065	1715 m	CCSCBH1			Domestic			0.25m			
-81852.604	-2874878.495	1662 m	CCSHOBH1		6.8	Domestic		CCTF015GW	0.3m		No	
-86681.963	-2887054.869	1596 m	CCSTABH1		7.6	Domestic	1000l/d	CCDG002GW				
-85844.364	-2876570.388	1676 m	CCTAUBH1		6.7	Domestic	1000l/d	CCKF013GW	0.27m	33m		
-91013.436	-2882019.897	1609 m	CCUYSBH1		7.3	Domestic	1000l/d		0.15m	50m		
-91153.752	-2881850.250	1612 m	CCUYSD1	0m	8	Domestic + Live stock						
-90263.415	-2880472.416	1638 m	CCUYSF1	0m	7.3	Live stock watering						
-81214.015	-2879823.619	1720 m	CCVASBH1	4.8m		Domestic	500l/d	CCTF017GW	0.37m	30m		
-82060.662	-2878590.242	1693 m	CCVASF1	0m		Domestic		CCTF018GW				
-82342.213	-2889339.004	1708 m	CCVNBBH1		Dried up after mining							

X	Y	Z	Name	Water level	PH	Use	Volume	Sample ID	Casing Stickup	BH Depth	Registered Water User	Abstraction Rate
-82043.310	-2889465.639	1709 m	CCVNBBH2		Dried up after mining							
-82177.777	-2889240.466	1715 m	CCVNBBH3		Dried up after mining							
-83131.419	-2881187.354	1688 m	CCVREBH1	3.4m	6.9	Domestic	10 000l/d	CCGV011GW	0.6m	45m	Yes	
-86205.223	-2883191.609	1625 m	CCVREF1	0m	5.6	Domestic		CCGV010GW				
-85418.331	-2882462.948	1632 m	CCVREF2	0m	6	Domestic		CCGV024GW				
-84480.033	-2881916.168	1628 m	CCVREF3	0m	7	Domestic		CCGV025GW				
-86374.140	-2882469.236	1621 m	CCVREF4	0m	6.9	Domestic	20 000l/d	CCGV012GW				
-87343.540	-2882987.558	1662 m	CCVZBH1		6.5	Domestic + Chickens		CCGV005GW	0.25m		No	
-87678.447	-2883044.093	1638 m	CCVZBH2		6.6	Domestic	10 000l/d		0.15m			
-74687.790	-2887387.218	1671 m	CCWILDM1	0m		Live stock watering						
-74058.504	-2886856.257	1613 m	CCWILF1	0m	6.6	Domestic		CCAD007GW			No	
-77286.244	-2887185.218	1690 m	CCWILWET1	0m	7	Live stock watering						
-77383.500	-2887318.746	1695 m	CCWILWP1			Not working			0.2m			

5.4.2.11 WETLANDS

5.4.2.11.1 SENSITIVE AREAS SURVEY

Certain portions of the farm Appeldoorn 38 IT which border the mining right area, have recently been declared as protected (Notice 19 of 2014, Mpumalanga Tourism and Parks Agency, Declaration of the Chrissiesmeer Protected Environment in terms of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) as amended.)

In addition, wetlands are considered to be sensitive landscapes. A wetland delineation study was conducted by S.E.F. in September 2011 (Appendix M) the sections below have been extracted from this report and detail the findings of the study.

The Mining Right area wetlands are classified as National Freshwater Ecosystem Priority Areas (NFEPA), which are wetlands containing special features such as species of conservation concern or extensive peat wetlands. The wetlands identified on site have the following key sensitivities:

- Boesmanspruit catchment is identified as a Fish Support Area for threatened fish species (i.e. fish sanctuary, translocation, and/or relocation zone not in Present Ecological State Class A or B), in this case a specific genetic lineage of *Barbus anoplus* (Chubbyhead Barb);
- Swartspruit catchment is identified as a Freshwater Ecosystem Priority Area and accordingly needs to stay in a good condition (i.e. Present Ecological State Class A or B) in order to achieve national biodiversity goals and protect water resources for human use; and
- Buffelspruit catchment is identified as an upstream management catchment required to prevent the downstream degradation of Freshwater Ecosystem Priority Areas and Fish Support Areas.

The largest portion of the Mining Right is considered to be highly significant in terms of the Mpumalanga Biodiversity Conservation Plan with one area considered to be irreplaceable (Figure 64).

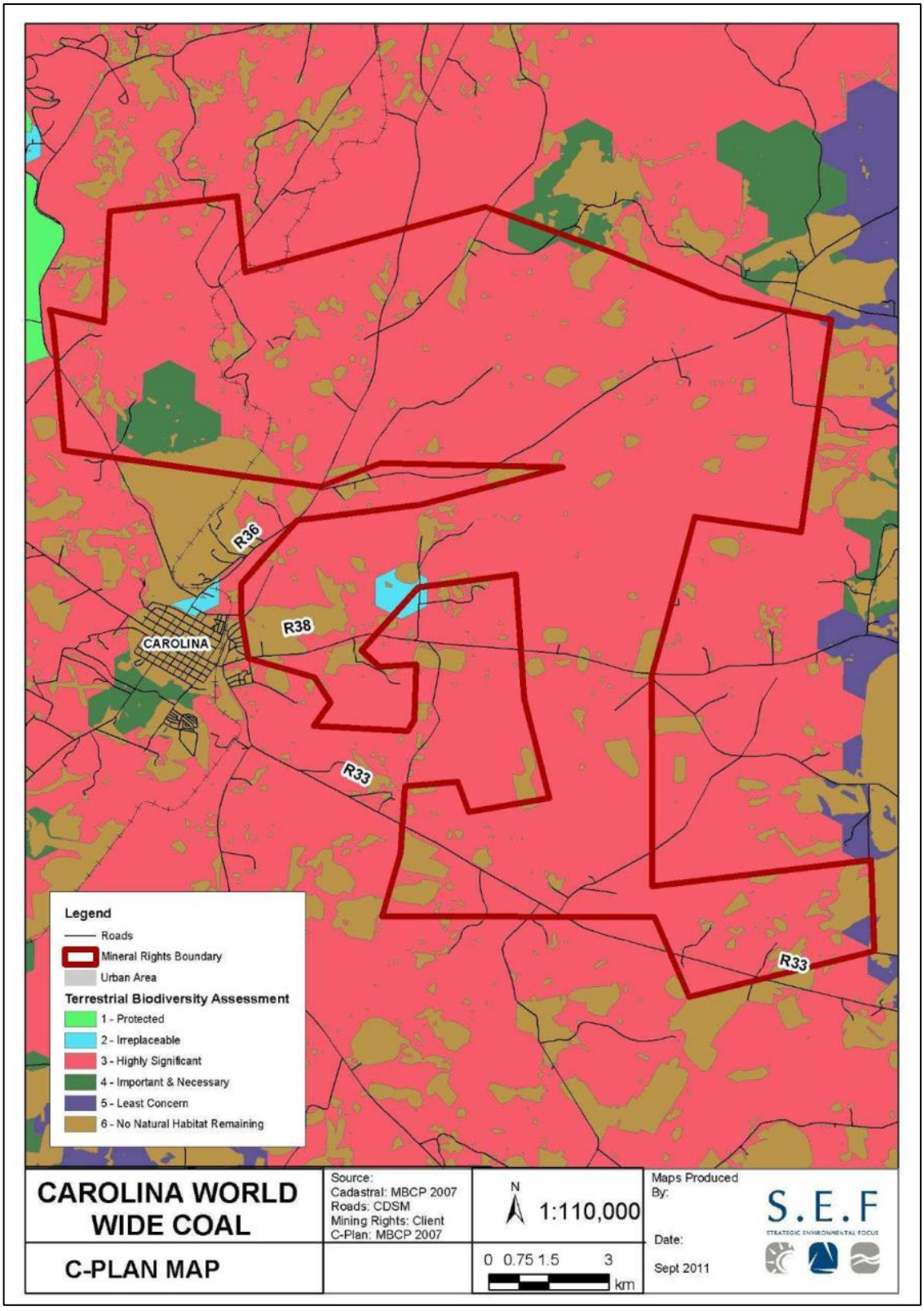


Figure 64: Mpumalanga Conservation Plan for the Mining Right

Wetlands typically occur on the interface between aquatic and terrestrial habitats and therefore display a gradient of wetness – from permanent, to seasonal, to temporary zones of wetness - which is represented in their plant species composition, as well as their soil characteristics. It is important to take cognisance of the fact that not all wetlands have visible surface water. An area which has a high water

table just below the surface of the soil is also a wetland, as well as a pan that only contains water for a few weeks during the year. Hydrophytes and hydric soils are subsequently used as the two main wetland indicators.

Hydro-geomorphic (HGM) units encompass three key elements (Kotze *et al*., 2005 in SEF, 2011):

- Geomorphic setting. This refers to the landform, its position in the landscape and how it evolved (e.g. through the deposition of river borne sediment);
- Water source. There are usually several sources, although their relative contributions will vary amongst wetlands, including precipitation, groundwater flow, stream flow, etc.; and
- Hydrodynamics, which refers to how water moves through the wetland.

Five different types of wetland areas were classified within the study area and were categorised HGM units A total of a 147 separate HGM units were identified and classified within the study area, and are presented graphically in Figure 65. These included 11 valley bottom wetlands with a channel, 2 valley bottom wetlands without a channel, 45 hillslope seepage wetlands not feeding a watercourse, 80 hillslope seepage wetlands feeding a watercourse (including 25 valley head seepages) and 9 depression wetlands. Altogether, delineated wetlands occupy approximately 4,781 ha within the study area.

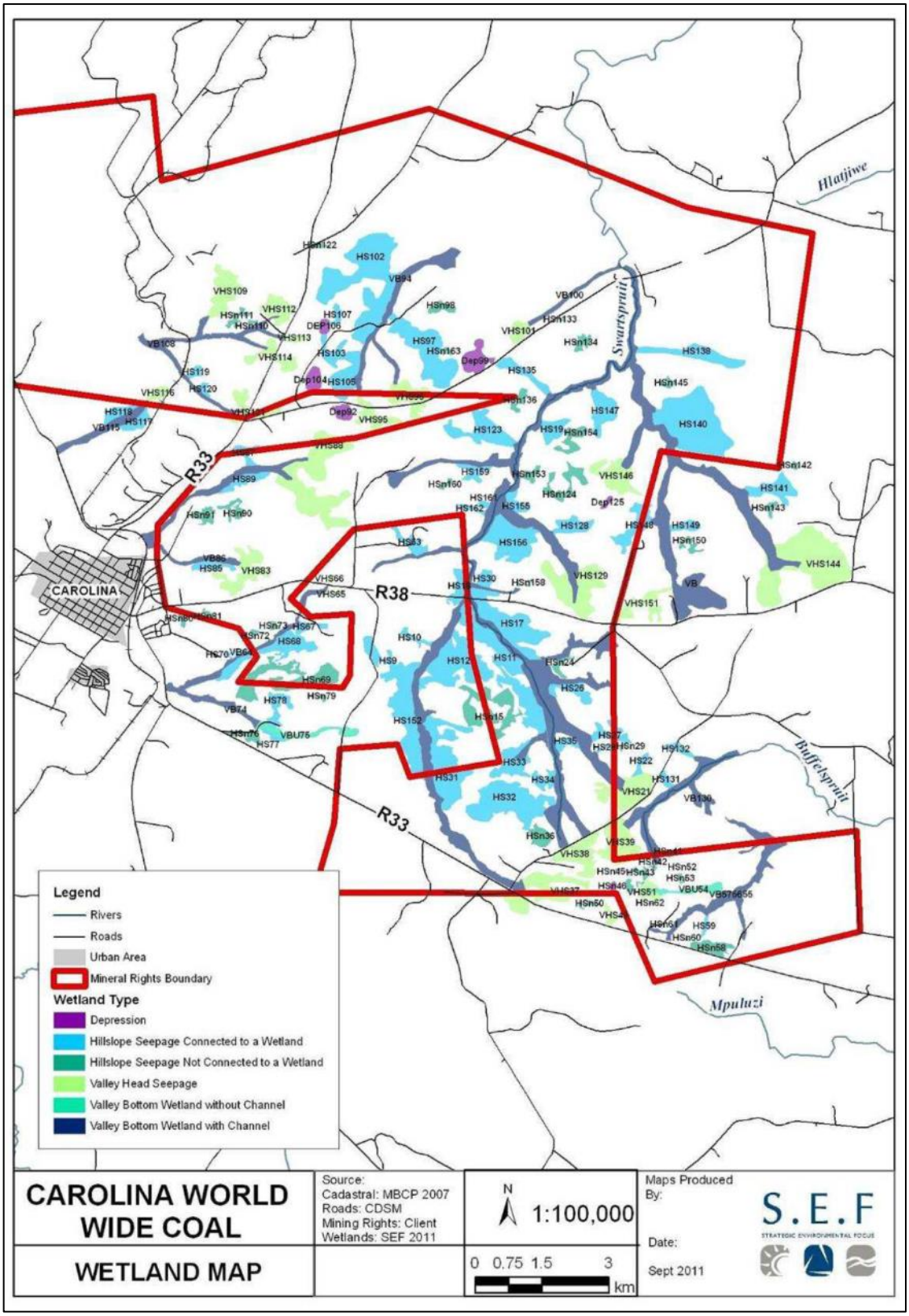


Figure 65: Identified Wetland types within the Mining Right

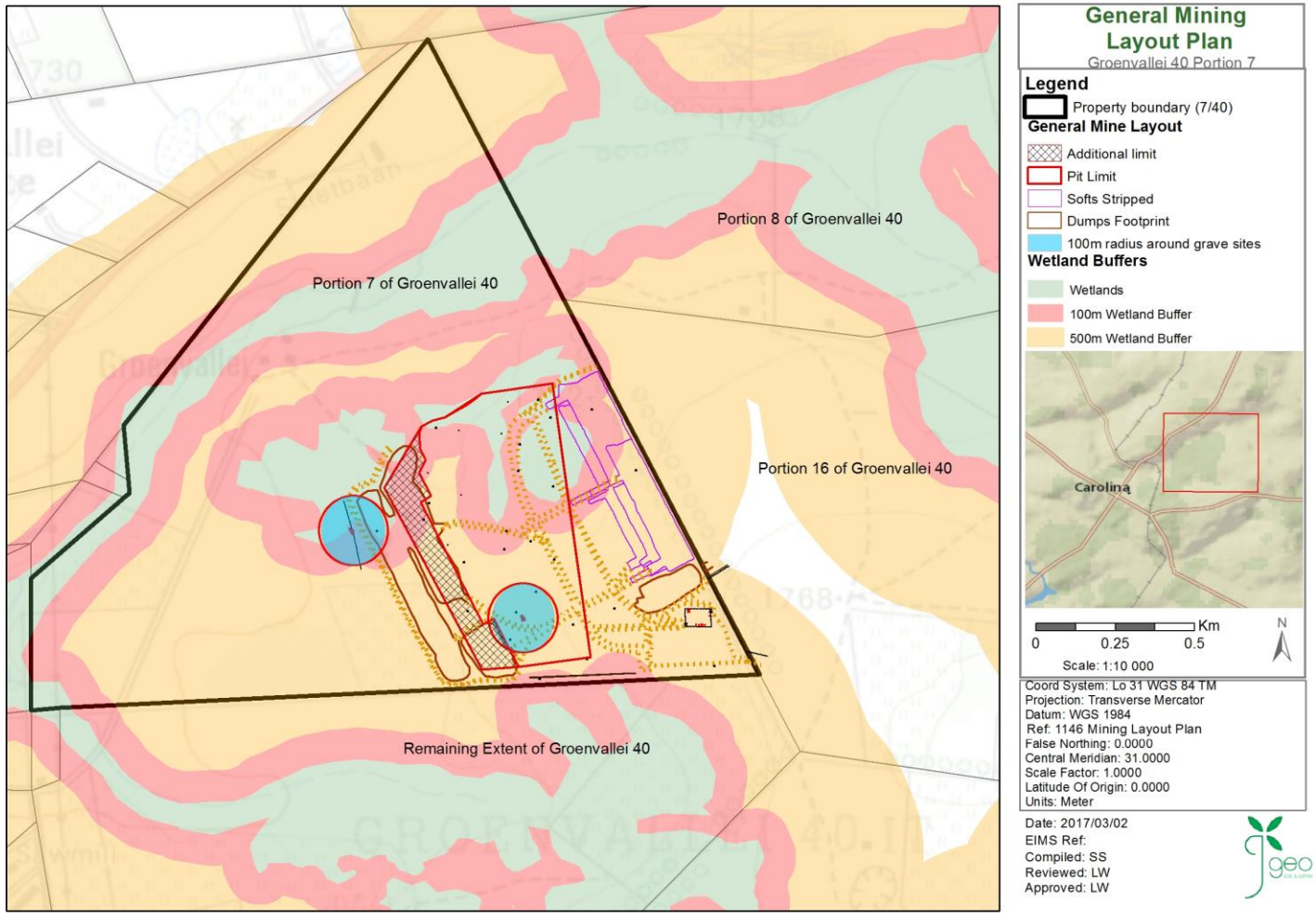


Figure 66: Mining layout for Groenvallei 40 Portion 7 indicating wetlands and the buffers

The wetland delineation study included a high level assessment on the Present Ecological State (PES) of the area. This study indicated that the PES for the various wetlands varied and included examples of all the possible PES categories. Figure 67 below indicates the PES score for selected wetlands within the mining right area, whilst Table 30 interprets the ratings thereof.

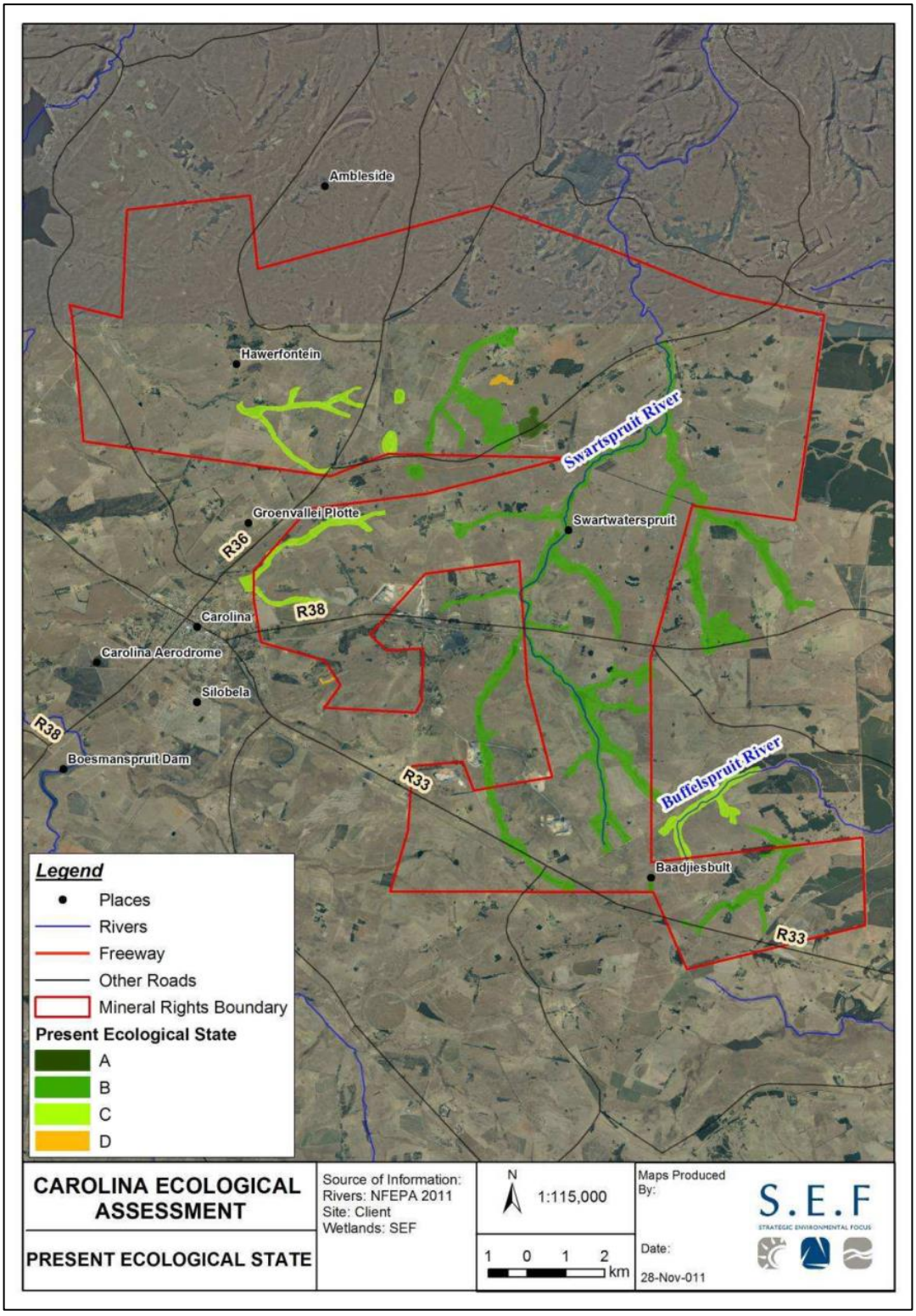


Figure 67: Present Ecological State of wetland within the Mining Right

Table 30: Interpretation of PES status category

Class	Ecological category	Description
A	Natural	Unmodified state - Un-impacted state, conditions natural
B	Good	Largely natural - Few modifications, mostly natural
C	Fair	Moderately modified - Community modifications, some impairment of river health
D	Poor	Largely modified - Distinct impairment of river health, impacted state
E	Seriously modified	Seriously modified - Most community characteristics modified, seriously impacted state
F	Critically modified	Critically modified - Extremely low species diversity and abundance, unaccepted modified state

From a preliminary perspective, PES for wetlands within the Mining Right varied greatly (Figure 67), with examples of all possible PES categories observed within the Mining Right. The PES of most of the valley bottom wetlands are classified as PES category C, moderately modified, with isolated hillslope seepages showing more variance, a likely result of exposure to divergent management regimes on different properties. Heavy grazing regimes and cultivation practices within wetland catchments was perceived to be the biggest modifiers of hydrology and water quality. From a geomorphic perspective, the largest impacts within wetlands was as a result of placement of impoundments (dams) throughout valley bottom systems as well as within hillslope seepages. The concentrated outlets / overflows from impoundments often cause unchanneled valley bottoms to become incised, changing them to channelled valley bottom systems with accompanied changes in wetland functionality. From a preliminary perspective, most of the valley bottom systems seems to have reached some form of equilibrium again with erosion processes stabilised to some extent, probably as a result of deposition of sediments mobilised from sheet erosion within heavily grazed or cultivated areas.

5.4.2.11.2 RESOURCE CLASS AND RIVER HEALTH

Pembani has an established bi-annual biomonitoring program in place. The latest survey was conducted in October 2014, at eight (8) sampling locations (Figure 68).

Site BS1 is located on the Buffelspruit, approximately 9 km from its origin, with sites SS1 and SS3 associated with the Swartspruit catchment. Five additional sites were strategically selected and included in 2013: two sites on tributaries of the Boesmanspruit (TB1 and TB2), two on tributaries of the Swartspruit (TS1 and TS2) and an additional site in the upper reaches of the Swartspruit (SS0).

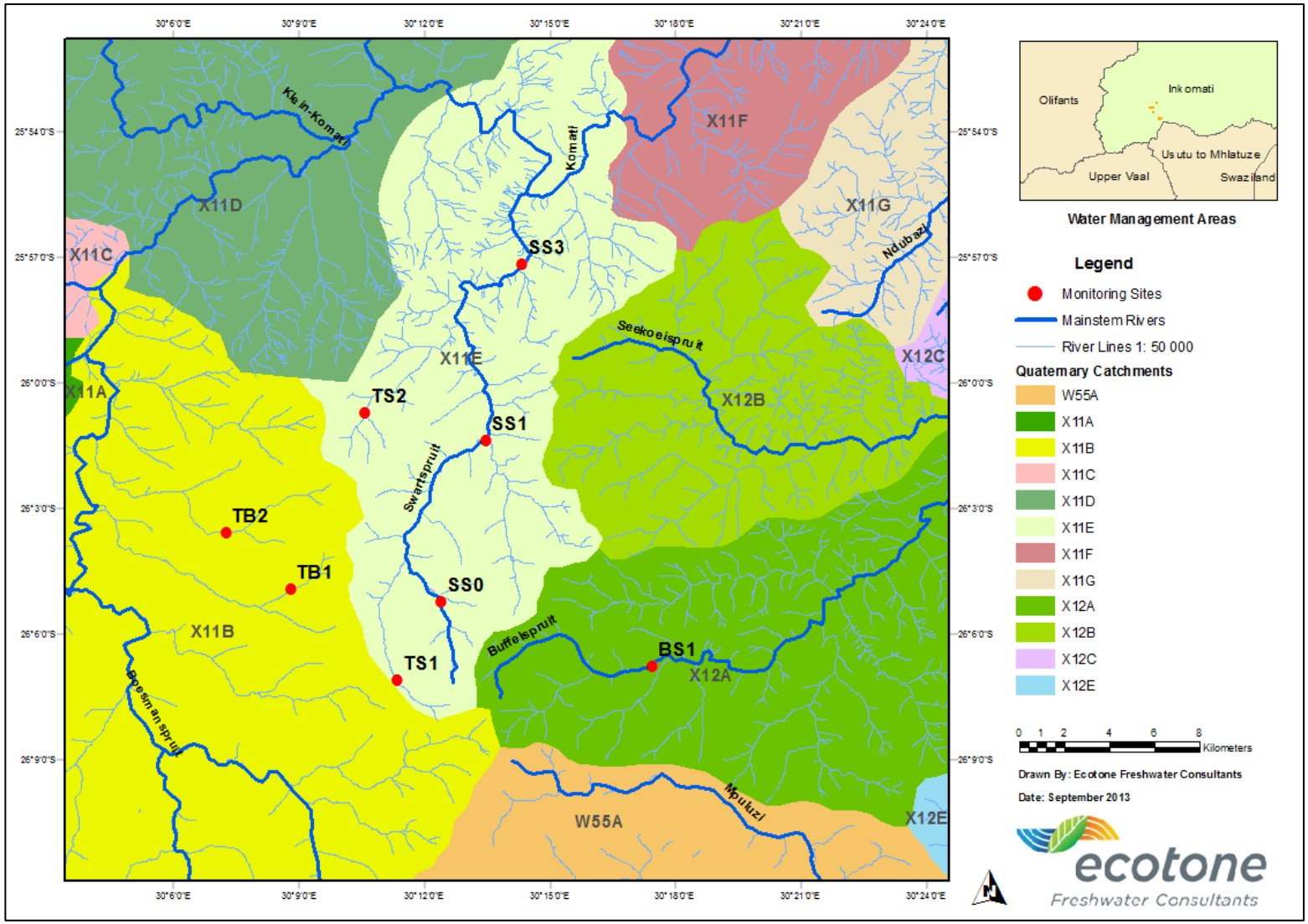


Figure 68: Biomonitoring sample locations in comparison to the catchment and water management areas (Ecotone, 2014)

The main findings of the recent biomonitoring survey are summarized below (Ecotone, 2014).

The main catchment drivers of ecological change in the various sub-catchments include forestry, agriculture, grazing, abstraction, damming, algal growth, transfer schemes and irrigation. The catchment of the Buffelspruit is seriously affected by afforestation activities.

The sub-catchments associated with the study area have a C desktop PES indicating a Moderately Modified state with High to Very High Ecological Importance and Sensitivity (EIS) scores as indicated by the updated PES and EIS tables (DWA, 2011).

In general, the *in situ* water quality at the study sites was characterised by circumneutral to slightly alkaline pH values, and low to moderate EC and TDS measurements. All variables assessed fell within benchmark criteria for aquatic ecosystems with the exception of pH at TS1, which was Alkaline in the Low Flow 2014 survey. Concerning the temporal variation, the majority of sites assessed showed a stable trend in in-situ water quality constituents, with a slight reduction in water quality at site TS2 on the tributary of the Swartspruit.

- None of the sites assessed indicated chronic toxicity during the 2014 Low Flow survey.
- All the river sites showed a stable trend in habitat availability for aquatic macro invertebrates for the low flow season, with all Invertebrate Habitat Assessment (IHAS) scores classing as “Poor” (Table 0-1). Aquatic macro invertebrate communities showed an improving or stable trend between seasons for the current survey, with the site on the Boesmanspruit (BS1) increasing two PES categories between seasons, and the site on the Swartspruit (SS3) increasing to a near pristine state in terms of the aquatic community.
- All wetlands showed a High to Good ecological water quality and PES according to the diatom community, with the exception of TS2, which fell in a Moderate/Good category.

Sites for this study season generally showed a stable or increasing trend in ecological integrity, ranging from Moderately modified to near Pristine ecosystem states. Site TS2 on the Swartspruit system showed signs of nutrient and salt inputs, likely rated to grazing activities on the banks of the river. No impacts related to mining activities were noted in the 2014 low flow survey.

5.4.2.12 CULTURURAL AND HERITAGE RESOURCES

A heritage study was conducted by professional archaeological consultants in 2004 (refer to Appendix I1) to identify all heritage sites that occur in the proposed mining areas and document and assess their importance within local, provincial and national context. In 2013, a follow-up archaeological study was undertaken (Appendix I2) and an additional heritage study was undertaken in 2015 for Zandvoort (Appendix I3). As Kwaggafontein was not included in the previous heritage studies, a heritage study was conducted and the results therof are included in this EIR (Appendix I4). Palaentological studies were conducted on Kwaggafontein and Zandvoort, following a reuest from SAHRA during the scoping phase (Appendix I5).

Cultural and heritage resources include graves, cemeteries, palaeolithic features and structures that are more than 60 years old. It is of great importance to identify these features prior to the proposed

mining activities to ensure that they are correctly protected thereby attempting to prevent disturbance or damage to the features.

The province of Mpumalanga is known to be rich in archaeological sites that tell the story of humans and their predecessors in the region going back some 1.7 million years (Delius and Hay, 2009). The archaeological history of the area can broadly be divided into a Stone Age, Iron Age and Historic Period. Both the Stone and Iron Ages form part of what is referred to as the Pre-Colonial Period (Prehistoric Period) whereas the Historic Period is referred to as the Colonial Period. The archaeological and historical overview of the study area and surrounding landscape is summarised in a chronological order in Table 31 below.

Table 31: Archaeological and Historical Overview of the Study Area and Surrounding Landscape

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The Earlier Stone Age is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago. No Early Stone Age sites are known from the study area or direct vicinity. This is more than likely rather due to lack of research focus in this area than an absence of such sites.
250 000 to 40 000 years ago	The Middle Stone Age is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique. No Middle Stone Age sites are known from the study area or direct vicinity. This is more than likely rather due to lack of research focus in this area than an absence of such sites.
40 000 years ago to the historic past	The Later Stone Age is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. Later Stone Age sites, including rock paintings, are known from the farm Groenvlei in localities roughly 5 km east of Carolina (Van Niekerk, 1984)

DATE	DESCRIPTION
	(Bergh, 1999). The farm Groenvlei (or Groenvallei) is located adjacent to and directly south of Zandvoort and within the Pembani Colliery area.
AD 280 – AD 450	The earliest phase in the Iron Age history of Southern African is known as the Early Iron Age. According to the distribution maps published by Huffman (2007) the only possible presence of Early Iron Age sites in the study area and surrounding landscape would be in the form of the so-called Silver Leaves facies of the Kwale Branch of the Urewe Tradition. This facies is dated to between AD 280 and AD 450. The key features on the decorated ceramics of the Silver Leaves facies comprise multiple facets in the first position (Huffman, 2007).
AD 1650 – AD 1840	The second phase in the Iron Age history of the study area and surrounding landscape is in the form of the Marateng facies of the Moloko Branch of the Urewe Tradition. The key features in the decorated ceramics of the Marateng facies are incised arcades on upper shoulder separating black and red (Huffman, 2007).
c. 1800	At the time a group of people known as the Phuthing were living in the wider surroundings of the present study area (Bergh, 1999). According to this author the Phuthing were at the time living in the watershed between the upper reaches of the Vaal and Olifants Rivers.
c. 1821	Across the Highveld this period was characterised by warfare and unrest. Known as the Mfecane, these years of upheaval originated primarily in the migration of three Nguni groups from present day Kwazulu-Natal into the present day Free State, North West, Gauteng and Mpumalanga as a result of the conquests of the Zulu under King Shaka. The three Nguni groups were the Hlubi of Mpangazitha, the Ngwane of Matiwane and the Khumalo Ndebele (Matabele) of Mzilikazi. Only the latter group is of relevance to the present study area and surroundings. The Khumalo Ndebele left present day Kwazulu Natal and moved through the general vicinity of the present study area. In this general area they attacked the Phuthing who fled southward across the Vaal River (Bergh, 1999).
1836 – 1850	Although the first Voortrekker parties started crossing over the Vaal River in 1836, the years 1839 to 1840 saw the first widespread settlement of Voortrekkers north of the Vaal River in an area which

DATE	DESCRIPTION
	encompasses the south-eastern end of the North West Province and the western end of Gauteng. Early towns such as Klerksdorp, Potchefstroom, Rustenburg and Pretoria were all included in this first settlement area. Between 1841 and 1850 an expansion of settlement took place which included present day towns of Bronkhorstspruit in the east, Thabazimbi in the north and Rooigrond in the west (Bergh, 1999).
1845 – 1864	The district of Lydenburg was established in 1845 and the study area fell within this district (Bergh, 1999). It can be expected that the general surroundings of the study area would have increasingly being settled by Voortrekkers after the establishment of this district. The permanent settlement of white farmers in the general vicinity of the study area would have resulted in the proclamation of individual farms and the establishment of permanent farmsteads. Features that can typically be associated with early farming history of the area include farm dwellings, sheds, rectangular stone kraals, canals, farm labourer accommodation and cemeteries. While very few heritage sites associated with the very first establishment of white farmers in the study area would likely still be found, a number of farmsteads dating from the 1880s and 1890s are likely still in existence in the general vicinity of the study area. The other sites often associated with these early farms are graves and cemeteries for both white farmers and black farm labourers. A large number of such cemeteries are located in the general vicinity of the study area.
16 November 1864	The farm Zandvoort was inspected by J. J. H. Steyn (National Archives, RAK, 3082). It is possible that this person was Jacobus Johannes Hercules Steyn (11 June 1837 – 27 August 1893) who appears to have been a resident of the Lydenburg district (see for example www.geni.com) and may have been responsible for the inspection of the farm at a time when it still fell within the Lydenburg district. If this assumption is correct, then Jacobus Johannes Hercules Steyn would in all likelihood have been a veldkornet or commandant. At the time the farm was proclaimed as Zandvoort number 306 of the Lydenburg District (National Archives, RAK, 3082).

DATE	DESCRIPTION
3 August 1869	The farm Zandvoort was transferred to its first owner, Gerhardus Theodorus Becking (National Archives, RAK, 3082). While no information is presently known about Mr. Becking, his surname suggests a strong Dutch association or origin. It is therefore quite likely for the farm name Zandvoort to have originated with the property's very first owner.
1872 - 1894	During the early 1870s the general vicinity of Witbank was visited by a geologist from Eastern Europe Woolf Harris. During his visit Harris identified coal in the Van Dyksdrift area. He is also believed to have started the Maggie's Mine the following year. Following on these discoveries and events, a number of small coal mining operations were started in the general vicinity of Witbank as well. By 1889 there were four coal mines in the Witbank area, namely Brugspruit Adit, Maggie's Mine, Steenkoolspruit and Douglas (Falconer, 1990). No coal mines are known from the Carolina area at this early point in time.
10 January 1876	The farm Zandvoort was transferred to James Martin Williams (National Archives, RAK, 3082) roughly six years after the death of its first owner Gerhardus Theodorus Becking in 1870 (National Archives, MHG, 0/19328).
7 February 1876	Less than a month after obtaining the farm, James Martin Williams divided Zandvoort into two portions. One portion was transferred to Frans Coenraad Dekker with another going to Richard Thomas Nicolaas James (National Archives, RAK, 3082). No information could be found on these two individuals.
2 December 1879	The portion of the farm Zandvoort belonging to Frans Coenraad Dekker was transferred to the Lydenburg Branch of the Cape Commercial Bank (National Archives, RAK, 3082).
9 March 1880	The portion of the farm Zandvoort belonging to Richard Thomas Nicolaas James was transferred to William Palframan (National Archives, RAK, 3082). It would appear that the person referred to here was William Palfaram who had been born in Binkin, North Yorkshire, Great Britain in c. 1924 and died on 4 August 1905 in Pietermaritzburg, Kwazulu Natal (www.geni.com).

DATE	DESCRIPTION
7 December 1880	The share of the farm Zandvoort belonging to the Cape Commercial Bank was transferred to Hermann Ludwig Eckstein (3 August 1847 – 16 January 1893) (National Archives, RAK, 3082). Eckstein immigrated to South Africa from Germany in 1882 and became manager of the Phoenix Diamond Mining Company at Du Toit's pan in Kimberly. In 1884 he joined the partnership of Jules Porges & Co which later became known as Wernher, Beit & Co. The company was intensively involved in the Barberton and De Kaap goldfields. In 1888 Eckstein started his own firm namely Hermann Eckstein and Co. It was during this early phase in the existence of Hermann Eckstein and Co. that he acquired the portion of the farm Zandvoort. While it is certain that Eckstein would not have bought the farm with the intention of living there (his business interests were more orientated towards Johannesburg), it may have been acquired for farming purposes or alternatively for coal. Amongst many accomplishments, Eckstein is known to have established the Chamber of Mines in Johannesburg and acted as its president until 1892. He was also one of the leading role players in the mining development of the Witwatersrand and the Transvaal Republic. In 1903, a decade after his death, Eckstein's former partners made a gift to the City of Johannesburg of a portion of land known as the Sachsenwald. This land presently includes Saxonwold, Forest Town, Zoo Lake and the Johannesburg Zoo. At the time, the area which today encompasses the Johannesburg Zoo and Zoo Lake was known as the Hermann Eckstein Park in honour of this historic figure.
26 October 1882	The district of Ermelo was proclaimed (Bergh, 1999). The study area would now fall within this district for the next 11 years.
16 June 1886	The town of Carolina was officially proclaimed on this day (Myburgh, 1956) and was proclaimed on the farms Groenvlei and Goedehoop owned by Cornelius Johannes Coetzee. The name of the town is in honour of Coetzee's wife namely Magdalena Carolina Smit.
4 February 1890	The portion of the farm Zandvoort belonging to W. Palframan was transferred to another well known late nineteenth century Transvaal businessman named Alois Hugo Nellmapius (5 May 1847 – 27 July 1893) (National Archives, RAK, 3082).

DATE	DESCRIPTION
	Nellmapius was born in Budapest, Hungary and after the discovery of gold in the eastern Transvaal Republic gave up a promising career as a civil engineer to follow a path of business and fortune in Africa. He arrived in Pilgrims Rest in 1873 and within a short spate of time became successful. At first he ran a successful mule caravan service between the Highveld and Delagoa Bay and also had a successful business of merchant of contraband Portuguese liquor in Pilgrims Rest. However, Nellmapius also had much success in farming and became the owner of large tracks of land, including a farm just south of Pretoria that he named Irene after his daughter (Webster 2002). With time Nellmapius became a friend and confidant of President Paul Kruger and also suggested to Kruger to start implementing concessions. On 3 October 1881 the Republican Volksraad granted Nellmapius the concession for the "*...sole right to manufacture from grain, potatoes and other products growable in the Transvaal, with the exception of tree fruits and grapes, and the right to sell in bulk and bottle free of licence such spirits*." (Webster 2002). This concession was granted for a period of fifteen years which made Nellmapius the only legal licensed producer of spirits in the Transvaal. On 17 June 1882 Nellmapius ceded this concession to a partnership consisting of himself, cousins Isaac and Barnard Lewis and Barnard's brother in law, Samuel Marks (Webster 2002). This laid the foundation for the first liquor distillery in the Transvaal Republican known as De Eerste Fabrieken and in June 1883 President Paul Kruger opened the new distillery and christened it 'Volkshoop' (the Nation's Hope) (Webster 2002).
11 June 1892	Hermann Ludwig Eckstein transferred his portion of Zandvoort to the Transvaal Consolidated Land & Exploration Company Limited (National Archives, RAK, 3082). Incorporated in the 1870s, this company became one of the significant players in the Transvaal Republic as a land company. By the end of the nineteenth century the company owned as many as 656 farms in the Transvaal Republic (Bonner, 2002).
21 December 1893	The district of Carolina was established on this day (Bergh, 1999). The study area now fell within this district. It would remain in this district for at least the next 100 years.

DATE	DESCRIPTION
4 November 1895	Alois Hugo Nellmapius transferred his portion of Zandvoort to the Landed Proprietary Company Limited (National Archives, RAK, 3082). Very little information could be found about this company.
31 December 1902	The Landed Proprietary Company Limited transferred their portion of Zandvoort to the Transvaal Consolidated Land & Exploration Company Limited (National Archives, RAK, 3082). According to a file found in the National Archives (LD, 184, AG6377/02) all the farms owned by the Landed Proprietary Company Limited were transferred to the Transvaal Consolidated Land & Exploration Company during the period between 1902 and 1904. When this transfer was completed it meant that for the first time since 7 February 1876 the farm was again owned by a single entity.
1899 - 1902	The South African War wreaked havoc across Southern Africa during this time. Although no record for any battles or skirmishes for the study area and its immediate surroundings could be located, a number of skirmishes and battles did take place in the surrounding landscape. On 14 August 1900 members of the Canadian force known as Stratchcona's Horse were about to occupy Carolina when they were fired upon by 14 Boers under the command of General Tobias Smuts. The skirmish took place in Dorp Street (Van der Westhuizen & Van der Westhuizen 2000) and the scene of the skirmish is located roughly 4 km south west of Zandvoort. Furthermore, on 7 November 1900, a battle took place at Leliefontein (the battle is also referred to as Witkloof). The farm Leliefontein is located roughly 10 km west by northwest of the present study area. Two senior Boer commanders at the battle, namely General Joachim Fourie and Commandant Hendrik Prinsloo were killed in a fatal frontal attack on a strong British position. Twenty-seven years after the battle, on 7 November 1927, General Smith-Dorrien, the British commander at the battle, erected a memorial on the battlefield in honour of Fourie and Prinsloo. The memorial was designed and built with funds raised from the public in Great Britain (Van der Westhuizen & Van der Westhuizen 2000).

A study was conducted by professional archaeological consultants in 2004 to identify all heritage sites which occur in the proposed mining areas and document and assess their importance within local, provincial and national context. During the survey, twenty-four sites of importance were found along the proposed opencast mining area (Figure 69). In 2013 a follow-up archaeological study was undertaken and identified six archaeological features, two of which were previously identified in 2004. An additional

heritage study was undertaken in 2015 for Zandvoort and in 2017 for Kwaggafontein. Each of the identified archaeological sites is described in detail below.

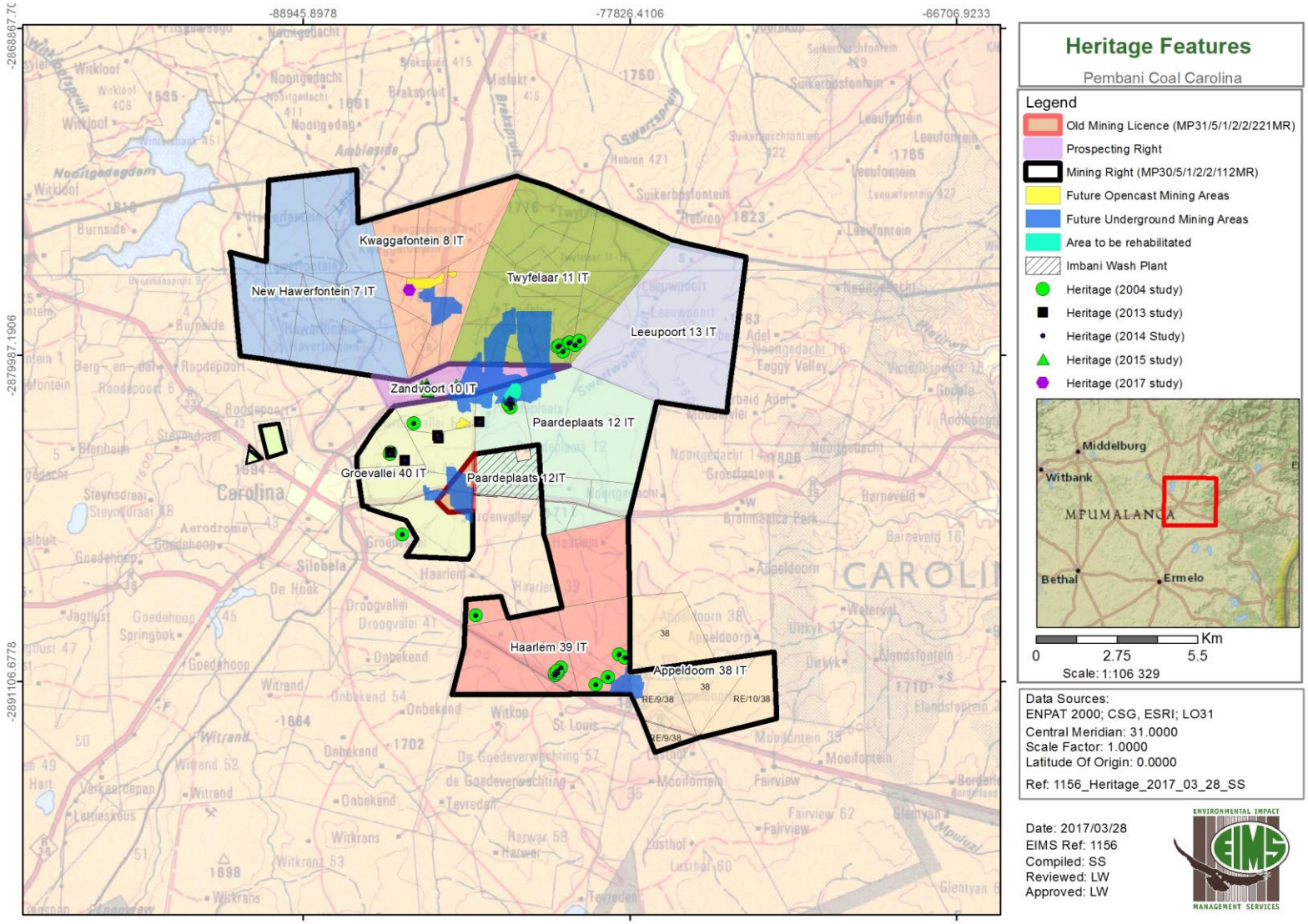


Figure 69: Identified heritage features within the application area

5.4.2.12.1 PALAEONTOLOGY

A desktop palaeontology study was undertaken for Zandvoort in 2015. The site is underlain by Carboniferous to Permian aged tillite of the Dwyka Group, Permian aged sandstone and shale, with coal beds of the Vryheid Formation, Ecca Group and Jurassic aged Dolerite of the Karoo Supergroup. SAHRA requested that a palaeontological study be conducted for the Zandvoort site. Therefore, during April 2017, a palaeontological study of both Zandvoort and Kwaggafontein was undertaken. During the field survey of the proposed Zandvoort development footprint no fossils were found. Similarly, no fossils were found during the thorough field survey of the Kwaggafontein development footprint area. Mining on Kwaggafontein, thus far, has also not recovered any fossils. However, the palaeontological specialist indicated that should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

Due to the igneous nature of the rock, dolerite will contain no fossils; however, the Vryheid Formation is well known for the occurrence of coal beds that resulted from the accumulation of plant material over long periods of time. According to Bamford (2011), little data has been published on these potentially fossiliferous deposits.

The potential to find well preserved plant fossil material can differ from place to place. These are, however, more likely to be found around the coal bearing strata than elsewhere. When they do occur, fossil plants are usually abundant and it would not be feasible to preserve and maintain all the sites. With regards to animal fossils, the late Carboniferous to early Jurassic Karoo Supergroup sediments of South Africa are almost entirely lacking in complete fossils. Trace fossils (ichnofossils) are, however, abundant in the area surrounding the site.

5.4.2.12.2 HERITAGE ASSESSMENTS

Twenty-four (24) heritage features were identified during the 2004 heritage assessment. These comprise twelve (12) potential cemeteries and grave sites, five (5) historical farmsteads, and seven (7) historical structures. Several of these heritage features were noted to fall within the proposed development footprints. A verification of the previously undertaken mining activities and the locations of these heritage features must be conducted in order to verify whether any of the identified heritage features have been disturbed by mining activities. An additional six (6) cemeteries and grave sites were assessed during the 2013 heritage assessment, two of which had been previously identified during the 2004 assessment.

In support of the S102 amendment application a heritage assessment was undertaken for Zandvoort in 2015. A total of seven heritage sites were identified during the study, four of which form part of a single farmstead, namely a farm dwelling, rondavel, garage and shed. The three other sites include one cemetery, one possible informal grave and an old farm dipping structure.

All seven identified heritage sites are surface occurrences and as a result the proposed underground mining activities at Zandvoort 10 IT are not expected to have any direct negative impact on any of these seven heritage sites. Such surface impacts are unlikely if mining is undertaken correctly and safely because of the safety factors required. However potential impacts include vibration and surface subsidence, although these are highly unlikely to occur.

As the majority of the Kwaggafontein site had already been exposed and opencast mining is currently in process, it was not possible to conduct an assessment of the heritage remains. However, satellite imagery which was observed before the site visit suggests that there were no significant buildings or stone-walls present in the area. A small cemetery is located just outside the construction area exists. It has been clearly marked and fenced off as required by SAHRA. The fenced off area is about 20x25 m and contains approximately 16 graves.

A full description of the identified heritage features is included in the specialist studies attached in Appendix I.

5.4.2.13 SOCIO-ECONOMIC

Mpumalanga Province, with Nelspruit as its Capital, occupies 6.5% of South Africa and 3 million (6.9%) of the population resides in this province. Manufacturing industries, mining, power generation industries, tourism, agriculture and forestry are some of the main economical activities in the Mpumalanga area. The GGP in 1993 was around R 28 billion and comprised of 8% of the GGP of South Africa.

The mining area falls specifically within the Albert Luthuli Local Municipality which covers an area of around 5 556.29 km^2, and is one of seven (7) local municipalities of the Gert Sibande District Municipality in Mpumalanga. The Municipality offices are in Carolina and the main industries include agriculture and mining.

The major economic activities and sources of employment are in the mining and quarrying sector (23.9%), the services sector (23.7%), the manufacturing sector (14.3%) and the agricultural sector (13.9%). In Carolina, the main source of employment is the agricultural sector; however increased mining activities are increasing employment opportunities in this sector. Agriculture/forestry and fishing make up the largest percentage of industries in the municipality (27.05%), followed by community, social and government service industries (22.8%). Mining and quarrying only makes up 3.4%.

About 34.3% of the population falls within the elementary occupation category. Around 11.1% are technicians and 10.2% are occupations related to agriculture and fishery. Plant or machine operators make up 9% of occupations. Within the Albert Luthuli Local Municipality 20% of the population is employed, 22% are unemployed and around 58% are not economically active. About 78% of the population within the Albert Luthuli Local Municipality receive no monthly income, 7% receive between R1 – R400 and 9.3% between R401 – R800. Of the households in the area, around 30% receive no income, 15.4% receive between R1 000 – R4 800 annually, 24.6% receive between R4 801 – 9 600 annually.

The Albert Luthuli Local Municipality provides essential services such as water, sanitation and housing to the local communities, although bulk water supply is still administered largely by DWS. Communities obtain water from community standpipes (29.2%), from flowing waters (8.6%) and dam or pool water (1.7%). No municipal water supply is available within the mine boundary and the immediate surrounding areas.

Many school buildings in the Albert Luthuli Local Municipality area are reported to be in unacceptable condition and there is a shortage of classrooms. The schools also lack essential services such as water and electricity. Access to schools is poor and long distances need to be covered for pupils to get to schools. Of the population over 20 years of age, around 37% have no schooling, 23% have secondary schooling and only 5% have tertiary education.

The Pembani Colliery falls within the Albert Luthuli Local Municipality. The Municipality covers an area of about 5 556.29 km^2, and together with six other local Municipalities, contributes to the Carolina District Municipality in the Mpumalanga Province. Towns within the Municipality include Badplaas, Carolina, Eerstehoek and Lochiel. The Municipality offices are based in Carolina, the surroundings of which are predominantly rural. The Municipality is dominated by agricultural (i.e. maize, vegetables, stock farming and timber) and mining industries (coal, lime, granite, iron).

5.4.2.14 TRANSPORTATION, INFRASTRUCTURE AND TAFFIC

Current traffic in the area consists of local farmers, motorists and trucks transporting coal from the mines, mostly for Eskom consumption. Private properties are fenced off to the public but secondary roads are accessible to the public. The main access roads to the area are the R33, R36 and R38. These all lead to Carolina and then to neighbouring towns. The roads in Carolina are currently being upgraded in order to handle the large trucks.

5.4.2.15 VISUAL

The visual aspects section was compiled based on a site assessment and the ortho photos available for the area during 2008. The initial mining plan, which was based on information obtained from the drilling program, was also used.

The surrounding area is predominantly rural in nature with farmhouses and small farm roads connecting the farms to the main roads. There are small areas of plantations and natural vegetation but predominantly fields for grazing and crops. Structures, including the existing mines in the area and associated infrastructure, are visible from neighbouring farms, but are well screened from the main roads. There are various dams and rivers in the vicinity which are aesthetically pleasing, as well as undulating hills and farmhouses. As mining activities progress, they will be visible to residents of Carolina town, and the Silobela township.

5.4.2.16 AIR QUALITY

The project is situated on the Mpumalanga Highveld, an area which has been formally declared as an air quality priority area in terms of Section 18(1) of the National Environmental Management: Air Quality

Act, 2004 (Act 39 of 2004) (NEMAQA), to be known as the “the Highveld Priority Area” (Notice No. 1123 of 23 November 2007 contained in Government Gazette No. 30518).

This declaration is in recognition of the extremely stressed nature of the airshed in this region, home as it is, to much of South Africa’s coal mining activity and to many coal fired power stations. While the declaration of this hotspot does not have a direct impact on the project, it will mean that in the long term this mine will operate in a legislative environment where proper air quality management will be considered a priority and appropriate management and mitigation measures against excessive emissions will be required in keeping with the broader air quality management plan for the area.

Dust monitoring takes place on site on a monthly basis. The network comprises of thirty-seven (37) single buckets, located over nine (9) mining areas (see Figure 70). The selection of sampling sites was in accordance with the latest SANS 1137:2012 guidelines, which stipulates:

- The number of samplers that shall be sufficient to monitor dust fallout at representative locations; and
- Criteria for site selection around the dust source.

This includes monitors located at human residences and sensitive business, non-residential or agricultural locations within a maximum distance of two kilometres (km) from the source boundary. A site might sometimes be located farther to establish background away from the influence of source emissions.

Typical sources of the fugitive dust emissions are from farming activities such as ploughing, mining and transportation of coal on the dirt roads in the area. Table 32 below indicates the annual dust fallout averages for all Pembani areas.

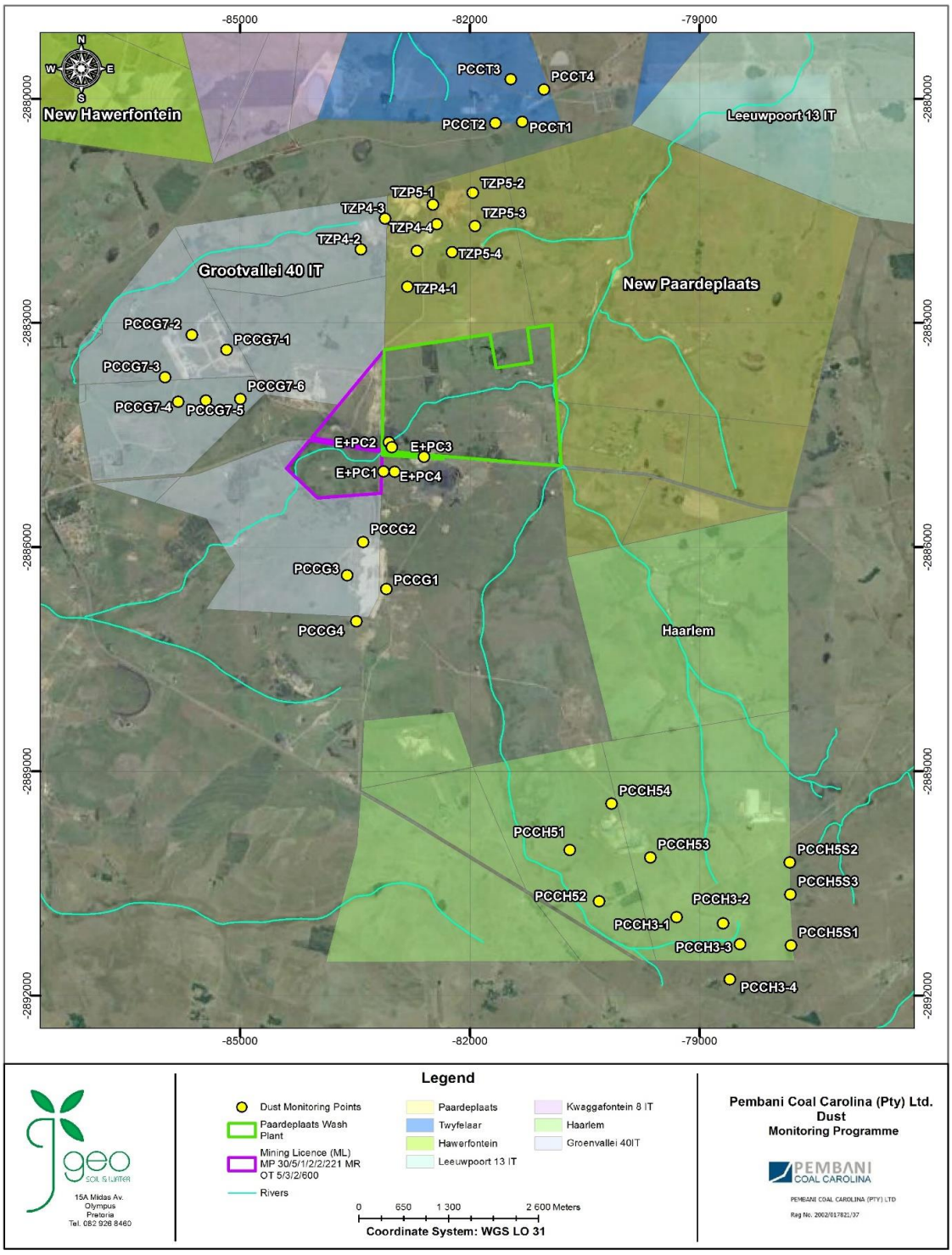


Figure 70: Pembani dust fallout monitoring programme

Table 32: Combined annual averages for all Pembani areas

Pembani Dust Fallout Monitoring 2014 Monthly Average – All Pembani Areas	
Monitoring Area	**Dust Fallout in mg/m^2/day**
	All Areas
Groenvallei	342.001
Twyfelaar	255.750
E+PC	798.029
TZP4	513.978
TZP5	350.680
Groenvallei 7	464.274
Haarlem 3	489.538
Haarlem 5	419.369
Haarlem 5 South	344.623
* NDCR, 2013 - National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004). National Dust Control Regulations 2013.	
** Values highlighted in yellow exceeded the NEMA: AQA Residential Standards	
*** Values highlighted in red exceeded the NEMA: AQA Non-residential Standards	
NR = No Results - Either because of theft or the dust sample was compromised	

From the results, it is evident that dust fallout recorded at the monitoring sites fluctuated according to the time of season and the intensity of activities. The Imbani Wash Plant, with the highest activity, recorded the highest individual and average dust fallout during the monitoring period. Dust fallout was the highest during the September seasonal winds.

5.4.2.17 NOISE

Noise monitoring points are indicated in Figure 71 and monitoring took place over two eight hour shifts for day and night. The results of the noise monitoring are indicated in Table 33.

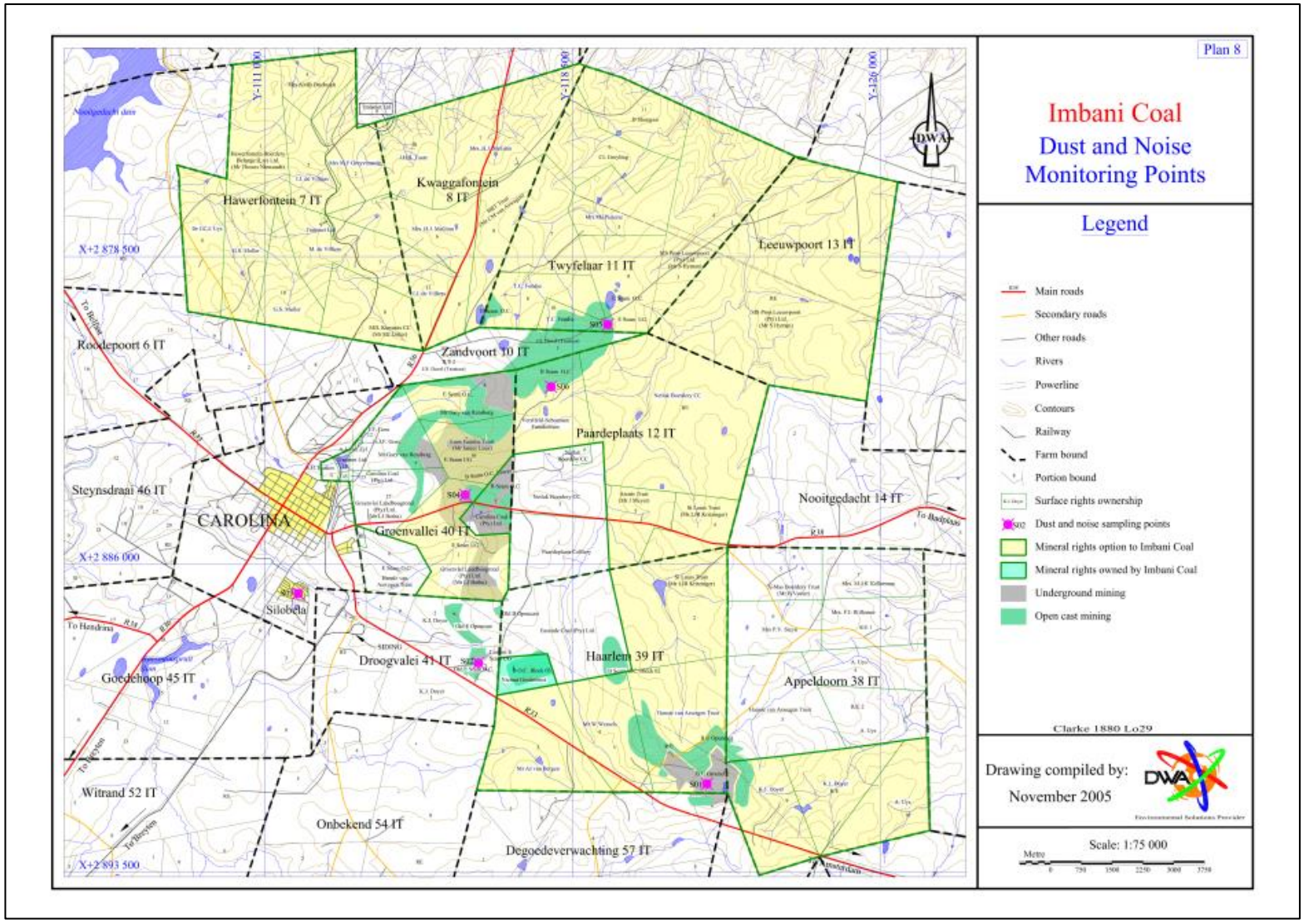


Figure 71: Noise monitoring points (Pink)

Table 33: Noise monitoring in the Mining Right

Monitoring Position	Noise Readings (dBa)	
	Day	Night
1	48,1	43,0
2	64,7	54,8
3	68,4	61,7
4	32,5	54,9
5	50,8	42,7
6	53,3	45,3

Noise levels exceeding 85dBa can cause damage to hearing. From the results above it is evident that all noise levels are within acceptable levels. Noise in the Carolina area is generated from road traffic, farm machinery, animals, urban living and, in some parts, mining activities.

5.4.2.18 BLASTING AND VIBRATION

The opencast blasting operations will be the main source contributing to the influences with regards to ground vibration levels, air blast levels and fly rock. These aspects contribute to damage to structures and causing nuisance to humans and animals if levels are too high and not controlled. Apart from levels that causes damage the possible influence with regards to the human perceptions of ground vibration and air blast will also be considered. Humans are sensitive to even very low level effects of ground vibration and air blast. In order to take this into consideration an area of 3500m is identified as the area that could observe influence. This is in view that people will experience ground vibration at levels as low as 0.75mm/s[3].

5.4.2.19 ENVIRONMENTAL ASPECTS WHICH MAY REQUIRE PROTECTION AND/OR REMEDIATION

Environmental aspects both within the application and surrounding area that may require protection or remediation are listed in Table 34 below. These aspects have been identified and based on the information contained in the description of the baseline receiving environment as well as the impact assessment. These environmental aspects that may require protection or remediation have been included in the action plan and technical management measures contained in this report.

Table 34: Environmental aspects requiring protection

Aspect	Feature
Topography	Surface drainage lines
Ground water	Ground water resources (such as aquifers)
	Ground water quantity
	Ground water quality
Surface Water	Surface water resources (such as streams and pans)
	Surface water quantity
	Surface water quality
	Wetlands and pans
Biodiversity	Species of concern (flora and fauna)
	Primary vegetation units
	Wetlands and pans
Soils	Stripped and stockpiled soils
	Soils of moderate to high agricultural potential
Land Use	Livestock Grazing
	Agriculture
	Homesteads
Land Capability	Agricultural potential
	Grazing potential
Air Quality	Ambient air quality
Noise Environment	Ambient noise levels
Social	Livelihoods
Economic	Employment
Heritage and Cultural	Heritage Resources (cemeteries, graves, structures older than 60 years)
	Palaeontological features
Visual	Sensitive viewer locations

5.4.3 DESCRIPTION OF CURRENT LAND USES

The pre-mining landuse of the mine area was described in the original EIA for the mining right application. The predominant landuses on the properties that make up the project area are:

- Arable land;
- Dry beans cultivation;
- Fallow land;
- Grazing;
- Informal settlement;
- Maize cultivation;
- Pastures; and

- Wetland.

The current land use for the site is a combination of opencast and underground mining. There remain areas where active mining is not underway and the pre-mining land uses continue in co-exist with mining operations. This includes the following land uses that existed prior to mining:

- Agriculture - Maize;
- Dry beans
- Pastures;
- Grazing;
- Fallow land;
- Wetland; and
- Informal settlement.

5.4.4 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON SITE

The sensitive environmental features on site have been mapped together with the mine infrastructure layout and are presented in Figure 72 to Figure 75. Sections within the mining right area are identified as Critical Biodiversity Areas (CBA) and Ecologically Sensitive Areas (ESA) according the Mpumalanga Conservation Plan (CPLAN). The CPLAN is a compilation of sensitive ecological elements considered to be a high priority in terms of protection and conservation.

Further to the above, specific environmental features identified on site which may require protection, remediation, management or avoidance includes the following identified sensitive features:

- Farmhouses and associated farm buildings;
- Rural settlements;
- Infrastructure such as Eskom Transmission/Distribution lines and servitudes;
- Several heritage features, including grave sites;
- Remaining areas of natural vegetation;
- High Biodiversity areas; and
- Watercourses, wetlands and dams.

The existing surface infrastructure located within the application area is considered sensitive in terms of physical damage. Mitigation measures will stipulate total avoidance of surface infrastructure with a 100 m buffer or unless other with stipulated by the landowner or Chief Mining officer, whichever is relevant.

