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 WASTE 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).

NAME OF APPLICANT Evander Gold Mines Pty Ltd

TEL NO: + 27 17 620 1602

FAX NO: + 27 17 632 4046

POSTAL ADDRESS: Private Bag X1012, Evander, 2280

PHYSICAL ADDRESS: Off Rotterdam Road, Adjacent to the R546 road, Evander, Mpumalanga

FILE REFERENCE NUMBER SAMRAD: MP30/5/1/2/3/2/1/(126)EM

Record No.: MP-00041-MR/102

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 or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications 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 required 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 the 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.

Objectives of the Environmental Impact Assessment Process

The objective of the environmental impact assessment process is, through a consultative process, to —

a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
d) determine the—
    - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - degree to which these impacts—
        - can be reversed;
        - may cause irreplaceable loss of resources, and
        - can be avoided, managed or mitigated;
e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
g) identify suitable measures to manage, avoid or mitigate identified impacts; and
h) identify residual risks that need to be managed and monitored.

LIST OF ACRONYMS

ACRONYM:	DESCRIPTION:
AEL	Atmospheric Emissions License in terms of NEM:AQA
AMD	Acid Mine Drainage
ASTM	American Standard for Testing and Materials (followed by protocol number)
BA	Basic Assessment (process or report)
BID	Background Information Documents
BOCA	Burnt Out Coal Areas
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983) as amended
CBD	Central Business District (specifically LLM)
COP	Codes of Practice
C-Plan	Conservation Plan (specifically Mpumalanga Conservation Plan)
DMR	Department of Mineral Resources
DO	Dissolved Oxygen
DWS	Department of Water Affairs and Sanitation
EA	Environmental Authorisation in terms of NEMA
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act (Act 73 of 1989) as amended
EGM	Evander Gold Mines (Pty) Ltd
EIA	Environmental Impact Assessment (process or report)
EIA Regulation	Environmental Impact Assessment Regulation published under NEMA
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme Report
GDP	Gross Domestic Product

ACRONYM:	DESCRIPTION:
GIS	Geographical Information Systems
GN	General Notice (issued under an Act, providing notice or information)
GNR	General Notice Regulation (issued under an Act, providing instruction)
HSTP	Human Settlement Plan
I&AP	Interested and Affected Parties
IAIA SA	International Association of Impact Assessment South Africa
IDP	Integrated Development Plan
IWUL	Integrated Water Use Licence
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
LED	Local Economic Development
LoM	Life of Mine
MHSA	Mine Health and Safety Act (Act 29 of 1996) as amended
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002) as amended
MR	Mining Right in terms of the MPRDA
MRA	Mining Right Application in terms of the MPRDA
NAEIS	National Atmospheric Emissions Inventory System
NEA	National Energy Act, Act 34 of 2008
NEM:AQA	National Environmental Management: Air Quality Act (act 59 of 2008) as amended
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004) as amended
NEM:PAA	National Environmental Management: Protected Areas Act (Act 57 of 2003) as amended
NEM:WA	National Environmental Management: Waste Act (Act 39 of 2004) as

ACRONYM:	DESCRIPTION:
	amended
NEMA	National Environmental Management Act (Act 107 of 1998) as amended
NFEPA	National Freshwater Ecology Priority Areas
NHRA	National Heritage Resources Act (Act No. 25 of 1999) as amended
NPAES	National Protected Area Expansion Strategy
NWA	National Water Act (Act 35 of 1998) as amended
PCD	Pollution Control Dam
PDA	Potential Development Area (in terms of the SDF)
PES	Present Ecological State (usually followed by category A-F)
PM10/5/2.5	Particulate Matter up to 10/5/2.5 micrometres
POI	Points of Interest
PPP	Public Participation Process
RoD	Record of Decision (for specific application)
RWD	Return Water Dam
RWQO	Resource Water Quality Objectives
SCC	Species of Conservation Concern
S&EIR	Scoping and Environmental Impact Reporting process
S&LP	Social and Labour Plan
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resource Agency
SAMRAD	South African Mineral Resources Administration System
SANBI	South African National Biodiversity Institute
SANS	South African National Standard (followed by standard number)
SASS5	South African Scoring System version 5 (in terms of aquatic invertebrate assessments)

ACRONYM:	DESCRIPTION:
SAWIS	South African Waste Information System
SDF	Spatial Development Framework (specifically LLM)
SEMA	Specific Environmental Management Acts
SMME	Small and Medium and Micro Enterprise
SOP	Standard Operating Procedure
SPLUMA	Spatial Planning and Land Use Management Act (Act No.16 of 2013)
Stats SA	Statistics South Africa
TSF	Tailings Storage Facility
WMA	Water Management Area
WML	Waste Management Licence in terms of NEM:WA

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PART A: SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 INTRODUCTION

Evander Gold Mines has been operational since 1958, and has an approved mining right and Environmental Management Programme report ("EMPr") in terms of the Minerals and Petroleum Resources Development Act, Act 28 of 2002 ("MPRDA"). The approved EMPr currently authorises the mining and processing of gold and associated activities at the mine's three (3) operational shaft complexes (Kinross, Winkelhaak and Leslie/Bracken). In addition, the approved EMPr covers the re-processing of the Kinross Tailings Storage Facility ("TSF") as part of the Evander Tailings Recycling Project.

EGM intends to extend this Evander Tailings Recycling Project to include the re-processing of the Winkelhaak and Leslie/Bracken TSFs, ultimately consolidating them into one large TSF at the end of life of mine. In addition, a dedicated extraction and smelting plant will be established within the Kinross shaft complex to handle additional tailings loads. These operational changes will require authorisation in terms of the various environmental legislation and as such an application for Environmental Authorisation ("EA") was submitted as per the requirements of the National Environmental Management Act, Act No. 107 of 1998 ("NEMA") and the NEM: Waste Act, Act No. 59 of 2008 ("NEM:WA"); read together with the MPRDA.

South African Law requires that the environmental and social impacts associated with a proposed development be assessed to identify any potential negative and / or positive consequences as result thereof. Following which, measures must be proposed to avoid or minimise these impacts. As the application relates to listed activities published in terms of GNR 983, 984, 985 and 921 a full Scoping and Environmental Impact Report ("S&EIR") is required as well as an Environmental Management Plan report ("EMPr"). The scoping phase has been completed and this report constitutes the Environmental Impact Report ("EIR") and the EMPr. The mine will continue to operate in terms of its existing EMPr and only the additional activities requiring authorisation are detailed within this Report.

No changes are proposed to the underground mine areas or access points.

2 CONTACT DETAILS

Evander Gold Mines (Pty) Ltd (EGM) holds an approved Mining Right for the Evander operations (MP30/5/1/2/2/126MR) totalling an extent of 31,783.0738 Ha. EGM has applied for environmental authorisation for activities associated with the re-processing of tailings, and the associated expansion of the Kinross Tailings Storage Facility (TSF). The particulars of the applicant are detailed below.

2.1 APPLICANT

Applicant Name:	Evander Gold Mines (Pty) Ltd *(formerly known as Evander Gold Mines Ltd)*
Registration No.:	1963/006226/07
Contact Person:	P.A. Tendaupenyu General Manager
Telephone:	+ 27 17 620 1602
Fax:	+ 27 17 632 4046
E-mail:	tenda.tendaupenyu@emines.co.za
Postal Address:	Private Bag X1012, Evander, 2280
Physical Address:	Off Rotterdam Road, Adjacent to the R546 road, Evander, Mpumalanga

2.2 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Cabanga Environmental has been appointed by EGM as the independent Environmental Assessment Practitioners (EAP), responsible for the completing the S&EIR for the proposed project. The contact particulars of the EAP are indicated below.

EAP:	Cabanga Environmental (*t/a Cabanga Concepts cc*)
Contact Person:	Jane Kennard
Telephone:	+ 27 11 794 7534
Fax:	+ 27 11 794 6946
E-mail:	jane@cabangaenvironmental.co.za
Postal Address:	Postnet Suite 470, Private Bag x3, Northriding, 2162
Physical Address:	Units 5 & 6 Beyers Office Park, Bosbok Road, Randpark Ridge

2.3 EXPERTISE OF THE EAP

2.3.1 The Qualifications of the EAP

Caroline Wallington: BSc. (Hons) in Botany and Environmental & Geographical Sciences

Jane Kennard: B.Sc. in Environmental Management & Botany, Certificates in Project Management and Carbon Footprint Analysis.

Barbara Kasl: PhD in Animal, Plant and Environmental Sciences.

CVs and Proof of qualifications are attached as Appendix 1

2.3.2 Summary of the EAP's Past Experience

Caroline Wallington: has been an environmental consultant for four years with specific expertise in wetland ecology, terrestrial botany and land rehabilitation; and is on the council of the Land Rehabilitation Society for Southern Africa (LARSSA)

Jane Kennard: has been involved in environmental management for approximately 10 years and is a member of IAIA SA, the International Association for Public Participation and the Environmental Law Society of South Africa.

Barbara Kasl has been an environmental practitioner for over 10 years and is a registered professional with SACNASP as an ecologist and environmental scientist, is a certified EAP and a member of the South African Entomological Society.

All of the above have worked on mineral and environmental applications under the MPRDA and ECA and have been involved with various NEMA, NEM:WA and NEM:AQA applications since the inception of these Acts for various mines and industries.

3 DESCRIPTION OF THE PROPERTY

The approved mining right spans over numerous properties within the Govan Mbeki Local Municipality (MP307), of the Gert Sibande District Municipality (DC30), Mpumalanga. The mining right area totals an extent of 31,783.07 Ha. The regional setting and extent of the mining right area is indicated in Plan 1.

The mine's three shaft complexes, namely Kinross; Winkelhaak and Leslie/Bracken are situated south of the N17 near the town of Evander. The area is largely characterised by mining, industry, and residential use with some scattered agricultural use (grazing). Please refer to Plan 2 for the local setting:

- The Kinross complex is located immediately west of the town of Evander, separated by the R546. A small industrial area is located south of the existing Kinross TSF, and just east of the proposed "new" TSF.
- The Leslie complex is situated approximately 5 kilometres south-west of the Kinross complex, and 1.4km north-east of eMbalenhle.
- The Winkelhaak complex is situated approximately 4 kilometres south-east of the Kinross complex, and 600m north-east of eMbalenhle.
- The mine's evaporation dam, the Leeuwpan Dam, is located approximately 12 kilometres south-west of the Kinross complex and 6 kilometres west of eMbalenhle.

The proposed project entails the construction of facilities and infrastructure at EGM to re-process gold tailings, the three existing TSFs will be mined in the following sequence:

- Kinross TSF
- Leslie TSF
- Winkelhaak TSF

Additional facilities and infrastructure required for the project include (Please refer to Plan 3 for an overview of the proposed layout):

- Hydraulic mine infrastructure (incl. pump stations) to be constructed at each of the TSFs
- Water and slurry reticulation pipelines, to be constructed within existing servitudes registered in favour of EGM
- New plant ("the Elikhulu Plant") and associated infrastructure
    - The new plant will be constructed adjacent to the existing metallurgical plant, located at the Kinross complex
- "New" TSF and associated water management facilities (including the refurbishment of the existing Kinross Kariba RWD)
    - The new TSF will be designed as an extension to the existing Kinross TSF.

Once the existing Kinross TSF material is recovered; the footprint that becomes available will be re-utilised and a new large TSF will be established at Kinross.

- Water supply
    - Water will be sourced from the mine's existing evaporation dam, the Leeuwpan Dam.
- Power supply
    - Power will be supplied by existing Eskom infrastructure; thus no new Eskom infrastructure is required.

The directly affected properties are summarised in Table 1 below. Table 2 further details the surface right holder.

Table 1: Property details

Directly Affected Farms:	Winkelhaak 135 IS Leeuwspruit 134 IS Witkleifontein 131 IS Zandfontein 130 IS Grootspruit 279 IS Langverwacht 282 IS Leeuwpan 532 IR Rietkuil 531 IR Springbokdraai 277 IS
Application area (Ha) :	5,288.75 Ha
Magisterial district:	Govan Mbeki Local (Gert Sibande District)
Distance and direction from nearest town :	Situated within the town of Evander, Mpumalanga.
21 digit Surveyor General Code for each farm portion :	T0IS00000000013500003 T0IS00000000013500003 T0IS00000000013500056 T0IS00000000013500084 T0IS00000000013500086 T0IS00000000013400000 T0IS00000000013100000 T0IS00000000013100001

	T0IS00000000013100002 T0IS00000000013100003 T0IS00000000013100004 T0IS00000000013000002 T0IS00000000013000003 T0IS00000000013000005 T0IS00000000013000008 T0IS00000000013000009 T0IS00000000027900000 T0IS00000000028200002 T0IR00000000053200012 T0IR00000000053200013 T0IR00000000053100000 T0IS00000000027700001

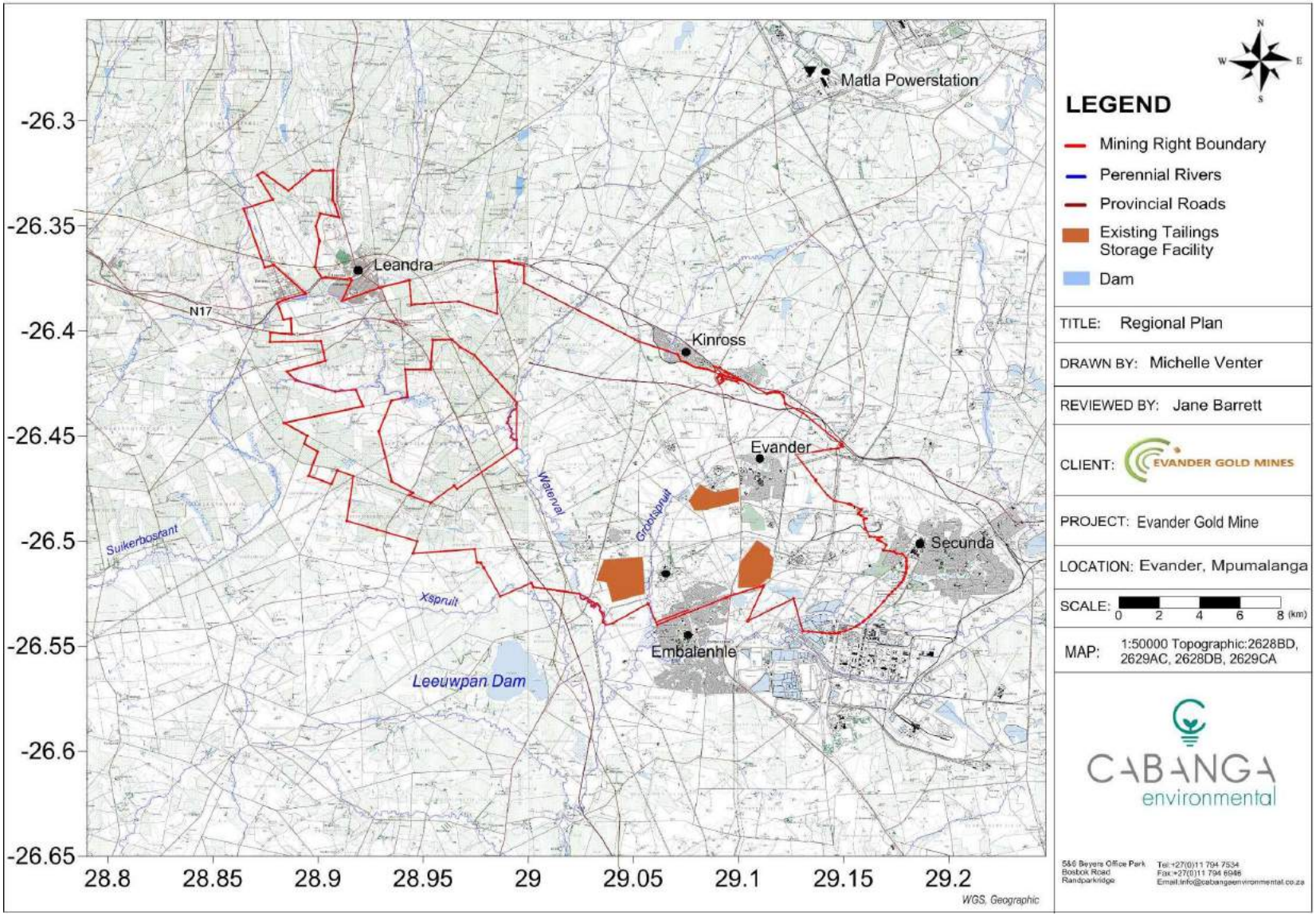
Table 2: Surface right holders

Property	Portion	Extent	Registered Owner(s)	Activity / infrastructure proposed
Winkelhaak 135 IS	RE3	452.3688 Ha	M.Wienand, Els and Roets Note: EGM is in the process of negotiating the purchase of this property.	• A portion of the New TSF • Water and slimes reticulation pipelines • Clean water diversion • Winkelhaak pump station and holding dam • Existing footprint of Winkelhaak TSF (to be reprocessed and rehabilitated) • Pipeline crossing
Winkelhaak 135 IS	13	303.0025 Ha	Evander Gold Mining (Pty) Ltd	• Water and/or slimes reticulation pipelines • Existing footprint of Winkelhaak TSF (to be reprocessed and rehabilitated)
Winkelhaak 135 IS	56	98.6219 Ha	Evander Township Ltd (a subsidiary of Evander Gold)	• A portion of the New TSF • Soil stockpiles • Water and slimes reticulation pipelines • Clean water diversion
Winkelhaak 135 IS	84	22.2698 Ha	Evander Gold Mining (Pty) Ltd	• Existing Kinross TSF • Elikhulu Plant • Kinross pump station • Water and/or slimes reticulation pipelines.

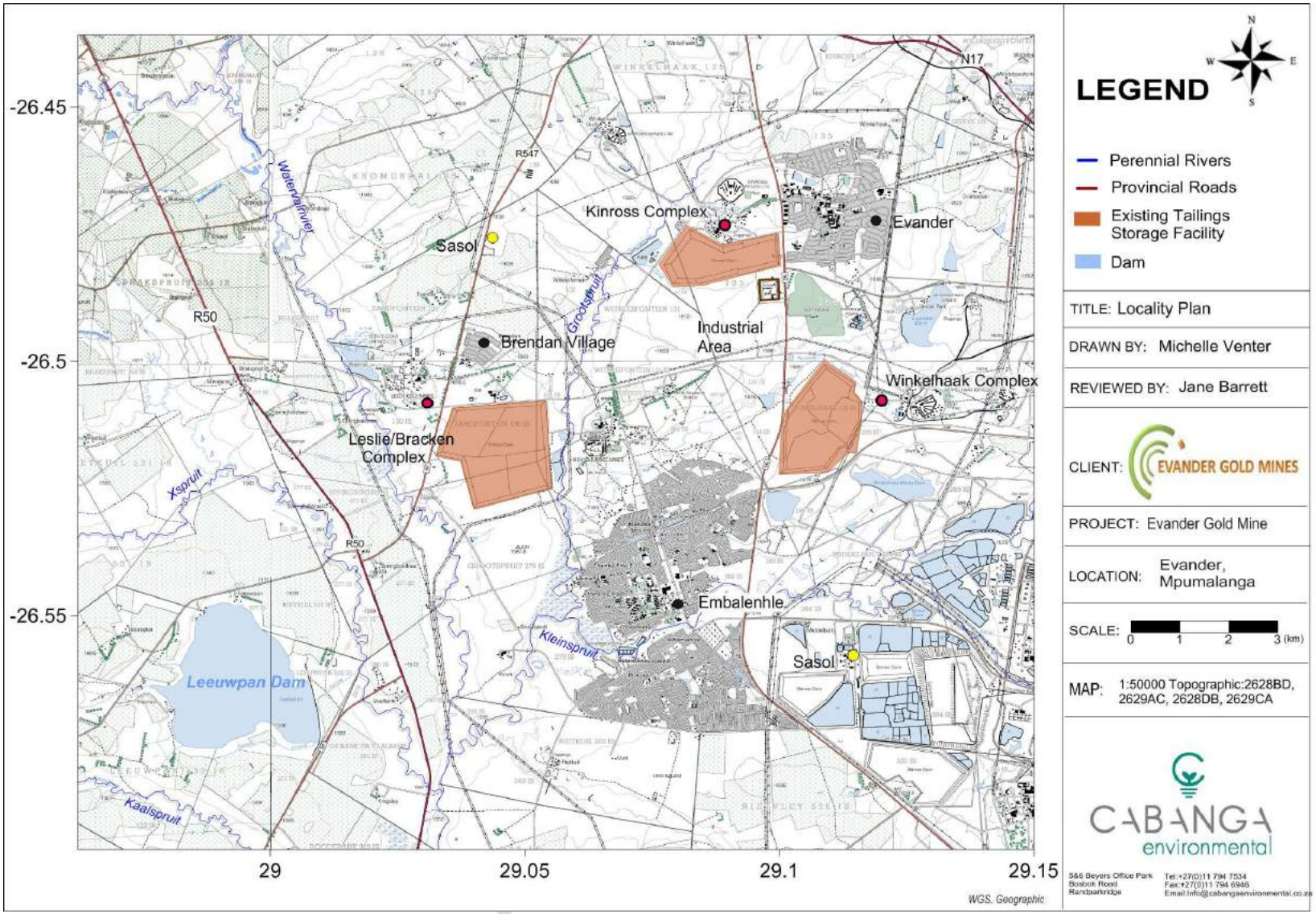
Property	Portion	Extent	Registered Owner(s)	Activity / infrastructure proposed
Winkelhaak 135 IS	86	213.2237 Ha	Evander Gold Mining (Pty) Ltd	• Existing Kinross TSF • A portion of the New TSF • Water and slimes reticulation pipelines • Clean water diversion
Leeuwspruit 134 IS	RE0	530.9998 Ha	Evander Gold Mining (Pty) Ltd	• Existing Kinross TSF • A portion of the New TSF • Water and slimes reticulation pipelines • Clean water diversion • Soil stockpiles • Kinross Kariba RWD (to be refurbished)
Witkleifontein 131 IS	RE0	241.2936Ha	Evander Gold Mining (Pty) Ltd	• A portion of the New TSF • New RWD(s) • Water and/or slimes reticulation pipelines • Soil stockpiles
Witkleifontein 131 IS	1	342.6128 Ha	Sakhisizwe Communal Property Association	• Water and/or slimes reticulation pipelines.
Witkleifontein 131 IS	2	40.8132 Ha	Evander Gold Mining (Pty) Ltd	• Water and/or slimes reticulation pipelines. • Leslie Pump Station • Existing footprint of Leslie/Bracken TSF (to be

Property	Portion	Extent	Registered Owner(s)	Activity / infrastructure proposed
				reprocessed and rehabilitated)
Witkleifontein 131 IS	RE 3	234.6356 Ha	Evander Gold Mining (Pty) Ltd	• Water and/or slimes reticulation pipelines. • Leslie Pump Station • Existing footprint of Leslie/Bracken TSF (to be reprocessed and rehabilitated)
Witkleifontein 131 IS	RE 4	224.8468 Ha	Evander Gold Mining (Pty) Ltd	• Water and/or slimes reticulation pipelines. • A portion of the New TSF • New RWD(s) • Soil stockpiles
Zandfontein 130 IS	2	182.9964 Ha	Brendan Village cc	• Water and/or slimes reticulation pipelines • Existing Leslie Holding Dam • Existing footprint of Leslie/Bracken TSF (to be reprocessed and rehabilitated)
Zandfontein 130 IS	3	151.1718 Ha	Evander Gold Mining (Pty) Ltd	• Existing underground water reticulation pipelines will be utilised
Zandfontein 130 IS	5	271.6105 Ha	Brendan Village cc	• Existing Leslie Holding Dam • Water reticulation pipelines
Zandfontein 130 IS	8	186.7673Ha	Evander Gold Mining (Pty) Ltd	• Existing footprint of Leslie/Bracken TSF (to be reprocessed and rehabilitated)

Property	Portion	Extent	Registered Owner(s)	Activity / infrastructure proposed
Zandfontein 130 IS	9	186.7673 Ha	Evander Gold Mining (Pty) Ltd	• Existing footprint of Leslie/Bracken TSF (to be reprocessed and rehabilitated)
Grootspruit 279 IS	RE0	184.2244Ha	Evander Gold Mining (Pty) Ltd	• Existing footprint of Leslie/Bracken TSF(to be reprocessed and rehabilitated)
Langverwacht 282 IS	2	71.6538 Ha	Evander Gold Mining (Pty) Ltd	• Existing footprint of Leslie/Bracken TSF (to be reprocessed and rehabilitated)
Leeuwpan 532 IR	12	96.7497 Ha	HB Louwrens Trust	• Existing underground water reticulation pipelines will be utilised • Floating pump/barge will be utilised at the Leeuwpan Dam
Leeuwpan 532 IR	13	182.4008 Ha	HB Louwrens Trust	• Existing underground water reticulation pipelines will be utilised • Floating pump/barge will be utilised at the Leeuwpan Dam
Rietkuil 531 IR	RE0	1017.3430 Ha	PF Louwrens Trust	• Existing underground water reticulation pipelines will be utilised
Springbokdraai 277 IS	1	285.2682 Ha	R.T. du Preez	• Existing underground water reticulation pipelines will be utilised
5 334.874 Ha				



Plan 1: Regional plan indicating extent of the approved Mineral Right



Plan 2: Locality plan

4 DESCRIPTION OF THE OVERALL ACTIVITY

The mine will continue to operate in terms of its existing EMPr and only the additional activities triggered by this application for environmental authorisation (EA) are detailed within this Report. Note: No changes are proposed to the underground mine areas or access points. Underground mining will continue at Shafts 7 and 8 as per the approved EMPr.

This section outlines the relevant listed activities applicable to the project (Section 4.1), project background (Section 4.2) and gives a detailed project description (Section 4.4).

4.1 LISTED ACTIVITIES TO BE UNDERTAKEN

On 4 December 2014, the Department of Environmental Affairs published three notices which list activities for which environmental authorisations is required in terms of section 24(2) and 24D of NEMA, these include:

- Regulation GN R.983: Listing Notice 1;
- Regulation GN R.984: Listing Notice 2; and
- Regulation GN R.985: Listing Notice 3.

Furthermore, a list of waste management activities that have, or are likely to have, a detrimental effect on the environment were published in terms of section 19(2) of the NEM:WA (GN 921 of 29 November 2013). No person may commence, undertake or conduct a listed waste management activity unless a waste management license (WML) is issued in respect of that activity.

The Department of Mineral Resources (DMR) is the Competent Authority for mining related activities in terms of both NEMA and NEM:WA. As such an integrated application has been submitted as per the One Environmental System.

Figure 1 outlines the main project activities, whilst Table 3 details the ancillary activities associated with the proposed project, and identifies the applicable listed activities in terms of NEMA and NEM:WA.

Figure 1: The four main groups of the project activities

Table 3: Summarised listed activities and relevant legislation

Name of activity	Approximate extent of the activity	Listed Activity		Applicable listing notice	Waste management authorisation
Reprocessing of Winkelhaak and Leslie/Bracken TSFs & new pump station at Kinross TSF					
Construction and operation of pump houses at each of the TSFs	Kinross – 970m^2 Winkelhaak – 1,260m^2 Leslie – 1,260m^2				
Installation and use of container offices and portable toilets at each of the TSFs	80m^2				
Construction and utilisation of slurry pipelines from pump houses to Elikhulu Plant	±12.8kms	Yes	Activity 10	GNR 983	
Hydraulic mining –incl. slurry generation, handling and pumping	Kinross – 187 Ha Winkelhaak – 260 Ha Leslie – 295 Ha	Yes	Activity 10	GNR 983	Category A, Activity 13 Category B, Activity 3 Category B, Activity 11
Pipeline crossing (x1)	12 m^2	Yes	Activity 14	GNR 985	
Rehabilitation of Winkelhaak and Leslie/Bracken TSF footprints	Winkelhaak – 350 Ha Leslie – 433 Ha	Yes			Category A, Activity 14

New TSF (Expansion of Kinross TSF)					
Base preparation of new/expanded TSF footprint – incl. vegetation clearance and topsoil stripping	230 Ha	Yes	Activity 12 Activity 19 Activity 30 Activity 15	GNR 983 GNR 983 GNR 983 GNR 984	Category A, Activity 13
Topsoil stockpiles	28 Ha				
Subsoil stockpiles	66 Ha				
Access control and fencing	10,000m				
Tailings disposal	230 Ha	Yes	Activity 12 Activity 19 Activity 34	GNR 983 GNR 983 GNR 983	Category A, Activity 13 Category B, Activity 7 Category B, Activity 11
Refurbishment of existing Kinross Kariba RWD	Total area 12.38Ha Capacity = 225,000m^3				
New RWDs and collection trenches	Total area 30 Ha Capacity = 273,000m^3 and	Yes	Activity 12 Activity 13 Activity 19	GNR 983 GNR 983 GNR 983	

	178,000m^3		Activity 30 Activity 34 Activity 16	GNR 983 GNR 983 GNR 984	
Diversions	1,300m	Yes	Activity 12 Activity 19	GNR 983 GNR 983	
Elikhulu Plant and associated infrastructure					
Construction and Operation of Plant (CIL plant with dedicated smelt house)	10 Ha	Yes	Activity 34	GNR 983	Category B, Activity 3 Category B, Activity 10
Chemical / Reagent Storage	±905m^3	Yes	Activity 4	GNR 984	
Ablutions and change house with sewage treatment plant	Change house – 112m^2 Sewage treatment plant – 10m^2				
Process water dam pumps the material back to the CIL tanks	Total Area 7056 m^2 Capacity15,000m^3	Yes	Activity 2	GNR 985	
Dirty water containment (PCD and Event Pond)	Total Area 2,300m^2 Capacity 1,500m^3 and 3,600m^3	Yes	Activity 13 Activity 34	GNR 983 GNR 983	

Process water supply and reticulation					
Installation and operation of floating pump (barge) at Leeuwpan Dam	n/a - Floating pump	Yes	Activity 12	GNR 983	
Abstraction from Leeuwpan Dam	8.55 ML/day				
Construction and operation of water reticulation pipelines	±16.6kms	Yes	Activity 9	GNR 983	
Overall development and associated activities on site					
Access to site	n/a - existing roads will be utilised				
Waste Generation					
Employment opportunities	Construction – 700 jobs Operations – 250 jobs				
Procurement opportunities – local/regional businesses	n/a				

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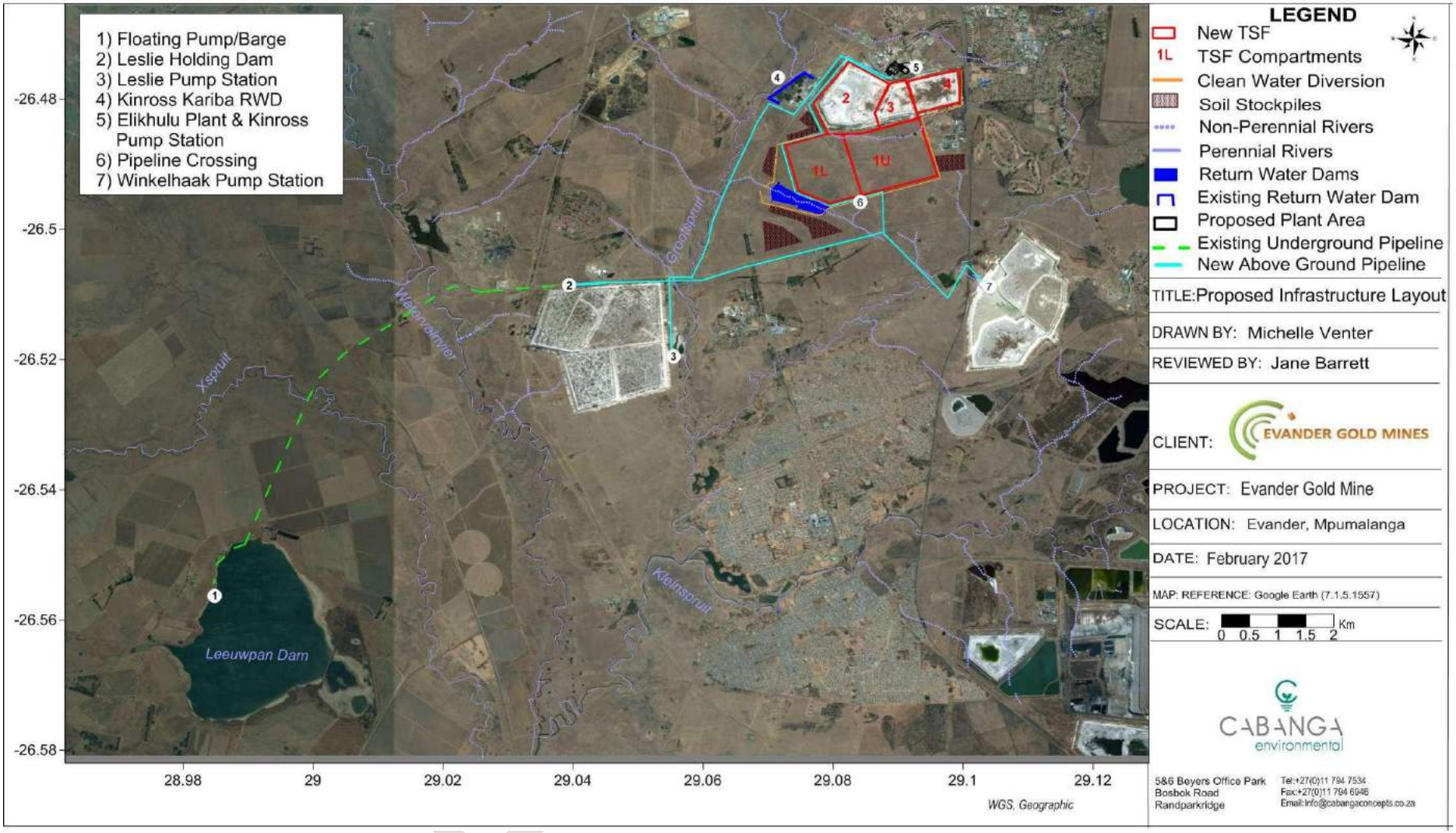


Plan 3: Overview of proposed infrastructure layout

4.2 BACKGROUND

EGM is an operational gold mine consisting of three shaft complexes namely: Kinross; Winkelhaak and Leslie/Bracken. Mining first commenced at the Winkelhaak section in 1958, expanding to Leslie/Bracken and Kinross; consolidating to form EGM in 1998.

During the following years unused land, owned by EGM, within the mining right area was sold off to private entities. This included: portions of old Leslie/Bracken Mine including the Leslie sewage treatment works, the old Winkelhaak offices, portions of Evander Township, Brendan Village, .and properties in the area of the Leeuwpan Dam.

Pan African Resources PLC acquired EGM, from Harmony Gold, in February 2013. EGM was converted from a public company (Evander Gold Mines Limited) to a private company (Evander Gold Mines (Pty) Ltd) in January 2017 (refer to Appendix 3 for the name change certificate).

4.3 CURRENT STATUS OF OPERATIONS

Sasol Coal Mining Secunda (Pty) Ltd (Sasol) acquired the coal reserves over a portion of the Mining Right Area in 2003. Thus, the Mining Right Area is in parts undermined by Sasol Coal (for coal) and EGM (for gold). The depth of coal mining varies but is generally in excess of 120 metres below ground level (mbgl). The gold mine workings are at a much greater depth (between 229 – 2,500 mbgl).

Underground mining of the Kimberley Reef is undertaken by means of conventional scraper mining, whilst, stooping is being undertaken using a conventional mechanized face and strike gully method. The total underground resource represents 32.5Moz (147Mt @ 6.88g/t) and a reserve of 7.6Moz (29.5Mt @ 8.02g/t). The expected life of mine is 14 years.

Access to the underground is by means of vertical shafts. Currently only the No. 7 and 8 shafts are active. The ore is received from the No.7 shaft bins and fed onto a conveyor which delivers it to silos at the plant area. From the silos the ore is fed to the plant for milling and processing.

In addition to the above, the plant receives a second stream for processing, that being the slurry tailings from the Kinross TSF (Evander Tailings Recycling Project). Currently the Kinross TSF is being reclaimed and processed at a rate of 200,000 t/m. The tailings residue from this process is deposited onto the Winkelhaak TSF (referred to as the Mini Libra Project in the authorised EMP, 2013).

Table 4 below summarises the various shaft complex areas, and the current status thereof.

Table 4: Summary of Shaft Complex Areas

Complex	**Winkelhaak**
Shaft #	1, 2, 3, 4, and 5 – all shafts are dormant. The production of gold from these shafts has ceased.
Plant Status	Plant demolished.
TSF Status	Receives waste tailings from the Kinross Metallurgical Plant.
Water Management Facilities:	• Winkelhaak Emergency Dam - RWD at Winkelhaak TSF.
Complex	**Kinross**
Shaft #	#7 – active. Production has temporarily ceased, the shaft is currently used for hoisting ore and pumping fissure water. #8 – active.
Plant Status	Operational, located adjacent to the Kinross TSF at Shaft #7. Receives ore from the underground, as well as tailings from the Kinross TSF for re-processing as part of the Evander Tailings Recycling Project.
TSF Status	No deposition is currently taking place. However, may receive waste tailings from the Kinross plant.
Water Management Facilities:	• Kinross Kariba Dam – RWD at Kinross TSF, also receives excess water from the Kinross RWD Dam and the Million gallon dams. • Toe Dam – receives storm water run-off from No. 7 shaft and Metallurgical Plant area. • 2x Million Gallon Dams - receive water from No. 7 shaft and the Fridge Plant. Water from the Million Gallon Dams is used at the Kinross Metallurgical Plant. • Kinross RWD Dam - Receive mine affected water from the Kinross TSF, the Toe Dam and the 2 x Million Gallon Dams. Water from the Kinross RWD Dam is recycled back to the t Kinross Metallurgical Plant and excess water flows to the Kinross Kariba Dam. • Header Dam – receives mine water from Kinross Kariba Dam, Bracken Kariba North Dam and the Winkelhaak Emergency Dam. Water from the Header Dam is gravity fed to Leeuwpan Dam for disposal by evaporation. • Evander Dam – collects clean storm water runoff. • Shaft 8 Plaasdam – collects clean storm water runoff.
Complex	**Leslie**
Shaft #	#9 – on care and maintenance. #10 – decommissioned and sealed.
Plant Status	Plant demolished.
TSF Status	Dormant.
Water Management	• Leslie Emergency Dam – receives storm water run-off from

Facilities:	No. 9 shaft area and surrounds. • Leslie Holding Dam – reservoir used for storing mine water. • Bracken Kariba North Dam – RWD at Leslie / Bracken TSF. • Leeuwpan Evaporation Dam - Receives mine water from the various dams and underground workings for evaporation.

4.4 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

4.4.1 MINERAL RESERVE

The proposed project comprises of the re-processing of the Kinross, Leslie and Winkelhaak TSFs to extract the residual gold (Au). Cumulatively these TSFs total 187 Million tonnes (Mt). SRK Consulting (South Africa) (Pty) Ltd (SRK) produced a Mineral Resource Estimate in December, 2015. Using the grade cut-off calculated therein for the project (equalling 0.174g/t) the Mineral Reserve was estimated, by DRA Projects (Pty) Ltd, to be approximately 1.7 Million ounces of gold (Moz) (Table 5; DRA, 2016).

Table 5: Mineral Reserve Estimate (DRA, 2016)

Tailings facility	Probable Reserve tonnes (M)	Probable Reserve Grade (g/t)	Probable Au Content (Moz)
Kinross	47.0	0.31	0.47
Leslie	70.1	0.32	0.71
Winkelhaak	70.0	0.24	0.55
Total	187.1	0.29	1.73

4.4.2 ESTIMATED LIFE OF PROJECT

The project life is estimated at 14 years, with 1 year estimated for construction and 3 years for decommissioning and closure. Thus the EA is being sought for a period of 18 years.

4.4.3 MINING METHOD – HYDRAULIC MINING

The TSFs will be reclaimed using the hydraulic bench mining method. Hydraulic mining is carried out by effectively "washing" the tailings into suspension by means of high pressure water monitor guns. The liberated material from the TSF will be collected in a satellite pumping station, and pumped over a trash screen before being pumped to the plant by means of a running/ standby pumping configuration. Each pump will have a dedicated gland service water pump with a common standby unit.

Generally the targeted TSF will be divided into a number of compartments, which are classified by means of areas with similar top elevation. The tailings contained within the compartment at a specific elevation were generally deposited during the same period of time. The compartments are subdivided into mining blocks which are separated by trenches (referred to as gullies). The purpose of the gullies is to serve as channels in which the waterlogged tailings will gravitate towards a penstock from where it is pumped to the processing facility (Figure 2). To ensure that the tailings gravitates along the gully and the retreating mining bench floor, a slope of 1:150 towards the penstock will be maintained.

Once the TSFs are mined to completion, the footprint will be rehabilitated and remediated. This will however not be the case for the Kinross TSF as this footprint area will be incorporated into the "new" consolidated TSF.

Figure 2: Typical gully being excavated via hydraulic mining methods (DRA, 2016)

The TSFs will be re-processed in the following sequential order:

- Kinross
- Leslie/Bracken
- Winkelhaak

The proposed expansion to the recycling project will result in the mining and processing of approximately 1 Mt/m, thus totaling 1.2 Mt/m. The current Kinross plant is at capacity and thus a new dedicated plant (the Elikhulu Plant) will be established within the existing Kinross shaft complex to handle the additional tailings loads.

4.4.3.1 SLURRY RETICULATION PIPELINES AND PUMP STATIONS

A high pressure water pumping system will be used to supply water to the monitor guns used for the re-mining purposes. A spillage pump installed in the slurry receiving sump will be installed, to pump spillage back to the screen.

Pump and piping systems will be constructed to transfer slurry to the Elikhulu plant (at a rate of ±595 litres/second). This will include the construction of a new pump station at each of the existing TSFs, as well as the installation of new pipelines. The pipelines will be constructed above ground within earth paddocks. Table 6 below lists the coordinates of the proposed slurry pipelines; these will follow existing servitudes registered in favour of EGM. Refer to Plan 5 for the detailed layout of the proposed pipelines and pump stations.

Table 6: Coordinates of proposed slurry pipelines

Set Out Point	in Degrees, Minutes and Seconds								
	°	'	"		°	'	"		
SOP3	26	30	26.41	S	29	3	15.02	E	
SOP4	26	30	50.74	S	29	3	16.87	E	
SOP5	26	30	52.72	S	29	3	19.23	E	
SOP6	26	30	25.96	S	29	3	31.04	E	
SOP7	26	30	12.06	S	29	3	39.61	E	
SOP8	26	29	54.31	S	29	3	42.87	E	
SOP9	26	28	55.73	S	29	4	9.76	E	
SOP10	26	28	48.80	S	29	4	15.37	E	
SOP11	26	28	50.89	S	29	4	17.93	E	
SOP12	26	28	52.66	S	29	4	30.66	E	
SOP13	26	28	38.11	S	29	4	41.56	E	
SOP14	26	28	39.18	S	29	4	43.35	E	
SOP15	26	28	23.97	S	29	4	54.69	E	
SOP16	26	28	37.47	S	29	5	19.93	E	
SOP17	26	28	51.35	S	29	4	34.51	E	
SOP18	26	29	5.69	S	29	4	41.37	E	
SOP19	26	29	12.49	S	29	4	19.69	E	

Set Out Point	in Degrees, Minutes and Seconds							
	°	'	"		°	'	"	
SOP20	26	29	37.41	S	29	4	12.79	E
SOP21	26	29	39.21	S	29	4	27.94	E
SOP22	26	29	46.37	S	29	4	45.41	E
SOP23	26	29	38.95	S	29	5	14.50	E
SOP24	26	30	1.15	S	29	5	14.52	E
SOP25	26	30	4.16	S	29	5	16.11	E
SOP26	26	30	25.00	S	29	5	42.28	E
SOP27	26	30	35.05	S	29	5	49.46	E
SOP28	26	30	33.47	S	29	5	52.65	E
SOP29	26	30	27.13	S	29	5	58.14	E
SOP30	26	30	22.90	S	29	5	59.95	E
SOP31	26	30	20.83	S	29	6	1.96	E
SOP32	26	30	20.83	S	29	6	3.58	E
SOP33	26	30	21.46	S	29	6	4.51	E
SOP34	26	30	22.96	S	29	6	5.36	E
SOP35	26	30	23.29	S	29	6	6.73	E
SOP36	26	30	25.80	S	29	6	6.92	E
SOP37	26	30	27.09	S	29	6	8.18	E
SOP38	26	30	26.23	S	29	6	11.23	E

4.4.4 ELIKHULU PLANT

The Elikhulu Plant will be constructed adjacent to the existing metallurgical plant within the Kinross shaft complex. This area is disturbed and was previously used to crush and screen waste rock. The following supporting infrastructure will be associated with the Elikhulu Plant (refer to Plan 6 for the detailed layout of the proposed plant):

- Security access and control
- Parking
- Administration building and offices
- Change house and ablution facilities
- Workshop and stores
- Reagent storage
- Helipad

The Elikhulu plant will include a Carbon in Leach (CIL) circuit as well as dedicated smelt house. Technical information pertaining to this process is summarised in the below sub-headings.