5.4.5 ENVIRONMENTAL AND CURRENT LAND USE MAPS

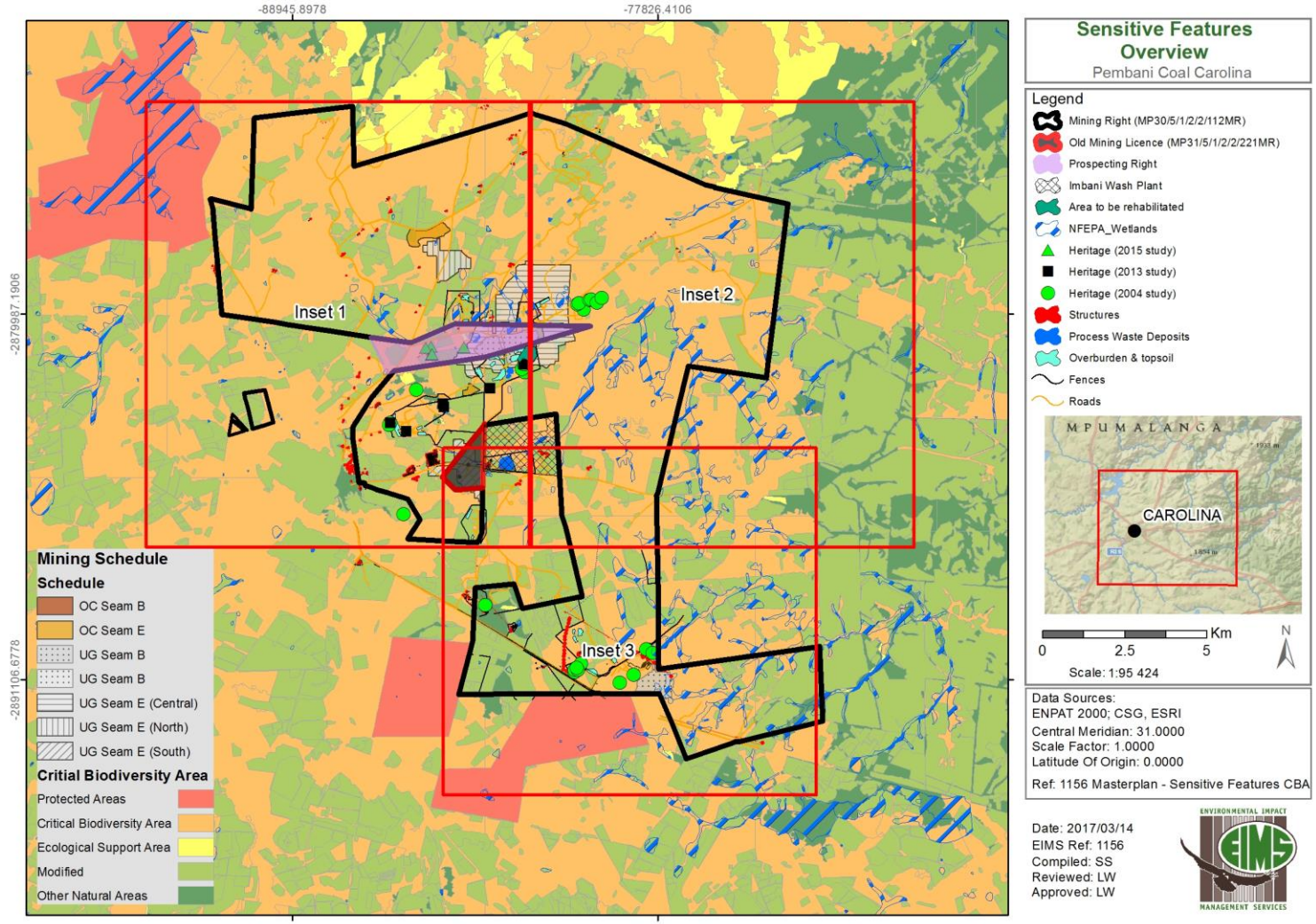


Figure 72: Sensitive Environmental Features - Overview

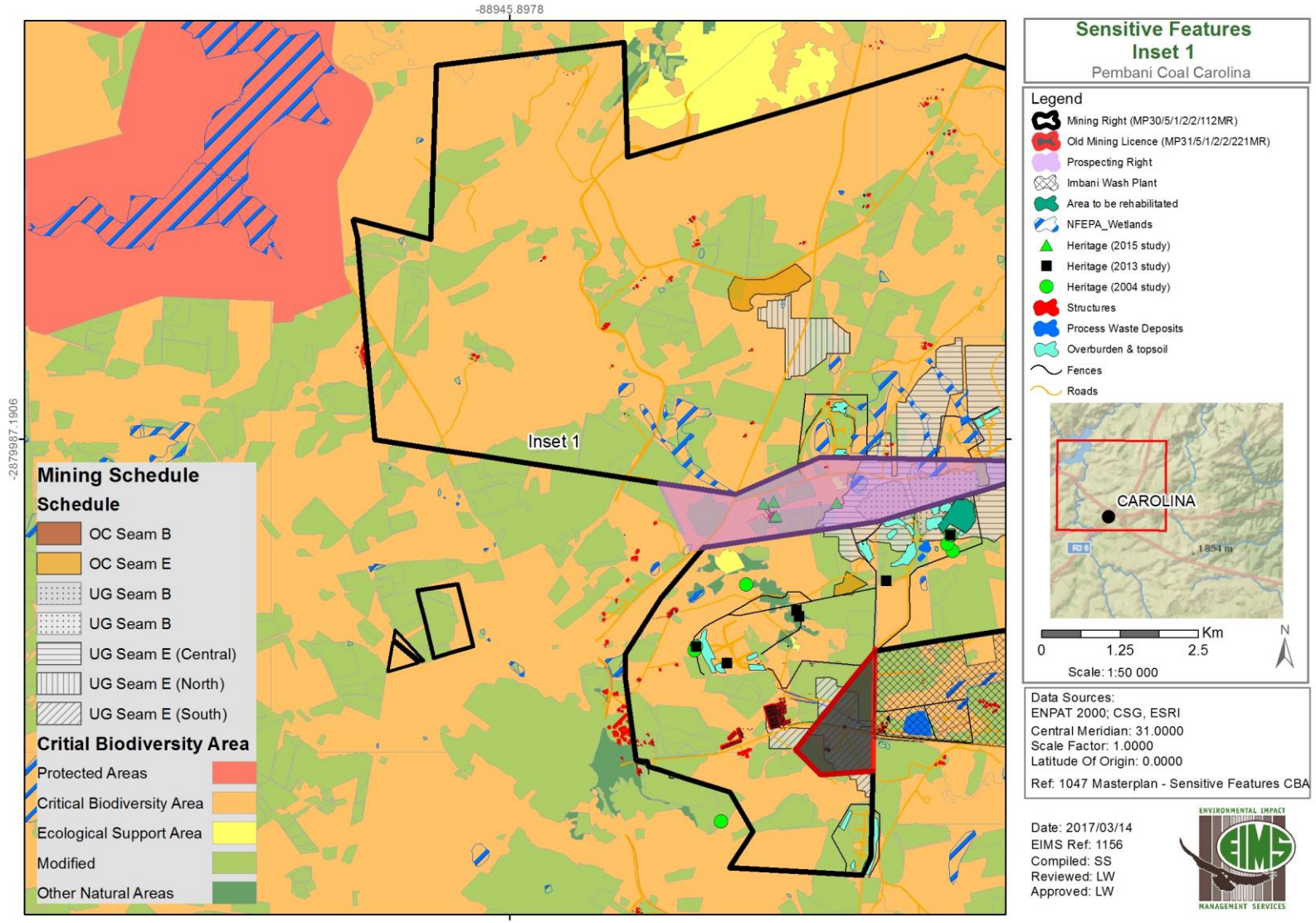


Figure 73: Sensitive Environmental Features – Inset 1

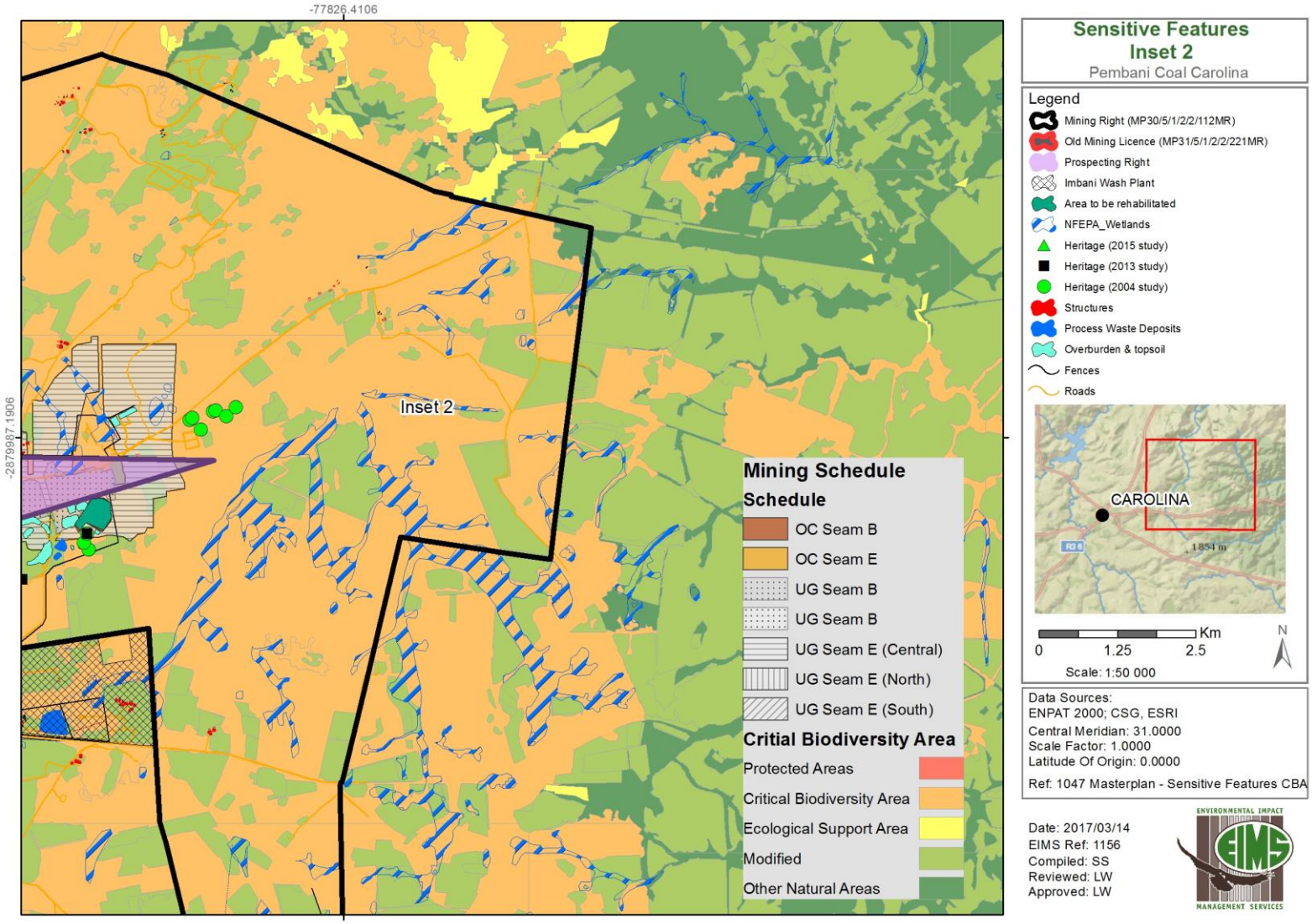


Figure 74: Sensitive Environmental Features – Inset 2

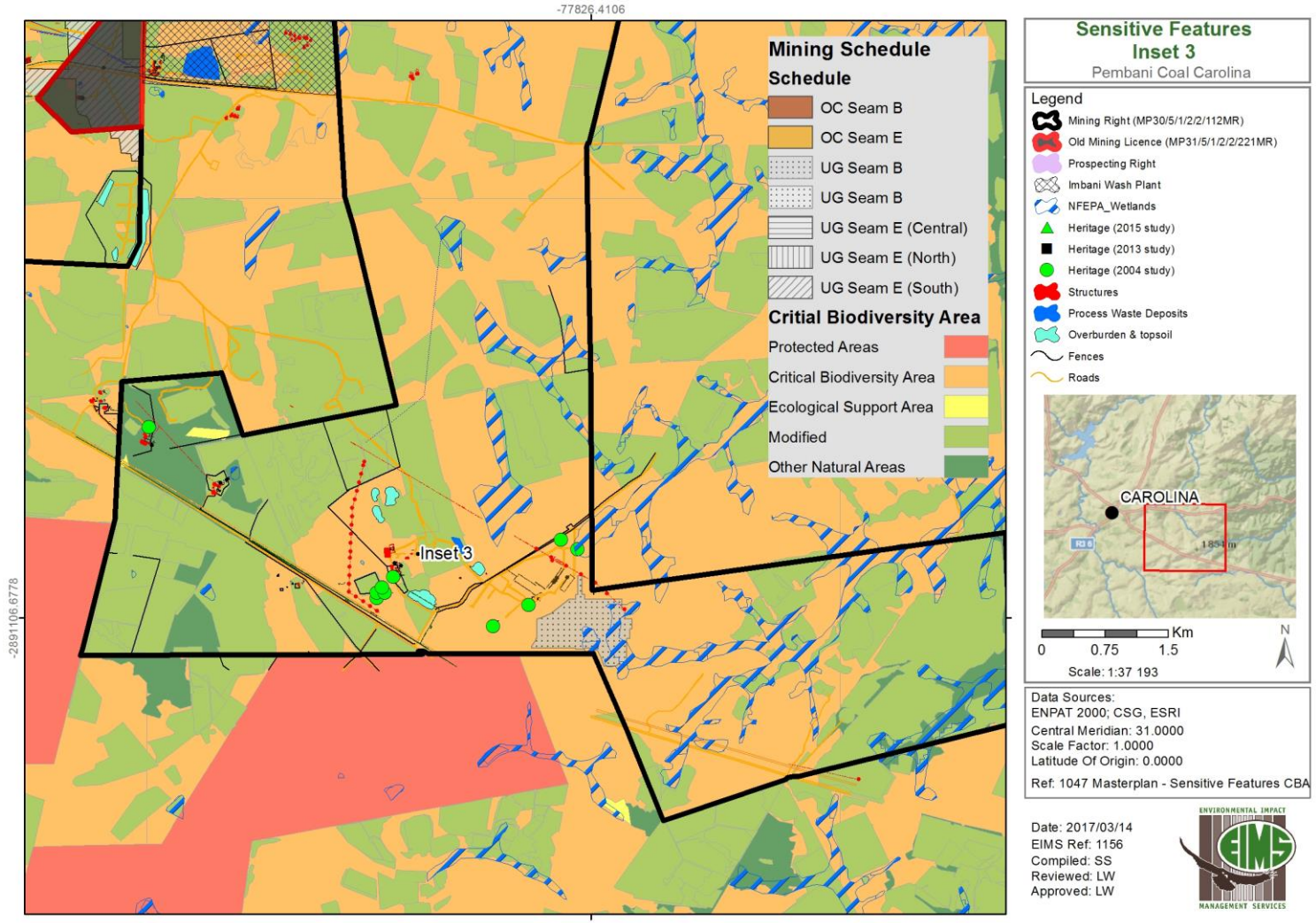


Figure 75: Sensitive Environmental Features – Inset 3

5.5 IMPACTS AND RISKS IDENTIFIED

Impacts and risk were identified through the review of previous reports, current activities taking place on site and those proposed to take place in the future.

It is important to note that as an operational mine, Pembani has been subject to previous impact and risk identification and this information combined with on site observation as well as proposed activities form the basis of impact and risk identification.

As such the following impacts and risk per environmental aspect have been identified for each project phase:

Aspect	Impact
Planning and Design Phase	
Soils	Soil compaction
Land use	Interference with existing land uses
Fauna and Flora	Direct and indirect mortality of flora and fauna
	Introduction/invasion by alien (non-native) species
Environmental Pollution	Hydrocarbon spills/contamination
Social	Crime and violence
	Influx of migrant workers
	Social vices
	Loss of sense of place
	Relocation
Socio-Economic	Education, Skills Development and Training
	Employment Opportunities
	Economic growth
	Impacts on local farm labour
	Loss of jobs and economic opportunities
	Perceptions and Expectations
	Re-instatement of livelihoods
Health and Safety	Community health and safety
	Health impacts
Air Quality	Fugitive emissions (Dust)
Noise	Disburbing and/or nuisance noise
Construction Phase	
Topography and Landform	Soil surface subsidence
	Alteration of topography
	Altered drainage patterns
Soils	Soil compaction
	Soil Pollution/Contamination
	Erosion and sedimentation
Land Capability	Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability
	Loss of soil resource and its utilisation potential
Land use	Interference with existing land uses
	Impacts on services
Fauna and Flora	Direct and indirect mortality of flora and fauna
	Habitat fragmentation and blockage of seasonal and dispersal movements
	Introduction/invasion by alien (non-native) species
Surface Water	Pollution of surface water resources/decreased water quality
	Decrease in surface water quantity/availability
Groundwater	Pollution of groundwater/decreased water quality

Aspect	Impact
	Decrease in groundwater quantity/availability
Wetlands	Loss and disturbance of wetland habitat
	Decreased watermake to adjacent wetlands
Environmental Pollution	Sewage spills/contamination
	Hydrocarbon spills/contamination
Heritage	Destruction/damage of heritage resources
	Destruction/damage of palaeontological resources
Social	Crime and violence
	Influx of migrant workers
	Social vices
	Loss of sense of place
	Relocation
Socio-Economic	Education, Skills Development and Training
	Employment Opportunities
	Perceptions and Expectations
	Economic growth
	Impacts on local farm labour
	Loss of jobs and economic opportunities
	Re-instatement of livelihoods
Health and Safety	Community health and safety
	Fire and explosion hazard
	Health impacts
Transportation, Infrastructure and Traffic	Damage to road infrastructure
	Increased traffic
Visual	Visual impact of mine infrastructure, stockpiles and dust
	Visual impact of light at night
Air Quality	Fugitive emissions (Dust)
	Greenhouse gas emissions
Noise	Noise
Operation Phase	
Topography and Landform	Altered drainage patterns
	Alteration of topography
	Soil surface subsidence
Geology	Impacts on Geology
Soils	Soil compaction
	Soil Pollution/Contamination
	Erosion and sedimentation
Land Capability	Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability
	Loss of soil resource and its utilisation potential
Land use	Interference with existing land uses
	Impacts on services
Fauna and Flora	Direct and indirect mortality of flora and fauna
	Introduction/invasion by alien (non-native) species
	Habitat fragmentation and blockage of seasonal and dispersal movements
Surface Water	Pollution of surface water resources/decreased water quality
	Decrease in surface water quantity/availability
Groundwater	Pollution of groundwater/decreased water quality
	Decrease in groundwater quantity/availability
	Dewatering of groundwater aquifers
Wetlands	Decreased watermake to adjacent wetlands
	Loss and disturbance of wetland habitat
	Undermining of wetlands - surface subsidence
Environmental Pollution	Hydrocarbon spills/contamination

Aspect	Impact
	Sewage spills/contamination
	General Environmental Pollution
Heritage	Destruction/damage of heritage resources
	Destruction/damage of palaeontological resources
	Discovery and preservation of fossils
Social	Crime and violence
	Influx of migrant workers
	Social vices
	Loss of sense of place
	Relocation
Socio-Economic	Education, Skills Development and Training
	Employment Opportunities
	Perceptions and Expectations
	Economic growth
	Impacts on local farm labour
	Loss of jobs and economic opportunities
	Re-instatement of livelihoods
	Coal supply for energy security
Health and Safety	Community health and safety
	Health impacts
	Fire and explosion hazard
	Fly Rock
Transportation, Infrastructure and Traffic	Damage to road infrastructure
	Increased traffic
Visual	Visual impact of light at night
	Visual impact of mine infrastructure, stockpiles and dust
Air Quality	Fugitive emissions (Dust)
	Greenhouse gas emissions
Noise	Noise
Blasting and Vibration	Air Blast
	Ground Vibration and human perception
	Ground Vibration Impacts on productivity of farm animals (cattle, chickens, pigs, etc.)
	Impacts on Infrastructure (roads, communications infrastructure, services, houses, boreholes)
	Noxious fumes
Decommissioning Phase	
Topography and Landform	Altered drainage patterns
	Alteration of topography
	Soil surface subsidence
Soils	Erosion and sedimentation
	Soil Pollution/Contamination
	Soil compaction
Land Capability	Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability
	Loss of soil resource and its utilisation potential
Land use	Interference with existing land uses
	Impacts on services
Fauna and Flora	Introduction/invasion by alien (non-native) species
	Direct and indirect mortality of flora and fauna
Surface Water	Pollution of surface water resources/decreased water quality
Groundwater	Decrease in groundwater quantity/availability
	Pollution of groundwater/decreased water quality
	Dewatering of groundwater aquifers
Wetlands	Decreased watermake to adjacent wetlands

Aspect	Impact
Environmental Pollution	Hydrocarbon spills/contamination
	General Environmental Pollution
	Sewage spills/contamination
Social	Crime and violence
	Influx of migrant workers
	Social vices
	Loss of sense of place
	Relocation
Socio-Economic	Employment Opportunities
	Economic growth
	Education, Skills Development and Training
	Impacts on local farm labour
	Loss of jobs and economic opportunities
	Re-instatement of livelihoods
Health and Safety	Community health and safety
	Health impacts
Transportation, Infrastructure and Traffic	Damage to road infrastructure
Visual	Visual impact of mine infrastructure, stockpiles and dust
Air Quality	Fugitive emissions (Dust)
	Greenhouse gas emissions
Noise	Noise
Rehabilitation and Closure Phase	
Topography and Landform	Alteration of topography
	Altered drainage patterns
	Soil surface subsidence
Soils	Soil compaction
	Erosion and sedimentation
	Soil Pollution/Contamination
Land Capability	Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability
	Loss of soil resource and its utilisation potential
Land use	Interference with existing land uses
	Impacts on services
Fauna and Flora	Direct and indirect mortality of flora and fauna
	Introduction/invasion by alien (non-native) species
	Habitat fragmentation and blockage of seasonal and dispersal movements
Surface Water	Pollution of surface water resources/decreased water quality
Groundwater	Dewatering of groundwater aquifers
	Acid Mine Drainage
	Pollution of groundwater/decreased water quality
	Decrease in groundwater quantity/availability
Wetlands	Loss and disturbance of wetland habitat
Environmental Pollution	Hydrocarbon spills/contamination
	Decant from underground workings
	General Environmental Pollution
	Sewage spills/contamination
Heritage	Destruction/damage of heritage resources
	Destruction/damage of palaeontological resources
Social	Crime and violence
	Influx of migrant workers
	Social vices
	Loss of sense of place
	Relocation

Aspect	Impact
Socio-Economic	Economic growth
	Education, Skills Development and Training
	Employment Opportunities
	Impacts on local farm labour
	Loss of jobs and economic opportunities
	Re-instatement of livelihoods
Health and Safety	Community health and safety
	Health impacts
Visual	Visual impact of mine infrastructure, stockpiles and dust
Air Quality	Fugitive emissions (Dust)
	Greenhouse gas emissions
Noise	Noise

For the existing mining operation, there are no construction phase related impacts to be assessed and therefore only operational, decommissioning, and rehabilitation and closure impacts have been assessed. Each of the identified risks and impacts for these phases was assessed using the EIMS assessment mythology described in section 5.6 below. The assessment criteria include the nature, extent, duration, magnitude/intensity, reversibility, probability, public response, cumulative impact and irreplaceable loss of resources. The full scoring of each impact is provided in the impact assessment table provided in Appendix E.

A summary of the impacts and their significance before and after mitigation is provided in Section 7 of this report (see Table 42 below provides a summary of the potential impacts during the various project phases, as well as the mitigation types that should be implemented and the significance results before and after mitigation.

Table **42**).

5.6 THE IMPACT ASSESSMENT METHODOLOGY

The impact significance rating methodology, as provided by EIMS, is guided by the requirements of the NEMA EIA Regulations. The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. This determines the environmental risk. In addition, other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S).

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER).

The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E+D+M+R) \times N}{4}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 35:

Table 35: Criteria for determination of impact consequence

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary),
	3	Local (i.e. the area within 5 km of the site),
	4	Regional (i.e. extends between 5 and 50 km from the site
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years),
	3	Medium term (6-15 years),
	4	Long term (the impact will cease after the operational life span of the project),
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected),
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected),
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way),
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring prohibitively high time and cost.
	5	Irreversible Impact

Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/scored as per Table 36.

Table 36: Probability scoring

Probability	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur),

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

ER= C x P

Table 37: Determination of environmental risk

Consequence	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
	Probability					

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in **Table 38.**

Table 38: Significance classes

Environmental Risk Score	
Value	Description
< 10	Low (i.e. where this impact is unlikely to be a significant environmental risk),
≥ 10; < 20	Medium (i.e. where the impact could have a significant environmental risk),
≥ 20	High (i.e. where the impact will have a significant environmental risk).

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/ mitigated.

In accordance with the requirements of Regulation 31 (2)(l) of the EIA Regulations (GNR 543), and further to the assessment criteria presented above it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

In addition, it is important that the public opinion and sentiment regarding a prospective development and consequent potential impacts is considered in the decision making process.

In an effort to ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority / significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/ mitigation impacts are implemented.

Table 39: Criteria for the determination of prioritisation

Public response (PR)	Low (1)	Issue not raised in public response.
	Medium (2)	Issue has received a meaningful and justifiable public response.
	High (3)	Issue has received an intense meaningful and justifiable public response.
Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable loss of resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 74. The impact priority is therefore determined as follows:

Priority = PR + CI + LR

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 2 (refer to Table 40).

Table 40: Determination of prioritisation factor

Priority	Ranking	Prioritisation Factor
3	Low	1
4	Medium	1.17
5	Medium	1.33
6	Medium	1.5
7	Medium	1.67
8	Medium	1.83
9	High	2

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is to be able to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential, significant public response, and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

Table 41: Environmental Significance Rating

Environmental Significance Rating	
Value	**Description**
< -10	Low negative (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥ -10 < -20	Medium negative (i.e. where the impact could influence the decision to develop in the area).
≥ -20	High negative (i.e. where the impact must have an influence on the decision process to develop in the area).
0	No impact
< 10	Low positive (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥ 10 < 20	Medium positive (i.e. where the impact could influence the decision to develop in the area).
≥ 20	High positive (i.e. where the impact must have an influence on the decision process to develop in the area).

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

5.7 ASSESSMENT AND EVALUATION OF POTENTIAL PROJECT IMPACTS

Project alternatives have been previously assessed in the relevant applications. As such this report presents the risks and impacts associated with the approved mine design and layout, but also includes risks and impacts associated with the proposed addition of the farm Zandvoort into the area to be mined, as well as the inclusion of additional mining of coal resources through the amendment of the exsiting (within the approved mining right boundary). Due to the nature of the coal reserve (high quality reserve) and the identified sensitivities identified on the surface area of Zandvoort as well as concerns raised by I&AP's it was concluded that underground mining is the only viable alternative for the proposed mining activities on Zandvoort.

It should be noted that this report has been made available to I&AP's for review and comment and their comments and concerns will be addressed in the final report to be submitted to the DMR for adjudication. Furthermore, it should be noted that the impact scores themselves will include the results of the aforementioned public response and comment. The results of the public consultation will be used to update the impact scores upon completion of the public review period, whereafter the finalised report will be submitted to the competent authority for adjudication.

The following sections provide a description and assessment of the potential impacts identified in the impact assessment process. The impact scores below are reflective of the impacts prior to the

implementation of mitigation measures. Please refer to Appendix E for the full impact scoring calculations.

5.7.2 TOPOGRAPHY AND LANDFORM

Topography refers to the surface shape and features of an area. Opencast operations will remove surface material to access and mine an orebody and this can alter the natural topography of the site. Resultant changes to the topography can in turn impact on ground water, surface water drainage, visual character and the safety of both people and animals if not properly mitigated. If underground mining extraction techniques are not carried out correctly, lack of support from underlying layers could cause the surface soil profile to vertically subside to a greater or lesser degree. This could result in limitations to the viability of potential post mining land uses.

The following activities have been associated with potential impacts on topography and landform:

- Construction
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining;
  - Underground mining; and
  - Mineral Processing.
- Decommissioning
  - Infrastructure removal;
  - Filling Opencast Voids; and
  - Decommissioning of Underground Mine Infrastructure.
- Rehabilitation and Closure
  - General Surface Rehabilitation;
  - Storm water management; and
  - Post Closure Monitoring and Maintenance.

Impacts on the topography and landform within the application area are expected to occur as follows:

- Alteration of topography;
- Altered drainage patterns; and
- Soil surface subsidence.

5.7.2.2 SIGNIFICANCE OF IMPACTS

The above impacts on topography and landform will be negative but site specific. They are long term impacts and are expected to last for the duration of the life of the mine and in some cases the impact will be permanent.

Impact	Activity	Pre-Mitigation Score
Operational Phase		
Alteration of Topography	Opencast Mining	-16,25
	Underground Mining	-16,25
Altered Drainage Patterns	Maintenance and operation of site infrastructure and facilities	-12
	Mineral Processing	-12
	Opencast mining	-12
	Underground mining	-12
Soil surface subsidence	Opencast mining	-8,25
	Underground mining	-13
Decommissioning Phase		
Alteration of Topography	Filling Opencast Voids	-11,25
Altered Drainage Patterns	Infrastructure removal	-6,75
	Filling Opencast Voids	-6,75
Soil surface subsidence	Filling Opencast Voids	-10
	Decommissioning Underground Mine Infrastructure	-10
Rehabilitation and Closure Phase		
Alteration of Topography	General Surface Rehabilitation	-6,75
Altered Drainage Patterns	General Surface Rehabilitation	-3
	Storm water management	-3
Soil surface subsidence	Post Closure Monitoring and Maintenance	-6,75

5.7.3 IMPACT ON GEOLOGY

Geology refers to the underlying mineral structure of an area. Alterations to the natural geology could have impacts on other aspects such as groundwater and topography. Mining operations will remove the entire ore body layer which will alter the geology of the site. Resultant changes to the geology can in turn impact on ground water, soil forms, and palaeontological resources. Mining will have a permanent impact on the geology of the application area.

The following activities have been associated with potential impacts on geology:

- Operation

- Underground mining; and
- Opencast mining.

Impacts on the local geology are expected to occur as follows:

- Impacts on Geology

5.7.3.2 SIGNIFICANCE OF IMPACT

The impact on the local geology is permanent as an entire orebody and stratigraphic unit will be removed during the mining operations.

Impact	Activity	Pre-Mitigation Score
Operational Phase		
Impacts on geology	Opencast mining	-18,75
	Underground mining	-18,75

5.7.4 IMPACTS ON SOIL

Mining operations have the potential to damage soil resources through physical loss of soil and/or the contamination of soils, thereby impacting on the soils ability to sustain natural vegetation and altering land capability. Due to the increased activity of trucks and heavy machinery the possibility of soil contamination by leaking oils and fuels is increased. The contamination of soils may contribute to the contamination of surface and groundwater resources. Increased soil erosion can be caused by a loss in vegetative cover resulting in increased water runoff. This is especially likely to occur on sloping terrain. Impacts on soil structure can result in changes to soil drainage, increasing runoff and erosion, and may also result in further potential knock on effects impacting on surface and underground water resources. Loss of the topsoil resource reduces chances of successful rehabilitation and restoration. The underground operations, if confined to bord and pillar mining will have limited impact, with the possibility of subsidence and collapse of the surface at or close to the adit entrances to the underground operations and/or around the ventilation shafts.

The following activities have been associated with potential impacts on soil:

- Planning and Design
  - Drilling monitoring boreholes; and
  - Drilling for continued resource evaluation.
- Construction
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.

- Operation
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining.
  - Underground mining; and
  - Mineral Processing.
- Decommissioning
  - Drilling monitoring boreholes;
  - General decommissioning activities;
  - Decommissioning of Co-Disposal Dump;
  - Infrastructure removal;
  - Filling Opencast Voids; and
  - Decommissioning of Underground Mine Infrastructure.
- Rehabiliation and Closure
  - Drilling monitoring boreholes;
  - General Surface Rehabilitation;
  - Storm water management;
  - Re-vegetation;
  - Post Closure Monitoring and Maintenance; and
  - Water Treatment (when required).

Impacts on soil resources are expected to occur as follows:

- Erosion and sedimentation;
- Soil compaction; and
- Soil Pollution/Contamination.

5.7.4.2 SIGNIFICANCE OF IMPACTS

The above impacts on soil resources will be negative but site specific. They are long term impacts and are expected to last for the duration of the life of the mine.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Soil compaction	Drilling for continued resource evaluation	-9
	Drilling monitoring boreholes	-9
	Mineral Processing	-12
	Opencast mining	-12
	Underground mining	-12
Soil pollution/contamination	Maintenance and operation of site infrastructure and facilities	-12

Impacts	Activity	Pre-Mitigation Score
	Mineral Processing	-12
	Opencast mining	-12
	Underground mining	-12
Erosion and sedimentation	Maintenance and operation of site infrastructure and facilities	-13
	Mineral Processing	-13
	Opencast mining	-13
	Underground mining	-13
Decommissioning Phase		
Soil compaction	Decommissioning of Co-Disposal Dump	-10
	Drilling monitoring boreholes	-7,5
	Infrastructure removal	-10
Soil pollution/contamination	Decommissioning of Co-Disposal Dump	-10
	General decommissioning activities	-10
	Infrastructure removal	-10
	Filling Opencast Voids	-10
	Decommissioning Underground Mine Infrastructure	-10
Erosion and sedimentation	Decommissioning of Co-Disposal Dump	-11
	Infrastructure removal	-11
Rehabilitation and Closure Phase		
Soil compaction	Drilling monitoring boreholes	-7,5
	Post Closure Monitoring and Maintenance	-10
	Storm water management	-7,5
	Water Treatment (when required)	-7,5
Soil pollution/contamination	General Surface Rehabilitation	-10
	Post Closure Monitoring and Maintenance	-10
	Re-vegetation	-10
	Storm water management	-10
	Water Treatment (when required)	-10
Erosion and sedimentation	General Surface Rehabilitation	-10
	Post Closure Monitoring and Maintenance	-10
	Storm water management	-10

Impacts	Activity	Pre-Mitigation Score
	Water Treatment (when required)	-10

5.7.5 IMPACTS ON LAND CAPABILITY

Land capability is closely linked to the soil. Mining operations have the potential to significantly transform the land capability, often irreparably. The types of impacts related to land capability involve post mining compaction, loss of fertility, impeded soil drainage and insufficient depth of the replaced soil. In many cases, mining may result in the land capability class changing from arable to grazing post closure. The loss of potentially productive agricultural land, along with a reduction in land capability may occur as a result of site sterilisation due to mining activities. A reduction of natural soil fertility can be caused by the removal, storage, and replacement of the soil profile. Underground mining does not affect the surface to the same extent as opencast mining. In this respect the impact on the land capability will be less severe and will impact only in areas which will be cleared for infrastructure. Some impacts such as acidification and loss of original soil depth and volume can be permanent and will reduce the capability post closure.

The following activities have been associated with potential impacts on land capability:

- Construction
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Maintenance and operation of site infrastructure and facilities; and
  - Opencast mining.
- Decommissioning
  - Filling Opencast Voids.
- Rehabilitation and Closure
  - General Surface Rehabilitation;
  - Storm water management; and
  - Water Treatment (when required).

Impacts on land capability are expected to occur as follows:

- Loss of soil fertility (denitrification, loss of soil nutrient store and organic carbon stores) and loss of land capability; and
- Loss of soil resource and its utilisation potential.

5.7.5.2 SIGNIFICANCE OF IMPACTS

The above impacts on land capability will be negative but site specific. They are long term impacts and are expected to last for the duration of the life of the mine and in some cases the disturbance will be permanent.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	Maintenance and operation of site infrastructure and facilities	-9
	Opencast mining	-13
Loss of soil resource and its utilisation potential	Maintenance and operation of site infrastructure and facilities	-13
	Opencast mining	-13
Decommissioning Phase		
Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	Filling Opencast Voids	-6,75
Loss of soil resource and its utilisation potential	Filling Opencast Voids	-7,5
Rehabilitation and Closure Phase		
Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	General Surface Rehabilitation	-7,5
	Storm water management	-7,5
	Water Treatment (when required)	-6
Loss of soil resource and its utilisation potential	General Surface Rehabilitation	-7,5
	Storm water management	-7,5
	Water Treatment (when required)	-6

5.7.6 IMPACTS ON LAND USE

The predominant land use in the surrounding area is agriculture. Mining activities have the potential to affect land uses both within the application area and in the surrounding areas. This can be caused by physical transformation of land through direct or indirect impacts. Impacts may be related to factors such as loss of soil, loss of biodiversity, pollution of water, dewatering, air pollution, noise pollution, and damage/destruction from blasting. The nature of opencast mining is such that it is unlikely that mining and other land uses can coexist. This means that any area utilised for opencast mining will be unavailable for other land uses. The extent of surface interference from underground mining is limited to areas of surface infrastructure and the underground entrance only.

The following activities have been associated with potential impacts on land use:

- Planning and Design
  - Drilling monitoring boreholes; and
  - Drilling for continued resource evaluation.
- Construction
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Opencast mining; and
  - Underground mining.
- Decommissioning
  - Drilling monitoring boreholes;
  - Infrastructure removal; and
  - Filling Opencast Voids.
- Rehabilitation and Closure
  - Drilling monitoring boreholes;
  - General Surface Rehabilitation;
  - Storm water management; and
  - Water Treatment (when required).

Impacts on land use are expected to occur as follows:

- Damage/Disruption of services (such as water and power supply, etc.); and
- Interference with existing land uses.

5.7.6.2 SIGNIFICANCE OF IMPACTS

This change in land use will be negative and site specific. The impact will remain for the life of the mine and has an overall low significance.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Impacts on services	Opencast Mining	-13
	Underground Mining	-12
	Drilling for continued resource evaluation	-6,75

Impacts	Activity	Pre-Mitigation Score
Interference with existing land uses	Drilling monitoring boreholes	-6,75
	Opencast Mining	-12
	Underground Mining	-12
Decommissioning Phase		
Impacts on services	Infrastructure removal	-9
Interference with existing land uses	Drilling monitoring boreholes	-5,25
	Infrastructure removal	-5,25
	Filling Opencast Voids	-6
Rehabilitation and Closure Phase		
Impacts on services	Water treatment (when required)	-8
Interference with existing land uses	Drilling monitoring boreholes	-5,25
	General Surface Rehabilitation	-6
	Storm water management	-6

5.7.7 IMPACTS ON FAUNA AND FLORA

The mining activities and the establishment of the supporting infrastructure have the potential to result in loss of vegetation, habitat disruption, loss of ecosystem functionality, habitat transformation, spread of alien invasive species, a reduction in overall biodiversity, increased hunting of animals, the introduction of new species to the site, and disruption of migration routes.

Mining and associated activities may result in the removal and destruction of primary vegetation communities. These communities may be in threat categories according to NEMBA or important according to the Mpumalanga C-Plan. According to the ecology specialists several species listed as threatened under NEMBA, the South African Red Data list, and the Mpumalanga C-Plan are expected to be present on site. Should these species be present on site mining activities may result in losses to the on site populations of these species.

Disturbances to the site may result in an increase of invasive species on site and on downstream and adjacent properties. Increased erosion may alter the drivers that affect wetland vegetation. Several pollutants associated with mining activities including oil, concrete, coal dust, and AMD have the potential to inhibit plant growth and germination and could potentially result in plant mortality. Mining alters the movement of water through the landscape, potentially affecting the hydrological flow regime which is the main driver of natural vegetation.

Threatened animal species are affected primarily by the overall loss of habitat, as direct mining impacts on individuals can often be avoided due to movement of individuals from the area of disturbance. Direct impacts during mining activities are unlikely to have an impact on individual animals of concern, as most are highly mobile and will move out of the area. During operation, birds could potentially suffer mortality

due to collisions with vertical infrastructure, especially infrastructure with low visibility, such as power lines.

The following activities have been associated with potential impacts on fauna and flora:

- Planning and Design
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation; and
  - Site visits.
- Construction
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining;
  - Underground mining; and
  - Mineral Processing.
- Decommissioning
  - Drilling monitoring boreholes;
  - Decommissioning of Co-Disposal Dump;
  - Infrastructure removal; and
  - Filling Opencast Voids.
- Rehabilitation and Closure
  - Drilling monitoring boreholes;
  - General Surface Rehabilitation;
  - Storm water management;
  - Post Closure Monitoring and Maintenance; and
  - Water Treatment (when required).

Impacts on fauna and flora are expected to occur as follows:

- Direct and indirect mortality of flora and fauna;
- Habitat fragmentation and blockage of seasonal and dispersal movements; and
- Introduction/invasion by alien (non-native) species.

5.7.7.2 SIGNIFICANCE OF IMPACTS

The impacts on fauna and flora will be negative and will remain for the life of the mine.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Direct and indirect mortality of flora and fauna	Drilling for continued resource evaluation	-13,75
	Drilling monitoring boreholes	-13,75
	Maintenance and operation of site infrastructure and facilities	-15
	Mineral Processing	-15
	Opencast mining	-15
Habitat fragmentation and blockage of seasonal and dispersal movements	Opencast mining	-14
	Maintenance and operation of site infrastructure and facilities	-14
Introduction/invasion by alien (non-native) species	Drilling for continued resource evaluation	-4,5
	Maintenance and operation of site infrastructure and facilities	-9
	Mineral Processing	-5
	Opencast mining	-5
	Underground mining	-5
Decommissioning Phase		
Direct and indirect mortality of flora and fauna	Drilling monitoring boreholes	-11,25
Habitat fragmentation and blockage of seasonal and dispersal movements	General decommissioning activities	-11
Introduction/invasion by alien (non-native) species	Decommissioning of Co-Disposal Dump	-3,5
	Infrastructure removal	-10
	Filling Opencast Voids	-9
Rehabilitation and Closure Phase		
Direct and indirect mortality of flora and fauna	Drilling monitoring boreholes	-8
	General Surface Rehabilitation	-9
	Post Closure Monitoring and Maintenance	-9
	Storm water management	-9
	Water Treatment (when required)	-9
Habitat fragmentation and blockage of seasonal and dispersal movements	Storm water management	-11
	Water Treatment (when required)	-11

Impacts	Activity	Pre-Mitigation Score
Introduction/invasion by alien (non-native) species	General Surface Rehabilitation	-10
	Post Closure Monitoring and Maintenance	-10
	Storm water management	-8
	Water Treatment (when required)	-3,5

5.7.8 IMPACTS ON SURFACE WATER RESOURCES

Mining activities have the potential to alter surface water features through actual mining methods employed as well as the placement of infrastructure. Hydrocarbon spills from diesel machinery also pose threats to local water resources. Surface infrastructure can result in the diversion of surface runoff to storm water dams and PCD's resulting in a decrease in the quantity of water entering local resources. Should surface water become contaminated it could have impacts on downstream users, resulting in affected livelihoods and supply problems. Underground mining methods are in general, less impactful on surface water than opencast mining methods.

The following activities have been associated with potential impacts on surface water:

- Construction
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining;
  - Underground mining; and
  - Mineral Processing.
- Decommissioning
  - Decommissioning of Co-Disposal Dump; and
  - Filling Opencast Voids.
- Rehabilitation and Closure
  - Re-vegetation; and
  - Post Closure Monitoring and Maintenance.

Impacts on surface water are expected to occur as follows:

- Pollution of surface water resources/decreased water quality; and
- Decrease in Surface Water Availability.

5.7.8.2 SIGNIFICANCE OF IMPACTS

The impacts on surface water will be negative and will remain for the life of the mine.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Decrease in surface water quantity/availability	Maintenance and operation of site infrastructure and facilities	-15
Pollution of surface water resources/decreased water quality	Maintenance and operation of site infrastructure and facilities	-14
	Mineral Processing	-14
	Opencast mining	-14
	Underground mining	-9,75
Decommissioning Phase		
Pollution of surface water resources/decreased water quality	Decommissioning of Co-Disposal Dump	-11
	Filling Opencast Voids	-11
Rehabilitation and Closure Phase		
Pollution of surface water resources/decreased water quality	Post Closure Monitoring and Maintenance	-8,25
	Re-vegetation	-8,25

5.7.9 IMPACTS ON GROUNDWATER

Mining activities have the potential to impact on ground water resources through potential pollution and/or contamination as a result of activities such as the actual mining method employed and resultant geological exposure of oxidising materials, seepage, spillages and both mineralised and non-mineralised waste streams. Additional impacts related to mining activities also include dewatering cones of depression and loss of water supply to surrounding land users. The dewatering of the weathered and fractured aquifer will occur due to the removal of the material below the phreatic surface to reach the coal seam. This cone of depression will extend a short distance from the mine workings (Figure 76 to Figure 77). The cone of depression dewatering will remain in place until the completion of mining when the pits and void will be allowed to fill with water and flood.

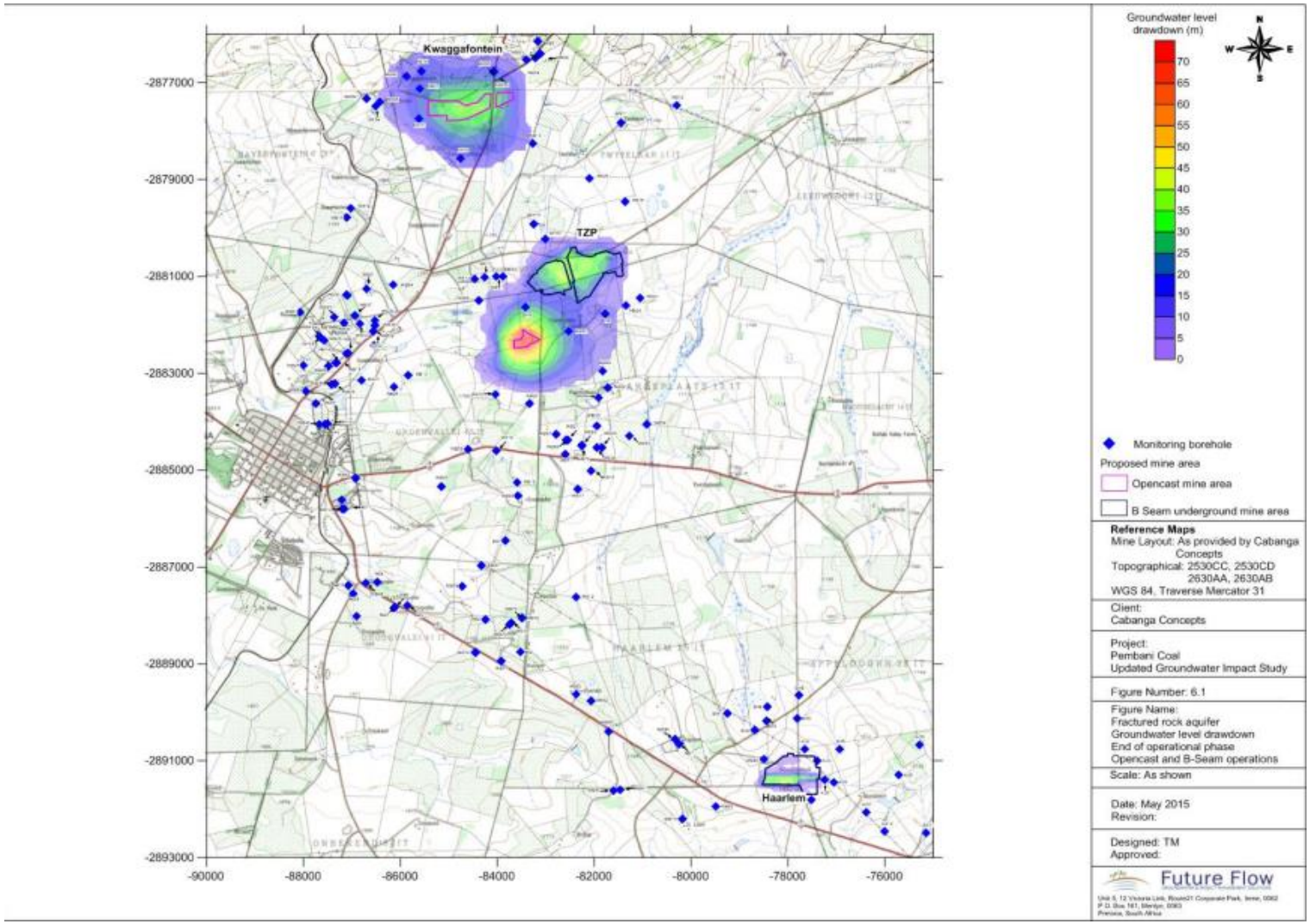


Figure 76: Fractured rock aquifer groundwater level drawdown - end of life operational phase Opencast and B seam operations

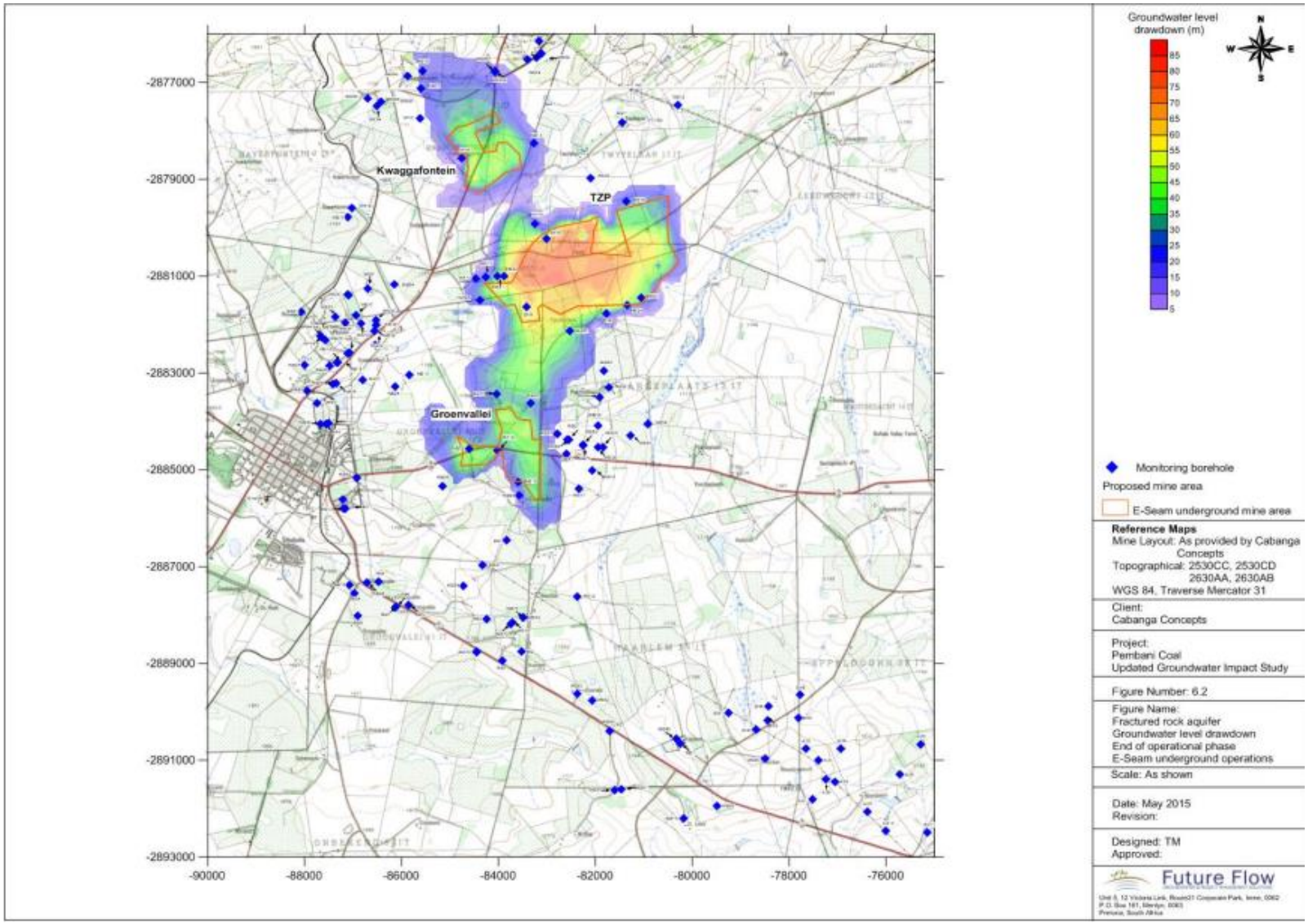


Figure 77: Fractured rock aquifer groundwater level drawdown - end of operational phase E seam operations

The access to the underground mining will be via the highwall of the opencast pits, therefore overlapping with the operational phase of the opencast mining. The driving of the accesses for the underground mining will result in the removal of the coal seam as the exposure of the coal seam roof and floor, the latter material could have a potential for the generation of acid mine drainage. Once the mining has ceased, AMD is still likely to form in the facility. Therefore, a groundwater contaminant plume is likely to migrate from the mining area once the water level in the workings have reached long term steady state conditions (i.e. each underground mine water level has reached the decant level). The migration of pollution in the groundwater could lead to the plume crossing the property boundary, albeit unlikely. Groundwater contamination plumes after mine closure are indicated in Figure 78 to Figure 80. The potential decant points ar indicated in Figure 82.

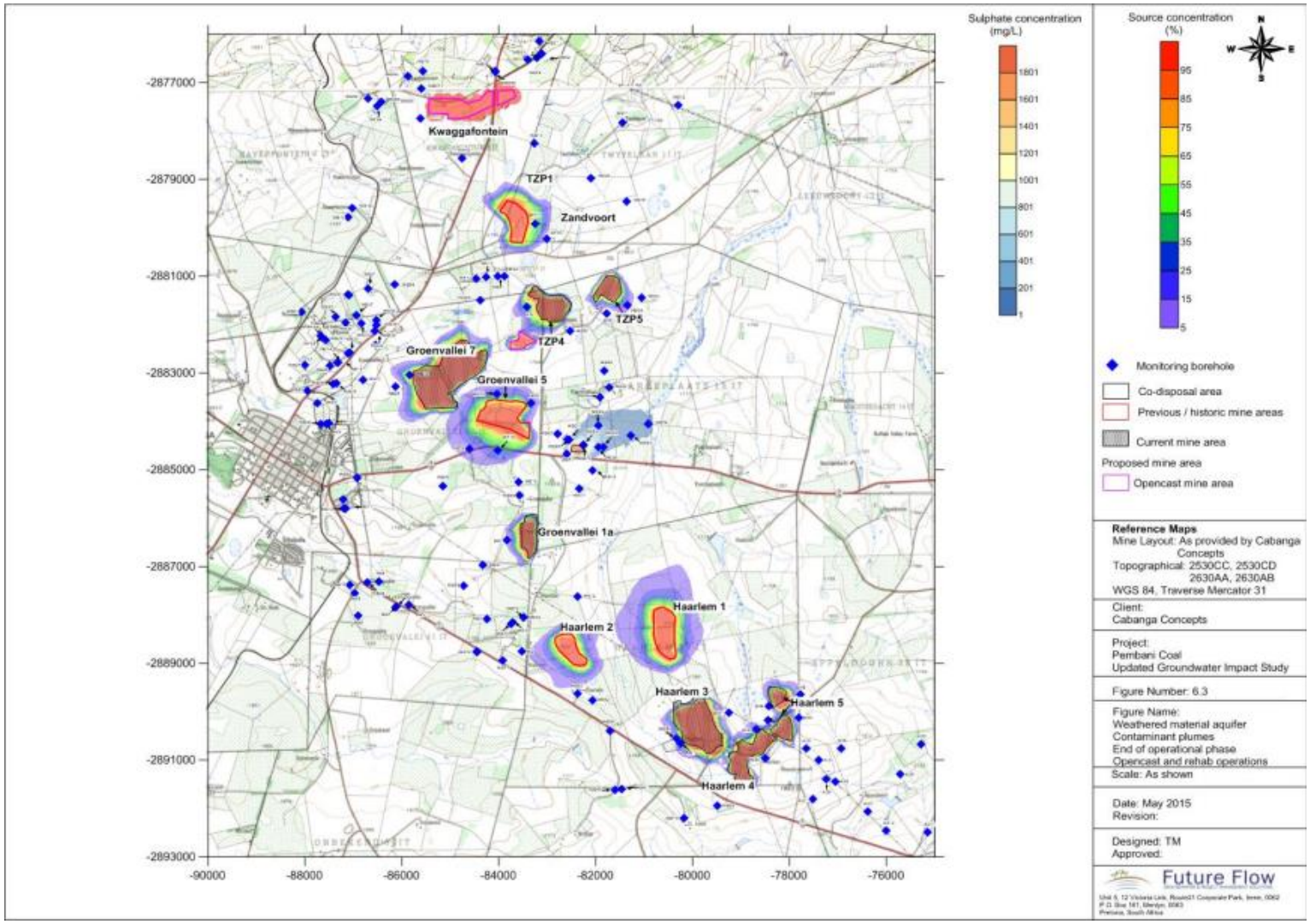


Figure 78: Sulphate plumes at end of life of mine

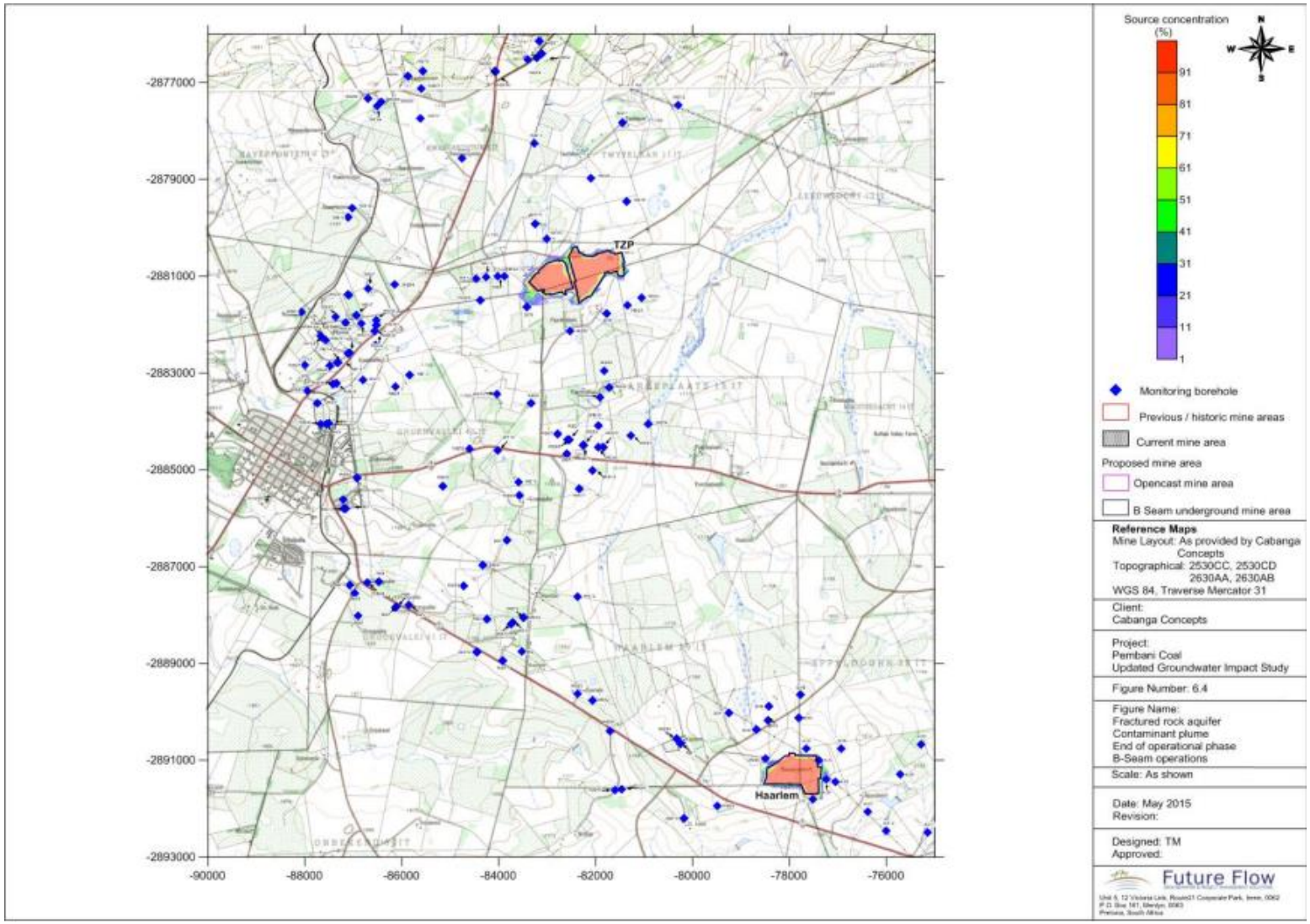


Figure 79: Sulphate plumes for the B Seam operations

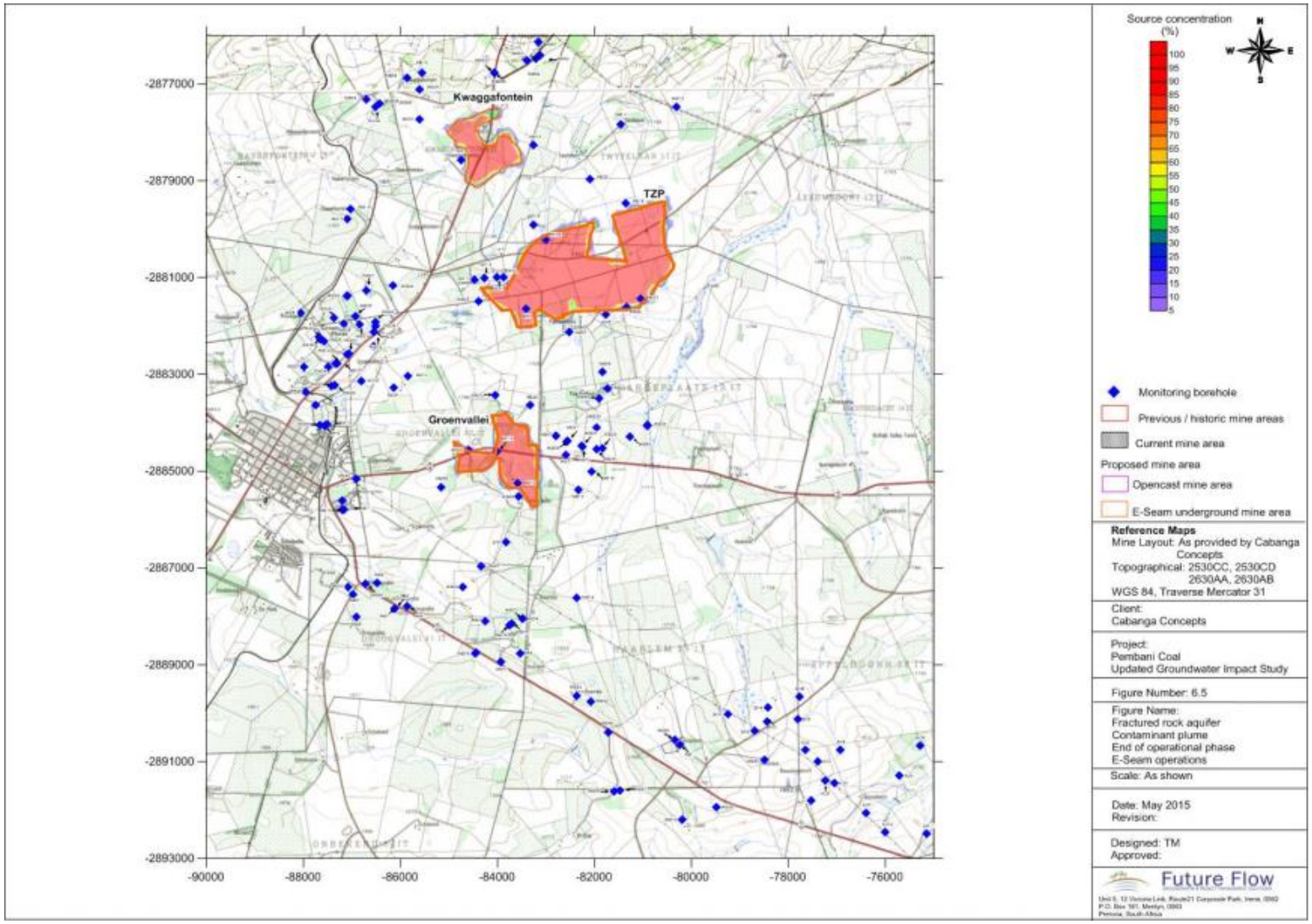


Figure 80: Sulphate plumes for E Seam operations

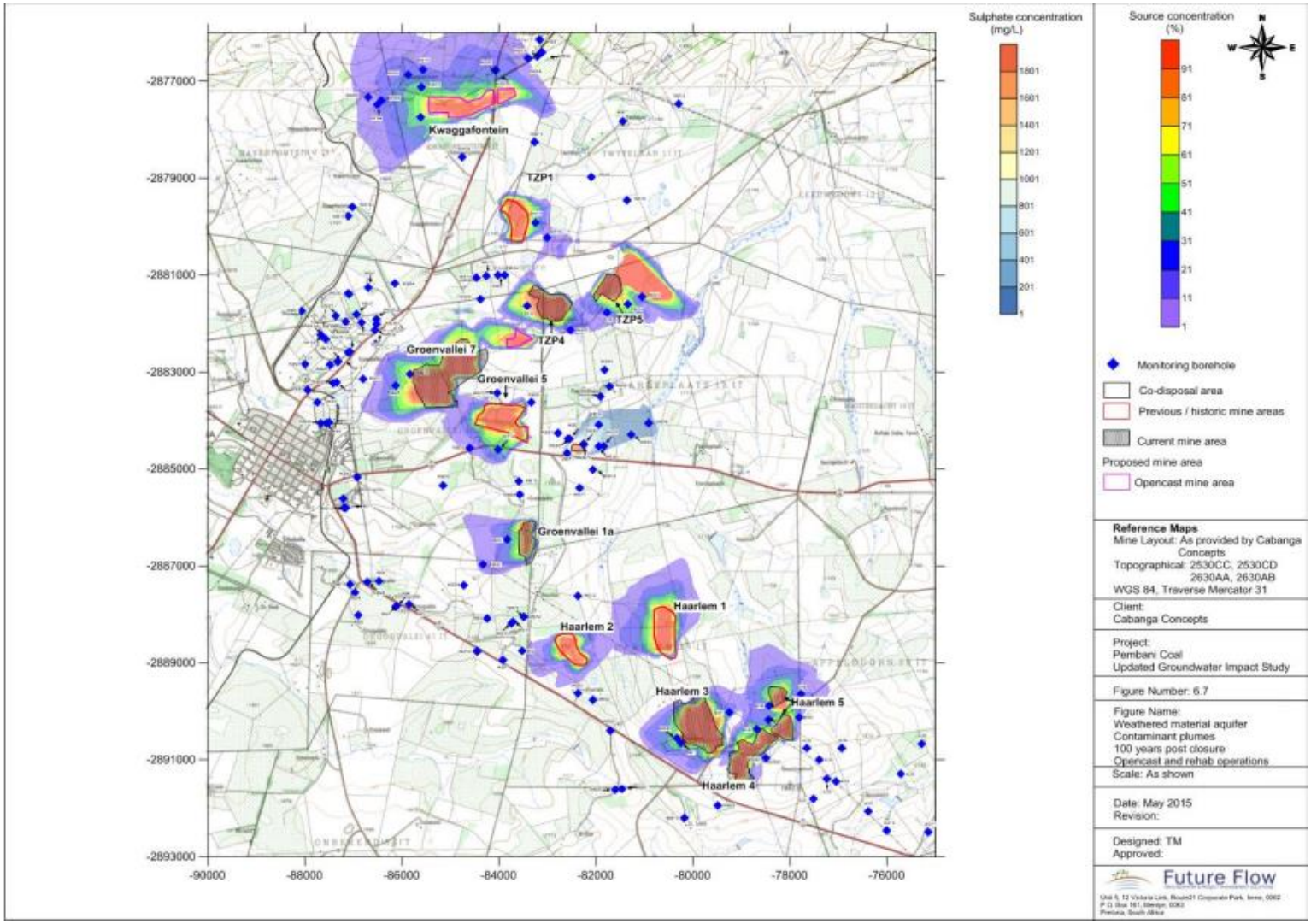


Figure 81: Contamination plumes 100 years after closure

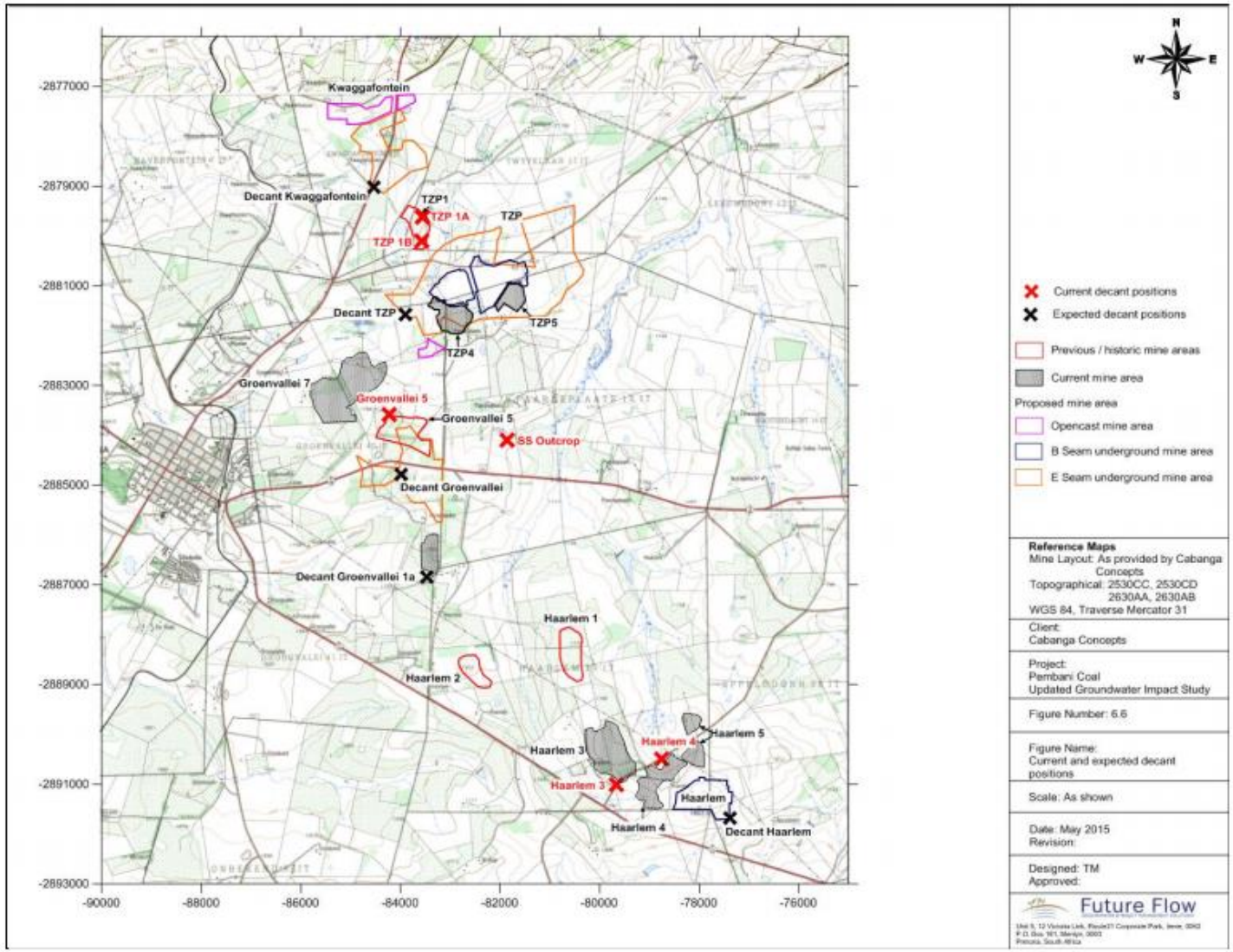


Figure 82: Potential decant points

The bord and pillar mining technique prevents the dewatering of the overlying aquifers due to the low vertical permeability of the Karoo strata. Small areas may be dewatered where the vertical conductivity is higher e.g. dyke contacts of geological faults.

The following activities have been associated with potential impacts on groundwater:

- Construction
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining;
  - Underground mining; and
  - Mineral Processing.
- Decommissioning
  - General decommissioning activities;
  - Filling Opencast Voids; and
  - Decommissioning of Underground Mine Infrastructure.
- Rehabilitation and Closure
  - General Surface Rehabilitation;
  - Storm water management;
  - Re-vegetation; and
  - Post Closure Monitoring and Maintenance.

Impacts on groundwater are expected to occur as follows:

- Acid Mine Drainage;
- Decrease in water quantity/availability;
- Dewatering of groundwater aquifers; and
- Pollution of groundwater/decreased water quality.

5.7.9.2 SIGNIFICANCE OF IMPACTS

The impacts to groundwater will be negative. They are long term impacts and are expected to last for the duration of the life of the mine and in some cases the impact will be permanent.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Decrease in water quantity/availability	Mineral Processing	-15
	Mineral Processing	-15

Impacts	Activity	Pre-Mitigation Score
	Opencast mining	-15
	Underground mining	-15
Dewatering of groundwater aquifers	Opencast mining	-15
	Underground mining	-15
Pollution of groundwater/decreased water quality	Maintenance and operation of site infrastructure and facilities	-11,25
	Opencast mining	-16
	Underground mining	-17
Decommissioning Phase		
Decrease in water quantity/availability	General decommissioning activities	-11
Dewatering of groundwater aquifers	Decommissioning Underground Mine Infrastructure	-9,75
Pollution of groundwater/decreased water quality	Filling Opencast Voids	-8,25
	Decommissioning Underground Mine Infrastructure	-12
Rehabilitation and Closure Phase		
Acid Mine Drainage	Post Closure Monitoring and Maintenance	-22,5
Decrease in water quantity/availability	Re-vegetation	-8,25
Dewatering of groundwater aquifers	General Surface Rehabilitation	-6,5
	Storm water management	-6,5
Pollution of groundwater/decreased water quality	Post Closure Monitoring and Maintenance	-9
	Re-vegetation	-5,5

5.7.10 IMPACTS ON WETLANDS

Mining activities have the potential to damage and/or disturb wetland habitat, and result in deterioration of water quality, increased surface run-off, erosion, increased transport and sedimentation in wetlands, and increased alien vegetation. Erosion of wetlands and watercourses may occur at storm water discharge points due to point source discharges of high velocity flows. The erosion of channels through wetlands results in the local lowering of the water table with resultant partial desiccation and changes in vegetation structure and composition. Erosion of topsoil which could result in silt deposition in wetlands and this could have severe impacts on wetland flow systems and therefore inhibit their functioning. Silt also changes the water quality which will adversely affect the habitat and biodiversity associated with wetlands. Increased sediment movement off the site may occur during mining operations. Increased sediment deposition within wetlands and watercourses can result in alteration to benthic habitats and the establishment of reed beds in areas of sediment deposition. With increased activity of heavy machinery and vehicles, there exists the increased potential of spillages. If hydrocarbons get into the wetland areas, then impacts on the habitat and biodiversity will be severe.

The following activities have been associated with potential impacts on wetlands:

- Construction
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining; and
  - Underground mining.
- Decommissioning
  - Decommissioning of Underground Mine Infrastructure.
- Rehabilitation and Closure
  - Water Treatment (when required).

Impacts on wetlands are expected to occur as follows:

- Decreased watermake to adjacent wetlands;
- Loss and disturbance of wetland habitat; and
- Undermining of wetlands - surface subsidence.

5.7.10.2 Significance of Impacts

The impacts to wetlands will be negative and site specific. They are long term impacts and are expected to last for the duration of the life of the mine and in some cases the impact will be permanent.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Decreased watermake to adjacent wetlands	Maintenance and operation of site infrastructure and facilities	-12
	Opencast mining	-12
	Underground mining	-12
Loss and disturbance of wetland habitat	Maintenance and operation of site infrastructure and facilities	-15
	Opencast mining	-18,75
	Underground mining	-15
Undermining of wetlands - surface subsidence	Underground mining	-14
Decommissioning Phase		
Decreased watermake to adjacent wetlands	Decommissioning Underground Mine Infrastructure	-7,5
Rehabilitation and Closure Phase		
Loss and disturbance of wetland habitat	Water Treatment (when required)	-15

5.7.11 IMPACT OF ENVIRONMENTAL POLLUTION

Environmental pollution refers to any contamination of the environment resulting from mining activities. The types of impacts related to environmental pollution include hydrocarbon spills, sewage spills, and decant from underground workings. Environmental pollution can affect surface water, groundwater, wetlands, soil resources, and air quality. Poorly designed wash bays, accidental spillages, related water facilities on site, hydrocarbon spills from heavy machinery and vehicles onsite, the removal or capping of waste products from the site, the intentional washing and rinsing of equipment, storage and use of hydrocarbons and other hazardous materials including cement, and improper waste handling, storage and disposal can all be sources of environmental pollution. Activities that involve the removal of infrastructure within the dirty water areas or associated with dirty water management systems such as PCD's could potentially result in the mobilisation of pollutants potentially trapped in the soils underlying these areas. Negative air quality effects can occur from processing plants, crushers and chemical/hydrocarbon by-product release in to the air. Due to the recovery of ground water levels in the post-mining environment, contaminated groundwater will be able to migrate away from the mining area. This can lead to the contamination of surrounding aquifers and streams.

The following activities have been associated with potential impacts of environmental pollution:

- Planning and Design
  - Drilling monitoring boreholes; and
  - Drilling for continued resource evaluation.
- Construction
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining;
  - Underground mining; and
  - Mineral Processing.
- Decommissioning
  - Drilling monitoring boreholes;
  - General decommissioning activities;
  - Decommissioning of Co-Disposal Dump;
  - Infrastructure removal;

- Filling Opencast Voids; and
- Decommissioning of Underground Mine Infrastructure.

- Rehabilitation and Closure
  - Drilling monitoring boreholes;
  - General Surface Rehabilitation;
  - Storm water management;
  - Re-vegetation;
  - Post Closure Monitoring and Maintenance; and
  - Water Treatment (when required).

Impacts of environmental pollution are expected to occur as follows:

- Decant from underground workings;
- General Environmental Pollution;
- Hydrocarbon spills/contamination; and
- Sewage spills/contamination.

5.7.11.2 SIGNIFICANCE OF IMPACTS

The above impacts of environmental pollution will be negative. They are long term impacts and are expected to last for the duration of the life of the mine and in some cases the disturbance can be permanent.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
General Environmental Pollution	Mineral Processing	-14
	Opencast mining	-14
	Underground mining	-14
Hydrocarbon spills/contamination	Drilling for continued resource evaluation	-11
	Drilling monitoring boreholes	-11
	Maintenance and operation of site infrastructure and facilities	-12
	Mineral Processing	-12
	Opencast mining	-12
	Underground mining	-12
Sewage spills/contamination	Maintenance and operation of site infra structure and facilities	-12
	Opencast mining	-11
	Underground mining	-11
Decommissioning Phase		
	General decommissioning activities	-12

Impacts	Activity	Pre-Mitigation Score
General Environmental Pollution	Infrastructure removal	-12
Hydrocarbon spills/contamination	Decommissioning of Co-Disposal Dump	-10
	Drilling monitoring boreholes	-9
	General decommissioning activities	-10
	Infrastructure removal	-10
	Filling Opencast Voids	-10
	Decommissioning Underground Mine Infrastructure	-10
Sewage spills/contamination	General decommissioning activities	-9
Rehabilitation and Closure Phase		
Decant from underground workings	Post Closure Monitoring and Maintenance	-22,5
General Environmental Pollution	Water Treatment (when required)	-12
Hydrocarbon spills/contamination	Drilling monitoring boreholes	-9
	General Surface Rehabilitation	-10
	Post Closure Monitoring and Maintenance	-10
	Re-vegetation	-10
	Storm water management	-10
	Water Treatment (when required)	-10
Sewage spills/contamination	Water Treatment (when required)	-9

5.7.12 IMPACTS ON HERITAGE RESOURCES

An evaluation of the study area and the surroundings has shown that various heritage resources occur within the mining area, including historical structures as well as graves and cemeteries. Mining activities such as blasting may result in damage to heritage features present on the site. The disturbance, destruction or damage of such sites requires a permit from the responsible heritage authority. If graves are to be relocated, the community will need to be engaged in a consultation process. The relocation of graves and the associated consultation process will need to be conducted by a reputable organisation. Unexpected discovery of any unidentified graves and cemeteries during the operations may also delay mining activities due to the legal processes involved.

The following activities have been associated with potential impacts on heritage resources:

- Construction
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;

- Site establishment – Permanent site office Infrastructure; and
- Water management Infrastructure construction.

- Operation
  - Opencast mining; and
  - Underground mining.
- Rehab and Closure
  - General Surface Rehabilitation;
  - Storm water management; and
  - Water Treatment (when required).

Impacts on heritage resources are expected to occur as follows:

- Discovery and preservation of fossils;
- Destruction/damage of palaeontological resources; and
- Destruction/damage of heritage resources.

5.7.12.2 SIGNIFICANCE OF IMPACTS

If the provided mitigation measures are implemented any disturbance to heritage features can be minimised. Any destruction of heritage features is considered permanent.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Destruction/damage of heritage resources	Opencast mining	-17
	Underground mining	-17
Destruction/damage of palaeontological resources	Opencast Mining	-15
	Underground Mining	-15
Discovery and preservation of fossils	Opencast Mining	4,5
	Underground Mining	4,5
Decommissioning Phase		
Destruction/damage of heritage resources	General decommissioning activities	-12
Rehabilitation and Closure Phase		
Destruction/damage of heritage resources	General Surface Rehabilitation	-12
	Storm water management	-12
	Water Treatment (as required by conditions of WUL)	-12
Destruction/damage of palaeontological resources	Water Treatment (as required by conditions of WUL)	-12

5.7.13 SOCIAL IMPACTS

It is important to understand the difference between a social change process and a social impact. Social change processes are set in motion by project activities or policies. Social change processes can be measured objectively, independent of the local context. Examples of a social change process are increase in the population, relocation or presence of temporary workers. Under certain circumstances these processes may result in social impacts, but if managed properly these changes may not create impacts. Whether impacts are caused will depend on the characteristics and history of the host community, and the extent of mitigation measures that are put in place (Vanclay, 2003). A social impact is something that is experienced or felt by humans. It can be positive or negative. Social impacts can be experienced in a physical or perceptual sense. Social impacts can be either objective or subjective. Objective social impacts can be quantified and verified by independent observers in the local context, such as changes in employment patterns, in standard of living or in health and safety. Subjective social impacts occur “in the heads” or emotions of people, such as negative public attitudes, psychological stress or reduced quality of life. It is very likely that a number of social changes processes will be set in motion by the project. Whether these processes result in social impacts will depend on the successful implementation of the suggested mitigation measures.

The following activities have been associated with potential impacts on the social environment:

- Planning and Design
  - General Mine Management.
- Construction
  - General Mine Management;
  - General Construction Management;
  - Site establishment – Permanent site office Infrastructure; and
  - Mine area site preparation.
- Operation
  - General Mine Management;
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining;
  - Underground mining; and
  - Mineral Processing.
- Decommissioning
  - General Mine Management.
- Rehabilitation and Closure
  - General Mine Management; and
  - Water Treatment (when required).

Impacts on the social environment are expected to occur as follows:

- Crime and violence;
- Influx of migrant workers;

- Loss of sense of place;
- Relocation; and
- Social vices.

5.7.13.2 SIGNIFICANCE OF IMPACTS

Social impacts will be negative and site specific. The impacts will remain for the life of the mine and have an overall to moderate significance.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Crime and violence	General mine management	-13
Influx of migrant workers	General mine management	-14
	Opencast mining	-14
Loss of sense of place	General mine management	-9,75
	Mineral processing	-13
	Opencast mining	-13
	Underground mining	-9,75
Relocation	General mine management	-17
Social vices	General mine management	-9,75
	Maintenance and operation of site infrastructure and facilities	-9,75
	Opencast mining	-9,75
	Underground mining	-9,75
Decommissioning Phase		
Crime and violence	General mine management	-8,25
Influx of migrant workers	General mine management	-8,25
Loss of sense of place	General mine management	-6,75
Relocation	General mine management	-17
Social vices	General mine management	-8,25
Rehabilitation and Closure Phase		
Crime and violence	General mine management	-8,25
Influx of migrant workers	General mine management	-7,5
Loss of sense of place	General mine management	-6,75
	Water treatment (when required)	-6,75
Relocation	General mine management	-17
Social vices	General mine management	-8,25

5.7.14 SOCIO-ECONOMIC IMPACTS

The study of economic development, which is generally broad in its scope, refers to the standard of living of citizens; most often measured by GDP per capita, literacy rate, and life expectancy. Economic development incorporates many elements of pure macro-economics, such as price stability, high employment, and sustainable growth. However, this is underpinned by the study of infrastructure and social development programs, such as education, housing, and road networks. Mine operations have the potential to positively or negatively influence/affect the economic environment of the area. Mines contribute directly towards employment, procurement, skills development and taxes on a local, regional and national scale. In addition, mines indirectly contribute to economic growth in the local and regional economies because the increase in the number of income earning people has a multiplying effect on the trade of other goods and services in other sectors. However, the introduction of a mine into an area can have undesirable implications in the surrounding environment. This is because changes occur not only to the pre-existing land uses but also to the existing associated social structures and general way of life. The closure phase of the mine can have highly negative impacts because the surrounding environment loses the economic support that it receives during the operation of the mine. To ensure the economic safety of the communities which are affected by the mining operations, mitigation measures post closure of the mine will need to consider the economic environment of the communities and address these impacts effectively.

The following activities have been associated with potential impacts on the socio-economic environment:

- Planning
  - General Mine Management; and
  - Drilling for continued resource evaluation.
- Construction
  - General Mine Management;
  - Drilling for continued resource evaluation;
  - General Construction Management;
  - Site establishment – Contractors Camp;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - General Mine Management;
  - Drilling for continued resource evaluation;
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining; and
  - Underground mining.
- Decommissioning
  - General Mine Management; and
  - General decommissioning activities.

- Rehabilitation and Closure
  - General Mine Management.

Impacts on the socio-economic environment are expected to occur as follows:

- Coal supply for energy security;
- Economic growth;
- Education, Skills Development and Training;
- Employment Opportunities;
- Impacts on local farm labour;
- Loss of jobs and economic opportunities;
- Perceptions and Expectations; and
- Re-instatement of livelihoods.

5.7.14.2 SIGNIFICANCE OF IMPACTS

The socio-economic impact will be positive in nature and of short-term duration over the region. Considering the levels of unemployment in the area, the significance is moderate. The impact is definite but will only be temporary as employment positions will be lost once the mining activities cease.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Coal supply for energy security	Opencast mining	14
	Underground Mining	14
Economic growth	General Mine Management	9
	Opencast mining	9
	Underground mining	9
Education, Skills Development and Training	Drilling for continued resource evaluation	6
	General Mine Management	6
	Opencast mining	6
	Underground mining	6
Employment Opportunities	Drilling for continued resource evaluation	9,75
	General Mine Management	9,75
	Maintenance and operation of site infrastructure and facilities	9,75
	Opencast mining	9,75
	Underground mining	9,75
Impacts on local farm labour	General Mine Management	-9
	Underground mining	-9

Impacts	Activity	Pre-Mitigation Score
Perceptions and Expectations	Drilling for continued resource evaluation	-13
Impact on livelihoods	General Mine Management	-9,75
Decommissioning Phase		
Economic growth	General Mine Management	6
Education, Skills Development and Training	General Mine Management	4
Employment Opportunities	General decommissioning activities	5
	General Mine Management	5
Impacts on local farm labour	General Mine Management	-6,75
Loss of jobs and economic opportunities	General Mine Management	-17,5
Impact on livelihoods	General Mine Management	-8,25
Rehabilitation and Closure Phase		
Economic Growth	General Mine Management	3,5
Education, Skills Development and Training	General Mine Management	3,5
Employment Opportunities	General Mine Management	5
Impacts on local farm labour	General Mine Management	-4
Loss of jobs and economic opportunities	General Mine Management	-17,5
Impact on livelihoods	General Mine Management	-7,5

5.7.15 IMPACTS ON HEALTH AND SAFETY

It is important to recognize that mining activities, equipment, and infrastructure can increase community exposure to risks and impacts. The mining activities can result in a possible increase in crime due to increased number of strangers in the community. Hazardous structures and excavations may pose a threat to community safety if not correctly located, properly designed and correctly managed. By way of example, excavations may pose a risk to animals and people if not properly managed to prevent unauthorised access. The use of hazardous materials on the mine may result in a community health and safety risk if these materials are not stored, handled and disposed of in an appropriate manner. For example, the storage and use of explosives may represent a safety risk if appropriate controls and procedures are not followed. Fly rock in particular may pose a risk to people, animals and infrastructure within close proximity to the mine. The use of public roads for hauling coal will result in increased safety risks for members of the community and public utilising these roads. Mining activities have the potential to increase the risk of accidental fires. Impacts on ecosystem services can impact on communities,

particularly where these communities rely on these ecosystem services (e.g. water from watercourses) for their livelihoods. The contamination or degradation of natural resources, such as adverse impacts on the quality, quantity, and availability of freshwater, may result in health-related risks and impacts. Land use changes may result in the loss of natural buffer areas such as wetlands, and impacts to natural vegetation areas that mitigate the effects of natural hazards such as flooding, landslides, and fire, may result in increased vulnerability and community safety-related risks and impacts. An influx of people to the mining area seeking employment may the increase the risk for community exposure to waterborne, water based, water-related, and vectorborne and communicable diseases.

The following activities have been associated with potential impacts on health and safety:

- Planning and Design
    - General Mine Management.
- Construction
    - General Mine Management;
    - General Construction Management;
    - Site establishment – Contractors Camp;
    - Construction of mineral processing facilities;
    - Mine area site preparation;
    - Site establishment – Permanent site office Infrastructure; and
    - Water management Infrastructure construction.
- Operation
    - General Mine Management;
    - Maintenance and operation of site infrastructure and facilities;
    - Opencast mining;
    - Underground mining; and
    - Mineral Processing.
- Decommissioning
    - General Mine Management;
    - General decommissioning activities;
    - Decommissioning of Co-Disposal Dump;
    - Filling Opencast Voids; and
    - Decommissioning of Underground Mine Infrastructure.
- Rehabilitation and Closure
    - General Mine Management; and
    - Re-vegetation.

Impacts on health and safety are expected to occur as follows:

- Community health and safety;
- Fire and explosion hazard;
- Fly Rock; and
- Health impacts.

5.7.15.2 SIGNIFICANCE OF IMPACTS

Health and safety impacts will be negative and site specific. The impact will remain for the life of the mine and has an overall low to moderate significance.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Community health and safety	General Mine Management	-13
	Maintenance and operation of site infrastructure and facilities	-13
	Opencast mining	-13
Fire and explosion hazard	Maintenance and operation of site infrastructure and facilities	-8,25
	Mineral Processing	-8,25
	Opencast mining	-8,25
	Underground mining	-8,25
Fly Rock	Opencast mining	-8,25
	Underground mining	-8,25
Health impacts	General Mine Management	-9,75
	Maintenance and operation of site infrastructure and facilities	-9,75
	Mineral Processing	-9,75
	Opencast mining	-9,75
	Underground mining	-9,75
Decommissioning Phase		
Community health and safety	Decommissioning of Co-Disposal Dump	-6
	General decommissioning activities	-6
	General Mine Management	-6
	Filling Opencast Voids	-6
	Decommissioning Underground Mine Infrastructure	-6
Health Impacts	General decommissioning activities	-8,25
	General Mine Management	-8,25
Rehabilitation and Closure Phase		
Community health and safety	General Mine Management	-4,5
	Re-vegetation	-4,5
Health Impacts	General Mine Management	-5
	Re-vegetation	-5

5.7.16 IMPACTS ON TRANSPORTATION, INFRASTRUCTURE AND TRAFFIC

In terms of potential impacts, the mine will result in increased use of the local road network which may result in the deterioration of road surfacing, damage to bridges and culverts in the area, and safety risks to surrounding communities. The R33, R36 and R38 are expected to experience increased traffic usage due to mining activities. This will be predominantly due to the increase in transport of heavy machinery, and vehicles carrying coal and labour for mining activities. Some of the roads are already in a state of disrepair and further traffic is expected to have negative impacts on road quality. Increased traffic will have repercussions on safety for other road users, predominantly by increasing the potential for road accidents. There are no large communities along the R38 and therefore increased traffic along this route should not create major safety concerns for residents, such as concern for children playing near the road. The R33, however, is close to the Silobela settlement which could pose a safety hazard to residents walking home and to town. The R36 is in close proximity to Carolina and increased traffic on this road will also be a safety issue with residents in this town.

The following activities have been associated with potential impacts on transportation, infrastructure, and traffic:

- Construction
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Opencast mining; and
  - Underground mining.
- Decommissioning
  - Decommissioning of Co-Disposal Dump.

Impacts on transportation, infrastructure, and traffic are expected to occur as follows:

- Damage to road infrastructure; and
- Increased traffic.

5.7.16.2 SIGNIFICANCE OF IMPACTS

The impacts on transportation, infrastructure, and traffic will be negative and will remain for the life of the mine.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		

Impacts	Activity	Pre-Mitigation Score
Increased traffic	Opencast mining	-14
	Underground mining	-14
Damage to road infrastructure	Opencast mining	-9,75
	Underground mining	-9,75
Decommissioning Phase		
Damage to road infrastructure	Decommissioning of Co-Disposal Dump	-8,25

5.7.17 VISUAL IMPACTS

Considering the rural setting of the application area and the mountain backdrop, it is anticipated that the introduction of mining structures and related activities would create strong contrast with the existing landscape characteristics. During mining, it is expected that there will be coal trucks and other mine vehicles on both the roads and farmlands. This, along with the removal of vegetation, dust generation and preparation of opencast mining areas will result in a negative impact on the visual aspect. Operational areas may require lighting at night for safety reasons.

The following activities have been associated with potential visual impacts:

- Construction
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Opencast mining;
  - Underground mining; and
  - Mineral Processing.
- Decommissioning
  - Decommissioning of Co-Disposal Dump.
- Rehab and Closure
  - General Surface Rehabilitation;
  - Storm water management; and
  - Water Treatment (when required).

Visual impacts are expected to occur as follows:

- Visual impact of light at night; and
- Visual impact of mine infrastructure, stockpiles and dust.

5.7.17.2 SIGNIFICANCE OF IMPACTS

Visual impacts will be negative and site specific. The impact will remain for the life of the mine and has an overall low significance.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Visual impact of light at night	Mineral Processing	-9,75
	Opencast mining	-9,75
	Underground mining	-7,5
Visual impact of mine infrastructure, stockpiles and dust	Mineral Processing	-9,75
	Opencast mining	-9,75
	Underground mining	-6,75
Decommissioning Phase		
Visual impact of mine infrastructure, stockpiles and dust	Decommissioning of Co-Disposal Dump	-9
Rehabilitation and Closure Phase		
Visual impact of mine infrastructure, stockpiles and dust	General Surface Rehabilitation	-6
	Storm water management	-6
	Water Treatment (when required)	-6,75

5.7.18 IMPACTS ON AIR QUALITY

Existing sources of emissions in the region and the characterisation of existing ambient pollution concentrations is fundamental to the assessment of cumulative air impacts. A change in the ambient air quality can result in a variety of impacts which in turn may cause a disturbance to and/or health impacts on nearby receptors. Sensitive receptor sites include residential areas, communities, and natural environments. Mining activities have the potential to result in increased levels of atmospheric dust, increased concentrations of PM_{10} (Particulate Matter with an aerodynamic diameter of less than 10µm) and increased concentrations of $PM_{2.5}$ (Particulate Matter with an aerodynamic diameter of less than 2.5µm). Historical evidence indicates that the pollutant of concern associated with open-cast mining operations is particulate matter creating a nuisance dust source and resulting in human health concerns and nuisance.

The following activities have been associated with potential impacts on air quality:

- Planning and Design
  - Drilling monitoring boreholes; and
  - Drilling for continued resource evaluation.
- Construction

  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining;
  - Underground mining; and
  - Mineral Processing.
- Decommissioning
  - Drilling monitoring boreholes;
  - General decommissioning activities;
  - Decommissioning of Co-Disposal Dump;
  - Infrastructure removal;
  - Filling Opencast Voids; and
  - Decommissioning of Underground Mine Infrastructure.
- Rehabilitation and Closure
  - Drilling monitoring boreholes;
  - General Surface Rehabilitation;
  - Storm water management;
  - Re-vegetation;
  - Post Closure Monitoring and Maintenance; and
  - Water Treatment (when required).

Impacts on air quality are expected to occur as follows:

- Greenhouse gas emissions; and
- Fugitive emissions (Dust).

5.7.18.2 SIGNIFICANCE OF IMPACTS

Impacts on air quality will be negative will remain for the life of the mine.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Fugitive emissions (Dust)	Drilling for continued resource evaluation	-11

Impacts	Activity	Pre-Mitigation Score
	Drilling monitoring boreholes	-11
	Mineral Processing	-18,75
	Opencast mining	-16,25
	Underground mining	-16,25
Greenhouse gas emissions	Maintenance and operation of site infrastructure and infrastructure and facilities	-16,25
	Mineral Processing	-16,25
	Opencast mining	-16,25
	Underground mining	-16,25
Decommissioning Phase		
Fugitive emissions (Dust)	Decommissioning of Co-Disposal Dump	-11
	Drilling monitoring boreholes	-9
	General decommissioning activities	-11
	Infrastructure removal	-11
	Filling Opencast Voids	-11
Greenhouse gas emissions	Decommissioning of Co-Disposal Dump	-13,75
	General decommissioning activities	-13,75
	Infrastructure removal	-13,75
	Filling Opencast Voids	-13,75
	Decommissioning Underground Mine Infrastructure	-13,75
Rehabilitation and Closure Phase		
Fugitive emissions (Dust)	Drilling monitoring boreholes	-9
	General Surface Rehabilitation	-9
	Post Closure Monitoring and Maintenance	-9
	Re-vegetation	-9
	Storm water management	-9
	Water Treatment (when required)	-9
Greenhouse gas emissions	Re-vegetation	-13,75
	General Surface Rehabilitation	-13,75
	Storm water management	-12,5
	Water Treatment (when required)	-13,75

5.7.19 NOISE IMPACTS

Certain noise generating activities associated with mining operations can cause an increase in ambient noise levels in and around the site. Significant noise is associated with opencast and plant (including workshops) activities. The only noisy activities relating to the underground mining activities are associated with the plant activities. A source of noise during the operational phase will be traffic to and from the site, traffic around the facility, RoM and product transport and activities associated with waste management. In some cases, mining and related activities may result in an increase in noise levels above the allowable thresholds. Whilst studies show that the response differs greatly between species, noise typically disturbs animals and results in them moving away from the source of noise or becoming adapted to the noise. Some of the typical effects that disturbing noise may have on sensitive receptors include interference with daily activities (work, leisure and sleeping), hindered speech communication, impeded thinking process, and interference with concentration. Mine workers in very close proximity to noisy activities would be at risk to hearing damage if the proper precautions (e.g. use of personal protective equipment) are not taken.

The following activities have been associated with potential impacts of noise:

- Planning and Design
  - Drilling monitoring boreholes; and
  - Drilling for continued resource evaluation.
- Construction
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Site establishment – Contractors Camp;
  - Construction of mineral processing facilities;
  - Mine area site preparation;
  - Site establishment – Permanent site office Infrastructure; and
  - Water management Infrastructure construction.
- Operation
  - Drilling monitoring boreholes;
  - Drilling for continued resource evaluation;
  - Maintenance and operation of site infrastructure and facilities;
  - Opencast mining;
  - Underground mining; and
  - Mineral Processing.
- Decommissioning
  - Drilling monitoring boreholes;
  - General decommissioning activities;
  - Decommissioning of Co-Disposal Dump;
  - Infrastructure removal;
  - Filling Opencast Voids; and

- Decommissioning of Underground Mine Infrastructure.

- Rehabilitation and Closure
  - Drilling monitoring boreholes;
  - General Surface Rehabilitation;
  - Storm water management;
  - Re-vegetation; and
  - Water Treatment (when required).

The impact of noise is expected to occur as follows:

- Disburbing and/or nuisance noise

5.7.19.2 SIGNIFICANCE OF IMPACT

The impact of noise will be negative and will remain for the life of the mine.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Disburbing and/or nuisance noise	Drilling for continued resource evaluation	-7,5
	Drilling monitoring boreholes	-7,5
	Maintenance and operation of site infrastructure and facilities	-12
	Mineral Processing	-13
	Opencast mining	-13
	Underground mining	-7,5
Decommissioning Phase		
Disburbing and/or nuisance noise	Decommissioning of Co-Disposal Dump	-7,5
	Drilling monitoring boreholes	-7,5
	General decommissioning activities	-12
	Infrastructure removal	-13
	Filling Opencast Voids	-13
	Decommissioning Underground Mine Infrastructure	-7,5
Rehabilitation and Closure Phase		
Disburbing and/or nuisance noise	Drilling monitoring boreholes	-6
	General Surface Rehabilitation	-6
	Re-vegetation	-5,25
	Storm water management	-6
	Water Treatment (as required by conditions of WUL)	-5,25

5.7.20 BLASTING AND VIBRATION

The application of explosives for breaking rock will always have an effect on the surrounding environment. These effects can manifest in the form of ground vibration, air blast, fumes, fly rock and noxious fumes. These short duration events may be noticeable by communities and individuals living in the immediate environment. These events tend to cause nuisance and elicit an emotive response because of resonance because they are easily recognized as being related to blasting.

The following activities have been associated with potential impacts of blasting and vibration:

- Operation
  - Opencast mining; and
  - Underground mining.

Impacts of blasting and vibration are expected to occur as follows:

- Air Blast;
- Ground Vibration and human perception;
- Ground Vibration Impacts on productivity of farm animals (cattle, chickens, pigs, etc.);
- Impacts on Infrastructure (roads, communications infrastructure, services, houses, boreholes); and
- Noxious fumes.

5.7.20.2 SIGNIFICANCE OF IMPACTS

The above impacts of blasting and vibration will be negative. They are long term impacts and are expected to last for the duration of the operational life of the mine.

Impacts	Activity	Pre-Mitigation Score
Operational Phase		
Air Blast	Opencast mining	-11
	Underground mining	-11
Ground Vibration and human perception	Opencast mining	-13
	Underground mining	-13
Ground Vibration Impacts on productivity of farm animals (cattle, chickens, pigs, etc.)	Opencast mining	-13
Impacts on Infrastructure (roads, communications infrastructure, services, houses, boreholes)	Opencast mining	-13
	Underground mining	-13
Noxious fumes	Opencast mining	-12
	Underground mining	-12

5.8 POTENTIAL MITIGATION MEASURES AND RESIDUAL RISK

The following sections provide a description and assessment of the mitigation measures for each potential impact identified in the impact assessment process. The impact scores below are reflective of the impacts post the implementation of mitigation measures. A second score indicating the final significance of each potential impact is also reflected below. This score indicates the degree of potential loss of irreplaceable resources, the cumulative nature of the impact, as well as the degree of public concern regarding the impact. It should be noted that this report will be made available to I&AP's for review and comment and their comments and concerns will be addressed in the final report to be submitted to the DMR for adjudication. Furthermore, it should be noted that the impact scores themselves will include the results of the aforementioned public response and comment. The results of the public consultation will be used to update the impact scores upon completion of the public review period, where after the finalised report will be submitted to the DMR for adjudication. Please refer to Appendix E for the full impact scoring calculations.

5.8.2 TOPOGRAPHY AND LANDFORM

The following mitigation types have been associated with potential impacts on topography and landform:

- Control through site planning and design;
- Control through proper soil management procedures; and
- Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities).

5.8.2.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impact can be controlled but not prevented and will remain low to moderate in significance.

Impact	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Alteration of Topography	Opencast Mining	-15	-15,00
	Underground Mining	-15	-15,00
Altered Drainage Patterns	Maintenance and operation of site infrastructure and facilities	-8,25	-11,00
	Mineral Processing	-8,25	-11,00
	Opencast mining	-8,25	-11,00
	Underground mining	-8,25	-11,00
Soil surface subsidence	Opencast mining	-4,5	-4,5
	Underground mining	-9	-9

Impact	Activity	Post-Mitigation Score	Final Significance
Decommissioning Phase			
Alteration of Topography	Filling Opencast Voids	-8	-8,00
Altered Drainage Patterns	Infrastructure removal	-6	-8,00
	Filling Opencast Voids	-6	-8,00
Soil surface subsidence	Filling Opencast Voids	-6	-6
	Decommissioning Underground Mine Infrastructure	-6,75	-6,75
Rehabilitation and Closure Phase			
Alteration of Topography	General Surface Rehabilitation	-6	-6,00
Altered Drainage Patterns	General Surface Rehabilitation	-3	-4,00
	Storm water management	-3	-4,00
Soil surface subsidence	Post Closure Monitoring and Maintenance	-3,5	-3,5

5.8.3 IMPACT ON GEOLOGY

Mining operations will remove the entire ore body layer which will alter the geology of the site. Mining will have a permanent impact on the geology of the application area.

The following mitigation types have been associated with potential impacts on geology:

- Modify through mine planning, design and rehabilitation.

5.8.3.2 SIGNIFICANCE OF IMPACT MITIGATION

There are no mitigation measures measures to reduce the impact on geology as the removal of a eological unit is the goal of the activity. The impact will remain high.

Impact	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Impacts on geology	Opencast mining	-17,5	-23,33
	Underground mining	-17,5	-23,33

5.8.4 IMPACTS ON SOIL

The following mitigation types have been associated with potential impacts on soil:

- Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures);
- Avoid through implementation of EMP mitigation measures;
- Remedy through application of treatment measures (e.g. ripping);

- Avoid through preventative measures (e.g. bunding, spill kits);
- Remedy through cleanup and waste disposal; and
- Modify through soil treatment if required.

5.8.4.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impact can be controlled but not prevented and will remain low to moderate in significance.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Soil compaction	Drilling for continued resource evaluation	-5	-6,67
	Drilling monitoring boreholes	-5	-6,67
	Mineral Processing	-8,25	-11,00
	Opencast mining	-9	-12,00
	Underground mining	-8,25	-11,00
Soil pollution/contamination	Maintenance and operation of site infrastructure and facilities	-9	-12,00
	Mineral Processing	-9	-12,00
	Opencast mining	-9	-12,00
	Underground mining	-6,75	-9,00
Erosion and sedimentation	Maintenance and operation of site infrastructure and facilities	-8,25	-9,63
	Mineral Processing	-8,25	-9,63
	Opencast mining	-8,25	-9,63
	Underground mining	-8,25	-9,63
Decommissioning Phase			
Soil compaction	Decommissioning of Co-Disposal Dump	-6,75	-9,00
	Drilling monitoring boreholes	-4	-5,33
	Infrastructure removal	-7,5	-10,00
Soil pollution/contamination	Decommissioning of Co-Disposal Dump	-5,25	-7,00
	General decommissioning activities	-7,5	-10,00
	Infrastructure removal	-7,5	-10,00
	Filling Opencast Voids	-5,25	-7,00
	Decommissioning Underground Mine Infrastructure	-5,25	-7,00

Impacts	Activity	Post-Mitigation Score	Final Significance
Erosion and sedimentation	Decommissioning of Co-Disposal Dump	-6,75	-7,88
	Infrastructure removal	-6,75	-7,88
Rehabilitation and Closure Phase			
Soil compaction	Drilling monitoring boreholes	-4	-5,33
	Post Closure Monitoring and Maintenance	-7,5	-10,00
	Storm water management	-4	-5,33
	Water Treatment (as required by conditions of WUL)	-4	-5,33
Soil pollution/contamination	General Surface Rehabilitation	-7,5	-10,00
	Post Closure Monitoring and Maintenance	-7,5	-10,00
	Re-vegetation	-7,5	-10,00
	Storm water management	-5,25	-7,00
	Water Treatment (as required by conditions of WUL)	-5,25	-7,00
Erosion and sedimentation	General Surface Rehabilitation	-6	-7,00
	Post Closure Monitoring and Maintenance	-6	-7,00
	Storm water management	-6	-7,00
	Water Treatment (as required by conditions of WUL)	-6	-7,00

5.8.5 IMPACTS ON LAND CAPABILITY

The following mitigation types have been associated with potential impacts on land capability:

- Avoid through preventative measures (e.g. limit area of disturbance); and
- Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications);

5.8.5.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impact can be controlled but not prevented and some impacts will be permanent.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	Maintenance and operation of site infrastructure and facilities	-9	-12,00
	Opencast mining	-12	-16,00
Loss of soil resource and its utilisation potential	Maintenance and operation of site infrastructure and facilities	-9	-13,50

Impacts	Activity	Post-Mitigation Score	Final Significance
	Opencast mining	-9	-13,50
Decommissioning Phase			
Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	Filling Opencast Voids	-6,75	-9,00
Loss of soil resource and its utilisation potential	Filling Opencast Voids	-4,5	-6,75
Rehabilitation and Closure Phase			
Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	General Surface Rehabilitation	-7,5	-10,00
	Storm water management	-7,5	-10,00
	Water Treatment (as required by conditions of WUL)	-5,25	-7,00
Loss of soil resource and its utilisation potential	General Surface Rehabilitation	-4,5	-6,75
	Storm water management	-4,5	-6,75
	Water Treatment (as required by conditions of WUL)	-4	-6,00

5.8.6 IMPACTS ON LAND USE

The following mitigation types have been associated with potential impacts on land use:

- Avoid through implementation of EMP mitigation measures (e.g. service detection and communication with landowners);
- Remedy through repair or reinstatement of services if required; and
- Control through implementation of ESMS.

5.8.6.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impact can be controlled but not prevented and will remain low in significance.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Impacts on services	Opencast Mining	-12	-12,00
	Underground Mining	-8,25	-8,25
Interference with existing land uses	Drilling for continued resource evaluation	-6	-8,00
	Drilling monitoring boreholes	-6	-8,00
	Opencast Mining	-12	-16,00
	Underground Mining	-7,5	-10,00
Decommissioning Phase			

Impacts	Activity	Post-Mitigation Score	Final Significance
Impacts on services	Infrastructure removal	-6,75	-6,75
Interference with existing land uses	Drilling monitoring boreholes	-4,5	-6,00
	Infrastructure removal	-4,5	-6,00
	Filling Opencast Voids	-5,25	-7,00
Rehabilitation and Closure Phase			
Impacts on services	Water treatment (as required by conditions of WUL)	-3,5	-3,50
Interference with existing land uses	Drilling monitoring boreholes	-4,5	-6,00
	General Surface Rehabilitation	-5,25	-7,00
	Storm water management	-5,25	-7,00

5.8.7 IMPACTS ON FAUNA AND FLORA

The following mitigation types have been associated with potential impacts fauna and flora:

- Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training);
- Avoid/Stop through relocation of threatened or protected species;
- Control through implementation of ESMS;
- Avoid and control through implementation of EMP mitigation measures (e.g. shape of disturbed areas, maintaining corridors);
- Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan); and
- Avoid/Stop through preventative measures (e.g. limit extent of disturbance).

5.8.7.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impact can be controlled but not prevented and will remain low to moderate in significance.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Direct and indirect mortality of flora and fauna	Drilling for continued resource evaluation	-8,25	-9,63
	Drilling monitoring boreholes	-8,25	-9,63
	Maintenance and operation of site infrastructure and facilities	-9	-10,50
	Mineral Processing	-9	-10,50
	Opencast mining	-9	-10,50

Impacts	Activity	Post-Mitigation Score	Final Significance
Habitat fragmentation and blockage of seasonal and dispersal movements	Opencast mining	-9,75	-11,38
	Maintenance and operation of site infrastructure and facilities	-9,75	-11,38
Introduction/invasion by alien (non-native) species	Drilling for continued resource evaluation	-4,5	-6,00
	Maintenance and operation of site infrastructure and facilities	-8,25	-11,00
	Mineral Processing	-5	-6,67
	Opencast mining	-5	-6,67
	Underground mining	-5	-6,67
Decommissioning Phase			
Direct and indirect mortality of flora and fauna	Drilling monitoring boreholes	-6	-7,00
Habitat fragmentation and blockage of seasonal and dispersal movements	General decommissioning activities	-8,25	-9,63
Introduction/invasion by alien (non-native) species	Decommissioning of Co-Disposal Dump	-3,5	-4,67
	Infrastructure removal	-7,5	-10,00
	Filling Opencast Voids	-6,75	-9,00
Rehabilitation and Closure Phase			
Direct and indirect mortality of flora and fauna	Drilling monitoring boreholes	-4	-4,67
	General Surface Rehabilitation	-4,5	-5,25
	Post Closure Monitoring and Maintenance	-4,5	-5,25
	Storm water management	-4,5	-5,25
	Water Treatment (as required by conditions of WUL)	-4,5	-5,25
Habitat fragmentation and blockage of seasonal and dispersal movements	Storm water management	-6,75	-7,88
	Water Treatment (as required by conditions of WUL)	-6,75	-7,88
Introduction/invasion by alien (non-native) species	General Surface Rehabilitation	-7,5	-10,00
	Post Closure Monitoring and Maintenance	-7,5	-10,00
	Storm water management	-6	-8,00
	Water Treatment (as required by conditions of WUL)	-3,5	-4,67

5.8.8 IMPACTS ON SURFACE WATER RESOURCES

The following mitigation types have been associated with potential impacts on surface water resources:

- Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management);
- Control through implementation of mitigation measures (water treatment when required); and
- Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling).

5.8.8.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impact can be controlled but not prevented.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Decrease in surface water quantity/availability	Maintenance and operation of site infrastructure and facilities	-9,75	-16,25
Pollution of surface water resources/decreased water quality	Maintenance and operation of site infrastructure and facilities	-9,75	-16,25
	Mineral Processing	-13	-21,67
	Opencast mining	-13	-21,67
	Underground mining	-6,5	-10,83
Decommissioning Phase			
Pollution of surface water resources/decreased water quality	Decommissioning of Co-Disposal Dump	-7,5	-12,50
	Filling Opencast Voids	-7,5	-12,50
Rehabilitation and Closure Phase			
Pollution of surface water resources/decreased water quality	Post Closure Monitoring and Maintenance	-5	-8,33
	Re-vegetation	-5	-8,33

5.8.9 IMPACTS ON GROUNDWATER

The following mitigation types have been associated with potential impacts on groundwater:

- Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling);
- Avoid and control through implementation of preventative measures (e.g. AMD mitigation strategy, mine design and progressive rehabilitation);
- Remedy through water treatment when required;
- Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures); and

- Control through implementation of mitigation measures (AMD mitigation strategy, progressive rehabilitation).

5.8.9.2 SIGNIFICANCE OF IMPACT MITIGATION

Mitigation is possible and is effective if implemented correctly.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Decrease in water quantity/availability	Mineral Processing	-9,75	-14,63
	Mineral Processing	-9,75	-14,63
	Opencast mining	-9,75	-14,63
	Underground mining	-9,75	-14,63
Dewatering of groundwater aquifers	Opencast mining	-14	-23,33
	Underground mining	-14	-23,33
Pollution of groundwater/decreased water quality	Maintenance and operation of site infrastructure and facilities	-10,5	-17,50
	Opencast mining	-15	-25,00
	Underground mining	-16	-26,67
Decommissioning Phase			
Decrease in water quantity/availability	General decommissioning activities	-7,5	-11,25
Dewatering of groundwater aquifers	Decommissioning Underground Mine Infrastructure	-6	-10,00
Pollution of groundwater/decreased water quality	Filling Opencast Voids	-7,5	-12,50
	Decommissioning Underground Mine Infrastructure	-11	-18,33
Rehabilitation and Closure Phase			
Acid Mine Drainage	Post Closure Monitoring and Maintenance	-15	-27,50
Decrease in water quantity/availability	Re-vegetation	-4,5	-6,75
Dewatering of groundwater aquifers	General Surface Rehabilitation	-6	-10,00
	Storm water management	-6	-10,00
Pollution of groundwater/decreased water quality	Post Closure Monitoring and Maintenance	-8,25	-13,75
	Re-vegetation	-5	-8,33

5.8.10 IMPACTS ON WETLANDS

The following mitigation types have been associated with potential impacts on wetlands:

- Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance);
- Remedy/modify through wetland rehabilitation; and
- Avoid through implementation of preventative measures (e.g. adequate safety factors).

5.8.10.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impact can be controlled but not prevented and will remain moderate to high in significance.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Decreased watermake to adjacent wetlands	Maintenance and operation of site infrastructure and facilities	-9	-13,50
	Opencast mining	-9	-13,50
	Underground mining	-9	-13,50
Loss and disturbance of wetland habitat	Maintenance and operation of site infrastructure and facilities	-11,25	-20,63
	Opencast mining	-15	-27,50
	Underground mining	-11,25	-20,63
Undermining of wetlands - surface subsidence	Underground mining	-9,75	-17,88
Decommissioning Phase			
Decreased watermake to adjacent wetlands	Decommissioning Underground Mine Infrastructure	-6,75	-9,00
Rehabilitation and Closure Phase			
Loss and disturbance of wetland habitat	Water Treatment (as required by conditions of WUL)	-11,25	-20,63

5.8.11 IMPACT OF ENVIRONMENTAL POLLUTION

The following mitigation types have been associated with potential impacts on environmental pollution:

- Avoid through implementation of suitable progressive rehabilitation and soil management;
- Control/Remedy through interception of decant and treatment of polluted water where required;
- Avoid and control through implementation of EMP mitigation measures (e.g. Spill prevention, Hydrocarbon Storage);
- Avoid through preventative measures (e.g. bunding, spill kits);
- Remedy through cleanup and waste disposal;
- Modify through soil treatment if required; and

- Avoid and control through implementation of preventative measures (e.g. location of toilets, spill prevention, waste management).

5.8.11.2 SIGNIFICANCE OF IMPACT MITIGATION

Mitigation is possible and is effective in most cases.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
General Environmental Pollution	Mineral Processing	-9	-13,50
	Opencast mining	-9	-13,50
	Underground mining	-9	-13,50
Hydrocarbon spills/contamination	Drilling for continued resource evaluation	-8,25	-11,00
	Drilling monitoring boreholes	-8,25	-11,00
	Maintenance and operation of site infrastructure and facilities	-9	-12,00
	Mineral Processing	-9	-12,00
	Opencast mining	-9	-12,00
	Underground mining	-9	-12,00
Sewage spills/contamination	Maintenance and operation of site infra structure and facilities	-5	-5,00
	Opencast mining	-4,5	-4,50
	Underground mining	-4,5	-4,50
Decommissioning Phase			
General Environmental Pollution	General decommissioning activities	-7,5	-11,25
	Infrastructure removal	-7,5	-11,25
Hydrocarbon spills/contamination	Decommissioning of Co-Disposal Dump	-6,75	-9,00
	Drilling monitoring boreholes	-6	-8,00
	General decommissioning activities	-6,75	-9,00
	Infrastructure removal	-6,75	-9,00
	Filling Opencast Voids	-6,75	-9,00
	Decommissioning Underground Mine Infrastructure	-6,75	-9,00
Sewage spills/contamination	General decommissioning activities	-3,5	-3,50
Rehabilitation and Closure Phase			

Impacts	Activity	Post-Mitigation Score	Final Significance
Decant from underground workings	Post Closure Monitoring and Maintenance	-15	-25,00
General Environmental Pollution	Water Treatment (as required by conditions of WUL)	-6,75	-10,13
Hydrocarbon spills/contamination	Drilling monitoring boreholes	-5,25	-7,00
	General Surface Rehabilitation	-6	-8,00
	Post Closure Monitoring and Maintenance	-6	-8,00
	Re-vegetation	-6	-8,00
	Storm water management	-6	-8,00
	Water Treatment (as required by conditions of WUL)	-6	-8,00
Sewage spills/contamination	Water Treatment (as required by conditions of WUL)	-3,5	-3,50

5.8.12 IMPACTS ON HERITAGE RESOURCES

The following mitigation types have been associated with potential impacts on heritage resources:

- Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief);
- Modify through removal and curation of fossils if found during construction and operation;
- Avoid and control through implementation of preventative measures (e.g. fencing of graveyards, watching brief, chance finds procedure); and
- Stop through relocation of graves if required.

5.8.12.2 SIGNIFICANCE OF IMPACT MITIGATION

If the provided mitigation measures are implemented any disturbance to heritage features can be minimised. Any destruction of heritage features is considered permanent. This impact will remain permanent despite mitigating efforts as it is not possible to mitigate the destruction of heritage resources.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Destruction/damage of heritage resources	Opencast mining	-12,75	-23,38
	Underground mining	-12,75	-23,38
Destruction/damage of palaeontological resources	Opencast Mining	-12	-14,00
	Underground Mining	-12	-14,00
Discovery and preservation of fossils	Opencast Mining	9	12,00
	Underground Mining	9	12,00

Impacts	Activity	Post-Mitigation Score	Final Significance
Decommissioning Phase			
Destruction/damage of heritage resources	General decommissioning activities	-8	-14,67
Rehabilitation and Closure Phase			
Destruction/damage of heritage resources	General Surface Rehabilitation	-8	-14,67
	Storm water management	-8	-14,67
	Water Treatment (as required by conditions of WUL)	-8	-14,67
Destruction/damage of palaeontological resources	Water Treatment (as required by conditions of WUL)	-8	-14,67

5.8.13 SOCIAL IMPACTS

The following mitigation types have been associated with potential social impacts:

- Avoidance and control through preventative measures (e.g. site security, code of conduct);
- Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct);
- Control through implementation of ESMS and stakeholder engagement plan;
- Modify through reduction of visual impact; and
- Modify and control through mitigation measures (e.g. grievance mechanism, Relocation plan).

5.8.13.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impacts can be controlled but not prevented.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Crime and violence	General mine management	-5,5	-5,50
Influx of migrant workers	General mine management	-13	-13,00
	Opencast mining	-13	-13,00
Loss of sense of place	General mine management	-6	-6,00
	Mineral processing	-9	-9,00
	Opencast mining	-12	-12,00
	Underground mining	-6	-6,00
Relocation	General mine management	-11,25	-13,13
Social vices	General mine management	-9	-9,00

	Maintenance and operation of site infrastructure and facilities	-9	-9,00
	Opencast mining	-9	-9,00
	Underground mining	-9	-9,00
Decommissioning Phase			
Crime and violence	General mine management	-4,5	-4,50
Influx of migrant workers	General mine management	-7,5	-7,50
Loss of sense of place	General mine management	-4	-4,00
Relocation	General mine management	-11,25	-13,13
Social vices	General mine management	-7,5	-7,50
Rehabilitation and Closure Phase			
Crime and violence	General mine management	-4,5	-4,50
Influx of migrant workers	General mine management	-5	-5,00
Loss of sense of place	General mine management	-4	-4,00
	Water treatment (as required by conditions of WUL)	-4	-4,00
Relocation	General mine management	-11,25	-13,13
Social vices	General mine management	-7,5	-7,50

5.8.14 SOCIO-ECONOMIC IMPACTS

The following mitigation types have been associated with potential socio-economic:

- Maximise through optimisation of economic growth opportunities;
- Maximise skills development and training through implementation of SLP;
- Maximise employment opportunities through implementation of SLP;
- Minimise impacts on local farm labour through compensation, skills development and livelihood restoration;
- Minimise impacts of job loss through skills development and livelihood restoration;
- Avoid through implementation of preventative measures (e.g. consultation and communication);
- Control through ESMS procedures such as recruitment procedure;
- Minimise impacts of job loss through skills development and livelihood restoration; and
- Maximise security of coal supply through sound and responsible mine management.

5.8.14.2 SIGNIFICANCE OF IMPACT MITIGATION

Implementation of mitigation measures will help maximise the positive impact of the mining operation.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Coal supply for energy security	Opencast mining	20	23,33
	Underground Mining	20	23,33
Economic growth	General Mine Management	13	13,00
	Opencast mining	13	13,00
	Underground mining	13	13,00
Education, Skills Development and Training	Drilling for continued resource evaluation	9	9,00
	General Mine Management	9	9,00
	Opencast mining	9	9,00
	Underground mining	9	9,00
Employment Opportunities	Drilling for continued resource evaluation	13	13,00
	General Mine Management	13	13,00
	Maintenance and operation of site infrastructure and facilities	13	13,00
	Opencast mining	13	13,00
	Underground mining	13	13,00
Impacts on local farm labour	General Mine Management	-8,25	-8,25
	Underground mining	-8,25	-8,25
Perceptions and Expectations	Drilling for continued resource evaluation	-8,25	-8,25
Impact on livelihoods	General Mine Management	-9	-9,00
Decommissioning Phase			
Economic growth	General Mine Management	8	8
Education, Skills Development and Training	General Mine Management	6	6
Employment Opportunities	General decommissioning activities	7,5	7,50
	General Mine Management	7,5	7,50
Impacts on local farm labour	General Mine Management	-4	-4,00
Loss of jobs and economic opportunities	General Mine Management	-16,25	-16,25
Impact on livelihoods	General Mine Management	-5	-5,00
Rehabilitation and Closure Phase			

Impacts	Activity	Post-Mitigation Score	Final Significance
Economic Growth	General Mine Management	5,25	5,25
Education, Skills Development and Training	General Mine Management	5,25	5,25
Employment Opportunities	General Mine Management	7,5	7,50
Impacts on local farm labour	General Mine Management	-3,5	-3,50
Loss of jobs and economic opportunities	General Mine Management	-16,25	-16,25
Impact on livelihoods	General Mine Management	-5	-5,00

5.8.15 IMPACTS ON HEALTH AND SAFETY

The following mitigation types have been associated with potential impacts on health and safety:

- Avoidance and control through preventative measures (e.g. HIV/AIDS awareness);
- Remedy through application of mitigation measures in EMP;
- Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management, adequate ventilation underground); and
- Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures).

5.8.15.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impact can be controlled but not prevented.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Community health and safety	General Mine Management	-9,75	-11,38
	Maintenance and operation of site infrastructure and facilities	-9,75	-11,38
	Opencast mining	-9,75	-11,38
Fire and explosion hazard	Maintenance and operation of site infrastructure and facilities	-5	-5,00
	Mineral Processing	-5	-5,00
	Opencast mining	-5	-5,00
	Underground mining	-5	-5,00
Fly Rock	Opencast mining	-4,5	-4,50
	Underground mining	-4,5	-4,50

Impacts	Activity	Post-Mitigation Score	Final Significance
Health impacts	General Mine Management	-9	-10,50
	Maintenance and operation of site infrastructure and facilities	-9	-10,50
	Mineral Processing	-9	-10,50
	Opencast mining	-9	-10,50
	Underground mining	-9	-10,50
Decommissioning Phase			
Community health and safety	Decommissioning of Co-Disposal Dump	-4	-4,00
	General decommissioning activities	-4	-4,00
	General Mine Management	-4	-4,00
	Filling Opencast Voids	-4	-4,00
	Decommissioning Underground Mine Infrastructure	-4	-4,00
Health Impacts	General decommissioning activities	-7,5	-8,75
	General Mine Management	-7,5	-8,75
Rehabilitation and Closure Phase			
Community health and safety	General Mine Management	-3	-3,00
	Re-vegetation	-3	-3,00
Health Impacts	General Mine Management	-6,75	-7,88
	Re-vegetation	-6,75	-7,88

5.8.16 IMPACTS ON TRANSPORTATION, INFRASTRUCTURE AND TRAFFIC

The following mitigation types have been associated with potential impacts on transportation, infrastructure and traffic:

- Avoid and control through implementation of EMP mitigation measures (e.g. speed limit enforcement, vehicle maintenance).

5.8.16.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impact can be controlled but not prevented and will remain low to moderate in significance.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			

Impacts	Activity	Post-Mitigation Score	Final Significance
Increased traffic	Opencast mining	-13	-13,00
	Underground mining	-13	-13,00
Damage to road infrastructure	Opencast mining	-9	-9,00
	Underground mining	-9	-9,00
Decommissioning Phase			
Damage to road infrastructure	Decommissioning of Co-Disposal Dump	-7,5	-7,50

5.8.17 VISUAL IMPACTS

The following mitigation types have been associated with potential visual impacts:

- Avoid and control through implementation of EMP mitigation measures (e.g. directional down lighting, dust suppression, mine planning and progressive rehabilitation).

5.8.17.2 SIGNIFICANCE OF IMPACT MITIGATION

Mitigation is possible and is effective if implemented correctly.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Visual impact of light at night	Mineral Processing	-8,25	-9,63
	Opencast mining	-8,25	-9,63
	Underground mining	-6	-7,00
Visual impact of mine infrastructure, stockpiles and dust	Mineral Processing	-9	-10,50
	Opencast mining	-9	-10,50
	Underground mining	-6,75	-7,88
Decommissioning Phase			
Visual impact of mine infrastructure, stockpiles and dust	Decommissioning of Co-Disposal Dump	-7,5	-8,75
Rehabilitation and Closure Phase			
Visual impact of mine infrastructure, stockpiles and dust	General Surface Rehabilitation	-6	-7,00
	Storm water management	-6	-7,00
	Water Treatment (when required)	-6,75	-7,88

5.8.18 IMPACTS ON AIR QUALITY

The following mitigation types have been associated with potential impacts on air quality:

- Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation);
- Avoid through preventative measures (e.g. speed limit enforcement); and
- Control through implementation of EMP mitigation measures (e.g. dust suppression).

5.8.18.2 SIGNIFICANCE OF IMPACTS

With mitigation, the impact can be controlled but not prevented and will remain low in significance.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Fugitive emissions (Dust)	Drilling for continued resource evaluation	-4	-4,67
	Drilling monitoring boreholes	-4	-4,67
	Mineral Processing	-12	-14
	Opencast mining	-8,25	-9,63
	Underground mining	-8,25	-9,63
Greenhouse gas emissions	Maintenance and operation of site infrastructure and infrastructure and facilities	-6,75	-10,13
	Mineral Processing	-6,75	-10,13
	Opencast mining	-6,75	-10,13
	Underground mining	-6,75	-10,13
Decommissioning Phase			
Fugitive emissions (Dust)	Decommissioning of Co-Disposal Dump	-6,75	-7,88
	Drilling monitoring boreholes	-3	-3,50
	General decommissioning activities	-6,75	-7,88
	Infrastructure removal	-6,75	-7,88
	Filling Opencast Voids	-6,75	-7,88
Greenhouse gas emissions	Decommissioning of Co-Disposal Dump	-5,25	-7,88
	General decommissioning activities	-5,25	-7,88
	Infrastructure removal	-5,25	-7,88
	Filling Opencast Voids	-5,25	-7,88
	Decommissioning Underground Mine Infrastructure	-5,25	-7,88
Rehabilitation and Closure Phase			
Fugitive emissions (Dust)	Drilling monitoring boreholes	-5,25	-6,13
	General Surface Rehabilitation	-5,25	-6,13

Impacts	Activity	Post-Mitigation Score	Final Significance
	Post Closure Monitoring and Maintenance	-5,25	-6,13
	Re-vegetation	-5,25	-6,13
	Storm water management	-5,25	-6,13
	Water Treatment (as required by conditions of WUL)	-5,25	-6,13
Greenhouse gas emissions	Re-vegetation	-5,25	-7,88
	General Surface Rehabilitation	-5,25	-7,88
	Storm water management	-5,25	-7,88
	Water Treatment (as required by conditions of WUL)	-5,25	-7,88

5.8.19 NOISE IMPACTS

The following mitigation types have been associated with potential noise impacts:

- Avoid through preventative measures (e.g. communication with landowners, timing of activities); and
- Control through implementation of EMP mitigation measures (e.g. Noise abatement measures).

5.8.19.2 SIGNIFICANCE OF IMPACT MITIGATION

With mitigation, the impact can be controlled but not prevented and will remain low in significance.

Impacts	Activity	Post-Mitigation Score	Final Significance
Operational Phase			
Disburbing and/or nuisance noise	Drilling for continued resource evaluation	-6,75	-7,88
	Drilling monitoring boreholes	-6,75	-7,88
	Maintenance and operation of site infrastructure and facilities	-9	-10,50
	Mineral Processing	-9	-10,50
	Opencast mining	-9	-10,50
	Underground mining	-7,5	-8,75
Decommissioning Phase			
Disburbing and/or nuisance noise	Decommissioning of Co-Disposal Dump	-6,75	-7,88
	Drilling monitoring boreholes	-6,75	-7,88
	General decommissioning activities	-9	-10,50
	Infrastructure removal	-9	-10,50

Impacts	Activity	Post-Mitigation Score	Final Significance
	Filling Opencast Voids	-9	-10,50
	Decommissioning Underground Mine Infrastructure	-7,5	-8,75
Rehabilitation and Closure Phase			
Disburbing and/or nuisance noise	Drilling monitoring boreholes	-5,25	-6,13
	General Surface Rehabilitation	-6	-7,00
	Re-vegetation	-5,25	-6,13
	Storm water management	-6	-7,00
	Water Treatment (as required by conditions of WUL)	-5,25	-6,13

5.8.20 BLASTING AND VIBRATION

The following mitigation types have been associated with potential blasting and vibration impacts:

- Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures).

5.8.20.2 SIGNIFICANCE OF IMPACT MITIGATION

Mitigation is possible and is effective in most cases.

Impacts	Activity	Pre-Mitigation Score	Post-Mitigation Score	Final Significance
Operational Phase				
Air Blast	Opencast mining	-11	-6,75	-7,88
	Underground mining	-11	-6,75	-7,88
Ground Vibration and human perception	Opencast mining	-13	-7,5	-7,50
	Underground mining	-13	-7,5	-7,50
Ground Vibration Impacts on productivity of farm animals (cattle, chickens, pigs, etc.)	Opencast mining	-13	-8,25	-9,63
Impacts on Infrastructure (roads, communications infrastructure, services, houses, boreholes)	Opencast mining	-13	-8,25	-9,63
	Underground mining	-13	-9	-9,00
Noxious fumes	Opencast mining	-12	-9	-9,00
	Underground mining	-12	-9	-9,00

5.9 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

As Pembani is an existing, operational mine no comparative land use and/or development alternatives have been considered or assessed in this report. It is important to note that as an existing, operational mine, Pembani have undertaken previous assessments where various land use and/or development alternatives have been previously considered as part of prior applications for approval or authorisation.

However, the land use at present is mining and given that the mine is already in operation there are no practical alternative land use and/or development alternatives to the land on which the mine and related infrastructure/activities are located.

Due to the nature of the coal reserve (high quality reserve) and the identified sensitivities identified on the surface area of Zandvoort as well as concerns raised by I&AP's it was concluded that underground mining is the only viable alternative for the proposed mining activities on Zandvoort.

5.10 STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION

As Pembani is an existing, operational mine no comparative land use and/or development alternatives have been considered or assessed in this report. The land use at present is mining and given that the mine is already in operation there are no practical alternative land use and/or development alternatives to the land on which the mine and related infrastructure/activities are located.