4.4.4.1 SLURRY RECEIVING & TRASH SCREENING (KZADBP000125-PFD-0200)

Slurred material pumped from the hydraulically mined pump station is screened on two vibrating screens in parallel. The screen oversize collects in a trash basket for manual removal, whilst the screen U/F collects in a 380m^3 agitated surge tank. The pH is adjusted by adding lime to the tank.

Two duty pumps transfer the material to the pre conditioning tank, after being sampled by a two in one vezin sampler station. Further pH corrections can be made in this tank. Oxygen is also added to this tank ensuring that the DO levels are >6ppm before cyanide addition and high shear applications.

Material from the pre conditioning tank is then transferred to the first of seven CIL tank by means of four running pumps, with each train consisting of two pumps in series. An online cyanide analyser is used to control the cyanide addition before passing eight high shear reactors in parallel, contacted with oxygen under high pressure – high shear conditions, which in turns increases the leach kinetics.

A safety shower and HCN, NH_3 gas detection will be installed, together with cyanide and pH control equipment. Two spillage pumps pumping the spillage back to the feed tank is provided.

4.4.4.2 CARBON IN LEACH CIRCUIT (KZADBP000125-PFD-0300)

The material pumped from the pre conditioning tank collects in the first of seven 3250m^3 CIL tanks. Each tank is fitted with an agitator and 3 oxygen spargers, allowing oxygen, consumed in the leach reaction, to enter the tank at high pressures, enhancing the leach kinetics. Flexibility to add cyanide to the first and second CIL tank has been allowed for. Lime addition to tank 1, 2 and 3 has also been made and can be used for pH corrections if necessary.

Each tank is fitted with two interstage screens, retaining the carbon during slurry transferral, whilst a single carbon transfer pump installed on each tank will ensure that the carbon is transferred up-stream during the carbon transfer periods. Harvesting of carbon can be done via tank one and two (if tank one is offline during maintenance periods) by pumping the tank contents over the carbon harvesting screen. The screen O/S (carbon) collects in the acid wash column, whilst the screen U/S is gravity fed back to the CIL circuit. A carbon concentration of 10g/L is maintained in each tank, allowing for 24 tons of carbon to be harvested per day.

Safety showers and HCN, NH_3 gas detection will be installed, together with pH control equipment. Three spillage pumps will be installed in the CIL bund, with a fourth installed in the washing bay.

Provision for a windsock installed on the CIL tanks, as well as a spare interstage screen has been made.

A tower crane provided for interstage screen and various other equipment maintenance and cleaning operations will be installed.

4.4.4.3 ACID WASH, ELUTION AND CARBON REGENERATION (KZADBP000125-PFD-0710/ 720)

Loaded carbon transferred from the carbon harvesting screen is collected in a single 15t Acid Column. Concentrated HCl solution drawn from the concentrated HCl tank is mixed with water in the acid wash water tank yielding a 3% HCL solution. This solution is circulated through to the acid column, at a flow rate of 2 bed volumes per hour (BV/hr), aiming to remove chemically bounded impurities. Upon completion of the acid wash cycle, the solution is gravity fed to a neutralization tank, where lime is added before being transferred to the tailings tank and pumped to the tailings storage facility. Neutralization of the carbon is then done by pumping water through the acid wash column, aiming to wash off all residual HCl before the elution cycle. Provision to add caustic to the rinse solution has been made, aiming to shorten the neutralization step.

Acid washed carbon is then educted into two 12t columns. 1 bed volume (BV) of elution solution containing 3% NaOH is pumped from the strip solution make-up tank into the column. This solution is pre-heated to 125°C by recirculating the solution through the elution column primary- and secondary heat exchangers, heated by an electric heater. After the set temperature and pressure is achieved, the solution is transferred to the CIL pregnant solution tank and an additional 5 BVs drawn from the intermediate tank is passed through the elution column. Also this solution is pumped to the CIL pregnant solution tank.

On completion of the elution cycle, the carbon is rinsed by pumping fresh water through the column and stored in the intermediate tank to be used in the next elution cycle. The carbon is cooled by pumping water through the column and discharging the water to the CIL circuit.

Eluted carbon is educted from the column and reports to the carbon regeneration kiln via a sieve bend using pressurised water flow. Drained carbon is then fed to the kiln by means of a screw feeder at a rate of 1250kg/h dry solids and treated at a temperature of 700-800°C. The regenerated carbon is then transferred to the regenerated carbon screen feed box, where the carbon is quenched, and fed to a

vibrating screen. The screen U/F collects in the fines carbon tank before being pumped to the fines carbon treatment area, whilst the screen O/F collects in the carbon transfer tank before being transferred back to the CIL circuit. Fresh carbon is also added via the quench tank and screen with an electric hoist provided.

A system consisting of a tank and circulation pump is provided for descaling the heating equipment. Sulphamic acid would be pumped into the tank by means of an air pump after which the cleaning process can start.

Safety showers, HCN, NH3 gas detection and a two spillage pumps will be installed.

4.4.4.4 ELECROWINNING AND SMELTING (KZADBP000125-PFD-0760)

Because two elution cycles per day will be required, dedicated pregnant solution tanks and electrowinning cells has been allowed, ensuring that flexibility and metal accounting is achieved.

The pregnant solution tank receives pregnant solution from the elution circuit. A running/ standby pumping configuration is used to circulate the solution through the electrowinning circuit consisting of two cells in parallel (per circuit). The electrowinning circulation continues for 18 hours, or until gold in solution value drops below a preset value measured by manual sampling, after which time the liquid is deemed barren and pumped to barren solution tank.

Caustic solution is dosed into the pregnant solution tank aimed at creating elevated conductivity levels necessary for electrowinning and to protect the anodes against corrosion. Manual conductivity analysis will dictate the addition of caustic.

Cathodes removed from the electrowinning cell is transferred to the calcining ovens, whilst the sludge reports to the sludge settling tank. The sludge settling tank overflow is pumped to the CIL circuit.

Sludge from the sludge settling tank is transferred to the calcining oven after decanting the water. Product from the calcining oven is moved by hand to a smelting furnace. Borax, Silica, Potassium Nitrate and Sodium Carbonate is added to the furnace as flux chemicals to collect impurities in the melt and form a slag that will float on top of the molten gold. An extraction fan is installed to extract furnace off-gas, as well as a dust extraction system.

Gold and slag from the furnace is decanted into the mold trolley where ore gold is recovered as the final product. The final product is kept in the safe with combination lock and key.

The slag is crushed and pulverized before being introduced to the CIL circuit aiming to leach any gold encapsulated in the slag during the gold smelting process.

HCN & NH3, gas detection will be installed, together with various extraction systems, safes, scales and various security systems. Spillage pumps in the tank farm as well as in the gold room will be used to pump the spillage to various destinations.

4.4.5 DISPOSAL OF TAILINGS ONTO NEW TSF

The "new" TSF has been designed as an expansion to the existing Kinross TSF, with a storage capacity of 204 Mt. Sufficient to store all tailings generated during the re-mining and reprocessing of the existing Kinross, Leslie/Bracken and Winkelhaak TSFs.

The new TSF will consist of a lined initial phase (Compartments 1 upper and 1 lower), located to the south of the existing Kinross TSF, expanding in future to encompass the existing Kinross TSF footprint as this area becomes available (Compartments 3-4). The TSF design assumes that the outer walls of the existing Kinross TSF will be left in place to reduce the starter wall volumes and costs. In addition to this it is assumed that deposition onto the Winkelhaak TSF will continue for as long as possible, thereby reducing the rate of the deposition onto the new TSF.

Cyclone deposition will be undertaken as it allows for TSF development at high rates of rise (4.5m/year). A brief technical summary of the tailings disposal process is as follows:

- The CIL tails is fed to two carbon recovery vibrating screens. The screen O/S is collected in a basket ensuring that any carbon passing through the CIL circuit is recovered. The screen U/S is collected in the final tailings tank before being pumped to the TSF by means of two running pump trains, each consisting of 3 pumps in series.
- HP GSW will be drawn from a dedicated HP GSW tank, and fed to each pump via a dedicated HP GSW supply pump, with a common standby. The first pump in each train will be fed from the LP GSW header.
- A single spillage pump installed in the tailings bund, pumps the spillage to the final tailings tank. Provision for HCN, NH3, a WAD cyanide monitoring system, as well as a safety shower has been made.
- A penstock pipeline will run underneath the TSF to drain water into a return water dam (RWD).

A waste classification study was completed for the project by Future Flow in November, 2016 (Appendix 5), with reference to R.634, R.635 and R.636 of NEM:WA. The results of which conclude that the mine residue can be classed as Type 3 waste and therefore requires disposal to a facility with a Class C liner. As such the design, compiled by SLR Consulting, assumes that a barrier of equivalent performance to a Class C barrier over the expansion footprint. Please refer to Appendix 6 for the detailed design report.

4.4.6 WATER SUPPLY, MANAGEMENT AND RETICULATION

4.4.6.1 PROCESS WATER

The project will require on average 39,339.73m^3 of process water / day the majority of which will be re-circulated; the required make-up water per day is 8 551.4 m^3/day. Water for the project will be sourced from the mine's evaporation dam, known as the Leeuwpan Dam, as well as from the mine's underground workings and water recycled from the RWDs.

No pump station will be constructed at the Leeuwpan Dam, but rather a floating pump (barge) will be installed. This water will be pumped (at a rate 165 litres/second) using the existing underground pipeline to the Leslie holding dam. Additional pipelines will be required from the Leslie holding dam to the Elikhulu plant as well as the Winkelhaak holding dam. In addition to the above, a15,000m^3 process water dam will constructed at the Elikhulu plant area to facilitate plant water feed.

These pipelines will be constructed above ground within earth paddocks. Table 7 below lists the coordinates of the proposed water reticulation pipelines, these will follow existing servitudes registered in favour of EGM. Refer to Plan 5 for the detailed layout of the proposed pipelines.

Table 7: Coordinates of proposed water reticulation pipelines

Set Out Point	in Degrees, Minutes and Seconds							
	°	'	"		°	'	"	
SOP1	26	30	27.60	S	29	2	23.19	E
SOP2	26	30	30.03	S	29	2	23.55	E
SOP3	26	30	26.41	S	29	3	15.02	E
SOP4	26	30	50.74	S	29	3	16.87	E
SOP5	26	30	52.72	S	29	3	19.23	E
SOP6	26	30	25.96	S	29	3	31.04	E
SOP7	26	30	12.06	S	29	3	39.61	E
SOP8	26	29	54.31	S	29	3	42.87	E
SOP9	26	28	55.73	S	29	4	9.76	E
SOP10	26	28	48.80	S	29	4	15.37	E
SOP11	26	28	50.89	S	29	4	17.93	E
SOP12	26	28	52.66	S	29	4	30.66	E
SOP13	26	28	38.11	S	29	4	41.56	E
SOP14	26	28	39.18	S	29	4	43.35	E
SOP15	26	28	23.97	S	29	4	54.69	E
SOP16	26	28	37.47	S	29	5	19.93	E

Set Out Point	in Degrees, Minutes and Seconds							
	°	'	"		°	'	"	
SOP17	26	28	51.35	S	29	4	34.51	E
SOP18	26	29	5.69	S	29	4	41.37	E
SOP19	26	29	12.49	S	29	4	19.69	E
SOP20	26	29	37.41	S	29	4	12.79	E
SOP24	26	30	1.15	S	29	5	14.52	E
SOP25	26	30	4.16	S	29	5	16.11	E
SOP26	26	30	25.00	S	29	5	42.28	E
SOP27	26	30	35.05	S	29	5	49.46	E
SOP28	26	30	33.47	S	29	5	52.65	E
SOP29	26	30	27.13	S	29	5	58.14	E
SOP30	26	30	22.90	S	29	5	59.95	E
SOP31	26	30	20.83	S	29	6	1.96	E
SOP32	26	30	20.83	S	29	6	3.58	E
SOP33	26	30	21.46	S	29	6	4.51	E
SOP34	26	30	22.96	S	29	6	5.36	E
SOP35	26	30	23.29	S	29	6	6.73	E
SOP36	26	30	25.80	S	29	6	6.92	E
SOP37	26	30	27.09	S	29	6	8.18	E
SOP38	26	30	26.23	S	29	6	11.23	E
SOP39	26	30	25.75	S	29	3	38.45	E
SOP40	26	30	23.87	S	29	3	46.49	E
SOP41	26	30	20.49	S	29	3	56.01	E
SOP42	26	32	46.75	S	28	59	33.46	E
SOP43	26	32	50.85	S	28	59	32.35	E
SOP44	26	32	52.02	S	28	59	31.09	E
SOP45	26	32	54.74	S	28	59	18.27	E
SOP46	26	32	55.61	S	28	59	16.38	E
SOP47	26	33	0.79	S	28	59	13.97	E
SOP48	26	33	2.25	S	28	59	11.53	E
SOP49	26	33	4.73	S	28	59	8.96	E
SOP50	26	33	8.64	S	28	59	8.00	E
SOP51	26	33	12.07	S	28	59	7.98	E
SOP52	26	33	14.80	S	28	59	7.45	E
SOP53	26	33	17.40	S	28	59	7.74	E

Furthermore, a water softener plant receiving its feed from the process water dam will be used to treat the water utilized for the elution process. The efficiency of the strip in the elution circuit is directly depended on the carbon quality. Ca2+ is a major contributor to carbon fouling, hence the need for a softener plant, reducing the Ca2+ ions.

4.4.6.2 RETURN WATER

The new TSF will incorporate a number of return water dams (RWDs) to receive and manage supernatant pond decant water, under drainage water and dirty water run-off. It is currently proposed that the existing Kinross Kariba RWD be refurbished, and that two additional RWDs be constructed.

The various RWD compartments will be lined with an HDPE geomembrane, underlain by a 0.3m layer of compacted clay i.e. a composite liner in accordance with a Class C barrier system. Suitable clayey material shall be borrowed from the available clay borrow areas and/or clay stockpiles. Table 8 below summarises the RWD dimensions.

Refer to Appendix 6 for the detailed design report compiled by SLR.

Table 8: RWD Dimension (SLR, 2017)

Description	Storage capacity up to spillway (m^3)	Surface water area at spillway (Ha)	Crest Elevation (mamsl)	Maximum water depth (m)	Maximum wall height (m)
RWD1	273,000	8.3	1593.5	1592.5	9.0
RWD2	178,000	6.6	1600.0	1599.0	7.5
Refurbished Kinross Kariba RWD	225,000	9.7	1588.5	1587.5	5.5
Total	676,000	24.7	-	-	-

Currently all the RWDs will be classed as 'dams with a safety risk' as per the Dam Safety Regulations (R. 139 of February 2012) because the maximum RWD wall heights all exceed 5m (measured from the RWD crest to the downstream toe), in addition to having a storage capacity in excess of 50,000 m^3. The Department of Water Affairs and Sanitation (DWS) will be consulted in this regard to obtain the necessary permissions and registrations.

4.4.6.3 POTABLE WATER SUPPLY

Water for potable and domestic use will continue to be supplied by Rand Water.

4.4.6.4 STORM WATER MANAGEMENT

A permanent clean water diversion trench will be required upslope of the TSF to divert clean water from the upstream catchment towards the nearby natural drainage channels. The clean storm water channels will be sized to convey the 1:50 year flood event. For clean water channels, and similarly for berms, natural earth embankments and trapezoidal channels are generally specified as there is no risk of soil contamination from this water; the natural soil and vegetation combined with generally low rainfalls and shallow gradients is also unlikely to result in heavy erosion.

Clean, though silt laden, storm water from the soil stockpile areas will be contained in perimeter catchment paddocks that allow for silt to be deposited and the clean water to be released.

Dirty storm water runoff from compartments 1L, 1U and 4 of the TSF will be decanted to the new RWDs constructed south of the TSF; and storm water from compartments 2 and 3 decanted to the refurbished Kinross Kariba RWD.

Potential dirty storm water from the TSF side slopes will be temporarily contained in catchment paddocks along the perimeter of the TSF and drained via a passive filtration system to a trench from where outflow will be directed to the nearest RWD (if dirty). Silt will collect in the catchment paddocks themselves.

The Elikhulu plant area will be concreted. All dirty water runoff from this area will be directed to the proposed PCD / Event pond (capacity 3,600m^3) and the existing plant Toe Dam. The existing Toe Dam is operated within a historic watercourse that has been diverted around the dam. This diversion channel will be upgraded to prevent clean water from entering the Toe Dam.

4.4.6.5 RIVER DIVERSIONS AND CROSSINGS

The new TSF and associated RWDs will directly impact two natural drainage lines / non-perennial streams. These will be diverted by means of clean water diversion trenches described above. Furthermore, the proposed Kinross-Winkelhaak slurry pipeline will cross a channelled valley bottom wetland and will require a new crossing to be constructed (Plan 3). The necessary applications have been made to the DWS in terms of the NWA.

As the remaining pipelines are within registered pipeline servitudes; and existing crossings will be utilised.

4.4.7 ASSOCIATED ACTIVITIES, INFRASTRUCTURE AND SERVICES

Additional services and infrastructure associated with the proposed project include:

4.4.7.1 SOIL STRIPPING AND STOCKPILING

Topsoil and subsoil will be stripped on average to a depth of 250mm and stockpiled separately (to a height of 2m). These will be stockpiled outside the 1:100 year floodline of the nearest watercourse. Silt control paddocks will be installed along the perimeter of the topsoil and subsoil stockpiles, so as to minimise the release of silt generated from stormwater runoff. Gabion baskets will be included at the lowest points of the paddock walls, to allow for the slow release of storm water to the downstream environment.

These stockpiles will be used for the concurrent rehabilitation of the side slopes, which will be considered in the design of the cover system of the new Kinross TSF.

4.4.7.2 POWER SUPPLY

Power will be supplied by the National grid, by means of existing substations. Additional overhead lines may be required however, these will remain under 33kV.

4.4.7.3 ACCESS ROADS

Existing access and service roads will be utilised. No new roads will be constructed.

4.4.7.4 TRANSPORT

Tailings will be piped to and from the plant and the various TSFs on site. Hauling activities are limited to the construction phase for the stripping and stockpiling of soils.

Product (gold) will be transported from site via helicopter.

4.4.7.5 WASTE MANAGEMENT

General waste includes office and domestic waste; construction and building waste; scrap metal; scrap metal and wood.

Hazardous waste includes mine residue; used hydrocarbons; contaminated construction and building waste.

No landfill site will be constructed on site. All waste will be separated and stored as per the relevant Norms and Standards where applicable. Waste will be recycled and sold/given to interested parties as far as possible. Waste for disposal will be collected by a reputable contractor for transport to a suitably licensed facility.

A modular sewage treatment plant will be installed at the Elikhulu plant area to cater for the admin block, change house and ablution facilities. The plant will be designed with a throughput capacity of 4500 litres / day. Treated water effluent from the plant will be recycled back to the process water dam for use within the plant. Sludge from the plant is minimal and will be collected by a reputable contractor for

disposal of at the Municipal Sewage Works (Refer to Appendix 16 for details on the sewage treatment plant).

Portable toilets will be provided at each of the TSF areas for use by the hydraulic miners. These will be managed by a reputable contactor and emptied on a regular basis.

4.4.7.6 STORAGE AND USE OF REAGENTS AT THE ELIKHULU PLANT

4.4.7.6.1 GENERAL

The Sodium Cyanide storage facility will be enclosed in a secondary fenced area, and transported to the plant storage facilities as and when required. The briquettes stored in this area will be enclosed, safeguarding it from the elements.

Lime, Cyanide, Caustic, HCl and Oxygen will be delivered in bulk, and transferred directly from the road tankers to the respective mixing facilities. The road tankers will not enter the secondary fenced off area, but will remain outside the plant perimeters at all times.

4.4.7.6.2 SODIUM CYANIDE (KZADBP000125-PFD-0900)

Liquid sodium cyanide will be delivered in bulk by tankers, and transferred to two bulk storage tanks. Concentrated Sodium cyanide will be supplied to all main plant dosage points via a running/ standby pumping configuration.

Provision for a dry cyanide receiving facility has been made, and includes a bag breaker, mixing tank c/w agitator and hoist.

A cyanide solution will be made up by adding reagent water, caustic and sodium cyanide briquettes to the mixing tank. A mixing period of 30min will be allowed before transferring the solution to the bulk storage tanks by means of a single transfer pump.

HCN, NH_3 gas detection and a spillage pump pumping back to the dosing tanks or CIL circuit has been made.

4.4.7.6.3 CAUSTIC SODA (KZADBP000125-PFD-0910)

Caustic Soda will be delivered in bulk by tankers, and supplied to all main plant dosage points via a running/ standby pumping configuration.

4.4.7.6.4 LIME (KZADBP000125-PFD-000125)

Hydrated lime will be made up to 20%Sw/v slurry using raw water. The lime make-up circuit consists of a bulk lime silo, screw feeder and a single mixing tank fitted with and agitator. Slurried lime will be supplied to all plant dosage points via a ring main supply system using a running/ standby pumping configuration.

A spillage pump and safety shower installed in the lime mixing bund is provided.

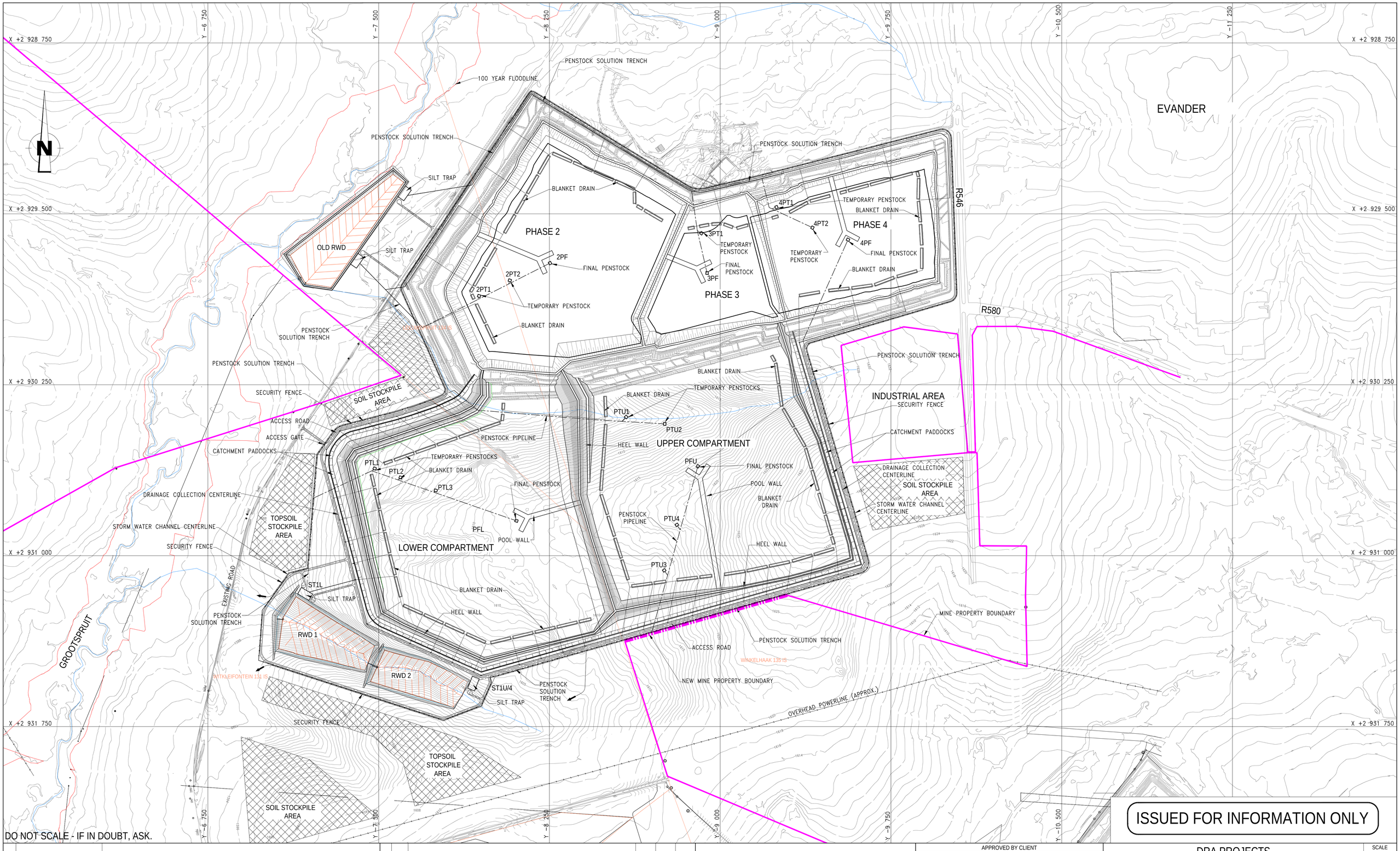
4.4.7.6.5 HYDROCHLORIC ACID (KZADBP000125-PFD-0710)

33% Hydrochloric acid will be delivered in bulk, and stored in a single storage tank.

4.4.8 EMPLOYMENT REQUIREMENTS

During construction some 700 temporary jobs will be created. During operations approximately 250 permanent jobs will be created.

Plan 4: Final TSF and RWD Design – Option A1 (SLR)



DO NOT SCALE - IF IN DOUBT, ASK.

ISSUED FOR INFORMATION ONLY

REFERENCE

DRAWING NUMBER	TITLE

REVISIONS

No.	DESCRIPTION	BY	CHKD	DATE
D	TOPSOIL AND SOIL STOCKPILE LOCATIONS UPDATED	AS	JW	24.01.17
C	LAYOUT REVISEDTO SUIT NEW PROPERTY BOUNDARY	AL	JW	21.12.16
B	ROAD AND RIVER NAMES ADDED	AL	LS	27.10.16
A	ISSUED FOR INFORMATION	AL	JW	21.10.16

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APPROVED BY CLIENT			
DESIGNATION	DATE	INITIALS	SIGN
1.)			
2.)			

APPROVED BY SLR			
DESIGNATION	DATE	INITIALS	SIGN
DRAUGHTSMAN	21.10.16	AL	
DESIGN ENGINEER			
PROJECT DIRECTOR			
PROFESSIONAL ENGINEER (REG No.)			

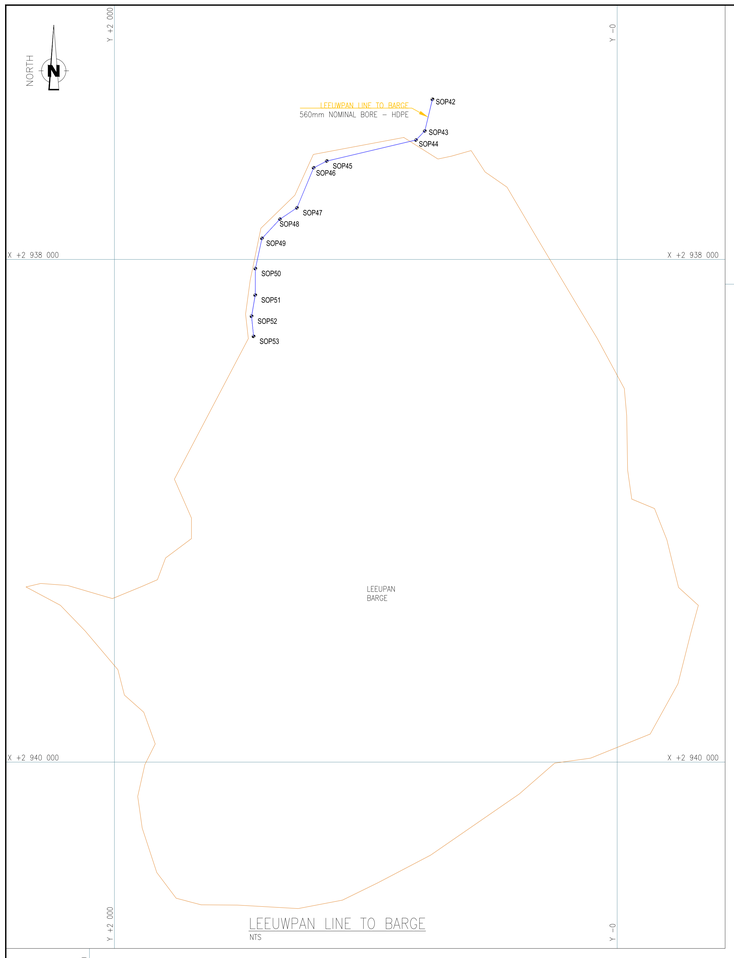
DRA PROJECTS
EVANDER ELIKHULU TSF DESIGN

SITE LAYOUT

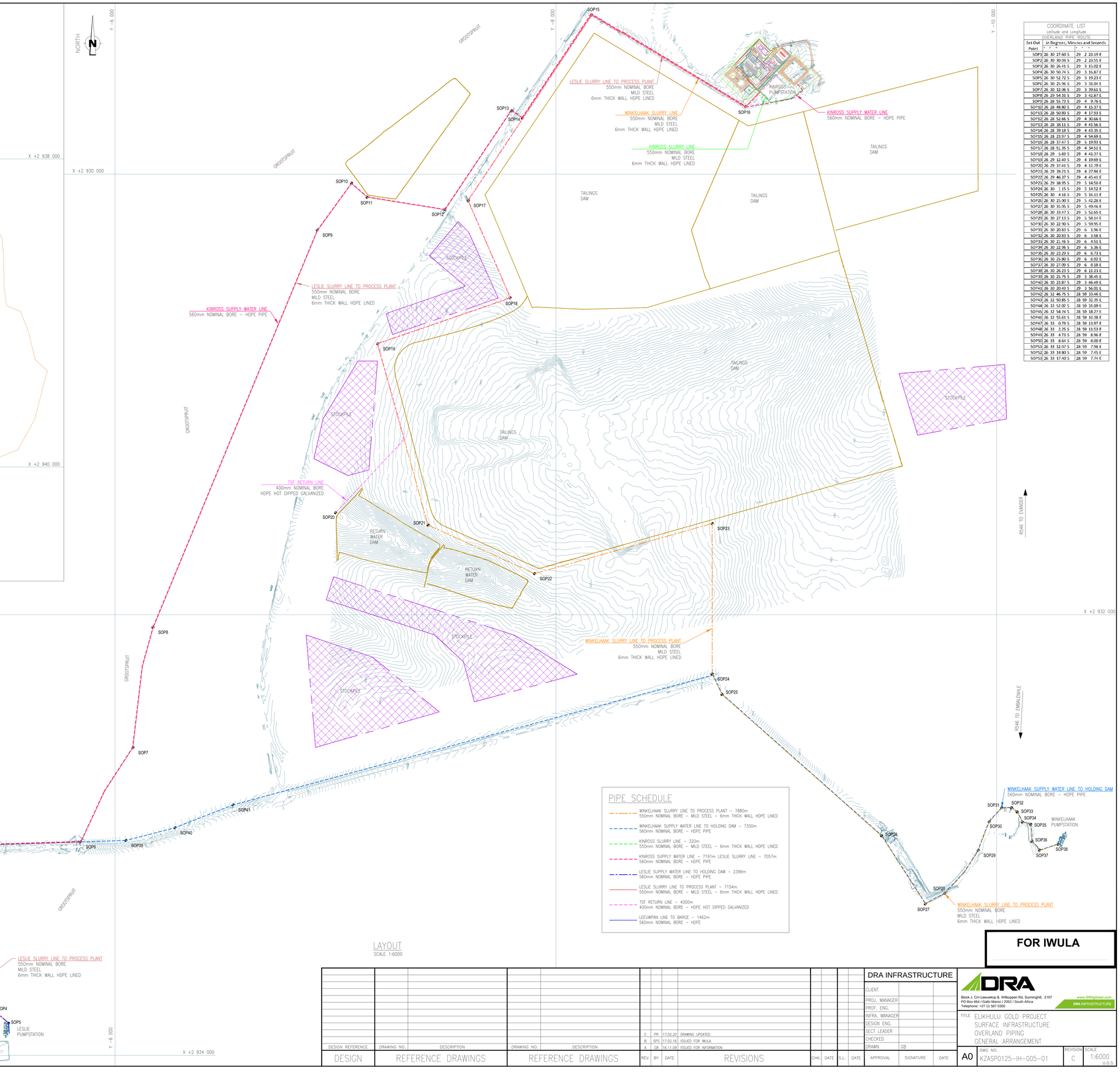
SCALE	1:7500
CO-ORD SYSTEM	CAPE Lo29
SHEET	1 OF 1
	A1
DRAWING NUMBER :	720.04026.00009-001
REV :	D

M:\Projects 3\720.04026.00009_Evander Elikhulu TSF Design\Drawings\Feasibility\720.04026.00009-001 Site Layout_RevD.dwg Jan 24, 2017 - 12:44pm

Plan 5: Final Pipeline Design (DRA)



LEEUWPAN LINE TO BARGE
NTS



LAYOUT
SCALE 1:6000

COORDINATE LIST
Latitude and Longitude
OVERLAND PIPE ROUTE

Set Out Point	in Degrees, Minutes and Seconds ° ' "	° ' "
SOP1	26 30 27.60 S	29 2 23.19 E
SOP2	26 30 30.09 S	29 2 23.55 E
SOP3	26 30 26.43 S	29 3 15.02 E
SOP4	26 30 50.74 S	29 3 16.87 E
SOP5	26 30 52.72 S	29 3 19.23 E
SOP6	26 30 25.96 S	29 3 31.04 E
SOP7	26 30 12.06 S	29 3 39.61 E
SOP8	26 29 54.33 S	29 3 42.87 E
SOP9	26 28 55.73 S	29 4 9.76 E
SOP10	26 28 48.80 S	29 4 15.37 E
SOP11	26 28 50.89 S	29 4 17.93 E
SOP12	26 28 52.66 S	29 4 30.66 E
SOP13	26 28 38.11 S	29 4 43.56 E
SOP14	26 28 39.18 S	29 4 43.35 E
SOP15	26 28 23.97 S	29 4 54.69 E
SOP16	26 28 37.47 S	29 5 19.93 E
SOP17	26 28 52.35 S	29 4 34.51 E
SOP18	26 29 5.69 S	29 4 41.37 E
SOP19	26 29 12.49 S	29 4 19.66 E
SOP20	26 29 37.43 S	29 4 12.79 E
SOP21	26 29 39.31 S	29 4 27.94 E
SOP22	26 29 46.37 S	29 4 45.41 E
SOP23	26 29 38.95 S	29 5 14.50 E
SOP24	26 30 1.15 S	29 5 14.52 E
SOP25	26 30 4.16 S	29 5 16.11 E
SOP26	26 30 25.00 S	29 5 42.28 E
SOP27	26 30 35.05 S	29 5 49.46 E
SOP28	26 30 33.47 S	29 5 52.65 E
SOP29	26 30 27.13 S	29 5 58.14 E
SOP30	26 30 22.92 S	29 5 59.95 E
SOP31	26 30 20.83 S	29 6 1.96 E
SOP32	26 30 20.83 S	29 6 3.58 E
SOP33	26 30 21.46 S	29 6 4.51 E
SOP34	26 30 22.96 S	29 6 5.36 E
SOP35	26 30 23.29 S	29 6 6.73 E
SOP36	26 30 25.80 S	29 6 6.92 E
SOP37	26 30 27.09 S	29 6 8.18 E
SOP38	26 30 26.23 S	29 6 11.23 E
SOP39	26 30 25.75 S	29 3 38.45 E
SOP40	26 30 23.87 S	29 3 46.49 E
SOP41	26 30 20.49 S	29 3 56.01 E
SOP42	26 32 46.75 S	28 59 33.46 E
SOP43	26 32 50.85 S	28 59 32.35 E
SOP44	26 32 52.09 S	28 59 31.09 E
SOP45	26 32 54.14 S	28 59 18.27 E
SOP46	26 32 55.61 S	28 59 16.38 E
SOP47	26 33 0.79 S	28 59 13.97 E
SOP48	26 33 2.25 S	28 59 11.53 E
SOP49	26 33 4.73 S	28 59 8.96 E
SOP50	26 33 8.64 S	28 59 8.00 E
SOP51	26 33 12.07 S	28 59 7.98 E
SOP52	26 33 14.80 S	28 59 7.45 E
SOP53	26 33 17.40 S	28 59 7.74 E

PIPE SCHEDULE
- WINKELHAAK SLURRY LINE TO PROCESS PLANT – 7880m
  550mm NOMINAL BORE – MILD STEEL – 6mm THICK WALL HDPE LINED
- WINKELHAAK SUPPLY WATER LINE TO HOLDING DAM – 7350m
  560mm NOMINAL BORE – HDPE PIPE
- KINROSS SLURRY LINE – 320m
  550mm NOMINAL BORE – MILD STEEL – 6mm THICK WALL HDPE LINED
- KINROSS SUPPLY WATER LINE – 7191m LESLIE SLURRY LINE – 7057m
  560mm NOMINAL BORE – HDPE PIPE
- LESLIE SUPPLY WATER LINE TO HOLDING DAM – 2396m
  560mm NOMINAL BORE – HDPE PIPE
- LESLIE SLURRY LINE TO PROCESS PLANT – 7154m
  550mm NOMINAL BORE – MILD STEEL – 6mm THICK WALL HDPE LINED
- TSF RETURN LINE – 4000m
  400mm NOMINAL BORE – HDPE HOT DIPPED GALVANIZED
- LEEUWPAN LINE TO BARGE – 1462m
  560mm NOMINAL BORE – HDPE

FOR IWULA

THIS DRAWING IS NOT TO BE SCALED. ALL DISCREPANCIES ARE TO BE REPORTED TO THE DESIGN ENGINEER. ALL CONSTRUCTION ERRORS OR DEVIATIONS FROM THE DETAILS ARE TO BE RECTIFIED ONLY AFTER CONSULTATION WITH THE DESIGN ENGINEER OR IN HIS ABSENCE THE DESIGN OFFICE HEAD OF DEPARTMENT MUST BE CONSULTED.

DESIGN REFERENCE	DRAWING NO.	DESCRIPTION
DESIGN	REFERENCE DRAWINGS	

DRAWING NO.	DESCRIPTION
REFERENCE DRAWINGS	

REV.	BY	DATE	REVISIONS
C	PR	17.02.20	DRAWING UPDATED
B	SPS	17.02.16	ISSUED FOR IWULA
A	GB	16.11.09	ISSUED FOR INFORMATION

CHK.	DATE	S.L.	DATE

DRA INFRASTRUCTURE

CLIENT			
PROJ. MANAGER			
PROF. ENG.			
INFRA. MANAGER			
DESIGN ENG.			
SECT LEADER			
CHECKED			
DRAWN	GB		
APPROVAL	SIGNATURE	DATE	

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DRA INFRASTRUCTURE

TITLE: ELIKHULU GOLD PROJECT
SURFACE INFRASTRUCTURE
OVERLAND PIPING
GENERAL ARRANGEMENT

SIZE	DWG NO.	REVISION	SCALE
A0	KZASP0125-IH-005-01	C	1:6000 U.O.S.

Plan 6: Final Plant Design (DRA)

FOR IWULA

DESIGN REFERENCE	DRAWING NO.	DESCRIPTION
DESIGN	REFERENCE DRAWINGS	

DRAWING NO.	DESCRIPTION
REFERENCE DRAWINGS	

REV.	BY	DATE	REVISIONS
B	SPS	19.02.17	PLANT LAYOUT UPDATED
A	FM	07.09.16	ISSUED FOR IWULA APPROVAL

CHK.	DATE	S.L.	DATE

CLIENT		
PROJ. MANAGER		
PROF. ENG.		
PROJECT ENG.		
PROCESS ENG.		
D.O. MANAGER		
SECT LEADER		
CHECKED		
DRAWN	F. MADHOMU	01.09.2016
APPROVAL	SIGNATURE	DATE

DRA
DRA Minerals Park / Number 3 Inyanga Close / Sunninghill / 2157
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Telephone: +27 11 587 0300
www.DRAglobal.com
DRA INFRASTRUCTURE

TITLE: ELIKHULU GOLD PROJECT
SURFACE INFRASTRUCTURE
SITE PLAN
LAYOUT

A1	DWG NO.	REVISION	SCALE
	KZASP0125-IH-001	B	1:1000 U.O.S.