6 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

The process undertaken to undertake the impact assessment may be summarised as follows:

1. Screening. Identify all the main mining activities and processes associated with the mining operation.
2. Identify the specific activities or actions associated with the main mining activities and processes.
3. Identify any potential impacts and risks associated with each of the activities.
4. Undertake EIA process to quantify the environmental significance of the impacts.

The impact significance rating methodology, as provided by EIMS, is guided by the requirements of the NEMA EIA Regulations. Please refer to section 5.6 for a full description of the impact assessment methodology. Please refer to Table 42 below provides a summary of the potential impacts during the various project phases, as well as the mitigation types that should be implemented and the significance results before and after mitigation.

Table **42** for a description of the activities and associated impacts.

7 IMPACT ASSESSMENT

Table 42 below provides a summary of the potential impacts during the various project phases, as well as the mitigation types that should be implemented and the significance results before and after mitigation.

Table 42: Impact Assessment Results

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
General Mine Management	Crime and violence	Social	Operation	-13	Avoidance and control through preventative measures (e.g. site security, code of conduct)	-5,5
			Decommissioning	-8,25		-4,5
			Rehab and Closure	-8,25		-4,5
	Influx of migrant workers		Operation	-14	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism) Control through implementation of ESMS and stakeholder engagement plan	-13
			Decommissioning	-8,25		-7,5
			Rehab and Closure	-7,5		-5
	Loss of sense of place		Operation	-9,75	Modify through reduction of visual impact	-6
			Decommissioning	-6,75		-4
			Rehab and Closure	-6,75		-4
	Social vices		Operation	-9,75	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct) Control through implementation of ESMS and stakeholder engagement plan	-9
			Decommissioning	-8,25		-7,5
			Rehab and Closure	-8,25		-7,5
	Relocation		Operation	-17	Modify and control through mitigation measures (e.g. grievance mechanism, Relocation plan)	-11,25
			Decommissioning	-17		-11,25
			Rehab and Closure	-17		-11,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Economic growth	Socio-Economic	Operation	9	Maximise through optimisation of economic growth opportunities	13
			Decommissioning	6		8
			Rehab and Closure	3,5		5,25
	Education, Skills Development and Training		Operation	6	Maximise skills development and training through implementation of SLP	9
			Decommissioning	4		6
			Rehab and Closure	3,5		5,25
	Employment Opportunities		Operation	9,75	Maximise employment opportunities through implementation of SLP	13
			Decommissioning	5		7,5
			Rehab and Closure	5		7,5
	Impact on livelihoods		Operation	-9,75	Minimise impacts of job loss through skills development and livelihood restoration	-9
			Decommissioning	-8,25		-5
			Rehab and Closure	-7,5		-5
	Impacts on local farm labour		Operation	-9	Minimise impacts on local farm labour through compensation, skills development and livelihood restoration	-8,25
			Decommissioning	-6,75		-4
			Rehab and Closure	-4		-3,5
	Loss of jobs and economic opportunities		Decommissioning	-17,5	Minimise impacts of job loss through skills development and livelihood restoration	-16,25
			Rehab and Closure	-17,5		-16,25
	Health impacts	Health and Safety	Operation	-9,75	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	-9
			Decommissioning	-8,25		-7,5
			Rehab and Closure	-5		-6,75
	Community health and safety		Operation	-13		-9,75
			Decommissioning	-6		-4
			Rehab and Closure	-4,5		-3
Drilling monitoring boreholes	Soil compaction	Soils	Operation	-9	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	-5
			Decommissioning	-7,5		-4
			Rehab and Closure	-7,5		-4
		Land use	Operation	-6,75		-6

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Interference with existing land uses		Decommissioning	-5,25	Avoid through implementation of EMP mitigation measures (e.g. communication with landowners) Control through implementation of ESMS	-4,5
			Rehab and Closure	-5,25		-4,5
	Direct and indirect mortality of flora and fauna	Fauna and Flora	Operation	-13,75	Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	-8,25
			Decommissioning	-11,25		-6
			Rehab and Closure	-8		-4
	Hydrocarbon spills/contamination	Environmental Pollution	Operation	-11	Avoid through preventative measures (e.g. bunding, spill kits, etc.) Remedy through cleanup and waste disposal Modify through soil treatment if required	-8,25
			Decommissioning	-9		-6
			Rehab and Closure	-9		-5,25
	Fugitive emissions (Dust)	Air Quality	Operation	-11	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-4
			Decommissioning	-9		-3
			Rehab and Closure	-9		-5,25
	Disburbing and/or nuisance noise	Noise	Operation	-7,5	Avoid through preventative measures (e.g. communication with	-6,75
			Decommissioning	-5,25		-5,25
			Rehab and Closure	-6		-5,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	
Drilling for continued resource evaluation	Soil compaction	Soils	Operation	-9	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	-5
	Interference with existing land uses	Land use	Operation	-6,75	Avoid through implementation of EMP mitigation measures (e.g. communication with landowners) Control through implementation of ESMS	-6
	Direct and indirect mortality of flora and fauna	Fauna and Flora	Operation	-13,75	Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	-8,25
	Introduction/invasion by alien (non-native) species		Operation	-4,5	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan)	-4,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	
	Hydrocarbon spills/contamination	Environmental Pollution	Operation	-11	Avoid through preventative measures (e.g. bunding, spill kits, etc.) Remedy through cleanup and waste disposal Modify through soil treatment if required	-8,25
	Education, Skills Development and Training	Socio-Economic	Operation	6	Maximise skills development and training through implementation of SLP	9
	Employment Opportunities		Operation	9,75	Maximise employment opportunities through implementation of SLP	13
	Perceptions and Expectations		Operation	-13	Minimise false expectation and perceptations through implementation of preventative measures (e.g. Public consultation and communication).	-8,25
	Fugitive emissions (Dust)	Air Quality	Operation	-11	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-4
	Disburbing and/or nuisance noise	Noise	Operation	-7,5	Avoid through preventative measures (e.g. communication with	-6,75

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	
Maintenance and operation of site infrastructure and facilities	Altered drainage patterns	Topography and Landform	Operation	-12	Control through proper soil management procedures	-8,25
	Erosion and sedimentation	Soils	Operation	-13	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	-8,25
	Soil Pollution/Contamination			-12	Avoid through preventative measures (e.g. bunding, spill kits, etc.) Remedy through cleanup and waste disposal Modify through soil treatment if required	-9
	Loss of soil fertility (denitrification, loss of soil nutrient store and organic carbon stores) and loss of land capability	Land Capability	Operation	-9	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	-9
	Loss of soil resource and its utilisation potential			-13		-9
	Direct and indirect mortality of flora and fauna	Fauna and Flora	Operation	-15	Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training)	-9

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	
	Habitat fragmentation and blockage of seasonal and dispersal movements			-14	Avoid and control through implementation of EMP mitigation measures (e.g. shape of disturbed areas, maintaining corridors)	-9,75
	Introduction/invasion by alien (non-native) species			-9	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	-8,25
	Decrease in surface water quantity/availability	Surface Water	Operation	-15	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	-9,75
	Pollution of surface water resources/decreased water quality			-14	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management) Control through implementation of mitigation	-9,75

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					measures (water treatment when required)	
	Pollution of groundwater/decreased water quality	Groundwater	Operation	-11,25	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (AMD mitigation strategy, progressive rehabilitation)	-10,5
	Decreased watermake to adjacent wetlands	Wetlands	Operation	-12	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limit area of wetland disturbance) Remedy/modify through wetland rehabilitation	-9
	Loss and disturbance of wetland habitat			-15		-11,25
	Hydrocarbon spills/contamination	Environmental Pollution	Operation	-12	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-9
	Sewage spills/contamination			-12	Avoid and control through implementation of preventative measures (e.g. location of toilets, spill	-5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					prevention, waste management)	
	Social vices	Social	Operation	-9,75	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct) Control through implementation of ESMS and stakeholder engagement plan	-9
	Employment Opportunities	Socio-Economic	Operation	9,75	Maximise employment opportunities through implementation of SLP	13
	Community health and safety	Health and Safety	Operation	-13	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	-9,75
	Health impacts			-9,75		-9
	Fire and explosion hazard			-8,25	Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management, adequate ventilation underground)	-5
	Greenhouse gas emissions	Air Quality	Operation	-16,25	Avoid and control through implementation of EMP mitigation measures (e.g.	-6,75

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					vehicle maintenance, progressive rehabilitation)	
	Disburbing and/or nuisance noise	Noise	Operation	-12	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	-9
Opencast mining	Alteration of topography	Topography and Landform	Operation	-16,25	Control through site planning and design	-15
	Altered drainage patterns			-12	Control through proper soil management procedures	-8,25
	Soil surface subsidence			-8,25	Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities)	-4,5
	Impacts on Geology	Geology	Operation	-18,75	Modify through mine planning, design and rehabilitation	-17,5
	Soil compaction	Soils	Operation	-12	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	-9
	Soil Pollution/Contamination			-12	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal	-9

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Modify through soil treatment if required	
	Erosion and sedimentation			-13	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	-8,25
	Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	Land Capability	Operation	-13	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	-12
	Loss of soil resource and its utilisation potential			-13		-9
	Impacts on services	Land use	Operation	-13	Avoid through implementation of EMP mitigation measures (e.g. service detection and communication with landowners) Remedy through repair or reinstatement of services if required Control through implementation of ESMS	-12
	Interference with existing land uses			-12	Avoid through implementation of EMP mitigation measures (e.g. communication with landowners) Control through implementation of ESMS	-12
	Direct and indirect mortality of flora and fauna	Fauna and Flora	Operation	-15	Control through implementation of EMP	-9

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	
	Habitat fragmentation and blockage of seasonal and dispersal movements			-14	Avoid and control through implementation of EMP mitigation measures (e.g. shape of disturbed areas, maintaining corridors)	-9,75
	Introduction/invasion by alien (non-native) species			-5	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	-5
	Pollution of surface water resources/decreased water quality	Surface Water	Operation	-14	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management) Control through implementation of mitigation measures (water treatment when required)	-13
	Dewatering of groundwater aquifers	Groundwater	Operation	-15	Avoid and control through implementation of preventative measures (e.g.	-14

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					limitation of water usage, water conservation strategies, optimization of water usage and recycling)	
	Decrease in water quantity/availability			-15	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	-9,75
	Pollution of groundwater/decreased water quality			-16	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (AMD mitigation strategy, progressive rehabilitation)	-15
	Decreased watermake to adjacent wetlands	Wetlands	Operation	-12	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance) Remedy/modify through wetland rehabilitation	-9
	Loss and disturbance of wetland habitat			-18,75		-15
	General Environmental Pollution	Environmental Pollution	Operation	-14	Avoid and control through implementation of EMP mitigation measures (e.g. Spill	-9

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					prevention, Hydrocarbon Storage)	
	Hydrocarbon spills/contamination			-12	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-9
	Sewage spills/contamination			-11	Avoid and control through implementation of preventative measures (e.g. location of toilets, spill prevention, waste management)	-4,5
	Destruction/damage of heritage resources	Heritage	Operation	-17	Avoid and control through implementation of preventative measures (e.g. fencing of graveyards, watching brief, chance finds procedure) Stop through relocation of graves if required	-12,75
	Destruction/damage of palaeontological resources			-15	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils	-12
	Discovery and preservation of fossils			4,5		9
	Influx of migrant workers	Social	Operation	-14	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism)	-13

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Control through implementation of ESMS and stakeholder engagement plan	
	Loss of sense of place			-13	Modify through reduction of visual impact	-12
	Social vices			-9,75	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct) Control through implementation of ESMS and stakeholder engagement plan	-9
	Coal supply for energy security	Socio-Economic	Operation	14	Maximise security of coal supply through sound and responsible mine management	20
	Economic growth			9	Maximise through optimisation of economic growth opportunities	13
	Education, Skills Development and Training			6	Maximise skills development and training through implementation of SLP	9
	Employment Opportunities			9,75	Maximise employment opportunities through implementation of SLP	13
	Community health and safety	Health and Safety	Operation	-13	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	-9,75
	Health impacts			-9,75		-9

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Fly Rock			-8,25	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	-4,5
	Fire and explosion hazard			-8,25	Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management, adequate ventilation underground)	-5
	Damage to road infrastructure	Transportation, Infrastructure and Traffic	Operation	-9,75	Avoid and control through implementation of EMP mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	-9
	Increased traffic			-14		-13
	Visual impact of light at night	Visual	Operation	-9,75	Avoid and control through implementation of EMP mitigation measures (e.g. directional down lighting)	-8,25
	Visual impact of mine infrastructure, stockpiles and dust			-9,75	Avoid and control through implementation of EMP mitigation measures (e.g. dust suppression, mine planning and progressive rehabilitation)	-9
	Fugitive emissions (Dust)	Air Quality	Operation	-16,25	Avoid through preventative measures (e.g. speed limit enforcement)	-8,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Control through implementation of EMP mitigation measures (e.g. dust suppression)	
	Greenhouse gas emissions			-16,25	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-6,75
	Disburbing and/or nuisance noise	Noise	Operation	-13	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	-9
	Air Blast	Blasting and Vibration	Operation	-11	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	-6,75
	Ground Vibration and human perception			-13		-7,5
	Ground Vibration Impacts on productivity of farm animals (cattle, chickens, pigs, etc.)			-13		-9
	Impacts on Infrastructure (roads, communications infrastructure, services, houses, boreholes)			-13		-8,25
	Noxious fumes			-12		-9
Underground mining	Alteration of topography	Topography and Landform	Operation	-16,25	Control through site planning and design	-15

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Altered drainage patterns			-12	Control through proper soil management procedures	-8,25
	Soil surface subsidence			-13	Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities)	-9
	Impacts on Geology	Geology	Operation	-18,75	Modify through mine planning, design and rehabilitation	-17,5
	Erosion and sedimentation	Soils	Operation	-13	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	-8,25
	Soil compaction			-12	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	-8,25
	Soil Pollution/Contamination			-12	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6,75
	Impacts on services	Land use	Operation	-12	Avoid through implementation of EMP mitigation measures (e.g. service detection and communication with landowners)	-8,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Remedy through repair or reinstatement of services if required Control through implementation of ESMS	
	Interference with existing land uses			-12	Avoid through implementation of EMP mitigation measures (e.g. communication with landowners) Control through implementation of ESMS	-7,5
	Introduction/invasion by alien (non-native) species	Fauna and Flora	Operation	-5	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	-5
	Pollution of surface water resources/decreased water quality	Surface Water	Operation	-9,75	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management) Control through implementation of mitigation measures (water treatment when required)	-6,5
	Decrease in water quantity/availability	Groundwater	Operation	-15	Avoid and control through implementation of preventative measures (e.g.	-9,75

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					limitation of water usage, water conservation strategies, optimization of water usage and recycling)	
	Dewatering of groundwater aquifers			-15	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	-14
	Pollution of groundwater/decreased water quality			-17	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (AMD mitigation strategy, progressive rehabilitation)	-16
	Loss and disturbance of wetland habitat	Wetlands	Operation	-15	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance) Remedy/modify through wetland rehabilitation	-11,25
	Decreased watermake to adjacent wetlands			-12		-9
	Undermining of wetlands - surface subsidence			-14	Prevent through implementation of preventative measures (e.g.	-9,75

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					adoption of adequate safety factors).	
	General Environmental Pollution	Environmental Pollution	Operation	-14	Avoid and control through implementation of EMP mitigation measures (e.g. Spill prevention, Hydrocarbon Storage)	-9
	Hydrocarbon spills/contamination			-12	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-9
	Sewage spills/contamination			-11	Avoid and control through implementation of preventative measures (e.g. location of toilets, spill prevention, waste management)	-4,5
	Destruction/damage of heritage resources	Heritage	Operation	-17	Avoid and control through implementation of preventative measures (e.g. fencing of graveyards, watching brief, chance finds procedure) Stop through relocation of graves if required	-12,75
	Destruction/damage of palaeontological resources			-15	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief)	-12
	Discovery and preservation of fossils			4,5		9

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Modify through removal and curation of fossils	
	Loss of sense of place	Social	Operation	-9,75	Modify through reduction of visual impact	-6
	Social vices			-9,75	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct) Control through implementation of ESMS and stakeholder engagement plan	-9
	Economic growth	Socio-Economic	Operation	9	Maximise through optimisation of economic growth opportunities	13
	Education, Skills Development and Training			6	Maximise skills development and training through implementation of SLP	9
	Employment Opportunities			9,75	Maximise employment opportunities through implementation of SLP	13
	Coal supply for energy security			14	Maximise security of coal supply through sound and responsible mine management	20
	Impacts on local farm labour			-9	Minimise impacts on local farm labour through compensation, skills development and livelihood restoration	-8,25
	Fire and explosion hazard	Health and Safety	Operation	-8,25	Avoid and control through implementation of preventative measures (e.g.	-5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Fire breaks, Blasting procedures, hazardous substances management, adequate ventilation underground)	
	Fly Rock			-8,25	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	-4,5
	Health impacts			-9,75	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	-9
	Damage to road infrastructure	Transportation, Infrastructure and Traffic	Operation	-9,75	Avoid and control through implementation of EMP mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	-9
	Increased traffic			-14		-13
	Visual impact of light at night	Visual	Operation	-7,5	Avoid and control through implementation of EMP mitigation measures (e.g. directional down lighting)	-6
	Visual impact of mine infrastructure, stockpiles and dust			-6,75	Avoid and control through implementation of EMP mitigation measures (e.g. dust suppression, mine planning and progressive rehabilitation)	-6,75

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Fugitive emissions (Dust)	Air Quality	Operation	-16,25	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-8,25
	Greenhouse gas emissions			-16,25	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-6,75
	Disburbing and/or nuisance noise	Noise	Operation	-7,5	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	-7,5
	Air Blast	Blasting and Vibration	Operation	-11	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	-6,75
	Ground Vibration and human perception			-13		-7,5
	Impacts on Infrastructure (roads, communications infrastructure, services, houses, boreholes)			-13		-8,25
	Impacts on productivity of farm animals (cattle, chickens, pigs, etc.)			-13		-9
	Noxious fumes			-12		-9

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
Mineral Processing	Altered drainage patterns	Topography and Landform	Operation	-12	Control through proper soil management procedures	-8,25
	Erosion and sedimentation	Soils	Operation	-13	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	-8,25
	Soil compaction			-12	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	-8,25
	Soil Pollution/Contamination			-12	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-9
	Direct and indirect mortality of flora and fauna	Fauna and Flora	Operation	-15	Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	-9
	Introduction/invasion by alien (non-native) species			-5	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan)	-5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	
	Pollution of surface water resources/decreased water quality	Surface Water	Operation	-14	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management) Control through implementation of mitigation measures (water treatment when required)	-13
	Decrease in water quantity/availability	Groundwater	Operation	-15	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	-9,75
	Pollution of groundwater/decreased water quality			-14	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (AMD mitigation strategy, progressive rehabilitation)	-13

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	General Environmental Pollution	Environmental Pollution	Operation	-14	Avoid and control through implementation of EMP mitigation measures (e.g. Spill prevention, Hydrocarbon Storage)	-9
	Hydrocarbon spills/contamination			-12	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-9
	Loss of sense of place	Social	Operation	-13	Modify through reduction of visual impact	-9
	Fire and explosion hazard	Health and Safety	Operation	-8,25	Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management, adequate ventilation underground)	-5
	Health impacts			-9,75	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	-9
	Visual impact of light at night	Visual	Operation	-9,75	Avoid and control through implementation of EMP mitigation measures (e.g. directional down lighting)	-8,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Visual impact of mine infrastructure, stockpiles and dust			-9,75	Avoid and control through implementation of EMP mitigation measures (e.g. dust suppression, mine planning and progressive rehabilitation)	-9
	Fugitive emissions (Dust)	Air Quality	Operation	-18,75	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-12
	Greenhouse gas emissions			-16,25	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-6,75
	Disburbing and/or nuisance noise	Noise	Operation	-13	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	-9
General decommissioning activities	Soil Pollution/Contamination	Soils	Decommissioning	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal	-7,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Modify through soil treatment if required	
	Habitat fragmentation and blockage of seasonal and dispersal movements	Fauna and Flora	Decommissioning	-11	Avoid and control through implementation of EMP mitigation measures (e.g. shape of disturbed areas, maintaining corridors)	-8,25
	Decrease in water quantity/availability	Groundwater	Decommissioning	-11	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	-7,5
	General Environmental Pollution	Environmental Pollution	Decommissioning	-12	Avoid and control through implementation of EMP mitigation measures (e.g. Spill prevention, Hydrocarbon Storage)	-7,5
	Hydrocarbon spills/contamination			-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6,75
	Sewage spills/contamination			-9	Avoid and control through implementation of preventative measures (e.g. location of toilets, spill prevention, waste management)	-3,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Destruction/damage of heritage resources	Heritage	Decommissioning	-12	Avoid and control through implementation of preventative measures (e.g. fencing of graveyards, watching brief, chance finds procedure) Stop through relocation of graves if required	-8
	Employment Opportunities	Socio-Economic	Decommissioning	5	Maximise employment opportunities through implementation of SLP	7,5
	Community health and safety	Health and Safety	Decommissioning	-6	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	-4
	Health impacts			-8,25		-7,5
	Fugitive emissions (Dust)	Air Quality	Decommissioning	-11	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-6,75
	Greenhouse gas emissions			-13,75	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-5,25
	Disburbing and/or nuisance noise	Noise	Decommissioning	-6	Avoid through preventative measures (e.g.	-6

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	
Final Profiling and Rehabilitation of Co-Disposal Dump	Erosion and sedimentation	Soils	Decommissioning	-11	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	-6,75
	Soil compaction			-10	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	-6,75
	Soil Pollution/Contamination			-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-5,25
	Introduction/invasion by alien (non-native) species	Fauna and Flora	Decommissioning	-3,5	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	-3,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Pollution of surface water resources/decreased water quality	Surface Water	Decommissioning	-11	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management) Control through implementation of mitigation measures (water treatment if required)	-7,5
	Hydrocarbon spills/contamination	Environmental Pollution	Decommissioning	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6,75
	Community health and safety	Health and Safety	Decommissioning	-6	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	-4
	Damage to road infrastructure	Transportation, Infrastructure and Traffic	Decommissioning	-8,25	Avoid and control through implementation of EMP mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	-7,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Visual impact of mine infrastructure, stockpiles and dust	Visual	Decommissioning	-9	Avoid and control through implementation of EMP mitigation measures (e.g. dust suppression, mine planning and progressive rehabilitation)	-7,5
	Fugitive emissions (Dust)	Air Quality	Decommissioning	-11	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-6,75
	Greenhouse gas emissions			-13,75	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-5,25
	Disburbing and/or nuisance noise	Noise	Decommissioning	-6	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	-6
Infrastructure removal	Altered drainage patterns	Topography and Landform	Decommissioning	-6,75	Control through proper soil management procedures	-6
	Erosion and sedimentation	Soils	Decommissioning	-11	Avoid and control through preventative measures (Soil placement, storm water	-6,75

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					infrastructure, erosion control structures)	
	Soil compaction			-10	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	-7,5
	Soil Pollution/Contamination			-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-7,5
	Impacts on services	Land use	Decommissioning	-9	Avoid through implementation of EMP mitigation measures (e.g. service detection and communication with landowners) Remedy through repair or reinstatement of services if required Control through implementation of ESMS	-6,75
	Interference with existing land uses			-5,25	Avoid through implementation of EMP mitigation measures (e.g. communication with landowners) Control through implementation of ESMS	-4,5
	Introduction/invasion by alien (non-native) species	Fauna and Flora	Decommissioning	-10	Control through implementation of EMP mitigation measures (e.g.	-7,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	
	General Environmental Pollution	Environmental Pollution	Decommissioning	-12	Avoid and control through implementation of EMP mitigation measures (e.g. Spill prevention, Hydrocarbon Storage)	-7,5
	Hydrocarbon spills/contamination			-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6,75
	Fugitive emissions (Dust)	Air Quality	Decommissioning	-11	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-6,75
	Greenhouse gas emissions			-13,75	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-5,25
	Disburbing and/or nuisance noise	Noise	Decommissioning	-6	Avoid through preventative measures (e.g. communication with	-6

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	
Filling Opencast Voids	Alteration of topography	Topography and Landform	Decommissioning	-11,25	Control through site planning and design	-8
	Altered drainage patterns			-6,75	Control through proper soil management procedures	-6
	Soil surface subsidence			-10	Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities)	-6
	Soil Pollution/Contamination	Soils	Decommissioning	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-5,25
	Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	Land Capability	Decommissioning	-6,75	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	-6,75
	Loss of soil resource and its utilisation potential			-7,5		-4,5
	Interference with existing land uses	Land use	Decommissioning	-6	Avoid through implementation of EMP mitigation measures	-5,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					(e.g. communication with landowners) Control through implementation of ESMS	
	Introduction/invasion by alien (non-native) species	Fauna and Flora	Decommissioning	-9	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	-6,75
	Pollution of surface water resources/decreased water quality	Surface Water	Decommissioning	-11	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management) Control through implementation of mitigation measures (water treatment when required)	-7,5
	Pollution of groundwater/decreased water quality	Groundwater	Decommissioning	-8,25	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (AMD mitigation	-7,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					strategy, progressive rehabilitation)	
	Hydrocarbon spills/contamination	Environmental Pollution	Decommissioning	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6,75
	Community health and safety	Health and Safety	Decommissioning	-6	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	-4
	Fugitive emissions (Dust)	Air Quality	Decommissioning	-11	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-6,75
	Greenhouse gas emissions			-13,75	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-5,25
	Disburbing and/or nuisance noise	Noise	Decommissioning	-6	Avoid through preventative measures (e.g. communication with	-6

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	
Decommissioning Underground Mine Sections	Soil surface subsidence	Topography and Landform	Decommissioning	-10	Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities)	-6,75
	Soil Pollution/Contamination	Soils	Decommissioning	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-5,25
	Dewatering of groundwater aquifers	Groundwater	Decommissioning	-9,75	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	-6
	Pollution of groundwater/decreased water quality			-12	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures)	-11

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Control through implementation of mitigation measures (AMD mitigation strategy, progressive rehabilitation)	
	Decreased watermake to adjacent wetlands	Wetlands	Decommissioning	-7,5	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance) Remedy/modify through wetland rehabilitation	-6,75
	Hydrocarbon spills/contamination	Environmental Pollution	Decommissioning	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6,75
	Community health and safety	Health and Safety	Decommissioning	-6	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	-4
	Greenhouse gas emissions	Air Quality	Decommissioning	-13,75	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-5,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Disburbing and/or nuisance noise	Noise	Decommissioning	-6	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	-5,25
General Surface Rehabilitation	Alteration of topography	Topography and Landform	Rehab and Closure	-6,75	Control through site planning and design	-6
	Altered drainage patterns			-3	Control through proper soil management procedures	-3
	Erosion and sedimentation	Soils	Rehab and Closure	-10	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	-6
	Soil Pollution/Contamination			-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-7,5
	Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	Land Capability	Rehab and Closure	-7,5	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	-7,5
	Loss of soil resource and its utilisation potential			-7,5		-4,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Interference with existing land uses	Land use	Rehab and Closure	-6	Avoid through implementation of EMP mitigation measures (e.g. communication with landowners) Control through implementation of ESMS	-5,25
	Direct and indirect mortality of flora and fauna	Fauna and Flora	Rehab and Closure	-9	Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	-4,5
	Introduction/invasion by alien (non-native) species			-10	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	-7,5
	Dewatering of groundwater aquifers	Groundwater	Rehab and Closure	-6,5	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	-6

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Hydrocarbon spills/contamination	Environmental Pollution	Rehab and Closure	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6
	Destruction/damage of heritage resources	Heritage	Rehab and Closure	-12	Avoid and control through implementation of preventative measures (e.g. fencing of graveyards, watching brief, chance finds procedure) Stop through relocation of graves if required	-8
	Visual impact of mine infrastructure, stockpiles and dust	Visual	Rehab and Closure	-6	Avoid and control through implementation of EMP mitigation measures (e.g. dust suppression, mine planning and progressive rehabilitation)	-6
	Fugitive emissions (Dust)	Air Quality	Rehab and Closure	-9	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-5,25
	Greenhouse gas emissions			-13,75	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-5,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Disburbing and/or nuisance noise	Noise	Rehab and Closure	-6	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	-6
Storm water management	Altered drainage patterns	Topography and Landform	Rehab and Closure	-3	Control through proper soil management procedures	-3
	Soil compaction	Soils	Rehab and Closure	-7,5	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	-4
	Soil Pollution/Contamination			-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-5,25
	Erosion and sedimentation			-10	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	-6
	Loss of soil fertility (denitrification, Loss of soil nutrient store and organic	Land Capability	Rehab and Closure	-7,5	Avoid through preventative measures (e.g. limit area of disturbance)	-7,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	carbon stores) and loss of land capability				Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	
	Loss of soil resource and its utilisation potential			-7,5		-4,5
	Interference with existing land uses	Land use	Rehab and Closure	-6	Avoid through implementation of EMP mitigation measures (e.g. communication with landowners) Control through implementation of ESMS	-5,25
	Direct and indirect mortality of flora and fauna	Fauna and Flora	Rehab and Closure	-9	Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	-4,5
	Habitat fragmentation and blockage of seasonal and dispersal movements			-11	Avoid and control through implementation of EMP mitigation measures (e.g. shape of disturbed areas, maintaining corridors)	-6,75
	Introduction/invasion by alien (non-native) species			-8	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	-6

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Dewatering of groundwater aquifers	Groundwater	Rehab and Closure	-6,5	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	-6
	Hydrocarbon spills/contamination	Environmental Pollution	Rehab and Closure	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6
	Destruction/damage of heritage resources	Heritage	Rehab and Closure	-12	Avoid and control through implementation of preventative measures (e.g. fencing of graveyards, watching brief, chance finds procedure) Stop through relocation of graves if required	-8
	Visual impact of mine infrastructure, stockpiles and dust	Visual	Rehab and Closure	-6	Avoid and control through implementation of EMP mitigation measures (e.g. dust suppression, mine planning and progressive rehabilitation)	-6
	Fugitive emissions (Dust)	Air Quality	Rehab and Closure	-9	Avoid through preventative measures (e.g. speed limit enforcement)	-5,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Control through implementation of EMP mitigation measures (e.g. dust suppression)	
	Greenhouse gas emissions			-12,5	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-5,25
	Disburbing and/or nuisance noise	Noise	Rehab and Closure	-6	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	-6
Re-vegetation	Soil Pollution/Contamination	Soils	Rehab and Closure	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-7,5
	Pollution of surface water resources/decreased water quality	Surface Water	Rehab and Closure	-8,25	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management)	-5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Control through implementation of mitigation measures (water treatment when required)	
	Pollution of groundwater/decreased water quality	Groundwater	Rehab and Closure	-5,5	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (AMD mitigation strategy, progressive rehabilitation)	-5
	Decrease in water quantity/availability			-8,25	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	-4,5
	Hydrocarbon spills/contamination	Environmental Pollution	Rehab and Closure	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6
	Community health and safety	Health and Safety	Rehab and Closure	-4,5	Avoidance and control through preventative	-3
	Health impacts			-5		-6,75

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	
	Fugitive emissions (Dust)	Air Quality	Rehab and Closure	-9	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-5,25
	Greenhouse gas emissions			-13,75	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	-5,25
	Disburbing and/or nuisance noise	Noise	Rehab and Closure	-5,25	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	-5,25
Post Closure Monitoring and Maintenance	Soil surface subsidence	Topography and Landform	Rehab and Closure	-6,75	Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities)	-3,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Soil Pollution/Contamination	Soils	Rehab and Closure	-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-7,5
	Soil compaction			-10	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	-7,5
	Erosion and sedimentation			-10	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	-6
	Direct and indirect mortality of flora and fauna	Fauna and Flora	Rehab and Closure	-9	Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	-4,5
	Introduction/invasion by alien (non-native) species			-10	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	-7,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Pollution of surface water resources/decreased water quality	Surface Water	Rehab and Closure	-8,25	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management) Control through implementation of mitigation measures (water treatment when required)	-5
	Acid Mine Drainage	Groundwater	Rehab and Closure	-22,5	Avoid and control through implementation of preventative measures (e.g. AMD mitigation strategy, mine design and progressive rehabilitation) Remedy through water treatment when required	-15
	Pollution of groundwater/decreased water quality			-9	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (AMD mitigation strategy, progressive rehabilitation)	-8,25
	Decant from underground workings	Environmental Pollution	Rehab and Closure	-22,5	Avoid with the implementation of preventative measures (soil	-15

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					management, progressive rehabilitation) Control through interception and treatment of polluted water	
	Hydrocarbon spills/contamination			-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6
	Fugitive emissions (Dust)	Air Quality	Rehab and Closure	-9	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-5,25
Water Treatment (as required by WUL)	Erosion and sedimentation	Soils	Rehab and Closure	-10	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	-6
	Soil compaction			-7,5	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	-4
	Soil Pollution/Contamination			-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal	-5,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					Modify through soil treatment if required	
	Loss of soil fertility (denitrification, Loss of soil nutrient store and organic carbon stores) and loss of land capability	Land Capability	Rehab and Closure	-6	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	-5,25
	Loss of soil resource and its utilisation potential			-6		-4
	Impacts on services	Land use	Rehab and Closure	-8	Avoid through implementation of EMP mitigation measures (e.g. service detection and communication with landowners) Remedy through repair or reinstatement of services if required Control through implementation of ESMS	-3,5
	Direct and indirect mortality of flora and fauna	Fauna and Flora	Rehab and Closure	-9	Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	-4,5
	Habitat fragmentation and blockage of seasonal and dispersal movements			-11	Avoid and control through implementation of EMP mitigation measures (e.g. shape of disturbed areas, maintaining corridors)	-6,75

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Introduction/invasion by alien (non-native) species			-3,5	Control through implementation of EMP mitigation measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	-3,5
	Loss and disturbance of wetland habitat	Wetlands	Rehab and Closure	-15	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance) Remedy/modify through wetland rehabilitation	-11,25
	General Environmental Pollution	Environmental Pollution	Rehab and Closure	-12	Avoid and control through implementation of EMP mitigation measures (e.g. Spill prevention, Hydrocarbon Storage)	-6,75
	Hydrocarbon spills/contamination			-10	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	-6
	Sewage spills/contamination			-9	Avoid and control through implementation of preventative measures (e.g. location of toilets, spill prevention, waste management)	-3,5

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
	Destruction/damage of heritage resources	Heritage	Rehab and Closure	-12	Avoid and control through implementation of preventative measures (e.g. fencing of graveyards, watching brief, chance finds procedure) Stop through relocation of graves if required	-8
	Destruction/damage of palaeontological resources			-12	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils	-8
	Loss of sense of place	Social	Rehab and Closure	-6,75	Modify through reduction of visual impact	-4
	Visual impact of mine infrastructure, stockpiles and dust	Visual	Rehab and Closure	-6,75	Avoid and control through implementation of EMP mitigation measures (e.g. dust suppression, mine planning and progressive rehabilitation)	-6,75
	Fugitive emissions (Dust)	Air Quality	Rehab and Closure	-9	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation measures (e.g. dust suppression)	-5,25
	Greenhouse gas emissions			-13,75	Avoid and control through implementation of EMP	-5,25

Name of Activity	Potential Impact	Aspects Affected	Phase	Significance If not mitigated	Mitigation Type	Significance If mitigated
					mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	
	Disburbing and/or nuisance noise	Noise	Rehab and Closure	-5,25	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	-5,25

Please refer to Appendix E for the full scoring for each of the assessed impacts.

8 SUMMARY OF SPECIALIST REPORTS

A summary of the recommendations from the specialist studies undertaken this and previous EIA studies is provided in Table 43 below.

Table 43: Summary of specialist recommendations

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
Surface Water Report (2005)	**Mitigation Measures.** The specialist report identified a number of mitigation and management measures to address the impacts that were identified. These mitigation and management measures have been included in this report.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
			26.10 Impact Management Outcomes 26.11 Impact Management Actions
Soil Assessments (2004)	**Mitigation Measures.** The specialist reports identified a number of mitigation and management measures to address the impacts that were identified. These mitigation and management measures have been included in this report.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
Archaeology Assessment (original EIA)	**Mitigation Measures.** The specialist report identified a number of mitigation and management measures to address the impacts that were identified. These mitigation and management measures have been included in this report.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	Watching Brief. An archaeological watching brief was proposed. The framework for a watching brief is included in the specialist report which is included as an Appendix to this report. This report includes the requirement for the Mine to develop a detailed Heritage Management Plan as part of the ESMS to be developed for the mine. This plan must include a watching brief for all known heritage sites as well as a chance finds procedure for any new heritage features that may be discovered.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
	Grave Relocation. The specialist report makes recommendations for relocation of graves where mining may impact on certain grave sites. This report includes recommendations for relocation of graves should this become a requirement.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
	Destruction Permits. The specialist report identifies structures that may need to be destroyed and recommends that the correct legal process be followed should this become	**X**	26 Impact Management Objectives

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	a requirement (requires a destruction permit). This EMPR includes recommendations for the correct legal procedure should the destruction of any heritage features be required.		26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
Grave Assessment (2013)	**Mitigation Measures.** The specialist report identified a number of mitigation and management measures to address the impacts that were identified. These mitigation and management measures have been included in this report.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
Social Report (2005)	Landowner Negotiations. In instances where the farm becomes no longer viable due to the extent of mining operations, the mine will enter into negotiations with that specific farmer.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
			26.11 Impact Management Actions
	Monitoring of Pollution. Monitoring of pollution will form part of the EMPR and the subsequent environmental management plan and measures will be put in place to try to minimise pollution.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
	Compensation. Where water has been proven to be negatively impacted by mining activities these farmers will be compensated.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
	Stock Theft. The labour force on the mine will be closely monitored to ensure they are not taking part in stock theft	**X**	26 Impact Management Objectives

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	activities. Should a worker be found to be a stock thief this will result in immediate dismissal.		26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
	I&AP Concerns and Stakeholder Engagement. The social report includes the comments from I&AP's and the commitments of the mine to address the concerns raised. This EMPR has been compiled with these concerns in mind and includes appropriate mitigation measures to ensure that ongoing stakeholder engagement is undertaken and that concerns which are raised are investigated and addressed appropriately. This includes the requirement for the development of a grievance mechanism which will allow I&AP's to raise any grievances.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
Fauna and Flora Report (2004)	**Mitigation Measures.** The specialist report identified a number of mitigation and management measures to address the impacts that were identified. This includes measures such as environmental training, pollution prevention, speed limit	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	enforcement, and environmental monitoring. These mitigation and management measures have been included in this report.		26.10 Impact Management Outcomes 26.11 Impact Management Actions
	Rehabilitation Monitoring. The specialist report recommends that a monitoring program be used to determine the success of all rehabilitated areas, as well as the species richness and biodiversity. This EMPR includes the framework for rehabilitation monitoring and requires the mine to develop a detailed rehabilitation monitoring plan.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
Ecology (Flora & Fauna) study for Zandvoort underground mining expansion (2015).	The detailed 2015 study was undertaken for the Zandvoort property in support of the S102 amendment process to include this farm into the mining right area. Due to the fact that there will be no surface disturbance of the site due to this project (underground mining only on this property), no additional studies are considered to be required to determine ecological sensitivity. A full biodiversity assessment would require additional floristic data collection, but this is not considered to be necessary for the current project.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
Ecology Study for Kwaggafontein 8IT (2017).	The recommendations of the specialist study include monitoring of the wetlands associated with the development should be conducted on an annual basis; monitoring of the remaining portions of Eastern Highveld Grassland on an annual basis; rehabilitation of grasslands the have previously been degarded; and treating of effluent from previous mining activities prior to discharge.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
Heritage Study for proposed underground mining on Zandvoort 10 IT (2015) and Heritage Study for Kwaggafontein 8IT (2017).	**Paleontology.** A palaeontologist must conduct a single one-day site visit to the present mining operation on the property located adjacent to Zandvoort as soon as possible to inspect the presence of possible fossil material in the spoil heaps of the existing mine. This site visit would be aimed at assessing the potential for significant fossils to be impacted upon by the proposed underground mining activities on the Zandvoort property. Two possible outcomes may result from the site visit, namely: (a) the palaeontologist finds that there is no potential for significant fossil material to be impacted upon by the proposed underground mining activities. Subsequently, the palaeontologist will provide a write up of his/her findings indicating that no further work would be required. This write-	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	up will be submitted to SAHRA. (b) The palaeontologist establishes that the potential for significant fossil material to be impacted upon by the proposed mining property does exist. The palaeontologist must then provide a write up of his/her findings and submit this to SAHRA. The appointed palaeontologist, in consultation with the mining company, must then develop a long-term strategy and budget for the recovery of significant fossils during the mining operation. This strategy may include site visits to monitor the spoil heaps, the collection of representative samples as well as the curation of fossil material.		
	Monitoring Heritage Sites. The specialist study recommended that monitoring of the grave sites on the farm Zandvoort should take place. The recommendations stated that the archaeologist must define a suitable number of fixed points around each identified heritage site and photographically record each site using pre-defined fixed points. This recording must be conducted in conjunction with the ECO. The archaeologist must familiarise the ECO with the principles and aims of the monitoring process and the use of fixed-point photography.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	This EIA and EMPR includes the requirement for the Mine to develop a detailed Heritage Management Plan as part of the ESMS to be developed for the mine. This plan shall take into account the recommendations of the specialist and shall extend these recommendations to all known heritage sites within the mining area to ensure heritage resources are adequately protected.		
Palaeontological Studies (2017)	**Paleontology**. Should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist. The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved collection (*e.g.* museum or university collection) and all	**x**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.		
Wetland Assessment (2011)	**Avoidance of impact** – the design and planning of a mine must first take into consideration the environmental sensitivities of the site and undertake to avoid impacts wherever possible. This should include appropriate further studies such as geo-hydrological investigations.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
	Minimisation of impact – where impacts to the wetland are unavoidable, the design and planning of a mine must be undertaken to minimise the impacts associated with their activities.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
	Mitigation of impact – once all possible impacts have been avoided and minimised as far as possible, the remaining	**X**	26 Impact Management Objectives

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	significant impacts must be mitigated on-site. This can be undertaken through control measures during construction and operation of the mine, and through effective rehabilitation measures once mining activities have been completed.		26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
	Off-set mitigation – where avoidance, minimisation and mitigation measures fail or are not possible, an appropriate off-set approach should be followed.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
Groundwater study (2011) and Groundwater study (April 2012)	AMD Mitigation. Contamination from the rehabilitated area can be reduced by placing carbonaceous material used for filling the pit at the bottom where oxygen will first be displaced by rising groundwater levels. This will also reduce the risk of seasonal exposure of the carbonaceous material and sulphide minerals to oxygen when the groundwater level drops during the dry season.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	This EMPR includes the requirement for the Mine to implement measures such as that described above to manage the potential formation of AMD. An AMD mitigation strategy is included in this report.		26.11 Impact Management Actions
	Post Closure Monitoring. The groundwater monitoring program must be continued after mine closure to monitor for any contamination migrating away from site. The additional monitoring boreholes that were installed as part of this study (WCM01 to WCM03) should be included in the monitoring program. This EMPR includes the requirement for the Mine to develop detailed procedures for their existing monitoring programmes and this shall include post closure monitoring requirements.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
	Contamination of the underlying aquifers from the plant, discard and stockpile areas. The specialist report recommends that potential pollution producing infrastructure should be adequately lined to prevent pollution of underlying aquifers.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	Controlling decant. The specialist report recommends the implementation of proactive management measures to address potential decant from certain rehabilitated opencast pits. The specialist report identifies that the old Kwaggafontein underground workings are already decanting. It should be noted that spring WF1 which is located right above the old workings shows no indication of contamination. Therefore, it is advised that the decant points not be sealed as this could force the groundwater levels to increase and contaminate the overlying aquifer, but rather that the decant be collected in control dams and managed from there, possibly through evaporation ponds and wetlands.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions
	Groundwater monitoring plan. The specialist report recommends that the groundwater level and quality monitoring program be continued. The monitoring boreholes installed during this study (WCM01 to WCM03) should be included in the monitoring program. This EMPR includes the requirement for the Mine to develop detailed procedures for their existing monitoring programmes and this shall include all existing monitoring boreholes as well	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
	as periodic review to identify the potential need for additional monitoring boreholes.		
Groundwater study (2015)	**Mitigation Measures.** The specialist reports identified a number of mitigation and management measures to address the impacts that were identified. These mitigation and management measures have been included in this report.	**X**	26 Impact Management Objectives 26.9 Impacts to be Mitigated in their Respective Phases 26.10 Impact Management Outcomes 26.11 Impact Management Actions

9 ENVIRONMENTAL IMPACT STATEMENT

9.1 SUMMARY OF KEY FINDINGS

Three new environmental studies were undertaken for Zandvoort and it was determined that a number of sensitive features exist on this property. Several new heritage sites were discovered which included graves and graveyards as well as historical structures. It was also determined that there are some remaining natural areas on this property which have a high biodiversity value. As Zandvoort will only be utilised for underground mining, which will be accessed through an existing opencast area, no surface disturbance will occur on this property. It was therefore determined that by implementing the recommended mitigation measures, the post mitigation impacts would be of low to medium significance. It was however noted that there is potential for fossils to exist within the geology of this property as well as others within the mining right. As such the specialist had made a recommendation for further investigation of the mine stockpiles to determine whether any significant fossil remains may exist. In terms of the Zandvoort project, SAHRA requested that a palaeontological study to be undertaken. During a thorough palaeontological field survey of the proposed development footprint no fossils were found. However, the specialist has indicated that should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist. This requirement has been included as a commitment in this EMPR. Depending on the results of the specialist visit, it may be necessary to develop a plan for the rescue and preservation of fossil material from the underground mining operations. In terms of heritage resources, the specialist has recommended a monitoring programme to detect any potential impacts due to blasting and vibration (although considered highly unlikely) and this has also been included as commitment in the EMPR.

In terms of site sensitivities, the most sensitive features which will require protection on site may be summarised as follows:

- Critical Biodiversity Areas;
- Ecologically Sensitive Areas;
- Heritage sites (including graveyards and historical structures); and
- Watercourses, wetlands and dams.

The following specific impacts were found to have a high significance:

- Impacts on Geology;
- Pollution of surface water resources/decreased water quality;
- Dewatering of groundwater aquifers;
- Pollution of groundwater/decreased water quality;
- Acid Mine Drainage;

- Decant from underground workings;
- Loss and disturbance of wetland habitat;
- Destruction/damage of heritage resources and
- Coal supply for energy security.

In terms of positive impacts, the following key benefits have been identified:

- Discovery and preservation of fossils;
- Coal supply for energy security;
- Economic growth; and
- Employment Opportunities.

9.2 FINAL SITE MAP

Please refer to the composite map included as Appendix Q.

9.3 SUMMARY OF POSITIVE AND NEGATIVE IMPLICATIONS AND RISKS

The positive implications of the Pembani Colliery include the potential discovery and preservation of fossils as well as several socio-economic benefits to the area. These include economic growth, employment, energy security, and education, skills development, and training.

In terms of risks and negative implications, the mine will have an adverse effect on the environment. These include impacts to the geophysical, hydrological, biological, and social aspects of the local environment. The most severe risks relate to the potential for water pollution and volume reduction, loss and damage to wetlands, destruction of heritage resources, and destruction of geological features. Potential water pollution includes AMD, decant from underground workings, and general pollution of ground and surface water resources. The implications of water pollution, wetland destruction, and destruction of heritage features include the permanent loss of irreplaceable resources. These potential impacts also have legal implications and risks should they not be minimised through the application of mitigation measures.

The EMPR has identified appropriate mechanisms for avoidance and mitigation of negative impacts. It is anticipated that the implementation of the ESMS and mitigation measures stipulated in this EMPR will result in effective mitigation of the negative impacts. Conversely the implementation of the mitigation measures designed to maximise the positive aspects of the project will result in a significant positive influence as a result of the mines operation.

10 PROPOSED IMPACT MANAGEMENT OBJECTIVES AND OUTCOMES

As a result of the EIA assessment and the specialist studies undertaken, the following principles and objectives have been identified for the management of the Pembani Colliery:

10.1 SOCIO-ECONOMIC

The following socio-economic objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Adhere to an open and transparent communication procedure with stakeholders at all times;
- Ensure that accurate and regular information is communicated to I&APs;
- Ensure that information is communicated in a manner which is understandable and accessible to I&APs;
- Enhance project benefits and minimise negative impacts through intensive consultation with stakeholders;
- Assemble adequate, accurate, appropriate, and relevant socio-economic information relating to the context of the operation;
- Ensure that recruitment strategies for the mine prioritises the sourcing of local labour, and share in gender equality;
- Ensure an atmosphere of equality and non-discrimination among the workforce;
- Contribute to the development of functional literacy and numeracy among employees;
- Empower the workforce to develop skills that will equip them to obtain employment in other sectors of the economy; and
- Labourers should be sought locally and only regionally if skills are not available. Employ as per SLP.

10.2 HISTORICAL AND CULTURAL ASPECTS

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To instil a sense of value in the local inhabitants for the relevant artefacts and structures by the treatment afforded to them by the mining operation;
- To ensure that all graves and cemeteries that remain have a 20 meter buffer zone and are fenced;
- To deal with I&APs in a sensitive and humane manner with regard to the relocation of graves and destruction of farm infrastructure;
- To ensure that relocation is done in such a way to retain the relevant context of the artefacts and structures; and
- To encourage the preservation of cultural structures not affected by mining.

10.3 TOPOGRAPHY

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To maintain the integrity of the landscape as far as possible;
- To ensure drainage lines are not disturbed as far as possible; and

- To create pollution control structures to ensure pollution on site is minimized

10.4 GEOLOGY

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To minimise the possibility for spontaneous combustion:
  - Coal and carbonaceous interburden stockpile slopes should be kept as flat as possible to reduce wind friction; and
  - Areas of high danger should be checked regularly for hot spots and smoke.

10.5 SOILS

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To prevent losing soil quality through mixing of usable soil with subsoil horizons;
- To prevent soil loss through erosion;
- To prevent loss of soil quality through contamination with other substances such as hydrocarbons;
- To prevent loss of soil structure through compacting of soil;
- To prevent loss of soil fertility; and
- To prevent water logging of any soils in the area.

10.6 LANDUSE

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To limit interference with existing landuses as far as possible during mining;
- To maximise potential land use options for post mining; and
- To allow the surface use of unmined land where practical.

10.7 LAND CAPABILITY

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To preserve soil so that land capability class can be re-established post mining (as far as this is possible).

10.8 SURFACE WATER

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To ensure minimal impact to the surface water resources; and

- To ensure that the construction activities are carried out so as to aid rehabilitation during decommissioning.

10.9 GROUNDWATER

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To prevent construction material becoming a source for pollution to the local aquifers;
- To ensure effective management of any accidental spills; and
- To ensure that adequate monitoring points exist to allow the monitoring of impacts on water quality and quantity during the operational phase.

10.10 WETLANDS

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To retain water flow in sensitive wetland areas;
- To retain water quality of wetland areas;
- To prevent silt deposition in wetland areas; and
- To preserve wetland habitat and biodiversity.

10.11 FLORA

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To eliminate alien invasive and exotic plants;
- To compile and implement an alien vegetation management plan for the entire site;
- To minimise and limit the destruction or disturbance of vegetation of the proposed mining areas, and infrastructures such as buildings, offices, roads, haul roads, stockpile areas, and power lines;
- To prevent the destruction of natural and/or pasture vegetation of the surrounding areas that will not be mined or used as roads or for other infrastructures;
- To prevent heavy machinery and light vehicles driving through natural vegetation that will not be disturbed by the proposed activities;
- To prevent the destruction of vegetation in areas prone to soil erosion;
- To remove and relocate any rare and endangered species within the areas where the natural vegetation will be destroyed;
- To revegeate any areas that are denuded during construction with indigenous vegetation in order to prevent erosion during flood events;
- To prevent the destruction of the vegetation of sensitive areas of the wetlands such as pans and streams and to commit to the conservation of any wetlands adjacent to the mining area that will not be mined or used during the proposed mining activity; and

- To prevent any pollution of natural vegetation, wetlands and red data species.

10.12 FAUNA

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- Not to alienate, other than in the disturbed mining areas, the wildlife in the area or to harm any animal life found on the property;
- To prevent the unnecessary destruction of natural habitat and animal life within the boundaries of the mining area and adjacent areas;
- To prevent animals being killed by speeding trucks, hunting of any kind by any worker, contractor or visitors to the mine;
- To relocate any red data animals that can be removed to a safe place outside the proposed mining area, and as far as possible record all rare and endangered animals observed; and
- Not to disturb the movement of any mammals, birds, amphibians, insects or reptiles, which tend to move out of the undisturbed and disturbed areas.

10.13 AIR QUALITY

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To limit air emissions as far as practically possible;
- To reduce dust emissions from mining activities to acceptable levels; and
- To reduce to nuisance factor of dust to neighbouring residents.

10.14 NOISE

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To reduce noise levels from the mining operations as far as possible; and
- To reduce noise annoyance to the surrounding community as far as possible.

10.15 VISUAL

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To limit the visual impact of mining and related infrastructure as far as possible during mining; and
- To enhance the visual aspect and maintain the aesthetics of the region post mining.

10.16 TRAFFIC

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To create safe entry roads into the construction and mining areas;
- To avoid damage to road infrastructure; and
- To maintain safety to pedestrians and motorists.

10.17 HEALTH AND SAFETY

The following objectives should be attained during the construction, operation, and decommissioning phases of the mining operations:

- To undertake mining and ancillary activities in safe and responsible manner so as to protect the safety of people and the environment;
- To management hazardous materials and explosives in a safe and responsible manner so as to protect the safety of people and the environment;
- To understand the nature of the activities undertaken and the associated safety risks and to effectively mitigate the risks; and
- To understand the nature of risks to the health and safety of the surrounding community and landowners and to develop effective management measures to avoid and limit these risks and impacts.

11 FINAL PROPOSED ALTERNATIVES

The Applicant has an existing Mining Right over the sites assessed in this report, and a Prospecting Right for Zandvoort 10 IT. It is noted that alternative locations for the project have not been considered for the following reasons:

- The proposed project of including Zandvoort 10IT, is an expansion of an existing mine.
- The proposed amendments to the Mining Works Programme, includes properties for which Pembani Colliery already has an existing Mining Right. The changes to the MWP were subject to a separate NEMA EIA for which approval has been granted.
- The location of the proposed project is determined by the availability of coal.

The proposed project cannot go ahead in the form as proposed (i.e. without any additional infrastructure) unless it is undertaken at the location as proposed due to the proximity of the existing infrastructure, mining operations and coal reserves.

Furthermore, as Pembani is an existing, operational mine no comparative land use and/or development alternatives have been considered or assessed in this report. Pembani has undertaken previous assessments where various land use and/or development alternatives have been previously considered as part of prior applications for approval or authorisation. However, the land use at present is mining and given that the mine is already in operation there are no practical alternative land use and/or development alternatives to the land on which the mine and related infrastructure/activities are located.

Due to the nature of the coal reserve (high quality reserve) and the identified sensitivities identified on the surface area of Zandvoort, as well as concerns raised by I&AP's it was concluded that underground

mining is the only viable alternative for the proposed mining activities on Zandvoort. This EIA and EMPR is based on the final approved alternatives and project description and provides the necessary mitigation measures to ensure the advantages associated with the chosen alternatives, layout and design are optimised.

12 ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION

Please refer to Section 14.2 for the commitments which should be included as conditions in the authorisation.

13 ADEQUACY OF PREDICTIVE METHODS, UNDERLYING ASSUMPTIONS, AND UNCERTAINTIES

The following assumptions, limitations, gaps in knowledge and uncertainties are applicable to this assessment:

13.1 ENVIRONMENTAL IMPACT ASSESSMENT

- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report are correctly and effectively implemented and managed throughout the life of the project.

13.2 ENVIRONMENTAL ASSESSMENT LIMITS

- The health and safety of communities has been assessed in the EIA as this relates to potential social impacts that may arise from the project. The EIA did not however assess the health and safety of workers as this is regulated separately under the Mine Health and Safety Act and the Occupational Health and Safety Act.

13.3 PREDICTIVE MODELS

- Predictive models are only as accurate as the data provided, therefore, if the input data becomes inaccurate or inapplicable due to project design changes or alterations to other variables, the predictive models will decrease in accuracy. Despite these shortcommings of predictive models in general, it should be noted that the models which are crucial for ongoing impact and risk identification (such as the geohydrological model) will be refined (as much as is practically possible) on an ongoing basis with real world data collected from the monitoring programmes. As such the models will be periodically refined and will improve in accuracy over time.

13.4 HERITAGE AND CULTURAL RESOURCES

- The scope of work made provision for the investigation of areas identified by Digby Wells and the survey of the whole development area by vehicle in the scope of four days.

- The majority of the Kwaggafontein site has already been exposed and opencast mining is currently in process. Therefore, assessment of the site for heritage remains was not possible. Satellite imagery which was observed before the site visit suggests that there were no significant buildings or stone-walls present in the area.
- Due to the nature of cultural remains that occur, in most cases, below surface, the possibility remains that some cultural remains may not have been discovered during the survey. It is incumbent upon the applicant to inform the relevant heritage agency should further as yet unknown cultural remains be unearthed or laid open during the process of development.
- Notwithstanding the comprehensiveness of the fieldwork undertaken in the various heritage assessments, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must be contacted immediately. Such observed or located heritage features and/or objects may not be disturbed or removed in any way, until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well.

13.5 SOCIAL

- The social environment constantly changes and adapts to change, and external factors outside the scope of the project can offset social changes, for example changes in local political leadership. It is therefore difficult to predict all impacts to a high level of accuracy, although care has been taken to identify and address the most likely impacts in the most appropriate way for the current local context within the limitations.
- Social impacts can be felt on an actual or perceptual level, and therefore it is not always straightforward to measure the impacts in a quantitative manner.
- There are different groups with different interests in the community, and what one group may experience as a positive social impact, another group may experience as a negative impact.

13.6 FAUNA AND FLORA

- Red List species are, by their nature, usually very rare and difficult to locate. Compiling the list of species that could potentially occur in an area is limited by the paucity of collection records that make it difficult to predict whether a species may occur in an area or not. The methodology used in this assessment is designed to reduce the risks of ommitting any species, but it is always possible that a species that does not occur on a list may be located in an area where it was not previously known to exist.
- Animal species are mostly highly mobile and often migrate seasonally. Any field assessment of relatively short duration is therefore unlikely to record anything more than the most common

species that happen to be on site at the time of the survey. This is a poor reflection of the overall diversity of species that could potentially occur on site.

- During the field survey on Kwaggafontein, opencast mining activities were found to be already underway. Therefore, the actual proposed opencast mining footprint could not be assessed. The proposed underground mining area which is situated directly to the south of the opencast area was surveyed.

13.7 WATER BALANCE

For the water balance the following assumptions have been made:

- It is assumed that rainfall will only enter the active mining areas. Opencast (300m x 100m). Underground Adit (50m x 50m).
- It is assumed that rainfall and groundwater seepage in the workings will migrate to the lowest point in the workings and be temporary stored in a sump (25m x 25m).
- It is assumed that dust suppression will be at a rate of 0.0025m/m^2/day.
- It is assumed that each ROM stockpiling area will be 3m high and cover an area of 10000m^2.
- It is assumed that each person consumes 25l per day.

13.8 GROUND WATER

- Where reliable data was absent, conservative/worse case assumptions were made when undertaking risk and impact assessments;

13.9 AIR QUALITY

- Modelling is inherently an imperfect science, relying as it must on assumptions and approximations for emissions rates, weather conditions and dispersion.
- When assessing the modelling results, it is important to bear the following in mind: The absolute values of modelled dust emissions may not be a reliable indicator of the values expected in the real world. However, the exercise is valuable in terms of assessing relative values. For example, if an area to one side of a source appears more heavily impacted from dust dispersion, it is reasonable to assume that that will be the case in the real world. For this reason, it is important to consider the results of the air quality modelling as being an indicator of areas of potential concern and impact, rather than a definitive prediction of the amount of dust expected to be released into the receiving environment.

13.10 VISUAL

- All mining structures will be removed during decommissioning phase. The land will be rehabilitated back to the original land use as far as possible after rehabilitation and closure.

13.11 NOISE

- Noise experienced at a certain location is the cumulative result of innumerable sounds emitted and generated both near and far, each in a different time domain, each having a different

spectral character at a different sound level. Each of these sounds are also impacted differently by surrounding vegetation, structures and meteorological conditions that result in a total cumulative noise level represented by a few numbers on a sound level meter. It is not the purpose of noise modelling to accurately determine a likely noise level at a certain receptor, but to calculate a noise rating level that is used to identify potential issues of concern.

13.12 FINANCIAL PROVISION

- As the mine is undertaking an environmental authorisation to include an additional area into its mining right, there is a requirement to calculate the additional costs associated with the proposed underground mining on the farm Zandvoort 10IT. This closure costing was calculated by EIMS in 2017 according to the following limitations and assumptions:

    1. The aerial extent figures utilised in the existing financial provision (undertaken by Digby Wells in 2016) was utilised for the existing operations;
    2. The latest 2016 DMR Master Rates were applied to the costing;
    3. Limited information was available for the size of the area affected by shafts entrances. The sealing of shafts for underground mining was therefore based on the assumption of a 100 000m^3 volume of soil.
    4. As Pembani Colliery is an existing mine, Digby Wells, did not conduct the financial provisioning study in terms of the Financial Provisioing Regultations (GNR 1147) of 2015 in terms of NEMA, as amended.
    5. Due to the above limitations, it is recommended that the closure costing be revised as soon as more detailed information becomes available for the new mining plan.
    6. The financial provisioning will need to be addressed and aligned according to the requirement of GNR 1147 (2015) by February 2019.
- Financial provisions for Kwaggafontein and the additional planned mining areas have not been done for the purpose of this EIR and these will need to be assessed and accounted for by the mine in their annual update, or conversion to the new NEMA requirements.

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

14.1 REASONS WHY THE ACTIVITY SHOULD BE AUTHORISED OR NOT

The Pembani Colliery is an existing mine and the proposed addition of the farm Zandvoort to the mining area, as well as the amendment of the existing mining works programme (within the approved mining right boundary) to include the mining of additional coal resources, will extend the life of mine and, therefore, allow for further and continued economic benefits associated with the mining operation. This EIAR and EMPR has assessed the potential impacts associated with the additional activities and mitigation measures have been developed to address the impacts identified. Furthermore, this

document has been compiled in accordance with the most recent guidelines and legislation and acts as a consolidation of the existing EMP's for the mine. Therefore, this EIR and EMPR will provide a framework for the effective management of the mining operations going forward. This EIR and EMPR will also be made available to I&APs and appropriate measures will be included wherever possible to ensure their concerns are addressed. As such, the EAP is of the opinion that the activity should be authorised.

14.2 CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORISATION

14.2.2 SPECIFIC CONDITIONS TO BE INCLUDED INTO THE COMPILATION AND APPROVAL OF EMPR

In addition to the standard conditions typically included in an authorisation, the following key commitments should be included in the conditions to be made legally binding on the Applicant should this EMPR be approved. These include:

- The Applicant shall develop an effective Environmental and Social Management System (ESMS) as described in the EMPR that is appropriate to the nature and scale of the project.
- The Applicant shall develop and implement social and environmental plans and procedures to support the successful implementation of the ESMS. The ESMS shall dictate which plans and procedures are required.
- An Integrated Rehabilitation and Closure Plan must be developed by a specialist for implementation within one year of the approval of the EMPR. The Plan shall be viewed as a dynamic document and shall be subjected to independent review on an annual basis along with the quantum for financial provision.
- The Applicant shall appoint a suitably qualified and competent Independent ECO who shall be tasked with auditing the mines environmental compliance. The ECO shall undertake monthly site inspections and prepare audit reports to be submitted to the mines management. The ECO must preferably have a tertiary qualification in an Environmental Management or appropriate field. The ECO should have appropriate qualification and experience in the implementation of environmental management specifications.
- The EMPR must be made binding on all contractors, sub-contractors or agents operating on behalf of the Mining Right Holder.
- The Applicant must appoint suitably qualified palaeontology and archaeology specialists to develop a Heritage Management Plan for the mine. This should include the relevant measures to protect and monitor all known heritage resources on site. Furthermore, the plan should include a chance finds procedure to protect any heritage or fossil resources which may be discovered during the operations.
- Should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO

should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist.

- In the event that graves or cemeteries must be relocated, a full grave relocation process must be undertaken that complies with legal requirements and includes comprehensive social consultation.
- The Applicant shall take the necessary precautions to avoid any impacts to wetlands outside of the required construction and/or mining footprint. These areas should be considered as no-go areas, and the restriction should be enforced. Should the Applicant not be able to comply with these conditions, the relevant authorisations, exemptions or licences will be obtained and complied with.
- The Applicant shall include additional groundwater/surface water monitoring points to include Kwaggafontein 8IT.
- The applicant must update their closure planning and associated financial provisions to incorporate the planned new mining areas (incl Zandvoort and Kwaggafontein).

14.2.3 REHABILITATION REQUIREMENTS

The following commitments are considered to be extremely important to ensure negative impacts are effectively mitigated and should be specifically included as conditions in the Authorisation.

- A specialist must be appointed to develop a detailed, site specific AMD management plan to be implemented for the remaining life of mine. Where acid mine drainage is anticipated, or detected, mitigation measures must be investigated and implemented (such as impermeable linings for the coal stockpiles and treatment of mine water).
- Provision must be made for the long-term treatment and/or management of water collecting in mined out voids. The extent of treatment required, as well as the duration of treatment needs to be determined by water quality assessments and in consultation with the competent authority. Polluted mine water and/or decant needs to be treated to the required level before discharge into natural watercourses.
- An Integrated Rehabilitation and Closure Plan that complies with the framework, guidelines and principles presented in this EMPR must be developed and implemented within one year of this EMPR being approved. Furthermore, the Mine shall investigate water treatment options to address decant where this occurs as a result of the mining activities. The mine should implement appropriate treatment options as agreed with the competent authority.

15 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The EA should be valid for the duration of the mining right.

16 UNDERTAKING

It is hereby confirmed that the undertaking required to meet the requirements of this section is provided at the end of the EMPR.

17 FINANCIAL PROVISION

An annual Financial Provision Assessment was conducted in 2016 (refer to Appendix S). As Pembani Colliery is an existing mine, the financial provisioning was not determined as required by the NEMA, as amended and associated regulations. Section 24 P of NEMA provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. Pembani will be required to address and align its financial provisioning according to the GNR 1147 by February 2019. Pembani will manage environmental impacts throughout the LoM. The mine will put in place mitigation measures to achieve the objectives and goals of impact management and rehabilitation as identified in this report. The direct operational budget for the financial year following approval will be determined in consultation with the DMR and a capital budget for the project provided for. Estimated costs for the implementation of specific mitigation measures where available are provided in the specialist reports.

17.1 EXPLAIN HOW THE AFORESAID AMOUNT WAS DERIVED

Estimated costs for the implementation of specific mitigation measures, where available, are based on previous costs for similar measures on previous projects and taking into account an inflation factor. It is, however, important to note that the mines operational budget for environmental management is reviewed on an annual basis and the mine is committed in terms of the EMPR, which is a legally binding document, to ensure that adequate operational budget is set aside for operational environmental management.

The financial provision associated with the Pembani Operation was assessed as at December 2016, (refer to Appendix S). New mining activities were observed on site whilst a portion of TZP4 and the entire TZP5 have been backfilled since the last assessment in 2015. The new activities include the Kwaggafontein 5 boxcut and hard stand.

Allowance was made for the sealing of the shafts at TZP 4, demolition and management of physical infrastructure, replacement of soil and re-vegetation, and for the general surface rehabilitation of all the disturbed areas at Pembani Operation.

The Financial Provisioning Regulations, 2015 (Government Notice No. 1147 published in GG 39425) pertaining to the financial provision for prospecting, exploration, mining or production operations were promulgated on 20 November 2015 under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended. The report did not address any of the requirements of the Financial Provisioning Regulations. The report and associated review of the financial provision is based on the Regulations applicable as at 1 December 2014. In terms of the new Regulations, a holder will have 39 months to assess, review and adjust the sum of the financial provision in accordance with Regulation 9. Therefore, the new Regulation will need to be addressed and aligned by February 2019.

It is recommended the financial provision be updated on an annual basis as a requirement by NEMA. This will ensure that all costs become more accurate over time and will reflect current market conditions.

17.2 CONFIRM THAT THIS AMOUNT CAN BE PROVIDED FOR FROM OPERATING EXPENDITURE

The amount provided for to manage and rehabilitate the environment will be provided by the direct operational budget for the proposed mine and in consultation with the DMR.

18 DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY

This document has been submitted in support of an environmental authorisation process to include an additional area into the mining right for underground mining, to make amendments to the existing mine works programme to include additional mining areas, and to consolidate previously approved EMPR's for the mine. A letter was received from SAHRA on 24 March 2017, requesting that a field site palaeontological study be conducted during the EIA phase of the project. This is the only deviation from the scoping report and plan of study.

18.1 DEVIATIONS FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

This EIR has been submitted in support of an environmental authorisation process to include an additional farm into the mining right for underground mining, to make amendments to the existing mining works programme to include additional mining areas (already included in the existing mining right) and to consolidate previously approved EMPR's for the mine. The previously submitted and approved EIA's were undertaken under legislation which has since been repealed and updated by new legislation. The impacts identified in this assessment have been assessed in accordance with the latest environmental regulations (NEMA 2014 EIA Regulations) and therefore include additional criteria such as the irreplaceable loss of resources, degree to which impacts can be reversed and the results of public consultation.

18.2 MOTIVATION FOR THE DEVIATION

The impacts identified in this assessment have been assessed in accordance with the latest environmental regulations (NEMA 2014 EIA Regulations), which includes additional criteria, thus rendering the impact assessment more robust than those undertaken previously.

19 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

No additional information has been requested from the competent authority.

19.1 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) THE EIA REPORT MUST INCLUDE THE:

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

The potential impacts on the socio-economic conditions have the potential to include:

- Education, Skills Development and Training

  The implementation of skills development and training programmes will have a direct positive effect on a number of individuals. The commitments in this regard are stipulated in the SLP and Pembani is legally bound to implement these programmes.
- Employment Opportunities

  The operation of the mine will result in both direct and indirect employment opportunities.
- Impacts on local farm labour

  There is potential for impact on farm labour as farm labourers are recruited by the mine and consequently there is a loss of skills and knowledge in the farm labour community. This in turn can have an impact on the socio-economic conditions for landowners and farmers.
  - Influx of migrant workers

    The mining operations can result in the influx of migrant workers seeking jobs and thereby reducing the number of jobs available to local labour. This is addressed through the recruitment procedure which focuses on employment of local labour.
  - Loss of jobs and economic opportunities

    Upon closure and downscaling of mining operations, there will be a loss of jobs and income for a large number of individuals. The SLP aims through skills development and training to equip to employees with portable skills, thereby opening up other employment opportunities post mining.
  - Perceptions and Expectations

    When a new mine comes into an area there is often false perceptions and expectations, particularly surrounding potential employment. There are inevitably more people seeking jobs than the number of jobs available at the mine, especially for unskilled labour. The manner in which false perceptions and expectations is addressed is through extensive consultation and communication to ensure people are fully aware of the potential employment opportunities and recruitment process.
  - Relocation

    In some cases, there is a requirement to relocate homesteads where opencast mining takes place in previously inhabited areas. This can result in socio-economic impacts including loss of income. This is addressed through livelihood restoration which typically includes replacement of infrastructure, property and services and may also include compensation.

Numerous EIA studies have been undertaken for the Pembani Colliery and extensive public consultation has taken place to determine the specific impacts on specific individuals or communities.

The consultation process has allowed directly affected parties to raise their concerns. The social report includes the results of the initial consultation undertaken with directly affected parties such as landowners. Please refer to the Social report in Appendix H for a full description of this assessment.

Further to the above, it must be noted that I&AP's, including directly affected parties such as landowners, will have the opportunity to review and comment on this report. The results of the public consultation will be included in the final report to be submitted to the department for adjudication.

19.1.3 IMPACT ON ANY NATIONAL ESTATE REFERRED TO IN SECTION 3(2) OF THE NATIONAL HERITAGE RESOURCES ACT

A number of heritage impact assessment studies have been undertaken to identify potential impacts on heritage and palaeontological resources. Please refer to section 5.4.2.12 of the report for a summary of the findings. For further detailed information, please refer to the full specialist reports which are provided in Appendix I.

The overall finding from the specialist studies is that numerous heritage resources exist on the properties within the mining right area. Furthermore, it was determined that there was a high probability of impacts to these features due to the proposed proximity of opencast mining areas to some of these sites. As discussed in the description of the baseline environment, it is now apparent that some of the heritage may have already been destroyed or impacted upon. As such a key mitigation measure included in this EMPR is for the mine to develop a heritage management plan which will first and foremost focus on the protection and monitoring of all known heritage sites. Should relocation of any graves be required, the mine will be required to appoint a suitably qualified specialist to under the necessary consultation and relocation process in accordance with legal requirements and as advised by the competent authority. Further to the protection of heritage resources, the desktop palaeontological study has described the possible presence of significant fossils, occurring in adjacent strata to the coal. As per SAHRAs request, a paleontological study has been undertaken. No fossils were discovered during the study. Should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist. As such, a condition has been included in the EMPR to ensure that the potential for significant fossil finds is confirmed during a site visit by a professional palaeontologist. Should there be a discovery of significant fossils, the mine will be required to develop a long-term strategy aimed towards to the retrieval and preservation of significant fossils.

20 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT

Due to the various EIA's undertaken in the past, no alternatives are assessed in this report. Project alternatives have been previously assessed in the relevant applications. The reader is directed to the original assessments for a full description of the alternative assessments previously undertaken. This

EIR and EMPR is based on the final approved alternatives and project description and provides the necessary mitigation measures to ensure the advantages associated with the chosen alternatives, layout and design are optimised.

Due to the nature of the coal reserve (high quality reserve) and the identified sensitivities identified on the surface area of Zandvoort as well as concerns raised by I&AP's it was concluded that underground mining is the only viable alternative for mining activities on Zandvoort.

21TECHNICAL SUPPORTING INFORMATION

The following specialist reports have been included as Appendices to this report:

Appendix A: Details of the EAP

Appendix B: Interested and Affected Parties Database

Appendix C: Proof of Notification

Appendix C1: Registered Letters, Faxes and Emails

Appendix C2: Site Notices and Posters

Appendix C3: Background Information Document

Appendix C4: Newspaper Advertisement

Appendix D: Issues and Response Report

Appendix E: Impact Assessment

Appendix F: Final Site Map

Appendix G: Master Plan Map

Appendix H: Social Study Report (2005)

Appendix I: Heritage and Cultural Resources

Appendix I1: Heritage study (2004)

Appendix I2: Heritage study (2013)

Appendix I3: Heritage Study for proposed underground mining on Zandvoort 10 IT (2015)

Appendix I4: Heritage Study for mining on Kwaggafontein 8IT (2017)

Appendix I5: Palaeontological Studies for Zandvoort 10IT and Kwaggafontein 8IT (2017)

Appendix J: Ecology

Appendix J1: Fauna and Flora Report (2004)

Appendix J2: Ecology (Flora & Fauna) study for Zandvoort underground mining expansion (2015)

Appendix J3: Biodiversity (Flora & Fauna) study for Kwaggafontein (2017)

Appendix K: Geohydrology

Appendix K1: Groundwater study (2012)

Appendix K2: Groundwater study (2015)

Appendix L: Surface Water Study Report (2005)

Appendix M: Wetland Biodiversity Assessment (2011)

Appendix N: Soils

Appendix N1: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 1 and 4 of the Farm Haarlem 39 IT (2004)

Appendix N2: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 5 of the Farm Haarlem 39 IT (2004)

Appendix N3: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 4 and R/E of the Farm Haarlem 39 IT and Portion 3 and 9 of The Farm Appeldoorn 38 IT (2004)

Appendix N4: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 2 and RE of the Farm Paardeplaats 12 IT (2004)

Appendix N5: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 8 of the Farm Twyfelaar 11 IT (2004)

Appendix N6: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 9 and 10 of the Farm Twyfelaar 11 IT (2004)

Appendix N7: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 6, 7, 8 and 17 of the Farm Groenvallei 40 IT (2004)

Appendix N8: Pre-mining Soil Assessment of the Proposed Opencast Area on Portion LG of the Farm Groenvallei 40 IT (2004)

Appendix N9: Zandvoort Soil Assessment (2015)

Appendix O: EAP's Motivation

Appendix P: Closure Cost Report (2016)

Appendix Q: Composite Map

Appendix R: Full Resolution Maps

Appendix S: Annual Financial Provision Assessment for Pembani Coal Carolina

SECTION 2: ENVIRONMENTAL MANAGEMENT PROGRAMME

22 INTRODUCTION

22.1 DETAILS OF THE EAP

The details and expertise of the EAP are detailed in Sections 1 above as required.

22.2 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

A description of the aspects of the activity covered by the EMPR below is included in Section 2 above.

22.3 COMPOSITE MAP

Figure 83 to Figure 90 below indicate the composite maps for the Pembani Colliery.

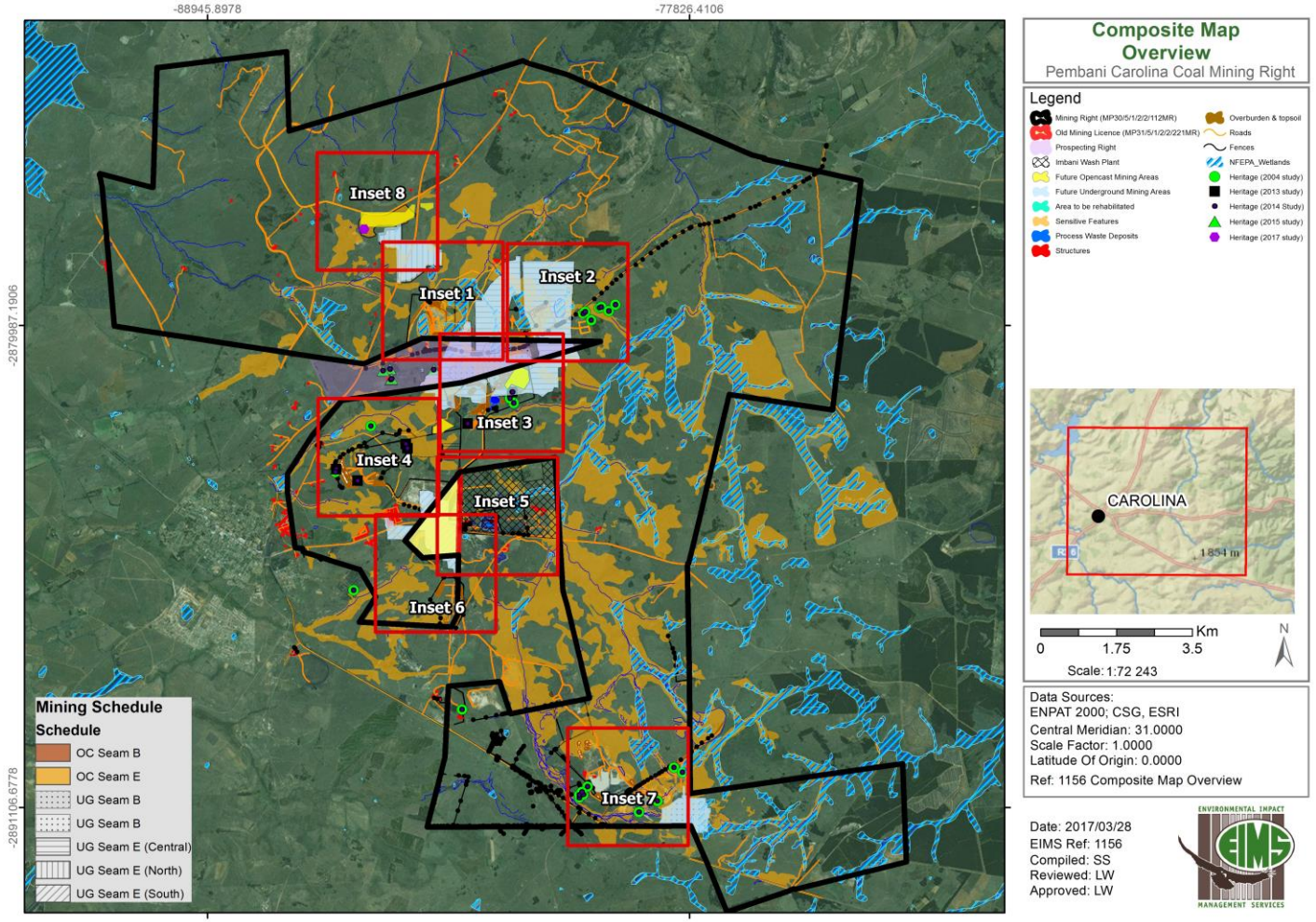


Figure 83: Composite Map (Appendix Q) - Overview

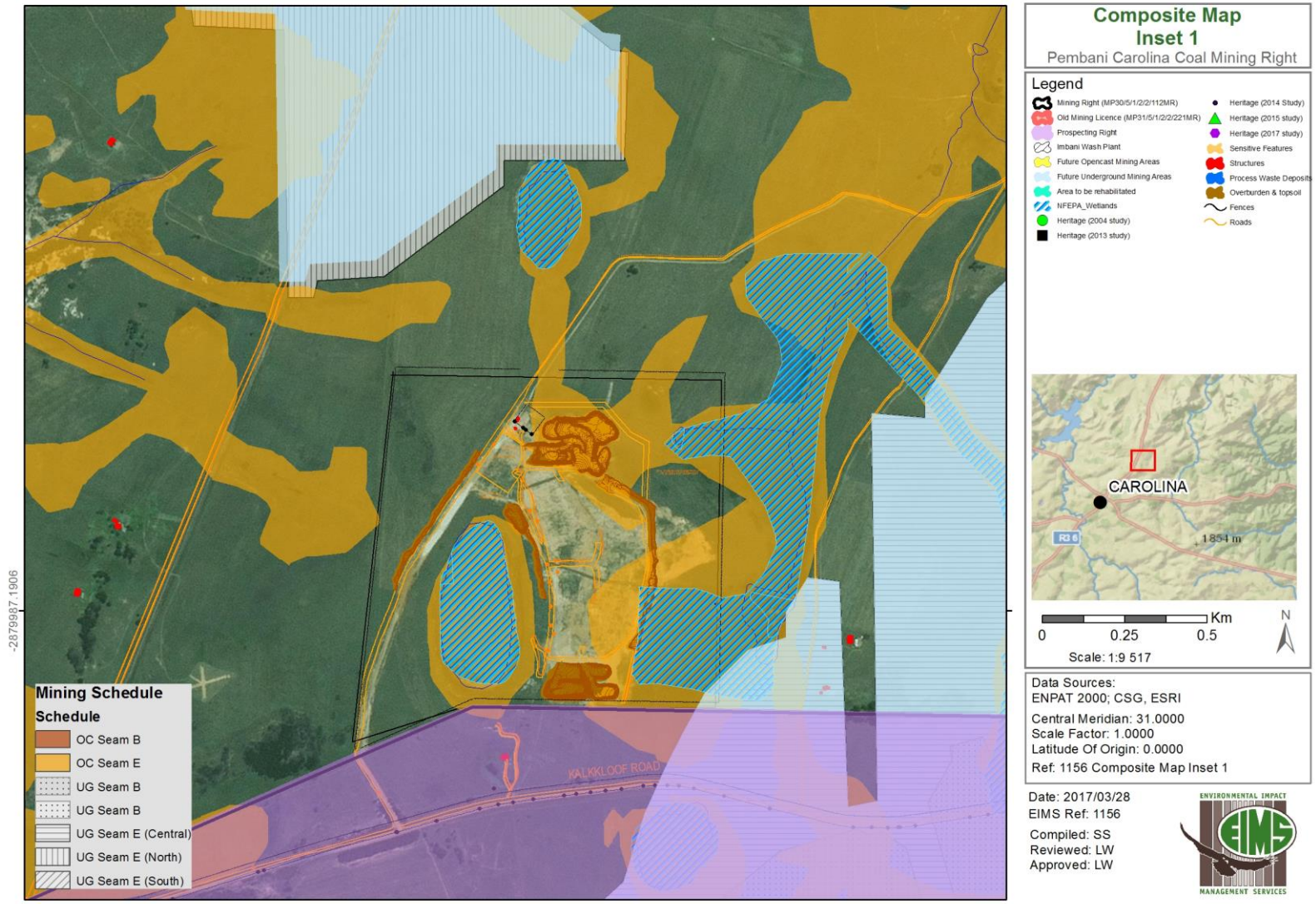


Figure 84: Composite Map – Inset 1

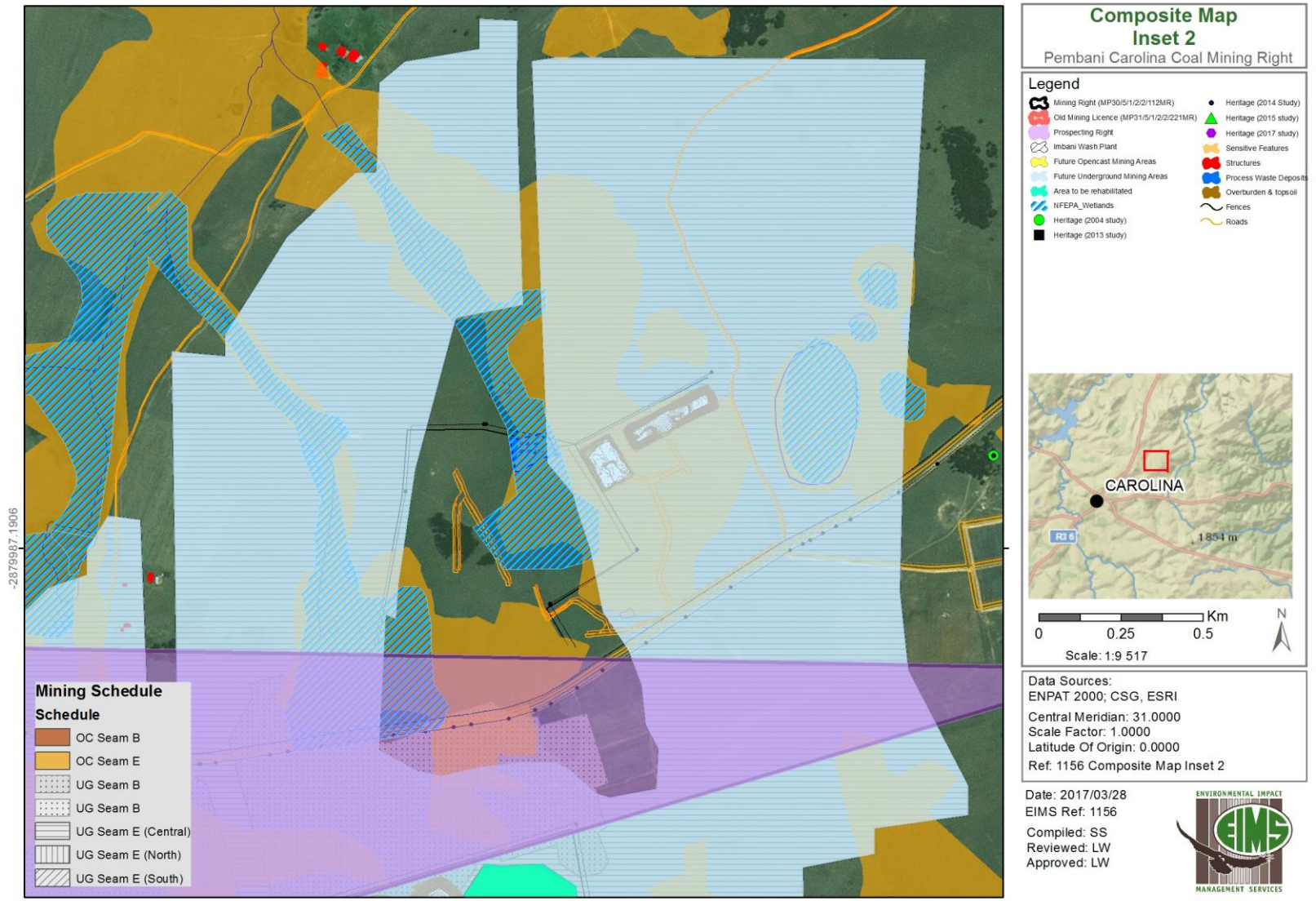


Figure 85: Composite Map – Inset 2

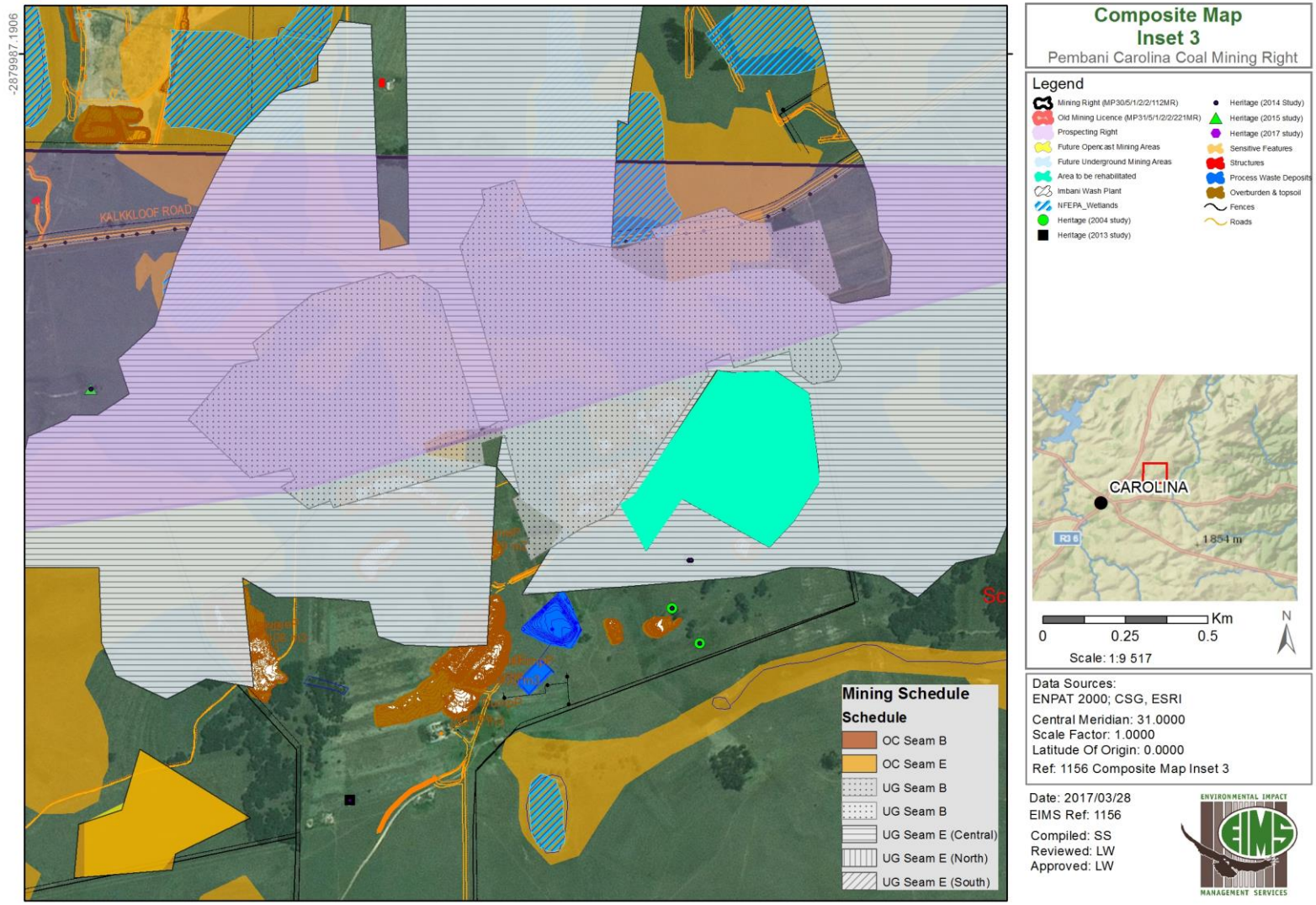


Figure 86: Composite Map – Inset 3

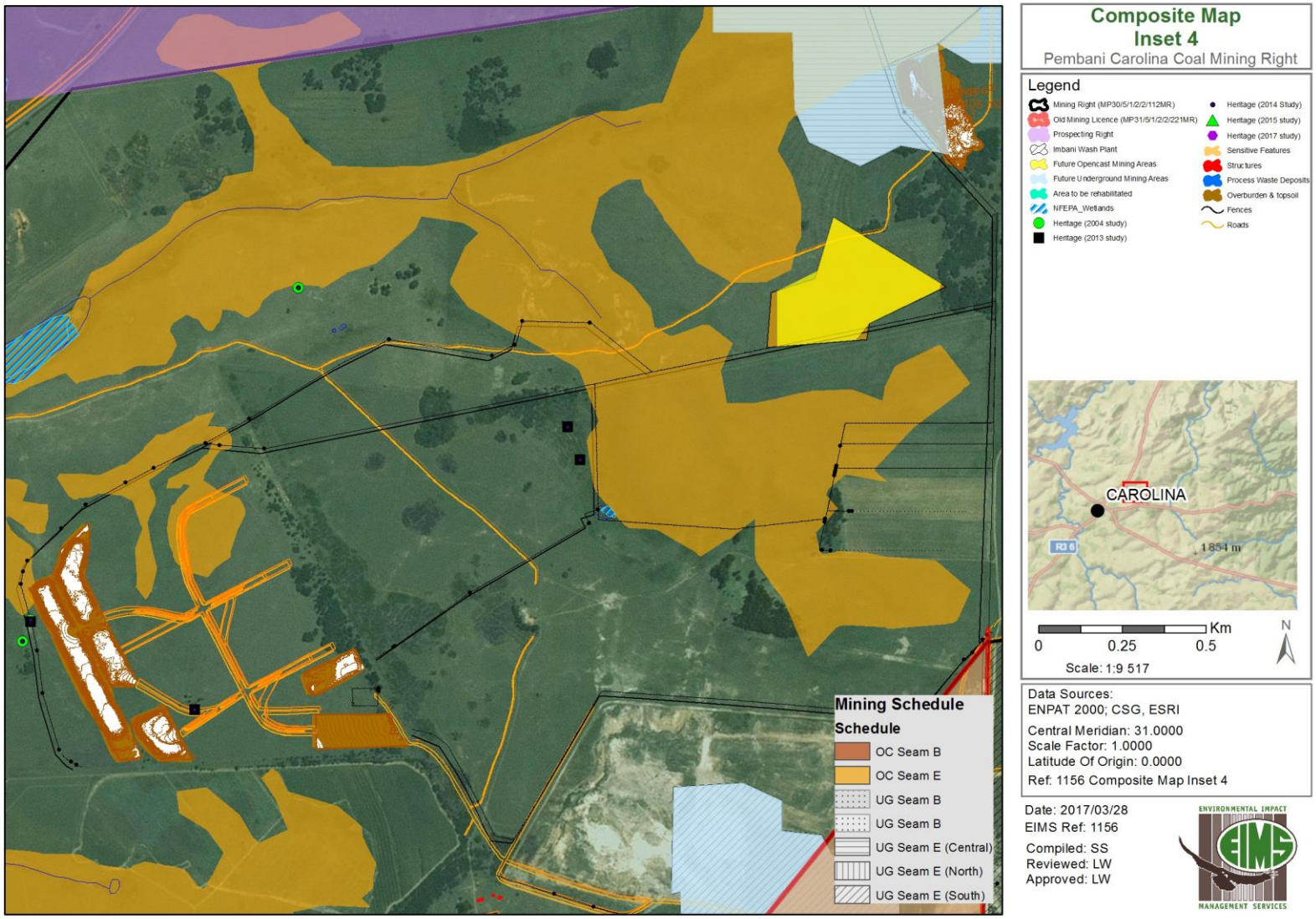


Figure 87: Composite Map – Inset 4

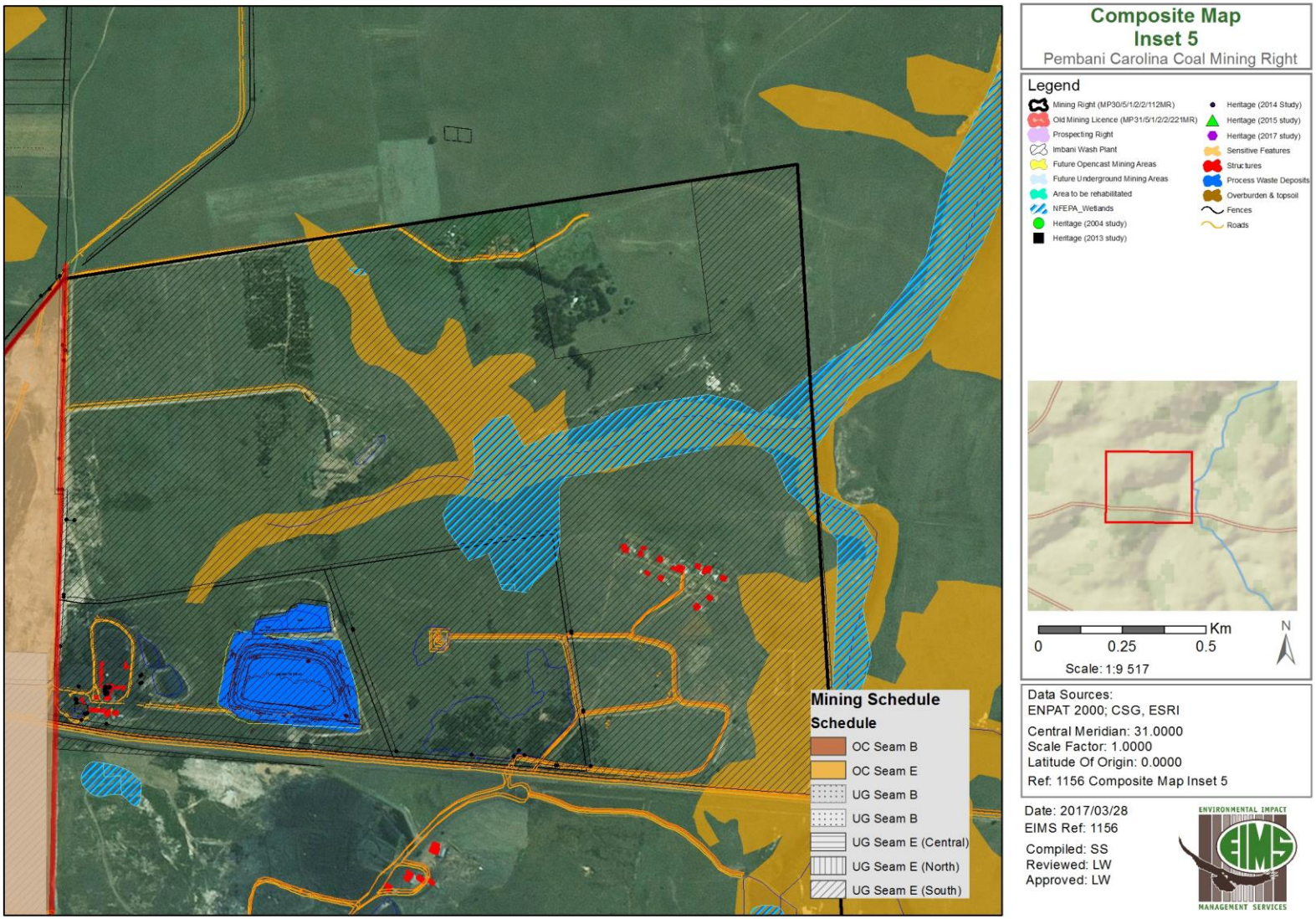


Figure 88: Composite Map – Inset 5

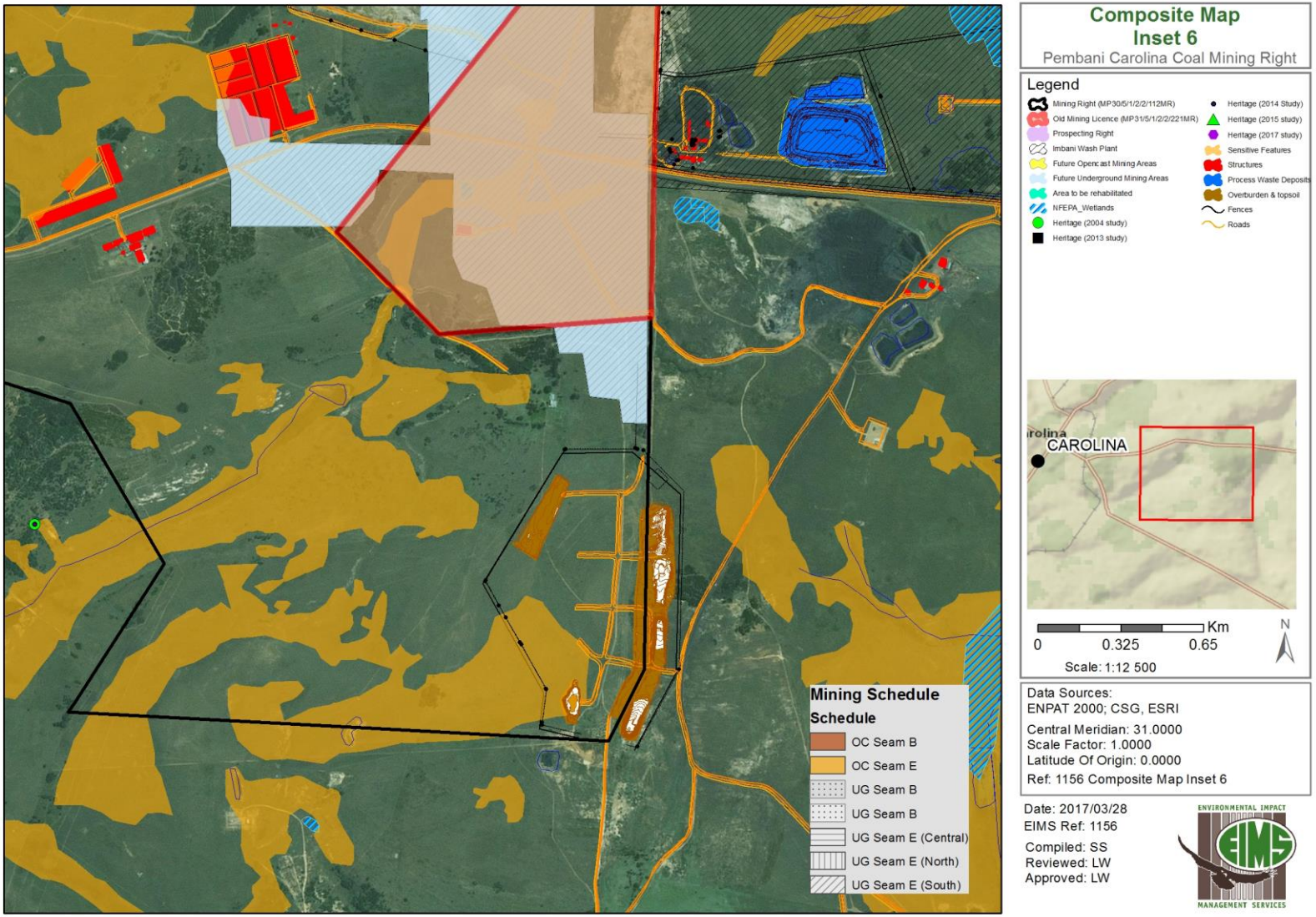


Figure 89: Composite Map – Inset 6

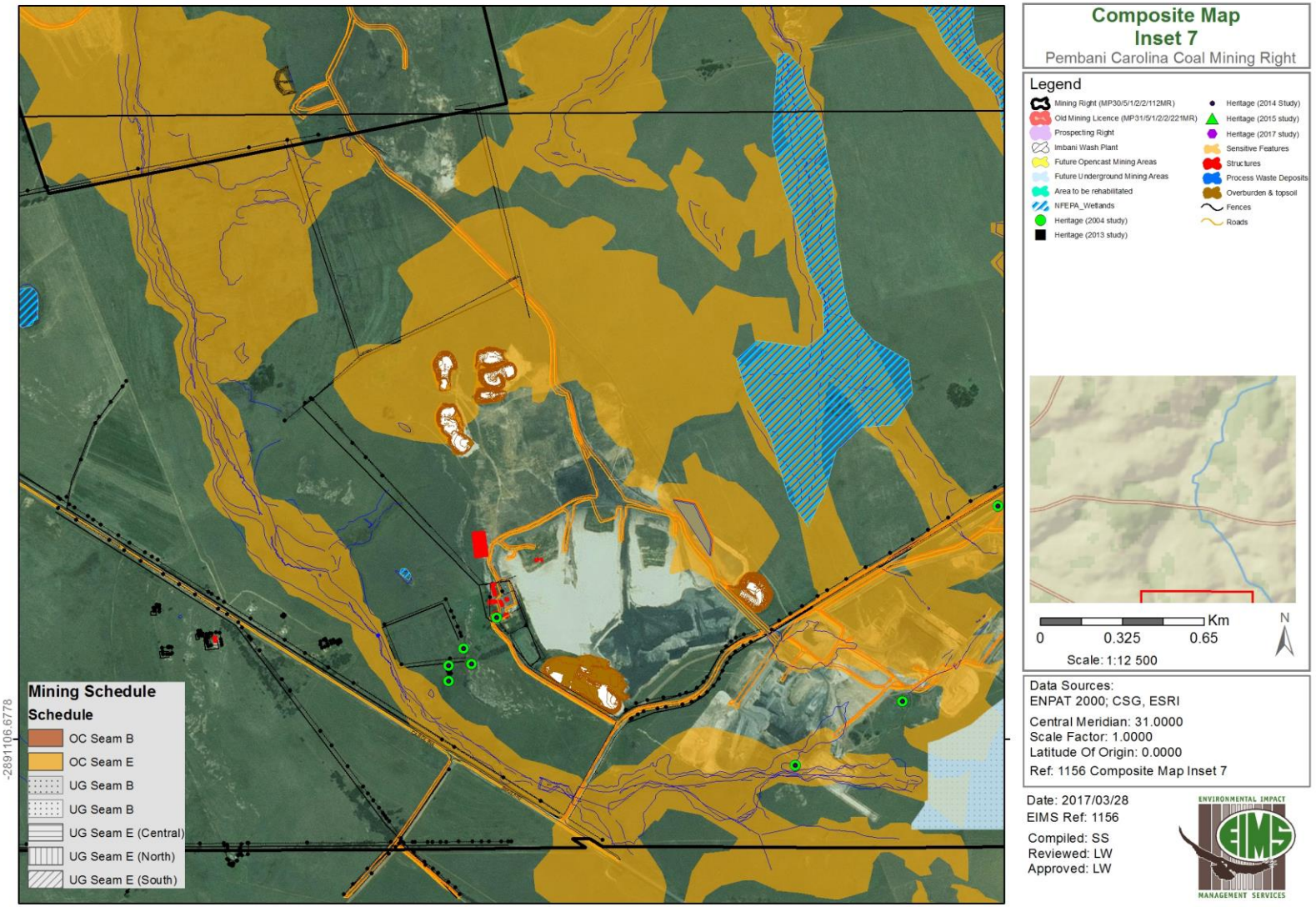


Figure 90: Composite Map - Inset 7

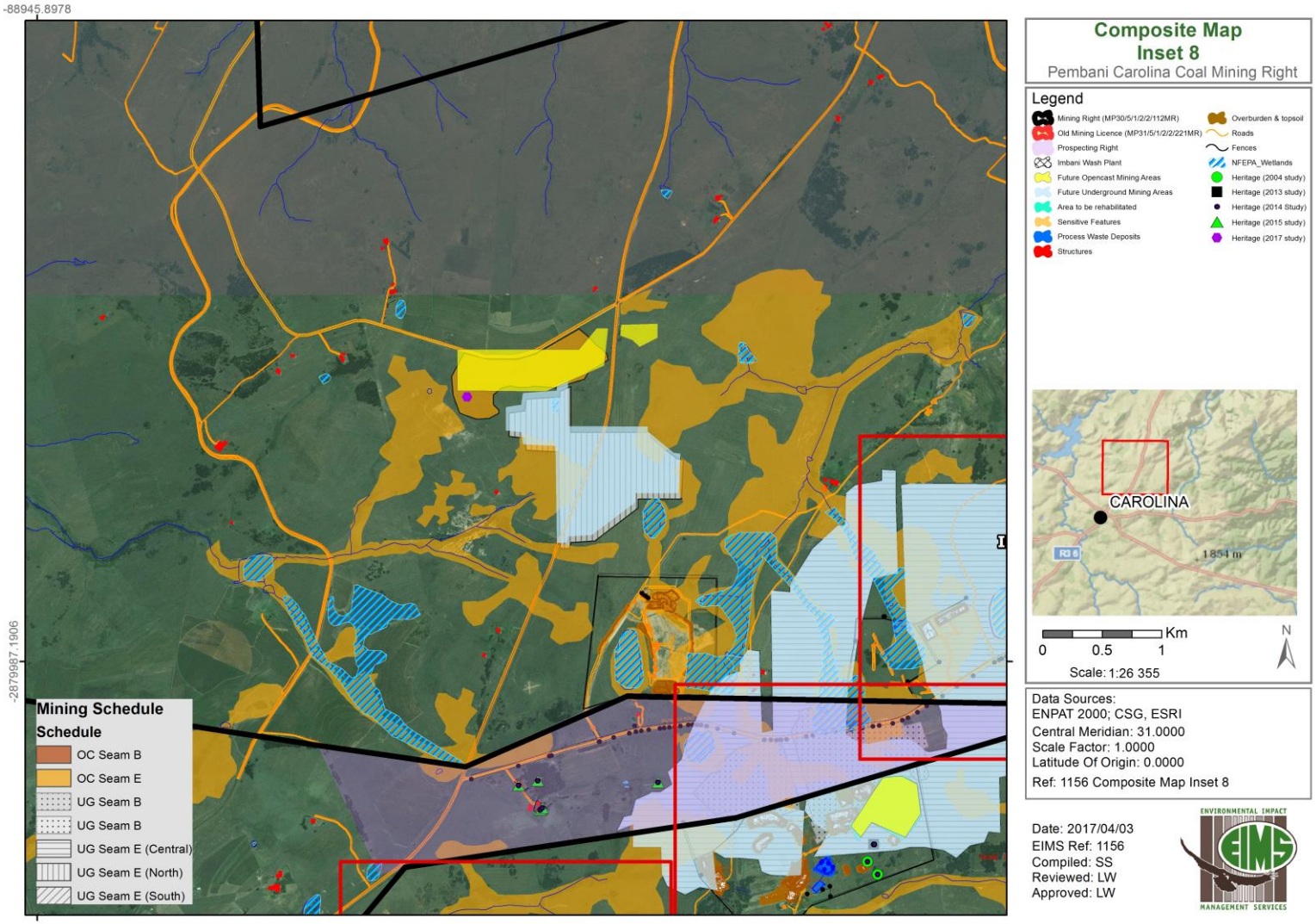


Figure 91: Composite Map - Inset 8

23 ENVIRONMENTAL MANAGEMENT PRINCIPLES

It is extremely important for effective environmental management that the mine be aware of the general principles upon which sound environmental management is based and that these principles are considered in all aspects of the mines operation. NEMA establishes a general framework for environmental law, in part by prescribing national environmental management principles that must be applied when making decisions that may have a significant impact on the environment. These principles are briefly summarised in the sections that follow.

23.1 HOLISTIC PRINCIPLE

The Holistic principle, as defined by NEMA (Section 2(4)(b) requires that environmental management must be integrated, acknowledging that all elements of the environment are linked and inter-related and it must take into account the effect of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option (defined below). Holistic evaluation does not mean that a project must be looked at as a whole. It rather means that it must be accepted that there is a whole into which a project introduced. If the indications are that the project could have major adverse effects, the project must be reconsidered and where appropriate re-planned or relocated to avoid an adverse impact or to ensure a beneficial impact.

23.2 BEST PRACTICABLE ENVIRONMENTAL OPTION

When it is necessary to undertake any action with environmental impacts, the different options that could be considered for the purpose must be identified and defined. The Best Practicable Environmental Option (BPEO) is defined in NEMA as “the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term.” Other guidelines typically used for environmental management in terms of other legislation include: BPM which is the Best Practicable Means and BAT which is the Best Available Technology.

23.3 SUSTAINABLE DEVELOPMENT

The concept of sustainable development was introduced in the 1980’s with the aim to ensure that the use of natural resources is such that our present needs are provided without compromising the ability of future generations to meet their own needs. The constitution of South Africa is built around the fact that everyone has the right to have the environment protected through reasonable legislative and other measures that secure ecologically sustainable development. The National Environmental Principles included in the NEMA require development to be socially, environmentally and economically sustainable.

23.4 PREVENTATIVE PRINCIPLES

The preventative principle is fundamental to sustainable development and requires that the disturbance to ecosystems and the pollution, degradation of the environment and negative impacts on the environment be avoided, or, where they cannot be altogether avoided, are minimised and remedied.

23.5 THE PRECAUTIONARY PRINCIPLES

The precautionary principle requires that where there is uncertainty, based on available information, that an impact will be harmful to the environment, it is assumed, as a matter of precaution, that said impact will be harmful to the environment until such time that it can be proven otherwise. The precautionary principle requires that decisions by the private sector, governments, institutions and individuals need to allow for and recognise conditions of uncertainty, particularly with respect to the possible environmental consequences of those decisions. In South Africa, the DWA (then DWAF, now DWS) adopted a BPEO guideline in 1991 for water quality management and in 1994 in the Minimum Requirements document for waste management.

In terms of DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, the precautionary principle is defined as, “Where a risk is unknown; the assumption of the worst case situation and the making of provision for such a situation.” Here the precautionary principle assumes that a waste or an identified contaminant of a waste is “both highly hazardous and toxic until proven otherwise.”

In the context of the EIA process in South Africa, the precautionary principle also translates to a requirement to provide sound, scientifically based, information that is sufficient to provide the decision making authority with reasonable grounds to understand the potential impacts on the environment, the extent thereof and how impacts could be mitigated. If such information is not adequate for this purpose, the relevant authority cannot be satisfied as is required and then the authority should require that further information be collected and provided.

23.6 DUTY OF CARE AND CRADLE TO GRAVE PRINCIPLE

In terms of the NEMA Section 28, “Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.”

By way of example, the principle of “duty of care” in terms of waste management emphasises the responsibility to make sure that waste is correctly stored and correctly transported, as it passes through the chain of custody to final point of disposal. This means that waste must always be stored safely and securely. The company removing and disposing of waste also holds the responsibility to hold the relevant licenses, and that waste is transported alongside the necessary paperwork.

“Cradle to Grave” refers to the responsibility a company takes for the entire life cycle of a product, service or program, from design to disposal or termination. In terms of the DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, “any person who generates, transports, treats or disposes of waste must ensure that there is no unauthorised transfer or escape of waste from his control. Such a person must retain documentation describing both the waste and any related transactions. In this way, he retains responsibility for the waste generated or handled.” This places responsibility for a waste on the Generator, and is supported by the "Cradle to Grave" principle, according to which a "manifest" accompanies each load of Hazardous Waste until it is responsibly and legally disposed. This manifest is transferred from one transporter to the next along with the load, should more than one transporter be involved. Once the waste is properly disposed of at a suitable, permitted facility, a copy of the manifest must be returned to the point of origin.” Duty of Care offers one strategy to implement sustainable development.

23.7 POLLUTER PAYS PRINCIPLE

The "polluter pays principle" holds that the person or organisation causing pollution is liable for any costs involved in cleaning it up or rehabilitating its effects. It is noted that the polluter will not always necessarily be the generator, as it is possible for responsibility for the safe handling, treatment or disposal of waste to pass from one competent contracting party to another. The polluter may therefore not be the generator, but could be a disposal site operator or a transporter. Through the 'duty of care' principle, however, the generator will always be one of the parties held accountable for the pollution caused by the waste. Accordingly, the generator must be able to prove that the transferral of management of the waste was a responsible action. The polluter pays principle acceding to NEMA dictates that “the cost of remedying pollution, environmental degradation and consequent adverse effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.”

24 DUTY OF CARE RESPONSIBILITIES

The principle of duty of care is especially important to understand when it comes to pollution that arises as a result of mining. Notwithstanding any licences or permits that may exist, the mine still has a responsibility to take suitable measures should pollution arise as a result of the mining activities.

Training and awareness should be fostered in all staff working to ensure that they can perform their duties. Failure to comply with the provisions in the EMPR and NEMA would be a contravention of the Act. The relevant sections of NEMA are provided below, to outline the duty of care and responsibility that the applicant and all employees have towards the environment. The National Environmental Management Act (Act 107 of 1998) (NEMA) Section 28 makes provision for Duty of care and remediation of environmental damage. The binding principals are described below:

1. Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is

authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

2. Without limiting the generality of the duty in subsection (1), the persons on whom subsection (1) imposes an obligation to take reasonable measures, include an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises on which or in 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 significant pollution or degradation of the environment.

3. The measures required in terms of subsection (1) may include measures to-

    a) investigate, assess and evaluate the impact on the environment;

    b) inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;

    c) cease, modify or control any act, activity or process causing the pollution or degradation;

    d) contain or prevent the movement of pollutants or the cause of degradation;

    e) eliminate any source of the pollution or degradation; or

    f) remedy the effects of the pollution or degradation.

4. No person may-

    a) unlawfully and intentionally or negligently commit any act or omission which causes significant or is likely to cause significant pollution or degradation of the environment;

    b) unlawfully and intentionally or negligently commit any act or omission which detrimentally affects or is likely to affect the environment in such manner; or

    c) refuse to comply with a directive issued under this section.

Any person who contravenes or fails to comply with subsection (14) is guilty of an offence and liable on conviction to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years or to both such a fine and such imprisonment.

25 FAILURE TO COMPLY WITH ENVIRONMENTAL CONSIDERATIONS

Within the provisions of the relevant environmental legislation, there are a number of penalties for non-compliance or offences. Below a few extracts are presented for information purposes, however these must not be read in isolation and the reader is reminded that there are other acts that may be applicable to the relevant project:

- NEMA Section 24F(2): It is an offence for any person to fail to comply with or to contravene the conditions applicable to any environmental authorization granted for that listed activity. 24F(4) A person convicted for an offence under subsection 2 is liable to a fine not exceeding 5 million rand or to imprisonment not exceeding 10 years or to both such a fine and imprisonment;
- NEMA Section 34(6): Whenever any manager, agent or employee does or omits to do an act which it had been his or her task to do, or to refrain from doing on behalf of the employer and which would be an offence under any provision listed in Schedule 3 (relates to all environmental related acts) for the employer to do or omit to do, he or she shall be liable to be convicted and sentenced in respect thereof as if he or she were the employer;
- NWA Section 151 (1): “No person may fail to comply with any condition attached to a permitted water use (Water Use License)”;
- NWA Section 151 (2): “Any person who contravenes any provision of subsection 1 is guilty of an offence and liable, on the first conviction, to a fine or imprisonment for a period not exceeding 5 years or to both a fine and such imprisonment (10 years for second conviction)”;
- In addition, if anyone is convicted of an offence under the act which has resulted in harm, loss or damage to any other person, the court may award damages to be paid by the accused or convicted;
- NWA Section 154: Makes provision that it’s not only the applicant that may be liable but also an employee or agent acting on their behalf;
- In terms of the MPRDA, Section 98, any person is guilty of an offence if he or she fails to comply with the requirements of the issued mining permit; and
- MPRDA Section 99 (1a): any person convicted of an offence in terms of the MPRDA is liable to a fine not exceeding R100, 000 or to imprisonment to a period not exceeding 2 years or to both such fine and imprisonment.

It is recommended that a procedure for non-compliances (i.e. incentives or disincentives for conformance and non-conformance with the EMP requirements) must be employed to ensure that the EMP is adequately implemented. The system to be used must be determined before mining commences, included in the tender documents and contracts, and made clear to all project workers. The system may include that the independent ECO can be authorized to impose spot fines on the Contractor and/or his subcontractors for any of the transgressions detailed below:

- Littering on site;

- Lighting of illegal fires on site;
- Persistent or un-repaired oil leaks;
- Any persons, vehicles or equipment related to the Contractor's operations found within the designated "no – go" areas;
- Any vehicles being driven in excess of designated speed limits;
- Removal and/or damage to fauna, flora or heritage objects on site; and
- Legal contraventions.

Such fines should be issued in addition to any remedial costs incurred as a result of non-compliance with the Environmental Specifications and or legal obligations.

26 IMPACT MANAGEMENT OBJECTIVES

26.1 DETERMINATION OF CLOSURE OBJECTIVES

The goals and objectives for closure were determined based on the baseline environment and the land uses that will be established post mining. Please refer to section 27.1 of this report for the determined closure and rehabilitation objectives.

26.2 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

The EIR includes preventative measures to firstly avoid potential risks and impacts. Where avoidance is not possible, the EIR provides mitigation measures to control, remedy or modify risks and impacts such as pollution. The response to risks, imapcts and incidents which are identified is managed through implementation of the ESMS which provides the mechanisms (such as procedures) for responding to risks and impacts. The process for managing risks and impacts is summarised in **Table 44** below. Table 45 provides an example of the process for responding to some of the main pollution related risks.

Table 44: Process for responding to risks and impacts

Aspect of the Environment	Aspect	Nature of risk or impact	Detection Mechanism	Response Mechanism	Mitigation Type	Nature of Corrective Action
Geophysical	Topography Landform Geology Soils	Pollute Contaminate Disturbance Destruction Damage	Site Inspections and Audits Environmental Monitoring Programmes (water monitoring, biomonitoring, noise, air quality etc) Periodic Impacts and Aspects Risk Assessment as per ESMS Topographical Surveys Public Complaints	Incident reporting procedure Preventative and Corrective Action Procedure Grievance Mechanism	Avoid/Stop through implementation of preventative measures Control/Modify through implementation of EMP mitigation measures (e.g. mine design and layout) Control through implementation of ESMS	Damage Limitation Intervention Incident Notification Rehabilitation Remediation Protective measures Monitoring Inspections Modification
Biophysical Environment	Fauna and Flora Surface Water Wetlands Air Quality Groundwater	Pollute Contaminate Disturbance Destruction Damage	Site Inspections and Audits Environmental Monitoring Programmes (water monitoring, biomonitoring, noise, air quality etc) Periodic Impacts and Aspects Risk Assessment as per ESMS Public Complaints	Incident reporting procedure Preventative and Corrective Action Procedure Grievance Mechanism	Avoid/Stop through implementation of preventative measures Control/Modify through implementation of EMP mitigation measures (e.g. alien vegetation control) Control through implementation of ESMS	Damage Limitation Intervention Incident Notification Rehabilitation Remediation Relocation Protective measures Monitoring Inspections Treatment Modification
Cultural and Heritage	Heritage Palaeontology	Disturbance Destruction	Site Inspections and Audits	Incident reporting procedure	Avoid/Stop through implementation of	Intervention Protective measures

Aspect of the Environment	Aspect	Nature of risk or impact	Detection Mechanism	Response Mechanism	Mitigation Type	Nature of Corrective Action
		Damage	Watching Brief Chance Finds Procedure Periodic Impacts and Aspects Risk Assessment as per ESMS Public Complaints	Preventative and Corrective Action Procedure Grievance Mechanism	preventative measures Control/Modify through implementation of EMP mitigation measures (e.g. grave relocation) Control through implementation of ESMS	Monitoring Inspections Damage Limitation Relocation
Built Environment	Transportation, Infrastructure Traffic	Disturbance Destruction Damage	Site Inspections and Audits Environmental Monitoring Programmes (water monitoring, biomonitoring, noise, air quality etc) Periodic Impacts and Aspects Risk Assessment as per ESMS Public Complaints	Incident reporting procedure Preventative and Corrective Action Procedure Grievance Mechanism	Avoid/Stop through implementation of preventative measures Control/Modify through implementation of EMP mitigation measures (e.g. traffic control) Control through implementation of ESMS	Damage Limitation Intervention Incident Notification Repair Rebuilt Monitoring Inspections
Social Environment	Health Safety Visual Noise Blasting Vibration Landuse	Pollute Injury Death Disturbance Perception Displacement	Periodic Impacts and Aspects Risk Assessment as per ESMS Public Complaints	Preventative and Corrective Action Procedure Grievance Mechanism	Avoid/Stop through implementation of preventative measures Control/Modify through implementation of	Intervention Compensate Replace Mediate Negotiate Communicate Monitoring Inspections

Aspect of the Environment	Aspect	Nature of risk or impact	Detection Mechanism	Response Mechanism	Mitigation Type	Nature of Corrective Action
	Socio-Economic			Emergency Response	EMP mitigation measures (e.g. communication) Control through implementation of ESMS	
Sociobiogeophysical Environment	Land Capability	Pollute Modify	Site Inspections and Audits Environmental Monitoring Programmes (water monitoring, biomonitoring, noise, air quality etc) Periodic Impacts and Aspects Risk Assessment as per ESMS Public Complaints	Incident reporting procedure Preventative and Corrective Action Procedure Grievance Mechanism	Avoid/Stop through implementation of preventative measures Control/Modify through implementation of EMP mitigation measures (e.g. fertilization) Control through implementation of ESMS	Ameliorate Replace Rehabilitate Remediate Compensate Mediate Negotiate Intervention Communicate Monitoring Inspections

Table 45: Examples of process to manage potential pollution risks

Potential source of pollution	Pollutant	Spatial scale	Temporal scale	Detection Mechanism	Mitigation Type	Nature of Corrective Action
Decant from opencast and underground workings	AMD and other water pollutants (e.g. high salt loads)	Site	Long Term	Ground water monitoring Bio-monitoring Public Complaints	Avoid through soil management practises and progressive rehabilitation Control through intervention measures (intercept decant and	Damage Limitation Intervention – Intercept decant and direct to treatment facility Rehabilitation – Rehabilitate any impacted areas Monitoring – Ongoing monitoring to determine effectiveness of treatment

Potential source of pollution	Pollutant	Spatial scale	Temporal scale	Detection Mechanism	Mitigation Type	Nature of Corrective Action
					direct to treatment plant/artificial wetland) Modify through water treatment (water treatment plant/artificial wetland)	and to act as early warning for any further impacts or risks Treatment - Treatment of polluted water with RO plant where required. Utilise artificial wetlands as sustainable, long term treatment options once more acceptable water quality is achieved.
Spills of hazardous substances at workshop	Hazardous chemicals	Activity	Short Term	Site Inspections and Audits	Avoid through preventative measures included in hazardous substance management procedure Control through intervention measures (Stop leak, clean up spill, dispose of contaminated soil) Prevent reoccurrence through implementation of preventive and corrective actions procedure	Damage Limitation Intervention – stop leak and clean up spill Rehabilitation – Dispose of contaminated soil For large spills may need to rehabilitate contaminated area
Hydrocarbon spills from fuel storage area	Diesel Hydraulic oil	Activity	Short Term	Site Inspections and Audits	Avoid through preventative measures included in hazardous substance management procedure Control through intervention measures (Stop leak, clean up spill, dispose of contaminated soil)	Damage Limitation Intervention – stop leak and clean up spill Rehabilitation – Dispose of contaminated soil For large spills may need to rehabilitate contaminated area

Potential source of pollution	Pollutant	Spatial scale	Temporal scale	Detection Mechanism	Mitigation Type	Nature of Corrective Action
					Prevent reoccurrence through implementation of preventive and corrective actions procedure	
Sewage spills from overflow of septic tank	Sewage	Activity	Short Term	Site Inspections and Audits	Avoid through preventative measures included in waste management plan Control through intervention measures (Stop leak, clean up spill, dispose of contaminated soil) Prevent reoccurrence through implementation of preventive and corrective actions procedure	Damage Limitation Intervention – stop leak and clean up spill Rehabilitation – Dispose of contaminated soil For large spills may need to rehabilitate contaminated area

26.3 POTENTIAL RISK OF ACID MINE DRAINAGE

26.3.2 BACKGROUND TO ACID GENERATION AND METAL MOBILISATION

Acid Mine Drainage (AMD) can be defined as the outflow or seepage of acidic water from old metal or coal mine areas. AMD is comprised of a low pH, iron and sulphate water and it usually occurs when water is exposed to the atmosphere via outflow or seepage, thus oxidising. The creation of acid or ferric hydroxide within the system is as a direct result of iron sulphide or pyrite oxidation. Pyrite is one of the most important sulphides found in the waste rock of mines. Coal-bearing rocks in particular have the potential to generate AMD, because of the low modal distribution of sulphide minerals, i.e. mainly pyrite. It is important to note that exposure to air is a crucial step in AMD formation. Iron sulphides in geologic materials that are located below the water table will remain essentially stable, since the potential for oxidation is limited. However, where sulphidic materials are exposed to oxidising conditions (air) the iron sulphides will react and water can move the reaction products (e.g. iron and sulphate) into surface water and groundwater. As the acid water migrates, it further reacts with other minerals and dissolves a broader range of metals. Once sulphides have been oxidised, it is extremely difficult to avoid ferric hydroxide precipitation.

26.3.3 AMD FORMATION IN THE HIGHVELD, WITBANK, AND ERMELO COALFIELDS

Samples were collected during previous research projects for the Water Research Commission from the coal seams, as well as their roof and floor lithologies in the Eastern Transvaal Highveld, Witbank, and Ermelo coalfields. Acid-base accounting (ABA) results for the collected samples show that the lithological units in the coalfields have the ability to contribute to deterioration in ground and surface water quality. A positive correlation was also recognized between the types of minerals, (modal proportion of sulphide, carbonate, and clay minerals) present in the coal and the associated water quality, i.e. the severity of the AMD problem.

26.3.4 POTENTIAL IMPACTS AND CONSEQUENCES OF AMD

If AMD is incorrectly managed, it has the potential to result in social and environmental impacts as well as long term liability for mine operators, regulators, and the community. The costs of managing AMD after it has occurred can incur millions of Rands. Some of the main social and environmental impacts associated with AMD are:

- Mobilise (bring into solution) metals to levels that may seriously compromise aquatic ecosystems, riparian communities and possibly human health (e.g. zinc, cadmium, aluminium, copper);
- Limit the downstream beneficial uses of the receiving water (e.g. stock, recreation, fishing, aquaculture, irrigation);
- Alter important life supporting balances in water chemistry (e.g. bicarbonate buffering system);
- AMD can cause rehabilitation and re-vegetation difficulties;

- Released chemicals that can result in the smothering of aquatic habitat and reduce light penetration; and
- Limit the reuse of mine site water and exacerbate the corrosion of site infrastructure and equipment.
- The above impacts can result in severe consequences which primarily include:
- Long term environmental liabilities for mine operators, regulators and communities; and
- Treatment of AMD requires the installation of expensive control, treatment and rehabilitation programs.

26.3.5 POTENTIAL FOR AMD AT PEMBANI

This section should be seen as a preliminary assessment of the potential contaminant source and possible formation of acid mine drainage conditions. This is a very important issue, as it is believed that the mine, as any coal mine, could potentially produce acid mine drainage that will impact on the surrounding groundwater quality.

The results show that in general sodium, manganese and iron concentrations are expected to be elevated in the post mining environment. These results correspond to the chemical analysis results of the monitoring boreholes from the GCS monitoring program where it can be seen that in boreholes close to the historic mining areas iron and manganese concentrations are elevated. In contrast to the results of the monitoring programme the sodium concentration is also very high.

In general, it can be said that the leach pH is neutral to alkaline for all the samples, except for one which shows a pH of 3.2. This sample was taken from the sulphur reducing algae bloom near the old Kwaggafontein underground and is also the only sample to show a definite negative acid neutralising capacity. One of the samples which was taken from discard material also show a somewhat low pH at 5.9. The remainder of the samples all show pH values above 7 with two samples measuring pH values of 9.5 and 9.2 respectively. The roof material tends to be non acid forming, but could still produce some acid. High sulphide concentrations from within the coal seams are expected as the coal seams are often associated with pyrite mineralisation. Material in the discard areas will mostly consist of competent rock material from the overlying strata (roof) which include carbonaceous as well as non-carbonaceous sandstone, mudstone and other Karoo sediments. Some coal will also end up in the discard areas and will then be used in the rehabilitation process at the opencast mine areas. Therefore, it can be expected that the results from the discard and rehabilitation material will show a mixture of high and low sulphur percentages.

It is considered that the leached weathered zone material, as well as the non-carbonaceous sandstone, mudstone and shale will not have an acid forming potential due to the inherent chemical nature of the material. Element concentrations measured from the leach testing largely correspond to the same order of magnitude (except sodium) as those measured from the GCS monitoring program around the historic mine areas. This affirms the results and increases the level of confidence in the results and outputs from any applications such as contaminant transport modelling where these values are applied.

26.4 STEPS TAKEN TO INVESTIGATE, ASSESS, AND EVALUATE THE IMPACT OF ACID MINE DRAINAGE

Acid Base Accounting (ABA) tests have been performed on nine samples, representing all lithologies which occur in the mined out underground areas, the operational opencast areas, the rehabilitated opencast areas, as well as any surface stockpiles that are expected to be potentially acid producing, namely carbonaceous shale and sandstones from the roof and floor material, as well as the coal seam itself. A sample was also collected from the developing sulphur reducing blooms as seen at the old Kwaggafontein underground area.

ABA involves a combined measurement of sulphur contents (total sulphur, sulphuric acid, sulphur, and organic sulphur), neutralisation capacity (NP), paste pH and the calculation of acid potential (AP), net neutralisation potential (NNP) and NP/AP ratio (NPR). The assessment obtained by ABA techniques needs to be refined and calibrated with detailed mineralogical characterisation, site-specific observation and kinetic testing.

Leach testing performed on the rock samples described above provides an indication of the expected quality of seepage from the mined-out area in the long term. The expected qualities are compared to the SANS241 domestic use quality guidelines.

Based on the results of these tests, the potential impact of AMD at the Pembani Colliery was assessed according to the Impact Assessment Methodology provided in Section 5.6. The results of the impact assessment are provided in Section 5.7 and Section 7.

26.5 ENGINEERING OR MINE DESIGN SOLUTIONS TO BE IMPLEMENTED TO AVOID OR REMEDY ACID MINE DRAINAGE

If accounted for at the beginning of a project together with an immediate action plan to be put into effect should oxidization begin, AMD can be managed correctly, therefore minimizing the affects to the surrounding environment. Currently, best practice environmental management of sulphidic mine wastes involves integration of acid drainage prevention, minimisation and control into the mining process. It can be summarised as the early characterisation and classification of the acid generating potential of these materials, development of strategies to minimise the oxidation of sulphides, and where acid drainage formation is unavoidable, the implementation of suitable long term control and treatment technologies.

The following best practice management of AMD principles will apply to the AMD avoidance and management strategy for Pembani:

- Understanding the site mechanisms for acid generation, predicting the acid generating potential and incorporating this information into mine design and management (e.g. location of waste dumps, blending of wastes, dump design and management procedures, water management plans, etc.);
- Development of suitable minimisation and control strategies;

- Monitoring to seek warning signs of the early development of acid drainage, and later to quantify the effectiveness of minimisation and control strategies; and
- Treatment where minimisation and control strategies are not totally effective or where costs of treatment are less than the costs of minimisation and control.

In almost all circumstances, resources spent on prevention and minimisations of acid drainage are returned many fold through lower control and treatment costs.