5 POLICY AND LEGISLATIVE CONTEXT

Table 9 outlines the legislation and guidelines that are considered to be applicable to the proposed project; and which were considered at the time of compiling this report

Table 9: Applicable legislation and guidelines

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT	REFERENCE WHERE APPLIED
The Constitution of South Africa, 1996 (Act 108 of 1996) • Everyone has the right to an environment that is not harmful to their health or well-being; to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development. • Every person has a right to information held by the State and to information held by other people that is required in the exercise or protection of a right. • Everyone has a right to just and procedurally fair administrative action.	• An EIA process has been followed for the project to determine the impact to the environment. Alternatives sites and activities have been considered for the project. • All reports will be made available for public review for a period of 30 days. • The Appeal Process will be described to I&APs through the RoD notification process.	• This report. Section 7, Appendix 6. • Section 8 and Appendix 7. • Section 8 and Appendix 7.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT	REFERENCE WHERE APPLIED
The Minerals and Petroleum Resources Development Act (MPRDA), Act No. 28 of and its Regulations (GNR527, 23 April 2004 as amended by: GNR R1288 dated 29 October 2004; GNR1203 dated 30 November 2006; and GNR349 dated 18 April 2011).	• EGM holds an approved mining right for the project area. • The existing EMPr covers the mining and processing of gold at the three shaft complexes, as well as the re-processing of the Kinross TSF. • An application in terms of Section 102 has been submitted to the DMR to amend the approved EMPr.	• Refer to Appendix 3 for a copy of the approved Mining Right.
National Environmental Management Act (NEMA), Act 107 of 1998 as amended and its associated regulations: (GNR982 – EIA Regulations; NEMA Regulation GNR983 – Listing Notice 1; NEMA Regulation GNR984 – Listing Notice 2; and NEMA Regulation GNR985 – Listing Notice 3).	• EGM has submitted an application for EA. A S&EIR process is applicable.	• Table 3 identifies the applicable listed activities.
NEMA: Public Participation Guidelines (GNR807).	• Guidelines were followed during the Public Participation Process (PPP).	• Section 8 and Appendix 7 outline the details of the PPP followed.
NEMA Regulations pertaining to the financial provision for prospecting, exploration, mining or production activities (GNR1147 –20 November 2015).	• Financial Provision has been calculated and will be provided for by means of a Trust Fund.	• Section 19 and 33.
National Environmental Management: Waste Act (NEM:WA), Act 59 of 2008 as amended and its associated regulations. The regulations and various addendums pertaining to scheduled waste activities (GNR921, November 2013).	• EGM has submitted an application for a WML. A S&EIR process is applicable.	• Table 3 identifies the applicable Waste Management Activities.
NEMA Regulation on planning and management	• Mine residues defined and handled	• Section 4.4.5 and Appendix 5.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT	REFERENCE WHERE APPLIED
of residue stockpiles (GNR632, July 2015).	accordingly.	
The Waste Classification and Management Regulations (GNR634, August 2013).	• Mine residue classified accordingly.	• Appendix 5.
Assessment of Waste for Landfill (GNR635, August 2013).	• Mine residues defined as Type 3 waste and handled accordingly.	• Appendix 5.
National Norms and Standards for the assessment of Waste for Landfill Disposal (GNR636, August 2013).	• Mine residues defined as Type 3 waste and handled accordingly. • Designs have incorporated a Class C equivalent barrier.	• Appendices 5 and 7.
National Waste Information Regulation (GNR625, August 2012).	• This mine will register and report on the South African Waste Information System (SAWIS).	• Section 27.3.10.
Norms and standards for the storage of waste on site as per GNR926, November 2013.	• The EMPr has considered this where relevant.	• Section 27.3.10.
National Water Act (NWA), Act 36 of 1998 as amended and its associated regulations.	• A water use license application has been submitted to the DWS for the applicable water uses associated with the project. These include: - 21(g) TSF - 21(g) RWDs - 21(c) & (i) Diverting a watercourse - 21(c) & (i) Activities within a water resource / wetland	• Appendix 17 for proof of submission.
GNR704 of the NWA, Regulations on the use of water for mining and related activities aimed at the protection of water resources.	• Incorporated into the design requirements for the TSF and RWDs.	• Appendix 6 for the Design Report and drawings.
National Environmental Management: Biodiversity	• Regulations utilised to determine the	• Table 3 identifies the applicable

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT	REFERENCE WHERE APPLIED
Act (NEM:BA), Act 10 OF 2004 as amended and its regulations, including various regulations pertaining to protected species and to alien and invasive species.	need for any listed scheduled activities under GNR 985 (Listing Notice 3). • The alien invasive management system will consider the listed alien and invasive species published under NEM:BA as well as CARA and preliminary plan included in the EMPr. • Protected species have been identified on site. These will be relocated with the necessary permits (where applicable).	listed activities. • Section 27.2.4 & 27.3.4 • Appendix 10.
National Environmental Management: Air Quality Act (NEM:AQA), Act 39 of 2004 as amended and its associated regulation GNR893, November 2013 regarding Scheduled Listed Activities.	• The Department of Environmental Affairs has been consulted to determine the need for an Atmospheric Emissions License (AEL). • An Air Quality Assessment has been completed to determine whether any schedule emissions are applicable to the project.	• Appendix 7 • Appendix 14
National Atmospheric Emissions Reporting Regulations (GNR283 and GNR284, April 2015)	• Mines are regarded as Class C emitters and must register and report on NAEIS. Incorporated into the EMPr.	• Section 27.2.6 & 27.3.6
National Dust Control Regulations (GNR827, November 2013).	• The dust monitoring will be conducted and measured against the dust fallout rates published in GNR827	• Section 27.2.6 & 27.3.6
ASTM D1739, 1970 or equivalent approved protocol for dust monitoring. Sets the requirements for dust monitoring as specifically stipulated in GNR827 of November 2013.	• Dust monitoring will be undertaken in accordance.	• Section 27.2.6 & 27.3.6

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT	REFERENCE WHERE APPLIED
National Environmental Management: Protected Areas Act (NEMPAA), Act 57 of 2003 as amended and its associated regulations.	• Regulations utilised to determine the need for any additional listed scheduled activities under GNR 985	• Table 3 identifies the applicable Listed Activities.
National Heritage Resources Act (NHRA), Act No. 25 of 1999	• A study was completed to assess the impacts on heritage resources in the area. • A desktop palaeontological study has been completed for the proposed project. • SAHRA has been consulted as a Regulatory Authority for the project.	• Section 10.1.7 and Appendix 13. • Section 10.1.7 Appendix 13. • Section 8 and Appendix 7
Spatial Planning and Land Use Management Act (SPLUMA), Act No.16 of 2013, Promulgated 1 July 2015.	• The project area falls within the mine's approved mineral right boundary.	• n/a
Hazardous Substances Act, Act No. 15 of 1973	• Hazardous substances handling on site will comply with the prescription of the Act and general practices have been included in EMPr.	• Section 27.3.11
South African National Standard: SANS 10234:2008 - Globally Harmonized System of classification and labelling of chemicals (GHS).	• Chemicals and reagents will be labelled as per the GHS system. Material Safety Data Sheets (MSDS) will be kept on site.	• Incorporated into the EMPr – Section 27.3.11.
South African National Standard: SANS 10228:2006 - The identification and classification of dangerous goods for transport	• The standard was consulted to determine which substances on site classified as dangerous goods in terms of the specific NEMA activities relating to storage of dangerous goods on site.	• Table 3 identifies the applicable Listed Activities.
The International Cyanide Management Code For the Manufacture, Transport, and Use of	• Used as best practice for the management of cyanide for the	• Incorporated into the EMPr – Section 27.3.11.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT	REFERENCE WHERE APPLIED
Cyanide In the Production of Gold (Cyanide Code)	project.	
South African National Standard: SANS 241-1:2011 – Drinking Water Specification: Physical, aesthetic, operational and chemical & microbial determinants.	• SANS standard will be utilised for comparative purposes to determine the quality of water at site. Where Resource Water Quality Objectives (RWQOs) are provided by DWS, then these will also be utilised for comparative purposes.	• Section 35.1.1

6 NEED AND DESIRABILITY OF THE PROPOSED PROJECT

The overall objective of the project is to recover residual gold from the tailings within the three existing TSFs. The slurry/tailings from the Elikhulu Plant will be deposited onto the new TSF immediately to the south of the existing Kinross TSF and then ultimately onto the existing Kinross TSF footprint as re-mining progresses. Thus, allowing for the rehabilitation of the land currently occupied by the Winkelhaak and Leslie/Bracken TSFs.

There will be some positive impact with the removal of the two smaller TSFs, and the development of one overall TSF, as the impact source will be from a single facility rather than three separate TSFs. This will also make management implementation easier in the long term as only a single TSF needs to be monitored and maintained through closure, benefits include:

- The consolidation of the TSF's will have a net positive socio-economic impact as rehabilitated land, currently occupied by two of the three TSFs, will be made available for community development initiatives, including: housing developments, advancement of Small and Micro-sized Enterprises, and the development of recreational facilities;
- More efficient volumetric storage - because of more innovative TSF planning and operating procedures, compared to the 3 existing TSFs;
- Improved water management - as the structure will be placed on more stable ground and will have an impervious layer, less water will be able to seep out from the footprint. Water will also be collected at the Return Water Dam (RWD) and recycled as part of a closed water circuit philosophy; the project will ensure all RWD's will be upgraded and/or built to be compliant with GN704;
- Improved stability and reduced safety risk - the new TSF will be designed with the aim of closure objectives and long term stability;
- Effective environmental practices and outcomes as the Tailings Reclamation Project will result in the reworking of aging Tailings Dams in the area that are located very close to the water resource, which will reduce current air and water quality impacts;
- The new TSF will be designed with the aim of closure and therefore on-going concurrent rehabilitation of the side slopes will be considered in the design of the cover system. This too will reduce current air quality and water quality impacts.

The project will contribute directly and indirectly to the Country's GDP, as well as provide employment to members of the surrounding communities including:

- Positively contribute to the Mpumalanga and South African Gross Domestic Product (GDP) to the value of R 1,340,000,000 (one billion three hundred and forty million Rand) in normal company taxation during the life of the Elikhulu Project. Together with other economic benefits to the people of Mpumalanga, this amount is expected to be higher.
- Benefit the surrounding community and local business by utilising services such as rental accommodation, cleaning services, consumables, equipment and material, labour hire.
- During construction some 700 temporary jobs will be created.
- During operations approximately 250 permanent jobs will be created

The listed activities requiring authorisation are for the construction of infrastructure associated with the new TSF, the Elikhulu plant, associated pipelines, as well as site clearance associated with the new TSF. The infrastructure is required for the overall implementation of the project and will ensure the efficient and successful management thereof.

7 ALTERNATIVES ASSESSMENT

7.1 THE TYPE OF ACTIVITY TO BE UNDERTAKEN

The main activities applicable to the expansion of the Kinross Tailings Recycling project include the reprocessing of the Winkelhaak and Leslie/Bracken TSFs at a rate of 1 Mt/m. This is in addition to the (currently authorised) reprocessing of the Kinross TSF at 0.2 Mt/m. The project, ultimately reprocessing 1.2 Mt/m, will thus consolidate the three TSFs into one large TSF and rehabilitate the decommissioned TSF footprints.

The installation of a second plant, new TSF, RWD, water and slurry reticulation facilities (pumps and pipelines) and associated infrastructure will be required. This infrastructure is needed in terms of the overall design and no further alternatives are discussed in terms of these. Best practices in the industry and, where applicable, SANS standards and legislative requirements will be followed in design, construction and management of infrastructure and activities on site.

7.2 THE PROPERTY OR LOCATION(S) OF THE ALTERNATIVES

SLR Consulting (SA) Pty (Ltd) were contracted to undertake a site alternatives assessment for the proposed project (SLR, 2016) (see Appendix 6). The criteria assessed, included:

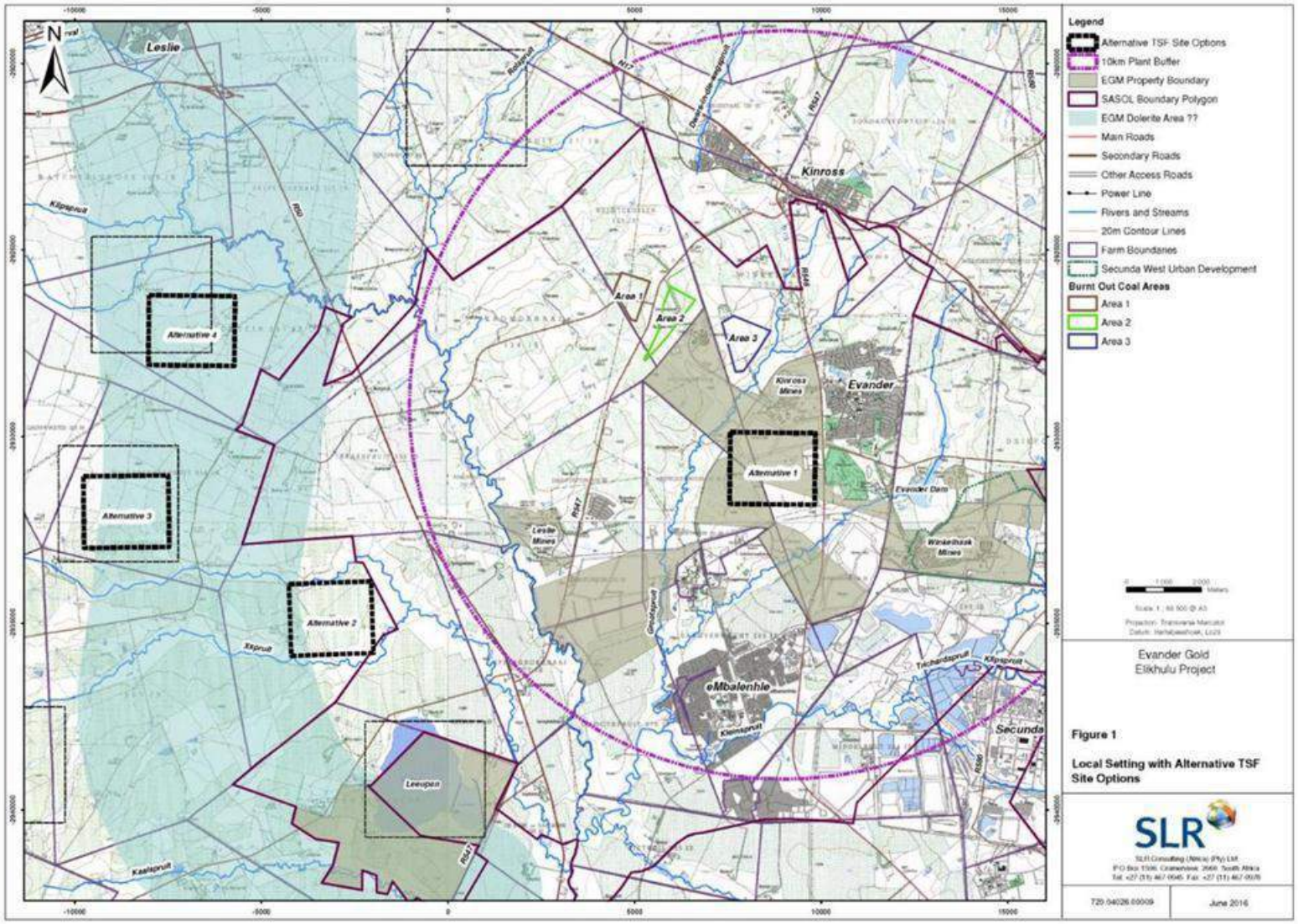
- Topography;
- Land use and servitudes;
- Pumping distances;
- Whether the area had been undermined in the past and if so were the safety factors sufficient to support the TSF;
- Environment sensitivity; and
- Cost implications.

Four sites were initially identified by EGM (Alternatives 1 to 4) for the new TSF and a further three sites were proposed by Sasol as these areas were associated with Burnt out Coal Areas (BOCA) (Table 10). Plan 7 shows the location of the property alternatives considered.

The study concluded Alternative 1 as the preferred option, both from an environmental perspective as well as from a technical and cost perspective.

Table 10: Description of Alternative TSF sites considered

Site	Description
Alternative 1	Kinross TSF - Initially immediately to the south of Kinross and then utilisation of Kinross TSF as re-mining of the TSF progresses
Alternative 2	West south west of Kinross (situated outside the mining right area)
Alternative 3	West of Kinross (situated outside the mining right area)
Alternative 4	West north west of Kinross (situated outside the mining right area)
BOCA 1	Most eastern area (out of the three)
BOCA 2	Relatively central area (out of the three)
BOCA 3	Most western area (out of the three)



Plan 7: Map indicating the alternative locations considered for the new TSF (SLR)

7.3 THE DESIGN OR LAYOUT OF THE ACTIVITY

The layout of the proposed pipelines are limited to existing servitude routes registered in favour of EGM, and properties over which EGM hold the surface rights.

Four layout alternatives were considered for the new TSF; namely A1, A2, B and C as depicted in Figure 3 below. Option C has the greatest capacity and was originally considered the preferred alternative. However, following consultation with other surface and mineral rights holders in the area it was decided to proceed with the design of alternative A1. Refer to Appendix 6 for the detailed TSF Design Report in support of alternative A1.

The position of the RWDs are limited due to topography and land availability. These have been positioned in relation to the TSF to allow water decanting from the TSF to be gravity fed by penstock systems into the RWDs.

The following aspects were taken into consideration when designing the final layout of the TSF and associated RWDs:

- Minimising the area of disturbance and utilising existing areas / infrastructure as far as possible.
- Clean and dirty water separation.
- The Waste Classification and Management Regulations (WCMR) (GN R. 634 of 2013) and associated National Norms and Standards (GN R.635 and GN R.636).
- The South African Regulations regarding the planning and management of residue stockpiles and residue deposits (R 632, dated 24 July 2015)
- GN704 (Government Gazette 20118) of the National Water Act, governing the use of water for mining and related activities aimed at the protection of water resources.
- GN 509 (Government Gazette 40229) of the National Water Act, regulating the area of a watercourse in terms of Section 21(c) and (i).
- Dam Safety Regulations (R. 139 of February 2012).

A waste classification study was completed for the project by Future Flow in November, 2016 (refer to Appendix 5), with reference to R.634, R.635 and R.636 of NEM:WA. The overall geochemical, toxicological and waste risk profiles of the gold tailings at EGM can be summarised as follows:

- Neither the TSF material, nor the water used in the process, is considered to be an oxidising substance.
- The test results for the total concentrations (TC) show that barium, copper, and nickel exceed the TCT0 guidelines in all of the samples. Fluoride exceeds the TCT0 guidelines in two of the three samples.
- All the samples comply with the TCT1 guidelines.

- The leachable concentration test results show that all the elements comply with the LCT0 guidelines.
- Therefore, the material is classified as non-hazardous in terms of physical hazards and aquatic toxicity. The tailings material is however classified as Category 1 (the highest toxicity category) for acute health effects. It should be noted that this high classification is due to the relatively high concentrations of total chromium and nickel. The other elements do not contribute significantly to the high rating.

Based on the above, the material that will be stored on the new TSF is classified as Type 3 Waste following the GN 635 classification system. Following the GN 636 guideline, the material from all the facilities may only be disposed of at a Class C landfill designed in accordance with Section 1(1) and (2) of the GN 636 Norms and Standards, or, subject to Section 3(4) it may be disposed of at a landfill site designed in accordance with the requirements for a GLB+ landfill as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAF, 1998).

As such the design, compiled by SLR Consulting, details a barrier of equivalent performance to a Class C barrier for the expansion footprint. The proposed barrier system consists of the following elements (from the top down, also refer to Appendix 6 for the detailed designs):

- Above-liner drainage as follows:
    - A blanket drain some 50m from the upstream toe of the heel wall;
    - A toe drain along the upstream toe of the heel wall;
    - Finger drains, over the outer ~50m between the toe drain and blanket drain;
    - A heel wall bench drain, limited to selected areas where the heel wall height is deemed excessive.
    - The more permeable cycloned tailings underflow which will be concentrated along the upstream o face of the heel wall to improve drainage in this area.
- A 1.5mm thick, black, HDPE geomembrane, conforming to GRI-GM13 as amended in November 2014, and installed to SANS 10409. The geomembrane shall be smooth over the majority of the basin, double-textured (co-extruded) along the outer ~50m to improve side slope stability, and monotextured (co-extruded) up the upstream face of the heel wall (placed textured side down).
- An adequately prepared sub-base as per the requirements of SANS 10409.
- A 300mm thick compacted clay liner (CCL) will be formed over the entire basin using the stockpiled clay material and compacted in 150mm layers to 98% Standard Proctor density (at 2-3% above optimum moisture content). Certain areas will invariably contain excessive amounts of gravels at surface which will negatively affect hydraulic contact between the geomembrane and sub-base. A bedding layer of fine clayey material will typically need to be placed and

compacted over the prepared in-situ surface in these areas, prior to geomembrane installation.

- The zone downstream of the heel wall and upstream of the toe wall be lined with smooth 1.5 mm thick black HDPE overlying a CCL.

The main objective of the above-liner drainage systems described above is to control the phreatic surface thereby improving side slope stability. Extending the under drainage system over the remainder of the TSF basin is not deemed necessary. Given the fine nature of gold tailings, and especially that of the finer overflow material that will cover the majority of the TSF basin, a leachate collection system as is standard practice on landfills is not required. At the point of any discontinuities in the geomembrane (pinholes, holes etc.), the head acting on the discontinuity would be reduced by the low permeability tailings to the order of 1-2m, making the provision of further above-liner drainage unnecessary.

Figure 3: Kinross Expansion New TSF Layout alternatives; showing the different compartments as well as the proposed RWD locations (blue) and the Sasol underground mine plan (grey)

7.4 THE TECHNOLOGY TO BE USED IN THE ACTIVITY

EGM believe that it has implemented the best available technology and that is cost effective for this specific project. Best practices as utilised in the industry have been selected and, where applicable, SANS standards and legislative requirements will be followed in design, construction and management of infrastructure and activities on site. Technological alternatives have therefore not been further assessed.

7.5 THE OPERATIONAL ASPECTS OF THE ACTIVITY

In all instances, common practices as utilised in the industry have been selected. Operational alternatives that have been considered and decided upon include:

7.5.1 HEATING

- Electrical furnaces and heaters vs. diesel driven furnaces and heaters. Electrical furnaces have been chosen so as to remove the need for diesel storage, this will limit the possibility of hydrocarbons spills as well as limit the emissions from the project.

7.5.2 HAZARDOUS SUBSTANCES AND WASTE

- The use of liquid cyanide vs. solid cyanide where liquid cyanide is preferred; this will minimise hazardous waste on site as no packaging will need to be disposed of.
- In the event that liquid cyanide cannot be sourced; packaging will be returned to the supplier for recycling.

7.6 THE OPTION OF NOT IMPLEMENTING THE ACTIVITY

EGM will continue with the current operations as per the approved EMPr and the three TSFs will continue to be managed individually. The gold reserves remaining within these will not be realised.

The no-go option would also prevent the socio-economic benefits (as discussed in Section 6), including the need for job creation, increased socio-economic activity and social upliftment.

The vacant but disturbed land adjacent to the Kinross TSF will remain in its current state, with no immediate or direct benefits to society. The Winkelhaak and Leslie/Bracken TSFs will remain and the environmental benefits associated with the rehabilitation and remediation of these will not be realised.

8 PUBLIC PARTICIPATION PROCESS (PPP)

8.1 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

Table 11 highlights the requirements for a public participation process as per NEMA and includes PPP carried out as part of this process. Please see the PPP report in Appendix 7 for the full details of the PPP carried out to date.

The PPP aims to involve the authorities and I&APs in the project process, and determines their needs, expectations and perceptions which in turn ensures a complete and comprehensive environmental study. An open and transparent process has and will be followed at all times and will be based on reciprocal dissemination of information.

Table 11: NEMA PPP requirements and PPP conducted to date

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
1	This regulation only applies in instances where adherence to the provisions of this regulation is specifically required
Noted	
2	The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation b:
NEMA PPP Guidelines have been followed.	
a	fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of:
i	the site where the activity to which the application or proposed application relates is or is to be undertaken
ii	An alternative site
Notices were compiled in English, Afrikaans & Zulu and erected on the site boundary fence as well as other public locations, namely: • Govan Mbeki Local Municipality; • Evander Magistrates Court; • Evander Library; • Embalenhle Library; • Evander Post Office; • Evander High School; • Local Petrol Stations; and • Shoprite. These posters informed the public of the proposed activities, invited (I&APs) to attend the scoping phase public meeting and requested people to register as I&APs for the project. Copies of the Posters have been included in Annexure F of Appendix 7.	

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
b	giving written notice, in any of the manners provided for in section 47D of the Act, to:
i	the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
ii	owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
iii	the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
iv	the municipality which has jurisdiction in the area;
v	any organ of state having jurisdiction in respect of any aspect of the activity; and
vi	any other party as required by the Competent Authority.
A database / I&AP register was compiled; this included various stakeholders, authorities, land owners, land users and associations within the area. Background Information Documents (BIDs) detailing the project were compiled in English, Afrikaans and Zulu. These were hand delivered to land owners / users and adjacent land owners / users; or sent via fax, e-mail or post. The purpose of the BID was to: • Invite members of the public to register as I&APs; • Introduce the proposed project, and inform the public on the application / environmental process and their involvement; • Provide information on the proposed impacts the development may have on the environment which will be investigated further; • Initiate a process of public consultation to record perceptions and issues; and • Invite I&APs to attend the Scoping Phase Public Meeting. A copy of the BID(s) is attached as Annexure C of Appendix 7.	
c	Placing an advertisement in:
i	One local newspaper; or
ii	Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations.
d	placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii)
Advertisements were placed in two (2) local newspapers, in both English and Afrikaans: • The Ridge Times, publication date 30 September 2016 • The Echo, publication date 30 September 2016 Copies of the Adverts are attached as Annexure E of Appendix 7.	

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
e	Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to- (i) illiteracy; (ii) disability; or (iii) any other disadvantage.
No issues in information dissemination have been noted to date. Any additional requirements made by the authorities will be applied during the PPP process.	
3	A notice, notice board or advertisement referred to in sub regulation (2) must –
a	Give details of the application which is subject to public participation
b	State -
i	whether basic assessment or S&EIR procedures are being applied to the application
ii	Whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation
iii	The nature and location of the activity to which the application relates
iv	Where further information on the application or activity can be obtained
v	The manner in which and the person to whom representations in respect of the application may be made
These aspects are addressed in the BIDs, Notices and Adverts. Please see the relevant appendices included as Appendix 7.	
4	A notice board referred to in sub regulation (2) must -
a	be of a size at least 60cm by 42 cm
b	Display the required information in lettering and in a format as may be determined by the Competent Authority
Notices were A2 in size (42 x 60 cm).	
5	Where public participation is conducted in terms of this regulation for an application or proposed application, sub regulation (2)(a), (b), (c) and (d) need not be complied with again during the additional public participation process contemplated in regulations 19(1)(b) or 23(1)(b) or the public participation process contemplated in regulation 21(2)(d), on condition that : -
a	such process has been preceded by a public participation process which included compliance with sub regulation (2)(a), (b), (c) and (d); and
b	written notice is given to registered interested and affected parties regarding where the: -
i	revised basic assessment report or, EMPr or closure plan, as contemplated in regulation 19(1)(b) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due;
ii	revised environmental impact report or EMPr as contemplated in regulation 23(1)(b) may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due; or
iii	environmental impact report and EMPr as contemplated in regulation 21(2)(d)

Legal and Regulatory Requirement: NEMA Regulation 982, Section 41 – Public participation process	
	may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due;
Noted. No deviation required.	
6	When complying with this regulation, the person conducting the public participation process must ensure that:
a	Information containing all the relevant facts in respect of the application is made available to potential interested and affected parties; and
b	Participation by potential interested and affected parties is facilitated in such a manner that all potential interested and affected parties are provided with a reasonable opportunity to comment on the application.
Noted. All environmental reports will be made available for public review for a minimum of 30 days.	
7	Where an environmental authorisation is required in terms of these Regulations and an authorisation, permit or licence is required in terms of a specific environmental management Act, the public participation process contemplated in this Chapter may be combined with any public participation processes prescribed in terms of a specific environmental management Act, on condition that all relevant authorities agree to such combination of processes.
The PPP has been combined for all the authorisations required from the DMR in terms of the MPRDA, NEMA and NEM:WA. The notices have also included information on the water use license application process through the DWS under the NWA.	

8.2 PPP COMPLETED TO DATE

This section summarises the PPP undertaken to date (Please refer to Appendix 7 for a copy of the PPP report):

8.2.1 I&AP CONSULTATION

The existing I&AP database for EGM was reviewed and updated with information and responses received from the press advertisements, notices and the BID's sent out. The I&APs include a database of landowners, adjacent landowners, land users, communities, local authorities, ward councillors and other interest groups. A copy of the I&AP register is included in Annexure A of Appendix 7.

A Scoping Phase Public Meeting was held on the 19 October 2016 at the Evander Rec Club. The purpose of the meeting was to introduce the project to I&APs; explain the application process to be followed; and to discuss the contents of the draft Scoping Report which at the time was out for public review. All registered I&APs were notified of the meeting through the BIDs, posters and adverts. In addition, a

reminder SMS was sent to all registered I&APs prior to the meeting. Copies of the minutes of the meeting have been circulated to all registered I&APs for review and comment (See Appendix 7).

The Draft Scoping Report was made available to the public for review and comment over a period of thirty (30) days (from 4 October 2016 – 3 November 2016) at the following locations:

- Online at www.cabangaconcepts.co.za;
- The Evander Public Library; and
- The EGM central offices.

All registered I&APs were informed of the reports availability via e-mail, fax, post and SMS.

All comments and / or issues raised by I&APs to date have been included in the issues and response table (Table 12) below. These comments were taken into consideration during the compilation of the various studies and the EIA and EMP report.

8.2.2 AUTHORITIES CONSULTATION

An introductory meeting was held with the DMR on the29th August 2016 to discuss the potential listed activities and format of the application.

A pre-application meeting was also held with the Department of Water Affairs and Sanitation (DWS) on the 7th October 2016, to discuss the project and to clarify the way forward with regards to the content and submission of the water use license application.

Other local and Regional authorities were identified and included in the I&AP register, and have been notified of the proposed project by means of the BID.

In addition, copies of the draft Scoping Report and draft EIA EMP report were circulated to the following authorities for review and comment:

- DMR;
- Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET);
- DWS;
- Govan Mbeki Local Municipality;
- Gert Sibande District Municipality;
- South African Heritage Resource Agency (SAHRA); and
- Mpumalanga Tourism and Parks Board.

All comments and / or issues raised by the authorities to date have been included in the issues and response table (Table 12) below. These comments were taken into

consideration during the compilation of the various studies and the EIA and EMP report.

8.3 OUTSTANDING PPP

The draft EIA EMP report (this report) is currently out for public for review and comment. This report will be made available for review between the period of 2 March to 3 April 2017.

A second public meeting has been scheduled for 16th March 2017 at the Evander Rec Club. The purpose of this meeting will be to provide feedback on the outcome of the various specialist studies completed, and highlight any significant impacts identified during the EIA phase.

The final comments will be collated and responded to and included in the Final EIA EMP Report for submission to the DMR.

8.4 SUMMARY OF ISSUES RAISED BY I&APS AND RESPONSES

Table 12: below summarises the issues raised by the various I&APs and authorities to date, and the EAP's response/feedback thereto

Interested & Affected Party	Date Comments Received		Issues raised	Initial Response	Final Response and reference in the EIA / EMP
AFFECTED PARTY					
Landowner/s	**X**				
Koos Louwrens Louwrens Trust Leeuwpan 532 IR: Portions 12 & 13 and Rietkuil 531 IR: RE0	X	19-Oct-16	Once the Winkelhaak and Leslie/Bracken dumps are removed, will the area really be rehabilitated and vegetated? Lots of dumps in Springs have been removed and the areas have not been rehabilitated.	The Environmental Management Plan Report will outline the rehabilitation plan, monitoring and compliance (auditing) measures will be proposed in the EMP.	The footprints of the Winkelhaak and Leslie/Bracken TSFs will be rehabilitated and remediated - see **Section 33.1.3.1** for details on rehabilitation.
			There are many underground workings in the area full with mine water. Why not pump this water out for use in the plant and pump the slimes underground, then there would be no need for surface dumps?	From a practical point of view the slimes will form a cone and will not spread to fill the area, this coupled with the bulking factor would mean that there would be more tailings than space underground. There are also implications in terms of environmental impacts, such as contamination to the groundwater system and is not ideal.	n/a
			Where will water be sourced from for this project?	Water will be sourced from the Leeuwpan dam, the underground workings and the return water dams.	The process plant will only need 8.55Ml/day from Leeuwpan Dam, and thus it can be concluded that the 8.55Ml/day water usage for the project is believed to be sustainable as the dam will contain water beyond the life of the project. See **Appendix 8: Water Balance Report (DRA, 2016).** It must be noted that the Leeuwpan Dam is a licensed mine water dam.
			Leeuwpan Dam is on my farm. The water is very shallow in one section, how will water be pumped from there?	A floating pump station will be used within the dam footprint. All pipelines will be constructed within existing servitudes as far as possible, these will not traverse your property.	The dam was constructed shallow for evaporation purposes. The existing underground pipeline to/from Leeuwpan Dam will be fitted with a floating pump(barge) – see **Plan 5: Final Pipeline Design (DRA).**
			If the Leeuwpan dam gets pumped till empty there will be an extremely big issue with dust. Will a plan be put together for rehabilitation?	Noted. A plan will be included in the EIA EMP report.	The process plant will only need 8.55Ml/day from Leeuwpan Dam, and thus it can be concluded that the 8.55Ml/day water usage for the project is believed to be sustainable as the dam will contain water beyond the life of the project. See **Appendix 8: Water Balance Report (DRA, 2016).** It is however estimated that the dam will shrink from approximately 730 Ha to approximately 300 - 260 Ha over the life of the project and thus on-going rehabilitation will be required – see **Section 33.1.3.4**.
Carel Dirker	X	19-Oct-16	What dust and noise impacts are expected	The TSF will be mined hydraulically using water	See **Appendix 14 and 15**.

Interested & Affected Party	Date Comments Received		Issues raised	Initial Response	Final Response and reference in the EIA / EMP
Brendan Village cc Zandfontein 130 IS: Portions 2 & 5			on Brendan village, situated adjacent to Leslie/Bracken?	cannons. The dust can be mitigated by mining from the down side of the dominant wind direction. This way you are shielded and not changing the outer surface of the TSF. Noise should be limited during the construction and operational phase as no big machinery will be utilized. Construction activities at Leslie/Bracken will be limited to the construction of the pump station and associated pipelines. Tractors and ploughs will be used during the rehabilitation of the TSF footprint once is it removed.	Noise and dust impacts have been assessed in the EIA – **Table 39** summarise the significant impacts identified for the project. The full impact Assessment is attached as **Appendix 18.**
			How will the additional traffic on this road be managed? The road was refurbished two years and needs to be maintained. Maintenance will need to be done on this road.	Additional traffic will be limited to light passenger vehicles e.g. transporting the operators to work and back. No big machinery is needed in the construction or operational phase at the Leslie/Bracken area.	Traffic and safety impacts have been assessed in the EIA. These are expected to be moderate-low. The full impact Assessment is attached as **Appendix 18**
			There is a corner of Bracken/Leslie TSF that falls on Brendan Village's property, the risk and responsibility of this needs to be addressed.	Noted.	The liability for the rehabilitation and management of the Leslie/Bracken TSF lies with EGM until such time that a closure certificate is obtained for the operations.
Dries Venter Brendan Village cc Zandfontein 130 IS: Portion 2 & 5,	X	19-Oct-16	At the end of the project there will be no water left in the Leeuwpan Dam.	The equilibrium level is 735 currently and will drop to 150 and stay there.	The process plant will only need 8.55Ml/day from Leeuwpan Dam, and thus it can be concluded that the 8.55Ml/day water usage for the project is believed to be sustainable as the dam will contain water beyond the life of the project. See **Appendix 8: Water Balance Report (DRA, 2016).** It is however estimated that the dam will shrink from approximately 730 Ha to approximately 300 – 260 Ha over the life of the project and thus on-going rehabilitation will be required – see **Section 33.1.3.4**.
M.Wienand/Van Heerden Schoeman Attorneys Representing Winkelhaak 135 IS RE3	X	27-Oct-16	Permission to extend the Kinross Tailings Storage Facility on Remainder Portion of the farm Winkelhaak 135 IS.	Noted.	n/a
Lawful occupier/s of the land	**X**				
No comments received to date					
Landowners or lawful occupiers on adjacent properties	**X**				
Willie Oosthuizen JVS Scaffolding, Adjacent	X	12-Oct-16	Concerned about: 1. Reduction in property value – future high risk project.	Noted.	See **Appendix 14** for the air quality study. Impacts with regards to social, property pricing and dust have been assessed in the EIA – **Table 39**

Interested & Affected Party	Date Comments Received		Issues raised	Initial Response	Final Response and reference in the EIA / EMP
Industrial Area			2. Sensitive machinery fails as a result of dust. 3. The air is already polluted (dust).		summarise the significant impacts identified for the project. The full impact Assessment is attached as **Appendix 18.**
		15-Nov- 16	Queried the date of the next public meeting.	A Second Phase Public meeting will be in 2017 during the EIA phase, invitations will be sent to all registered I&APs.	Mr.Oosthuizen has been invited to attend the second Public Meeting.
		15-Feb-17	Queried the date of the next public meeting; stated that a project goes ahead regardless of objections from public. Mentioned that DMR representatives had been establishing which local businesses could assist in the Evander Gold Mine project.	A Second Phase Public meeting will be in 2017 during the EIA phase, invitations will be sent to all registered I&APs. All comments and/or objections received will be incorporated into the final report for submission to the DMR. The DMR will then make a decision on the project. Note: the design engineers, DRA (and not DMR), were undertaking a survey of local business for procurement purposes.	Mr.Oosthuizen has been invited to attend the second Public Meeting. EGM is committed to procuring material and labour from the local area as far as possible.
Pieter Fourie, Adjacent Industrial Area	X	12-Oct-16	Our properties are our investments; the project will influence the property prices.	Noted. Will be assessed further in the EIA / EMP phase.	Impacts with regards to social, property pricing and dust have been assessed in the EIA – **Table 39** summarise the significant impacts identified for the project. The full impact Assessment is attached as **Appendix 18.**
			Concerned about the risk of the TSF failing.	Noted. Will be assessed further in the EIA / EMP phase.	The preliminary safety classification of the TSF has been carried out in accordance with the requirements of SANS 10286 (1998). **Section 10.1.12** summarises the safety classification; refer to **Appendix 6** for the detailed assessment.
			Dust and construction activities will affect business.	Noted. Will be assessed further in the EIA / EMP phase.	See **Appendix 14** for the air quality study. Impacts with regards to social, property pricing and dust have been assessed in the EIA – **Table 39** summarise the significant impacts identified for the project. The full impact Assessment is attached as **Appendix 18.**
Lavonne Croeser- Moco Steel, Adjacent Industrial Area	X	12-Oct-16	Completed BID and requested to be registered as an I&AP.	Noted and included in all future PPP.	n/a
Raphael Botha Pensioner in Residential Area opposite Evander TSF	X	19-Oct-16	What impact will the project have on properties in town?	Noted. Will be assessed further in the EIA / EMP phase.	Impacts with regards to social, property pricing and dust have been assessed in the EIA – **Table 39** summarise the significant impacts identified for the project. The full impact Assessment is attached as **Appendix 18.**
			Concerned about cracks.	There is no blasting for this project. Only hydraulic mining of the TSF using water cannons (surface mining of the dumps).	n/a
Municipal Councillor	**X**				
No comments received to date					

Interested & Affected Party	Date Comments Received		Issues raised	Initial Response	Final Response and reference in the EIA / EMP
Municipality	**X**				
Dan Hlanyane Gert Sibande Municipality	X	7-Nov-16	Requested electronic copies of the Scoping Report.	Scoping Report was made available electronically.	n/a
		27-Feb-17	Activities associated with proposed project must occur in an environmentally responsible manner in line with the duty of care principle.	Noted.	The EIA / EMP has been compiled in line with NEMA and the duty of care principle.
			The activities may not commence without the necessary authorisations in terms of the relevant legislation.	Noted.	The necessary applications are being sought in terms of NEMA, NWA and NEM:AQA.
			Relevant studies must be conducted and reported in the EMPr.	Noted.	The various studies have been completed as per the Scoping Report. These are reported within Section 9, and attached as Appendices where relevant.
			Gert Sibande District has 26 % of the area classified as CBA. Areas of high biodiversity importance must be kept with no further loss of habitat or species.	Noted.	
			Targeted site forms part of the CBA as it is reflected as minor CBA. Proposed project must be: • Outside areas with high flora and fauna sensitivities. • If relocation has to occur the required licenses/permits must be obtained. The project must not be implemented in environmentally sensitive areas as indicated in the Spatial Development Plan and Environmental Management Frameworks. Environmental Planning Tools applicable to project must be effected in planning and decision making.	Noted.	The site was chosen following an alternatives assessment, and was deemed to be the least environmentally sensitive of the sites identified (see **Section 7** and **Appendix 6).** The Mpumalanga Biodiversity Sector Plan (Plan 22) shows that most of the area is disturbed. The Spatial Development Framework identifies the area as urban agriculture. Some plant species of conservation concern have been identified on site and will be relocated following discussions with the MTPB.
			Wetland management plan, soil management plan, surface and groundwater management plan, biodiversity management plan, storm water management plan, waste management plan, alien invasive plants management plan, rehabilitation management plan, and other specialist reports to be included in EMP and implemented to mitigate potential impacts.	Noted.	**Part B** of this report outlines the various management plans.
			Maintenance plan of infrastructure to avoid incidences, spills and leaks due to poor maintenance.	Noted.	Regular inspections will be conducted of all pipelines and machinery so as to avoid incidence. This has generally been included in the EMPr (**Part B**) as a management measure.
			Storage of hazardous material must be in an	Noted.	All dangerous materials will be stored within

Interested & Affected Party	Date Comments Received		Issues raised	Initial Response	Final Response and reference in the EIA / EMP
			environmentally friendly manner and floors must be bonded.		bunded areas as per the applicable MSDS. This has generally been included in the EMPr (**Part B**) as a management measure.
			Project manager must adhere to mitigation measures on noise contributions.	Noted.	Noise management measures and monitoring frequency has been included in this EMPr (**Part B**) where relevant.
			Prior to commencement of project to submit dust fugitive management plan as well as dust management programme to district Air Quality officer. Dust generated by construction must be at a level prescribed for residential areas and those defined for non-residential (NEM:AQA).	Noted.	The air quality study is included as Appendix 14 and includes a dispersion model. This report will be submitted to the district Air Quality officer where applicable. Dust management measures have been included in the EMPr (**Part B**) where applicable.
			Commencement of proposed project must be avoided on heritage sites. If it cannot be avoided applications via SAHRA to take place.	Noted.	A HIA has been completed for the proposed project and submitted to SAHRA (see **Appendix 13**). It is expected that the construction of the RWDs will impact on an old farmyard (Site 11A); as such the necessary applications will be made to the applicable Heritage Authority (see **Section 9.1.10**).
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA etc.	**X**				
No comments received to date					
Communities	**X**				
Steve Shabangu Sakhisizwe Community Witkleifontein 131 IS:Portion 1	X	19-Oct-16	When it rains the return water dam at Kinross overflows into the streams. Our cattle drink this water and die.	Water monitoring results indicate high sodium this should not kill the cows. Water qualities will be assessed further in the EIA / EMP.	The Kinross Kariba RWD has been redesigned and will be refurbished as part of the Elikhulu project. The RWD will be lined with a Class C barrier. See **Appendix 6** for details. **Section 9.1.4** details the surface water monitoring results. **Table 39** summarise the significant impacts identified for the project. The full impact Assessment is attached as **Appendix 20.**
			Dust from the Kinross TSF is already a problem. Worried about the dust levels from the proposed expansion.	Noted. This issue will be investigated further during the EIA / EMP phase of the project.	The new TSF will be designed with the aim of closure and therefore on going concurrent rehabilitation of the side slopes will be considered in the design of the cover system. See **Appendix 14 and 15** for the air quality study. **Table 39** summarise the significant impacts identified for the project. The full impact Assessment is attached as **Appendix 18.**

Interested & Affected Party	Date Comments Received		Issues raised	Initial Response	Final Response and reference in the EIA / EMP
Dept. Land Affairs	**X**				
Ntloko Gobodo Commission on Restitution of Land Rights	X	19-Jan-17	Confirmed there are no land claims on the following: Winkelhaak 135 IS RE3, Winkelhaak 135 IS 13, Winkelhaak 135 IS 56, Winkelhaak 135 IS 84, Winkelhaak 135 IS 86, Leeuwspruit 134 IS RE0, Witkleifontein 131 IS RE0, Witkleifontein 131 IS 1, Witkleifontein 131 IS 2, Witkleifontein 131 IS RE 3, Witkleifontein 131 IS RE 4, Zandfontein 130 IS 2, Zandfontein 130 IS 3, Zandfontein 130 IS 5, Zandfontein 130 IS 8, Zandfontein 130 IS 9, Grootspruit 279 IS RE0, Langverwacht 282 IS 2, Leeuwpan 532 IR 12,Leeuwpan 532 IR 13, Rietkuil 531 IR RE0, Springbokdraai 277 IS 1	Noted.	n/a
Traditional Leaders	**X**				
No comments received to date					
Dept. Environmental Affairs	**X**				
No comments received to date					
Other Competent Authorities affected	**X**				
Regional Manager Department of Mineral Resources	X	13- Oct- 16	Acknowledgement of application of consent for Section 102.	Noted.	n/a
Jan Venter Department of Agriculture, Forestry & Fisheries	X	19-Oct-16	Requested that the Land Use Management Plan for the Govan Mbeki Municipality be consulted, as the project falls within the urban edge. Recommended that Evander Gold Mines and Cabanga contact Nick van Der Merwe from the Municipality in this regard to ensure there are no conflicts.	Noted. EGM have been in discussions with Nick van der Merwe for the past 9 – 10 years.	Kinross and Winkelhaak fall within the urban edge of the Greater Secunda area. Nick van der Merwe was included as I&AP for the project. According to the Spatial Development Plan, the new TSF footprint area is zoned for agriculture.
			According to available information the Department of Human Settlements have purchased the entire Winkelhaak for future settlement developments so this needs to be investigated. GIS data indicates that the Kinross and Winkelhaak complex falls on the farm Winkelhaak.	Noted. This will be investigated further.	Title Deed searches confirm that the farm portions in question have not been purchased by the Department of Human Settlements.
			Requested that all this information be made available in spatial format.	Agreed.	Shapefiles will be made available to the Department.
Nick van der Merwe		13-Feb-17	The mine needs to comply with the Land Use Scheme that implies you will have to appoint a registered Town Planner for the Rezoning and	Noted.	The project area falls within the approved mining right, EGM has been operational since the 1950's. The need for a rezoning application is currently