26.6 MEASURES THAT WILL BE PUT IN PLACE TO REMEDY ANY RESIDUAL OR CUMULATIVE IMPACT THAT MAY RESULT FROM ACID MINE DRAINAGE

The following measures will be put in place to remedy any residual or cumulative impact that may result from AMD:

- Long term surface and groundwater flow management measures; and
- Geotechnical / Downstream water quality / Passive or Active mine water treatment.

26.7 VOLUMES AND RATE OF WATER USE REQUIRED FOR THE MINING, TRENCHING OR BULK SAMPLING OPERATION

The Pembani has a WUL and the volumes and rates of water required for the mining process are detailed in this and in the associated IWWMP.

26.8 HAS A WATER USE LICENCE BEEN APPLIED FOR?

The Pembani has an existing IWUL (IWUL #: 05/X11D/AGJ/466) issued on 1st April 2011 by the DWA, now known as the DWS.

The approved water uses included in the IWUL include the following:

- Section 21(a) of the Act: Taking of water from a water resource;
- Section 21(g) of the Act: Disposing of waste in a manner which may detrimentally impact on a water resource; and
- Section 21(j) of the Act: Removing, discharging or disposing of water found underground.

Further to the issued IWUL, additional water uses have been identified and an Integrated Water Use License Application (IWULA) was compiled and submitted to the DWS. This IWUL was granted on 07 July 2016 (Licence No. 05/X11B/ACGIJ/4704). The following water uses are additionally included in the new IWUL:

- Section 21(c): Impeding or diverting the flow of water in a watercourse;
- Section 21(i): Altering the bed, banks, course or characteristics of a watercourse; and
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource.

26.9 IMPACTS TO BE MITIGATED IN THEIR RESPECTIVE PHASES

Table 46 below provides measure for rehabilitation of the environmental aspects that are impacted on during the different phases of the project.

Table 46: Measures to rehabilitate the environment affected by the activity

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Environmental Management System					
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall develop an effective Environmental and Social Management System (ESMS) that is appropriate to the nature and scale of the project. The ESMS should include and provide for the following as a minimum: • Environmental Policy; • Ongoing Identification of risks and impacts; • Social and Environmental Management programs; • Organisational capacity and competency; • Emergency preparedness; • Stakeholder engagement; and • Monitoring and review.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall develop and implement social and environmental plans and procedures to support the successful implementation of the ESMS. The ESMS shall dictate which plans and procedures are required, but the plans and procedures must provide for the following: • Stakeholder Engagement; • Grievance Mechanism; • Ongoing risk and impact identification; • Management targets and objectives; • Resources, Roles, Responsibility and Authority; • Legal compliance (maintenance of legal register) • Compliance monitoring; • Environmental Auditing procedures; • Competence Training;	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Environmental awareness training; • Environmental Document and Record Control • Emergency Preparedness and Response; • Requirements for Contractors; • Surface Disturbance Management; • Heritage resource management (including chance finds procedures); • Biodiversity Management; • Management of Weeds, Pests, Alien and Invasive Plant Species (including Herbicides, Pesticides and Insecticide Management) • Hazardous Substances Management (including Fuel and Oil Off loading and Refuelling); • Water Management; • Waste Management; • Environmental Aspect Monitoring (water quality and quantity, air quality, noise monitoring etc.); and • Non-conformity and Incident Reporting.		
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall ensure that Social and Environmental human resources have the knowledge, skills, and experience necessary to perform their work with competence and efficiency.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall appoint a suitably qualified and competent ECO who shall preferably be independent from the Applicant and the Contractor. The ECO must preferably have a tertiary qualification in an Environmental Management or appropriate field. The ECO should have appropriate qualification and experience in the implementation of environmental	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			management specifications. The ECO shall be tasked with auditing the mines environmental compliance on a regular basis (at least monthly). The Applicant shall provide the ECO with the necessary support to ensure that the environmental aspects relating to the development is adhered to.	Performance Standards	
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	All contractors and sub-contractors must have a copy of this EMPR at the point of use and should be briefed by the Mine EO or ECO with regards to the use and implementation of the EMPR.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The EMPR must be made binding on all contractors operating on behalf of the Mining Right Holder.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall ensure that all sub-contractors working under the main mining contractor abide by the requirements of the EMPR through the inclusion of the EMPR and applicable environmental requirements in contractual agreements for all sub-contractors.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
Emergency Response					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Emergencies have the potential for large scale and high significance impacts	The Applicant shall develop and implement an Emergency Preparedness and Response Plan which shall include and provide for the following as a minimum: • Risk assessment; • Response procedures; • Provision of equipment and resources; • Designation of responsibilities; • Communication and reporting (including that with potentially affected communities) • Periodic training to ensure effective response; and • Periodic review and revision, as necessary, to reflect changing conditions.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The necessary provisions (financial, resources, materials) shall be made in order to ensure compliance with the Emergency Preparedness and Response Plan.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
Health and Safety					
General Mine Management	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	The mine shall ensure that reasonable measures are taken to ensure the safety of all site staff, including induction training for all employees and visitors.	OHS and MHSA	Throughout LoM
General Mine Management	Construction Operation Decommissioning	Health and safety risks are classified as high significance due	The mine shall provide appropriate Personal Protective Equipment (PPE) to employees wherever required and in accordance with the risks associated with their activities.	OHS and MHSA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure	to the value of human life			
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	The mine shall undertake safety audits to ensure compliance with the; • Occupational Health and Safety Act (Act No. 85 of 1993) and associated regulations; and • Mine Health and Safety Act (Act 29 of 1996) as amended and associated regulations.	OHS and MHSA	Throughout LoM
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	The mine shall implement a safety reporting procedure to ensure that all accidents and incidents (safety and environmental) are recorded and reported to the Mine manager and EO.	OHS and MHSA	Throughout LoM
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Health risks are classified as high significance due to the value of human life	The mine shall develop and implement an infectious diseases management plan to address health issues with the workforce. The mine shall align the strategy with a community HIV strategy. This strategy should include but not be limited to: • The formation of an AIDS Task Force for the project with representatives from unions, management, local community members and people living with HIV. • The extension of the workplace programme for HIV beyond the company's operations, and include all contractors, suppliers, transportation companies and local communities. The spread of HIV along transportation routes (roads and railways) is well documented, so this component of the project (transportation of all goods and services to and from the project site) needs special attention. • Select suppliers who have in-house HIV programmes and policies in place;	IFC Performance Standards	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Develop tailored behaviour change communication (BCC) materials such as mirror hanger messages and bumper stickers; • Include condoms in the road safety kit; • Work with truck company managers to ensure that their drivers receive adequate HIV training.		
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Health and safety risks are classified as high significance due to the value of human life	Any containers in which hazardous substances (e.g. fuel, paints, solvents) are stored shall be clearly marked as to the contents therein (in accordance with OHSA regulations).	OHS and MHSA	Throughout LoM
Site Access and Security					
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Security risks can have a highly significant impact although localized	On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation off site, and to minimise disruption of traffic.	OHS and MHSA	Throughout LoM
General Mine Management	Construction Operation	The creation of roads can have a significant and relatively widespread impact, especially as roads create corridors	Any new access (if required) shall first be approved by the Mine Manager and ECO (method statement may be required) and should be provided with erosion and silt pollution prevention measures where required.	OHS and MHSA	Throughout LoM
General Mine Management	Construction Operation Decommissioning Rehabilitation and Closure	Security risks can have a highly significant impact although localized	No person will be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares or otherwise dangerous objects on-site, or to enter the site while under the influence of alcohol or drugs.	OHS and MHSA	Throughout LoM
Environmental Awareness					
General Mine Management	Construction Operation	No direct physical disturbance	All employees and visitors to the site must undergo a site induction which shall include basic environmental	NEMA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Decommissioning Rehabilitation and Closure		awareness and site specific environmental requirements (e.g. site sensitivities and relevant protocols/procedures). This induction should be presented or otherwise facilitated by the Contractors EO/Mine EO wherever possible.		
Social and Socio-Economic					
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall develop and implement a recruitment policy that allows equal opportunity to all people (woman, disabled) and give preference to local labour from the local Municipality.	Adherence to corporate policies and compliance with legislation including Labour Act and Employment Act	Throughout LoM
General Mine Management	Planning	No direct physical disturbance	Skilling and training of local community members should take place before the mining operations so as to equip people to become eligible for positions at the mine.	SLP commitments	Prior to construction
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The procurement policy for the mine should focus on utilising service providers from the local area so as to encourage the growth of businesses.	Adherence to corporate policies and compliance with legislation including Labour Act and Employment Act	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
				SLP Commitments	
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall attempt, where possible, to recruit local service providers and contractors to undertake construction activities.	Adherence to corporate policies and compliance with legislation including Labour Act and Employment Act SLP Commitments	Throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall comply with the conditions of the SLP developed for the mine to ensure the socio-economic benefits of the mine are maximised.	SLP commitments	Throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine and Contractor(s) shall comply with all relevant legislation pertaining to labour recruitment and employment.	Compliance with legislation including Labour Act and Employment Act	Throughout LoM
General Mine Management	Planning Construction	No direct physical disturbance	The mine shall develop and implement a Stakeholder Engagement Plan in consultation with a suitably	Shall adhere to the ESMS	Developed as early as

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Operation Decommissioning Rehabilitation and Closure		qualified specialist. This plan shall include a strategy to actively manage expectations. This includes the sharing of relevant information in a way that is accessible to all members of the community. Frequent communication is a key aspect in the management of expectations.	Framework guided by Equator Principles, and IFC Performance Standards	possible and implemented throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall appoint a community liaison officer that deals specifically with the surrounding communities. The Mine shall communicate frequently with the affected stakeholders to ensure that they understand the processes and do not develop more unrealistic expectations.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Appointment as early as possible and implemented throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall establish a detailed grievance mechanism for communities to lodge concerns, suggestions and grievances which can be dealt with by the Project in a timely manner. The grievance mechanism shall aim to accomplish the following objectives; • Receive and register external communications from the public; • Screen and assess the issues raised and determine how to address them; • Identify roles and responsibilities relating to the reporting, recording and addressing of grievances; • Maintenance of a grievance register to record and track, and document responses and actions taken to address grievances; • Reporting of grievances to DMR; and • Adjust the management program, as appropriate.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Developed as early as possible and implemented throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	A grievance register must be maintained by the mine to log grievances from landowners, communities, occupants and other Interested and Affected Parties, and response to such grievances. The grievance register should be provided to authorities at any point in time if so requested. The grievance register shall contain, at a minimum, the following information; • Date of the grievance being lodged, • Location relating to the grievance, • Contact details of the complainant, • Grievance description (detailed as possible), • Person receiving grievance, • Agreed corrective action, • Responsible party for corrective action, • Summary of actions taken (and date action was taken), • Status of grievance (open, closed-out, awaiting feedback etc.). The grievance mechanism must be communicated to all stakeholders and communities.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Developed as early as possible and implemented throughout LoM
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	Open channels of communication between the Mine and surrounding landowners/communities are essential. The mine shall establish a community liaison forum (CLF) that meet on a regular basis (at least quarterly) – at this forum the mine can give feedback on its activities and keep the communities informed about matters that concern them in a transparent and honest manner. The relevant authorities shall also be invited to attend CLF meetings. This forum is an important mechanism to manage expectations and build relationships. Meeting minutes must be captured and forwarded to all attendees.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	As early as possible in the process and implemented throughout LoM
General Mine Management	Planning Construction	No direct physical disturbance	Employees should be sourced from the local area where possible.	Adherence to corporate	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Operation Decommissioning Rehabilitation and Closure			policies and compliance with legislation including Labour Act and Employment Act SLP Commitments	
General Mine Management	Construction Operation	No direct physical disturbance	The mine shall conduct agricultural training programmes with community members and employees to encourage the continuation of agricultural activities in the area.	SLP	During operation
General Mine Management	Construction Operation	No direct physical disturbance	The mine shall encourage the continuation of agricultural activities in the area surrounding the mining activities that are not affected by mining.	SLP	During operation
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	The mine shall provide training, where necessary to local work force as per the Environmental Awareness Plan.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
General Mine Management	Operation	No direct physical disturbance	The workforce should undergo multi-skilling during the operation of the mine so that they may be productively absorbed into the local economy after mine closure.	Shall adhere to the ESMS Framework guided by Equator	During operation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
				Principles, and IFC Performance Standards	
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	Should relocation become necessary the Applicant must appoint a relocation specialist to compile a relocation action plan according to best practice international standards such as the IFC Resettlement Guidelines and the World Bank Resettlement Guidelines.	Equator Principles, and IFC Performance Standards	As required when scaling down operations and prior to closure
General Mine Management	Planning Construction Operation Decommissioning Rehabilitation and Closure	No direct physical disturbance	Stakeholder Engagement will continue throughout the life of the mine to ensure local communities are kept informed and allowed to raise issues. These issues will then be addressed through the grievance mechanism.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
General Mine Management	Operation	No direct physical disturbance	Where retrenchments are unavoidable, they should be managed humanely according to legislative requirements.		When retrenchments are required
General Mine Management	Operation	No direct physical disturbance	Upon closure, the contracting company for the mining operations should attempt to redeploy employees to its other operations.		As required when scaling down operations and prior to closure
Contractors Camp – Site Establishment					
Construction camp sewage management Dust suppression	Construction	Construction impacts are temporary in nature and have a limited extent but may include	The physical footprint of any construction or site camp shall be minimised and vegetation clearance should be kept to the minimum required area. Topsoil shall be handled in accordance with the soil management principles presented in this EMPR and the soil management guide developed for the Mine.	Shall adhere to the ESMS Framework guided by Equator Principles,	Throughout construction

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Earthworks Fencing Fuel Storage and refueling Hazardous substances management Site security Soil Management Truck and heavy machinery operation Utilization of portable toilets and generation of sewage Vegetation clearance		significant impacts	All construction and/or site camps shall be enclosed with a fence. The mesh size should be small enough for the fence to act as a catch net for blown debris and as a demarcation of the site. The fence shall be maintained as required to ensure access control remains effective. All temporary fences erected by the contractor shall be removed and the site restored on completion of construction, unless otherwise agreed in writing with the Applicant.	and IFC Performance Standards OHSA MHSA NEMA MPRDA	
			Site and construction camps must be kept in a clean, neat and tidy condition at all times. The contractor shall maintain good housekeeping practises and shall comply with the relevant HSE regulations in terms of materials storage. Stockpiles of construction materials may only be placed within demarcated areas within the construction camp. Laydown areas must be kept neat and tidy and free of litter or waste at all times.		
			A waste storage area must be established within the site camp/construction camp that provides for appropriate and adequate waste storage and waste separation for recycling. All waste must be adequately contained so as to prevent ground and/or water pollution. The total volume of general waste stored shall not exceed 100m3. In the case that a storage capacity exceeding this amount is required or planned for, the necessary waste permits must be obtained in accordance with the NEMWA beforehand (GN718).		
			The site camp/construction camp shall have adequate provision for the storage of hazardous waste (e.g. old oil filters, soil from spills etc.) and the waste shall be contained within closed containers to prevent the possibility of spillages.		
			All fuel storage areas shall be bunded to contain at least 110 % of the volume stored and will comply with the		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			relevant safety regulations. Fuel storage areas may not be located within 100m of the watercourse and the total volume of fuel stored on site may not exceed 30 cubic metres (30 000l) without the necessary authorisation in terms of the NEMA. Fuel storage areas must be provided with an impervious surface with the provision to contain any potential fuel spillages during refuelling (e.g. a bunded, sealed concrete slab which drains to a sump/oil separator). No person smoke or take part in any activity that may results in sparks in the vicinity of fuels and other flammable substances to prevent ignition.		
			All hazardous substances shall be stored within designated areas that comply with the relevant HSE standards (e.g. access control, HSE signage, fire fighting equipment etc.) and that provide for spill prevention and containment. It is recommended that a dedicated, bunded and fenced Hazardous Storage Area is provided within the construction camp for this purpose.		
			Site camps/construction camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and this equipment must be readily accessible.		
			No open fires shall be permitted within the site camp/construction camp, except where approved by the responsible safety officer and ECO and within a designated structure designed for that purpose. In such cases fire fighting equipment must be readily available in the vicinity of the fire place and an appropriate safety representative should be present at all times during burning of the fire. All fires shall be fully extinguished after use.		
Flora					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	The mine, in consultation with the ECO, shall develop an appropriate weed management plan, to be implemented throughout the lifespan of the project. The weed management plan shall aim to eradicate and control alien vegetation in accordance with NEMBA. Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Specialist input shall be sought in developing the plan to ensure the potential for residual or latent impacts resulting from alien vegetation removal are minimised and mitigated. The weed management plan shall include appropriate measures for removal/control of alien vegetation across the entire site. The weed management plan shall include the following measures as a minimum; • Weeds and invader plants will be controlled in the manner prescribed for that category by the Conservation of Agricultural Resources Act or in terms of Working for Water guidelines, • Alien invasive tree species such as black wattle and blue gum should be eradicated, • Institute an eradication/control programme for early intervention if invasive species are detected, so that their spread to surrounding natural ecosystems can be prevented, • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds (including closure and post closure monitoring), The Plan must clearly define the areas from which alien vegetation must be removed as well as the plant,	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Development of plan as soon as possible and implementation throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Mineral Processing Filling Opencast Voids Post Closure Monitoring and Maintenance Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Site visits Storm water management Underground mining Water management			equipment, materials and methodology to be used (including safe disposal)		
	Planning and Design Construction Operation	Impacts on red data species has a very high significance	All Red Data Plants within the proposed opencast areas, roads and all other infrastructure areas should be transplanted and relocated within either a nursery or any neighbouring piece of land where it can be conserved until rehabilitation can take place. These species can either be replanted during the rehabilitation process of the opencast mining areas as rehabilitation of mined out areas progresses, or left in their new location if this is not to be disturbed in future.	NEMBA Threatened or Protected Species (TOPS) regulations National Forests Act DAFF permitting requirements	Prior to commencement of activities or disturbance
	Planning and Design Construction Operation	Impacts on red data species has a very high significance	The mine shall ensure that the relevant permits are obtained to remove and relocate protected species. Plan activities carefully so that only vegetation that needs to be impacted is impacted. Incorporate herbaceous vegetation into soil stockpiles to maintain a seed bank. Limit activity to area of disturbance and revegetate impacted areas as soon as possible.	NEMBA TOPS regulations National Forests Act DAFF permitting requirements	Prior to commencement of activities or disturbance
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	No unnecessary clearing of vegetation will take place, to enable seeds from undisturbed areas to move into disturbed area through natural processes of succession.	NEMA	Throughout LoM
	Planning and Design Construction Operation	Impacts on flora may occur over a large area (active mine areas) and	The mine shall plan activities carefully so that only vegetation that needs to be impacted is impacted. Incorporate herbaceous vegetation into soil stockpiles to maintain a seed bank. Limit activity to area of	NEMA CARA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Infrastructure construction Water Treatment (as required by WUL)	Decommissioning Rehabilitation and Closure	has the potential to be a relatively high significance	disturbance and revegetate impacted areas as soon as possible. Allow pioneer species to establish in disturbed areas. Erosion prevention measures will be implemented along infrastructure areas.		
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	The harvesting of plants by construction and mine workers is prohibited on site. This includes the harvesting of plants for firewood, construction material, the making of crafts and medicinal purposes.	NEMA	Throughout LoM
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Damage or harm to threatened plant species is illegal in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004). Threatened species are defined in terms of the most recent Red Data list of Southern African Plants. Employees and workers shall be educated with regards to any potential threatened species that may be encountered on site, and shall take the necessary actions to prevent of harm to any such species found on site.	NEMBA TOPS regulations National Forests Act DAFF permitting requirements	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	All alien vegetation occurring on the site must be controlled in accordance with NEMBA. The area should be assessed and the alien invasive species controlled prior to the commencement of the construction activities. The area should be monitored for the establishment and spread of alien invasive species throughout the LoM. The weed management plan and principles for weed management presented in this EMPR must be implemented throughout the lifespan of the project.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
	Construction Operation	Impacts on flora may occur over a	All soil stockpiles shall be kept free of any weeds or alien invader plant species.	Shall adhere to the ESMS	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		large area (active mine areas) and has the potential to be a relatively high significance		Framework guided by Equator Principles, and IFC Performance Standards	
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Alien species removal must take place in an appropriate manner, which includes: • Avoid disturbance to the soil. • Use an appropriate control for each species. Some species may require manual and herbicide control. Where appropriate, use biological control. • Where herbicide control is used, ensure that the correct herbicide as registered for the species is used. • Use only herbicides that are registered for use near water close to the wetland areas. • In most cases herbicide control is only successful in the growing season. All herbicides must be applied appropriately.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Where large clumps of invasive trees are to be controlled, do not clear all invasive species at once, since this will lead to large areas bare of vegetation and may lead to erosion and a large sediment load in the adjacent water resources. Aliens must be removed gradually over a long period and the trees replaced with grassland.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	The mine should consider the use of excess vegetation (tree stumps etc.) to create 'safe sites' for seedling recruitment as well as animal habitats in rehabilitated areas.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	During Rehabilitation
	Rehabilitation and Closure	Impacts on flora may occur over a large area (active mine areas) and has the potential to be a relatively high significance	Disturbed surfaces will be re-vegetated as soon as they become available, by seeding with an appropriate seed mix as per direction by a vegetation specialist. The following seed mix shall be considered and utilised if approved by the specialist: *Chloris gayana* (Rhodes grass – 4 kg/ha), *Digitaria eriantha* (finger grass – 4 kg/ha), *Cynodon dactylon* (Couch grass – 3 kg/ha) and *Eragrostis teff* (Teff – 1 kg/ha).	Adherence to Rehabilitation and Closure Plan	During rehabilitation
Fauna					
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	Visitors and workers will be informed that the killing of fauna is prohibited within the boundaries of the mining area, as well as neighbouring areas.	Induction training shall comply with ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
	Planning and Design Construction Operation	Impacts on fauna has the potential to be a relatively high significance	The mine shall educate and inform all workers, contractors and visitors about any rare and endangered species through an environmental awareness plan and	NEMA NEMBA CARA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Drilling monitoring boreholes General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Filling Opencast Voids Post Closure Monitoring and Maintenance Site establishment	Decommissioning Rehabilitation and Closure	especially where threatened or protected species are impacted upon	the distribution of posters, containing pictures of any potential rare and endangered species.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	The sighting of any rare or endangered species needs to be reported to management which will keep record of all such species. Should there be a risk of an impact to such a species, the mine shall notify a specialist who shall advise on the best course of action. Should relocation or destruction of any species be required, the necessary permits shall be obtained.	NEMBA TOPS Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
	Construction Operation	Impacts on sensitive landscapes have the potential to be a relatively high significance with widespread effects.	The destruction of sensitive landscape features shall be avoided where possible and otherwise minimised through effective planning. In areas where the destruction cannot be avoided, these features should be re-introduced in the post mining landscape.	In accordance with Rehabilitation and closure plan	During construction and operation
	Construction Operation	Impacts on sensitive landscapes have the potential to be a relatively high	Infrastructure should be designed to rather follow the edge of natural areas than crossing it. If crossing it is the only option, then the area should be transected so that one large area remains rather than two equally sized	In accordance with Rehabilitatio	During construction and operation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
– Contractors Camp Site establishment – Permanent site office Infrastructure Site visits Storm water management Underground mining Water management Infrastructure construction Water Treatment (as required by WUL)		significance with widespread effects.	areas. Infrastructure should be condensed to prevent unnecessary sprawl into sensitive areas.	n and closure plan	
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	No construction workers or mine employees may disturb, hunt, set traps/snares, utilise dead or alive fauna/livestock/wildlife/fish. This includes the killing of any animal caught in construction works. No construction workers or mine employees may collect or remove firewood or medicinal plants or other plants/crops/fruits from the site or areas adjacent to the site. Disciplinary action must be taken in the event that any flora or fauna is wilfully disturbed or killed.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	Any animals found within excavations should be carefully returned without harm to an adjacent area away from potential harm, but preferably not further than 200m away from where it was found unless otherwise agreed to by the ECO.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
	Planning and Design Construction Operation Decommissioning	Impacts on fauna has the potential to be a relatively high significance especially where threatened or	The contractor shall ensure that any snakes discovered in excavated areas, on or near the construction site are not killed or otherwise harassed. The Mine EO must be notified should a snake be found on or near the site. The Mine EO will be responsible to ensure that an appropriately skilled person is summoned to remove the	NEMA NEMBA CARA Shall adhere to the ESMS Framework	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure	protected species are impacted upon	snake from the site for relocation to a suitable nearby location.	guided by Equator Principles, and IFC Performance Standards	
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	The mine shall take the necessary measures to limit the speed of trucks and vehicles on the roads on site and enforce these speed limits.	Internal speed limits for haul roads and declared legal speed limits for public roads.	Throughout LoM
	Planning and Design Construction Operation Decommissioning	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species are impacted upon	Any red data species such as the South African Hedgehog, recorded within the areas that will be cleared for the newly opencast mining areas should be relocated within re- vegetated areas where a good vegetation cover has been established. The mine must ensure relevant permits are in place if any threatened or protected species are relocated.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Impacts on fauna has the potential to be a relatively high significance especially where threatened or protected species	No person should wilfully disturb the movement of any mammals, birds, amphibians, insects or reptiles on the mine site.	NEMA NEMBA CARA Shall adhere to the ESMS Framework guided by	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		are impacted upon		Equator Principles, and IFC Performance Standards	
Soils					
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Decommissioning Underground Mine Infrastructure Drilling for continued resource evaluation Drilling monitoring boreholes Filling Opencast Voids	Construction Operation Decommissioning	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Topsoil shall be removed from all areas where physical disturbance of the surface will occur (up to a maximum of 30 cm depth). Topsoil must be stockpiled for re-use in subsequent rehabilitation activities outside of areas prone to erosion and 1:100 year floodplain demarcation.	CARA NEMA GN704 In accordance with Rehabilitation and closure plan	As required
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Soils must be stripped from the area of activity. Topsoils and subsoils should be stripped separately. The stripped soils should be utilised to create a berm up-slope of the proposed development area to divert runoff water around the site. Re-vegetate any bare soil immediately. Activity should be limited to area of disturbance. Where required the compacted soils should be ripped to an adequate depth and re-vegetated with indigenous plants.	CARA NEMA In accordance with Rehabilitation and closure plan	As required
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use	To the greatest extent possible topsoil shall only be handled twice, only-once during the initial stripping of topsoil and a second time to replace it.	CARA NEMA In accordance with Rehabilitation and closure plan	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General decommissioning activities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Post Closure Monitoring and Maintenance Re-vegetation Site establishment		and land capability.			
	Construction Operation	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	It must be ensured that the topsoil is separated from the subsoil and that the topsoil is stockpiled separately from the subsoil and construction materials.	CARA NEMA In accordance with Rehabilitation and closure plan	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Topsoil and sub-soil stockpiles must be located such that the potential for erosion is minimised. Areas with existing erosion and stability issues must be avoided. Topsoil stockpiles will not be placed within the 1:100 year floodline of a water course, and will not be placed within the path of a stormwater channel, and if necessary, will be provided with a silt fence around the perimeter of the foot of the stockpile (as directed by ECO). Stockpiles are to be stabilised if signs of erosion are visible. Any evidence of erosion, scouring, sedimentation, and/or undercutting must be rectified and rehabilitated immediately.	CARA NEMA GN704 In accordance with Rehabilitation and closure plan	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	There must be no contamination of topsoil. The biological, chemical and physical properties of the topsoil must not be changed by introducing detrimental foreign material, gravel, rock, rubble or mine residue to such soil (MPRDA Regulation 70(7)). This also includes littering, waste disposal, fuel or chemical contamination, plant matter dumping or other activity occurs that may introduce pollutants or foreign plant species into stockpiled soils. Material laydown areas and stockpiles of construction materials must be clearly separated from	MPRDA CARA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
– Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction Water Treatment (as required by WUL)			topsoil stockpiles in order to limit any contamination of the topsoil.		
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Care must be taken to protect topsoil resources on site and thereby avoid the need to obtain additional topsoil from outside the site for rehabilitation. However, in the event that additional topsoil needs to be sourced from outside the site, this shall be done with extreme caution not to introduce any alien or invasive species to the site. The topsoil shall be sourced from a location approved by, and a standard, acceptable to the ECO.	NEMBA NEMA	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Compacting of soil must be avoided as far as possible. The contractor should restrict the use of heavy machinery, particularly in areas outside of the physical mining footprint area to reduce the compaction of soils. No vehicles or machines will be allowed to drive over or be parked on the topsoil stockpiles.	MPRDA CARA	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Stockpiles and berms should be vegetated with a suitable seed-mix to be approved by the ECO. A typical seed mix would consist of *Chloris gayana* (Rhodes grass – 4 kg/ha), *Digitaria eriantha* (finger grass – 4 kg/ha), *Cynodon dactylon* (Couch grass – 3 kg/ha) and *Eragrostis teff* (Teff – 1 kg/ha).	MPRDA CARA	As required

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	A monitoring system shall be implemented which will include inspecting soil stockpiles and berms for any degradation or erosion, and ensure immediate action if these are noted.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Ongoing throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	The regular inspections shall aim to identify negative effects such as acidification and erosion of cover-soil, poor quality leachate seeping from the residue deposits and deterioration of vegetation cover. The mine shall take measures to re-vegetate any bare soil immediately.	Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Ongoing throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Trucks, machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks. All leaks will be cleaned up immediately using spill kits or as per the emergency response plan. For large spills a hazardous materials specialist shall be utilised.	NEMA NWA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Ongoing throughout LoM
	Construction Operation	Impacts on soils can have	Accidental hydrocarbon spillages should be reported immediately, and then the affected soil should be	NEMWA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Decommissioning Rehabilitation and Closure	significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	removed, and rehabilitated or if this is not possible, disposed of at a waste sites designated to accept such waste.	DWAF minimum requirement for waste disposal	
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	Activity should be limited to area of disturbance. This can be encouraged by pegging out the area of activity. Where required the compacted soils should be disked/ripped to an adequate depth and re- vegetated with indigenous plants.	In accordance with Rehabilitation and closure plan	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	All vehicles will be regularly serviced to ensure they are in proper working condition and to reduce risk of leaks. All leaks will be cleaned up immediately using spill kits or as per the emergency response plan.	NEMWA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
	Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of	During rehabilitation, soil samples shall be taken to determine soil fertility, depth compaction, acidity and mine related pollution. Treatment methods will then be	In accordance with Rehabilitatio	During rehabilitation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		severity and scale. Impacts on soil can in turn affect land use and land capability.	put forward for soils according to recommendations made from the results obtained.	n and closure plan	
	Rehabilitation and Closure	Impacts on soils can have significant impact both in terms of severity and scale. Impacts on soil can in turn affect land use and land capability.	The mine shall reinstate the soil over the open cast mining areas to the following standards • at least 1.5m deep, preferably the same as before construction, • in the correct soil profile order • add mulching • and soil stabilisation measures; and • ensure that the vegetation cover is as evenly spaced as possible with an initial basal cover of at least 15% with pioneer species	In accordance with Rehabilitation and closure plan	During rehabilitation
Land use					
Construction of mineral processing facilities Drilling for continued resource evaluation Drilling monitoring boreholes General Surface Rehabilitation	Planning Construction Operation	Impacts on alternative land uses are considered highly significant and can occur over a large area.	Leasing options should be evaluated so that unmined land (surface areas above underground mining) can be used for other uses such as grazing or cropping. Adequate fencing will be required to separate the land from miming areas for safety reasons.	MHSA	Throughout LoM
	Construction Operation	Impacts on alternative land uses are considered highly significant and can occur over a large area.	Soil stockpiles shall be designed to have free drainage of water with minimal soil erosion potential.	MPRDA	Throughout LoM
	Operation	Impacts on alternative land uses are	The ongoing rehabilitation should occur soon after the area has been mined out so that alternative land use can commence.	In accordance with	During rehabilitation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Infrastructure removal Mine area site preparation Opencast mining Filling Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction		considered highly significant and can occur over a large area.		Rehabilitation and closure plan	
	Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can occur over a large area.	Rehabilitation should follow procedures with regard to seed bed preparation and fertilising, and advice on seed mixtures to seed with.	In accordance with Rehabilitation and closure plan	During rehabilitation
	Operation Decommissioning Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can occur over a large area.	Rehabilitated areas should be mowed or grazed (where appropriate) as soon as they become available.	In accordance with Rehabilitation and closure plan	During rehabilitation
	Operation Decommissioning Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can occur over a large area.	Areas that have been rehabilitated and are suitable for grazing must be fenced off from the adjacent mining areas and made available to landowners.	In accordance with Rehabilitation and closure plan	During rehabilitation
	Operation Decommissioning Rehabilitation and Closure	Impacts on alternative land uses are considered highly significant and can occur over a large area.	The post mining land use must be predetermined in order to ensure it is rehabilitated to suit the use of the land.	In accordance with Rehabilitation and closure plan	Established early during operations and implemented during rehabilitation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Water Treatment (as required by WUL)					
Pollution Prevention					
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes General decommissioning activities General Surface Rehabilitation	Construction Operation Decommissioning Rehabilitation and Closure	Small scale and localised	Vehicles/machinery will be regularly serviced to reduce risk of leaks. Drip trays will be placed under potential leak sites. Any leakages should be reported and treated as per the emergency response plan. For large spills a hazardous materials company (specialist spill cleanup company) will be appointed.	NEMA Polluter Pays Principle NEMA Duty of Care NWA OHSA MHSA Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure		Any equipment that may leak, and does not have to be transported regularly, shall be placed on watertight drips trays to catch any potential spillages of pollutants. The drip trays shall be of a size that the equipment can be placed inside it. Daily inspections shall be carried out to ensure such spill prevention measures are in place and remain effective. Drip trays shall be cleaned regularly and shall not be allowed to overflow. All spilled hazardous substances must be collected and adequately disposed of at a suitably licensed facility.		
	Construction Operation Decommissioning		Appropriate measures must be implemented to ensure that rainwater does not run into areas containing cement, oil, diesel etc. as this could result in a pollution threat. Storage areas for these substances should be placed on high-lying ground, and surrounded by erosion control measures e.g. rows of filled hessian bags, silt fences etc. During operation, the storm water management system shall ensure that water from dirty areas reports to the PCD's.		
	Construction Operation Decommissioning		Servicing and maintenance of vehicles may only take place in the workshop area (subject to suitable spill prevention and containment measures). If emergency		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Filling Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp	Rehabilitation and Closure		repairs are required elsewhere on site, this shall be undertaken with the necessary spill prevention measures in place.		
	Construction Operation		Cement and liquid concrete are hazardous to the natural environment on account of the very high pH of the material, and the chemicals contained therein. As a result, the contractor shall ensure that: • Concrete shall only be mixed on mortar boards, and not directly on the ground, • The visible remains of concrete, either solid, or from washings, shall be physically removed immediately and disposed of as waste, (Washing of visible signs into the ground is not acceptable). • All excess aggregate shall also be removed.		
	Construction Operation Decommissioning Rehabilitation and Closure	Small scale and localised	All hazardous substances (e.g. fuel, grease, oil, brake fluid, hydraulic fluid) must be handled, stored and disposed of in a safe and responsible manner so as to prevent pollution of the environment or harm to people or animals. Appropriate measures must be implemented to prevent spillage and appropriate steps must be taken to prevent pollution in the event of a spill.		
	Construction Operation Decommissioning Rehabilitation and Closure	High significance and potentially a moderate scale disturbance	Hazardous substances shall be confined to specific and secured areas, and in such a way that does not pose any danger of pollution even during times of high rainfall. Hazardous storage areas shall be bunded (impermeable) with adequate containment (at least 110% the largest volume stored) for potential spills or leaks. Bunded storage areas shall be either be provided with an oil separator or sump. Waste from spillages will then be removed and recycled or disposed of responsibly.	NEMA Polluter Pays Principle NEMA Duty of Care NEMA NWA OHSA MHSA Shall adhere to the ESMS	Throughout operations
	Construction Operation Decommissioning	High significance and potentially a	All fuel storage areas shall be bunded to contain at least 110 % of the volume stored and will comply with the relevant environmental and safety regulations. Fuel		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Site establishment – Permanent site office Infrastructure Storm water management Decommissioning Underground Mine Infrastructure Underground mining Water management Infrastructure construction Water Treatment (as required by WUL)	Rehabilitation and Closure	moderate scale disturbance	storage areas must be provided with an impervious surface with the provision to contain any potential fuel spillages during refuelling (e.g. a sealed concrete slab which drains to a sump/oil separator). The applicant and Contractor(s) must ensure that employees and labourers do not smoke or take part in any activity that may results in sparks in the vicinity of fuels and other flammable substances to prevent ignition.	Framework guided by Equator Principles, and IFC Performance Standards	
	Construction Operation Decommissioning Rehabilitation and Closure	High significance and potentially a moderate scale disturbance	Refuelling may only take place within a dedicated area inside the mine that is subject to appropriate spill prevention and containment measures Refuelling and transfer of hazardous chemicals and other potentially hazardous substances must be carried out so as to minimise the potential for leakage and to prevent spillage onto the soil. Drip trays should be utilised in relevant locations (inlets, outlets, points of leakage, etc.) during transfer so as to prevent such spillage or leakage. Any accidental spillages shall be contained and cleaned up promptly.		
	Construction Operation Decommissioning	High significance and potentially a moderate scale disturbance	Any excess or waste material or chemicals should be removed from the site and should preferably be recycled (e.g. oil and other hydrocarbon waste products). Any waste materials or chemicals that cannot be recycled shall be disposed of at a suitably licensed waste facility.	NEMWA DWAF minimum requirement for waste disposal	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure	High significance and potentially a moderate scale disturbance	Hazardous waste may only be disposed of at a licensed hazardous waste disposal facility. A specialist waste contractor shall dispose of such waste and shall be required to provide waste manifests and safe disposal certificates. The ‘cradle-to-grave’ principle must be complied with.	NEMA Polluter Pays Principle NEMA Duty of Care NEMWA	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
				DWAF minimum requirement for waste disposal	
	Construction Operation Decommissioning Rehabilitation and Closure	Potential health risks are considered high significance	All relevant personnel on site must be properly trained concerning the proper use, handling and disposal of hazardous substances applicable to their line of work. If required, advice shall be obtained from the manufacturer with regard to the safe handling and storage of hazardous materials.	MSDS specifications OHSA MHSA	Throughout operations
	Construction Operation Decommissioning	Small scale and localised	The contractor shall supply the Mine EO with a list of all hazardous materials that would be present on site during the construction period. The same applies to any sub-contractor that should provide the contractor with this information. The Mine EO shall develop and maintain a hazardous substance register for all hazardous materials that shall be kept on site during all phases of the project. The register shall be provided to the ECO upon request. Material Safety Data Sheets (MSDS) must be available on site at the point of use and readily accessible for all hazardous substances stored.	OHSA MHSA	Throughout operations
Waste Management					
Construction of mineral processing facilities Maintenance and operation of site infrastructure and facilities	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The mine shall develop and implement a waste management plan for the Mine which complies with the principles of the NEMWA and provides a mechanism for the effective management of waste throughout the LoM. This plan shall ensure the appropriate management of all solid waste, including construction debris (cement bags, wrapping material, timber, cans, wire, nails, etc.), waste and surplus food, food packaging, organic waste etc.	NEMWA NEMA cradle to grave DWAF minimum requirement for waste disposal Shall adhere to the ESMS	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Drilling for continued resource evaluation Water management Infrastructure construction General Construction Mine area site preparation Construction of mineral processing facilities Drilling monitoring boreholes				Framework guided by Equator Principles, and IFC Performance Standards	
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The waste management system shall provide for adequate waste storage (in the form of waste skips and bins with lids), waste separation for recycling, and frequent removal of non-recyclable waste for permanent disposal at an appropriately licensed waste disposal facility. No waste material is to be disposed of on site. Under no circumstances may there be any burial of waste underground or on the site.	NEMWA NEMA cradle to grave DWAF minimum requirement for waste disposal	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	Waste generated on site should be recycled as far as possible and sold/given to interested contractors. Recyclable waste should not be stored on site for excessive periods to reduce risk of environmental contamination	NEMWA NEMA cradle to grave DWAF minimum requirement for waste disposal	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The Mine shall implement a waste removal regime that ensures waste skips do not exceed their capacity before being removed from site for disposal.	NEMWA NEMA cradle to grave	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from	Littering shall be strictly prohibited. The site shall remain in a neat and tidy condition at all times. If required, the mine shall make use of regular litter patrols to remove litter and ensure the site remains clean, neat and tidy.	NEMWA NEMA cradle to grave	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
General Mine Management Opencast mining Underground mining Mineral Processing Maintenance and operation of site infrastructure and facilities General decommissioning activities Infrastructure removal Decommissioning Underground Mine Sections		localized to large scale impacts.			
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The mine shall maintain a waste register which shall be used to track all waste removed from site. Proof of appropriate waste disposal shall be kept on file at the site for auditing purposes.	NEMA cradle to grave	Throughout operations
	Construction Operation Decommissioning Rehabilitation and Closure	Waste has the potential to pollute the environment and can vary from localized to large scale impacts.	The mine will adopt a cradle-to-grave approach to ensure that the waste is removed and disposed of in the prescribed and correct manner.	NEMA cradle to grave	Throughout operations
Sewage and Sanitation					
Drilling for continued resource evaluation	Construction Operation Decommissioning	Sewage has the potential to result in localized impacts of low to	There must be adequate provision for safe and effective sanitation (i.e. ablution facilities) at the mine and work sites and these shall conform to all relevant health and safety standards and codes. The Mine shall ensure	NEMWA NWA NEMA cradle to grave	Throughout operations

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Site establishment – Permanent site office Infrastructure Site establishment – Contractors Camp Water management Infrastructure construction General Construction Mine area site preparation Construction of mineral processing facilities Drilling monitoring boreholes General Mine Management	Rehabilitation and Closure	medium significance	compliance with the OHSA and MHSA in terms of sewage and sanitation (managed by safety department). Under no circumstances will pit latrines, french drain systems or soak away systems be allowed. Portable toilets will be managed by reputable contractors and inspected daily for any potential leaks. The Contractor (or reputable toilet-servicing company) shall be responsible for the cleaning, maintenance and servicing of the toilets. Chemical toilets shall be emptied/serviced frequently to avoid offensive odours (at least weekly). Toilets must be kept in a clean, neat and hygienic condition. Chemical toilets shall be cleaned and emptied before the contractor's long weekends or public holidays. Toilets must be easily accessible. Toilets shall be placed outside areas susceptible to potential flooding and shall not be placed within 50m of any wetland or watercourse. Ablution facilities shall be located a sufficient distance from any offices or eating areas to prevent nuisance from offensive odours. Sanitary arrangements shall also be to the satisfaction of the ECO. Disposal of sewage from chemical toilets shall be in a safe and responsible manner and at an approved facility specifically for that purpose. Proof of sewage removal and disposal shall be kept on file for auditing purposes.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Opencast mining Underground mining Maintenance and operation of site infrastructure and facilities General decommissioning activities Infrastructure removal					
Noise					
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation	Construction Operation Decommissioning Rehabilitation and Closure	Noise has the potential to result in significant impacts to sensitive receptors at a small to medium scale	The mine shall take reasonable measures to limit exceedingly noisy activities. Where noise is generated which may impact on sensitive receptors, the mine shall apply measures to control the noise cannot be avoided, mitigation measures to be applied shall include but is not limited to; • Using the smallest/quietest equipment for the particular purpose; • Ensuring that equipment is well-maintained and fitted with the correct and appropriate noise abatement measures; • Where possible, stationary noisy equipment (for example compressors, pumps, pneumatic breakers,) should be encapsulated in acoustic covers, screens or sheds. Proper sound insulation	SANS10103 ECA Noise Regulations World Bank EHS guidelines OHSA MHSA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Drilling monitoring boreholes General decommissioning activities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Filling Opencast Voids			can reduce noise by up to 20dBA. All construction vehicles and equipment are to be kept in good repair; • Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum; • The contractor must attempt to restrict noisy activities as far as is possible to times and locations whereby the potential for noise nuisance is reduced; • When working near (within 800 meters) to a potential sensitive receptor(s), the Contractor shall limit the number of simultaneous activities to the minimum; • All machines should be equipped with appropriate noise reduction equipment; • All machines should be roadworthy (including meeting maximum noise specifications); • The vehicles exhaust and baffle systems must be maintained regularly to ensure that the noise from these vehicles is within the required noise specification; • All plant and equipment must be operated in accordance with the specifications provided by the manufacturer; and • Safety measures that generate noise, including reverse gear alarms, should be adjusted to minimise noise where possible.		
			A maintenance programme will be investigated for the ventilation machinery and shall be implemented should feasible options exist.		
			Community involvement needs to continue throughout the project. Good public relations are essential. At all stages surrounding receptors should be educated with respect to the potential increase of noise from the mine.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground Mine Infrastructure Underground mining Water management Infrastructure construction Water Treatment (as required by WUL)			The information presented to stakeholders should be factual and should not set unrealistic expectations.		
			Trucks, machinery and equipment will be regularly serviced to ensure acceptable noise levels are not exceeded. Quieter equipment will be sought where possible when purchasing new equipment. Silencers will be utilised where possible. Point sources will be enclosed where possible. Acoustic screens will be considered if I&AP complaints are received.		
			Local residents should be notified of any potentially noisy activities or work and these activities should be undertaken at reasonable times of the day. These works should not take place at night or on weekends.		
			A channel of communication should be established and promoted between the mine and surrounding stakeholders. All noise complaints must be recorded and investigated. If required, the complaints should be investigated by an acoustical consultant.		
			As a general rule, construction operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993). The Applicant and Contractor(s) shall obtain a copy of the relevant noise regulations and take all reasonable measures to abide by these regulations. Sound pressure levels should not exceed the specified threshold level for the relevant area in accordance with SANS10103, as experienced by the nearest noise sensitive receivers (i.e. local residents). In the event that noise levels exceed the specified thresholds in terms of the noise regulations, the Applicant shall appoint a suitably qualified acoustic engineer to identify sources of the elevated noise levels and to suggest suitable and reasonable mitigation measures.		
Air Quality					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes General decommissioning activities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining	Construction Operation Decommissioning Rehabilitation and Closure	Localised and low significance	Areas of high risk for spontaneous combustion will be inspected regularly for signs of possible combustion. An emergency procedure will be set up in the case of spontaneous combustion.	NEMAQA Dust regulations	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Localised and low significance	Every effort should be made to avoid the tracking of coal from the site onto the road as this can have the impact of increasing the dust impact of the roads and changing the profile of the dust to one of black coal dust. The ECO shall evaluate the condition of the roads and in the event that coal dust is being tracked off site to an unacceptable degree, the Applicant shall implement measures as necessary to avoid and reduce this impact.	NEMAQA Dust regulations	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Wide scale of disturbance and low to medium significance. Some localized high significant impacts.	It is important to note that dust could be a major disturbance, especially during the dry winter periods to people residing around the site. All reasonable measures must be utilised to minimise the generation of dust as a result of activities on site. Such measures shall include, but shall not be limited to; • Traffic control measures aimed at reducing the entrainment of material by restricting traffic volumes and reducing vehicle speeds; • Regular and effective measures aimed at binding the surface material or enhancing moisture retention, such as wet suppression and chemical stabilisation; • Application of chemical dust palliatives and the optimal selection of wearing course materials (where possible environmentally friendly products should be utilised); • Appropriate scheduling of dust-generating activities (e.g. the clearing of parking areas should be	NEMAQA Dust regulations	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground Mine Infrastructure Underground mining Water management Infrastructure construction Water Treatment (as required by WUL)			postponed until the construction programme requires the clearing of that specific area). • Avoid excavation and stockpiling activities during periods of strong winds. • Increase dust suppression efforts during conditions conducive to excessive dust creation (e.g. dry and windy conditions). • Limit the height of soil stockpiles where possible, and wetting down of soil stockpiles when excessive dust is generated from these stockpiles; and • Areas where excessive or difficult to manage fallout dust and erosion occur remain may be treated with chemical dust suppressant or paved as opposed to using water.		
	Construction Operation Decommissioning Rehabilitation and Closure	Wide scale of disturbance and low to medium significance. Some localized high significant impacts.	The mine shall comply with the National Dust Control Regulations, Promulgated under the National Environmental Management: Air Quality Act (Act 39 of 2004). In the event that dust levels exceed the specified thresholds in terms of the dust control regulations, the Applicant shall appoint a suitably qualified specialist to identify sources of the excessive dust levels and to suggest suitable and reasonable mitigation measures.	NEMAQA Dust regulations	Throughout LoM
	Construction Operation Decommissioning	Localised and low significance	The mine must ensure that no transported materials escape from the construction and mine vehicles (no spillage on roads or dust clouds). If necessary, the load bin of the vehicle shall be covered with a tarpaulin to prevent dust.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	No direct Impacts	The Mine shall maintain open and transparent communication with the community and surrounding landowners regarding air quality and shall supply monitoring records to the public upon request.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation	Localised and low significance	A skirt (dust barrier) shall be placed around the base of dry drills to minimise the generation of airborne dust.	NEMAQA	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
				Dust regulation	
	Construction Operation Decommissioning Rehabilitation and Closure	Health impacts have a localized but high significance	Employees will receive training on the use of personal dust respirators, whenever high dust levels are experienced.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Wide scale of disturbance and low to medium significance. Some localized high significant impacts.	Speed limits will be established and enforced on the mine to minimise dust generation.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Localised and low significance	Machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of excessive emissions.	NEMAQA Dust regulation	Throughout LoM
	Construction Operation	Localised and low significance	Coal will not be left lying around as this increases the risk of spontaneous combustion.	NEMAQA Dust regulation	Throughout LoM
Heritage					
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued	Construction Operation	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law.	Fowllowing the palaeontological study conducted the specialist determined that althought no fossils were found during the site visit, should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or	NHRA Development Facilitation Act	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
resource evaluation Drilling monitoring boreholes General decommissioning activities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp			collection) can be taken by a professional palaeontologist. The appointed palaeontologist, in consultation with the mining company, must then develop a long-term strategy and budget for the recovery of significant fossils during the mining operation. This strategy may include site visits to monitor the spoil heaps, the collection of representative samples as well as the curation of fossil material. All fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.		
	Construction Operation Decommissioning	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law.	Monitoring of the grave sites on the farm Zandvoort should take place. The archaeologist must define a suitable number of fixed points around each identified heritage site and photographically record each site using pre-defined fixed points. This recording must be conducted in conjunction with the ECO. The archaeologist must familiarise the ECO with the principles and aims of the monitoring process and the use of fixed-point photography. Fixed photo points for the Status Quo report must be presented on the building plans to make it visually clear where follow up monitoring photos must be taken. This must be done before construction commences.	NHRA Development Facilitation Act	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law.	Should artefacts or archaeological items be observed, then all activity should cease immediately, the area marked off and a specialist consulted prior to any further activity.	NHRA Development Facilitation Act	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Site establishment – Permanent site office Infrastructure Storm water management Underground Mine Infrastructure Underground mining Water management Infrastructure construction Water Treatment (as required by WUL)	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law.	Should graves be observed on site during activity progress then all activity should cease and the area demarcated as a no-go zone. A specialist will need to be consulted and responsible action considered, whether grave relocation or ceasing activity completely within the area and a 50m buffer zone.	NHRA Development Facilitation Act	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law.	The mine must develop a heritage management plan. This should include the relevant measures to protect and monitor all known heritage resources on site. Furthermore, the plan should include a chance finds procedure.	NHRA Development Facilitation Act	As soon as possible and implemented throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law.	The ECO and Mine EO must be trained on potential heritage features which may be found on site and the implementation of the chance finds procedure. Should any potential heritage features be identified the relevant specialist must be notified and shall advise on the way forward.	NHRA Development Facilitation Act	As required
	Construction Operation Decommissioning	Impacts on heritage affect a limit extent but have a very high	All identified gravesites will be fenced off, or relocated. Access to gravesites will be arranged for family members/friends of the deceased if requested. Grave sites that remain insitu shall be inspected on a regular	NHRA	As soon as possible and implemented

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure	significance due to the value of heritage resources which are protected by law.	basis as per the heritage management plan to ensure no damage has occurred.	Development Facilitation Act	throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on heritage affect a limit extent but have a very high significance due to the value of heritage resources which are protected by law.	In the event that graves or cemeteries must be relocated, a full grave relocation process must be undertaken that includes comprehensive social consultation. The grave relocation process must include: • A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, which will be at least 60 days in length; • Site notices indicating the intent of the relocation • Newspaper Notice indicating the intent of the relocation • A permit from the local authority; • A permit from the Provincial Department of Health; • A permit from the South African Heritage Resources Agency, if the graves are older than 60 years, or unidentified and thus presumed older than 60 years; • An exhumation process that keeps the dignity of the remains and family intact; • The whole process must be done by a reputable company that is well versed in relocations; The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the development company.	NHRA Development Facilitation Act Human Tissue Act	Throughout LoM
Land Capability					
Construction of mineral	Construction Operation Decommissioning	Impacts on land capability have long term effects	The mine will ensure that overburden stockpiles are located in accordance with the rehabilitation plan to	In accordance with	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
processing facilities General Surface Rehabilitation Maintenance and operation of site infrastructure and facilities Mine area site preparation Opencast mining Filling Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure		and can be of a high significance	allow for minimal handling when returning soils during rehabilitation.	Rehabilitation and closure plan	
	Construction Operation Decommissioning Rehabilitation and Closure		The mine shall preserve soil potential as far as possible, thus conserving land capability.	In accordance with Rehabilitation and closure plan	Throughout LoM
	Construction Operation Decommissioning Rehabilitation		Soil stockpiles should be vegetated with prescribed seed mixtures to prevent soil erosion.	In accordance with Rehabilitation and closure plan	Throughout LoM
	Rehabilitation		The mined out areas undergoing rehabilitation should be topographically similar to the pre-mining topography, and should allow for free water drainage to prevent soil erosion.	In accordance with Rehabilitation and closure plan	During Rehabilitation
	Rehabilitation		During rehabilitation care must be taken to return the correct soil types and depths to specific sections of rehabilitated land to ensure land capability potential is restored to that area.	In accordance with Rehabilitation and closure plan	During Rehabilitation
	Construction Operation Decommissioning Rehabilitation and Closure		Re-vegetate rehabilitated areas as soon as possible to prevent soil erosion.	In accordance with Rehabilitation and closure plan	Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Storm water management Water management Infrastructure construction Water Treatment (as required by WUL)					
Surface Water					
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing	Construction Operation Decommissioning	Impacts on surface water can have a high significance and extent	The mine shall ensure that a detailed storm water management is approved and implemented for the mining area. Clean and dirty water system infrastructure must be installed as per the detailed storm water management plan which must take into consideration the design capacities and locations restrictions stipulated in GN 704 of the NWA.	NWA GN704 DWAF best Practise Guidelines Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	As soon as possible and implemented throughout LoM
	Construction Operation Decommissioning		Where clean water is diverted away from construction and/or mining areas, its point of re-entry into the natural watercourse should be well protected against erosion. In addition, sediments should be effectively trapped before re-entry.		
	Construction Operation Decommissioning		No wastewater may run freely into any of the surrounding environment or neighbouring properties. The contractor shall implement the storm water design in accordance with the approved Storm Water Management Plan. The Applicant and Contractor(s) shall ensure compliance with the requirements of the National Water Act and GN704		
	Construction Operation		All areas susceptible to erosion shall be protected by ensuring that there is no undue soil erosion resultant		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction	Decommissioning Rehabilitation and Closure		from construction and/or mining activities. Berms shall be constructed where necessary to direct all runoff into the stormwater system. Care must be taken to avoid scouring and erosion and suitable measures should be placed in areas where runoff concentrates, in order to detain the sediment load and slow down the runoff. All erosion damage shall be repaired as soon as possible as directed by the ECO.		
	Construction Operation Decommissioning Rehabilitation and Closure		All storm water and erosion control mechanisms must be inspected frequently and shall be maintained on a regular basis to ensure they remain effective. Appropriate remedial action, including the rehabilitation of eroded areas, shall be undertaken under direction from the ECO.		
	Construction		Materials capable of resulting in poor quality leachate will not be used for the construction of haul roads. This will entail testing for acid generation potential.		
	Construction		Where possible, the disturbance of land during the construction phase will be confined to areas which are disturbed for the operation of the mine.		
	Construction Operation		Soil stockpiles must be stabilised with vegetation to reduce erosion and siltation into streams and dams.		
	Construction Operation Decommissioning Rehabilitation and Closure		Hydrocarbon spills will require immediate attention and should be disposed of at a reputable facility. All used hydrocarbons will be collected and recycled.		
	Construction Operation		Storm water drainage and pollution control facilities will be constructed to divert the flow of water and separate clean and dirty water on site.		
	Construction Operation Decommissioning		All licenses and permits required as per the National Water Act will be applied for as per the relevant water uses.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
	Rehabilitation and Closure				
	Construction Operation Decommissioning Rehabilitation and Closure		The mine shall ensure soil erosion control measures are established in all high risk areas to reduce silt-loading in storm water runoff. Construct a down-stream drain and silt traps at the outlet of water diversion areas. Clean out silt build up in trenches and silt traps over dry season or more frequently if needed. Conduct construction activities in the dry winter months as far as possible.		
	Construction Operation Decommissioning Rehabilitation and Closure		Runoff from freshly-top soiled areas should be channelled to pollution control structures so that eroded soil does not leave the property.		
	Construction Operation Decommissioning Rehabilitation and Closure		Excess water will only be discharged if it meets statutory requirements.		
	Construction Operation		Storm water runoff will be diverted around opencast pits on the upslope side but the area enclosed within these boundaries will be kept as small as possible.		
	Construction Operation Decommissioning Rehabilitation and Closure		Mining will adhere to regulations stipulated in the water license.		
	Construction Operation		The mine shall ensure that water management facilities are operating adequately and will remain operational during a 50 year 24 hr storm event until such time that all disturbed areas are stabilised.		
	Rehabilitation and Closure		On gentle slopes, water will be encouraged to flow off the rehabilitated surface, as surface flow, as quickly as possible without causing erosion. This will ensure that		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			water does not infiltrate too deeply and come into contact with carbonatious material. On steeper slopes, water will be encouraged to infiltrate slightly to help prevent soil erosion.		
Wetlands					
Construction of mineral processing facilities Maintenance and operation of site infrastructure and facilities Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground Mine Infrastructure	Construction	Impacts on wetlands are considered to be highly significant due to the sensitivity of these areas. Impacts can range from localized to impacts which are large in extent	The mine shall limit the extent of the development footprint to exclude aquatic resources as far as possible.	NWA GN704 Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		The mine shall take the necessary precautions to avoid any impacts to wetlands outside of the required construction and/or mining footprint. These areas should be considered as no-go areas, and the restriction should be enforced.		Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		The mine shall set up a 100m buffer zone around sensitive areas, including pans, wetlands and streams. These areas should be considered as no-go areas, and the restriction should be enforced.		Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		Any wetlands impacted during the construction or mining process on site should be rehabilitated in accordance with the principles and guidelines presented in this EMPR.		Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		Re-vegetate all bare wetland areas not directly within the footprint of the developments as soon as possible. The extent of the disturbance should be limited to a minimum.		Throughout LoM
	Rehabilitation and Closure		Regular monitoring of the success of wetland rehabilitation measures must be undertaken. Where required, the necessary adjustments should be made to ensure the complete re-establishment of the natural vegetation.		Throughout LoM
	Construction Operation		Construction of a low berm, approximately 1m high by 2-3m wide between the stockpiles and the wetlands.		Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Underground mining Water management Infrastructure construction Water Treatment (as required by WUL)			These berms would serve to intercept flows containing suspended sediments and create a depositional environment. They should be located outside the wetland boundaries and should be created prior to construction and vegetation clearing on the stockpile footprint commencing.		
	Construction Operation Decommissioning Rehabilitation and Closure		Inform all construction contractors and other personnel to not disturb the fauna and flora in wetland areas and not to wash or bath in local streams.		Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		Control dust emissions to prevent dust from settling in the wetland areas.		Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		The mine shall implement an aquatic bio-monitoring and water quality programme. Where target endpoints are not met, recommendations should translate directly into follow-up action that is recorded and auditable.		Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		No dirty water may be discharged into any wetland or water resource on site unless treated to the required standards.		Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		No stockpiling of material may take place within the wetland areas and temporary construction camps and infrastructure should also be located away from these areas, with a minimum buffer of 100m maintained from delineated wetland boundaries. In cases where historical mining activities have encroached within 100m of wetlands, exemption must be obtained for the provisions of GN704 and the		Throughout LoM

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			necessary protection measures shall be implemented to minimise the impact on wetlands as far as is possible.		
	Construction Operation Decommissioning Rehabilitation and Closure		No abstraction of water from the wetlands or dams should be allowed unless expressly authorized in the IWULA.		Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		Where storm water and/or diverted clean water is discharged into wetlands, appropriate measures such as gabions should be constructed to contain erosion.		Throughout LoM
Topography and Landform					
Construction of mineral processing facilities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on topography tend to be large in extent and can have a significant effect on the environment	Levelling out of the mine site area will be supervised by a qualified engineer in conjunction with an environmental consultant.	In accordance with Rehabilitation and closure plan Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	Throughout LoM
			Where possible, natural drainage lines will be followed to reduce loss of water in the natural catchments.		
			Berms and diversion trenches will be constructed to help separate clean and dirty water on site.		
			A post mining topographical plan should be developed during the start of the project in order to ensure compliance during and after mining. This plan must be adhered to at all stages of the project.		
			Monitor, especially after first heavy rain falls to ensure adequate surface water drainage.		
			Monitor, especially after first heavy rain falls to ensure adequate surface water drainage, surface water flow and erosion.		
			Overburden will be temporarily stockpiled and will be placed back into the pit once the coal has been mined out, therefore attempting to maintain the natural topography.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Mineral Processing Opencast mining Filling Opencast Voids Post Closure Monitoring and Maintenance Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground Mine Infrastructure			The overburden should be replaced in a manner that replicates the previous topography, and ensures that the final topography has a surface that is free-draining.		
			There will be checks to ensure that the planned post mining topography is being followed.		
			All heavy machinery operators and truck drivers should be instructed to stay in designated areas, such as operation sites and roads.		
			Soils should be stockpiled separately according to their forms and their potentials.		
			During ongoing rehabilitation, soil horizons should be replaced in the same order as they occur in nature to prevent mixing of soil horizons.		
			Topsoil depth should be related to the proposed post-mining land capability plans.		
			Rehabilitated areas should not be compacted more than is necessary, and activity, particularly that of heavy machinery and vehicles, on these areas should be limited.		
			Rehabilitated areas should be landscaped to prevent water logging and vegetated to prevent soil erosion.		
			Erosion control measures such as contour banks and cut off berms should be constructed and soil vegetated in rehabilitated areas.		
			Accidental hydrocarbon spillages should have sawdust applied immediately, and rehabilitated or if this is not possible then the affected soil should be removed and the area rehabilitated.		
			Final profiling of the last cut will take place to ensure the area is rehabilitated as close to its natural state as possible.		
			Former DTM’s will be used to establish what contours were present prior to mining taking place and these will		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Underground mining Water management Infrastructure construction			be used to help shape the area to the final topographical plan.		
			Additional debris and soil will be brought in if required.		
			The area where pans once were will require additional attention to help restore its functions and form.		
			Regular surveyance to ensure the rehabilitation conforms to the final topographical plan and that no final void will be left.		
Transportation, Infrastructure and Traffic					
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent	Construction Operation Decommissioning Rehabilitation and Closure	Impacts on transportation infrastructure and traffic can have a significant extent although typically low in significance	The mine shall ensure that the internal haul roads are adequately maintained, including monthly scraping where required. Together with road maintenance, the storm water system to direct storm water that falls within the roads shall be kept maintained and settlement ponds shall be cleared of silt on a regular basis.	Road Traffic Act OHSA MHSA	Throughout LoM
			On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation on site, and to minimise disruption of traffic.		
			In the case of dual or multiple use of access roads by other users, arrangements for multiple responsibility must be made with the other users. If not, the maintenance of access roads will be the responsibility of the Applicant and/or Contractor(s). Road condition must be assessed regularly for signs of damage.		
			Damage caused to public roads as a result of the construction and/or mining activities shall be repaired in consultation with the relevant municipal authorities.		
			Materials for the haul road will be sourced locally from a legal source and the Department of Roads and Transport will be consulted with regard to the construction of haul roads.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
site office Infrastructure Underground mining Water management Infrastructure construction			All intersections with main tarred roads will be clearly signposted.		
			Road signs and safety features such as rumble strips will be maintained to ensure the writing is legible and the haul road crossings are visible to motorists.		
			All construction and mining vehicles using public roads shall be in a roadworthy condition and their loads secured. They must adhere to the speed limits and all local, provincial and national regulations with regards to road safety and transport.		
Visual					
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump General Surface Rehabilitation Mine area site preparation Mineral Processing Opencast mining	Rehabilitation and Closure	Visual impacts have an impact on the perception and sense of place in the area and although hard to quantify can have a significant impact over a large extent of the area.	Final shaping will be implemented, such that, the final profile of the rehabilitated mining areas are formed to emulate natural contours of the area.	In accordance with Rehabilitation and closure plan Closure and final land use objectives	Throughout LoM
	Construction Operation Decommissioning		Directional lighting and soft lighting will be utilised to ensure that only areas required to be lit are lit. Screens will be considered if I&AP complaints are received.		
	Construction Operation Decommissioning		Where possible, and in consideration of the rehabilitation plan and objectives, the mine shall create screening using soil stockpiles, berms and natural vegetation to reduce the visual impact of the mining operations and infrastructure.		
	Construction Operation Decommissioning Rehabilitation and Closure		Dust suppression methods must be applied when necessary to restrict the visual impact of dust emissions.		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction Water Treatment (as required by WUL)					
Blasting and Vibration					
Opencast Mining Underground Mining	Operation	Blasting and Vibration can have a significant impact which increases in significance with	Prior to mining commencing, local infrastructure should be inspected to determine and document the extent of existing damage. These properties will be periodically evaluated to determine any damage. Records of blasting times and distance to properties will also be used to determine likelihood of damage.	MHSA Explosives Act No. 26 of	Throughout Operation

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		proximity to the blast	The reduction of ground vibration is fundamental in different ways and shall include the following measures: • Detailed blast design for each blast with consideration the effects from blasting i.e. ground vibration and air blast. • Calculate expected ground vibration levels for blast to be done and if necessary re-design to reduce charge mass per delay, use of electronic initiation of blast, drilling smaller diameter blastholes that will reduce charge per blasthole and per delay.	1956 and amended No. 15 of 2003 United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast	
			The reduction of air blast is fundamental in different ways and shall include the following measures: • Detailed blast design for each blast with consideration the effects from blasting i.e. ground vibration and air blast. • Use of proper stemming lengths of between 25 and 30 blasthole diameters. • Use of crushed aggregate of 10% the blasthole diameter as stemming material • Record stemming lengths for each blast and correct if necessary prior to every blast blasted. • Monitor each blast done.		
			The mine should liaise with local residents on how best to minimise the impact of blasting. Information that should be provided to the potential sensitive receptor(s) includes: • Proposed blasting schedules, • How long the activity is anticipated to take place, • What is being done, or why the activity is taking place, • Contact details of a responsible person where any complaints can be lodged should there be an issue of concern.		
Groundwater					

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Construction of mineral processing facilities General decommissioning activities General Surface Rehabilitation Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Filling Opencast Voids	Construction Operation Decommissioning Rehabilitation and Closure	The underground mining impact on groundwater potentially affected a very large area and has a potentially high significance impact	The mine must take all reasonable measures to avoid and limit pollution of ground water resources as a result of site activities. Pollution could result from the release, accidental or otherwise, of chemicals, oils, fuels, sewage, waste water containing organic waste, detergents, solid waste and litter etc. The Applicant and Contractor(s) shall comply with the requirements relating to hazardous materials and spill management presented in this EMPR.	NEMA Duty of care NWA GN704 DWAF best practice guidelines Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards IWUL Conditions	Throughout LoM
	Construction Operation Decommissioning Rehabilitation and Closure		In the event of pollution caused as a result of construction or mining activities, the responsible party, according to section 20 of the National Water Act (Act No. 36 of 1998) shall be responsible for all costs incurred by organisations called to assist in pollution control and/or to clean up polluted areas.		
	Construction Operation		Materials capable of resulting in poor quality leachate will not be used for the construction of haul roads.		
	Operation		Water accumulating within the opencast workings will be pumped to a lined pollution control facility from where it will be re-used in the operation.		
	Construction Operation Decommissioning Rehabilitation and Closure		The mine shall ensure that the ground water monitoring program is implemented. All boreholes shall be monitoring throughout the LoM for ground water level and quality. It is recommendwed that a specialist be contracted to indicate additional monitoring points for the Kwaggfontein area.		
	Construction Operation Decommissioning Rehabilitation and Closure		Boreholes identified during the impact assessment as potentially being dewatered need to be monitored and if required replaced by newly drilled boreholes abstracting from below the mined workings or outside the area of influence of the boreholes.		
	Construction Operation Decommissioning		The mine shall utilize water on site responsibly. Ensure all pipelines and water containment facilities are		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground Mine Infrastructure Water management Infrastructure construction			adequately sealed to prevent leaks. Record water usage by attaching meters to all pumps.		
	Operation Decommissioning Rehabilitation and Closure		The flooding of mine workings needs to be maximised, this can be achieved by the closure of access points between the opencast and underground workings by a hydraulic seal. The design of the underground entrances completed with the post mining sealing requirements taken into account.		
	Construction Operation Decommissioning Rehabilitation and Closure		Boreholes overlying the underground mine workings will be surveyed and the total depths measured where not available. The layout of pillars will be adjusted to allow the preservation of the boreholes where possible, or alternatively the boreholes will be sealed and replaced with alternative water sources.		
	Operation Decommissioning Rehabilitation and Closure		The rehabilitation of mined cuts need to be done to minimise infiltration and then need to mine water. To achieve this, the area must be free draining in its entirety, the soil cover needs to be replaced and sufficient vegetation cover needs to be established.		
	Operation Decommissioning Rehabilitation and Closure		Water decanting from the opencast workings where the floor can not be flooded will be collected and treated prior to release, unless monitoring indicates that the water quality meets the water management objectives.		
	Rehabilitation and Closure		All access to the underground workings will be sealed by a seal capable of withstanding the hydraulic pressures prior to the backfilling of the opencast workings. Where this is not possible decant from the area will be collected and treated prior to release to a standard meeting the water quality management objectives.		
Acid Mine Drainage					
Open cast Mining	Construction Operation Decommissioning	Acid Mine drainage is a highly significant	The mine shall appoint specialist to develop detailed, site specific AMD management plan	NWA	As soon as possible during operation. AMD

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Underground Mining	Rehabilitation and Closure	impact in terms of its severity as well as potential extent.		NEMA duty of care IWUL conditions GN704 DWAF best practice guidelines Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	mitigation plan to be implemented as soon as possible.
	Operation Decommissioning Rehabilitation and Closure		Where acid mine drainage is anticipated or detected, an Acid-Base Accounting Technique and Evaluation (ABATE) should be initiated. Where the expected water quality is acidic or highly alkaline, mitigation measures will need to be investigated and implemented (such as impermeable linings for the coal stockpiles and treatment of mine water.)		As required and ongoing until closure certificate s received
	Operation Decommissioning Rehabilitation and Closure		Acid drainage control and treatment techniques can be broadly classified into physical, chemical and biological, and those using combinations of these. The mine must investigate further the best options for site specific treatment of AMD. Treatment techniques are usually reactive rather than pro-active, and are generally designed to: i. raise pH, ii. lower toxic metal concentrations (e.g. precipitation, adsorption) iii. lower aqueous sulphate concentrations, iv. lower the toxicity / bioavailability of metals in solution (e.g. oxidation, reduction) v. oxidise the solution (e.g. Fe(II)-Fe(III), Mn(II)-Mn(IV), As(III)-As(V)), vi. reduce the solution (e.g. SO_4^{2-}, H_2S) vii. collect / dispose / isolate the metallic sludge generated.		As soon as possible during operation. AMD mitigation plan to be implemented as soon as possible.
	Rehabilitation and Closure		Provision must be made for the long-term treatment and/or management of water collecting in mined out voids. Water that decants or is pumped from mined out areas will need to comply with target water quality		As required and ongoing until closure

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			variables and flow requirements of downstream watercourses (as advised by DWA).		certificate s received
	Rehabilitation and Closure		After closure, mine water and/or decant needs to be treated to the required level before discharge into natural watercourses. The extent of treatment required, as well as the duration of treatment needs to be determined by water quality assessments.		As required and ongoing until closure certificate s received
Decommissioning					
Decommissioning of Co-Disposal Dump Drilling monitoring boreholes General decommissioning activities General Mine Management Decommissioning Underground Mine Infrastructure Infrastructure removal	Decommissioning	Decommissioning of infrastructure can result in negative impacts. The extent is localized to the extent of the infrastructure and mining footprint.	All infrastructure, equipment, plant, temporary housing and other items used during the mining period will be removed from the site (section 44 of the MPRDA). Infrastructure should be removed down to foundations to prevent loss of soil productivity.	MPRDA In accordance with Rehabilitation and closure plan Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	During decommissioning activities
			All vehicles, equipment and other assets belonging to the Applicant/Contractor(s) must be removed from the property upon completion of the mining operation, including any excess aggregate, gravel, stone, concrete, temporary fencing and the like.		
			No discard materials of whatsoever nature shall be buried on the site, or on any vacant or open land in the area. Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on the site.		
			During decommissioning, all boreholes which will not be required for later monitoring or other useful purposes should be grouted to prevent possible cross flow and contamination between aquifers.		
			In the event that the landowner requests the retention and use of any boreholes, the Department of Water Affairs must be consulted with regards to the necessary legal requirements (e.g. water use licences and/or borehole registration).		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Filling Opencast Voids					
Rehabilitation					
General Surface Rehabilitation Re-vegetation Storm water management	Rehabilitation and Closure	Rehabilitation has limited negative impacts. The scale of the impact is limited to the disturbance footprint.	An Integrated Rehabilitation and Closure Plan shall be developed by the mine early in the life of the operations (preferably prior to operation). The Plan must be viewed as a dynamic document and shall be subjected to independent review on an annual basis (together with the quantum for financial provision). As a minimum, the Integrated Rehabilitation and Closure Plan shall include the following; • Desired end land use objectives, • Methodology and proposed schedule for progressive rehabilitation to be undertaken concurrently with mining operations, • Details of soil preparation procedures including proposed measures to improve soil fertility (if so required) and the sustainability thereof, • A list of the plant species that will be used in the rehabilitation process. Only indigenous species may be utilised and these species should be representative of the relevant vegetation unit/landscape type of the area, • Procedures for ensuring vegetation growth and survival (watering, fertilisation etc.), • Details of proposed storm water and erosion control measures to ensure re-vegetation is successful and not hampered by scouring and erosion, • Monitoring procedures that will be implemented to assess re-vegetation efforts (duration and frequency of monitoring, criteria for determining success of rehabilitation),	MPRDA In accordance with Rehabilitation and closure plan Shall adhere to the ESMS Framework guided by Equator Principles, and IFC Performance Standards	As soon as possible in operational phase and implemented throughout LoM Annually Updated

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Procedures for preventing the establishment of alien invasive vegetation in rehabilitated areas.		
			Upon completion of the mining operation and closure of the facility, the Applicant shall ensure that all cleared and/or disturbed areas (as a result of the activity) within and outside the boundaries of the site shall be rehabilitated in accordance with the Integrated Rehabilitation and Closure Plan.		
			Rehabilitation will include returning the slope to the minimum possible gradient (preferably less than 1:3), the topsoil will be replaced for vegetation re-establishment and contour drains will be built to prevent erosion if necessary.		
			The area must be rehabilitated using indigenous vegetation from the area in such a way that it will return as close as possible to the original production potential. Rehabilitation shall be overseen by a suitably qualified specialist who shall approve the indigenous seed mix to be used. The rehabilitated area must be returned to a self sustaining ecosystem that is consistent with the original vegetation type.		
			Any access road or portions thereof, constructed by the mine which will no longer be required by the landowner/tenant, shall be removed and/or rehabilitated to the satisfaction of the ECO and Regional Manager (DMR).		
			Erosion control measures shall be implemented where necessary (such as berms, brushpacking, silt fences etc.). Erosion control and silt prevention measures shall be inspected regularly and shall be maintained whenever required to ensure they remain effective.		
			No alien or invader plant species should be introduced on site during rehabilitation. The weed management plan shall be implemented throughout the rehabilitation		

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			and closure phase. Regular monitoring of the rehabilitated area shall be undertaken and all alien vegetation shall be eradicated and/or controlled prior to it setting seed. Weed management shall be to satisfaction of the ECO and Regional Manager (DMR). Where required, the necessary adjustments should be made to ensure the complete re-establishment of the natural vegetation.		
Mine Closure					
Post Closure Monitoring and Maintenance Storm water management Water Treatment (as required by WUL)	Rehabilitation and Closure	Very limited potential for impacts during closure. The Mine remains responsible for the mining right area until such time as a closure certificate is obtained.	Should the activity ever cease or become redundant the applicant shall undertake the required closure process in accordance with Section 43 of the MPRDA.	MPRDA and regulations	In accordance with legislated timeframes in force at the time of closure.
Post-Closure Monitoring					
Post Closure Monitoring and Maintenance Water Treatment (as required by WUL)	Rehabilitation and Closure	Very limited potential for impacts during closure. The Mine remains responsible for the mining right area until such time as a closure certificate is obtained.	The post-closure monitoring and management period following cessation of mining activities will be implemented by a suitable qualified independent party for a minimum of ten (10) years unless otherwise specified by the competent authority. The monitoring activities during this period will include but not be limited to: • Biodiversity monitoring; • Ground and surface water; • Air quality monitoring; • Bio-monitoring; • Re-vegetation of disturbed areas where required; • Wetlands; and	MPRDA and regulations	Minimum of ten (10) years post closure or as agreed upon with DMR

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
			• Maintenance on installed access control or fencing. Provision must be made to monitor any unforeseen impact that may arise as a result of the proposed mining activities and incorporated into post closure monitoring and management.		

26.10 IMPACT MANAGEMENT OUTCOMES

The impact management objectives are summarised in Table 47 below.

Table 47: Impact Management Objectives

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Construction of mineral processing facilities General Surface Rehabilitation Mine area site preparation Opencast mining Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction	Alteration of topography	Topography and Landform	Construction Operation Decommissioning Rehabilitation and Closure	Control through site planning and design	Original topography and landform serve as a reference for rehabilitation
Construction of mineral processing facilities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction	Altered drainage patterns	Topography and Landform	Construction Operation Decommissioning Rehabilitation and Closure	Control through proper soil management procedures	Rehabilitation and closure plan DWAF best practice Guidelines

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Underground Mine Infrastructure Construction of mineral processing facilities Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Underground mining Water management Infrastructure construction	Soil surface subsidence	Topography and Landform	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities)	Appropriate safety factors (Salomon and Monroe) as calculated by engineers and in consultation with DWA/DMR
Opencast mining Underground mining	Impacts on Geology	Geology	Operation	Modify through mine planning, design and rehabilitation	MPRDA Rehabilitation and Closure Plan
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Post Closure Monitoring and Maintenance Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Erosion and sedimentation	Soils	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	CARA

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes Infrastructure removal Mine area site preparation Mineral Processing Opencast mining Post Closure Monitoring and Maintenance Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Soil compaction	Soils	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	Principles of CARA Rehabilitation and Closure Plan Ripping to 30cm where soil depth permits
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump General decommissioning activities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management	Soil Pollution/Contamination	Soils	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	Hazardous Substances Act NWA NEMA Duty of Care NEMWA Incident reporting procedures DWAF minimum standards for waste disposal

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Underground Mine Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL					
Construction of mineral processing facilities General Surface Rehabilitation Maintenance and operation of site infrastructure and facilities Mine area site preparation Opencast mining Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Loss of soil fertility (denitrification, loss of soil nutrient store and organic carbon stores) and loss of land capability	Land Capability	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	CARA Rehabilitation and Closure Plan
Construction of mineral processing facilities General Surface Rehabilitation Maintenance and operation of site infrastructure and facilities Mine area site preparation Opencast mining Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Water management Infrastructure construction	Loss of soil resource and its utilisation potential	Land Capability	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	CARA Rehabilitation and Closure Plan

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Water Treatment as required by conditions of IWUL					
Construction of mineral processing facilities Infrastructure removal Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Damage/Disruption of services	Land Use	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of EMP mitigation measures (e.g. service detection and communication with landowners) Remedy through repair or reinstatement of services if required Control through implementation of ESMS	Stakeholder Engagement Plan Rehabilitation and Closure Plan Grievance Mechanism
Construction of mineral processing facilities Drilling for continued resource evaluation Drilling monitoring boreholes General Surface Rehabilitation Infrastructure removal Mine area site preparation Opencast mining Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction	Interference with existing land uses	Land Use	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of EMP mitigation measures (e.g. communication with landowners) Control through implementation of ESMS	Stakeholder Engagement Plan Rehabilitation and Closure Plan Grievance Mechanism

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Construction of mineral processing facilities Drilling for continued resource evaluation Drilling monitoring boreholes General Surface Rehabilitation Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Post Closure Monitoring and Maintenance Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Site visits Storm water management Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Direct and indirect mortality of flora and fauna	Fauna and Flora	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	NEMBA TOPS
Construction of mineral processing facilities Maintenance and operation of site infrastructure and facilities Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Habitat fragmentation and blockage of seasonal and dispersal movements	Fauna and Flora	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of EMP mitigation measures (e.g. shape of disturbed areas, maintaining corridors)	NEMBA Island Biogeography Principles
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation	Introduction/invasion by alien	Fauna and Flora	Planning and Design Construction	Control through implementation of EMP mitigation	NEMBA TOPS

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Site visits Storm water management Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	(non-native) species		Operation Decommissioning Rehabilitation and Closure	measures (e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)	Alien vegetation management plan Hazardous Substances Act SANS 10206
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining	Pollution of surface water resources/decreased water quality	Surface Water	Construction Operation Decommissioning Rehabilitation and Closure	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management) Control through implementation of mitigation measures (water treatment when required)	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines, including the consideration of BPG:G2 in the annual updating of the water balance process.

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Water management Infrastructure construction					
Maintenance and operation of site infrastructure and facilities Water management Infrastructure construction	Decrease in Surface Water Availability	Surface Water	Construction Operation	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines, including the consideration of BPG:G2 in the annual updating of the water balance process.
General Surface Rehabilitation Opencast mining Storm water management Underground Mine Infrastructure Underground mining	Dewatering of groundwater aquifers	Groundwater	Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines, including the consideration of BPG:G2 in the annual updating of the water balance process.

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
General decommissioning activities Mineral Processing Opencast mining Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction	Decrease in groundwater quantity/availability	Groundwater	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines, including the consideration of BPG:G2 in the annual updating of the water balance process.
Post Closure Monitoring and Maintenance	Acid Mine Drainage	Groundwater	Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. AMD mitigation strategy, mine design and progressive rehabilitation) Remedy through water treatment when required	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines Rehabilitation and closure plan AMD mitigation Strategy
Construction of mineral processing facilities Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Opencast Voids	Pollution of groundwater/decreased water quality	Groundwater	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (AMD mitigation	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines Rehabilitation and closure plan AMD mitigation Strategy

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Underground Mine Infrastructure				strategy, progressive rehabilitation)	
Maintenance and operation of site infrastructure and facilities Opencast mining Underground Mine Infrastructure Underground mining Water management Infrastructure construction	Decreased watermake to adjacent wetlands	Wetlands	Construction Operation Decommissioning	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance) Remedy/modify through wetland rehabilitation	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines Rehabilitation and closure plan
Construction of mineral processing facilities Maintenance and operation of site infrastructure and facilities Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Loss and disturbance of wetland habitat	Wetlands	Construction Operation Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance) Remedy/modify through wetland rehabilitation	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines Rehabilitation and closure plan
Underground mining	Undermining of wetlands - surface subsidence	Wetlands	Operation	Avoid through implementation of preventative measures (e.g. adequate safety factors)	MPRDA NWA GN704 DWF best practice guidelines Rehabilitation and closure plan

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
				Remedy/modify through wetland rehabilitation	
Post Closure Monitoring and Maintenance	Decant from underground workings	Environmental Pollution	Rehabilitation and Closure	Avoid through implementation of suitable progressive rehabilitation and soil management Control/Remedy through interception of decant and treatment of polluted water where required	MPRDA NWA NEMA Duty of Care NEMA Polluter Pays Principle NEMWA GN704 DWF best practice guidelines Rehabilitation and closure plan
General decommissioning activities Infrastructure removal Mineral Processing Underground mining Water Treatment as required by conditions of IWUL	General Environmental Pollution	Environmental Pollution	Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of EMP mitigation measures (e.g. Spill prevention, Hydrocarbon Storage)	Hazardous Substances Act NWA MSDS OHSA MHSA NEMA Duty of Care NEMA Polluter Pays Principle NEMWA Incident reporting procedures DWAF minimum standards for waste disposal

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes General decommissioning activities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground Mine Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Hydrocarbon spills/contamination	Environmental Pollution	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	Hazardous Substances Act NWA MSDS OHSA MHSA NEMA Duty of Care NEMWA Incident reporting procedures DWAF minimum standards for waste disposal
Construction of mineral processing facilities General decommissioning activities Maintenance and operation of site infrastructure and facilities Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining	Sewage spills/contamination	Environmental Pollution	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. location of toilets, spill prevention, waste management)	NWA NEMA Duty of Care NEMA Polluter Pays Principle OHSA MHSA

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Water Treatment as required by conditions of IWUL					
Opencast mining Underground mining	Discovery and preservation of fossils	Heritage	Operation	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils	NEMA MPRDA NHRA SAHRA permitting requirements Human Tissue Act IFC Performance Standard 8: Cultural Heritage
Construction of mineral processing facilities Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Destruction/damage of palaeontological resources	Heritage	Construction Operation Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils	NEMA MPRDA NHRA SAHRA permitting requirements Human Tissue Act IFC Performance Standard 8: Cultural Heritage
Construction of mineral processing facilities General Surface Rehabilitation Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Water management Infrastructure construction	Destruction/damage of heritage resources	Heritage	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of preventative measures (e.g. fencing of graveyards, watching brief, chance finds procedure)	NEMA MPRDA NHRA SAHRA permitting requirements Human Tissue Act IFC Performance Standard 8: Cultural Heritage

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Water Treatment (as required by WUL)				Stop through relocation of graves if required	
General Construction Management General Mine Management	Crime and violence	Social	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through preventative measures (e.g. site security, code of conduct)	Health and Safety Plan ESMS MHSA OHSA Code of Conduct
General Construction Management General Mine Management Mine area site preparation Opencast mining	Influx of migrant workers	Social	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism) Control through implementation of ESMS and stakeholder engagement plan	Labour Act Basic Conditions of Employment Act SLP Commitments IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement Grievance Mechanism
General Construction Management General Mine Management Mineral Processing Opencast mining Site establishment – Permanent site office Infrastructure Underground mining Water Treatment as required by conditions of IWUL	Loss of sense of place	Social	Construction Operation Decommissioning Rehabilitation and Closure	Modify through reduction of visual impact	Rehabilitation and Closure Plan ESMS
General Construction Management General Mine Management	Relocation	Social	Construction Operation Decommissioning Rehabilitation and Closure	Modify and control through mitigation measures (e.g. grievance mechanism, Relocation plan)	Constitution of South Africa SLP Commitments IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement Grievance Mechanism

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
General Construction Management General Mine Management Maintenance and operation of site infrastructure and facilities Opencast mining Underground mining	Social vices	Social	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct) Control through implementation of ESMS and stakeholder engagement plan	Labour Act Basic Conditions of Employment Act SLP Commitments IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement Grievance Mechanism Code of Conduct Livelihood restoration plan
General Construction Management General Mine Management Opencast mining Underground mining	Economic growth	Socio-Economic	Construction Operation Decommissioning Rehabilitation and Closure	Maximise through optimisation of economic growth opportunities	SLP Commitments
Drilling for continued resource evaluation General Construction Management General Mine Management Opencast mining Underground mining	Education, Skills Development and Training	Socio-Economic	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Maximise skills development and training through implementation of SLP	SLP Commitments
Drilling for continued resource evaluation General Construction Management General decommissioning activities General Mine Management Maintenance and operation of site infrastructure and facilities Opencast mining Site establishment – Contractors Camp	Employment Opportunities	Socio-Economic	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Maximise employment opportunities through implementation of SLP	SLP Commitments

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction					
General Construction Management General Mine Management Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining	Impacts on local farm labour	Socio-Economic	Construction Operation Decommissioning Rehabilitation and Closure	Minimise impacts on local farm labour through compensation, skills development and livelihood restoration	IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement SLP Commitments
General Construction Management General Mine Management Opencast mining	Loss of jobs and economic opportunities	Socio-Economic	Construction Operation Decommissioning Rehabilitation and Closure	Minimise impacts of job loss through skills development and livelihood restoration	IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement SLP Commitments
Drilling for continued resource evaluation	Perceptions and Expectations	Socio-Economic	Planning and Design Construction Operation	Avoid through implementation of preventative measures (e.g. consultation and communication) Control through ESMS procedures such as recruitment procedure	Stakeholder Engagement Plan SLP Commitments Grievance Mechanism
General Mine Management	Re-instatement of livelihoods	Socio-Economic	Operation Decommissioning Rehabilitation and Closure	Minimise impacts of job loss through skills development and livelihood restoration	IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement SLP Commitments
Opencast mining Underground mining	Coal supply for energy security	Socio-Economic	Operation	Maximise security of coal supply through	Legal register SLP Commitments ESMS

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
				sound and responsible mine management	
Decommissioning of Co-Disposal Dump General Construction Management General decommissioning activities General Mine Management Maintenance and operation of site infrastructure and facilities Mine area site preparation Opencast mining Opencast Voids Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground Mine Infrastructure Water management Infrastructure construction	Community health and safety	Health and Safety	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	OHSA MHSA IFC Performance Standard 4: Community Health, Safety, and Security SLP Commitments Grievance Mechanism
Construction of mineral processing facilities General Construction Management General decommissioning activities General Mine Management Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction	Health impacts	Health and Safety	Construction Operation Decommissioning Rehabilitation and Closure	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	OHSA MHSA IFC Performance Standard 4: Community Health, Safety, and Security SLP Commitments Grievance Mechanism

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Construction of mineral processing facilities Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining	Fire and explosion hazard	Health and Safety	Construction Operation	Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management, adequate ventilation underground)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
Opencast mining Underground mining	Fly Rock	Health and Safety	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining	Damage to road infrastructure	Transportation, Infrastructure and Traffic	Construction Operation Decommissioning	Avoid and control through implementation of EMP mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	National Road Traffic Act OHSA MHSA

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Water management Infrastructure construction					
Construction of mineral processing facilities Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction	Increased traffic	Transportation, Infrastructure and Traffic	Construction Operation	Avoid and control through implementation of EMP mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	National Road Traffic Act OHSA MHSA
Mine area site preparation Mineral Processing Opencast mining Underground mining	Visual impact of light at night	Visual	Construction Operation	Avoid and control through implementation of EMP mitigation measures (e.g. directional down lighting)	Security specifications
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump General Surface Rehabilitation Mine area site preparation Mineral Processing Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining	Visual impact of mine infrastructure, stockpiles and dust	Visual	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of EMP mitigation measures (e.g. dust suppression, mine planning and progressive rehabilitation)	Rehabilitation and Closure Plan Final landuse objectives

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Water management Infrastructure construction Water Treatment as required by conditions of IWUL					
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump General decommissioning activities Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction General Surface Rehabilitation Opencast Voids Storm water management Underground Mine Infrastructure Water Treatment as required by conditions of IWUL	Greenhouse gas emissions	Air Quality	Construction Operation Decommissioning Rehabilitation and Closure	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	NEMAQA Equator Principles IFC Performance Standard 3: Resource Efficiency and Pollution Prevention
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes General decommissioning activities General Surface Rehabilitation Infrastructure removal Mine area site preparation	Fugitive emissions (Dust)	Air Quality	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. speed limit enforcement) Control through implementation of EMP mitigation	Road Traffic Act NEMAQA Dust regulations

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL				measures (e.g. dust suppression)	
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes General decommissioning activities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground Mine Infrastructure Underground mining	Disburbing and/or nuisance noise	Noise	Planning and Design Construction Operation Decommissioning Rehabilitation and Closure	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	ECA noise regulations SANS 10103 OHSA MHSA

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Water management Infrastructure construction Water Treatment as required by conditions of IWUL					
Opencast mining Underground mining	Air Blast	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security
Opencast mining Underground mining	Ground Vibration and human perception	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
					IFC Performance Standard 4: Community Health, Safety, and Security
Opencast mining Underground mining	Ground Vibration Impacts on productivity of farm animals (cattle, chickens, pigs, etc.)	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security
Opencast mining Underground mining	Impacts on Infrastructure (roads, communications infrastructure, services, houses, boreholes)	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. structural surveys, blast procedures, monitoring, communication with landowners)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved
Opencast mining Underground mining	Noxious fumes	Blasting and Vibration	Operation	Avoid and control through implementation of preventative measures (e.g. structural surveys, blast procedures, monitoring, communication with landowners)	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security

26.11 IMPACT MANAGEMENT ACTIONS

The impact management actions associated with the prevention and mitigation of identified risks and impacts are provided below in Table 48.

Table 48: Impact Management Actions

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Construction of mineral processing facilities General Surface Rehabilitation Mine area site preparation Opencast mining Opencast Voids Site establishment – Contractors Camp	Alteration of topography	Control through site planning and design	During construction	Original topography and landform serve as a reference for rehabilitation

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction				
Construction of mineral processing facilities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction	Altered drainage patterns	Control through proper soil management procedures	During construction and rehabilitation	Rehabilitation and closure plan DWAF best practice Guidelines
Underground Mine Infrastructure Construction of mineral processing facilities Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Underground mining Water management Infrastructure construction	Soil surface subsidence	Avoidance through mine design and planning (depth of mining, safety factors, overburden and rock qualities)	During mining	Appropriate safety factors (Salomon and Monroe) as calculated by engineers and in consultation with DWA/DMR

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Opencast mining Underground mining	Impacts on Geology	Modify through mine planning, design and rehabilitation	During Blasting	MPRDA Rehabilitation and Closure Plan
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Post Closure Monitoring and Maintenance Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Erosion and sedimentation	Avoid and control through preventative measures (Soil placement, storm water infrastructure, erosion control structures)	As required throughout LoM	CARA
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes Infrastructure removal Mine area site preparation Mineral Processing Opencast mining Post Closure Monitoring and Maintenance Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure	Soil compaction	Avoid through implementation of EMP mitigation measures Remedy through application of treatment measures (e.g. ripping)	As required and during final rehabilitation	Principles of CARA Rehabilitation and Closure Plan Ripping to 30cm where soil depth permits

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Storm water management Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL				
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump General decommissioning activities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground Mine Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Soil Pollution/Contamination	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	Throughout LoM	Hazardous Substances Act NWA NEMA Duty of Care NEMWA Incident reporting procedures DWAF minimum standards for waste disposal

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Construction of mineral processing facilities General Surface Rehabilitation Maintenance and operation of site infrastructure and facilities Mine area site preparation Opencast mining Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Loss of soil fertility (denitrification, loss of soil nutrient store and organic carbon stores) and loss of land capability	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	As required and upon final rehabilitation	CARA Rehabilitation and Closure Plan
Construction of mineral processing facilities General Surface Rehabilitation Maintenance and operation of site infrastructure and facilities Mine area site preparation Opencast mining Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Loss of soil resource and its utilisation potential	Avoid through preventative measures (e.g. limit area of disturbance) Remedy through soil remediation if required (e.g. fertilizer and Organic Matter applications)	As required and upon final rehabilitation	CARA Rehabilitation and Closure Plan

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Construction of mineral processing facilities Infrastructure removal Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Damage/Disruption of services	Avoid through implementation of EMP mitigation measures (e.g. service detection and communication with landowners) Remedy through repair or reinstatement of services if required Control through implementation of ESMS	As required throughout LoM	Stakeholder Engagement Plan Rehabilitation and Closure Plan Grievance Mechanism
Construction of mineral processing facilities Drilling for continued resource evaluation Drilling monitoring boreholes General Surface Rehabilitation Infrastructure removal Mine area site preparation Opencast mining Opencast Voids Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction	Interference with existing land uses	Avoid through implementation of EMP mitigation measures (e.g. communication with landowners) Control through implementation of ESMS	As required throughout LoM	Stakeholder Engagement Plan Rehabilitation and Closure Plan Grievance Mechanism

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Construction of mineral processing facilities Drilling for continued resource evaluation Drilling monitoring boreholes General Surface Rehabilitation Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Post Closure Monitoring and Maintenance Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Site visits Storm water management Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Direct and indirect mortality of flora and fauna	Control through implementation of EMP mitigation measures (e.g. limit area of disturbance, training) Avoid/Stop through relocation of threatened or protected species Control through implementation of ESMS	Throughout LoM	NEMBA TOPS
Construction of mineral processing facilities Maintenance and operation of site infrastructure and facilities Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Habitat fragmentation and blockage of seasonal and dispersal movements	Avoid and control through implementation of EMP mitigation measures (e.g. shape of disturbed areas, maintaining corridors)	Throughout LoM	NEMBA Island Biogeography Principles
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation	Introduction/invasion by alien (non-native) species	Control through implementation of EMP mitigation measures	Throughout LoM	NEMBA TOPS

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Site visits Storm water management Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL		(e.g. alien vegetation management plan) Avoid/Stop through preventative measures (e.g. limit extent of disturbance)		alien vegetation management plan Hazardous Substances Act SANS 10206
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining	Pollution of surface water resources/decreased water quality	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management) Control through implementation of mitigation measures (water treatment when required)	Throughout LoM	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Water management Infrastructure construction				
Maintenance and operation of site infrastructure and facilities Water management Infrastructure construction	Decrease in Surface Water Availability	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	Throughout LoM	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines
General Surface Rehabilitation Opencast mining Storm water management Underground Mine Infrastructure Underground mining	Dewatering of groundwater aquifers	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	Throughout LoM	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
General decommissioning activities Mineral Processing Opencast mining Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction	Decrease in groundwater quantity/availability	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	Throughout LoM	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines
Post Closure Monitoring and Maintenance	Acid Mine Drainage	Avoid and control through implementation of preventative measures (e.g. AMD mitigation strategy, mine design and progressive rehabilitation) Remedy through water treatment when required	Throughout LoM	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines Rehabilitation and closure plan AMD mitigation Strategy
Construction of mineral processing facilities Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Opencast Voids Underground Mine Infrastructure	Pollution of groundwater/decreased water quality	Avoid and control through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures) Control through implementation of mitigation measures (AMD mitigation strategy, progressive rehabilitation)	Throughout LoM	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines Rehabilitation and closure plan AMD mitigation Strategy

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Maintenance and operation of site infrastructure and facilities Opencast mining Underground Mine Infrastructure Underground mining Water management Infrastructure construction	Decreased watermake to adjacent wetlands	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance) Remedy/modify through wetland rehabilitation	Throughout LoM	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines Rehabilitation and closure plan
Construction of mineral processing facilities Maintenance and operation of site infrastructure and facilities Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Loss and disturbance of wetland habitat	Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance) Remedy/modify through wetland rehabilitation	Throughout LoM	NWA GN704 IWULA Conditions NEMA Duty of Care NEMA Polluter Pays Principle DWF best practice guidelines Rehabilitation and closure plan
Underground mining	Undermining of wetlands - surface subsidence	Avoid through implementation of preventative measures (e.g. adequate safety factors) Remedy/modify through wetland rehabilitation	As soon as possible after detection and ongoing until closure is granted	MPRDA NWA GN704 DWF best practice guidelines Rehabilitation and closure plan
Post Closure Monitoring and Maintenance	Decant from underground workings	Avoid through implementation of suitable progressive	As soon as possible after detection and ongoing until closure is granted	MPRDA NWA NEMA Duty of Care NEMA Polluter Pays Principle

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
		rehabilitation and soil management Control/Remedy through interception of decant and treatment of polluted water where required		NEMWA GN704 DWF best practice guidelines Rehabilitation and closure plan
General decommissioning activities Infrastructure removal Mineral Processing Underground mining Water Treatment as required by conditions of IWUL	General Environmental Pollution	Avoid and control through implementation of EMP mitigation measures (e.g. Spill prevention, Hydrocarbon Storage)	Throughout LoM	Hazardous Substances Act NWA MSDS OHSA MHSA NEMA Duty of Care NEMA Polluter Pays Principle NEMWA Incident reporting procedures DWAF minimum standards for waste disposal
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes General decommissioning activities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp	Hydrocarbon spills/contamination	Avoid through preventative measures (e.g. bunding, spill kits) Remedy through cleanup and waste disposal Modify through soil treatment if required	Throughout LoM	Hazardous Substances Act NWA MSDS OHSA MHSA NEMA Duty of Care NEMWA Incident reporting procedures DWAF minimum standards for waste disposal

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Site establishment – Permanent site office Infrastructure Storm water management Underground Mine Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL				
Construction of mineral processing facilities General decommissioning activities Maintenance and operation of site infrastructure and facilities Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water Treatment as required by conditions of IWUL	Sewage spills/contamination	Avoid and control through implementation of preventative measures (e.g. location of toilets, spill prevention, waste management)	Throughout LoM	NWA NEMA Duty of Care NEMA Polluter Pays Principle OHSA MHSA
Opencast mining Underground mining	Discovery and preservation of fossils	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils	Throughout LoM	NEMA MPRDA NHRA SAHRA permitting requirements Human Tissue Act IFC Performance Standard 8: Cultural Heritage

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Construction of mineral processing facilities Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Destruction/damage of palaeontological resources	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils	Throughout LoM	NEMA MPRDA NHRA SAHRA permitting requirements Human Tissue Act IFC Performance Standard 8: Cultural Heritage
Construction of mineral processing facilities General Surface Rehabilitation Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Water management Infrastructure construction Water Treatment as required by conditions of IWUL	Destruction/damage of heritage resources	Avoid and control through implementation of preventative measures (e.g. fencing of graveyards, watching brief, chance finds procedure) Stop through relocation of graves if required	Throughout LoM	NEMA MPRDA NHRA SAHRA permitting requirements Human Tissue Act IFC Performance Standard 8: Cultural Heritage
General Construction Management General Mine Management	Crime and violence	Avoidance and control through preventative measures (e.g. site security, code of conduct)	At onset of construction and throughout LoM	Health and Safety Plan ESMS MHSA OHSA Code of Conduct
General Construction Management General Mine Management Mine area site preparation Opencast mining	Influx of migrant workers	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism)	At onset of construction and throughout LoM	Labour Act Basic Conditions of Employment Act SLP Commitments

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
		Control through implementation of ESMS and stakeholder engagement plan		IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement Grievance Mechanism
General Construction Management General Mine Management Mineral Processing Opencast mining Site establishment – Permanent site office Infrastructure Underground mining Water Treatment as required by conditions of IWUL	Loss of sense of place	Modify through reduction of visual impact	At onset of construction and throughout LoM	Rehabilitation and Closure Plan ESMS
General Construction Management General Mine Management	Relocation	Modify and control through mitigation measures (e.g. grievance mechanism, Relocation plan)	At onset of construction and throughout LoM	Constitution of South Africa SLP Commitments IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement Grievance Mechanism
General Construction Management General Mine Management Maintenance and operation of site infrastructure and facilities Opencast mining Underground mining	Social vices	Avoidance and control through mitigation measures (e.g. recruitment procedure, grievance mechanism, code of conduct) Control through implementation of ESMS and stakeholder engagement plan	At onset of construction and throughout LoM	Labour Act Basic Conditions of Employment Act SLP Commitments IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement Grievance Mechanism Code of Conduct Livelihood restoration plan
General Construction Management General Mine Management Opencast mining Underground mining	Economic growth	Maximise through optimisation of economic growth opportunities	At onset of construction and throughout LoM	SLP Commitments

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Drilling for continued resource evaluation General Construction Management General Mine Management Opencast mining Underground mining	Education, Skills Development and Training	Maximise skills development and training through implementation of SLP	At onset of construction and throughout LoM	SLP Commitments
Drilling for continued resource evaluation General Construction Management General decommissioning activities General Mine Management Maintenance and operation of site infrastructure and facilities Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction	Employment Opportunities	Maximise employment opportunities through implementation of SLP	At onset of construction and throughout LoM	SLP Commitments
General Construction Management General Mine Management Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining	Impacts on local farm labour	Minimise impacts on local farm labour through compensation, skills development and livelihood restoration	At onset of construction and throughout LoM	IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement SLP Commitments
General Construction Management General Mine Management Opencast mining	Loss of jobs and economic opportunities	Minimise impacts of job loss through skills development and livelihood restoration	When jobs are lost and at mine closure	IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement SLP Commitments
Drilling for continued resource evaluation	Perceptions and Expectations	Avoid through implementation of preventative measures (e.g. consultation and communication)	Throughout LoM	Stakeholder Engagement Plan SLP Commitments Grievance Mechanism

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
		Control through ESMS procedures such as recruitment procedure		
General Mine Management	Re-instatement of livelihoods	Minimise impacts of job loss through skills development and livelihood restoration	When jobs are lost and at mine closure	IFC Performance Standard 5 Land Acquisition and Involuntary Resettlement SLP Commitments
Opencast mining Underground mining	Coal supply for energy security	Maximise security of coal supply through sound and responsible mine management	Throughout Operation	Legal register SLP Commitments ESMS
Decommissioning of Co-Disposal Dump General Construction Management General decommissioning activities General Mine Management Maintenance and operation of site infrastructure and facilities Mine area site preparation Opencast mining Opencast Voids Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground Mine Infrastructure Water management Infrastructure construction	Community health and safety	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness) Remedy through application of mitigation measures in EMP	Throughout LoM	OHSA MHSA IFC Performance Standard 4: Community Health, Safety, and Security SLP Commitments Grievance Mechanism
Construction of mineral processing facilities General Construction Management General decommissioning activities General Mine Management Maintenance and operation of site infrastructure and facilities	Health impacts	Avoidance and control through preventative measures (e.g. HIV/AIDS awareness)	Throughout LoM	OHSA MHSA IFC Performance Standard 4: Community Health, Safety, and Security SLP Commitments

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Mine area site preparation Mineral Processing Opencast mining Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction		Remedy through application of mitigation measures in EMP		Grievance Mechanism
Construction of mineral processing facilities Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining	Fire and explosion hazard	Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management, adequate ventilation underground)	As required when blasting is undertaken	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast
Opencast mining Underground mining	Fly Rock	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	During Blasting	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction	Damage to road infrastructure	Avoid and control through implementation of EMP mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	Throughout LoM	National Road Traffic Act OHSA MHSA
Construction of mineral processing facilities Mine area site preparation Opencast mining Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction	Increased traffic	Avoid and control through implementation of EMP mitigation measures (e.g. speed limit enforcement, vehicle maintenance)	Throughout LoM	National Road Traffic Act OHSA MHSA
Mine area site preparation Mineral Processing Opencast mining Underground mining	Visual impact of light at night	Avoid and control through implementation of EMP mitigation measures (e.g. directional down lighting)	Throughout LoM	Security specifications
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump General Surface Rehabilitation Mine area site preparation Mineral Processing Opencast mining Site establishment – Contractors Camp	Visual impact of mine infrastructure, stockpiles and dust	Avoid and control through implementation of EMP mitigation measures (e.g. dust suppression, mine planning and	Throughout LoM	Rehabilitation and Closure Plan Final landuse objectives

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL		progressive rehabilitation)		
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump General decommissioning activities Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Underground mining Water management Infrastructure construction General Surface Rehabilitation Opencast Voids Storm water management Underground Mine Infrastructure Water Treatment as required by conditions of IWUL	Greenhouse gas emissions	Avoid and control through implementation of EMP mitigation measures (e.g. vehicle maintenance, progressive rehabilitation)	Throughout LoM	NEMAQA Equator Principles IFC Performance Standard 3: Resource Efficiency and Pollution Prevention
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes	Fugitive emissions (Dust)	Avoid through preventative measures (e.g. speed limit enforcement)	Throughout LoM	Road Traffic Act NEMAQA Dust regulations

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
General decommissioning activities General Surface Rehabilitation Infrastructure removal Mine area site preparation Mineral Processing Opencast mining Opencast Voids Post Closure Monitoring and Maintenance Re-vegetation Site establishment – Contractors Camp Site establishment – Permanent site office Infrastructure Storm water management Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL		Control through implementation of EMP mitigation measures (e.g. dust suppression)		
Construction of mineral processing facilities Decommissioning of Co-Disposal Dump Drilling for continued resource evaluation Drilling monitoring boreholes General decommissioning activities General Surface Rehabilitation Infrastructure removal Maintenance and operation of site infrastructure and facilities Mine area site preparation Mineral Processing Opencast mining Opencast Voids Re-vegetation Site establishment – Contractors Camp	Disburbing and/or nuisance noise	Avoid through preventative measures (e.g. communication with landowners, timing of activities) Control through implementation of EMP mitigation measures (e.g. Noise abatement measures)	Throughout LoM	ECA noise regulations SANS 10103 OHSA MHSA

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Site establishment – Permanent site office Infrastructure Storm water management Underground Mine Infrastructure Underground mining Water management Infrastructure construction Water Treatment as required by conditions of IWUL				
Opencast mining Underground mining	Air Blast	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	During Blasting	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security
Opencast mining Underground mining	Ground Vibration and human perception	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	During Blasting	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
				Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security
Opencast mining Underground mining	Ground Vibration Impacts on productivity of farm animals (cattle, chickens, pigs, etc.)	Avoid and control through implementation of preventative measures (e.g. blast procedures, monitoring, communication with landowners, emergency response procedures)	During Blasting	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security
Opencast mining Underground mining	Impacts on Infrastructure (roads, communications infrastructure, services, houses, boreholes)	Avoid and control through implementation of preventative measures (e.g. structural surveys, blast procedures, monitoring, communication with landowners)	During Blasting	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security

Activity	Potential Impact	Mitigation Type	Time period for Implementation	Compliance with Standards
Opencast mining Underground mining	Noxious fumes	Avoid and control through implementation of preventative measures (e.g. structural surveys, blast procedures, monitoring, communication with landowners)	During Blasting	Explosives Act MHSA OHSA MPRDA United States Bureau of Mines (USBM) criteria for safe blasting for ground vibration and recommendations on air blast Blast Procedures Emergency response procedure IFC Performance Standard 4: Community Health, Safety, and Security

27 FINANCIAL PROVISION

27.1 CLOSURE GOALS AND OBJECTIVES

The goals and objectives for closure were determined based on the baseline environment and the land uses that will be established post mining. The overall closure objectives include:

- To return land, mined by opencast methods, to a land capability similar to that which existed prior to mining and that the management level required to utilise the rehabilitated land be within the means of the farmer who uses it;
- Reshape the land disturbed by mining so that it is stable, adequately drained and suitable for the desired long-term land use;
- To ensure that as little water as possible seeps out of the various sections of the mine and where this is unavoidable, to ensure that the water is contained, if the volume is significant and if it does not meet the statutory water quality requirements;
- To clean up all coal stockpiles, loading areas and spillages within the opencast areas and to rehabilitate these to at least a grazing land capability. The cleared coal, if not saleable, will be placed on the discard dump;
- Make all areas safe for both humans and animals;
- Make all areas stable and sustainable;
- Waste rock piles must be stable in the long term to prevent erosion, subsidence or collapse;
- These facilities must also be closed in such a way that they do not continue to contribute to long term water quality problems form leachates which spread in an uncontrolled fashion;
- Remove the entire infrastructure other than the discard dumps and other waste disposal facilities such as the slurry dams unless alternative users can be found;
- Remove and/or bury of all rubble and waste, at approved sites;
- Rehabilitate areas as soon as possible (during operational phase if possible);
- Return rehabilitated land to the pre-mining environment where possible;
- Minimise the impact on the local community;
- Each area will be maintained and monitored for a period of three to five years following re-vegetation and, if this monitoring shows that the objectives have been met, an application for closure will be made;
- To demolish and remove salvageable infrastructure, dump unsalvageable material and rubble in the adit, seal the access ways and rehabilitate the adit or box cut;
- To ensure that the areas mined by underground methods do not subside and that it will be safe to conduct normal farming operations above these workings by using appropriate safety factors and mine design.
- To close off all entries to the underground workings so that the water table will be restored thereby preventing the ingress of air and preventing spontaneous combustion of the pillars. Any access to the working will also be restricted in accordance with the MPRDA.

27.2 CONFIRM SPECIFICALLY THAT THE OBJECTIVES FOR CLOSURE HAVE BEEN CONSULTED WITH LANDOWNERS AND I&AP'S

The Pembani Colliery is an existing mine and a number of EIA processes have been undertaken for the mine to date. The EIA processes undertaken have included extensive PPP and stakeholders have been given an opportunity to provide input into the EIA process including comments on the final land use objectives. The Stakeholder Engagement process is ongoing throughout the LoM and landowners will continue to be engaged with regards to the reinstatement of preferred landuses post mining. The Closure Cost Report is included in Appendix P of this report and the Financial Provisioning Report in Appendix S of this report.

27.3 REHABILITATION PLAN

27.3.2 INTEGRATED REHABILITATION AND CLOSURE PLAN

The mine shall develop and implement a detailed Integrated Rehabilitation and Closure Plan. This commitment has been included in the mitigation measures presented in this EMPR. The rehabilitation plan shall be based on the following objectives and principles:

- The Integrated Rehabilitation and Closure Plan will be developed in consultation with landowners and other directly affected stakeholders including the local community. The final landuse shall be determined in consultation with the above parties and must compatible with the climate, soil, topography of the final landform and the degree of the management available after rehabilitation. Due to the length of the mining operations, it is anticipated that stakeholder's needs may change and as such the agreed end use should be updated from time to time as the expectations of society change over time.
- The mine shall aim to maximise progressive rehabilitation, where possible, so that the rate of rehabilitation is similar to the rate of mining;
- A water treatment plant will be built to treat contaminated water from the various decant sources (anticipated capacity to treat 1 200 m^3/d), unless an alternative management measure acceptable to DWAF can be implemented at mine closure.

27.3.3 MINE CLOSURE PROCESS

Phase 1: Making Safe

The purpose of opencast rehabilitation is to ensure the site becomes safe for humans and animals. All the voids will be filled with the adjacent overburden. The overburden will be loaded, trucked and placed into the voids, and the topography in the area adjacent to these voids shaped to ensure that a free draining topography results.

Once all the voids have been backfilled, 300mm thick topsoil or soft overburden in place of soil will be spread on rehabilitated areas. Once placed, the "growth medium" should then be fertilised, ripped and revegetated. A small topsoil stockpile should be left for remedial work.

The following actions are required to meet the objectives of this phase:

- Remove all the facilities and equipment from the site;
- Inert ceramic and buried waste with a salvage value to individuals such as scrap metal, building materials, etc. will be removed and disposed of at a proper facility;
- The company contracted to supply fuel will be requested to remove all fuel storage and reticulation facilities;
- Those sections of haul road where a lot of coal and shale spillage has occurred, will be picked up and the waste material taken back to the discard dump;
- Remove or control residual hazardous materials. Identify any potential toxic overburden or exposed strata and manage them so as to prevent environmental damage;
- All coal material on the surface should be collected by grading and transported to the plant area for processing or depositing on the discard dump. The underlying soil material should be analysed to determine if it has become acidified, and liming of the area should be done if required. A layer of soil (approximately 300mm) should be placed on the area, it should be fertilised, ripped and re-vegetated.
- Access roads around the site should be ripped for all areas except those needed to access the facilities for inspection after closure. Roads that can and will be used by other users post closure should, however, be left provided this is agreed upon by all parties concerned. For the rehabilitation of roads, a cost has been allocated to rip the area, add 300 mm topsoil and vegetate.
- Negotiations will take place with local farmers to establish which sections of haul road they will require. The extra portions not required will be left and the remainder ripped. This would normally mean that the edges or verges are ripped and the centre portion remains. They will be responsible for maintaining the roads after closure;
- Haul roads not required by subsequent landowners will be cross-ripped and then vegetated in the normal way. Where there is topsoil this will be spread on the surface. Where this is not available the soil will be ameliorated using the addition of organic material. They will be re-established to a grazing land capability;
- Backfill opencast voids as far as possible;
- Sealing of shafts will be required to ensure that surface runoff does not enter the mine and to reduce the potential for ground water contamination.

Phase 2: Landform Design, Erosion Control, and Re-Vegetation

All the disturbed and void areas that have been filled, top soiled and levelled, will have to be prepared for planting.

- Deep rip compacted surfaces to encourage infiltration, allow plant root growth and key the topsoil to the subsoil, unless subsurface conditions dictate otherwise;
- Reinstate natural drainage patterns disrupted by mining wherever possible;

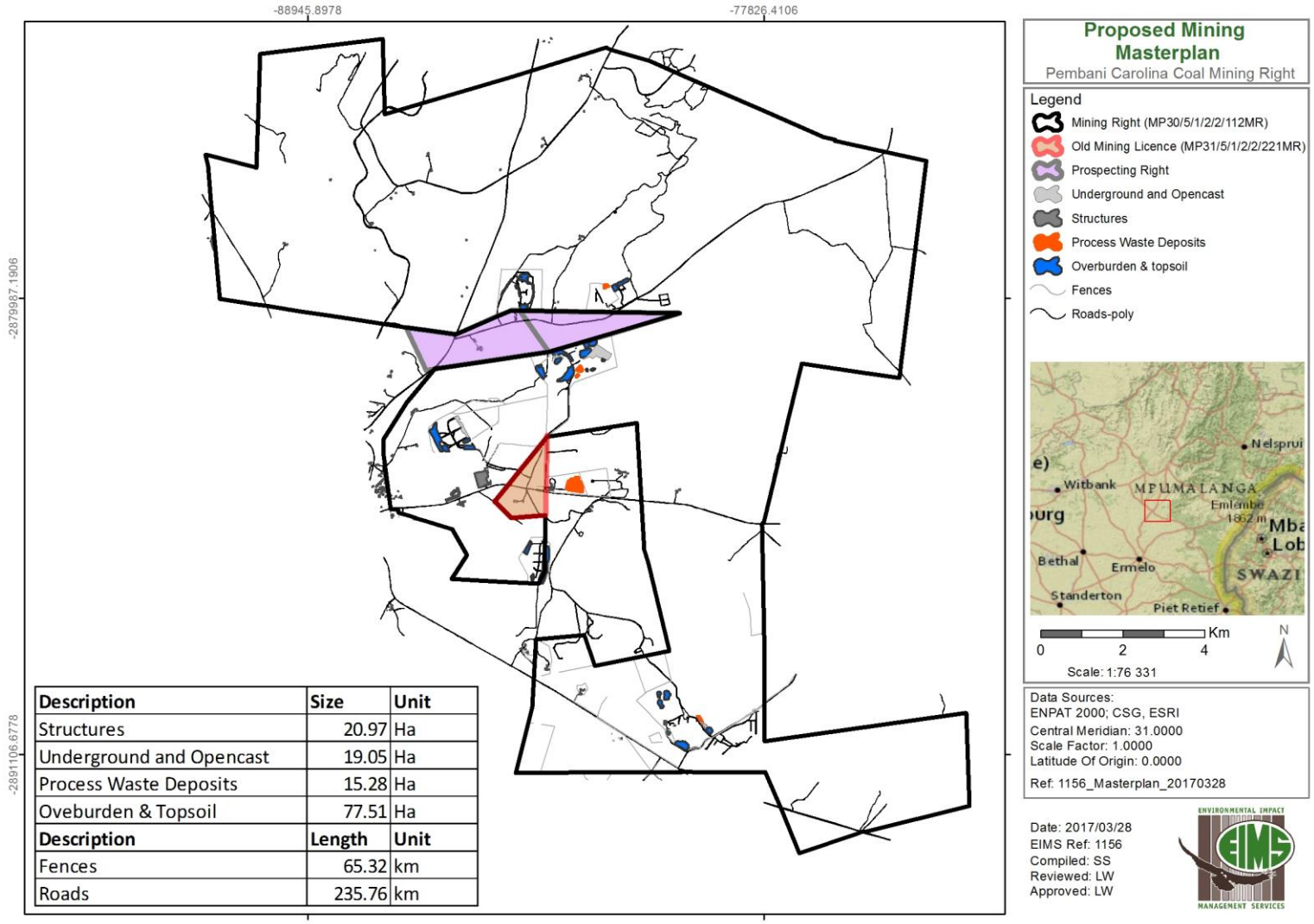
- Characterise the topsoil and retain it for use in rehabilitation. It is preferable to reuse the topsoil immediately rather than storing it in stockpiles. Only discard if it is physically or chemically undesirable, or if it contains high levels of weed seeds or plant pathogens;
- If topsoil is unsuitable or absent, identify and test alternatives substrates, e.g. overburden that may a suitable substitute after addition of soil improving substances;
- Lime and superphosphate are applied to the surface;
- These ameliorants are then incorporated by deep ripping, which penetrated 100mm through the soil into the underlying overburden material;
- Compound (NPK + Zn) fertilizer is applied, and disced in as part of seedbed preparation;
- A is then planted, usually with first rains, or after rains have commenced; and
- Consider spreading the cleared vegetation on disturbed areas
- Re-vegetate the area with plant species consistent with the post mining land use.
- The site is then mulched together with an indigenous grass seed mix. This is to stimulate the long term establishment of indigenous vegetation and to reduce erosion during early plant growth.

Phase 3: Monitoring, Maintenance, and Relinquishments

Maintenance and aftercare must be planned for 2-3 years after the land preparation and replanting of vegetation has been completed. This will apply to the plant area, discard dumps and 7 voids and that will be backfilled. In addition, Pembani has already backfilled TZP, Haarlem 4 and 5 voids (refer to Figure 92 below) which will also require further maintenance.

Maintenance will specifically focus on annual fertilising the rehabilitated area (where required), control of all other alien plants and general maintenance, including rehabilitation of cracks, subsidence and erosion gullies. Continuous erosion monitoring of rehabilitated areas and slopes should be undertaken and zones with excessive erosion should be identified. The cause of the erosion should be identified, and rectified. Zones with erosion will need to be repaired with topsoil.

The mine shall continue to monitor and manage rehabilitation areas until the vegetation is self-sustaining and meets the requirements of the landowner or land manager, until their management can be integrated into the management of the surrounding area.



Description	Size	Unit
Structures	20.97	Ha
Underground and Opencast	19.05	Ha
Process Waste Deposits	15.28	Ha
Oveburden & Topsoil	77.51	Ha
Description	**Length**	**Unit**
Fences	65.32	km
Roads	235.76	km

Figure 92: Rehabilitation Plan

27.4 REHABILITATION AIMS AND OBJECTIVES

The objectives for rehabilitation and closure have been provided in section 27.1 above. The rehabilitation plan is based on good industry practise and is based on the described objectives for rehabilitation and closure which in turn are based on the end land use objectives defined during the original EIA studies in consultation with landowners and key stakeholders. Further to this, the ongoing stakeholder engagement as per the ESMS will allow for continued consultation landowners with regards to the reinstatement of preferred land uses post mining.

27.5 FINANCIAL PROVISION QUANTUM CALCULATION

This closure cost calculation is based on the rehabilitation DMR guidelines in the “Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine”. The focus of this financial provision calculation is the cost to backfill voids, demolishing of the plant and the general surface rehabilitation of the disturbed areas.

The approach followed for the calculation of the closure liability costs was to reflect the “snapshot-in-time” principle. Costs have been calculated assuming that the mine would have to close immediately and would have to rehabilitate or remediate the impacts without delay. Savings are however possible through the application of progressive rehabilitation and various other management measures, whereby environmental liabilities can be reduced during the mines operations or after closure. Conversely a number of environmental liabilities can only be better defined through more detailed investigations, or as their extent is confirmed during reclamation operations.

The Pembani Colliery is an existing mine that has been in operation for many years. The original quantum calculations for the financial provision were calculated by Digby Wells in 2006 for the mining right application and amounted to **R 2,142,884.45**. Subsequent to this, the mine has revised and updated the quantum calculation in 2014 and amounted to **R43 599 579.85,** and the latest update was undertaken in 2016 by Digby Wells. The closure costing was calculated in December 2016, and the assessment excluded possible liabilities related to retrenchment, contractual obligations, social issues or shallow or deep aquifer contamination were: **R132 425 708** (from Digby Wells 2016 Closure Cost Report)

Please refer to the Digby Wells 2016 Closure Cost Report in Appendix P for further details on this closure costing calculation.

There is a requirement to calculate the additional costs associated with the proposed underground mining on the farm Zandvoort 10IT. This closure costing was calculated by EIMS in 2017 according to the following limitations and assumptions:

1. The aerial extent figures utilised in the existing financial provision (undertaken by Digby Wells in 2016) was utilised for the existing operations;
2. The latest 2016 DMR Master Rates were applied to the costing;

3. Limited information was available for the size of the area affected by shafts entrances. The sealing of shafts for underground mining was therefore based on the assumption of a 100 000m^3 volume of soil.
4. Due to the above limitations it is recommended that the closure costing be revised as soon as more detailed information becomes available for the new mining plan.

The quantum calculation is provided in Table 49 below. On the basis of this calculation, the total amount to be provided is **R 66 586 266.33.**

Table 49: Quantum Calculation

CALCULATION OF THE QUANTUM							
Project: Pembani Colliery							
Evaluators: EIMS							
	Description	Unit	A Quantity	B Master Rate	C Multiplication Factor	D Weighting Factor 1	E = A*B*C*D Amount
			Step 4.5	Step 4.3	Step 4.3	Step 4.4	
1	**Dismantling of processing plant and associated structures (including associated conveyors)**		0	R 13.68			
2(A)	**Demolition of steel buildings and structures (including floor slabs)**		0	R 190.54			
2(B)	**Demolition of reinforced concrete buildings and structures including Processing Plant and related structures**		0	R280.80			
3(A)	**Rehabilitation of access roads (surfaced roads)**	m^2	141584	R 34.10	1	1.1	R 5 310 816
4(A)	**Demolition of electrified railway lines**			R 330.94			R 0
4(B)	**Demolition and rehabilitation of non-electrified railway lines**			R 180.52			R 0
5	**Demolition of housing and facilities (including floor slabs)**			R 381.09			R 0
6	**Opencast rehabilitation (including final voids and ramps)**	ha	45.77	R 199 768.65	1	1.1	R 10 057 752
7	**Sealing of shafts, adits and inclines (including concrete cap)**	m3	100000	R 102.30	1	1.1	R 11 253 000
8(A)	**Rehabilitation of overburden and spoils**		65.9	R 133 179.10	1	1.1	R 9 654 153
8(B)	**Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)**			R 165 872.16			R 0
8(C)	**Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)**			R 481 771.38			R 0
9	**Rehabilitation of subsided areas**			R 111 517.43			R 0

10	**General surface rehabilitation, including grassing of all denuded areas**			R 105 500.31			R 0
11	**River diversions**			R 105 500.31			R 0
12	**Fencing**	m	1500	R 120.34	1	1.1	R 198 561
13	**Water management**	ha	45.77	R 40 114.19	1	1.1	R 2 019 629
14	**Aftercare and maintenance**	ha	185.03	R 14 039.97	1	1.1	R 2 857 597
15	**Specialist Study** (Hydrogeological study)		1	133 150	1	1.1	R 146 465
15	**Specialist Study** (Auditing)		1	R 63 290.69	1	1.1	R 69 620
							R 41 351 508
				Weighting factor 2 (Step 4.4)		1.05	
					Sub Total 1		R 43 419 083.78
1	Preliminary and General				12%		R 5 210 290
	Administration and supervision costs				6%		R 2 605 145
	Engineering Drawings and specifications				2%		R 868 382
	Engineering and Procurement of specialist work				2.5%		R 1 085 477
	Development of a closure plan Final Groundwater modelling				2.5%		R 1 085 477
	Final Groundwater modelling						
2	Contingency				10%		R 4 135 151
					Sub Total 2		R 58 409 005.56
					VAT - 14%		R 8 177 260.78
					GRAND TOTAL		**R 66 586 266.33**

27.6 CONFIRMATION OF AMOUNT TO BE PROVIDED

In terms of the MPRDA and the Income Tax Act, the financial provision for closure must be assessed annually in order for any additional infrastructure or negative impact to be incorporated into the financial provision costing during the annual assessment as the project progresses.

In terms of Section 51(b) (v) and Regulation 53 and 54 of the MPRDA, Pembani Coal Carolina is required to make financial provision for the rehabilitation of negative impacts associated with its activities under the mining right. In terms of said Act, the company is further required to determine the quantum of the financial provision for the cost of pre-mature closure, decommissioning and final closure and post-closure management of the residual and latent environmental impacts.

Once said closure quantum has been calculated, Pembani Coal Carolina must begin the process of setting aside funds to ensure, that through annual (theoretically equal) contributions, the full amount required to cover de-commissioning, rehabilitation closure and post-closure activities will be provided for over a 30 year period or the life of mine, whichever is shorter. These funds must be set aside in a separate mine closure trust fund whose operation is governed by the Income Tax Act 58 of 1962 (as amended) Section 10 (1) (cH).

In addition, in terms of Regulation 53 (1) of the MPRDA, Pembani Coal Carolina as the owner/operator must lodge a guarantee (in the form of a bank guarantee from a registered South African bank) in order to provide security against a closure funding shortfall in the case of un-planned or premature closure.

Finally, Regulation 54 (2) of the MPRDA provides for the annual review of the financial quantum for mine closure. This review must be informed by any adjustments of the Life of Mine plans, revisions of the EMPR and new legislative requirements. Depending upon the outcome of the review, annual contributions to the mine closure provision/ mine closure trust fund will be adjusted to ensure that sufficient funds are available for rehabilitation, decommissioning and closure of the Pembani Colliery.

28 COMPLIANCE MONITORING

28.1 METHOD OF MONITORING IMPACT MANAGEMENT ACTIONS

Pembani is required to develop an auditing and reporting procedure in support of the ESMS to be developed and implemented. The purpose of the auditing and reporting procedure is to clearly define the requirements for compliance monitoring and audits and the reporting of the information gathered. Through integration with the ESMS, the procedure will allow management to take rapid corrective action for concerns and non-conformances identified during inspections and audits. This section provides a framework for the detailed procedure which will be developed by the mine.

Different reporting mechanisms may include:

- Inspections;
- Reporting accidents and emergencies;
- Measuring performance indicators and interpreting and acting on the indicators;
- Records of monitoring activities to test the effectiveness of mitigation measures and impact controls, as well as for compliance auditing purposes; and
- Training programmes and evidence of appropriate levels/amount of skills/capacities created.

All monitoring and auditing must be accompanied by applicable records and evidence (e.g. delivery slips, photographic records, etc.). All reports must be retained and made available for inspection by the ECO, the Applicant and /or the Relevant Competent Authorities. All reports shall be signed by the relevant parties to ensure accountability. Pembani must use the audit report findings to continually ensure that environmental protection measures are working effectively on site through a system of self-checking. The EMPR should be viewed as a dynamic document aimed at continual environmental performance improvement.

The framework for compliance monitoring and auditing is summarised in the sections below.

Table 50: Proposed framework for compliance monitoring and audits

Resource	Document	Implementation		Checking/Monitoring/Audit			Reporting		
		Responsible Party	Frequency	Responsible Party	Type	Frequency	To	Type	Frequency
Contractors Environmental Representative	Pembani ESMS Procedures	Yes	Daily	No					
	EMP/EMPR's	Yes	Daily	Yes	Site Inspection	Daily	Checklist	Daily	
	IWULA	Yes	Daily	No					
	NEMA EA	Yes	Daily	No					
	Other Licences, Permits or Approvals	Yes	Daily	No					
Pembani Environmental Manager	Pembani ESMS Procedures	Yes	As Required	Yes	Report Review	As Required	Mine Management	Board Report	As Required
	EMP/EMPR's	Yes	As Required	Yes	Report Review	As Required	Mine Management	Board Report	As Required
	IWULA	Yes	As Required	Yes	Report Review	As Required	Mine Management	Board Report	As Required
	NEMA EA	Yes	As Required	Yes	Report Review	As Required	Mine Management	Board Report	As Required
	Other Licences, Permits or Approvals	Yes	As Required	Yes	Report Review	As Required	Mine Management	Board Report	As Required
Pembani Environmental Officer	Pembani ESMS Procedures	Yes	Weekly	Yes	Site Inspection	Weekly	Environmental Manager	Report	Monthly
	EMP/EMPR's	Yes	Weekly	Yes	Site Inspection	Weekly	Environmental Manager	Report	Monthly
	IWULA	Yes	Weekly	Yes	Site Inspection	Weekly	Environmental Manager	Report	Monthly

Resource	Document	Implementation		Checking/Monitoring/Audit			Reporting		
		Responsible Party	Frequency	Responsible Party	Type	Frequency	To	Type	Frequency
	NEMA EA	Yes	Weekly	Yes	Site Inspection	Weekly	Environmental Manager	Report	Monthly
	Other Licences, Permits or Approvals	Yes	Weekly	Yes	Site Inspection	Weekly	Environmental Manager	Report	Monthly
Environmental Control Officer	Pembani ESMS Procedures	No	-	Yes	Sample Audit	Monthly	Environmental Manager	Audit Report	Monthly
	EMP/EMPR's	No	-	Yes	Sample Audit	Monthly	Environmental Manager	Audit Report	Monthly
	IWULA	No	-	Yes	Sample Audit	Monthly	Environmental Manager	Audit Report	Monthly
	NEMA EA	No	-	Yes	Sample Audit	Monthly	Environmental Manager	Audit Report t	Monthly
	Other Licences, Permits or Approvals	No	-	Yes	Sample Audit	Monthly	Environmental Manager	Audit Report	Monthly
Independent Environmental Auditor	Pembani ESMS Procedures	No	-	No					
	EMP/EMPR's	No	-	Yes	Performance Assessment	Annual	Environmental Manager		Annual
	IWULA	No	-	Yes	Audit	Annual	Environmental Manager		Annual
	NEMA EA	No	-	Yes	Audit	Annual	Environmental Manager		Annual
	Other Licences, Permits or Approvals	No	-	Yes	Audit	As Per Licence			As Per Licence

28.2 MONITORING AND REPORTING FREQUENCY

The following auditing and reporting shall be required during operations:

- Weekly Compliance Reports: These reports must be prepared by the designated Mine EO and must aim to monitor and report on-site environmental performance;
- Monthly Compliance Audits: These audits must be undertaken by the ECO and must aim to monitor and report on compliance with the requirements of the relevant authorisations. licences and permits, the approved EMPR; and
- Monthly Audit Reports: The ECO must compile quarterly compliance reports (audits) which are to be submitted to the applicant for his review and correction of non-compliance issues. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified.