Interested & Affected Party	Date Comments Received		Issues raised	Initial Response	Final Response and reference in the EIA / EMP
			relevant land Use applications.		being investigated by EGM.
DPS Hlatshwayo- Agriculture, Rural Development, Land and Environmental Affairs	X	14-Nov-16	Draft report has been evaluated. Department has no comment at this stage but will appreciate to be afforded the opportunity to comment on the final draft once completed.	Noted.	A copy of the EIA EMP report will be circulated to the Department for comment.
Matome Montsha- Department of Mineral Resources	X	27-Jan-17	Scoping Report accepted. EIA to include: 1. Superimposed map with proposed activities and infrastructure with buffers for environmental sensitive areas. 2. Financial provisions for rehab, closure and on-going post decommissioning management. 3. Feasible and reasonable alternatives identified and assessed. 4. PPP to be transparent and all comments included in EMP. 5. Proof of correspondence with stakeholders. 6. Comments from I&APs to be in EIA. 7. For linear activities coordinates of corridor where activities will be undertaken. 8. Any other matters required in Appendix 3(3) and Appendix 4 (1) on EIA Reg 2014. 9. EIA timelines to be complied with. 10. A3 maps of area of exact location of proposed development to have the following attributes: maps related to on another, coordinates, legends, indicating alternatives, scale and vegetation types. 11. No activity may commence prior to environmental authorisation.	Noted. These have been included in the EIA EMP report.	Environmental Sensitivity map included – see **Plan 30.** Financial Provision addressed in **Section 33**. Alternatives considered for the project are detailed in **Section 7** and **Appendix 6**. Details of PPP included **in Section 8** and **Appendix 7**. Copies of all comments and correspondence receives are included therein. **Table 6** and **Table 7** detail the coordinates of the linear activities. The relevant Regulations and Appendices have been considered. All submissions have complied with the relevant timelines. A3 maps have been included in **Appendix 2**. No activities have commenced to date.
Nokukhanya Khumalo South African Heritage Resource Agency (SAHRA)	X	9- Dec- 16	SAHRA still requires a heritage assessment for the proposed activities outlined in the Scoping Report, the HIA should also include a map of the heritage resources that will be or may be impacted by the proposed activities, overlaid with the proposed project areas. This HIA should be conducted by a qualified Archaeologist.	Noted.	A Phase I HIA has been completed for the proposed project, see **Appendix 13.** The findings of which have been incorporated into the EIA EMP report. **Table 39** summarise the significant impacts identified for the project. The full impact Assessment is attached as **Appendix 18.**
			The underlying geology consists of colluvial and alluvial sands, silts and clays which overlie	Noted.	A desktop PIA has been completed for the proposed project, see **Appendix 13.** The findings of

Interested & Affected Party	Date Comments Received		Issues raised	Initial Response	Final Response and reference in the EIA / EMP
			sandstone, mudrock and coal of the Vryheid Formation. The Vryheid Formation has a very high sensitivity for the occurrence of fossiliferous rocks as such a Palaeontological Impact Assessment (PIA). The PIA must be conducted by a suitably qualified palaeontologist.		which have been incorporated into the EIA EMP report. **Table 39** summarise the significant impacts identified for the project. The full impact Assessment is attached as **Appendix 18.**
OTHER AFFECTED PARTIES	**X**				
No comments received to date					
INTERESTED PARTIES	**X**				
Xolani Mahlangu Govan Mbeki Forum	X	19-Oct-16	Will labour be sourced locally for this project? We cannot always fight with them to recruit locally. We want 50 percent black owned and 10 percent youth owned.	Employment and procurement will be according to the mine's Social and Labour Plan.	A business and labour forum has been established. Information on job specifications / vacancies and business opportunities will be highlighted through the forum. **See Appendix 7 – Annexure I**.
			Will the material for the reservoir etc. be sourced locally?	Employment and procurement will be according to the mine's Social and Labour Plan.	A business and labour forum has been established. Information on job specifications / vacancies and business opportunities will be highlighted through the forum. **See Appendix 7 – Annexure I**.
			The slimes pipelines should be constructed within trenches in the event of a leak/burst pipe.	This will be investigated further in the EIA / EMP phase of the project. Mitigation measures will be proposed in the event of a spill leak.	The pipelines will be constructed within earth paddocks. **Section 27** details the management measures proposed.
			Where is the pump from the dam to the reservoir going to be built?	A pump house will be constructed at each of the TSFs as well as a floating pump at the Leeuwpan Dam (position of these were indicated on a plan).	The position of the pump stations, pipelines and floating pump (barge) are indicated in **Plan 5.**
			Water usage needs to be managed better to avoid wastage.	Noted. Water saving initiatives will be included in the EMP.	Water will be recycled as far as possible. **Section 27**details the management measures proposed.
			Apparently Taung Gold's water is also going to the Leeuwpan Dam and there were plans of building a water treatment plant. Concerned about where all the water is going to come from for this process.	Noted. Water usage will be investigated further during the EIA / EMP phase and the IWULA / IWWMP.	The Leeuwpan dam is licensed as a 21g disposal facility in EGM's existing water use license. The dam serves as an evaporation facility for excess mine water pumped from the underground workings, the TSFs and plant operations within EGM. The proposed project will utilise this facility to return water to the new plant. No water treatment plant is currently planned at the Leeuwpan Dam.
			There will only be160 permanent jobs for the new plant? I think Pan Africa can do better and make it 250 jobs.	Noted.	Approximately 700 temporary jobs will be created during the construction phase, and ±250 permanent jobs will be created for the life of the project. See **Section 4.4.8**
			Concerned about security, there are a lot of	EGM is currently sampling all surface areas to	n/a

Interested & Affected Party	Date Comments Received		Issues raised	Initial Response	Final Response and reference in the EIA / EMP
			Zama-zamas in the area. What additional security measures will be put in place? A barricade is needed such as a barbed wire and a "Private Property" sign to stop them from entering.	determine the gold levels, these will then be stripped. By removing potential sources EGM is hoping to stop the influx of illegal miners. The barricades don't last long as they steal it and sell it as scrap metal. It is very expensive to do and doesn't last. The mine's security is working with the SAPS to get plans in place to arrest the illegal miners.	
			Please include guidelines on how to object in the next meeting.	Noted.	Comments and/or objections can be sent to Cabanga, or alternatively to the DMR directly (must include the project reference number) – contact details will be included in the presentation at the 2ndPPP Meeting. Details on how to appeal the final decision will be included in the notification of the record of decision, once this is received from the DMR.
Sakhile Mahlangu Quatro SA Pty Ltd	X	19-Oct-16	The Municipality should be involved in this process. Issues of local entrepreneurship needs to be covered and addressed in this meeting, there is currently no platform to deal with these issues.	Both local and district municipalities (as well as the various councillors) were included as I&APs and invited to the PPP meeting. Employment and procurement will be according to the mine's Social and Labour Plan. Recommended that EGM schedule a separate meeting or establish a forum for these issues.	A business and labour forum has been established with the assistance of the Municipality. Information on job specifications / vacancies and business opportunities will be highlighted through the forum. **See Appendix 7 – Annexure I**.
			How long is the construction phase? And what is the overall life of project?	Construction of the pump stations at the Leslie/Bracken and Winkelhaak will be approximately 1 month. Construction of the plant etc. at Kinross will be approximately 12 months. The overall life of project is 14 – 15 years.	See **Section 4.4.2**
			How often will public meetings be held?	Only two meetings are proposed for the environmental authorisation process, this meeting and a second meeting the EIA Phase. The next meeting will discuss the significant impacts and the findings of the specialist studies.	Mr.Mahlangu has been invited to attend the second Public Meeting.
Nkosikho Khontsiwe Nkhontsiwe Construction	X	19-Oct-16	Have noted radioactive signs around the existing dumps. Could runoff from these not be affecting the water quality in the nearby streams and rivers? Is this not what is killing the cows?	The safety signs are a requirement in terms of the Nuclear Act. The mine's Uranium levels are low and well below the thresholds. Monitoring is undertaken and the mine complies with the Nuclear Act.	Current radiation monitoring indicates that radiation to the surrounding environment is within acceptable dose limits. Monitoring will continue.
Smanga Lephoto Black Business Youth Council	X	19-Oct-16	What is the recovery rate for the tailings?	The tailings will be mined at a rate 1, 2 million tonnes per month.	**Section 4.4.1** details the reserve estimation.
Thembinkosi Cyprian Nkambule	X	03-Nov-16	Sent in his CV, queried available positions.	CV will be sent to EGM to be kept on file.	A business and labour forum has been established. Information on job specifications / vacancies and business opportunities will be highlighted through

Interested & Affected Party	Date Comments Received		Issues raised	Initial Response	Final Response and reference in the EIA / EMP
					the forum. **See Appendix 7 – Annexure I**.
Sello Samson Nthinya Evander Resident	X	03-Nov-16	Sent in his CV, queried available positions.	CV will be sent to EGM to be kept on file.	A business and labour forum has been established. Information on job specifications / vacancies and business opportunities will be highlighted through the forum. **See Appendix 7 – Annexure I**.
Ngcondobeza General Trading-Bethal	X	04-Nov-16	Would like to register as a Vendor.	Information sent to EGM to be kept on file.	A business and labour forum has been established. Information on job specifications / vacancies and business opportunities will be highlighted through the forum. **See Appendix 7 – Annexure I**.
Menzi Hlakukane Embalenhle Resident	X	04-Nov-16	Would like to register as a Vendor.	Information sent to EGM to be kept on file.	A business and labour forum has been established. Information on job specifications / vacancies and business opportunities will be highlighted through the forum. **See Appendix 7 – Annexure I**.
Lehlohonolo Patsa Embalenhle Resident	X	25-Jan-17	Concerned about air pollution.	Noted. Will be assessed further in the EIA / EMP phase.	The new TSF will be designed with the aim of closure and therefore on going concurrent rehabilitation of the side slopes will be considered in the design of the cover system to reduce any potential air quality issues. See **Appendix 14 and 15** for the air quality study. **Table 39** summarises the significant impacts identified for the project. The full impact Assessment including mitigation measures is attached as **Appendix 18.**

9 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES

9.1 TYPE OF ENVIRONMENT AFFECTED BY THE PROPOSED ACTIVITY

9.1.1 CLIMATE

Mpumalanga, thus Evander, experiences a sub-tropical climate with hot summers and mild to cool winters. The wind speed remains relatively stable at about 10km/h throughout the year with a 2-4 km/h increase during the summer months.

Rainfall occurs during the summer months between October to March, with the highest rainfall occurring in December. Below is a table summarising the precipitation and temperature of Evander, Mpumalanga.

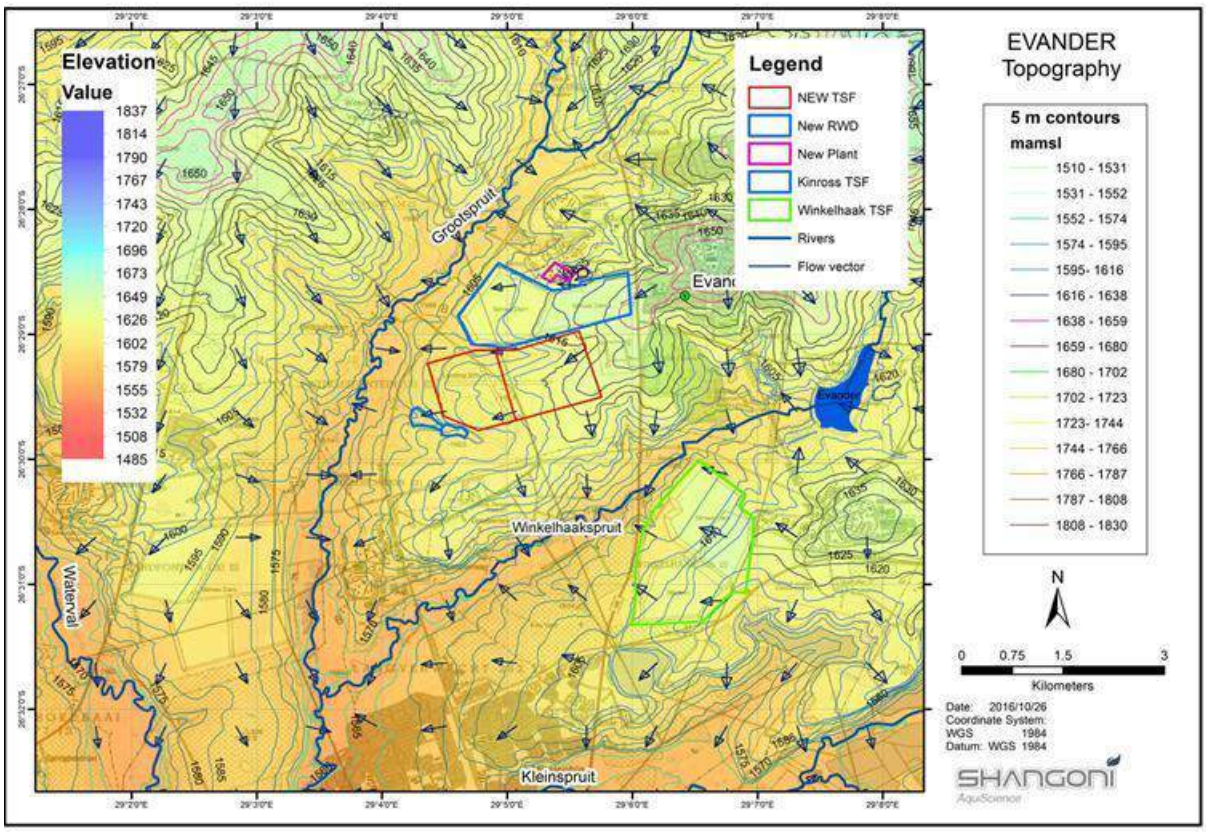
Table 13: Mean Regional Climatic Data

Month	Precipitation (mm)	Evaporation (mm)	Min Temperature (°C)	Max Temperature (°C)	Mean Temperature (°C)
January	145	155	11.1	29.6	20.4
February	76	145	11.1	29.2	20.2
March	61	141	9.1	26.6	18.2
April	60	100	3.6	25.2	14.3
May	21	90	0.9	20.9	11.8
June	6	70	-0.9	18.6	8.6
July	7	79	-3.4	17.2	8.4
August	12	116	-1	23.5	10.9
September	24	149	0.4	24.8	14.7
October	78	173	2.6	28.1	16.5
November	110	140	4.6	28.4	18.5
December	103	171	11.2	30	20.3
Total	704	1530			

9.1.2 TOPOGRAPHY

The topography of the project area is characterised by a combination of flat and undulating grassland, with elevations ranging between 1,600 mamsl to 1,617 mamsl.

The overall mining area generally slopes from north to south. The surface area slopes downward from the Leslie TSF towards the Waterval River to the south and south-west of the TSF. The surface area slopes downward from the Kinross and Winkelhaak TSFs towards the Leslie TSF (Shangoni, 2016).

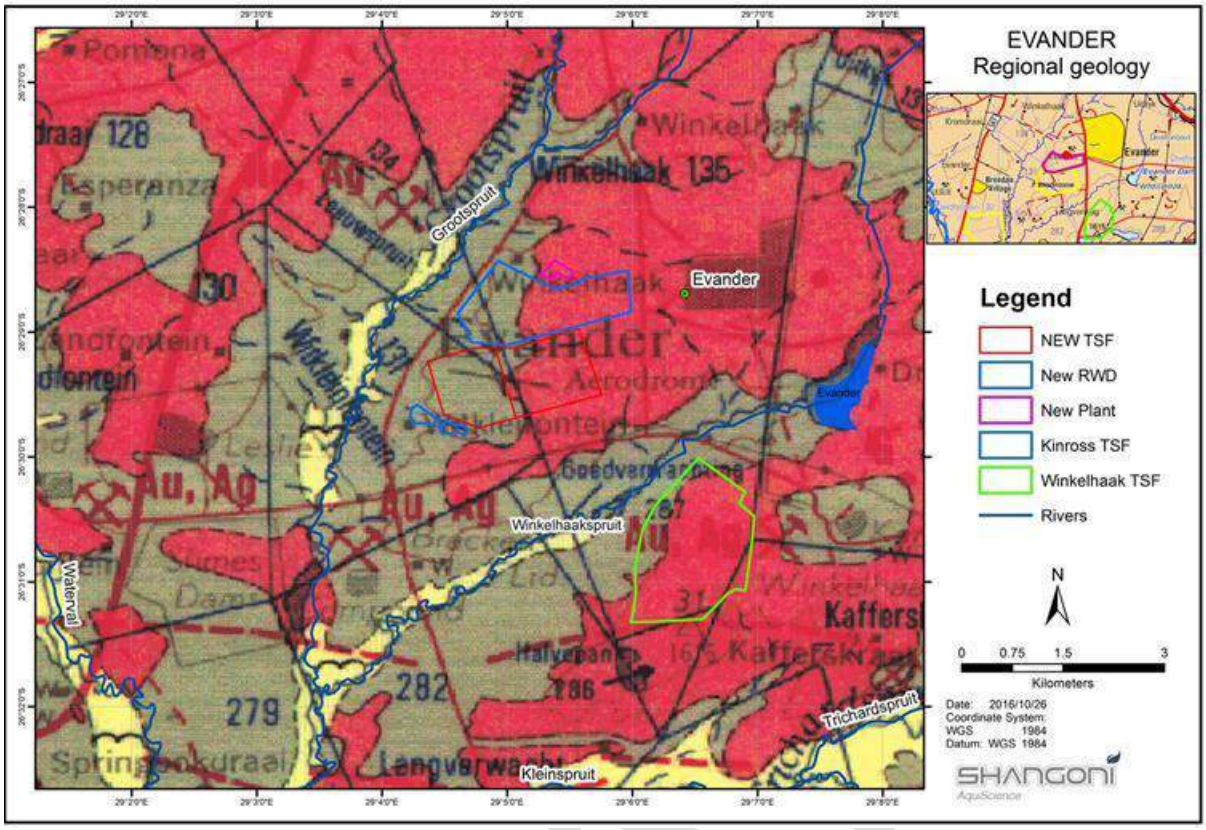


Plan 8: Topography (Shangoni, 2016)

9.1.3 GEOLOGY, LAND TYPE AND SOILS

The Evander Goldfield is situated on the north-eastern limb of the Witwatersrand Basin, approximately 110 km east-southeast of Johannesburg and hosts several operating and defunct gold mines, all of which produce or produced gold from the Kimberley Reef of Central Rand Group of the Witwatersrand Supergroup. The Witwatersrand Supergroup strata are partially overlain by the Transvaal and Ventersdorp Supergroup sequences and all are entirely overlain by the Karoo Supergroup.

The proposed locations of the New TSF and treatment plant are directly underlain by rocks of the Vryheid Formation occurring in the Ecca Group of the Karoo Supergroup. The Vryheid Formation consists predominantly of thick beds of yellowish to white cross-bedded sandstone and grit alternating with beds of soft sandy shale. The Vryheid Formation also contains coal seams and is widely intruded by dolerite sills. The project area is thus located on recent colluvial and alluvial sands, silts and clays which overlie the weathered and fractured sandstone, mudrock and coal of the Vryheid Formation.



Plan 9: Regional Geology (Shangoni, 2016)

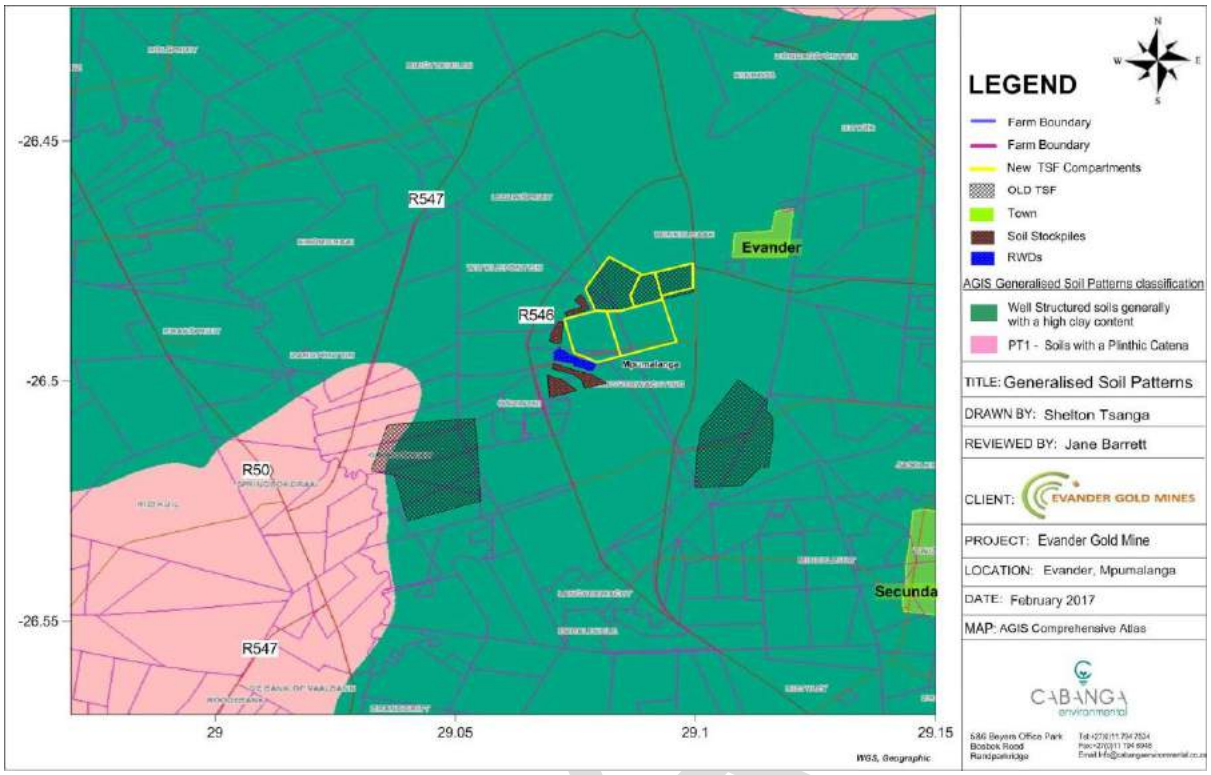
The regional geology gives rise to the land type Ea20. Typical soils within Land type EA20 are characterised as follows:

- Higher lying landscape positions dominated by rock outcrops and shallow swelling soils.
- Midslope positions dominated by variable depth structured soils, often with swelling properties.
- Valley bottom positions dominated by poorly drained non-swelling soils and exposed streambeds.

As indicated in Plan 10 below, the proposed New TSF and Elikhulu plant and associated infrastructure lies within the Midslope position within terrain class A2. Average soil depth ranges form 450 – 750 mm in depth. The area has a low – moderate susceptibility to water erosion and such the soils have low – moderate erodibility.

The soils in the area are typically not susceptible to acidification. The pH ranges 6.5 – 7.4 rendering the soils saline in nature. The soils have a high clay content > 55% resulting in soils with a high Moderate – high swelling capacity. The high content impedes drainage as resulting in a low water holding capacity of between 21-40 mm.

The Leeuwpan Dam falls onto the land type Bb3 which is characterised by dominantly yellow-brown, freely drained soils on soft plinthite (Limosella, 2011).

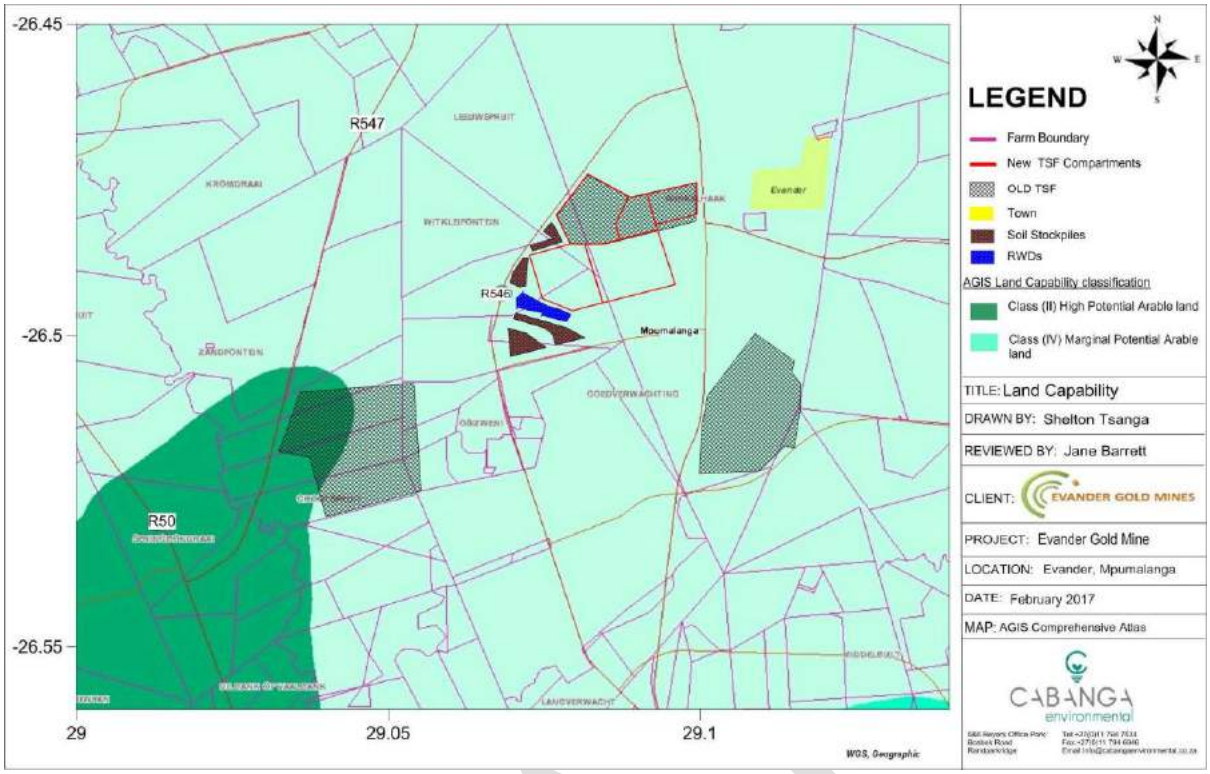


Plan 10: Land Type (Generalised Soil Patterns)

The proposed project area falls within land capability class IV as shown in Plan 11 below. According to the Department of Agriculture Forestry and Fisheries Class IV is characterised as follows:

- Class IV – Land has very severe limitations that restrict the choice of plants, require very careful management, or both; it may be used for cultivated crops, but more careful management is required than for Class III and conservation practices are more difficult to apply and maintain; restrictions to land use are greater than those in Class III and the choice of plants is more limited.

The area has a marginal potential for arable farming, and a high agricultural potential for dryland cropping. Grazing capacity is generally low.



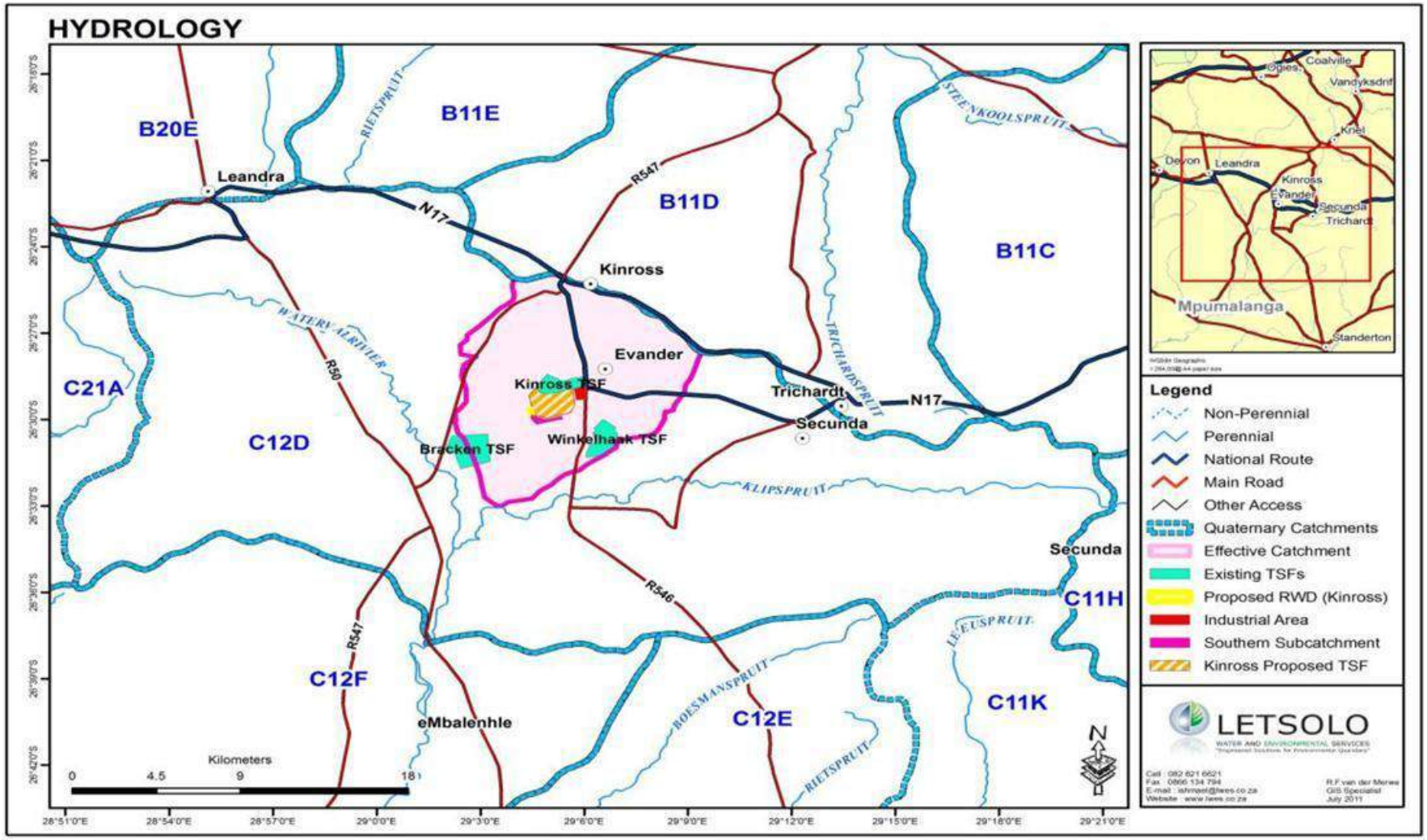
Plan 11: Land Capability

9.1.4 SURFACE WATER

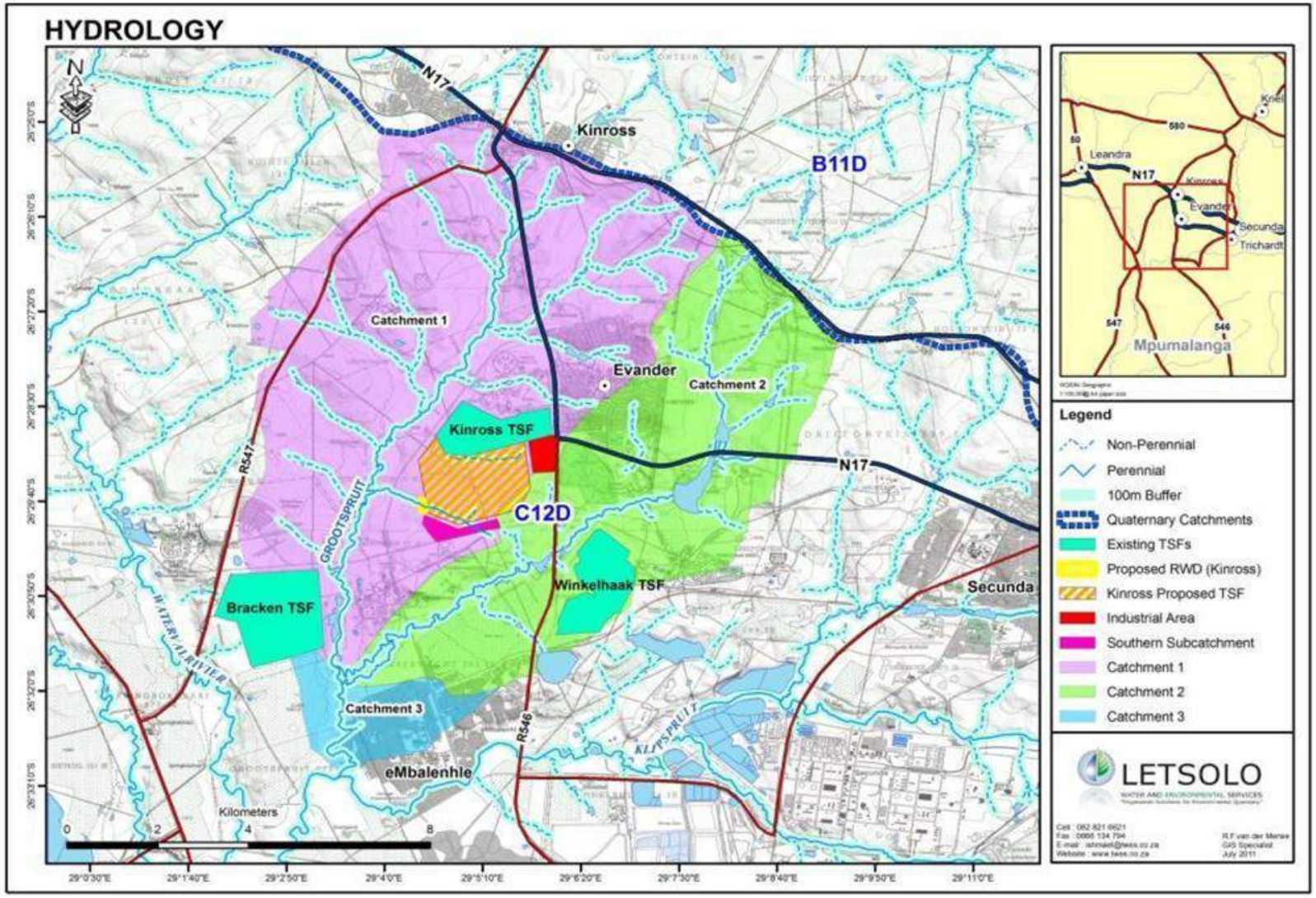
A hydrological assessment was undertaken by Letsolo Water and Engineering Services CC (Letsolo, 2016). Refer to Appendix 8 for the full report, which is summarized in this section.

9.1.4.1 CATCHMENTS

The study area falls within The Upper Vaal Water Management Area (WMA 8), and the C12D Quaternary Catchment (Plan 12). The study site has been delineated into site specific catchments where the proposed infrastructure is within; the "Effective Catchment" (Plan 13). This contains local catchment 1, 2 and 3. Furthermore, the artificially contained catchment areas have been delineated and calculated, which are no longer hydrologically linked to the natural catchments due to dirty water containment measures.



Plan 12: Quaternary Catchment Area (Letsolo, 2016)



Plan 13: Site specific delineated catchments (Letsolo, 2016)

9.1.4.2 HYDROLOGICAL CHARACTERISTICS

The hydrological characteristics of these catchments have been calculated through statistically downscaling the quaternary catchment runoff data. These results are summarised below as taken from Letsolo (2016).

Table 14: Summary of Natural Catchment Hydrological Characteristics

Catchment	Surface Area (km^2)	Hydraulic Length (km)	Change in height (m)	Significant Water Resource	MAR (m^3/a)
C12D	901	48	115	Perennial Klipspruit river	53 429 300
Effective Catchment (1,2&3)	114	17.7	99	Perennial Grootspruit	6 760 200
Catchment 1	67.3	14.52	99	Perennial Grootspruit	3 990 890
Catchment 2	40.2	11.29	95	Perennial Winkelhaakspruit	2 383 860
Catchment 3	6.1	3.43	2	Perennial Grootspruit	361 730

Table 15: Summary of Artificial Catchment Hydrological Characteristics

Catchment	Surface Area (km^2)	MAR (m^3/a)
Winkelhaak TSF	2.19	129 867
Leslie TSF	3.49	206 957
Kinross TSF	1.75	103 775
Extended Kinross TSF	3.49	206 957
Metallurgical Plant	0.085	5030
Elikhulu Plant	0.005	322
Industrial Site	0.415	2460.95
Southern Sub-Catchment	0.386	22889.8

9.1.4.3 FLOOD CALCULATIONS

The following tables are taken from Letsolo (2016) for flood peak calculations of the delineated catchments.

Table 16: Summary flood peak flows for all delineated catchments

Catchment Description	Peak Flow in m3/s Qp50	Peak Flow in m3/s Qp100
C12D quaternary Catchment	599.91	834.94
Effective Catchment	246.92	333.40
Catchment 1	179.01	240.17
Catchment 2	111.32	152.16
Catchment 3	13.49	18.72

Table 17: Summary flood peak flows for delineated artificial catchments

ID	1:50 years Peak Flow Qp50	1:50 years Volume V50	1:100 years Peak Flow QP100	1:100 Years Volume V100
Elikhulu Processing plant	0.231	112.266	0.3	145.8
Kinross TSF	23.84	157057.9	30.86	203305.7
Kinross TSF extension	37.64	262200.2	48.68	339104.9
Winkelhaak TSF	34.36	185544	44.46	240084
Leslie/Bracken TSF	46.74	312971	60.45	404773.2
Industrial Catchment	8.012	36414.54	10.02	45540.9
Southern Sub-catchment Area	4.956	26717.8	6.419	34604.83

9.1.4.4 WATER QUALITY

EGM has a program in place for monitoring of potential impacts from the existing infrastructure as part of the existing EMP. Thus, the surface water assessment was completed by Letsolo (2016) in alignment with the five surface water monitoring points of the existing monitoring program. These points are located upstream and downstream of the three TSFs, which gives a clear picture of the current impact on the receiving Grootspruit River system from surrounding activities. The points are shown in Plan 14 and described in Table 18.

Two sets of water quality results presented; one being the average results from the current EGM monitoring program spanning July 2015 to July 2016 (Table 19), and the other is Letsolo tested results from September 2016 for the EIA (Table 20). It is evident that BM3 (MP-B) and KM4 (MP-C) are the most contaminated monitoring points

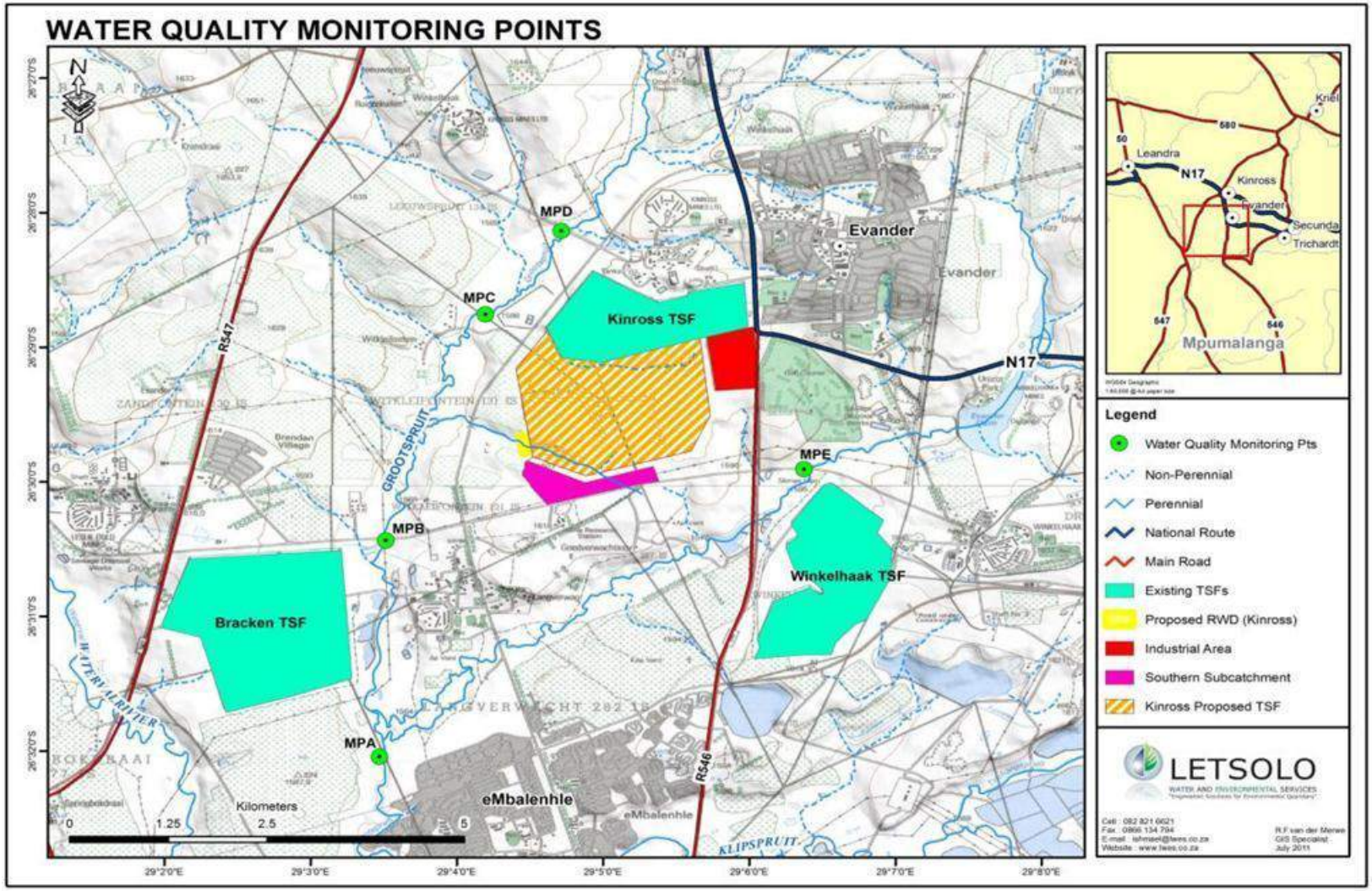
along the Grootspruit, with many measured constituents outside of the allowed limits.

Letsolo concluded the following from the monitoring results:

- MPA – BM2 was highly impacted by agricultural activities such as small scale farming and sewage effluents from the informal dwellings. This is indicated by high concentrations of Ammonia, phosphates, and E. Coli/ 100 ml which is greater than 100 000, and high metals such as Fe and Mn.
- MPB – BM3 is impacted by agricultural and mining activities. This is indicated by the high concentrations of Na, Cl, EC and TDS.
- MPC – KM4 is impacted by mining activities such as the seepage from the RWD (Kinross Kariba Dam). This is indicated by high concentrations of the salts such as Cl, Mg, Na and Ca, and high sulphate concentration of 153 mg/l. Elevated sulphates and manganese are good indicators of mining related contaminants.
- MPD – KM2 is impacted by mining activity, possibly the Toe Dam at the plant. There is overflow of water from the mine footprint to the stream that confluences with the Grootspruit at MPD during rainy seasons. This is indicated by high concentrations of salts such as Na & Cl, as well as high EC and TDS.[1]
- MPE is located downstream of the sewage plant and is shown to be impacted by the runoff effluents; indicated by high concentrations of Ammonia 22 mg/l and phosphates 3.18 mg/l.
- KM6 doesn't show any contamination in all elements analysed. This monitoring point is located upstream of the Kinross Mine Complex along Grootspruit.