28.3 RESPONSIBLE PERSONS

Table 51: Roles and responsibilities for environmental resources on site

Environmental Resource	Key Responsibility	Tasks	Reporting
Pembani Environmental Manager (EM)	Overall responsibility for environmental management at the mine	Develop and implement the ESMS Develop procedures for the ESMS Review compliance monitoring reports and audit reports Assign responsibilities for corrective actions and addressing non-compliance Liaison with authorities Issuance of NCR's Reporting KPI's to mine management Liaison with landowners and Key stakeholders with regards to environmental issues Supervise Environmental Monitoring Programmes	Reports to Mine management
Environmental Control Officer (ECO)	Responsible for **external** compliance monitoring	Acts as an external check/verification of environmental compliance Review EO reports Conduct inspections and report on environmental compliance Advise EM in corrective actions for non-compliance Recommendations for improvement Environmental training and support	Reports to EM
Pembani Environmental Officer (EO)	The Pembani EO is responsible for **internal** monitoring compliance against the conditions of the EMPR and other licenses and permits. The EO is only responsible for implementation of management measures that are the responsibility of the Applicant	Undertake regular (at least weekly) site inspections Report on compliance and advise contractor/applicant on corrective actions Implement corrective actions where the responsibility lies with Applicant Coordinate and Implement Environmental Monitoring Programmes Environmental record keeping	Reports to EM

Environmental Resource	Key Responsibility	Tasks	Reporting
Contractors Environmental Representative (ER)	The Contractors ER is responsible for **implementation** of the mitigation measures applicable to the contractor's activities. Where responsibilities are delegated by the Applicant to the contractor, it shall be the role of the Contractors ER to **implement** these management measures	Day to day implementation of environmental management actions. Key responsibilities include: Waste management Daily site inspections Advising workers on their environmental responsibilities Maintaining environmental standards Environmental awareness training Record keeping Maintenance of environmental management measures (e.g. silt fences, berms etc).	Reports to ECO
Independent Environmental Auditor (IEA)	Responsible for **external** compliance audits and annual Performance Assessments	Conducting Auditing Recommendations for improvement	Reports to authorities

28.4 TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS

The time periods for implementation of the impact management actions are provided in Table 50 above.

28.5 MECHANISMS FOR MONITORING COMPLIANCE

Table 52 below provides a summary of the functional requirements for monitoring that needs to be implemented, identifies who is responsible for the monitoring and the frequency of monitoring and reporting.

Table 52: Mechanisms for monitoring compliance

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementation
Mine Planning and Design	None	None		
Mine Infrastructure Construction	All Impacts Identified during the EIA	Site Inspections and checklists	Contractors Environmental Representative	Daily inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Pembani Environmental Manager	As Required
		Site Inspections and Audits	Contractors Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment
Opencast Mining	All Impacts Identified during the EIA	Site Inspections and checklists	Contractors Environmental Representative	Daily inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Pembani Environmental Manager	As Required
		Site Inspections and Audits	Contractors Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment
Underground Mining	All Impacts Identified	Site Inspections and checklists	Contractors Environmental Representative	Daily inspections and checklists

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementation
		Report Review and Development of Action Plans for Corrective Action	Pembani Environmental Manager	As Required
		Site Inspections and Audits	Contractors Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment
Mineral Processing	All Impacts Identified during the EIA	Site Inspections and checklists	Contractors Environmental Representative	Daily inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Pembani Environmental Manager	As Required
		Site Inspections and Audits	Contractors Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment
Decommissioning Activities	All Impacts Identified during the EIA	Site Inspections and checklists	Contractors Environmental Representative	Daily inspections and checklists
		Report Review and Development of Action Plans for Corrective Action	Pembani Environmental Manager	As Required
		Site Inspections and Audits	Contractors Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment
Rehabilitation	All Impacts Identified during the EIA	Report Review and Development of Action Plans for Corrective Action	Pembani Environmental Manager	As Required
		Site Inspections and Audits	Contractors Environmental Officer	Weekly inspections
				Monthly Reports
			Environmental Control Officer	Monthly Audit Reports

Source Activity	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles and Responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementation
			Independent Environmental Auditor	Annual Performance Assessment
Closure - Aftercare and Maintenance	All Impacts Identified during the EIA	Report Review and Development of Action Plans for Corrective Action	Pembani Environmental Manager	As Required
		Site Inspections and Audits	Contractors Environmental Officer	Bi-Monthly inspections
				Bi-Monthly Reports
			Environmental Control Officer	Bi-Annual Audit Reports
			Independent Environmental Auditor	Annual Performance Assessment

29 THE EMPR PERFORMANCE ASSESSMENT

According to Regulation 55 of the MPDRA regulations compliance with the EMPR must be monitored on a continuous basis. This requirement shall be accomplished through the continuous monitoring of compliance undertaken by the Mine EO and ECO. The performance assessment will focus on the following Key Aspects:

- Compliance with the Approved EMPR;
- Compliance with the approved SLP; and
- Appropriateness and validity (technical content) of the EMPR.

An EMPR performance assessment report shall be submitted to the Department of Mineral Resources (DMR) on an annual basis (each year of mining and before applying for closure). The holder of the mining right may appoint an independent qualified person for the monitoring and to compile a report, but the responsibilities remain the holder's. The performance assessment will include:

- The period when the performance assessment was conducted;
- The scope of the assessment;
- The procedures used for conducting the assessment;
- Interpreted information gained from monitoring the EMPR (e.g. ECO reports);
- Evaluation criteria used during the assessment; and
- Results of the assessment are to be discussed and mention must be made of any gaps in the EMPR and how it can be rectified.

29.1 REVIEW AND REVISION OF THE EMPR

It is important to note that this EMPR is made legally binding on the applicant at such time as the EA and/or WML is granted and the EMPR is approved by the decision making authority. Since this is a mining project, the overarching legislation is the MPRDA, and it is important to note that in accordance with Section 102 of the MPRDA, no EMPR may be amended or varied without the written consent of the minister. It is however also important to consider that the EMPR is a dynamic document which may require such alteration and /or amendment as the project evolves. Conditions under which the EMPR would require revision include:

- Changes in legislation;
- Occurrence of unanticipated impacts or impacts of greater intensity, extent and significance than predicted;
- Inadequate mitigation measures (i.e. where environmental performance does not meet the required level despite the implementation of the mitigation measure); and
- Secondary impacts occur as a result of the mitigation measures.

The Applicant in consultation with the ECO should be responsible for ensuring that the registration and updating of all relevant EMPR documentation is carried out. It shall be the responsibility of the

Applicant/Mine Manager to ensure that all personnel are performing according to the requirements of this procedure and to initiate the revision of controlled documents, when required by changes in process or operations and shall notify the ECO of such changes.

It is recommended that a risk assessment protocol must be developed and implemented by the ECO which shall be utilised to evaluate the environmental risk associated with the potential proposed alterations and/or amendments. The results of the risk assessment must then be included in the submission to the competent authority for the amendment process. It is important to note that if alterations and/or amendments are required, these may only be effected with written approval from the competent authority and in accordance with the then-in-effect relevant legal processes.

30 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

Management of operational risk is a key consideration for Mines operating within the social and economic context of South Africa. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. Operational risks and impacts are usually managed through the implementation of the Environmental and Social Management System (ESMS) and Safety, Health and Environmental (SHE) system. A formal, effective ESMS is an important requirement for establishing and maintaining effective environmental management and should be undertaken during the planning phase of the Project. As such the Applicant shall be required to appoint a suitably qualified specialist to develop the ESMS to be implemented on the mine. Adequate resources (people, financial and technical) need to be made available to ensure effective establishment, implementation, maintenance and continual improvements of the ESMS. The roles and responsibilities for these key environmental personnel should be clearly defined and communicated throughout the organisation. The ESMS should include the requirement to constantly monitor environmental performance and assess the adequacy of environmental resources provided for the Mine. If required, the Mine would need to procure further environmental resources to ensure the successful implementation of the ESMS and EMPR. The development and implementation of an ESMS is a requirement in terms of compliance with international standards of best practise such as the IFC Performance Standards and Equator principles.

30.1 ESMS FRAMEWORK

The Pembani Colliery ESMS will be based on:

- Pembani Coal Carolina corporate vision;
- South African legal requirements; and
- Mining best practice.

The ESMS to be developed for the Mine should incorporate and provide for:

- A project specific Environmental Policy;
- Organisational capacity and competency;
- The ESMS shall identify roles and responsibilities of key role players;
- The ESMS shall incorporate a mechanism for ongoing identification of risks and impacts (e.g. Impacts and aspects register of an ISO system).
- Integration of the ESMS with the SHE management system may be undertaken to form a holistic SHE risk management system;

- The ESMS shall comprise appropriate management plans and procedures to ensure effective operational control;
- The ESMS shall provide for emergency response and also make provision for emergency protocols;
- Effective communication (both internal and external) is a key requirement for successful implementation of the ESMS and an appropriate communication procedure to this effect shall be developed;
- The ESMS shall involve engagement between the client, its workers, local communities directly affected by the project (the affected communities) and where appropriate, other stakeholders. It is therefore imperative that there is integration between Stakeholder Engagement procedures and the ESMS;
- The ESMS shall make provision for ongoing compliance monitoring, performance assessment and external audits; and
- The ESMS shall make provision for internal auditing and continual improvement which should be incorporated into internal management review processes. The ESMS should provide for setting and reviewing objectives and targets to demonstrate continual SHE improvements associated with the project.

Ultimately an effective ESMS should provide for effective management of social and environmental risks and impacts whilst maintaining legal compliance and meeting international standards of best practise where these are feasible and appropriate.

30.1.2 STAKEHOLDER ENGAGEMENT

Social impacts occur immediately in the planning phase of a project and as such it is imperative to start with stakeholder engagement as early in the process as possible. Stakeholder engagement commenced during the EIA Phase of the project, in accordance with the relevant legislation. Stakeholder engagement is however required on an ongoing basis throughout the operation of the facility. As such, the mine will need to develop and implement a detailed Stakeholder Engagement Plan, designed to work as a living document for implementation over the entire LoM.

The following stakeholder engagement framework outlines the principles and objectives for stakeholder engagement during all phases of the mining operation.

- To identify and assess the processes and/or mechanisms that will improve the communication between local communities, the wider community and the Pembani Colliery;
- To improve relations between mine staff and the people living in the local communities;

- To provide a guideline for the dissemination of information crucial to the local communities in a timely, respectful and efficient manner; and
- To provide a format for the timely recollection of information from the local communities in such a way that the communities are included in the decision making process.

This stakeholder engagement plan will assist the Pembani Colliery to outline their approach towards communicating in the most efficient way possible with stakeholders throughout the life of the project. Such a plan cannot be considered a once off activity and should be updated on a yearly basis to ensure that it stays relevant and to capture new information. The Stakeholder Engagement Plan should be compiled in line with IFC Guidelines (IFC) and should consist of the following components:

- Stakeholder Identification and Analysis – time should be invested in identifying and prioritising stakeholders and assessing their interests and concerns.
- Information Disclosure – information must be communicated to stakeholders early in the decision-making process in ways that are meaningful and accessible, and this communication should be continued throughout the life of the project.
- Stakeholder Consultation – each consultation process should be planned out, consultation should be inclusive, the process should be documented and follow-up should be communicated.
- Negotiation and Partnerships – add value to mitigation or project benefits by forming strategic partnerships and for controversial and complex issues, enter into good faith negotiations that satisfy the interest of all parties.
- Grievance Management – accessible and responsive means for stakeholders to raise concerns and grievances about the project must be established throughout the life of the project.
- Stakeholder Involvement in Project Monitoring – directly affected stakeholders must be involved in monitoring project impacts, mitigation and benefits. External monitors must be involved where they can enhance transparency and credibility.
- Reporting to Stakeholders – report back to stakeholders on environmental, social and economic performance, both those consulted and those with more general interests in the project and parent company.
- Management Functions – sufficient capacity within the company must be built and maintained to manage processes of stakeholder engagement, track commitments and report on progress.

It is of critical importance that stakeholder engagement takes place in each phase of the project cycle and it must be noted that the approach will differ according to each phase.

30.1.3 GRIEVANCE MECHANISM

In accordance with international good practice the Pembani Colliery shall establish a specific mechanism for dealing with grievances. A grievance is a complaint or concern raised by an individual or organisation that judges that they have been adversely affected by the project during any stage of its development. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts, or perceived impacts. The IFC standards require Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities, and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies.

The proposed grievance mechanism shall be based on the following principles:

- Transparency and fairness;
- Accessibility and cultural appropriateness;
- Openness and communication regularity;
- Written records;
- Dialogue and site visits; and
- Timely resolution.

Based on the principles described above, the grievance mechanism process involves four stages:

- Receiving and recording the grievance;
- Acknowledgement and registration;
- Site inspection and investigation; and
- Response.

30.1.4 INTERNAL GRIEVANCE PROCEDURE

The Pembani Mine shall develop a detailed internal grievance mechanism designed to receive and facilitate resolution of workplace concerns and grievances raised by employees (and their organizations, where they exist). Employees must be informed of the grievance mechanism at the time of recruitment and it must be made easily accessible to them. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned, without any retribution. The mechanism should also allow for anonymous complaints to be

raised and addressed. The mechanism should not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.

30.2 DOCUMENT CONTROL

A formal document control system should be established during the development of the ESMS. The document control system must provide for the following requirements;

- Documents are approved for adequacy prior to use;
- Review and update documents as necessary and re-approve documents;
- Ensure that changes and the current version status of documents are identified;
- Ensure that relevant versions of applicable documents are available at points of use;
- Ensure that documents remain legible and readily identifiable;
- Ensure that documents of external origin necessary for the ESMS are identified and their distribution controlled; and
- Prevent unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

30.3 RECORD KEEPING

It is essential that an official procedure for control of records be developed to ensure records required to demonstrate conformity to environmental and social standards are maintained. The Pembani Colliery is therefore required to develop and maintain a procedure for the identification, storage, protection, retrieval, retention and disposal of records as part of the ESMS. Records must be legible, identifiable and traceable.

30.4 AUDITING AND REPORTING PROCEDURES

The Applicant shall develop and auditing and reporting procedure, for conveying information from the compliance monitoring activities and to ensure that management is able to take rapid corrective action should certain thresholds be exceeded. The sections below present a framework for the development of the necessary procedures.

Different reporting mechanisms may include:

- Inspections;
- Accidents and emergencies;
- Measuring performance indicators and interpreting and acting on the indicators;
- Records of monitoring activities to test the effectiveness of mitigation measures and impact controls, as well as for compliance auditing purposes; and

- Training programmes and evidence of appropriate levels/amount of skills/capacities created.

All monitoring and auditing must be accompanied by applicable records and evidence (e.g. delivery slips, photographic records, etc.). All reports must be retained and made available for inspection by the ECO, the Applicant and /or the Relevant Competent Authorities. All reports shall be signed by the relevant parties to ensure accountability. The applicant must use the audit report findings to continually ensure that environmental protection measures are working effectively on site through a system of self-checking. The EMP should be viewed as a dynamic document aimed at continual environmental performance improvement.

The following auditing and reporting shall be required throughout the operation phase;

- Weekly Compliance Reports: These reports must be prepared by the designated Mine EO and must aim to monitor and report on-site environmental performance;
- Monthly Compliance Audits: These audits must be undertaken by the ECO and must aim to monitor and report on compliance with the requirements of the relevant authorisations, licences and permits, the approved EMPR; and
- Monthly Audit Reports: The ECO must compile quarterly compliance reports (audits) which are to be submitted to the applicant for his review and correction of non-compliance issues. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified.

30.5 RESPONDING TO NON-COMPLIANCES

Non-compliance will be identified and managed through the following four key activities including;

- **Inspections** of the site and activities across the site;
- **Monitoring** of selected environmental quality variables;
- **Audits** of the site and relevant documentation as well as specific activities;
- **Reporting** on a monthly basis.

An environmental non-conformance and incident register must be prepared and maintained by the ECO throughout the lifespan of the mine in order to monitor environmental concerns, incidents, and non-conformances. The register must include details of date, location, description of the NC or Incident, applicable environmental commitment/standard, corrective action taken, adequacy of corrective action, date rectified, etc.

Non-compliance with the EMPR or any other environmental legislation, specifications or standards shall be recorded by the ECO in the non-conformance register. This register shall be maintained by the ECO and will be sent to the Applicant and Contractor on a regular basis (Monthly), and the Applicant shall ensure that the responsible party takes the necessary

corrective actions. Non-conformances may only be closed out in the register by the ECO upon confirmation that adequate corrective action has been taken. The register should be utilised to measure overall environmental performance.

30.6 ENVIRONMENTAL INCIDENTS

For the purposes of this project, an environmental incident can be divided into three levels, i.e. major, medium and minor. All major and medium environmental incidents shall be recorded in the incident register. Minor incidents do not need to be reported, but require immediate rectification on site. Definitions and examples of environmental incidents are provided in Table 53 below.

Table 53: Description of incidents and non-conformances for the purpose of the project

Non-Conformance	Any deviation from work standards, practices, procedures, regulations, management system performance etc. that could either directly or indirectly lead to injury or illness, property damage, damage to the workplace environment, or a combination of these.
Major Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread, long-term, irreversible significant negative impact on the environment and/or has a high risk of legal liability. A major environmental incident usually results in a significant pollution and may entail risk of public danger. Major environmental incidents usually remain an irreversible impact even with the involvement of long-term external intervention i.e. expertise, best available technology, remedial actions, excessive financial cost etc. Major environmental incidents may be required to be reported to the authorities. The ECO shall make the final decision as to whether a particular incident should be classified as a Major incident. An example of a Major environmental incident would be a significant spillage (e.g. 500 litres) of fuel into a watercourse.
Medium Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread or localised, short term, reversible significant negative impact on the environment and/or has a risk of legal liability. A medium environmental incident may be reported to the authorities, can result in significant pollution or may entail risk of public danger. The impact of medium environmental incidents should be reversible within a short to medium term with or without intervention. The ECO shall make the final decision as to whether a particular incident should be classified as a Medium incident. An example of a Medium environmental incident would be a large spill of fuel (e.g. 20 – 50 litres) onto land.
Minor Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, where the environmental impact is negligible immediately after

	occurrence and/or once-off intervention on the day of occurrence. An incident where there is unnecessary wastage of a natural resource is also classified as a minor environmental incident. An example would be leaking water pipes that result in the wastage of water. A minor environmental incident is not reportable to authorities. An example of a minor incident is day to day spills of fuel or oil onto the ground where the spill is less than one or two litres.

The following incident reporting procedures shall apply to this project:

- All environmental incidents shall be reported to Contractor's EO and Mine EO who shall ensure that the appropriate rectification is undertaken;
- The Mine EO shall record all medium and major incidents in the incident register and advise on the appropriate measures and timeframes for corrective action;
- An incident report shall be completed by party responsible for the incident for all medium and major incidents and the report shall be submitted to the Mine Manager and Mine EO within 5 calendar days of the incident;
- The Mine EO shall investigate all medium and minor incidents and identify any required actions to prevent a recurrence of such incidents;

In the event of an emergency incident (unexpected sudden occurrence), including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed, the Applicant shall notify the relevant authorities in accordance with legal requirements (e.g. Section 30 of NEMA and Section 20 of the NWA). In the event of a dispute in terms of the classification of a such an incident, the Applicant shall engage the ECO to advise on the potential reporting requirements in terms of the above.

31 ENVIRONMENTAL AWARENESS PLAN AND TRAINING

Training and environmental awareness is an integral part of a complete EMPR. The overall aim of the training will be to ensure that all site staff are informed of their relevant requirements and obligations pertaining to the relevant authorisations, licences, permits and the approved EMPR and protection of the environment.

The applicant and contractor must ensure that all relevant employees are trained and capable of carrying out their duties in an environmentally responsible and compliant manner, and are capable of complying with the relevant environmental requirements. To obtain buy-in from staff, individual employees need to be involved in:

- Identifying the relevant risk;

- Understanding the nature of risks;
- Devising risk controls; and
- Given incentive to implement the controls in terms of legal obligations.

The applicant shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the employees. All training must be formally recorded and attendance registers retained. The environmental training should, as a minimum, include the following:

- General background and definition to the environment;
- The importance of compliance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- Compliance with mitigation measures proposed for sensitive areas;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving compliance with the environmental policy and procedures and with the requirement of the applicant's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences (legal and/or other) of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities; and
- All operational risks must be identified and processes established to mitigate such risk, proactively. Thus, the applicant needs to inform the employees of any environmental risks that may result from their work, and how these risks must be dealt with in order to avoid pollution and/or degradation of the environment.

In the case of permanent staff required during the operational phase of the project, the applicant / contractor shall provide evidence that such induction courses have been presented. In the case of new staff (including contract labour) the contractor / applicant shall keep a record of adequate environmental induction training.

31.1 MANNER IN WHICH EMPLOYEES WILL BE INFORMED OF ENVIRONMENTAL RISKS

The specific requirements for environmental training include:

- Site Environmental Induction Training: All site staff and employees will receive induction training which will be presented by the Health and Safety Manager

Representatives. The induction training must include an environmental management component which will be will be prepared by the Mine EO and presented where possible by the Mine EO. The training material must include general environmental awareness and an overview of the EMPR and EA requirements. The Induction Training Material must be reviewed and approved by the ECO;

- Regular Environmental Toolbox Talks: Environmental toolbox talks will be prepared by the Mine EO to cover a range of environmental topics and must be presented to relevant staff during applicable times during all relevant phases. The aim of these toolbox talks will be to inform site employees of environmental requirements pertaining to specific activities, as well as specific EMPR and EA requirements and obligations;
- Informal training of all staff on site is also required on an on-going basis through informal discussions, on-site supervision and through facilitation of day to day activities. Such training must be given or otherwise facilitated by the Mine EO; and
- The Contractor's EO must review all safe work procedures/risk assessments/DSTI's (daily safe task instruction) from the safety department and include the relevant environmental risks and appropriate mitigation measures. Since the above procedures are specific to the applicable activity being undertaken, the inclusion of environmental measures aims to ensure each activity is undertaken in an environmentally responsible manner.

31.2 MANNER IN WHICH RISKS WILL BE DEALT WITH TO AVOID POLLUTION OR DEGRADATION

The Pembani Colliery will be required to develop and ESMS which provides a mechanism for ongoing assessment of operational risks and impacts associated with their activities and any new activities that may arise. The impacts and risks identified will be managed through the framework of internal procedures which specify the mechanisms and actions required to effectively manage the risks and impacts on the ground. Where any unexpected events occur that have the potential to result in environmental damage, these shall be manged through the emergency response procedure. The framework for the emergency response procedure is provided below.

31.2.2 EMERGENCY RESPONSE PLAN

The Pembani Colliery must identify potential emergencies and develop procedures for preventing and responding to them. There are several options for dealing with high priority impacts and risks, as the paradigm has two components, probability and consequence. The design of control measures rest on the understanding the cause and effect. Best practise is to intervene with the ultimate factors were feasible, rather than treat the outcomes. Emergency response therefore has the option of reducing probability, or reducing the consequence,

reducing the probability is the preferred option. Below are some common emergency preparedness approaches:

- Threat consequence if and when the risk eventuates, when the risk becomes an issue;
- Combine reducing the probability and treating the consequence;
- Offset environmental losses by investing in other assets;
- Not manage some of the risks because there are too many; and
- Make provision to manage residual impacts or issues that arise because of shortcomings in risk identification and rating, avoidance and mitigation or because a rare event has occurred.

Residual impacts are those impacts that despite reducing the probability and consequence might still occur. In these cases, parties will have to be compensated, pollution cleaned up and damage to the environment remediated.

The Applicant shall be required to develop and implement an Emergency Preparedness and Response Plan prior to commencing work. The Emergency Preparedness and Response Plan should be based on a baseline Hazard and Risk Assessment and should provide for the following as a minimum:

- Risk assessment (identification of areas where accidents and emergency situations may occur, communities and individuals that may be impacted);
- Response procedures;
- Provision of equipment and resources;
- Designation of responsibilities;
- Communication and reporting (including that with potentially Affected Communities);
- Periodic training to ensure effective response; and
- Periodic review and revision, as necessary, to reflect changing conditions.

The Applicant must ensure that the Emergency Preparedness and Response Plan makes provision for environmental emergencies, including, but not limited to;

- Fire Prevention;
- Fire Emergency Response;
- Spill prevention;
- Spill Response;
- Contamination of a water resource;

- Accidents to employees; and
- Use of hazardous substances and materials, etc.

The Applicant and Contractor must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the lifespan of the project.

31.2.2.2 FIRE

Fires represent a significant risk to mining operations, particularly on the Highveld and require special attention in the Emergency Response Plan. Sparks generated during welding, spontaneous combustion, cutting of metal or gas cutting can result in fires. Every possible precaution shall therefore be taken when working with this equipment near potential sources of combustion. The contractor/Applicant must take all reasonable measures to ensure that fires are not started as a result of activities on site. No smoking is allowed near containers with flammable contents or at areas that are highly flammable. Smoking is only permitted at areas designated for smoking. No open fires are permitted on site and no burning of waste is to be allowed on site. The contractor/Applicant shall ensure that there is sufficient fire fighting equipment available on site at all times. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities. The contractor/Applicant is to ensure that he/she has the contact details of the nearest fire station in case of an emergency. Appropriate and correctly serviced equipment must be available for all activities that are likely to generate fire.

It is further anticipated that firebreaks will be required around the site perimeter. It is recommended that such fire prevention measures are implemented in consultation with adjacent landowners and where necessary that the Applicant coordinate fire prevention efforts with local Fire Protection Agency (FPA).

31.2.2.3 HEALTH AND SAFETY

The Applicant and Contractor shall make allowance for the supply, erection, maintenance and removal of the information boards. Information boards shall also provide the name of the process managers, relevant contact person and contact number. This will ensure that the public access to request information and/or to lodge any complaints. The boards will essentially be to advise the public of the construction activities to be undertaken, or being undertaken and to advise of the prohibition of entering demarcated “no-go” areas.

The Applicant and Contractor must ensure that compliance with the Mine Health and Safety Act (Act No. 29 of 1996) and the Occupational Health and Safety Act (Act No. 85 of 1993) is strictly adhered to. All reasonable measures must be taken to ensure the safety of all site staff and the surrounding community is not compromised. No weapons may be brought onto the property by any person. Where fencing is temporarily affected, temporary security must be provided at all times until the fence is reinstated.

The Applicant and Contractor must ensure that all vehicles using public roads are in a roadworthy condition, that drivers adhere to the speed limits and that their loads are secured and that all local, provincial and national regulations are adhered to. The contractor shall make provision for flagmen to regulate traffic and construction vehicles when necessary.

The Applicant and Contractor must ensure that all accidents and incidents are recorded and reported to the ECO. The Applicant/ contractor must have easy access to all relevant emergency numbers for example, spill response teams, fire authorities, fire protection associations, medical emergency, nearest emergency rooms (hospitals) to the site, of both private and public hospitals. The Applicant and Contractor must take all reasonable measures to ensure the health and safety of all employees, visitors and the public.

31.2.2.4 SPILL RESPONSE PROCEDURE

All employees, staff and labourers must be instructed regarding implementation of spill prevention measures and spill response procedures. In the event of a spill, the following general requirements shall apply and the detailed spill procedure must cater for these requirements;

- Immediately reporting of spills by all employees and/or visitors to the relevant supervisor and EO (this requirement must be including in induction training);
- Take immediate action to contain or stop the spill where it is safe to do so;
- Contain the spill and prevent its further spread (e.g. earth berm or oil absorbent materials for spill to land or by deploying booms and/or absorbent material for a spill to water);
- Dispose of any contaminated soil or materials according to appropriate waste disposal procedure (waste from spills of hazardous materials shall be disposed of as hazardous waste at a suitably licensed waste disposal facility);
- The Contractor's EO and Mine EO shall record details of the spill in their respective incident registers; and
- Photographic evidence shall be obtained of the spill cleanup.

In the case of large spills, the services of a specialist spill response agency shall be required, who shall advise on appropriate cleanup procedures and follow-up monitoring (if required).

In the event of any spills which are classified as medium or major incidents, the Mine EO shall immediately inform the ECO. The ECO shall record the incident in the ECO's non-conformance and incident register and advise on the appropriate measures and timeframes for corrective action. Environmental incident reports shall be completed and submitted to the Mine Manger and ECO within 5 working days for all medium and major incidents. If there is a requirement to report the incident to the authorities, this shall be done by the Applicant in consultation with the ECO.

The Applicant must also, (as per Section 30 of the NEMA) notify the Director-General (DWS, DEA and DMR), South African Police Services, MDARDLEA and Local Municipality and any persons whose health may be affected of the nature of an incident including:

- Any risks posed to public health, safety and property,
- Toxicity of the substance or by products released by the incident and
- Any step taken to avoid or minimise the effects of the incident on public health and the environment

The Applicant and Contractor must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the lifespan of the project.

31.2.2.5 MEASURES TO CONTROL OR REMEDY ANY CAUSES OF POLLUTION OR DEGRADATION

The broad measures to control or remedy any causes of pollution or environmental degradation as a result of the proposed activities taking place on the Pembani Colliery are provided below:

- Limit the size of the area to be disturbed as far as is practically possible;
- Design and construct infrastructure such as the PCD and Pit dewatering dams with both decant and drainage systems inclusive of storm water runoff measures;
- Conduct regular dam inspections in line with the regulatory requirements;
- Design and construct waste rock dumps and overburden dumps with adequate storm water runoff measures;
- Establish and maintain dirty and clean water systems in line with the regulatory requirements;
- Treat all contaminated water prior to discharge;
- Contain potential pollutants and contaminants (where possible) at source;
- Handling of potential pollutants and contaminants (where possible) must be conducted in bunded areas and on impermeable substrates;
- Ensure the timeous clean-up of any spills;
- Implement a waste management system for all waste stream present on site;
- Investigate any I&AP claims of pollution or contamination as a result of mining activities;
- Continue with concurrent rehabilitation;
- Operate the mine in line with the proposed closure goals and objectives;

- Rehabilitate the proposed mining site in line with the requirements of the detailed rehabilitation and closure plan; and
- Implement the impact management objectives, outcomes and actions, as described in Section 26 above.

It is of critical importance that the broad measures to control or remedy any causes of pollution or environmental degradation are applied during all phases of the proposed mining operation. This is essential and allows for the operation to be conducted in a manner that will allow for the post mining closure goals and objectives to be met.

32 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

No additional information was requested or is deemed necessary.

33 ENVIRONMENTAL MONITORING

33.1 FUNCTIONAL REQUIREMENTS OF MONITORING PROGRAMMES

The purpose of monitoring is not merely to collect data, but to provide information necessary to make informed decisions on managing and mitigating potential impacts. Monitoring therefore serves the following functions:

- Serve as early warning system to detect any potential negative impacts;
- To provide information to feedback into management controls to avoid, prevent or minimise potential negative impacts;
- Provide quantitative data that can serve as evidence for the presence of negative impacts or the lack thereof;
- Allows for trending, modelling and prediction of future conditions or potential impacts;
- Based on the above, the mine must ensure that monitoring programmes comprise of the following (at a minimum) in order to obtain valuable environmental data;
- Environmental aspect monitoring must be a formalised procedure;
- All equipment used in monitoring must be correctly calibrated and serviced regularly;
- Samples required for analysis will be sent to an independent and accredited laboratory;
- Monitoring data must be stored;
- Data must be checked and interpreted and tending undertaken on a quarterly basis;
- Both the date and reports on environmental monitoring must be kept on record for the life of mine and where relevant provided to I&AP's; and
- The general and site specific parameters to be monitored must be identified by an independent specialist, the authorities and where relevant I&AP's.

33.2 LIST OF ASPECTS THAT REQUIRE MONITORING PLANS

The list of aspects that require on-going environmental monitoring includes the following:

- Air quality;
- Aquatic biomonitoring;
- Blasting and vibration;
- Surface water;
- Groundwater;
- Noise; and
- Rehabilitation.

As mines and the environment are both dynamic it is likely that future scenarios may require the monitoring of additional or unforeseen impacts. As such, the list provided is by no means conclusive and must instead be used as a guideline for the impacts that require monitoring.

33.3 MONITORING PLANS FOR ENVIRONMENTAL ASPECTS

The monitoring of various environmental aspects and the impact on them as a result of the proposed project shall take place by means of both quantitative and qualitative techniques in order to determine whether or not the requirements of the Environmental Management Programme are being complied with. The importance and value of detailed environmental monitoring networks cannot be overstated.

Environmental monitoring serves as a tool to track compliance, assist with potential liability identification, and mitigation throughout the life of the proposed project. This is achieved through the provision of actual evidence based monitoring and reporting thereof. In essence, monitoring is a continuous data-gathering, data interpreting, and control procedure that ranges from visual inspection to in-depth investigative monitoring and reporting. These monitoring plans need to be drawn into standalone plans that can be updated and amended as per authority requirements and additional data requirements identified during the mining activities. These plans need to include the site specific roles and responsibilities for actions.

33.3.2 AIR QUALITY

Air quality monitoring in the form of dust sampling is undertaken at the Pembani Colliery. The dust sampling is undertaken at thirty-seven (37) single buckets, located over nine (9) mining areas on a quarterly basis. The results are compared to the National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) (NEMA: AQA): National Dust Control Regulations 2013 (NDCR, 2013).

Whilst air quality monitoring is currently undertaken a detailed stand-alone procedure which is subject to internal review and update is required to align the mine with current best practice standards. This procedure must incorporate a mechanism for dealing with any exceedances identified.

In terms of air quality, the main pollutant of concern is particulates. As such, the design and implementation of the air quality monitoring programme must incorporate the following considerations:

- Monitoring of select parameters namely dust fallout (TSP), PM_{10} and $PM_{2.5}$ concentrations at both source and receptor indicator sites;
- Use of source and receptor based key performance indicators in monitoring strategies, namely compliance with NAAQS and NDCR;
- Detailed identification and update of all emissions sources;
- Implementation of source based controls;
- Implementation of the technical management options stipulated in the EMPR;
- Internal and external auditing; and
- Review and amendment of the monitoring programme as required.

Based on the above considerations it is recommended that a dust fall network both on and off site be implemented at select locations with the thresholds as stipulated in the NAAQA and NDCR standards utilised as receptor based objectives. In addition, further PM_{10} source sampling is suggested for underground vents to ensure compliance with Health and Safety Regulations, which supersede the standards of the NAAQA and NDCR in this instance. The NAAQQ and NDCR standards are indicated in Table 54 and Table 55 below.

Table 54: NAAQS SO_2, NO_x, PM_{10} and $PM_{2.5}$

Substance	Molecular Formula	Averaging Period	Concentration (µg/m³)	Permitted Frequency of Exceedance	Compliance Date
Sulphur Dioxide	SO_2	10 minutes	500	526	Immediate
		1 hour	350	88	Immediate

		24 hours	125	4	Immediate
		1 year	50	0	Immediate
Nitrogen Dioxide	NO_2	1 hour	200	88	Immediate
		1 year	40	0	Immediate
Particulate Matter	$PM_{2.5}$	24 hours	65	4	Immediate – 31 Dec 2015
		I Year	40	4	1 Jan 2016 – 31 Dec 2029
	PM_{10}	24 hours	25	4	1 Jan 2030
		I Year	25	0	Immediate – 31 Dec 2015

Table 55: NDCR Standards

Restriction Areas	Dustfall Rate (D) (mg/m²/day, 30 days average)(1)	Permitted frequency of exceeding dustfall rate
Residential Area	D < 600	Two within a year, not sequential months
Non-Residential area	600 < D < 1200	Two within a year, not sequential months

Dust fall out monitoring is to be undertaken throughout the life of mine and must be accompanied by quarterly reporting thereof. As a result of the above, a dust monitoring network comprised of (at a minimum) four (4) dust buckets at each potential dust source and one (1) dust bucket at each identified sensitive receptor as well as at least one (1) PM_{10} monitor is recommended.

33.3.3 AQUATIC BIOMONITORING

The purpose of aquatic biomonitoring is aimed at assessing the ecological integrity of wetlands and rivers at the time of sampling in relation to the pre-mining condition.

Aquatic Biomonitoring is currently conducted in accordance with the requirements of the IWUL. Biomonitoring for temporal and spatial comparison is undertaken at eight (8) locations on a bi-annual basis. Three of these (SS0, SS1, SS3) are situated on the Swartspruit, one (BS1) is situated on the Buffelspruit, two sites are situated on tributaries of the Boesmanspruit (TB1 and TB2), and two are situated on tributaries of the Swartspruit (TS1 and TS2). TS2, SS1, and SS3 are situated downstream of the co-disposal and return water dams.

In situ measurements for pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS) and Temperature (Temp) are measured. The results obtained from the assessment of the water quality data were compared to benchmark criteria and Target Water Quality Ranges (TWQRs) for aquatic ecosystems.

The Present Ecological State (PES) of the river ecosystems are assessed and monitored by applying the South African Scoring System 5 (SASS5) with associated IHAS. The results of the SASS5 assessment are provided as Ecological Categories ranging from Natural (Category A) to Critically Modified (Category F) for each site assessed. The ecological state of the wetland systems is ascertained by applying the Diatom Assessment Protocol (DAP) as an indication of water quality as indicated by the biotic response of diatoms to the ambient environment.

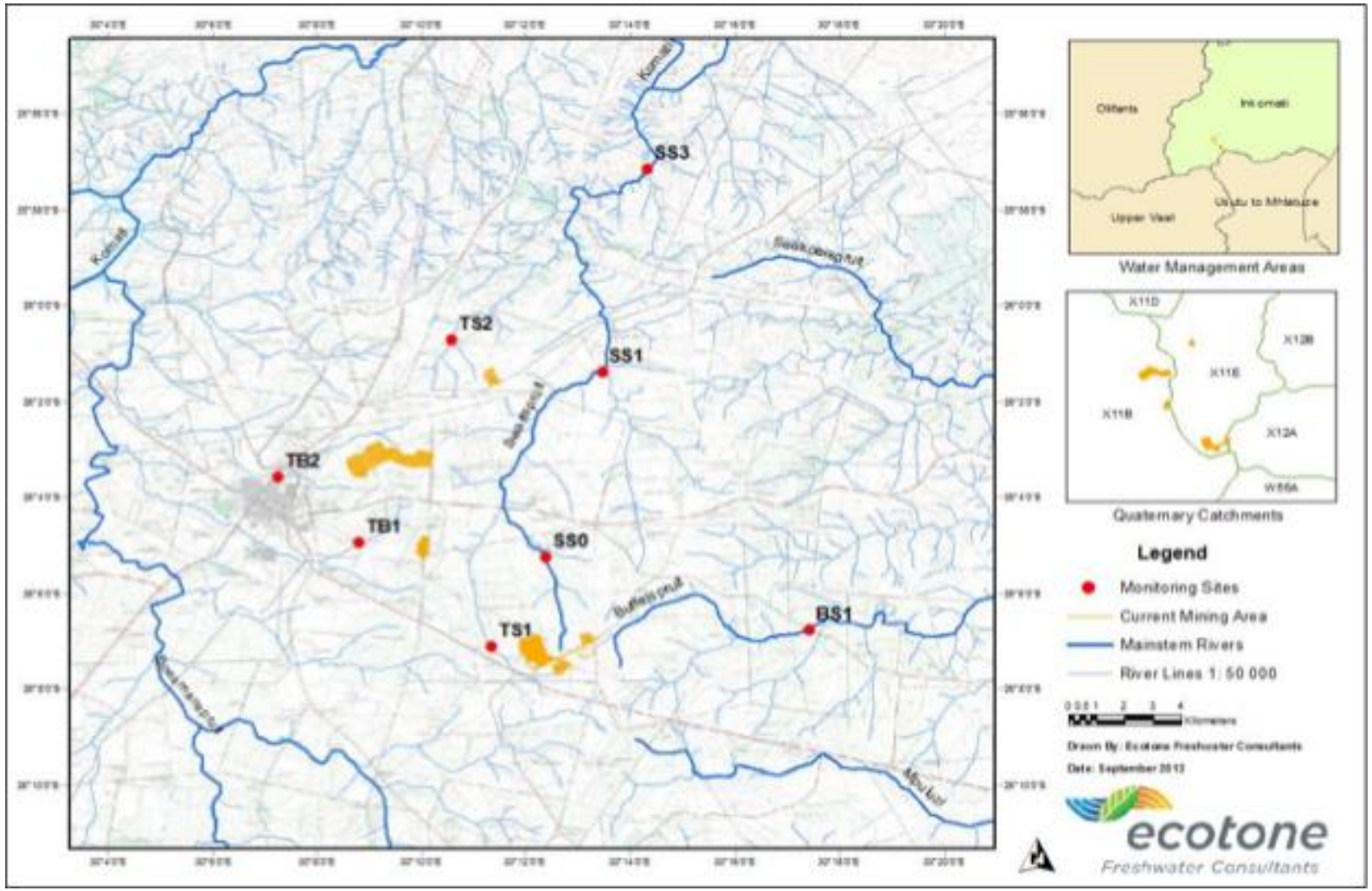


Figure 93: Bio-Monitoring sites

Whilst biomonitoring is currently undertaken a detailed stand-alone procedure which is subject to internal review and update is required to align the mine with current best practice standards.

The purpose of biomonitoring is aimed at assessing the ecological integrity of wetlands and rivers at the time of sampling in relation to the pre-mining condition.

The following biotic components must be assessed on a bi-annual (twice/year) basis by a qualified aquatic ecologist:

- Monitoring and assessing freshwater macro-invertebrate communities, in terms of diversity and abundance. The assessment will be based on the SASS5 index according to the protocol of Dickens & Graham (2001), upstream and downstream of mining activities. The number of taxa with a moderate to high requirement for good water quality should be monitored relative to baseline conditions. The disappearance of one or more sensitive taxon from a site is likely to indicate deteriorating flow, habitat and/or water quality conditions;
- The Present Ecological State, based on SASS5, should be assessed using Dallas (2007) to provide a benchmark against which future changes can be measured. MIRAI (Thirion 2008) should additionally be considered to assess the response of the biota to changes in habitats, flow and water quality;
- Assessing the condition and availability of invertebrate habitats at each site according to the protocol of Kleynhans (1999) (Index of Habitat Integrity) and McMillan (1998) (IHAS). Fixed point photography should be used to facilitate the detection of habitat deterioration (e.g. erosion, sedimentation);
- On site biota-specific water quality parameters, i.e. pH, electrical conductivity, dissolved oxygen and temperature. Laboratory analysis of major anions and cations will provide further value to the biomonitoring programme, in terms of interpreting biotic responses to water quality stressors; and
- An assessment of fish integrity based on and appropriate index (Fish Asemblage Integruty Index (FAII) or Fish Response Assessment Index (FRAI)). The prevalence of *Barbus pallidus* should be carefully monitored. Its disappearance from a site is likely to indicate deteriorating flow and/or water quality conditions

It is additionally recommended that Whole Effluent Toxicity (WET) testing be done on water sampled from pollution control facilities on site, as well as the wetland downstream of the open-cast mine and mine infrastructure. Where high levels of toxicity is detected, definitive testing should be conducted to determine dilution ratios required to render the water safe for aquatic biota. As watercourses are structurally and functionally linked to their adjacent wetland areas, it is further recommended that wetland integrity be monitored. Declining wetland integrity is likely to lead to a decline in the watercourses they drain into. A detailed water quality assessment should be conducted on all surface water and ground water resources, as per the recommendations given by a water quality specialist.

The resource quality objectives of downstream users should be complied with (as advised by DWS). It is also considered essential that flows leaving the Pembani Colliery area be measured (e.g. by means of a v-notch weir) to ensure that flow requirements of downstream ecosystems are met (as advised by the DWS).

After completion of each biomonitoring survey, a biomonitoring report must be drafted and detail the following:

- Results of the survey;
- Spatial comparison between upstream and downstream sites;
- Comparison with historical data and baseline conditions; and
- Recommendations for management interventions.

33.3.4 BLASTING AND VIBRATION MONITORING

Blast monitoring is undertaken at the Pembani Colliery during each blast by a suitably qualified blast manager employed by the contractor. Each blast is monitored and a report compiled by a qualified blasting expert employed by the contractor. No sensitive receptors have been identified and the allowable limits for blasting at these receptors have not been determined. There is no written procedure for identifying exceedances or ensuring that negative impacts on sensitive receptors are avoided. The monitoring results do not include a description of the procedures undertaken.

Whilst blast monitoring is currently undertaken a detailed stand-alone procedure which is subject to internal review and update is required to align the mine with current best practice standards. This procedure must include a list of identified sensitive receptors and allowable limits as well as incorporating a mechanism for identifying and dealing with exceedances incorporate a mechanism for dealing with any exceedances identified.

The design and implementation of a blasting and vibration monitoring programme must incorporate the following considerations:

- The Applicant must undertake a pre-blast baseline survey including photographic inspections of privately owned structures within 1500 m of the mine;
- Monitoring of each individual surface blast must be undertaken and the limits as stipulated by the blasting specialist) adhered to; and
- Further points for off-site vibration and blasting monitoring must also be identified in consultation with surrounding landowners and legal occupiers.

In addition, the following reconditions should be incorporated into the blasting and vibration monitoring programme:

- Blasting should not be undertaken in the early morning when it is still cool and the possibility of inversion is present or too late in the afternoon in winter;
- No blasting must be undertaken in the evenings;

- Refrain from blasting when wind conditions are unfavourable and in the direction of receptors;
- Development of a standard blasting time and placement of blast notices to inform I&AP's of blasting operations;
- Develop a list of all boreholes within the project area including location, conditions, and water levels;
- Maintain ground vibration levels below 50 mm/s;
- Document and audit each operation; and
- Provision of blast data and recordings to I&AP's who request it.

The following ground vibration and air blast levels are recommended for blasting operations in this area. Table 56 below gives limits for ground vibration and air blast.

Table 56: Recommended ground vibration and air blast limits

Structure Description	Ground Vibration Limit (mm/s)	Air Blast Limit (dBL)
National Roads/Tar Roads:	150	N/A
Electrical Lines:	75	N/A
Railway:	150	N/A
Transformers	25	N/A
Water Wells	50	N/A
Telecoms Tower	50	134
General Houses of proper construction	USBM Criteria or 25 mm/s	Shall not exceed 134dB at point of concern but 120 dB preferred
Houses of lesser proper construction	12.5	134
Rural building – Mud houses	6	134

Third party consultation and monitoring should be considered for all ground vibration and air blast monitoring work. Additionally, assistance may be sought when blasting is done close to the highways. This will bring about unbiased evaluation of levels and influence from an independent group. Monitoring could be done using permanent installed stations. Audit

functions may also be conducted to assist the mine in maintaining a high level of performance with regards to blast results and the effects related to blasting operations.

33.3.5 SURFACE WATER MONITORING

Surface and ground water monitoring is currently being undertaken at the Pembani Colliery in accordance with the requirements of the Integrated Water Use Licence (IWUL). The stated objectives of the monitoring programme have been developed in alignment with section 9 of the NWA and are in correlation with the catchment management strategy, are as follows:

- To establish a continuous database specific to the Pembani Colliery;
- Assessing the general temporal condition of water quality of resources in the vicinity likely to be impacted upon by the mine;
- Identifying any potential pollution sources and determining their extent, in order to circumvent relevant legal liabilities potentially resulting from recorded impacts on the receiving aquatic environment;
- Quantifying and assessing any impacts in obstruction of legislative stipulations in order to develop mitigation or remedial plans where necessary; and
- To set out strategies, objectives, plans, guidelines and procedures for protection, use, development, conservation, management and control of water resources within the water management area.
- The monitoring plan must be amended to take in account the new mining areas.

Surface water monitoring occurs at thirty (30) surface water monitoring points on a monthly basis. Surface water quality is assessed against the SANS- 241:2011 Drinking Standards and Background Water Quality Limits. The surface water quality monitoring includes relevant parameters as identified in the IWUL which includes:

- pH;
- Electrical Conductivity (EC);
- Total Dissolved Solids (TDS);
- Chloride (Cl);
- Sulphate (SO_4);
- Calcium (Ca);
- Magnesium (Mg);
- Sodium (Na);
- Iron (Fe); and
- Aluminium (Al).

Water samples are analysed at a South African National Accreditation System (SANAS) Accredited Testing Laboratory (currently Yanka Labs). The quarterly and annual surface water assessments are evaluated by a registered Pri. Sci. Nat. Environmental Scientist. The quarterly reports include basic representation of data, evaluated against appropriate water quality guidelines with related discussions.

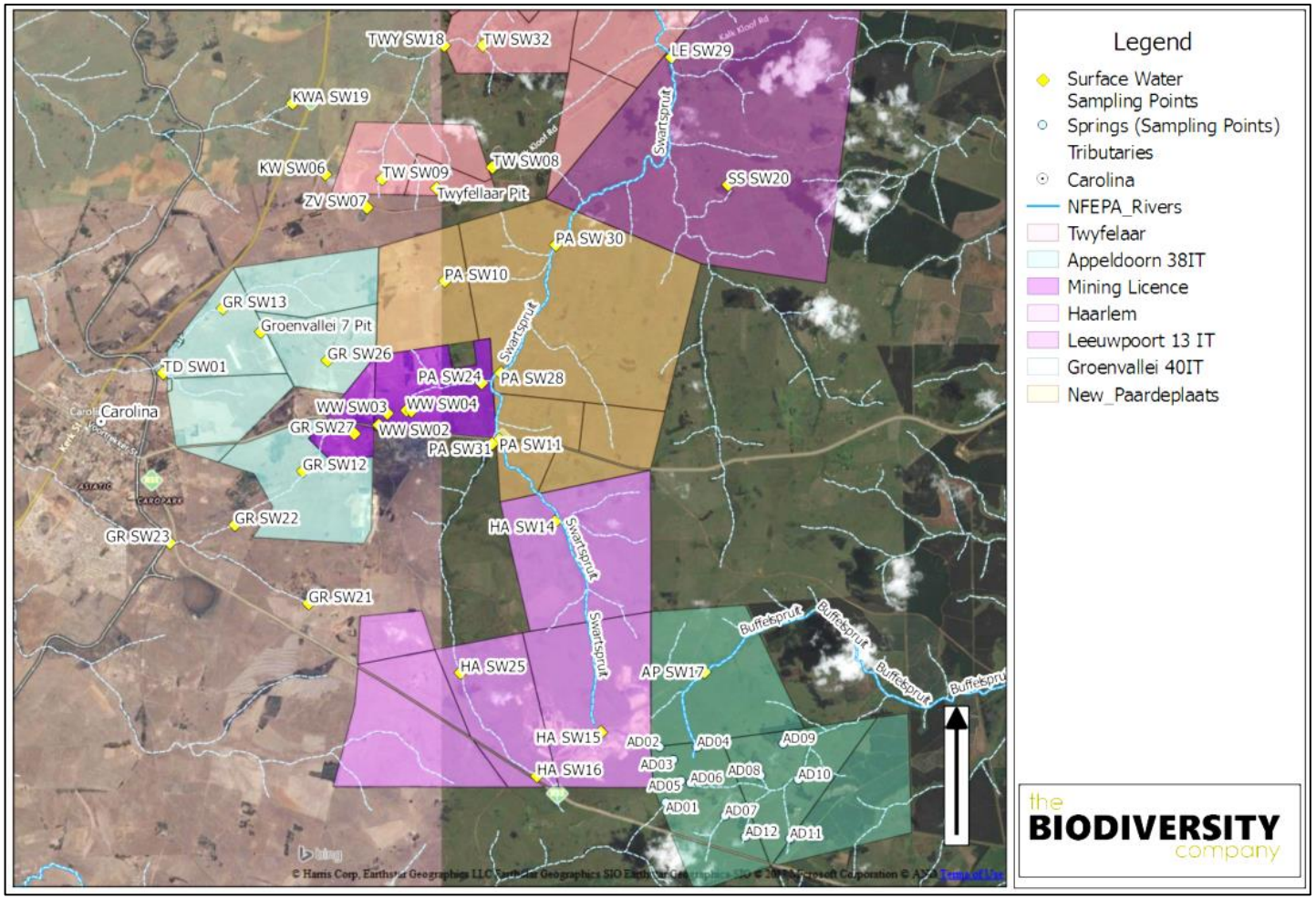


Figure 94: Surface water monitoring points.

Whilst surface water monitoring is currently undertaken, a detailed stand-alone procedure which is subject to internal review and update is required to align the mine with current best practice standards. This procedure must incorporate a mechanism for dealing with any exceedances identified.

The design and implementation of the surface water monitoring programme must be undertaken in accordance with the Best Practice Guidelines G3: Water Monitoring Systems (DWAF, 2006). The aim of the surface water monitoring network is to assist with overall water management including but not limited to the following:

- Pollution prevention;
- Assess the performance of pollution prevention; and
- Develop a more holistic understanding of current, baseline water quality on site and the changes that result from mining activities.

It is strongly recommended that any water containment facility in site be subject to water quality and quantity monitoring and on a monthly basis. Quantity should be monitored to ensure the facilities are of a sufficient size for the water volumes they are expected to contain. The water quality results should meet applicable standards or ensure that water released into the environment, either intentionally or unintentionally, are of appropriate quality. The proposed surface water monitoring programme is described below in Table 57:

Table 57: Surface water monitoring programme outline

Aspect	Details	Monitoring Frequency
Surface Water	Sample point in the wetland upstream and downstream of mining activities	Monthly
	Clean water discharge points (if any)	
Drinking water	Treated or supplied water for domestic purposes	Monthly
Process water	Outlets of oil and grease traps, washbays, storm water containment, pollution control dams and sewage treatment facilities.	Monthly

Surface water samples should be analysed for the parameters listed in Table 58 below on a monthly basis. On a bi-annual basis all samples should additionally be submitted for a full ICP-MS metal scan as described in Table 59, also below. This list of parameters should be amended annually to ensure all priority parameters are analysed monthly and lower-priority parameters are only analysed on a bi-annual basis.

Table 58: Parameters for monthly analyses

List of parameters for monthly analyses	
pH at 22°C	Chloride (Cl)
Conductivity (mS/m)	Sulphate (SO_4)
Total Dissolved Solids (TDS)	Nitrate (NO_3)
Calcium (Ca)	Fluoride (F)
Magnesium (Mg (mg/l))	Aluminium (Al)
Sodium (Na)	Manganese (Mn)
Potassium (K)	Iron (Fe)
Total Alkalinity as $CaCO_3$	Zinc (Zn)
Bicarbonate (HCO_3)	

Table 59: List of parameters for bi-annual analyses

List of parameters for bi-annual analyses	
Antimony (Sb)	Nickel (Ni)
Arsenic (As)	Selenium (Se)
Barium (Ba)	Silicon (Si)
Beryllium (Be)	Silver (Ag)
Bismuth (Bi)	Strontium (Sr)
Cadmium (Cd)	Tin (Sn)
Cobalt (Co)	Titanium (Ti)
Lithium (Li)	Vanadium (V)
Mercury (Hg)	Zirconium (Zr)
Molybdenum (Mo)	

The water quality results should be compared to the limits specified in the Water Use Licence (WUL). If limits for some parameters are not specified in the WUL, the Department of Water Affairs' (DWA) South African Water Quality Guidelines (SAWQG) Target Range, Volume 1, Domestic Use (1996) and the South African National Standards for Drinking Water (SANS 241:2011) should be utlised.

33.3.6 GROUND WATER MONITORING

Groundwater quality should be assessed against the SANS- 241:2011 Drinking Standards and Background Water Quality Limits.

The groundwater-monitoring network must be designed to comply with the risk based source-pathway-receptor principle. The groundwater-monitoring network will be utilised to monitor the impact on water quality and quantity.

Ground water monitoring is undertaken at the Pembani Colliery in accordance with the requirements of the WUL. Groundwater monitoring occurs at forty- four (44) groundwater monitoring points on a quarterly basis. Several monitoring points in addition to those required by the WUL have been added to the monitoring programme. Quarterly groundwater samples are analysed as per the IWUL for:

- pH;
- Electrical Conductivity (EC);
- Chloride (Cl);
- Sulphate (SO_4);
- Nitrate (NO_3);
- Calcium (Ca);
- Magnesium (Mg);
- Sodium (Na); and
- Dissolved Oxygen.

Ground water samples are analysed at a SANAS Accredited Testing Laboratory (currently Yanka Labs). The quarterly and annual groundwater assessments are evaluated by a registered Pri. Sci. Nat. Environmental Scientist and annual groundwater assessments are evaluated by a registered Pri. Sci. Nat. Geohydrologist.

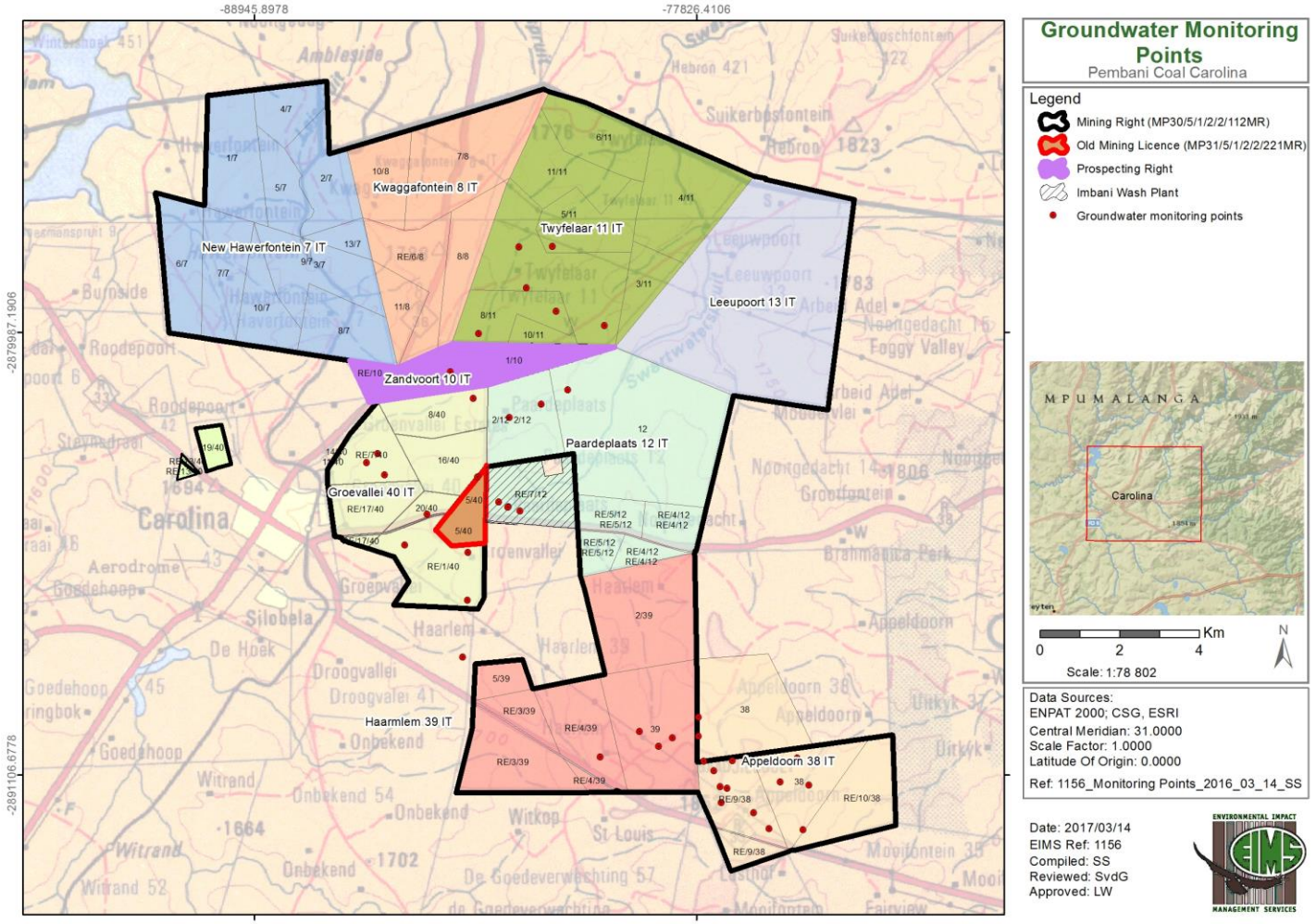


Figure 95: Ground water monitoring points.

Whilst ground water monitoring is currently undertaken, a detailed stand-alone procedure which is subject to internal review and update is required to align the mine with current best practice standards. This procedure must incorporate a mechanism for dealing with any exceedances identified.

The groundwater monitoring network must be designed to comply with the risk based source-pathway-receptor principle. The groundwater monitoring network will be utilised to monitor the impact on water quality and quantity. The proposed monitoring boreholes associated with the groundwater monitoring network will be located so as to consider contaminant sources, receptors, potential contaminant plumes as well as background quality and quantities. As a result, the groundwater monitoring network will be designed to assess the following:

- Dewatering of the surrounding aquifers through the monitoring of groundwater levels in monitoring boreholes. This will include any other borehole identified within the modelled cone of depression;
- Groundwater inflow (ingress) into the mine workings through the monitoring of groundwater levels in monitoring boreholes including water volumes pumped from the mining work areas;
- Groundwater quality through the sampling of boreholes at the prescribed frequency as well as trending of groundwater quality results; and
- Groundwater recovery rates and potential for decant after physical mining operations cease through the drilling of additional monitoring boreholes into the underground workings which are to be drilled in the deepest sections of the mine. Stage curves will be drafted to further assess inflow into the defunct workings.

Groundwater monitoring must be undertaken in accordance with the SANS and DWS standards and according to the schedule as described in Table 60 below:

Table 60: Groundwater monitoring schedule

Monitoring Aspect	Sampling Interval	Analysis	Water Quality Standards
Construction, Operation, Decommissioning and Rehabilitation Phases			
All monitoring boreholes	Quarterly measurements of groundwater levels	N/A	N/A
All monitoring boreholes	Quarterly sampling for water quality analysis	Full analysis in April and October	South African Water Quality Guidelines: Domestic Use and Aquatic Ecosystem/WUL standards
Rainfall	Daily	N/A	N/A

The parameters to be monitored and assessed are provided below and laboratory analysis must comply with SABS standards. Revision of the sampling parameters is required and additional metals must be added to the analyses should pH decrease during the operational phase.

- Full Analysis:
  - Physical parameters;
  - Groundwater levels; and
  - Chemical parameters inclusive of the following:
    - Field measurements: pH and EC;
    - Laboratory analyses: Anions and cations (Ca, Mg, Na, NO_3, Cl, SO_4, F, Fe, Mn, Al, & Alkalinity, pH, EC and TDS);
  - Petroleum hydrocarbons contaminants where applicable such as near workshops of petroleum handling facilities; and
  - Sewage related contaminants namely *E.Coli* faecal coliforms in boreholes in proximity to septic tanks or sewage plants.

The groundwater monitoring database must be updated on a monthly basis as information becomes available. The database should be used to analyse the information and evaluate trends noted. An annual compliance report should be compiled and submitted to the authorities for evaluation and comment. This report should be submitted annually for the life of mine as well as for two years after mining ceases. The mine must develop a monitoring response protocol. This protocol will describe procedures in the event that groundwater monitoring information indicates that action is required.

33.3.7 NOISE MONITORING

Environmental noise is divided into two distinct categories namely passive monitoring and active monitoring. Due to the low significance of a potential noise impact to develop, no active noise monitoring is recommended. However, should a complaint be registered the mine must investigate the complaint and consider the following during the monitoring and follow up investigation:

- Noise measurement must be taken at the location of the person that registered the complaint. The measurement location must consider the direct surrounding to ensure that other sound sources cannot influence noise readings. A second measurement instrument must also be deployed simultaneously at the mine during the potential noise complaint measurement;
- Ambient sound measurements must be collected as defined in the SANS 10103:2008 standards. Due to variability that naturally occurs in sounds levels it is recommended that a semi-continuous measurement over a period of 16 hours which covers the full night time period of 22:00 – 06:00 be conducted;
- Measurements must be collected in 10 minute bins defining the 10 minute descriptors such as $L_{Aeq,I}$ (National Noise Control Regulation requirement), $L_{A90,f}$ (background noise level as used internationally) and $L_{Aeq,f}$ (Noise level used to compare with IFC noise limit). Spectral frequencies should also be utilised to define the potential origin of the noise;
- Measurements must be conducted during a period or in conditions similar to then the receptors experienced the noise event responsible for the complaint; and

- Noise measurements must also be conducted in accordance with the National Noise Control Regulations ((GN R154 of 1992) and SANS 10103:2008 standards.
- The noise monitoring plan must be extended to take into account the new mining areas.

On completion of the noise monitoring and investigation, a monitoring report must be drafted. The report must be provided to the complainant or noise sensitive receptor. Included in the report must be additional mitigation measures to be employed (if required) and indicate dates for further follow ups to ensure that noise complaint is adequately addressed.

33.3.8 REHABILITATION MONITORING

Once the final landform design has been established and stabilized (with re-vegetation or otherwise) the mine will provide for a period of monitoring to verify the success or otherwise of the rehabilitation program. The length of the monitoring period will be determined in consultation with the appropriate regulators and would take the form of periodic inspections by contracted specialists, but is generally assumed to last for at least 3 years for issues other than ground water and possibly more than a decade for ground water. This applies even to the areas directly returned to forestry.

The parameters that may be monitored after rehabilitation should subject to agreement with the regulator, include the following:

- The continued safety of the site;
- Alignment of actual final topography to agreed planned landform;
- Depth of topsoil stripped and replaced;
- The establishment and growth of plants including the return of species not planted as part of re-vegetation, on the areas not returned to forestry;
- The percentage of ground cover and species composition;
- The return of native fauna (where eco-system restoration is intended);
- Soil fertility, ph and salinity;
- Evidence of land erosion or land degradation;
- The presence of vertebrate and invertebrate aquatic species identified in the eia/emp as indicator species;
- Surface water drainage systems and surface water quality;
- Groundwater quality at agreed locations (including downstream); and
- Condition of downstream ecosystems.

34 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&AP's;
(c) The inclusion of inputs and recommendations from the specialist reports where relevant; and
(d) That the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein.

35 TECHNICAL SUPPORTING INFORMATION

The following specialist reports have been included as Appendices to this report:

Appendix S: Details of the EAP

Appendix T: Interested and Affected Parties Database

Appendix U: Proof of Notification

Appendix C1: Registered Letters, Faxes and Emails

Appendix C2: Site Notices and Posters

Appendix C3: Background Information Document

Appendix C4: Newspaper Advertisement

Appendix V: Issues and Response Report

Appendix W: Impact Assessment

Appendix X: Final Site Map

Appendix Y: Master Plan Map

Appendix Z: Social Study Report (2005)

Appendix AA: Heritage and Cultural Resources

Appendix I1: Heritage study (2004)

Appendix I2: Heritage study (2013)

Appendix I3: Heritage Study for proposed underground mining on Zandvoort 10 IT (2015)

Appendix I4: Heritage Study for mining on Kwaggafontein 8IT (2017)

Appendix I5: Palaeontological Studies for Zandvoort 10IT and Kwaggafontein 8IT (2017)

Appendix BB: Ecology

Appendix J1: Fauna and Flora Report (2004)

Appendix J2: Ecology (Flora & Fauna) study for Zandvoort underground mining expansion (2015)

Appendix J3: Biodiversity Study for Kwaggafontein (2017)

Appendix CC: Geohydrology

Appendix K1: Groundwater study (2012)

Appendix K2: Groundwater study (2015)

Appendix DD: Surface Water Study Report (2005)

Appendix EE: Wetland Biodiversity Assessment (2011)

Appendix FF: Soils

Appendix N1: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 1 and 4 of the Farm Haarlem 39 IT (2004)

Appendix N2: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 5 of the Farm Haarlem 39 IT (2004)

Appendix N3: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 4 and R/E of the Farm Haarlem 39 IT and Portion 3 and 9 of The Farm Appeldoorn 38 IT (2004)

Appendix N4: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 2 and RE of the Farm Paardeplaats 12 IT (2004)

Appendix N5: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 8 of the Farm Twyfelaar 11 IT (2004)

Appendix N6: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 9 and 10 of the Farm Twyfelaar 11 IT (2004)

Appendix N7: Pre-mining Soil Assessment of the Proposed Opencast Area on Portions 6, 7, 8 and 17 of the Farm Groenvallei 40 IT (2004)

Appendix N8: Pre-mining Soil Assessment of the Proposed Opencast Area on Portion LG of the Farm Groenvallei 40 IT (2004)

Appendix N9: Zandvoort Soil Assessment (2015)

Appendix GG: EAP's Motivation

Appendix HH: Closure Cost Report (2016)

Appendix II: Composite Map

Appendix JJ: Full Resolution Maps

Appendix S: Financial Provisioning Report (2016)

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