Please refer to Appendix 8 for the full report.

[1] It must be noted that this site largely receives storm water runoff from the Evander Town and this will have an impact on the water quality.



Plan 14: Current and Proposed Surface Water Monitoring Points (Letsolo, 2016)

Table 18: Description of Surface Water monitoring points

Letsolo Point ID	EGM existing Point ID	Latitude (S) Longitude (E)	Location description	Field Observation	Picture
MPA	BM 2	26° 32' 02.70" 29° 3' 28.56"	Grootspruit below confluence of the Winkelhaakspruit - Downstream of Kinross, Winkelhaak and Bracken complexes	Farming (grazing) activity taking place. Presence of rubble in proximity to the stream. Small community nearby. Water appears dirty with lots of suspended solids.	
MPB	BM3	26° 30' 23.878" 29° 3' 32.2"	Grootspruit at bridge on Leslie - Bracken mine road	No flow observed. Water was ponding hence no sample was collected.	
MPD	KM 2	26° 28' 08.26" 29° 4' 43.01"	Grootspruit at the 1st bridge on the No.7 to No. 8 shaft road	Water was ponding, and appeared brownish. There's evidence that the stream receives high volumes of storm water during high rainfall periods, as evident by the grass hanging on the bridge.	

Letsolo Point ID	EGM existing Point ID	Latitude (S) Longitude (E)	Location description	Field Observation	Picture
MPC	KM4	26° 28' 32.429" 29° 4' 14.39"	Grootspruit below the Kinross Kariba dams	Water appears clear with suspended solids. There's green algae' growing on the water. There's re-processing of tailings from the RWD (Kinross) observed.	
N/A	KM6	26° 27' 32.92" 29° 05' 11.93"	Grootspruit upstream of the Kinross mine complex	No sample was collected here.	N/A
MPE	N/A	26° 29' 54.6"	Winkelhaakspruit - Upstream of Winkelhaak mine complex at the bridge 508 m away of R546 Road. Downstream of the sewage works.	Little flow was observed. Water appeared clear to brownish.	

Table 19: Surface Water Quality average results July 2015 to July 2016 (EGM)

EGM MPs	SANS 241-2015 water quality standards															
	Ca	Mg	Na	K	Cl	SO_4	F	B	pH	EC	NH_4	COD	NO_3	Phenol	P	TDS
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l		mS/m	mg/l as N	mg/l	mg/l as N	mg/l	mg/l	mg/l
			<200		<300		<1.5		≥ 5.0-9.7 ≤	<170			<11			<1200
BM2-(MPA)	39.63	19.43	75.28	11.78	77.29	48.81	0.72	0.07	7.30	86.59	9.79	56.35	3.07	<0.05	2.82	567.67
BM3-(MPB)	123.35	48.01	307.89		719.06	131.77	1.52		7.66	340.98	0.13		0.74			2238.33
KM2-(MPD)	50.03	32.20	72.87		83.84	44.81	0.56		7.75	88.10	0.15		1.01			576.73
KM4 (MPC)	121.72	73.72	251.56	9.09	642.50	85.67	1.28	0.14	7.87	314.77	0.11		0.86		0.56	2099.39
KM6	38.40	30.05	52.03	7.31	33.03	47.39	0.46	0.18	7.86	65.88	0.45	43.91	1.23	<0.05	0.49	434.21

Table 20: Water Quality results (September 2016; Letsolo)

Analyses		Unit	Detection Limit	Drinking /Domestic Use		Aquatic Ecosystems	Irrigation	Sampling Point Constituent Concentration Summary				
				SANS 241-1 (2011 & 2015)	DWA SAWQTV	DWA SAWQTV	DWA SAWQTV	MPA	MPB	MPC	MPD	MPE
Physio-Chemical Parameters												
- pH	pH	pH unit	n/a	≥ 5.0-9.7 ≤	6 – 9	NS	6.5 - 8.4	7.5	No Sample	7.7	8.3	7.8
- Electrical Conductivity	EC	mS/m	0.1	<170	<70	NS	<40	78.2	No Sample	500	72.9	70.4
- Total Dissolved Solids	TDS	mg/L	10	<1200	<450	NS	NS	412	No Sample	3256	444	352
- Total Alkalinity	T-Alk	mg $CaCO_3$/L	2.477	250	NS	NS	NS	240	No Sample	184	292	200
Inorganic and Metal Parameters												
Major Ionic Constituents												
- Calcium	Ca	mg/L	0.0259	<150	<32	NS	NS	33	No Sample	185	49	29
- Magnesium	Mg	mg/L	0.009	<70	<30	NS	NS	15	No Sample	87	33	13
- Potassium	K	mg/L	0.018	<50	<50	NS	NS	13	No Sample	8	9	11
- Sodium	Na	mg/L	0.013	<200	<100	NS	<70	69	No Sample	681	51	61
- Sulphate	SO_4	mg/L	0.04	<500	<200	NS	NS	45	No	153	45	56

Analyses		Unit	Detection Limit	Drinking /Domestic Use		Aquatic Ecosystems	Irrigation	Sampling Point Constituent Concentration Summary				
				SANS 241-1 (2011 & 2015)	DWA SAWQTV	DWA SAWQTV	DWA SAWQTV	MPA	MPB	MPC	MPD	MPE
									Sample			
- Chloride	Cl	mg/L	0.423	<300	<100	NS	<100	87	No Sample	1593	55	77
Fluoride and Phosphorus Constituents												
- Fluoride	F	mg/L	0.055	<1.5	<1	<0.75	<2	0.3	No Sample	3	0.5	0.2
- Orthophosphate	PO_4 as P	mg/L	0.008	<1	NS	NS	NS	4.87	No Sample	0.033	0.069	3.18
Metals/Metalloids Constituents												
- Arsenic	As	mg/L		<0.01	<0.01	<0.010	<0.1	<0.010	No Sample	<0.010	<0.010	<0.010
- Cobalt	Co	mg/L	0.001	<0.5	NS	NS	<0.05	<0.025	No Sample	<0.025	<0.025	<0.025
- Copper	Cu	mg/L	0.001	2	<1	NS	<0.2	<0.010	No Sample	<0.010	<0.010	<0.010
- Total Chromium	Cr	mg/L	0.001	0.05	0.05	0.007	NS	<0.025	No Sample	<0.025	<0.025	<0.025
- Iron	Fe	mg/L	0.003	Aesthetic: ≥0.3 Acute ≥2	<0.1	NS	<5	0.525	No Sample	<0.025	<0.025	0.191
- Lead	Pb	mg/L	0.004		<0.01	NS	<0.2	<0.010	No	<0.010	<0.010	<0.010

Analyses		Unit	Detection Limit	Drinking /Domestic Use		Aquatic Ecosystems	Irrigation	Sampling Point Constituent Concentration Summary				
				SANS 241-1 (2011 & 2015)	DWA SAWQTV	DWA SAWQTV	DWA SAWQTV	MPA	MPB	MPC	MPD	MPE
									Sample			
- Manganese	Mn	mg/L	0.001	Aesthetic: ≥0.1 Acute ≥0.4	<0.05	<0.180	<0.02	1.08	No Sample	0.266	0.143	0.249
- Nickel	Ni	mg/L	0.001	<0.07	NS	NS	<0.20	<0.025	No Sample	<0.025	<0.025	<0.025
- Zinc	Zn	mg/L	0.002	<5	<3	<0.002	<1	<0.025	No Sample	<0.025	<0.025	<0.025
Nitrogen-Species Parameters												
- Ammonium	NH_4 as N	mg/L	0.005	<1.5	<1	<0.007	NS	21	No Sample	<0.1	0.1	22
- Nitrate	NO_3 as N	mg/L	0.017	<11	<6	NS	NS	<0.1	No Sample	0.2	<0.1	<0.1
- Nitrite	NO_2 as N	mg/L										

9.1.5 GROUNDWATER

The geohydrological assessment was completed by Shangoni AquiScience, a division of Shangoni Management Services (November 2016); the full report is attached in Appendix 9. Approximately 36 boreholes were surveyed during a hydrocensus (Plan 15). All of these boreholes are EGM monitoring boreholes located in the larger Evander mining area. No privately owned boreholes are present in the near vicinity of the New TSF and its associated infrastructure.

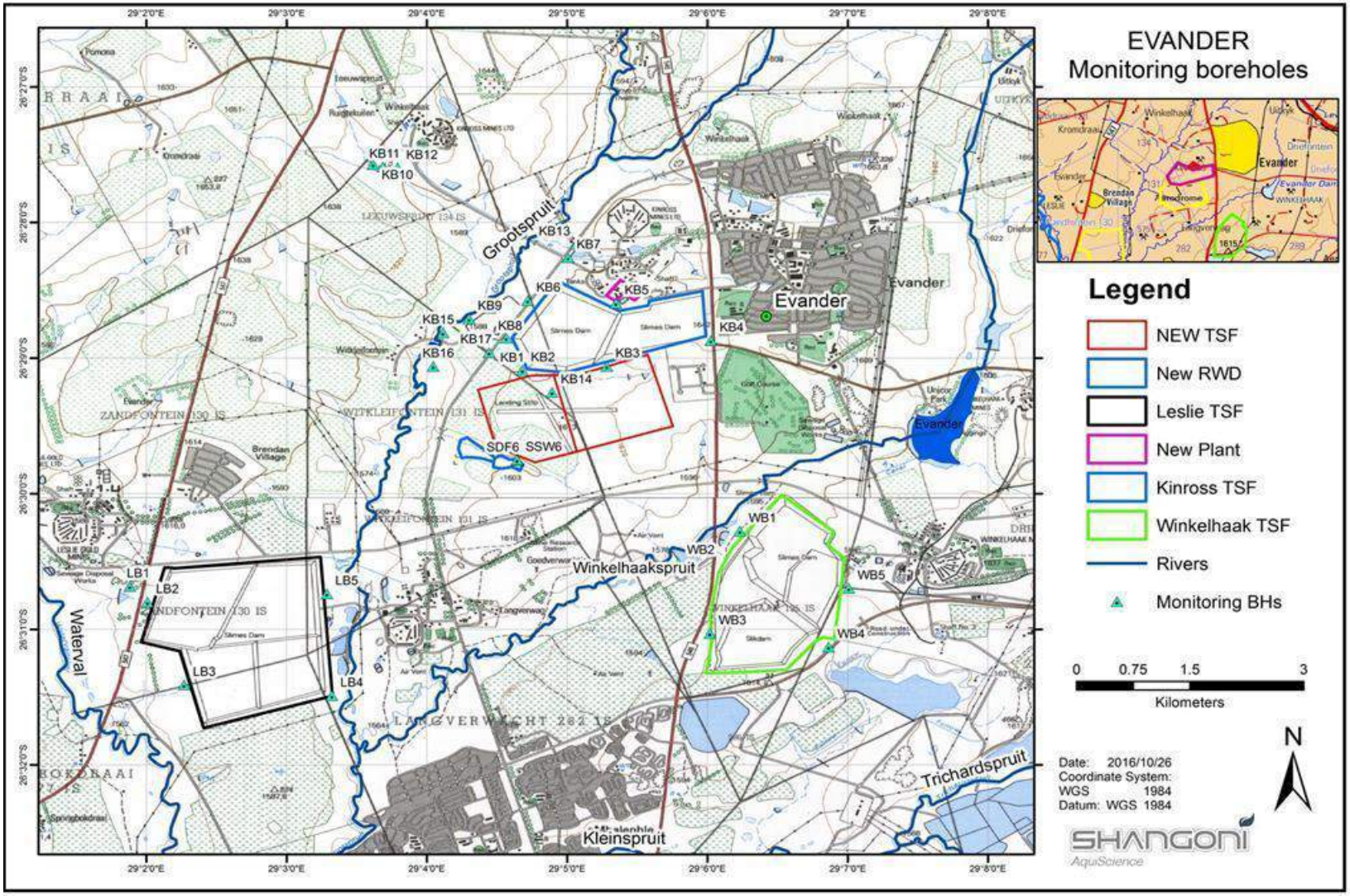
9.1.5.1 GEOLOGICAL SETTING

The Witwatersrand Supergroup strata are partially overlain by the Transvaal and Ventersdorp Supergroup sequences and all are entirely overlain by the Karoo Supergroup. Intrusives (dykes) are uncommon in the Evander Basin but the overall goldfield is characterised by basin margin faulting. These faults mainly manifest in the Ventersdorp and Witwatersrand Supergroup below the Karoo Supergroup, and can therefore, from a groundwater pollution perspective be regarded as insignificant. Dolerite sills at surface and at various horizons are also present. Generally, the formations overlying the sills are more extensively weathered than those underlying the sill.

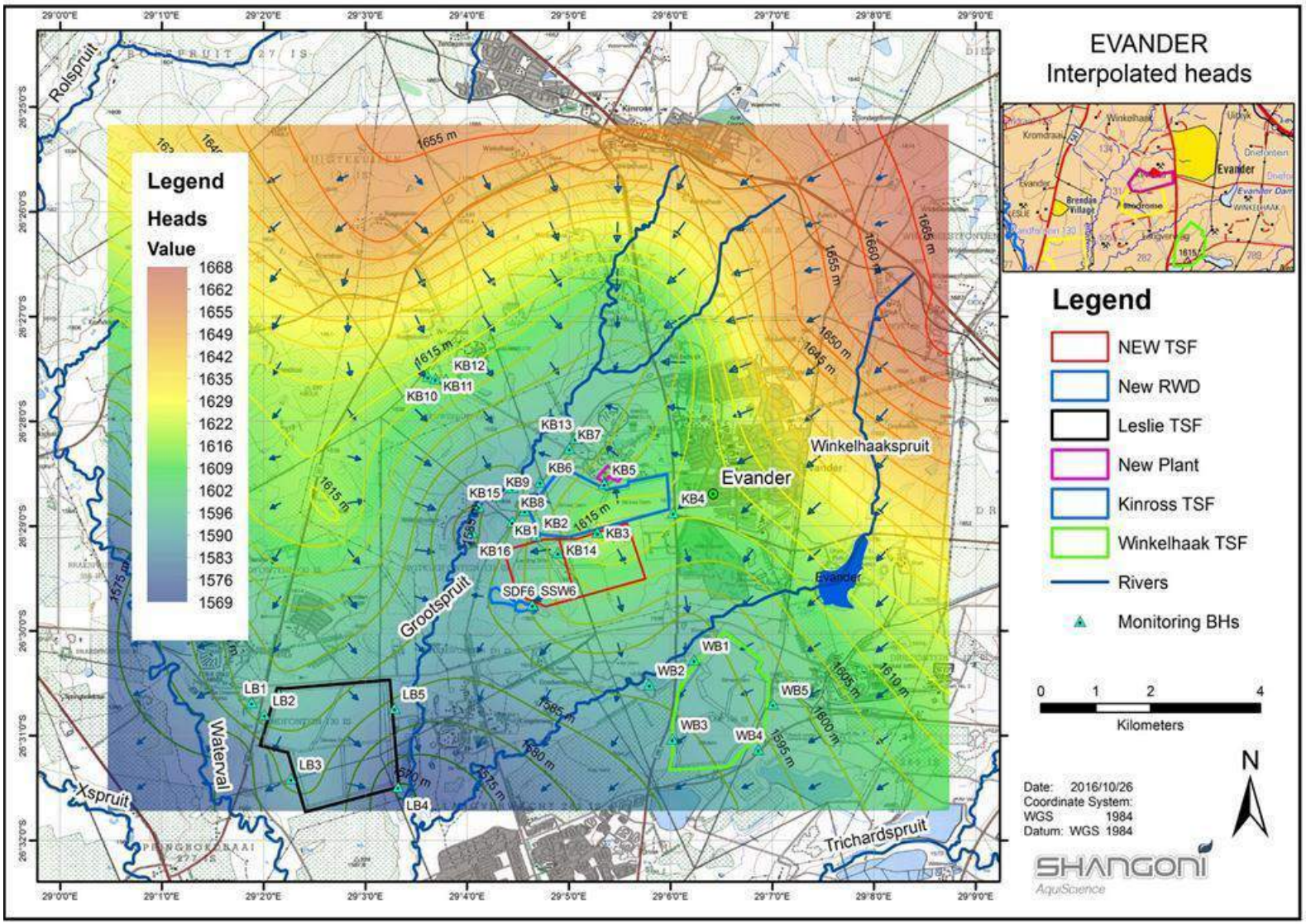
The proposed locations of the New TSF and plant are directly underlain by rocks of the Vryheid Formation occurring in the Ecca Group of the Karoo Supergroup. Approximately 50% of the proposed TSF is underlain by a massive and impermeable dolerite sill (Karoo age). The Vryheid Formation consists predominantly of thick beds of yellowish to white cross-bedded sandstone and grit alternating with beds of soft sandy shale

9.1.5.2 GROUNDWATER DEPTH AND FLOW

A contour map was created by interpolating the hydraulic heads of the boreholes (Plan 16), which showed that the groundwater flow directions are largely directed towards the Grootspruit to the west of the new TSF and to the south towards the unnamed tributary. In general, water levels in the area mimic the surface topography, where the weathered aquifer is around 5 to 10m below surface and the fractured aquifer is >15m below surface.



Plan 15: Hydrocensus & groundwater monitoring borehole locations



Plan 16: Hydraulic head calculated showing groundwater flow path

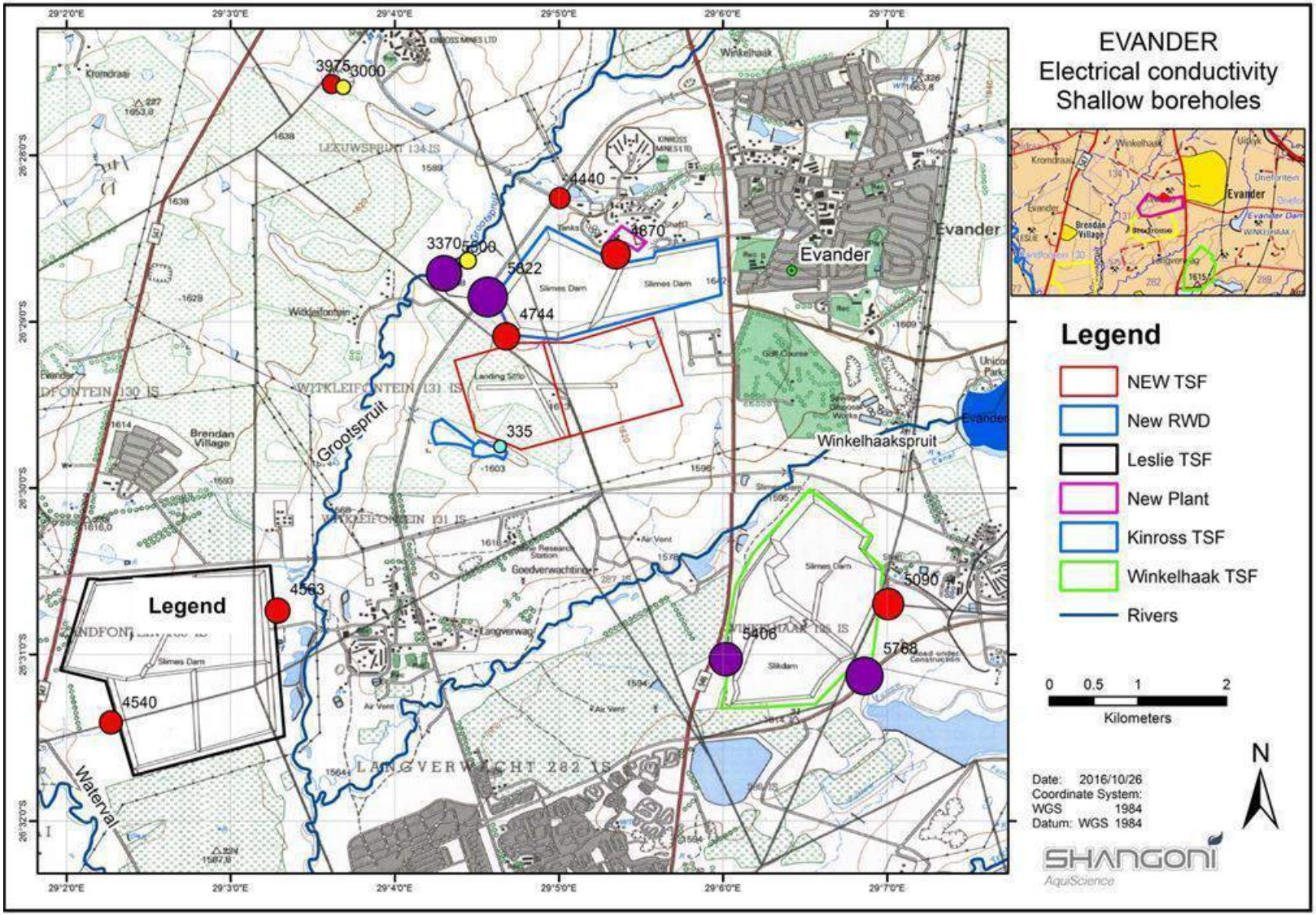
9.1.5.3 GROUNDWATER QUALITY

The 36 Evander monitoring boreholes were surveyed on the 21st of September 2016 (ref). All of these boreholes are Evander monitoring boreholes located in the larger Evander mining area. Information obtained from these boreholes included, i) static water level, ii) *in-situ* parameters, iii) collar height, iv) XYZ coordinates. It is clearly evident that the EC of the shallow weathered aquifer (5-10 m) (Plan 17) is considerably more saline compared to the deeper aquifer (>15) (Plan 18). Average EC values for the deeper aquifer is 2114 µS/cm, while for the shallow aquifer the average EC is 4387 µS/cm.

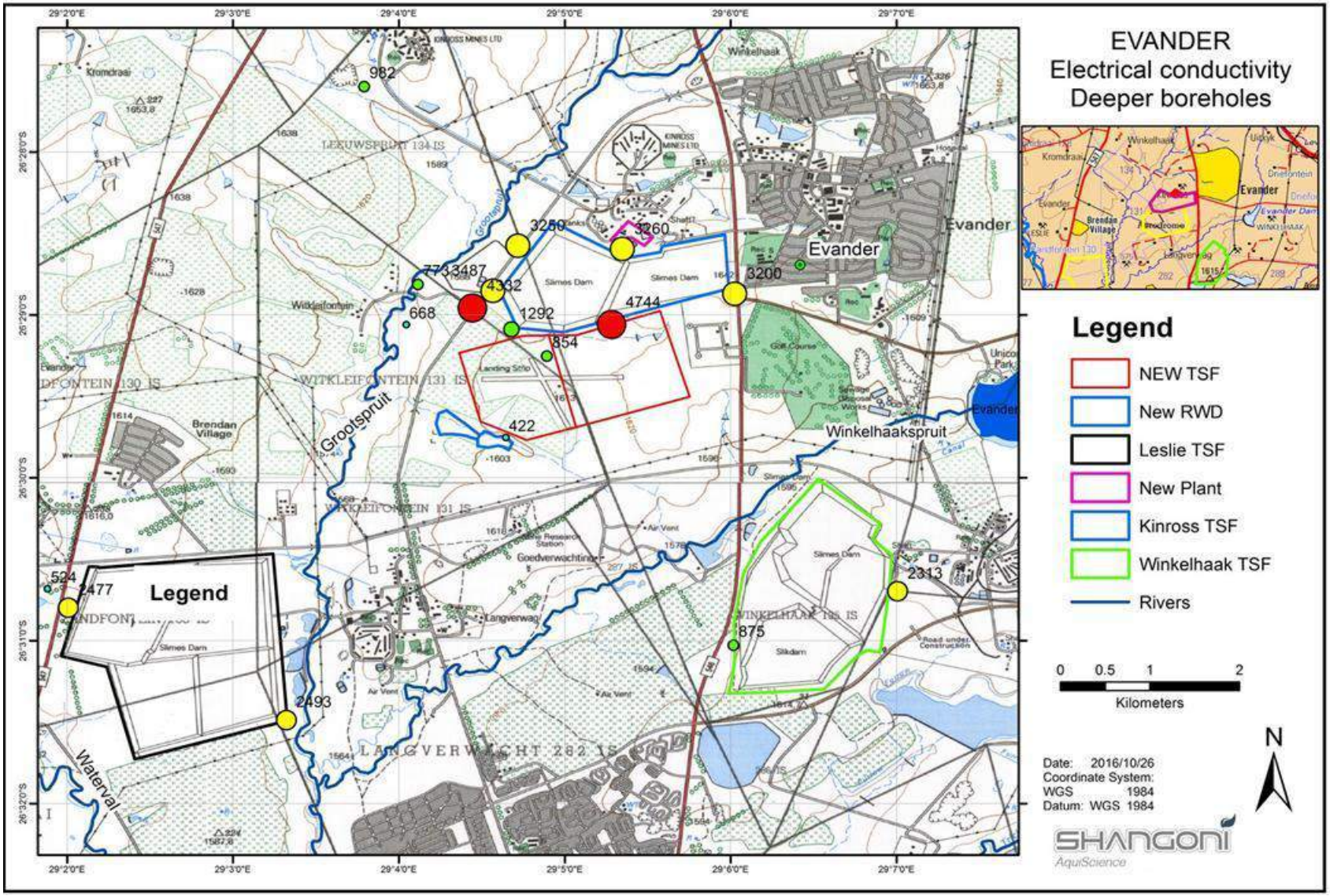
A long-term EC (in mS/m) concentration trend for borehole KB1 located on the western perimeter of the Kinross TSF shows an increasing trend in both the weathered and fractured aquifer (Figure 4). The data indicates that the EC for KB1S has plotted in the Unacceptable (class 4) ranges since 2012 while KB1D plot in the Marginal (class 2) ranges, according to the Quality of Domestic Supplies (WRC, 1998). Furthermore, the quality datasets for the deeper boreholes do show deteriorating quality, indicating contamination effects from the TSFs towards these aquifers (Shangoni, 2016).

In addition to the existing monitoring boreholes discussed above, four boreholes were drilled as a representative of the geological and geohydrological characteristics in vicinity of the new TSF and according to the data gathered during the geophysical study. All boreholes were drilled 165 mm and developed to function as long-term monitoring boreholes by inserting 140 mm PVC casing (solid & perforated) from top to end of hole (EOH).

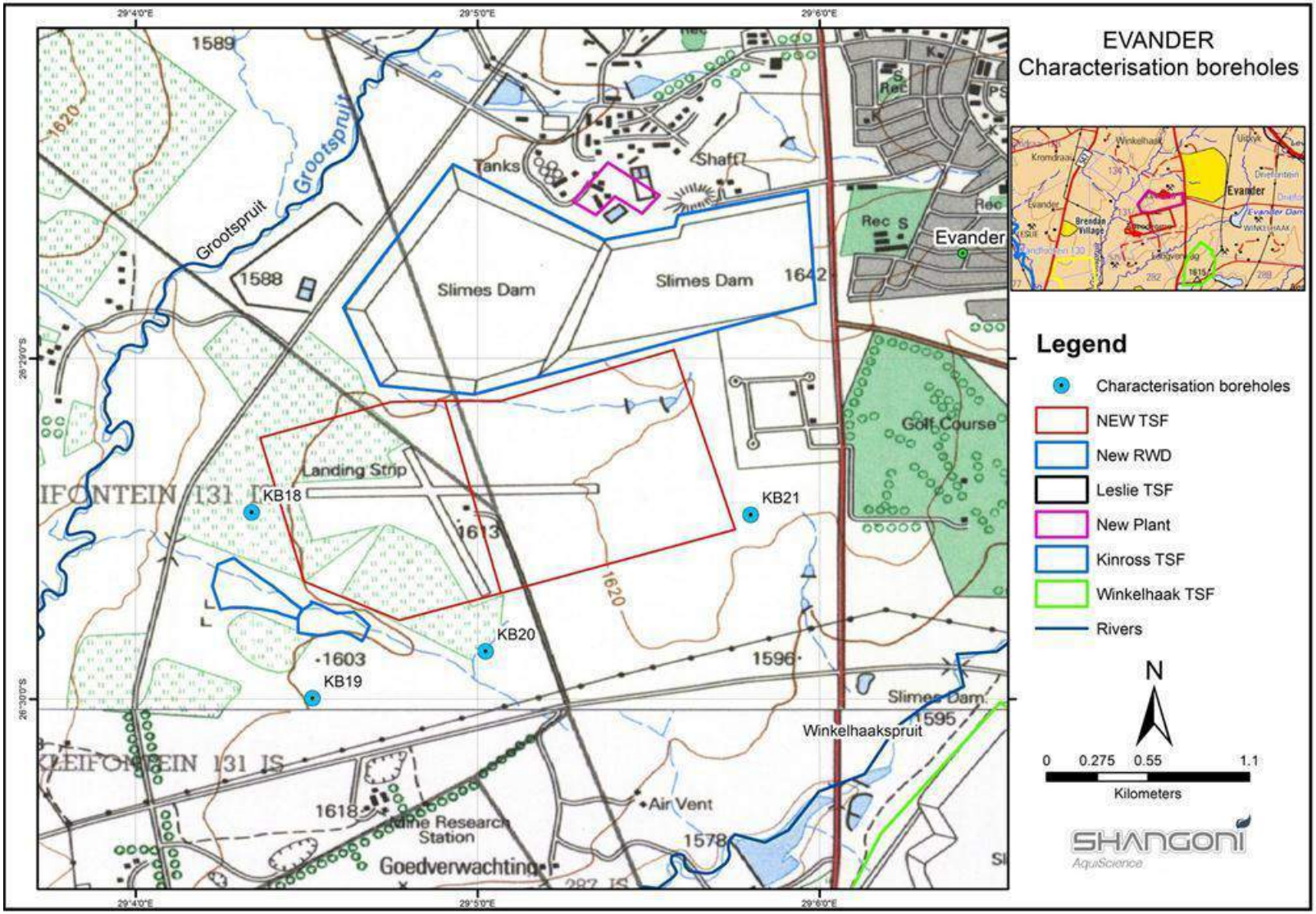
The general quality of groundwater sampled from the boreholes can be classified as fresh, clean and relatively 'young' that has started to undergo magnesium (Mg) or sodium (Na) ion exchange. The pH levels are in the neutral ranges of between 7.86 and 8.02, while EC values are typical of fresh water ranging between 89 and 97.4 mS/m (Table 21). The waters are characteristic of high HCO3 ions (alkalinity), Ca/Mg and/ or Na cations and relatively low SO4 and Cl. Nutrients recorded in the low ranges while all trace metals were recorded as undetected.



Plan 17: Spatial distribution of EC (µS/cm) in the weathered shallow aquifer (Shangoni, 2016)



Plan 18: Spatial distribution of EC (µS/cm) in the fractured deeper aquifer (Shangoni, 2016)



Plan 19: Location of new characterisation boreholes drilled around proposed new TSF (Shangoni, 2016)

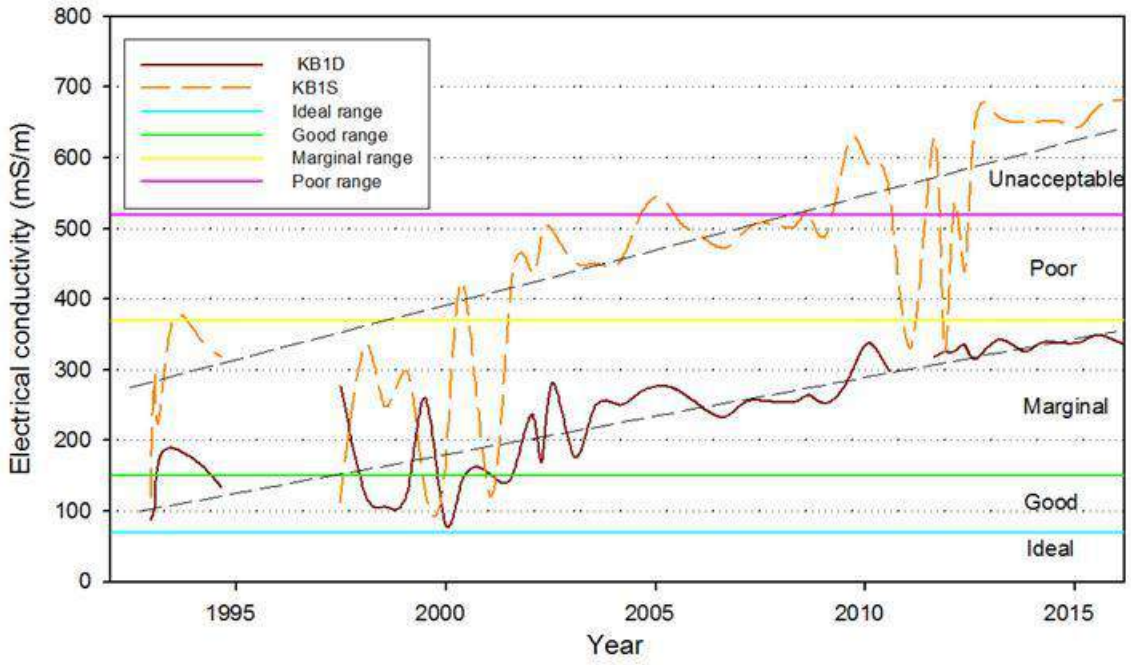


Figure 4: Long term trends of the monitoring borehole near Kinross TSF (KB1) (Shangoni 2016)

Table 21: Baseline groundwater quality of new boreholes around proposed new TSF location (Shangoni, 2016)

Locality	units	Groundwater			SANS 241: 20145	Ideal Class 01 (WRC, 1998)	Good Class 02 (WRC, 1998)
		KB18	KB19	KB20			
pH	pH	7.86	7.87	8.05	5.5 - 9.7	5 - 9.5	-
EC	mS/m	92.1	89.0	97.4	<170	<70	70 - 150
TDS	mg/l	644.7	623.0	681.8	<1200	<450	450- 1000
Ca	mg/l	49.1	61.3	58.9	-	<80	80 – 150
Mg	mg/l	32.7	26.8	57.5	-	<70	70 – 100
Na	mg/l	142.0	126.0	76.5	<200	<100	100 – 200
K	mg/l	3.88	3.76	1.00	-	-	-
Alkalinity	mg $CaCO_3$/l	405.0	415.0	331.0	-	-	-
Cl	mg/l	35.5	42.7	76.5	<300	<100	100 – 200
SO_4	mg/l	63.8	28.8	49.2	<500	<200	200 – 400
NO_3	mg/l	1.02	1.59	3.49	<11	<6	6 – 10
NH_4	mg/l	0.25	0.68	0.01	<1.5	-	-
PO_4	mg/l	0.05	0.05	0.04	-	-	-
F	mg/l	<0.263	0.30	0.37	<1.5	<0.7	0.7 – 1.0

Locality	units	Groundwater			SANS 241: 20145	Ideal Class 01 (WRC, 1998)	Good Class 02 (WRC, 1998)
		KB18	KB19	KB20			
Total hardness	mg $CaCO_3$/l	257	263	384	-	<200	200 – 300
Al	mg/l	<0.002	<0.002	<0.002	-	<0.15	0.15 – 0.5
Fe	mg/l	<0.004	<0.004	<0.004	<0.3	<0.5	0.5 – 1.0
Mn	mg/l	<0.001	<0.001	<0.001	<0.1	<0.1	0.1 – 0.4
Cr	mg/l	<0.003	<0.003	<0.003	<0.05	<0.15	-
Cu	mg/l	<0.002	<0.002	<0.002	<2	<1	1.0 - 1.3
Ni	mg/l	<0.002	<0.002	<0.002	<0.07	-	-
Zn	mg/l	<0.002	<0.002	<0.002	<5	<20	>20
Co	mg/l	<0.003	<0.003	<0.003	-	-	-
Cd	mg/l	<0.002	<0.002	<0.002	<0.003	<0.003	0.003– 0.005
Pb	mg/l	<0.004	<0.004	<0.004	<0.01	<0.01	0.01 – 0.05
Charge balance	%	4.2	2.9	4.5			
DWA Classification		**Good class 01**			-	-	-

9.1.5.4 AQUIFER TRANSMISSIVITY

Geophysical surveys and aerial photographs interpretations indicate the absence of significant fracture zones. Drilling and test pumping of characterisation boreholes indicate a low yielding weathered rock aquifer of low permeability. Transmissivities derived from aquifer tests were low ranging between 0.7 and 2.7 m^2/d.

Aquifer development in the area is controlled by the underlying geology and consists of a confined to semi-confined regional low yielding weathered aquifer, usually intercepted at shallow depths, less than 30 mbs. The shallow weathered and fractured aquifer (±40 mbs) can be regarded as minor aquifers.

Table 22: Aquifer test results

Basic Information											Transmissivity (m²/d)				Average Hydraulic Conductivity (m/d)
Site ID	Borehole depth (mbs)	Water level (mbc)	Collar height (m)	Estimated Aquifer thickness	Tested yield (ℓ/s)	Constant discharge (min.)	Available Drawdown (m)	Drawdown reached (m)	% Drawdown used	Pump depth inlet	Early T (m²/d)	Late T (m²/d)	Recovery T (m²/d)	Average T (m²/d)	
KB18	35.00	14.30	0.45	21	0.35	240	17	12.29	74	31.00	1.35	0.96	1.43	1.25	0.06
KB19	35.00	10.30	0.45	25	0.40	180	21	20.70	100	31.00	0.93	0.47	0.73	0.71	0.03
KB20	25.00	5.06	0.45	20	0.75	240	18	15.99	89	23.00	4.37	1.27	2.54	2.73	0.14
KB21	30.00	Dry	0.45	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	-	-	-	n/a

9.1.5.5 AQUIFER VULNERABILITY

The aquifer classification vulnerability assessment for the aquifer/s in vicinity of the project area resulted in a final DRASTIC score of 120 (Shangoni, 2016). This indicates that the aquifer/s in the region has a medium to high susceptibility to pollution and a medium to high level of aquifer protection is therefore required.

Therefore, based on the Groundwater Quality Management Classification (GQM), a medium/high level of protection is needed to adhere to DWS's water quality objectives. Reasonable and sound groundwater protection measures are required to ensure that no further cumulative pollution affects the aquifer, even in the long term.

In terms of DWS's overarching water quality management objectives which is i) protection of human health and ii) the protection of the environment, the significance of this aquifer classification is that if any potential risk exist, measures must be triggered to limit the risk to the environment, which in this case is the i) protection of the secondary underlying aquifers and ii) the streams/rivers draining the larger project area.

9.1.5.6 GEOCHEMICAL ANALYSIS & WASTE ASSESSMENT CHARACTERISTICS

A geochemical procedure was conducted by Future Flow in November, 2016 (refer to Appendix 5) to establish contaminants of concern within the tailings material and to select a pollution control barrier system to comply with the norms and standards for disposal to landfill.

Based on this assessment, the contaminants of concern were identified as TDS/EC, chloride, sodium, sulphate, fluoride, barium, cadmium, copper, manganese, nickel, and lead (Table 23). Specifically, the results indicate the following:

- All TSFs recorded a neutral pH ranging between 7.2 and 7.5.
- All trace metals show an inability to leach at the neutral pH and recorded within undetected levels and also below LCT0 limits.
- Total dissolved solids recorded between 144 mg/l (Kinross) and 330 mg/l (Winkelhaak), being mostly contributed to by sulphate (SO4), with concentrations ranging between 70 mg/l (Kinross) and 194 mg/l (Winkelhaak).
- No fluoride leached from the TSF material and no cyanide was recorded.
- No gasoline range organics were recorded for the TSFs.
- Barium (Ba), cadmium (Cd), copper (Cu), manganese (Mn), nickel (Ni), fluoride (F) and lead (Pb) were recorded above detection limits in the total analyses.
- Ba, Cu, Ni, F and Pb were recorded in concentrations exceeding the TCT0 limits.

The following limitations should be noted with regards to the geochemical study:

- Static leachate procedures were performed on the samples and therefore do not reflect transient time based scenarios such as decomposition and chemical and physical weathering scenarios as is the case with kinetic time-based assessments.
- The complex hydrology, redox and geochemical dynamics present within tailings material are difficult, if not impossible to reproduce in a laboratory setting.
- The 1: 20 solid to liquid ratio used (leach studies) is not a true or accurate representative of *in-situ* conditions or of source concentrations used in this study, but it can nevertheless provide useful information for environmental decision-making.

Table 23: Leachate test results for the TSF

TSF	Winkelhaak	Leslie	Kinross	Leachable Concentration Threshold (LCT0)
Leachate type	**Distilled Water**	**Distilled Water**	**Distilled Water**	
Ratio*	**1:20**	**1:20**	**1:20**	
Units	**mg/l**	**mg/l**	**mg/l**	**mg/l**
As, Arsenic	<0.010	<0.010	<0.010	0.01
B, Boron	<0.025	<0.025	<0.025	0.5
Ba, Barium	<0.025	<0.025	<0.025	0.7
Cd, Cadmium	<0.003	<0.003	<0.003	0.003
Co, Cobalt	<0.025	<0.025	<0.025	0.5
$Cr_{Total,}$ Chromium Total	<0.025	<0.025	<0.025	0.1
Cr(VI), Chromium (VI)	<0.010	<0.010	<0.010	0.05
Cu, Copper	<0.010	<0.010	<0.010	2.0
Hg, Mercury	<0.001	<0.001	<0.001	0.006
Mn, Manganese	<0.025	<0.025	0.027	0.5
Mo, Molybdenum	<0.025	<0.025	<0.025	0.07
Ni, Nickel	<0.025	<0.025	<0.025	0.07
Pb, Lead	<0.010	<0.010	<0.010	0.01
Sb, Antimony	<0.010	<0.010	<0.010	0.02
Se, Selenium	<0.010	<0.010	<0.010	0.01
V, Vanadium	<0.025	<0.025	<0.025	0.2
Zn, Zinc	<0.025	<0.025	0.027	5
Inorganic Anions	**mg/l**	**mg/l**	**mg/l**	**mg/l**
Total Dissolved Solids	330	222	144	1000
Chloride as Cl	2	6	12	300

TSF	Winkelhaak	Leslie	Kinross	Leachable Concentration Threshold (LCT0)
Leachate type	**Distilled Water**	**Distilled Water**	**Distilled Water**	
Ratio*	**1:20**	**1:20**	**1:20**	
Units	**mg/l**	**mg/l**	**mg/l**	**mg/l**
Sulphate as SO_4	194	122	70	250
Nitrate as N	0.1	0.1	<0.1	11
Fluoride as F	<0.2	<0.2	<0.2	1.5
Total Cyanide as CN	<0.01	<0.01	<0.01	0.07
pH	7.3	7.2	7.5	
Organics [s]	**µg/kg**	**µg/kg**	**µg/kg**	
TPH GRO: Dilution x1				
Petroleum H/Cs,C6-C10	<200	<200	<200	N/A

9.1.5.7 NUMERICAL GROUNDWATER MODEL AND SIMULATED POLLUTION PLUMES

The numerical flow and mass transport groundwater models were constructed to simulate current aquifer conditions and impacts in addition to providing a tool for evaluating different long-term management options. A two-dimensional numerical groundwater flow model was developed using the modelling software Feflow version 6.2 (Shangoni, 2016)

Different mining related scenarios were simulated in the modelling exercise reflecting the various stages of development to quantify the potential impact on the geohydrological environment.

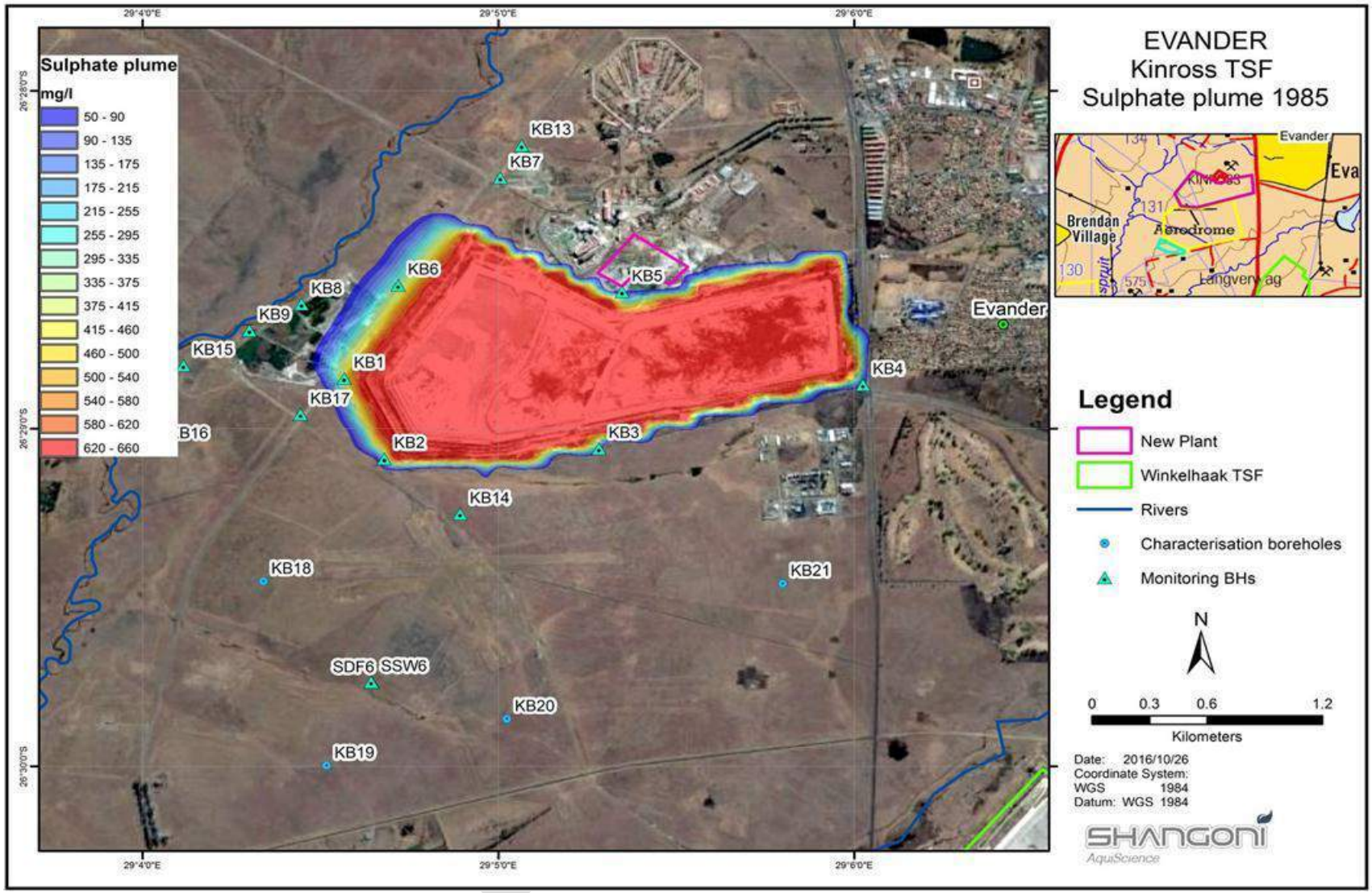
Assumptions and limitations of the modelling exercise include:

- The model was developed on the assumption that the fractured rock aquifer will behave as an equivalent homogeneous porous medium. In reality this is not true, aquifer conditions and parameters vary in the natural system. However, on a large enough scale this assumption should be acceptable and the Representative Elemental Volume (REV) should suffice well enough.
- The complexities of fractured rock aquifers imply that the model can only be used as a guide to estimate the aquifer hydraulic properties that will in turn be used in the model to predict the contaminant transport.

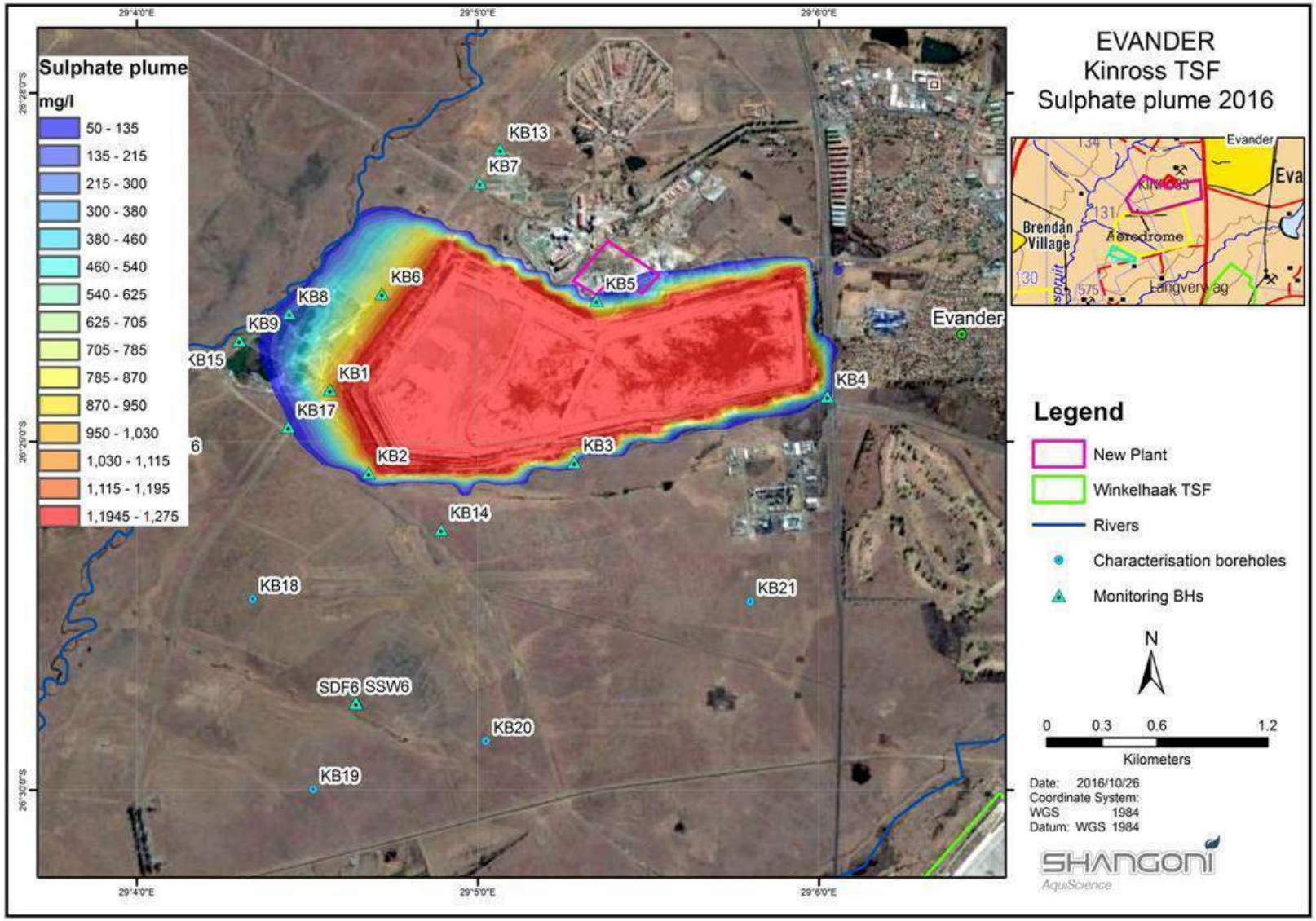
- If there are preferential flow paths due to faults or fractures that have not been identified, it can be expected that the contaminant plume will move faster in these structures and could therefore have a greater aerial extent.
- Conservative approaches were followed with regards to assigning hydraulic and physical parameters to the steady state calibration and the transient transport model.
- The groundwater model was based on a two-dimensional approximation of horizontal groundwater flow.

The following scenarios were applicable to the model:

- Scenario 1: Steady state pre-mining conditions. This scenario was used to calibrate the flow model (day 0) (Plan 20).
- Scenario 2: Transient contaminant transport model at for current time simulated for the period 1958 – 2016 (Plan 21).
    - This simulated period was also used to calibrate the numerical transport model in terms of source terms for the New TSF. The Kinross TSF and the monitoring boreholes surrounding the Kinross TSF were used for the calibration spanning the period 1958 – 2016.
- Scenario 3: Transient contaminant transport model simulating contaminant transport 800 years post operation of the new TSF (Refer to Section 8 of the Geohydrology Impact Assessment).



Plan 20: Calibrated sulphate plume for the Kinross TSF 1958 – 1985 (Shangoni, 2016)



Plan 21: Calibrated sulphate plume for the Kinross TSF 1958 – 2016 (Shangoni, 2016)

9.1.6 FLORA

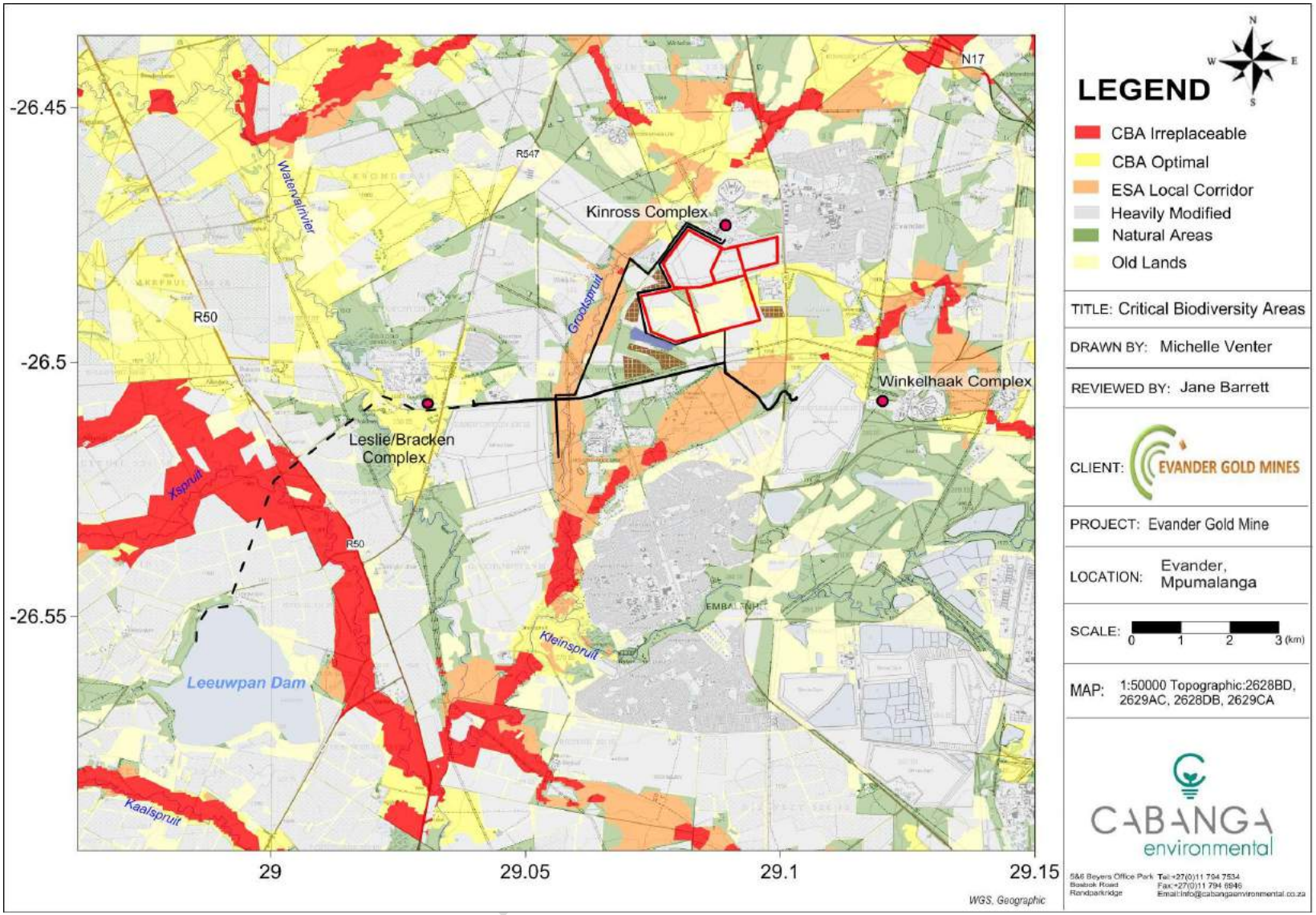
A terrestrial biodiversity survey for the EGM properties was undertaken in the year 2011 (de Wet, 2011). Two of the sites surveyed (sites 4 & 5) are situated within or in close proximity the proposed TSF footprint. Dimela Eco Consulting was tasked to update and verify the species composition within the proposed project footprint as well as to survey for plants species of conservation concern (2016). Both reports are included in Appendix 10.

9.1.6.1 REGIONAL & NATIONAL SIGNIFICANCE

The mining right area falls within the grassland biome (MP302), characterised as lands dominated by grasses and herbaceous vegetation of relatively short and simple structure (Mucina and Rutherford, 2012). The vegetation types naturally occurring in the area are classified as the Soweto Highveld Grassland.

According to SANBI GIS (2015) the Soweto Highveld Grassland (Gm8) is currently listed as vulnerable (VU). Dominant and diagnostic grass species associated with the Soweto Highveld Grassland are *Themeda triandra*, *Paspalum dilatatum*, *Eragrostis curvula*, *Cynodon dactylon*, *Hyparrhenia hirta* and *Sporobolus pyramidalis* (Mucina and Rutherford, 2012).

The Mpumalanga Biodiversity Sector Plan (Plan 22) shows that most of the area is disturbed. The main rivers in the area are delineated as the local corridors for ecological support areas. It must be noted that the existing pipeline from the water supply dam (Leeuwpan Dam) crosses a corridor zoned an Irreplaceable CBA.



Plan 22: The Mpumalanga Biodiversity Sector Plan – Critical Biodiversity Areas

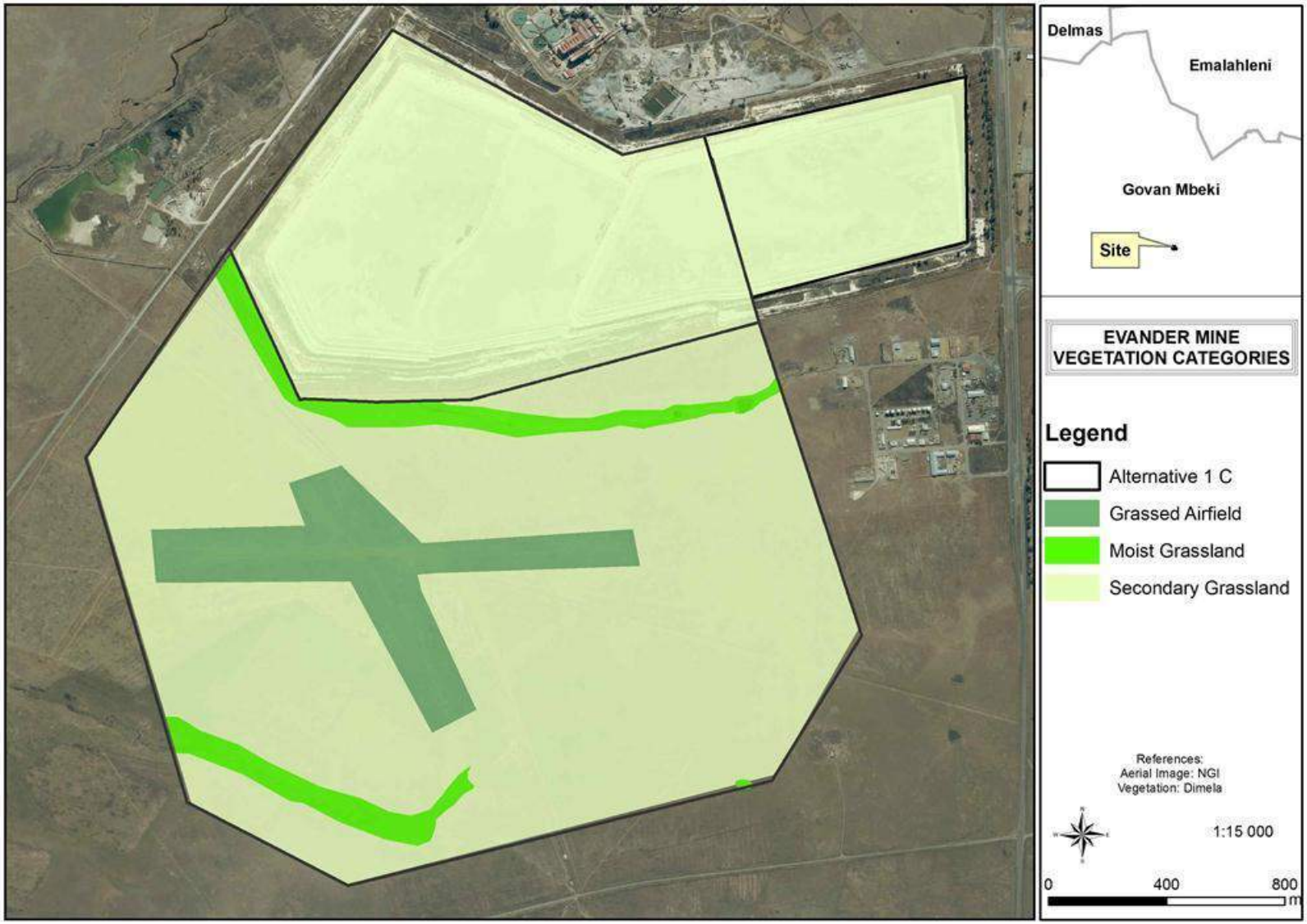
9.1.6.2 ON-SITE VEGETATION

The vegetation within the TSF project area is modified grassland and has been heavily grazed by livestock. Due to these impacts, the species diversity is not as what would be expected from Soweto Highveld Grassland vegetation type. Three broad vegetation groups were delineated (Plan 23), namely Moist Grassland, Secondary Grassland and the Grassed Airstrip. The biodiversity of these areas was re-assessed (2016) and their ecological sensitivity was determined to be moderate to low (Plan 24), which is in agreement with the 2011 study. These communities are summarised in Table 24 below.

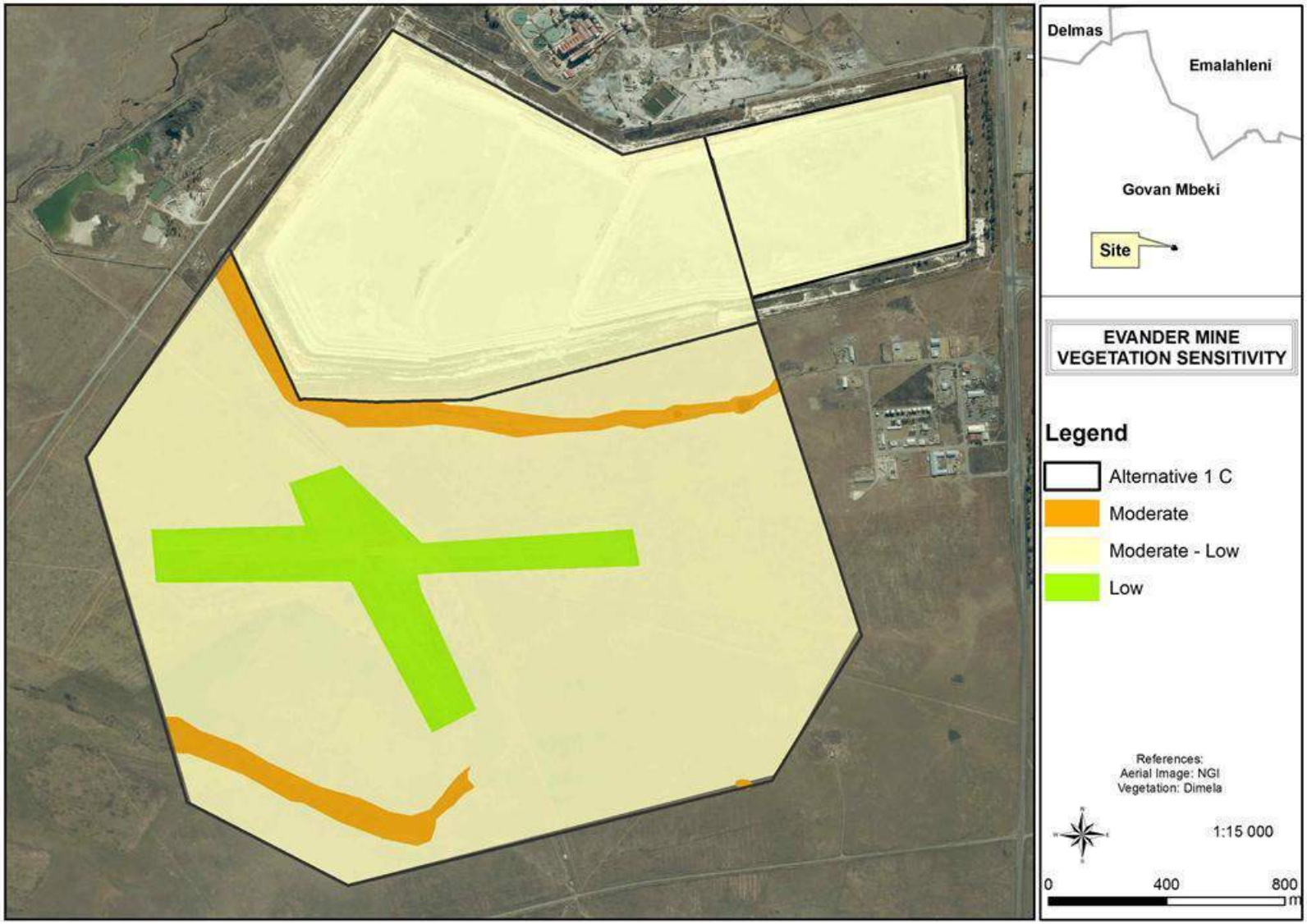
Table 24: Summary of the vegetation communities present

Community	Moist Grassland	Secondary Grassland	Grassed Airfield
Description	Moist grassland was characterised as areas where permanent water was observed or where the soils supported plant species with an affinity to grow in permanent, temporary or seasonally saturated conditions. Refer to the Wetland section for more detail.	The majority of the site was historically cultivated but has been left fallow for likely more than 15 years. Some portions were likely converted to pasture and not cultivated again. The grassland contained no rocks or termite mounds.	The derelict airfield is situated on a built-up embankment. Portions are eroding into the adjacent secondary grassland. Hardy and pioneer grass species colonised this area. The species diversity was the lowest recorded on site with only weedy herbaceous species present in the compacted soils
Species richness	20 indigenous species recorded (10 grass and 10 forb spp)	41 indigenous species recorded (12 grass and 29 forb spp)	10 indigenous species recorded (5 grass and 5 forb)
Dominant species	Grasses: *Paspalum dilatatum, Setaria sphacelata var. sericea, Themeda triandra* and *Phragmites australis* west of mine dump Forbs: *Haplocarpa scaposa, Senecio inaequidens, Cephalaria zeyheriana*	Grasses: *Hyparrhenia hirta, Eragrostis species, Themeda triandra, Aristida* species Forbs: *Cyanotis speciosa Jamesbrittenia aurantiaca, Asclepias gibba, Ipomoea tranvaalensis, Hermannia depressa* Geophyte: *Boophone distichia*	Grasses: Hyparrhenia hirta, Eragrostis lehmanni, Cynodon dactylon Forbs: Crepsis hypochoeridea, Conyza podocephala, Hypochaeris radicata
Species of Conservation Concern	None within the permanent moist grasslands, however the edge zones supported secondary grassland species of conservation concern (see right).	The following Declining species were recorded: *Boophone distichia* (abundant), *Hypoxis hemerocallidea*, and *Eucomis autumnalis* (note: emergent with no flower at time of assessment). One Near-Threatened species was recorded: *Stenostelma umbelluliferum*	None
Disturbance	Grazing. Water quality impacts due to polluted water likely entering the system.	Historical agriculture. Grazing. Dumping.	Artificially Grazed and very compacted

Community	Moist Grassland	Secondary Grassland	Grassed Airfield
Ecological Condition	Moderate: Intermediate levels of species diversity without any threatened species, at disturbances of low-medium intensity and representative of secondary succession stages with some degree or limited connectivity with other ecological systems. Declining species (not yet threatened) were present.	Moderate to low: the grassland is in a secondary state and will take many years to reach a climax sate, depending on subsequent impacts such as grazing. The species diversity is regarded as reasonable to low. Although no threatened species were present, Declining species and a Near-Threatened species were recoded.	Low: this vegetation has little or no conservation potential with poor species diversity, and limited ecological function
Photos (Dimela, 2016)			



Plan 23: Vegetation communities (Dimela, 2016)



Plan 24: Vegetation community ecological sensitivity (Dimela, 2016)

9.1.6.3 SPECIES OF CONSERVATION CONCERN (SCC)

The original study (de Wet, 2011) did not record any SCC, however the updated survey (Dimela, 2016) recorded the presence of three Declining species and one Near Threatened species (Table 25); no Threatened species were recorded. The coordinates of all individual SCC were recorded, as shown in Plan 25. *Boophone distichia* was unusually abundant with over a hundred (100) localities of individuals or small groups recorded. Although it unlikely, it must be noted that some individuals could have been missed due to the nature of these flowering plants and the limitations in field methodologies. This is particularly possible for the species *Stenostelma umbelluliferum*.

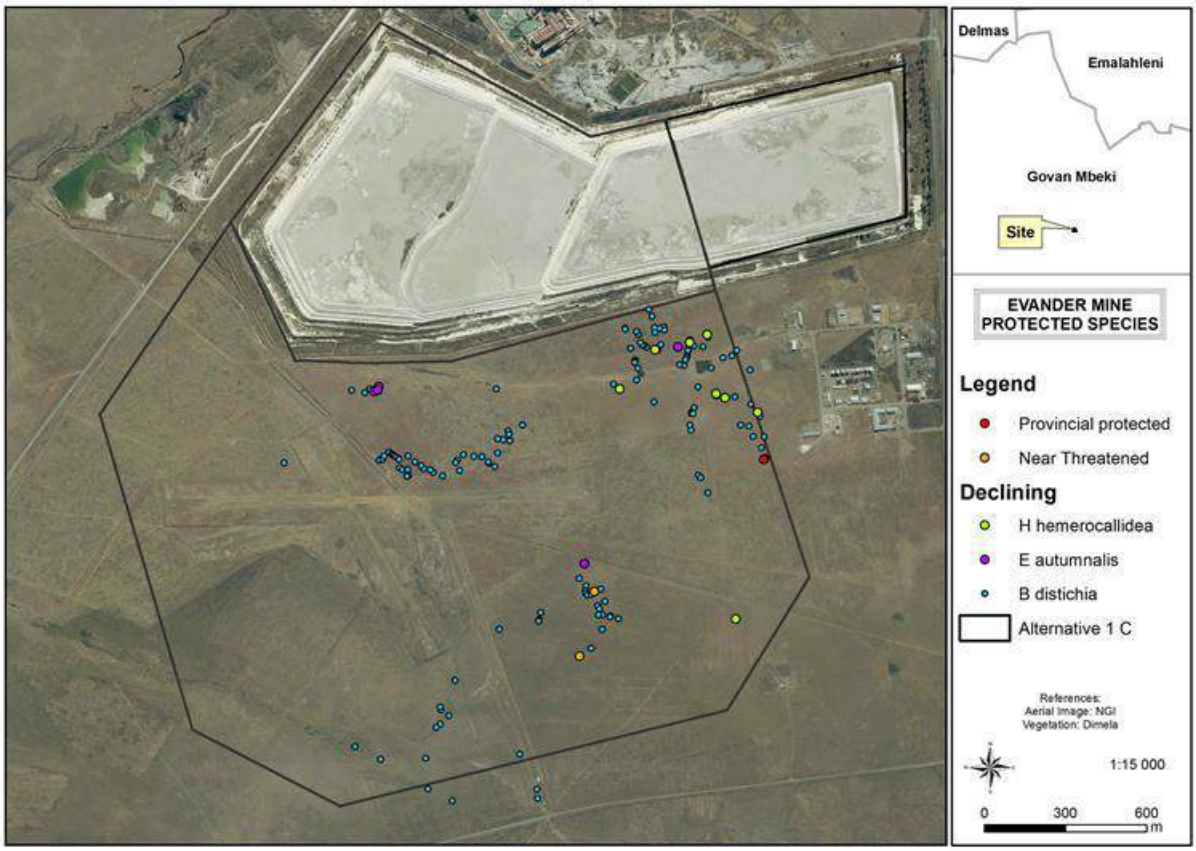
As per the Red List of Southern Africa Plants (www.redlist.sandbi.org), recommendations exist for these SCC (Table 25). Note that these plants can only be destroyed or removed once a permit from the Mpumalanga Tourism & Parks Agency (MTPA) has been obtained. The Declining species could be removed and used in medicinal plant cultivation programmes or relocated. The Near-Threatened species (*S. umbelluliferum*) is not situated within the remaining extent of a listed ecosystem, within a CBA or associated with any other local sensitivity.

Therefore, the potential to remove this species must be discussed with the MTPA. *S umbelluliferum* seems to thrive in disturbed areas, possibly because disturbed habitats favour the establishment of seedlings, but the plants are unlikely to survive relocation. Please refer to Appendix 10 for the full detailed report.

Table 25: Protected Species or Plant Species of Conservation Concern

Species	Conservation status	Vegetation type on site	Recommended action (SANBI)
Boophone disticha	Declining	Secondary grassland and edges of moist grassland	The species is declining but the population has not yet reached a threshold of concern; limited loss of habitat may be permitted. These species are known to be used for traditional medicine and if individuals will not be conserved in situ, plants should be rescued and used as mother stock for medicinal plant cultivation programmes.
Eucomis autumnalis	Declining	Moist grassland and secondary moist grassland	
Hypoxis hemerocallidea	Declining	Secondary grassland	
Stenostelma umbelluliferum	Near Threatened	Secondary grassland The inconspicuous nature of this	The species is approaching thresholds for listing as threatened but there are still a number of subpopulations in existence and therefore there is need

Species	Conservation status	Vegetation type on site	Recommended action (SANBI)
		species makes it easy to be overlooked	to minimise loss of habitat. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.



Plan 25: Location of the SCC recorded in the larger project area (Dimela, 2016)

9.1.6.4 ALIEN INVASIVE SPECIES

Eucalyptus species were identified as the main alien and invasive species during the site investigation (de Wet, 2011), which is listed as Category 1b according to NEM:BA. Numerous other exotic herb species common to the Highveld Grasslands were observed. Please refer to Appendix 10 for the full report.

9.1.7 FAUNA

A faunal assessment of the full project area (all three TSF's and pipelines) was completed as part of the 2011 biodiversity study (de Wet, 2011) the findings of which were limited and led to the conclusion of low faunal diversity in the area. This is not surprising given the disturbed nature of the area. Many faunal species are expected to occur within the region as listed in the full report (Appendix 10), however only a few of these were recorded during the assessment, as summarised below in Table 26.

Table 26: Summary of faunal assessment findings (de Wet, 2011)

Faunal group	Summary of findings
Mammals	Two species of rodents were sampled near the TSF's, namely the Striped mouse (*Rhabdomys pumilio*) and the Multimammate Mouse (*Mastomys coucha*). A Vlei Rat (*Otomys* sp.) was sampled near Leeupan wetland.
Birds	The following bird species were recorded within the full project area including the TSF's, pipelines and Leeupan Dam (*Alopogen aegyptiacus* Egyptian goose *Anas undulata* Yellowbilled duck *Ardea melanocephala* Blackheaded heron *Bubulcus ibis* Cattle egret *Bostrychia hagedash* Hadeda ibis *Burhinus vermiculatus* Water dikkop *Buteo vulpinus* Steppe buzzard *Childonias hybridus* Whiskered tern *Childonias leucopteris* Whitewinged tern *Dendrocygna viduata* Whitefaced duck *Elanus caeruleus* Blackshouldered kite *Euplectes afer* Golden bishop *Euplectes orix* Southern red bishop *Euplectes progne* Longtailed widow *Falco amurensis* Amur falcon *Pternistis natalensis* Natal francolin *Pternistis swainsonii* Swanson's spurfowl *Fulica cristata* Redknobbed coot *Hirundo albigularis* Whitethroated swallow *Hirundo spilodera* SA cliff swallow *Lanius collaris* Common fiscal shrike *Macronyx capensis* Orangethroated longclaw *Numida meleagris* Helmeted guinea fowl

Faunal group	Summary of findings	
	Passer melanurus	Cape sparrow
	Plectropterus gambensis	Spurwinged goose
	Threskiornis aethiopicus	Sacred ibis
	Vanellus armatus	Blacksmith lapwing
	Vanellus senegallus	Wattled lapwing
	Vidua macroura	Pintailed wydah
Herpetofauna	No herpetofauna were recorded, although this was likely not an accurate results due to rainy conditions. Thus the project must plan to accommodate the commonly expected herpetofauna in the area as listed in the full report (Appendix 10).	

9.1.8 AQUATIC ECOLOGY

Aquatic biomonitoring has been on-going since 2011 for the overall mining right area. The latest biomonitoring reports are completed by Scientific Aquatic Services (SAS, 2016) and are included in Appendix 11. Six bio-monitoring sites are studied, which are upstream and downstream of possible point and diffuse sources of pollution associated with the EGM area. Four rivers, namely the Grootspruit, Wildebeesspruit, Winkelhaakspruit and the Waterval Stream were assessed.

The study site that is relevant to this application is the Grootspruit River, of which there are two monitoring points included in the biomonitoring plan; one upstream of the current Kinross TSF and one downstream of the Leslie/Bracken TSF. The following sub-sections are summary tables as given in the 2016 monitoring reports for summer high flow (April) and winter low flow (August) results (SAS, 2016; Appendix 11). Long term trends of the Grootspruit River (2011 - 2016) is also given, which do show a decreasing trend in aquatic integrity

9.1.8.1 HIGH FLOW BIOMONITORING RESULTS, APRIL 2016 - GROOTSPRUIT

Table 27: High Flow Biomonitoring summary results – Upstream Grootspruit site (SAS, April 2016)

Site KM2

Figure 16: General view of the KM2 site at the time of the assessment.

Algal proliferation	Present on rocks.
Depth profiles	Very shallow. Generally < ½ m.
Flow condition	Slow flowing at the time of the assessment.
Riparian zone characteristics	Very narrow due to incised nature of the stream. Dominated by grass.
Water clarity and odour	Water was clear with no odours.
Site Ecostatus Category Dickens & Graham Dallas IHIA	 Category E Category E/F Category B

***In situ* physico-chemical water quality**

pH	7.49
EC (mS/m)	43.0
DO (mg/L)	5.18
DO (% sat)	64.3
Temp (°C)	23.7

Site specific temporal water quality variations (% Var)

Parameter	% Var from baseline data (Jan 2011)	% Var compared to previous season (Nov 2014)
pH	-2.1	-8.3
EC (mS/m)	-50.1	-44.2
*DO (mg/L)	+17.2	+118.6
Temp (°C)	+11.3	+26.0

Site specific spatial water quality variations (% Var)

Parameter	% Variation from upstream spatial reference
pH	NA
EC (mS/m)	NA
DO (mg/L)	NA
Temp (°C)	NA

Impacts and Essential Mitigation
Algal proliferation on rocks at the time of the assessment.

NA = Not Applicable, SASS reference score = 240, ASPT reference score = 6.8, Var = variation, ref = reference

*DO- Oldest available data from May 2012

Aquatic macro-invertebrate community integrity

Invertebrate community assessment (SASS5 and IHAS)

SASS5 score	70
Number of taxa	14
ASPT score	5.0
IHAS score	71 (Adequate)
IHIA score	85.1 (Class B)

Site specific temporal aquatic invertebrate community variations (% Var)

Parameter	% Var from ref ecoregion data (SASS5)	% Var from baseline data (Jan 2011)	% Var compared to previous season (Nov 2014)
SASS5	-70.8	-26.3	+125.8
ASPT	-26.5	0	+28.2
IHAS	NA	+2.9	+9.2

Site specific spatial aquatic invertebrate community variations (% Var)

Parameter	% Variation from upstream spatial reference
SASS5	NA
ASPT	NA
IHAS	NA

Key Drivers of System Change

- Dissolved salt concentration at this point is elevated from expected natural conditions and is expected to limit the diversity and sensitivity of the macro-invertebrate community present at the site. This is likely as a result of the drought experienced at the time of the assessment leading to low flow, increased evaporation and concentration of salt in the system. However, upstream agricultural activities, run-off from hard surfaces such as roads and other anthropogenic activities in the area, is likely to also contribute to elevated salt levels.
- Dissolved oxygen levels at this point are low and is expected to limit the diversity and sensitivity of the macro-invertebrate community present at the site. Organic pollution ingress upstream of this site is considered to have a significant impact in this regard.
- Catchment-wide impacts are thus evident prior to any potential impact from EGM activities.

Table 28: High Flow Biomonitoring summary results – Downstream Grootspruit site (SAS, April 2016)

Site BM2

Figure 19: General view of the BM2 site at the time of the assessment.

Algal proliferation	None observed.
Depth profiles	Shallow. Generally > ½ - 1m.
Flow condition	Moderately fast flowing at the time of the assessment.
Riparian zone characteristics	Very narrow due to incised nature of the stream. Dominated by grass.
Water clarity and odour	Water was slightly discoloured.
Site Ecostatus Category Dickens & Graham Dallas IHIA	 Category E Category E/F Category C

***In situ* physico-chemical water quality**

pH	7.71
EC (mS/m)	147.0
DO (mg/L)	7.54
DO (% sat)	94.5
Temp (°C)	24.2

Site specific temporal water quality variations (% Var)

Parameter	% Var from baseline data (Jan 2011)	% Var compared to previous season (Nov 2014)
pH	+1.6	-4.6
EC (mS/m)	+25.0	+48.5
*DO (mg/L)	-4.2	+118.6
Temp (°C)	+0.8	+26.0

Site specific spatial water quality variations (% Var)

Parameter	% Variation from upstream spatial reference
pH	+2.9
EC (mS/m)	+241.9
DO (mg/L)	+45.6
Temp (°C)	+2.1

Impacts and Essential Mitigation
Elevated dissolved salt concentrations along with high turbidity at the time of the assessment.

NA = Not Applicable, SASS reference score = 240, ASPT reference score = 6.8, Var = variation, ref = reference

*DO- Oldest available data from May 2012

Aquatic macro-invertebrate community integrity

Invertebrate community assessment (SASS5 and IHAS)

SASS5 score	44
Number of taxa	11
ASPT score	4.0
IHAS score	68 (Adequate)
IHIA score	67.6 (Class C)

Site specific temporal aquatic invertebrate community variations (% Var)

Parameter	% Var from ref ecoregion data (SASS5)	% Var from baseline data (Jan 2011)	% Var compared to previous season (Nov 2014)
SASS5	-81.7	-29.0	+2.3
ASPT	-41.2	-23.0	+2.6
IHAS	NA	+3.0	-2.9

Site specific spatial aquatic invertebrate community variations (% Var)

Parameter	% Variation from upstream spatial reference
SASS5	-37.1
ASPT	-20.0
IHAS	-4.2

Key Drivers of System Change

- Dissolved salt concentration at this point is elevated from expected natural conditions and is expected to limit the diversity and sensitivity of the macro-invertebrate community present at the site. This is likely as a result of the drought experienced at the time of the assessment leading to low flow, increased evaporation and concentration of salt in the system. However, upstream agricultural activities, run-off from hard surfaces such as roads and other anthropogenic activities in the area, is likely to also contribute to elevated salt levels. Spatial increase also indicates potential EGM activity contribution to salt load as will be discussed in dashboard tables to follow.

Table 29: Comparison between upstream and downstream Grootspruit high flow biomonitoring results (SAS, April 2016)

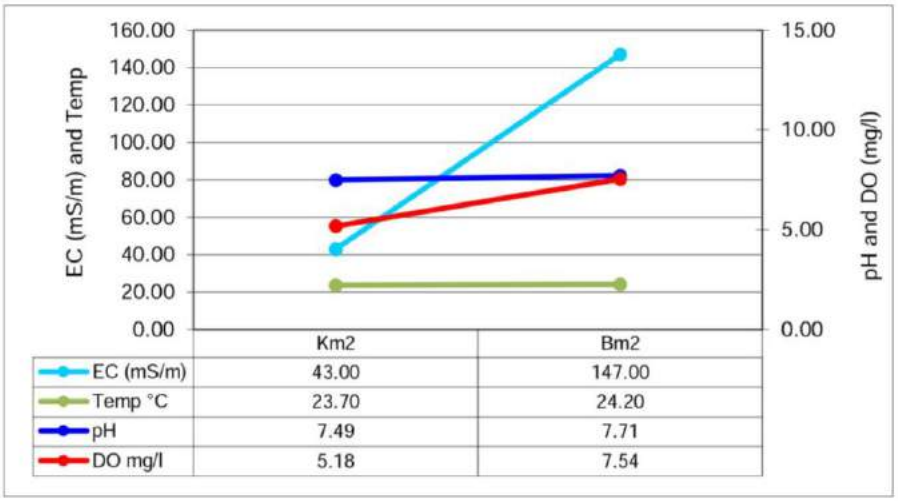


Figure 22: Spatial water quality variation between site KM2 and BM2.

Comment:

- Spatially the EC increased significantly by 241.9% between the upstream and downstream sites, indicating that additional dissolved salts are entering the system at the time of the assessment. This special change exceeds the DWS target water quality guideline (DWAF, 1996);
- Between the upstream site KM2 and the downstream site BM2, the pH has increased slightly by 2.9% and complies with the DWS target water quality guideline (DWAF, 1996);
- DO concentration increases significantly by 45.6% between the upstream and downstream sites, this is likely as a result of the weir at the downstream site increasing the DO concentration at the time of the assessment;
- The temperature at both sites can be regarded as natural for the time of year and time of day when sampling took place;
- These observations serve as an indication that mining activities may contribute to the observed variability in EC, but impacts from other upstream point and diffuse sources of pollution confound any generalisations or attempted quantification of potential impact;
- Ongoing monitoring at this point will need to continue to monitor existing trends and identify any emerging trends.

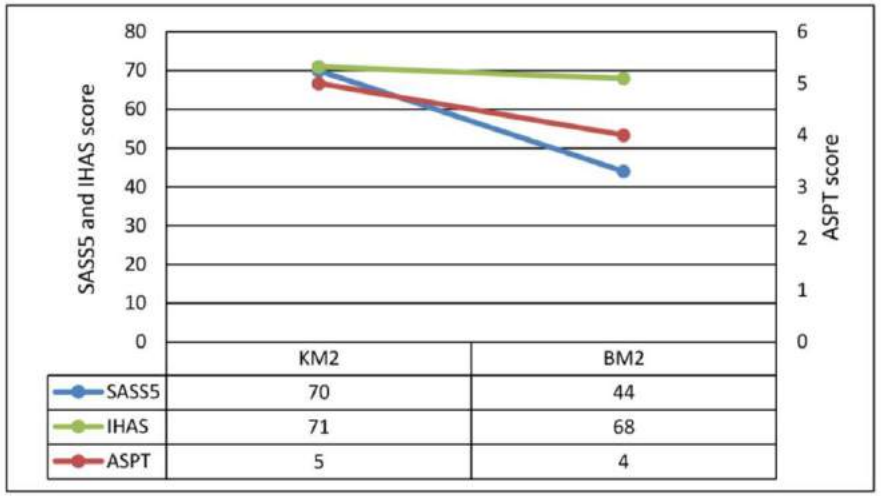


Figure 23: Spatial macro-invertebrate community integrity variation between site KM2 and BM2.

Comment:

- Spatially, the SASS5 score decreases by 37.1% between the upstream KM2 site and the downstream BM2 site, and the ASPT score decreases by 20.0% in the current assessment;
- The habitat suitability decreases slightly by 4.2% between the sites;
- The spatial decrease in macro-invertebrate community diversity and sensitivity is likely as a result of the significant EC increase between the upstream and downstream site;
- Cumulative impacts on the Grootspruit from EGM activities is considered likely but such contribution cannot be quantified due to the impact from upstream points of pollution (anthropogenic and agricultural activities).

9.1.8.2 LOW FLOW BIOMONITORING RESULTS, AUGUST 2016 - GROOTSPRUIT

Table 30: Low Flow Biomonitoring summary results – Upstream Grootspruit site (SAS, August 2016)

Site KM2

Figure 16: General view of the KM2 site at the time of the assessment.

Algal proliferation	Isolated clumps.
Depth profiles	Very shallow. Generally < ½ m.
Flow condition	Slow flowing at the time of the assessment.
Riparian zone characteristics	Very narrow due to incised nature of the stream. Dominated by grass.
Water clarity and odour	Water was clear with no odours.
Site Ecostatus Category	
Dickens & Graham	Category E
Dallas	Category E/F
IHIA	Category C
MIRAI	Category E

***In situ* physico-chemical water quality**

pH	7.29
EC (mS/m)	53.0
DO (mg/L)	8.33
DO (% sat)	79.3
Temp (°C)	10.9

Site specific temporal water quality variations (% Var.)

Parameter	% Var. from baseline data (Jan 2011)	% Var. from previous season (Jun 2015)
pH	-4.7	-3.8
EC (mS/m)	-38.5	-18.5
*DO (mg/L)	+88.5	-5.9
Temp (°C)	-48.8	-1.8

Site specific spatial water quality variations (% Var.)

Parameter	% Var. from upstream spatial reference
pH	NA
EC (mS/m)	NA
DO (mg/L)	NA
Temp (°C)	NA

Impacts and Essential Mitigation

Isolated algal proliferation between vegetation at the time of the assessment. Extremely low flows.

Aquatic macro-invertebrate community integrity

Invertebrate community assessment (SASS5 and IHAS)

SASS5 score	68
Number of taxa	14
ASPT score	4.9
IHAS score	64 (Inadequate)
IHIA score	76.2 (Class C)
MIRAI score	29.5 (Class E)

Site specific temporal aquatic invertebrate community variations (% Var.)

Parameter	% Var. from ref ecoregion data (SASS5)	% Var. from baseline data (Jan 2011)	% Var. from previous season (Jun 2015)
SASS5	-71.7	-28.4	+126.7
ASPT	-27.9	-2.0	+48.5
IHAS	NA	-7.2	-4.5

Site specific spatial aquatic invertebrate community variations (% Var.)

Parameter	% Var. from upstream spatial reference
SASS5	NA
ASPT	NA
IHAS	NA

Key Drivers of System Change

- Dissolved salt concentration at this point is slightly elevated from expected natural conditions and is expected to limit the diversity and sensitivity of the macro-invertebrate community present at the site. This is likely as a result upstream agricultural activities, run-off from hard surfaces such as roads and other anthropogenic activities in the area.
- Lack of strong flowing water at this point and variability in system flow rate also limits habitat availability at this point, thus limiting the diversity and sensitivity of the aquatic community likely to occur at this point.
- Catchment-wide impacts are thus evident prior to any potential impact from EGM activities.

NA = Not Applicable, SASS reference score = 240, ASPT reference score = 6.8, Var. = variation, ref = reference

*DO- Oldest available data from May 2012

Table 31: Low Flow Biomonitoring summary results – Downstream Grootspruit site (SAS, August 2016)

Site BM2

Figure 19: General view of the BM2 site at the time of the assessment.

Algal proliferation	None observed.
Depth profiles	Shallow. Generally > ½ - 1m.
Flow condition	Moderately fast flowing at the time of the assessment.
Riparian zone characteristics	Very narrow due to incised nature of the stream. Dominated by grass.
Water clarity and odour	Water was slightly discoloured.
Site Ecostatus Category Dickens & Graham Dallas IHIA MIRAI	 Category F Category E/F Category C Category E

***In situ* physico-chemical water quality**

pH	7.66
EC (mS/m)	88.0
DO (mg/L)	2.80
DO (% sat)	26.0
Temp (˚C)	9.8

Site specific temporal water quality variations (% Var.)

Parameter	% Var. from baseline data (Jan 2011)	% Var. from previous season (Jun 2015)
pH	+0.9	+1.6
EC (mS/m)	-25.2	-6.4
*DO (mg/L)	-64.4	+15.2
Temp (˚C)	-59.2	-12.5

Site specific spatial water quality variations (% Var.)

Parameter	% Var. from upstream spatial reference
pH	+5.1
EC (mS/m)	+66.0
DO (mg/L)	-66.4
Temp (˚C)	-10.1

Impacts and Essential Mitigation

Elevated dissolved salt concentrations along with high turbidity at the time of the assessment.

Aquatic macro-invertebrate community integrity

Invertebrate community assessment (SASS5 and IHAS)

SASS5 score	22
Number of taxa	8
ASPT score	2.8
IHAS score	53 (Adequate)
IHIA score	61.5 (Class C)
MIRAI score	22.2 (Class E)

Site specific temporal aquatic invertebrate community variations (% Var.)

Parameter	% Var. from ref ecoregion data (SASS5)	% Var. from baseline data (Jan 2011)	% Var. from previous season (Jun 2015)
SASS5	-90.8	-64.5	-40.5
ASPT	-58.8	-46.2	-17.6
IHAS	NA	-19.7	-15.9

Site specific spatial aquatic invertebrate community variations (% Var.)

Parameter	% Var. from upstream spatial reference
SASS5	-67.6
ASPT	-42.9
IHAS	-17.2

Key Drivers of System Change

- Dissolved salt concentration at this point is elevated from expected natural conditions and is expected to limit the diversity and sensitivity of the macro-invertebrate community present at the site. This is likely largely as a result of upstream agricultural activities, run-off from hard surfaces such as roads and other anthropogenic activities in the area, such as organic pollution ingress. Contribution to salt load by mining operations is possible, but potential impact cannot be quantified due to the presence of other point and diffuse sources of pollution in the catchment (see Tables 14 and 15).
- Dissolved oxygen levels at this point are low and is expected to limit the diversity and sensitivity of the macro-invertebrate community present at the site. Organic pollution ingress upstream of this site is considered to have a significant impact in this regard.
- Spatial increase also indicates potential EGM activity contribution to salt load as will be discussed in dashboard tables to follow (see Table 15 for details).

NA = Not Applicable, SASS reference score = 240, ASPT reference score = 6.8, Var. = variation, ref = reference

*DO- Oldest available data from May 2012

Table 32: Comparison between upstream and downstream Grootspruit low flow biomonitoring results (SAS, August 2016)

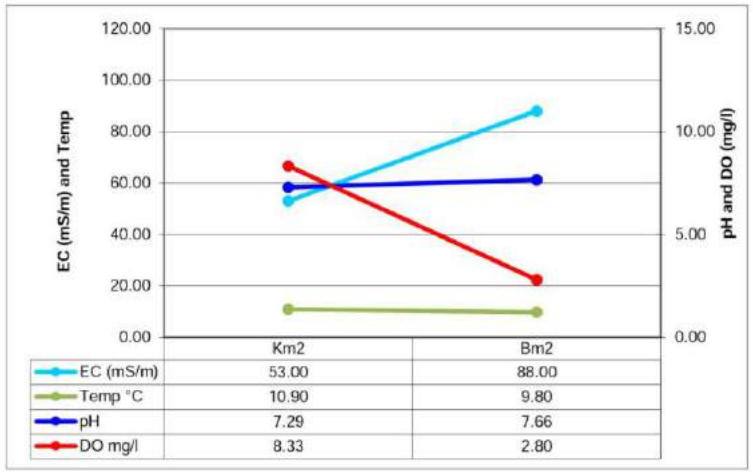


Figure 22: Spatial water quality variation between site KM2 and BM2.

Comment:

- Spatially the EC increased significantly by 66.0% between the upstream and downstream sites, indicating that additional dissolved salts are entering the system at the time of the assessment. This spatial change exceeds the DWS target water quality guideline (DWAF, 1996);
- Between the upstream site KM2 and the downstream site BM2, the pH has increased slightly by 5.1% and exceeds the DWS target water quality guideline (DWAF, 1996);
- DO concentration decreases significantly by 66.4% between the upstream and downstream sites, this is likely as a result of organic pollution entering the system from the surrounding settlement at the time of the assessment;
- The temperature at both sites can be regarded as natural for the time of year and time of day when sampling took place;
- These observations serve as an indication that mining activities may contribute to the observed variability in especially EC but potentially also DO, but impacts from other upstream point and diffuse sources of pollution confound any generalisations or attempted quantification of potential impact;
- Ongoing monitoring at this point will need to continue to monitor existing trends and identify any emerging trends.

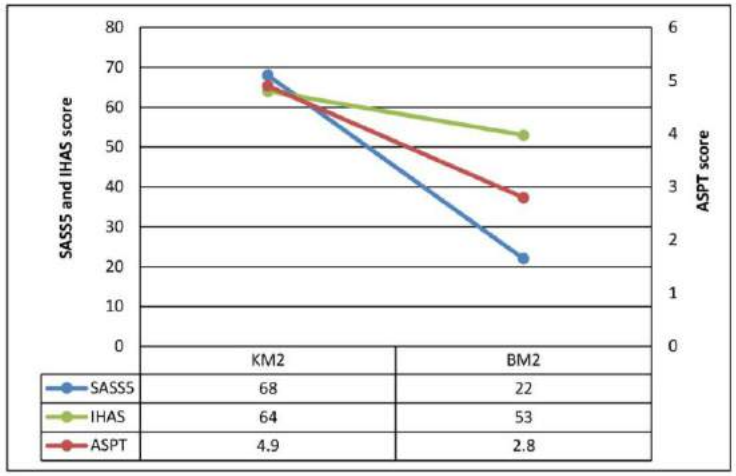


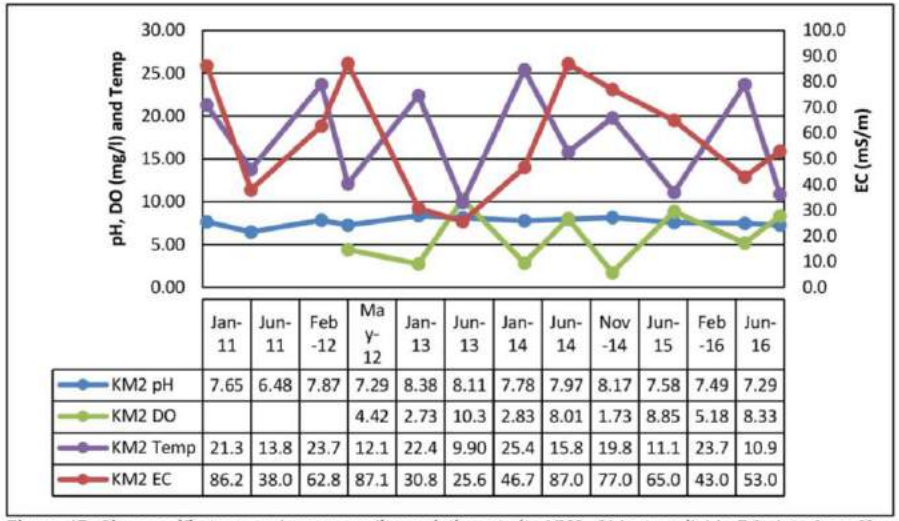
Figure 23: Spatial macro-invertebrate community integrity variation between site KM2 and BM2.

Comment:

- Spatially, the SASS5 score decreases by 67.6% between the upstream KM2 site and the downstream BM2 site, and the ASPT score decreases by 42.9% in the current assessment;
- The habitat suitability decreases by 17.2% between the sites;
- The spatial decrease in macro-invertebrate community diversity and sensitivity is likely as a result of the significant EC increase and the DO concentration decrease between the upstream and downstream site along with the decrease in habitat suitability;
- Cumulative impacts on the Grootspruit from EGM activities is considered likely but such contribution cannot be quantified due to the impact from upstream points of pollution (anthropogenic and agricultural activities).

9.1.8.3 LONG-TERM BIOMONITORING RESULTS: 2011 – 2016

Table 33: Summary of 2011-2016 biomonitoring results– Upstream Grootspruit site (SAS, 2016)

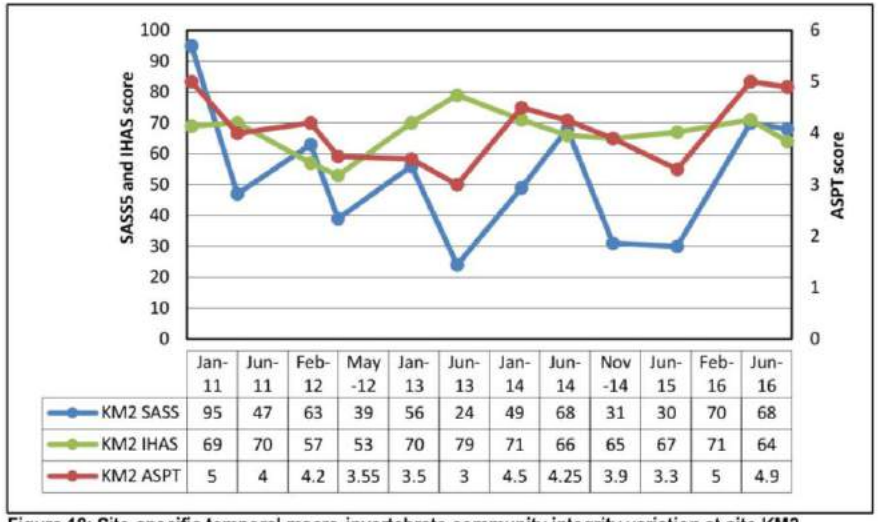


	Jan-11	Jun-11	Feb-12	May-12	Jan-13	Jun-13	Jan-14	Jun-14	Nov-14	Jun-15	Feb-16	Jun-16
KM2 pH	7.65	6.48	7.87	7.29	8.38	8.11	7.78	7.97	8.17	7.58	7.49	7.29
KM2 DO				4.42	2.73	10.3	2.83	8.01	1.73	8.85	5.18	8.33
KM2 Temp	21.3	13.8	23.7	12.1	22.4	9.90	25.4	15.8	19.8	11.1	23.7	10.9
KM2 EC	86.2	38.0	62.8	87.1	30.8	25.6	46.7	87.0	77.0	65.0	43.0	53.0

Figure 17: Site-specific temporal water quality variation at site KM2. Oldest available DO data from May 2012.

Comment:

- Electrical conductivity (EC) decreased by 38.5% when compared to the baseline assessment (Jan 2011) and by 18.5% when compared to the previous season (Jun 2015). These temporal changes exceed the DWS target water quality guideline (DWAF, 1996) (Table 11), which advocates that seasonal and temporal changes should not exceed 15%;
- However, the decrease in EC can be seen as an improvement in the water quality of the system;
- When compared to the baseline assessment the pH has decreased slightly by 4.7% and by 3.8% when compared to the previous season assessment. These temporal changes comply with the DWS target water quality guideline (DWAF, 1996) (Table 11), which advocates that seasonal and temporal changes should not exceed 5%;
- Dissolved oxygen (DO) saturation falls below the 80% saturation requirement (DWAF, 1996), however, no adverse effects are anticipated at the time of the assessments as percentage saturation reached 79%;
- DO concentrations are highly variable over time and largely dependent on seasonality;
- Ongoing monitoring at this point will need to continue to monitor existing trends and identify any emerging trends.



	Jan-11	Jun-11	Feb-12	May-12	Jan-13	Jun-13	Jan-14	Jun-14	Nov-14	Jun-15	Feb-16	Jun-16
KM2 SASS	95	47	63	39	56	24	49	68	31	30	70	68
KM2 IHAS	69	70	57	53	70	79	71	66	65	67	71	64
KM2 ASPT	5	4	4.2	3.55	3.5	3	4.5	4.25	3.9	3.3	5	4.9

Figure 18: Site-specific temporal macro-invertebrate community integrity variation at site KM2.

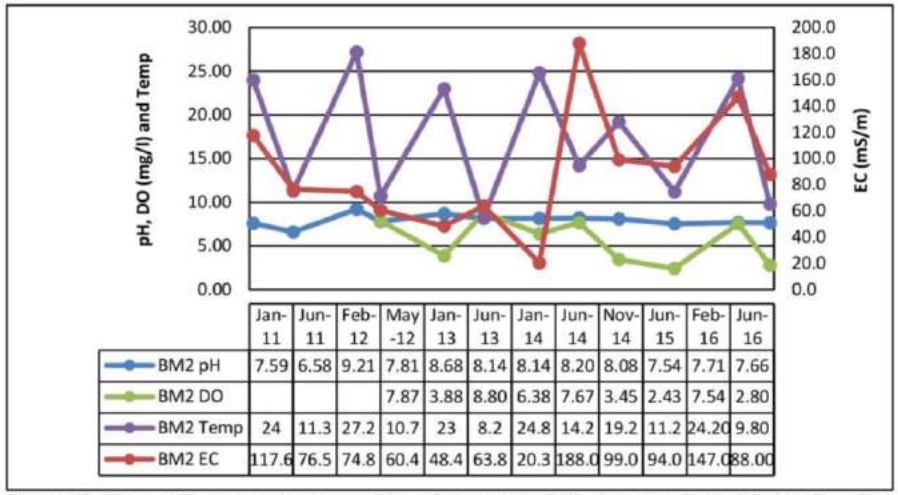
Comment:

- When compared to the baseline assessment (Jan 2011) the SASS5 score has decreased by 28.4% and the ASPT score by 2.0%, along with a 7.2% decrease in habitat suitability in the current assessment;
- In comparison to the previous season assessment (Jun 2015), the SASS5 score has increased by 126.7% and the ASPT score increased by 48.5% (Table 11), despite a slight 4.5% decrease in habitat suitability when compared to the previous season. The increase in macro-invertebrate community diversity and sensitivity is likely as a result of the decrease in EC concentration when compared to the previous season;
- The SASS5, ASPT and IHAS scores are highly variable over time, and likely related to changes in water quality, habitat availability and seasonality.

Potential upstream and catchment-wide impacts prior to potential impact from mining activities:

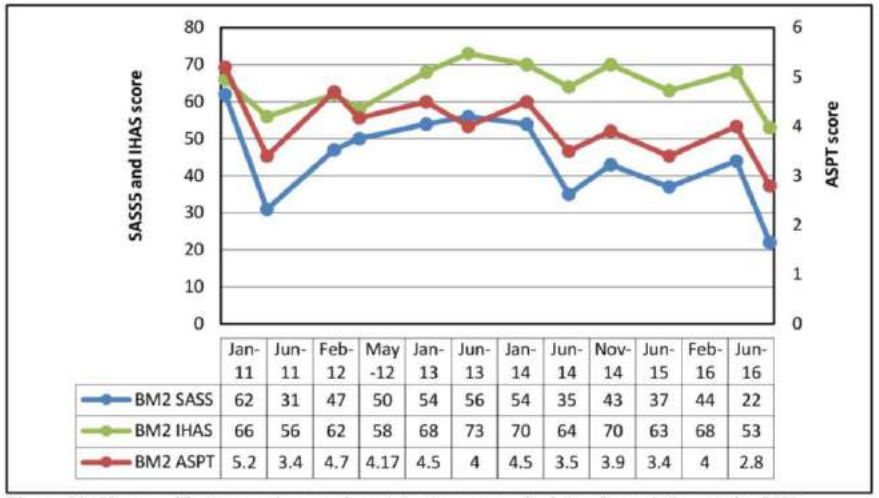
- Potential impacts prior to any likely impact from mining include agricultural return flow and run-off as well as run-off from hard surfaces such as roads and other anthropogenic activities in the area;
- Also see Table 15 for spatial comparisons between sites.

Table 34: Summary of 2011-2016 biomonitoring results – Downstream Grootspruit site (pasted from SAS, 2016)



	Jan-11	Jun-11	Feb-12	May-12	Jan-13	Jun-13	Jan-14	Jun-14	Nov-14	Jun-15	Feb-16	Jun-16
BM2 pH	7.59	6.58	9.21	7.81	8.68	8.14	8.14	8.20	8.08	7.54	7.71	7.66
BM2 DO				7.87	3.88	8.80	6.38	7.67	3.45	2.43	7.54	2.80
BM2 Temp	24	11.3	27.2	10.7	23	8.2	24.8	14.2	19.2	11.2	24.20	9.80
BM2 EC	117.6	76.5	74.8	60.4	48.4	63.8	20.3	188.0	99.0	94.0	147.0	88.00

Figure 20: Site-specific temporal water quality variation at site BM2. Oldest available DO data from May 2012.



	Jan-11	Jun-11	Feb-12	May-12	Jan-13	Jun-13	Jan-14	Jun-14	Nov-14	Jun-15	Feb-16	Jun-16
BM2 SASS	62	31	47	50	54	56	54	35	43	37	44	22
BM2 IHAS	66	56	62	58	68	73	70	64	70	63	68	53
BM2 ASPT	5.2	3.4	4.7	4.17	4.5	4	4.5	3.5	3.9	3.4	4	2.8

Figure 21: Site-specific temporal macro-invertebrate community integrity variation at site BM2

Comment:

- Electrical conductivity (EC) can be considered as significantly elevated from natural conditions;
- The EC increased by 25.2% when compared to the baseline assessment (Jan 2011) and decreased by 6.4% when compared to the previous season (Jun 2015). The temporal change from baseline data exceeds the DWS target water quality guideline (DWAF, 1996) (Table 13), which advocates that seasonal and temporal changes should not exceed 15%;
- When compared to the baseline assessment the pH has increased slightly by 0.9% and by 1.6% when compared to the previous season assessment. These temporal changes comply with the DWS target water quality guideline (DWAF, 1996) (Table 13), which advocates that seasonal and temporal changes should not exceed 5%;
- Dissolved oxygen (DO) saturation can be considered as critically low and inadequate in supporting a diverse and sensitive aquatic community as it falls below the 80% saturation requirement (DWAF, 1996);
- DO concentrations indicate a significant decrease in concentration over time;
- The temporal decrease in DO needs to be closely monitored in future, especially with consideration of the spatial trends to be discussed in the following table;
- Ongoing monitoring at this point will need to continue to monitor existing trends and identify any emerging trends.

Comment:

- When compared to the baseline assessment (Jan 2011) the SASS5 score has decreased by 64.5% and the ASPT score by 46.2%. This is likely as a result of the significantly decreased DO concentration and decreased habitat suitability at the time of the assessment (Table 13);
- In comparison to the previous season assessment (Jun 2015), the SASS5 score has decreased by 40.5% and the ASPT score by 17.6% (Table 13). The decrease in macro-invertebrate diversity and sensitivity is likely as a result of the decrease in DO concentration and habitat suitability when compared to the previous season;
- The SASS5, ASPT and IHAS scores follow the same trends over time, indicating that habitat suitability along with water quality parameters are key drivers of this system.

Potential relevance to mining activities:

- Mining activities may contribute to the observed variability in EC and DO concentrations, but impacts from other upstream point and diffuse sources of pollution confound any generalisations or attempted quantification of potential impact;
- Impacts from the rural residential area located upstream of this site is considered to have a significant impact on the system at the time of the assessment, including organic pollution ingress contributing
- to high oxygen demand and variability in DO concentrations;
- Also see Table 15 for spatial comparisons between sites.

9.1.9 WETLAND ECOLOGY

A series of studies have been undertaken to understand the wetland ecological resources of the area, including:

- A wetland study was undertaken by Limosella Consulting (Pty) Ltd (2011) for the Evander Gold Mine Project area to inform the existing EMP (Plan 26);
- A detailed wetland assessment on the Leeuwpan Dam was undertaken by Scientific Aquatic Services (Pty) Ltd (2011); and
- A detailed wetland study was undertaken by Limosella Consulting (Pty) Ltd (2016) for the TSF expansion area (Plan 27).

Summarised herein is the results for the TSF expansion area as well as information on Leeupan Dam as these wetland systems are relevant to this application. Please refer to Appendix 12 for the full reports as listed above for more information.

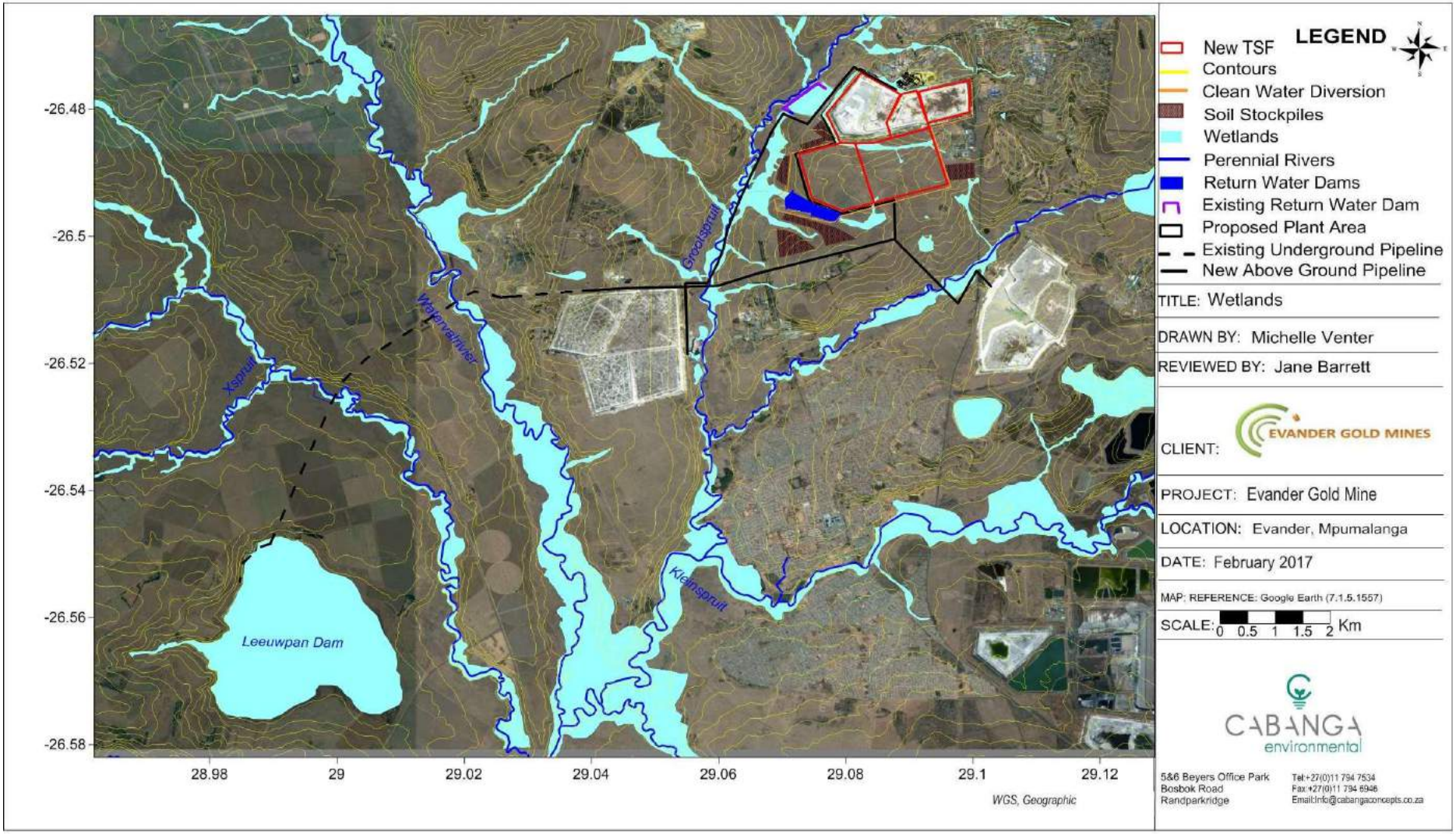
9.1.9.1 WETLANDS WITHIN THE NEW TSF FOOTPRINT AREA

Four wetland units were recorded on the TSF expansion study site including an unchannelled valley bottom wetland in the north, a channelled valley bottom wetland in the south and two depression pan wetlands (Plan 27).

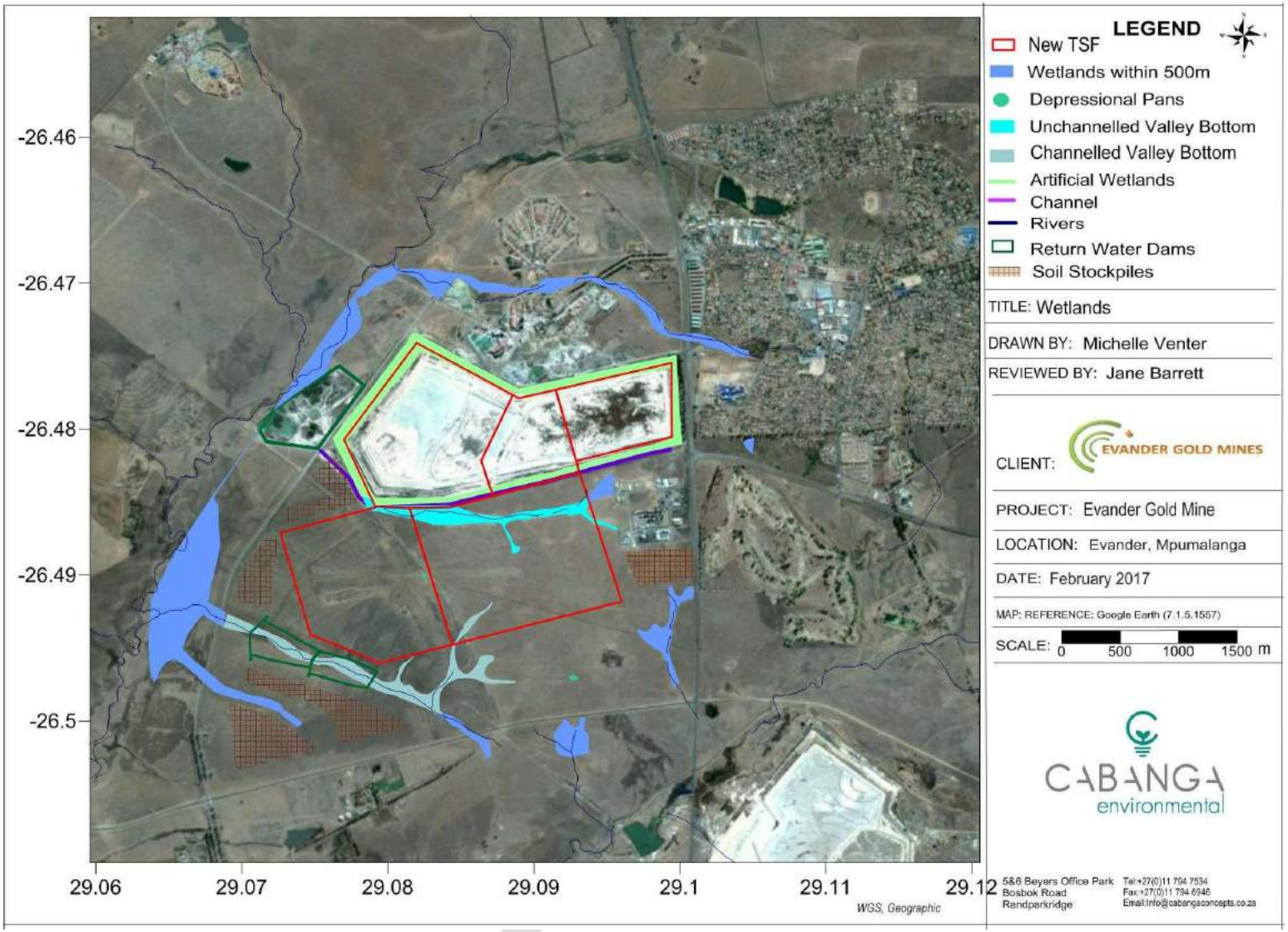
The unchannelled valley bottom wetland is located adjacent to the Kinross TSF and the nearby industrial area. This unchannelled valley bottom wetland drains west into a manmade channel.

The channelled valley bottom wetland drains into a larger floodplain wetland in the east. Water that is released into the Grootspruit from this wetland is likely to be driven by surface water flow collected from the catchment rather than lateral seepage water. Due to the grazing pressure this water is likely to be enriched with nitrates.

One of the two depressional pan wetlands is located on the historical airstrip landing area, which is a raised piece of land that is older than 50 years and is thus an artificial wetland. The remaining depressional pan is a small pan, which is likely a seasonal wetland created due to the dark dense clay soils of the area that trap moisture and support hydrophytic vegetation during the wet season. Water from the pan wetlands does not drain into the Grootspruit.



Plan 26: Wetland delineation (Limosella, 2011)



Plan 27: Wetland Types within the new TSF Footprint Area (Limosella, 2016)

9.1.9.2 WETLAND PRESENT ECOLOGICAL STATE (PES)

The unchannelled valley bottom has been impacted the most by the long term mining activities (since at least 1966) which has significantly altered its hydrology and flow characteristics. A large section of the wetland has been removed and now flows in a manmade channel. Although some unique plant species were recorded within this wetland a number of exotic species remain. This wetland scored a PES score of **E** - The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.

The channelled valley bottom wetland, although also located on land that has been used for mining activities, has been less impacted as it is located further away from the existing Kinross TSF. Moderate to major erosion was recorded in this wetland. As with all other wetlands on the study site large numbers of cattle grazing on the land and illegal plant collection by the people in the area affect the current integrity of the wetland. Water that is released into the Grootspruit from this wetland is likely to be driven by surface water flow collected from the catchment rather than seepage water. Due to the grazing pressure this water is likely to be enriched with nitrates. This wetland scored a PES score of **D** - Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.

The two depression wetlands on the study site are very small with small catchments and impacts are thus limited to the grazing. Water from these pans does not enter into the Grootspruit. The vegetation, although mainly dominated by one homogenous species in both pans, did not have much exotic vegetation. The artificial pan was excluded from the PES calculation since this scoring system calculates the change from a theoretical reference condition. The remaining pan scored a PES score of **B -** Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.

The PES scores of the wetlands are reflected in the table below (Table 35).

Table 35: Summary of wetland ecological health assessment results (Limosella, 2016).

Wetland Unit	Hydrology		Geomorphology		Vegetation		Overall Score	
	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Unchannelled Valley Bottom	7.4	-1	6.7	-1	3.4	0	6.0	0

Wetland Unit	Hydrology		Geomorphology		Vegetation		Overall Score	
	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
PES Category and Projected Trajectory	**E**	↓	**D**	↓	**C**	→	**E**	↓
Channelled Valley Bottom	5.8	0	3.6	0	2.4	0	4.2	0
PES Category and Projected Trajectory	**D**	→	**C**	→	**C**	→	**D**	→
Depressional Pan	1.8	0	1.5	0	2.3	0	1.6	0
PES Category and Projected Trajectory	**B**	→	**B**	→	**C**	→	**B**	→

9.1.9.3 WETLAND ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

The overall study site was open and the land generally grazed short. No significant bird life was observed and it is unlikely that any significant faunal species use the site for breeding or nesting. Due to the contaminated water on the study site it is highly unlikely that any significant direct human benefits exist on the study site. The wetlands (except the pans) still contribute to flood attenuation and water quality improvement to some degree, particularly the channelled valley bottom wetland in the south. Due to the small size of the two pans on the study site the EIS scores are very low as they do not contribute significantly to hydro-functional importance or human benefits. The pan (excluding the artificial pan) scored high with regards to hydrology and geomorphology due to the small catchment area associated with depressional pans in general. The vegetation however has been impacted by grazing to a large extent.

The unchannelled valley bottom and channelled valley bottom wetlands falls into the category characterised by **Moderate** ecological importance and sensitivity (Table 36). Wetlands that fall into this category are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water in major rivers (DWAF, 1999). The Recommended Ecological Management Class for these wetlands is a C.

Both depressional pan wetlands fall into the category characterised by Low/Marginal ecological importance and sensitivity (Table 36). Wetlands that fall into this category are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water in major rivers (DWAF, 1999). The Recommended Ecological Management Class for these wetlands are thus a D. Details for the components assessed in the combined EIS score are presented in the full report, attached as Appendix 12.

Table 36: Summary of EIS scores obtained for wetland systems on the study site. (Limosella, 2016)

WETLAND IMPORTANCE AND SENSITIVITY	Unchannelled valley bottom	Channelled valley bottom	Depressional pan (Airfield)	Depressional pan
Ecological importance & sensitivity	1.6	1.7	1.4	1.4
Hydro-functional importance	1.4	1.6	0.6	0.6
Direct human benefits	0.3	0.3	0.3	0.3
Overall EIS score	1.1	1.2	0.8	0.8
Overall EIS category	Moderate	Moderate	Low	Low

9.1.9.4 LEEUWPAN DAM

Leeuwpan is a lacustrine (permanently flooded), limnetic (>2 m deep), water surface wetland (vegetation covers >30% of surface). It used for the discharge of effluent from the mine's process water system, i.e. it is used as an evaporation dam. This has led to the major expansion of the wetland to its current extent of approximately 735 ha. Thus, the current wetland functioning and service provisioning of the system deviates from that of the perceived historic system.

9.1.9.5 ECOLOGICAL STATE:

Due to the pan being used for the disposal of mine water, the increased salinity provides good habitat for the near-threatened Greater Flamingo (*Phoenicopterus ruber*) and other bird species. Vegetation is largely disturbed and is dominated by alien invasive plant species. Water from the Leeuwpan Dam and associated wetlands are deemed unsuitable for irrigation purposes, due to the high salinity of the system.

Three fish species, namely Sharptooth catfish (*Calrias gariepinus*), Common carp (*Cyprinus carpio*) and Largemouth black bass (*Micropterus salmoides*), with the latter two species being exotic, have been introduced into the system for angling purposes, but no sensitive fish species or micro-invertebrates occur in the system due to lack of habitat and impaired water quality placing severe limitations on aquatic faunal communities.

The mean score was calculated as 2.1, indicating the PES which as Class D – Largely Modified. This class obtained is mainly due to the impacts on the system arising from mine effluent discharge and the severely altered vegetation characteristics of the wetland feature.

9.1.9.6 ECOLOGICAL SERVICES:

The current system now exists and performs functions and services different from the original wetland. Leeuwpan Dam is also used for recreational purposes; and birdlife in the vicinity is well represented. The nutrient assimilation functions of the wetland system are also important elements of the current service provision in the system. The most significant services the wetland provides are toxicant, nitrate and phosphate assimilation and biodiversity maintenance in terms of habitat provision for water-dependent bird species, such as the endangered Greater Flamingo (*Phoenicopterus rubra*). The dam does not contribute significantly towards erosion and sediment control. The dam and its associated wetland do however currently provide recreational services in terms of boating and angling.

9.1.10 HERITAGE RESOURCES AND PALAEONTOLOGICAL POTENTIAL

A heritage impact assessment study was completed for the greater mining right area in 2010 by African Heritage Consultants. Seventeen sites were identified during this assessment, including a number of graves and farmyards, as well as township foundations, a midden and an initiation site (Plan 28). Two of these sites, 11 and 11A fall within the proposed project area.

Following a request from the South African Heritage Resources Agency (SAHRA) a second heritage impact assessment was completed, to assess the impacts with specific reference to the proposed project.

During this assessment, the project area associated with the new TSF, RWDs and associated pipelines were surveyed. Two sites were identified in the immediate project area, these coincided with the sites identified in the original study, namely 11 and 11A (Archaetnos, 2017).

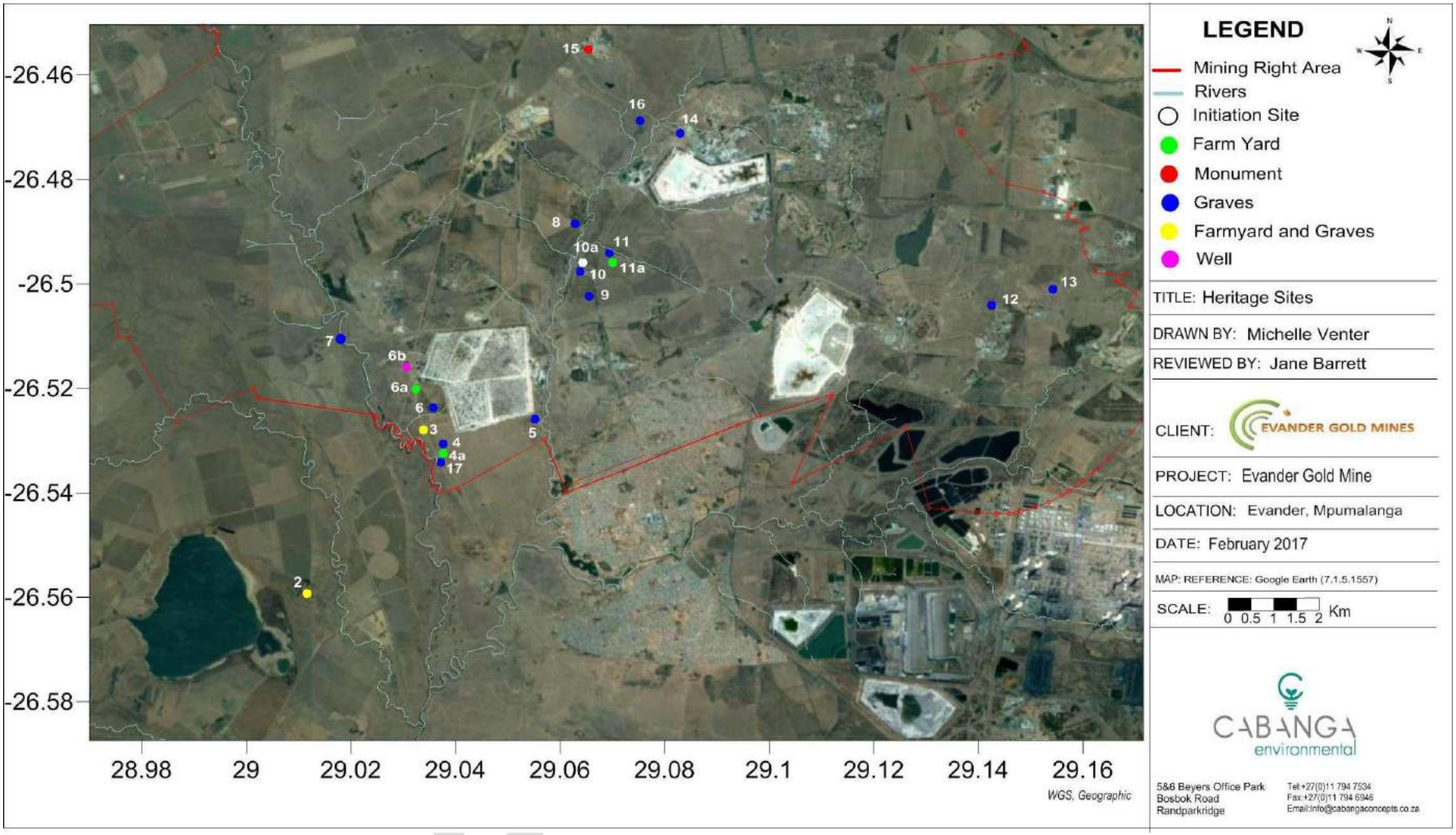
- **Site 11: Graveyard**

This is a large grave yard containing approximately 15 graves. Most of the graves have cement or granite dressings and headstones. One of the surnames identified is Pieterse. The graves are mostly older than 60 years and some are damaged.

- **Site 11A: Farm yard**
  The site consists of the rectangular ruin of a house, built from stone and a number of outbuildings of similar style. The house has at least three rooms and has measurements of approximately 12 x 5 m. At least two outbuildings and a kraal is visible. It is a very common building style for the early farms in the vicinity and is in a reasonably bad state of preservation.

A desktop palaeontological study was completed for the proposed project by Professor Marion Bamford at the University of the Witwatersrand (Bamford, 2017). This assessment found that based on the geology of the area and the palaeontological record as we know it; there is a small chance that fossil plants, animals or invertebrates would occur there. However due the fact that no fossils have been reported previously and the area is already highly disturbed, the chance of finding recognizable and well preserved fossils is extremely small.

Please refer to Appendix 13 for copies of the Heritage and Paleontological reports.



Plan 28: Heritage Sites Identified in the greater Mining Right Area (African Heritage Consultants, 2010)

9.1.11 AIR QUALITY

The Air Quality assessment was completed by Rayten Engineering Solutions (February, 2017). The baseline findings are summarised herein; the full report is attached in Appendix 14.

9.1.11.1 WIND

Wind speeds are generally moderate to fast with calm conditions, which are defined as wind speeds less than 1 m/s, observed for 15.42% of the time. In the morning and day time periods, prevailing northerly and north-north-westerly winds are observed. In the afternoon and night time periods, the northerly component weakens; with a stronger north-westerly wind observed.

During the autumn and winter months (March to August), winds originate predominantly from the north-west and north-north-west. During the spring and summer months (September to February) winds originate predominantly from the north and north-eastern sectors. Moderate to fast wind speeds are observed throughout all four seasons (Figure 5).

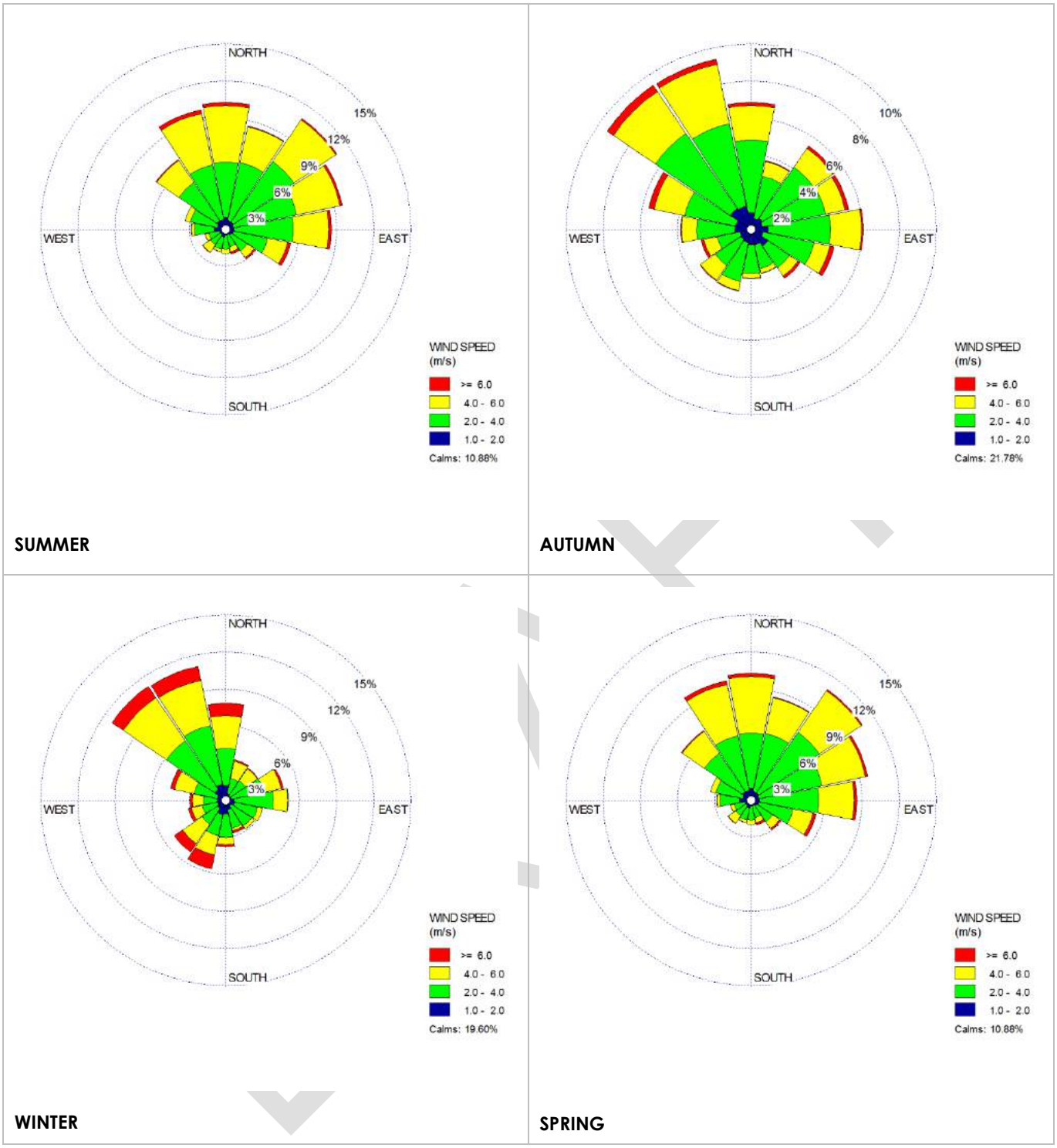


Figure 5: Seasonal variation of winds for the project site for the period January 2013 - December 2015 (Rayten, 2017)

9.1.11.2 SUMMARY OF EXISTING POLLUTION SOURCES

Based on the prevailing wind fields, emissions from the existing operations will likely be transported towards the south-east and south-west. Moderate to fast wind speeds observed may result in effective dispersion and dilution of emissions from the operations. However, moderate to fast wind speeds may also increase dust emissions from the tailings facilities and exposed areas.

Existing key sources of air pollution surrounding the project site have been identified to be:

- Mining Activity;
- Industrial Activity & Power Generation;
- Agricultural activity and biomass burning;
- Vehicle dust entrainment on unpaved roads;
- Wind erosion from exposed areas (e.g. eroded land, tailings facilities, stockpiles, open storage piles, cultivated land, etc.).

9.1.11.3 DUST FALLOUT

Dust Fallout monitoring is conducted by EGM at eleven sites located in and around their premises (Figure 6). Dust fallout monitoring results for each site was provided by EGM for the period January 2014 – September 2016. Maximum dust fallout rates for all the sites range from approximately 709 – 3500 mg/m^2/day.

Exceedances of the non-residential limit of 1200 mg/m2/day were sporadically observed at site D1 (Figure 7) and D2 (Figure 8), which are located west of the Winkelhaak and Kinross TSFs respectively. Exceedances at D1 at the particular time period was not fully dust related as a flood light was installed close to the dust monitoring point at the Winkelhaak Emergency pump station. This attracted a lot of insects at night which got trapped in the fallout dust monitoring bucket. This result was captured in the comments column in the fallout data base.

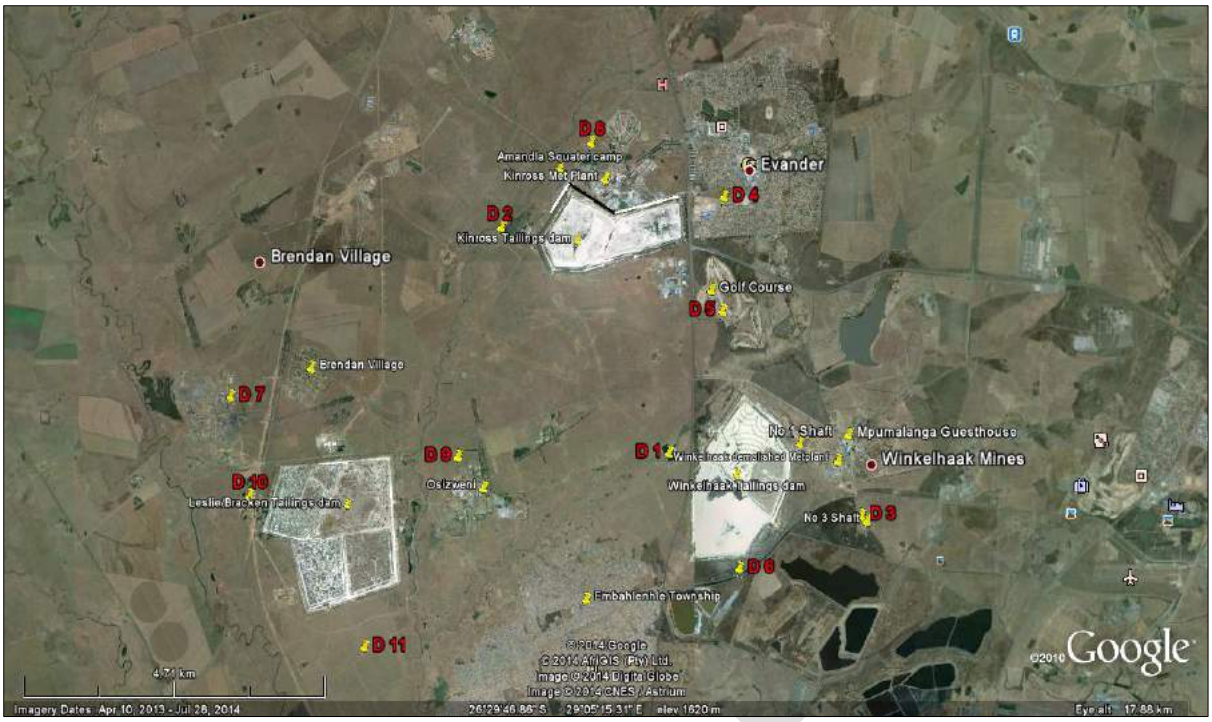


Figure 6: Locality of the Evander Gold Mine dust fallout monitoring sites (Rayten, 2017)

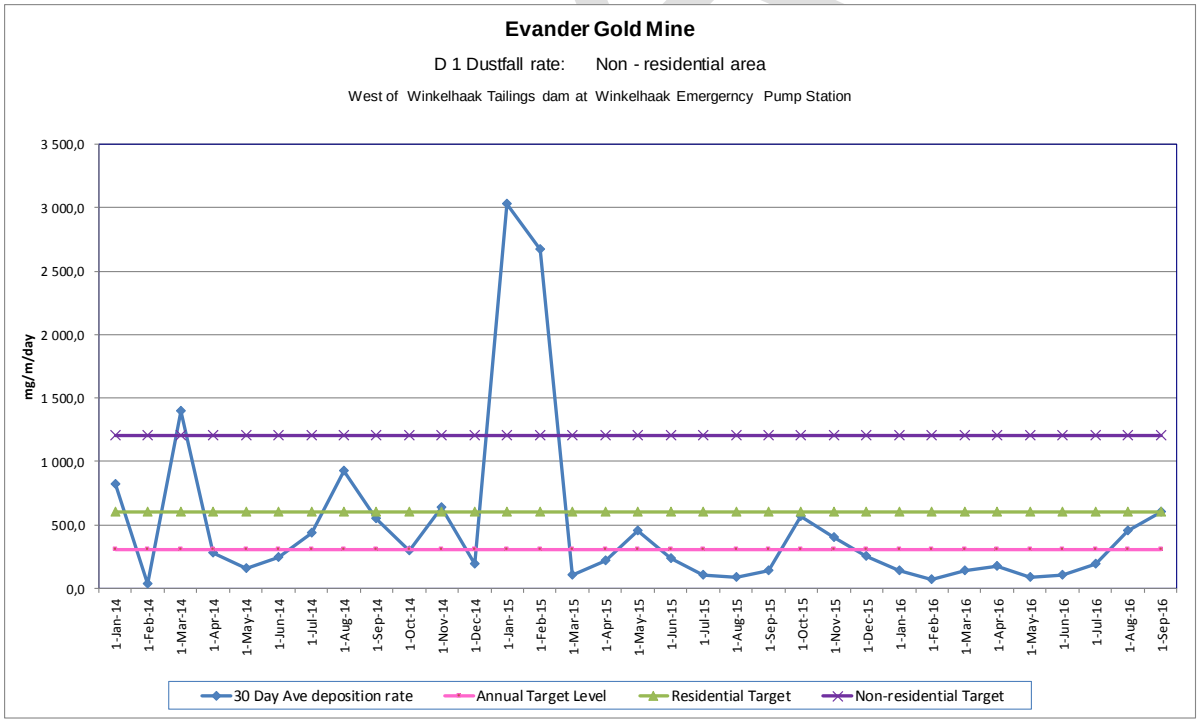


Figure 7: EGM dust fallout rates at site D1 (Jan 2014 – Sep 2016).

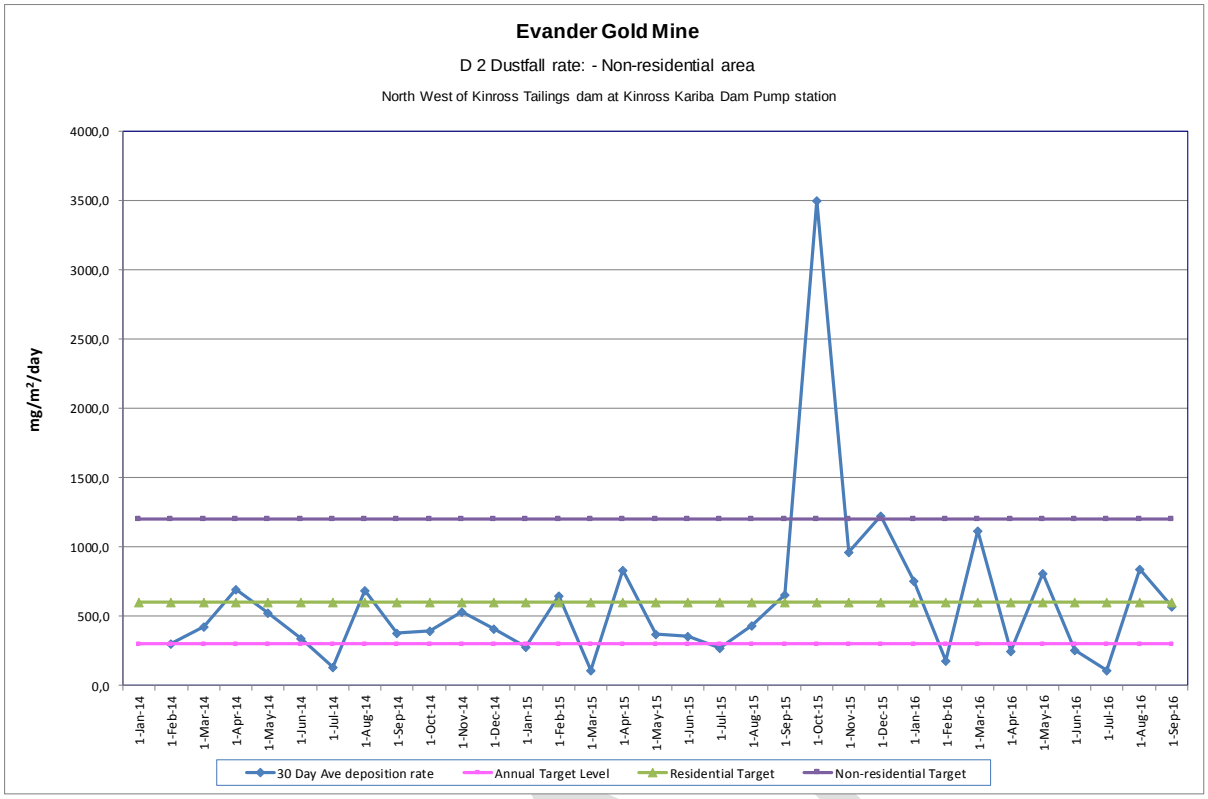


Figure 8: EGM dust fallout rates at site D2 (Jan 2014 – Sep 2016)

9.1.11.4 PARTICULATE MATTER (PM10 AND PM 2.5)

The nearest air quality monitoring station to the project site is the Sasol Recreation Club in Secunda, which is situated approximately 8km east of the Winkelhaak tailings facility. This monitoring station also monitors the air quality from and the Sasol Synfeul factory.

Ambient PM10 and PM2.5 concentrations in the area are mostly in compliance during the spring and summer seasons; with exceedances of the 24-hour average standard of 75µg/m3 and 40µg/m3 mostly occurring during the autumn and winters seasons.

A maximum PM10 daily average concentration of approximately 200 µg/m3 was recorded in September 2014 and a maximum PM2.5 concentration of approximately 65µg/m^3 was recorded during the winter season in July 2016.

9.1.11.5 NITROGEN DIOXIDE (NO_2)

Hourly average nitrogen dioxide concentrations fall below the acceptable standard of 106 ppb for most of the period; with higher concentrations and exceedances mostly observed during the winter season. A maximum hourly average

concentration of approximately 130ppb was recorded during the winter season in July 2016.

9.1.11.6 SULPHUR DIOXIDE (SO_2)

Hourly and daily sulphur dioxide concentrations are in compliance with hourly and daily limits of 134ppb and 48ppb for most of the period. A maximum hourly concentration of approximately 305 ppb was recorded in October 2015 and a maximum daily concentration of approximately 56 ppb was recorded in July 2013.

9.1.11.7 CARBON MONOXIDE (CO)

Hourly carbon monoxide concentrations are in compliance with hourly limit of 26ppm throughout the monitoring period January 2013 to January 2017.

9.1.12 NOISE

A noise assessment was undertaken in January 2011 and is included in Appendix 15. Sound pressure levels were measured at 5 test sites around the plant and town (Figure 9). Sound pressure levels from the industrial environment did not exceed the recommended levels stated in SANS 10103:2008 for industrial areas. The activities at the EGM did not exceed the levels as stated by the code. Peaks recorded during this survey were from wildlife (birds and insects) and traffic passing by the identified sampling points.

Figure 9: Image showing general locations of noise monitoring done in January 2011

9.1.13 SOCIO-ECONOMICS

The town of Evander was established in 1955 to accommodate mining personnel with the discovery of gold in the area; approximately 90% of the residents in Evander are employees of the surrounding mining companies. The town falls within the Govan Mbeki Local Municipality (GMLM), of the Gert Sibande District Municipality (GSDM).

The information below is largely abstracted from the Govan Mbeki Spatial Development Framework 2014 – 2034 and summarises the relevant demographics of the GMLM:

- The population grew at a rate of 2.84% per annum over the period 2001 - 2011. This is higher than the district growth of 1.48% per annum and the province of 1.82 % p.a. This is likely as a result of migration of people from other provinces due to mining activities.
- The existing population within the developed areas of the GMLM (urban and rural) totals some 294 538 people approximately 28.2% of the district population. Within Govan Mbeki, the population is mostly concentrated within:
    - Embalenhle (40.4%);
    - Bethal/ Emzinoni (20.6%);
    - Secunda (14.5%);

- Leandra (Leslie, Lebohang, Eendracht) (14.8%).

Only 4.5% of the population is associated with the mining villages and farms within the area.

- Number of households within the local municipality is 83 874 (average of 3.3 people per household).
- Approximately 66% of the population is black, 27.3 % is white and 6.7% coloured, Indian, Asian or other.
- The gender ratio over the period 2001 – 2011 indicates more males than females in the area indicating the presence of migrant workers.
- The Govan Mbeki unemployment rate (25.2%) is higher than the provincial rate of 24.5%, but lower than the district rate of 30.0%.
- The economic active population percentage of Govan Mbeki (43.3%) is higher than that of the country, province, district and Emalahleni, Steve Tshwete, Msukaligwa, Dipaleseng and Lesedi in the area. It has the same economic active population as Lekwa and lower than that of Victor Khanye (48.5%).

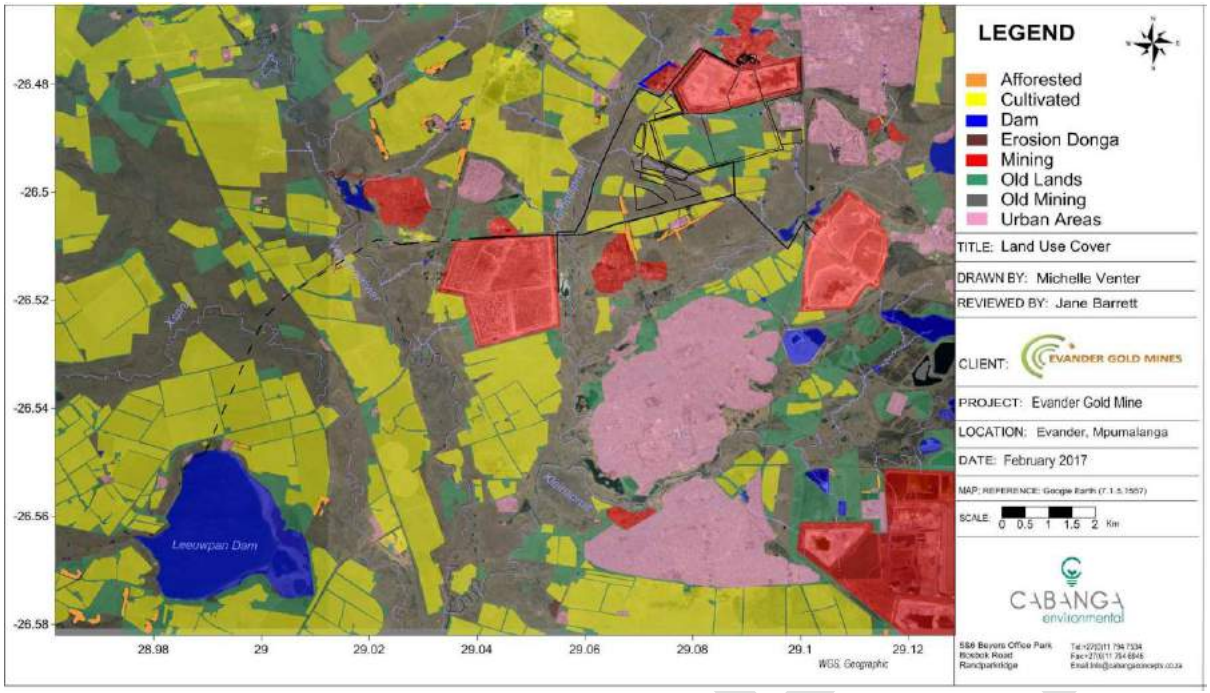
GMLM has a major influence on the Mpumalanga and GSDM economies. It contributes 19.8% to the Mpumalanga and 63.3% to the district economy. Within the subregion consisting of Govan Mbeki, Emalahleni, Steve Tshwete, Msukaligwa, Victor Khanye, Dipaleseng and Lekwa, the contribution of Govan Mbeki is 33.1%.

Mining and Manufacturing are the dominant sectors within GMLM due to the strong petrochemical industry provided by Sasol and gold mining activities in the area. The expansion of these sectors as well as agricultural, tourism and finance within GMLM has been identified as future leading sectors to support economic and socio-economic development in the area.

9.2 DESCRIPTION OF THE CURRENT LAND USES

The locality and extent of current land use cover within, and surrounding, the proposed project area is indicated in Plan 29 below.

The land use immediately surrounding the proposed project site consists predominantly of mining, cultivated community fields, grassland and urban areas. Urban areas include urban residential, urban industrial, mine buildings, schools, sports grounds and recreational areas, commercial areas, townships and villages. A small industrial area lies immediately east of the new TSF footprint.



Plan 29: Land Use Cover

EGM has been operational since approximately 1958. The new TSF will be constructed as an extension to the current Kinross TSF, which has been in existence since the early 1960's. The footprint area of the proposed expansion (indicated in red in Figure 10) is currently used for grazing by the surrounding communities, however historical imagery indicates that this area was utilised as an airfield/landing strip in the past.

The proposed Elikhulu Plant will be constructed adjacent to existing Kinross Metallurgical Plant (indicated in orange in Figure 10 below). This area is disturbed by mining activities and has up until recently been used to crush and screen waste rock at the mine.

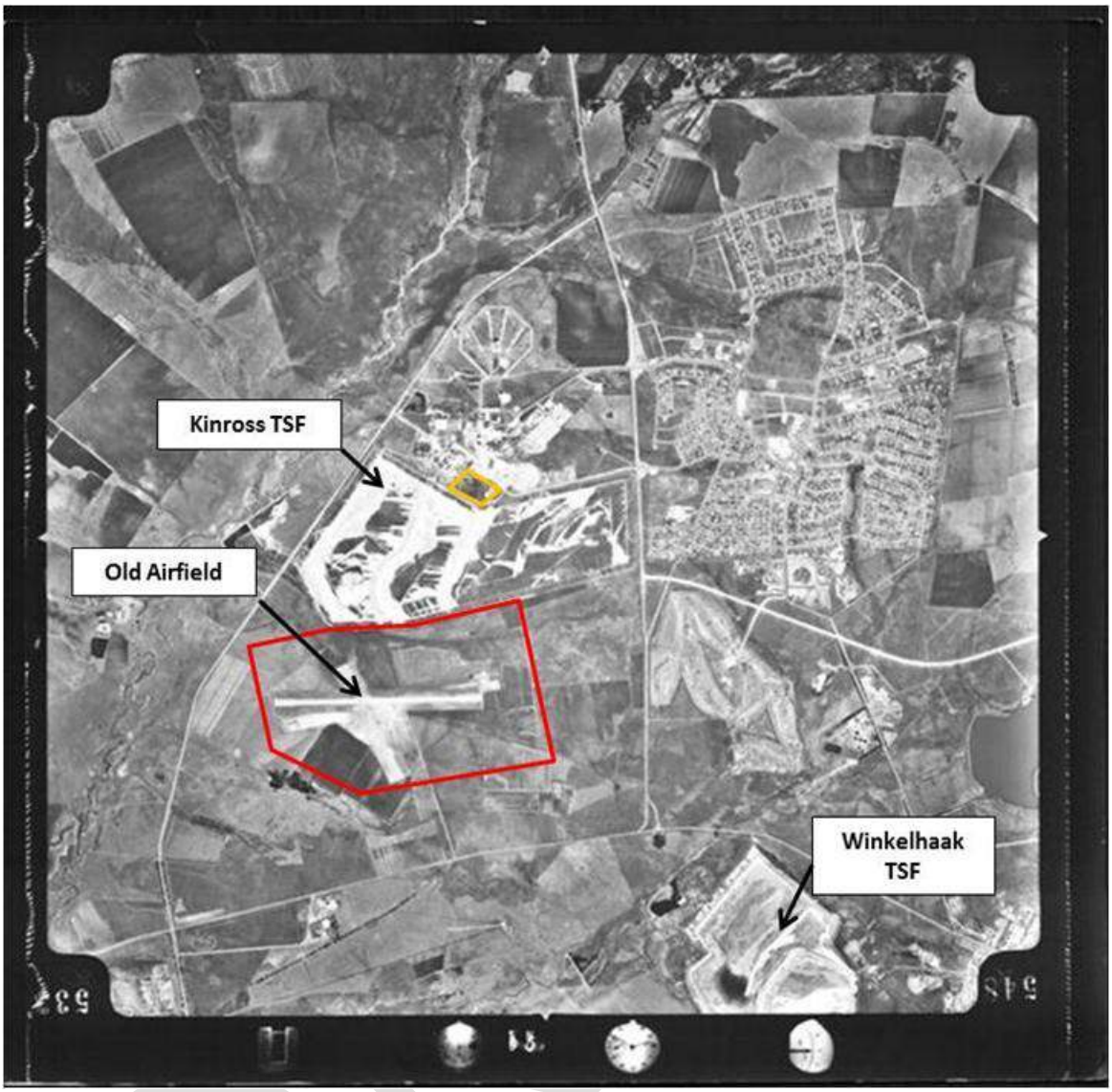


Figure 10: 1966 historical imagery of the TSF project area

The Leeuwpan Dam is owned and operated by EGM as an evaporation dam; a water use license has been issued in terms of Section 21g of the NWA for this activity and as such it is considered to be a disposal facility. The dam was developed from a natural pan in the latter part of 1963 for the purpose of receiving and evaporating excess mine water. The dam wall was later upgraded in 1991, following which the dam was registered and classified under the Dam Safety Regulations (R. 139) in 1994. The dam currently receives water from EGM and the adjacent Taung Gold.

9.3 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE

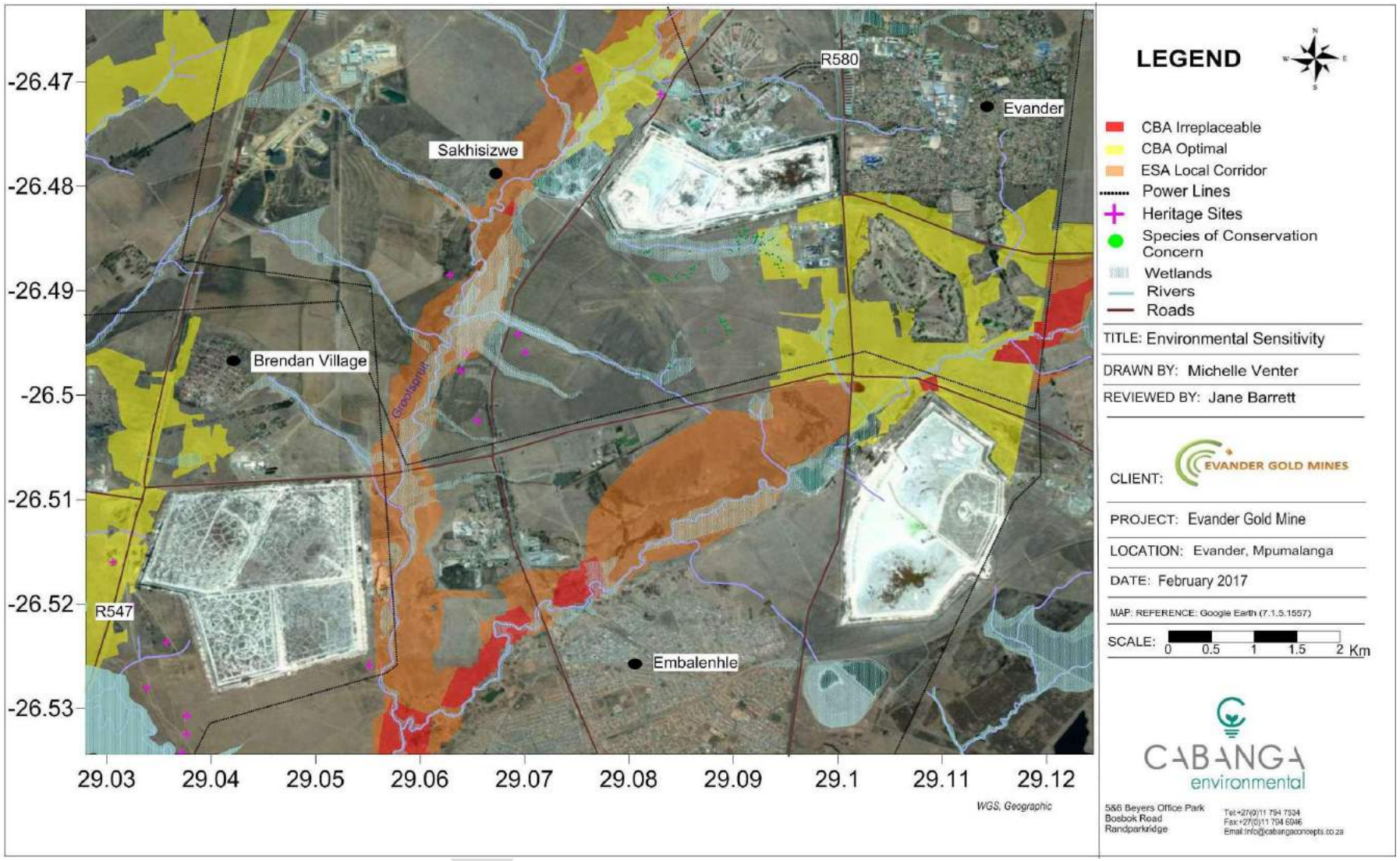
As described in the baseline and the current land use sections above, the sensitive environmental features associated with the project area are as follows:

- Watercourses;
- Wetlands;
- CBA's
- Heritage sites; and
- Floristic species of concern.

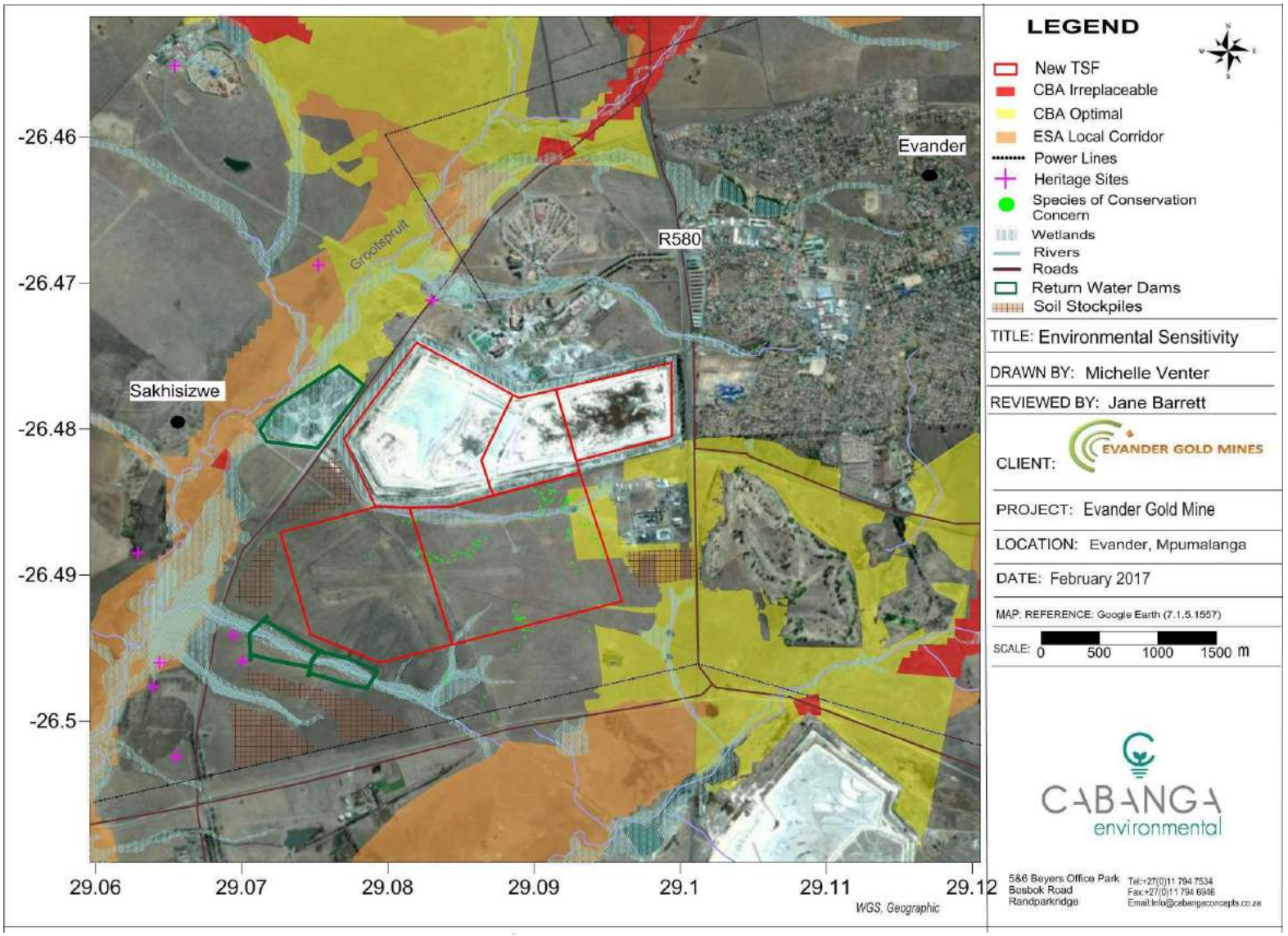
Existing servitudes and infrastructure within the proposed project area include overhead powerlines; as well as existing slimes slurry and water pipelines (owned by EGM), the Kinross TSF and associated Kinross Shaft Complex (incl. plant area). Refer to Plan 30 and Plan 31 on the following pages for the environmental sensitivity maps.

9.4 ENVIRONMENTAL AND CURRENT LAND USE MAP

Plan 30 and Plan 31 below overlays all the environmentally sensitive areas with the proposed project infrastructure for a full understanding of the project influence.



Plan 30: Overall environmental sensitivity map



Plan 31: Environmental sensitivity map of the new TSF location

10 IMPACT ASSESSMENT PROCESS AND FINDINGS

10.1 IMPACTS AND RISKS IDENTIFIED BY SPECIALISTS

This section summarises the main findings of various specialists' impact assessments with respect to the proposed project.

The full impact rating assessment (specialist impacts, general impacts and I&AP impacts) is included in Appendix 18, which details the magnitude, extent, duration, reversibility, probability and the overall significance of each impact identified.

10.1.1 SOILS, LAND USE AND CAPABILITY

The most significant impact will be the permanent loss of the soils and land capability associated with the new TSF area, totalling approximately 230 ha. However, the land capability of the area is limited and this is assessed to be a low impact.

It must also be noted that two TSF's will be rehabilitated as part of this project and this will result in a positive impact as the footprints will be rehabilitated and remediated for an alternative use.

Other impacts that may occur that will need mitigation attention include:

- Soil erosion;
- Topsoil degradation;
- Soil compaction; and
- Chemical soil pollution.

10.1.2 SURFACE WATER

The following activities have been highlighted as risks to the hydrological environment that may cause significant impacts (as summarised from the Hydrological Impact Assessment Report, Letsolo, 2016 – Appendix 8):

- Construction phase:
    - The land profile will be changed due to stripping of vegetation and construction of the new extended TSF area;
    - Construction of the return water dam in the water course south west of proposed TSF negatively impacts the natural hydrological environmental;
    - Construction material will be transported to site. The type of material used during this phase may impact negatively on the runoff water quality;
    - Dust may emanate from the use of heavy construction vehicles, which would impact on runoff water quality.

- Operational Phase:
    - Polluted runoff from the re-processing of tailings materials, which represents a risk to the natural environment.
    - Unlined or overflowing return water dams may impact negatively on the water resources nearby;
    - Dust from tailings may have a significant impact on the surface water runoff outside of the TSF;
    - Spillages of slurry and water from the reticulation pipelines may occur and may impact negatively on surface water quality;
    - Polluted runoff from the processing plant and associated infrastructure, if not channelled to RWD, may impact negatively on the environment; and
    - Due to an increased percentage of bare surfaces, there is a higher potential of soil erosion.

Due to the above, the proposed project may result in negative impacts to the hydrological environment if unmitigated. This will occur primarily through the undesired runoff into the natural hydrological environment that alters natural water quality. In addition, there will be some water removed from the natural system due to the increased footprint of the Kinross TSF that also will include a small stream. However, it must be noted that the three existing TSF's represent similar current impacts to the catchment. Thus, in the context of the area, this project has some advantages from a surface water point of view, which include:

The proposed Tailings Reclamation Project will result in the reworking of aging Tailings Dams in the area, which are located very close to the water resource.

- More efficient volumetric storage will be achieved as a result of more innovative TSF planning and operating procedures, compared to the 3 existing Tailings Dams.
- Current water management practices will be improved from the status quo of the three individual TSFs as the new TSF will be placed on an area with an impervious layer and lined. Water will also be collected at the Return Water Dam and recycled as part of a closed water circuit philosophy.
- The Kinross TSF will be designed with the aim of closure and therefore on going concurrent rehabilitation of the side slopes will be considered in the design of the cover system.

10.1.3 GROUNDWATER

The proposed project will represents risk to the geohydrological environment that may result in significant impacts. These impacts are summarised below according to the different phases of the project.

10.1.3.1 CONSTRUCTION PHASE

The potential environmental impacts on the water table during the construction phase are predominantly realised as reduction in the natural baseflow and rainfall recharge. This is assessed to be of a low significance.

10.1.3.2 OPERATIONAL PHASE

The proposed project represents significant risk to groundwater quantity and quality through the operational life of the project.

- Impacts to Groundwater Quantity:

The new TSF liner and under drain system should intercept a significant portion of the seepage through the base of the TSF reducing recharge to the underlying aquifer(s). This is seen as a positive impact due to contaminant spread retardation. Given the reduced recharge to the underlying aquifers and the resultant baseflow reduction the operational phase impact was assessed as low.

- Impacts to Groundwater Quality:

Deterioration of groundwater quality is expected to occur due to potential leachate infiltration/percolation from the following areas:

a) New TSF – extension of Kinross TSF;
b) The return water dam;
c) The water management dam/s at the treatment facility; and
d) Through spillage of chemicals or oils used at the treatment facility.

The potential impact on the groundwater quality during the operational phase was assessed to be of a high significance. However, with mitigation that constitutes the engineering of water management structures / facilities, including lining, early detection monitoring and good housekeeping, the significance rating is reduced to moderate. A summary of the impacts is as follows:

The TSF is not expected to be acid generating, however a much stronger Na-Cl-SO_4 signature can be expected and possible metal leaching. Trace metals showed an inability to leach from the material at the pH levels recorded but total digestions revealed high quantities of metals including barium (Ba), cadmium (Cd), copper (Cu), manganese (Mn), nickel (Ni), fluoride (F) and lead (Pb). Kinetic testing would be required to confirm the rate at which these metals are actually mobilised from the waste rock over time.

Contamination can be expected from seepage through the base of the TSF liner as well as from toe seepages and percolation from the base of contact water drainage ditches.

Geochemical assessments revealed the probability of sulphate rich leachate and therefore a high probability to leach from the facilities.

Within the zones of influence some contamination can be expected from baseflow to rivers and streams.

An increase in the contaminant load can be expected throughout the operational phase.

The water quality of the containment dam at the treatment plant and the return water dam is expected to have similar quality signatures compared to the seepage/leachate quality of the TSF, comprising of saline water with Na-Cl-SO_4 signatures. Seepage from the dams will undoubtedly impact on the down gradient groundwater quality. However, a suitable liner at its base will reduce or prevent seepage.

10.1.3.3 CLOSURE PHASE

The long term impact from the new TSF has been modelled as Scenario 3 in the Geohydrological modelling as discussed in Section 9.1.5 above. The simulated contaminant transport has been modelled for up to 800 years post operation of the new TSF and the following is concluded from the simulated sulphate plumes (as shown in Figure 11):

- The model accomplishes to simulate the direction of contaminant migration and the magnitude of concentration levels of plumes according to the conceptual understanding of the flow system, i.e. contamination migration occurs towards rivers/streams.
- Due to a mounding and diffusion effect, the plume extends around the base of the TSF, but is localised.
- The plume migrates relatively slowly due to the low permeable host material.
- Plume movement is initially towards the Grootspruit towards the west and to a lesser extent south towards the unnamed tributary of the Grootspruit.
- After approximately 150 post operation, does the simulated plume reach the Grootspruit towards the west with an approximate zone of influence along the Spruit of 1.3 km. It is expected that the seepage will discharge into the base of the Spruit as groundwater contribution to baseflow. Expected SO4 concentrations at the outer perimeter of the plume is expected to be between 50 and 135 mg/l.
- Approximately 200-250-years post-closure will the plume reach the unnamed tributary to the south with simulated concentrations of between 50 and 125 mg/l.

The base of the proposed TSF expansion will be compacted and not impermeable. It is therefore foreseen that water seepage will continue to migrate very slowly downward into the underlying aquifer during the decommissioning phase. Due to the fact the TSF will remain intact, a similar risk rating is proposed as compared to the operational phase. It shows that the potential impact of seepage from the proposed

TSF could be significant if not mitigated. With mitigation measures implemented during the operational and decommissioning phases, the significance of the impacts could be reduced to medium.

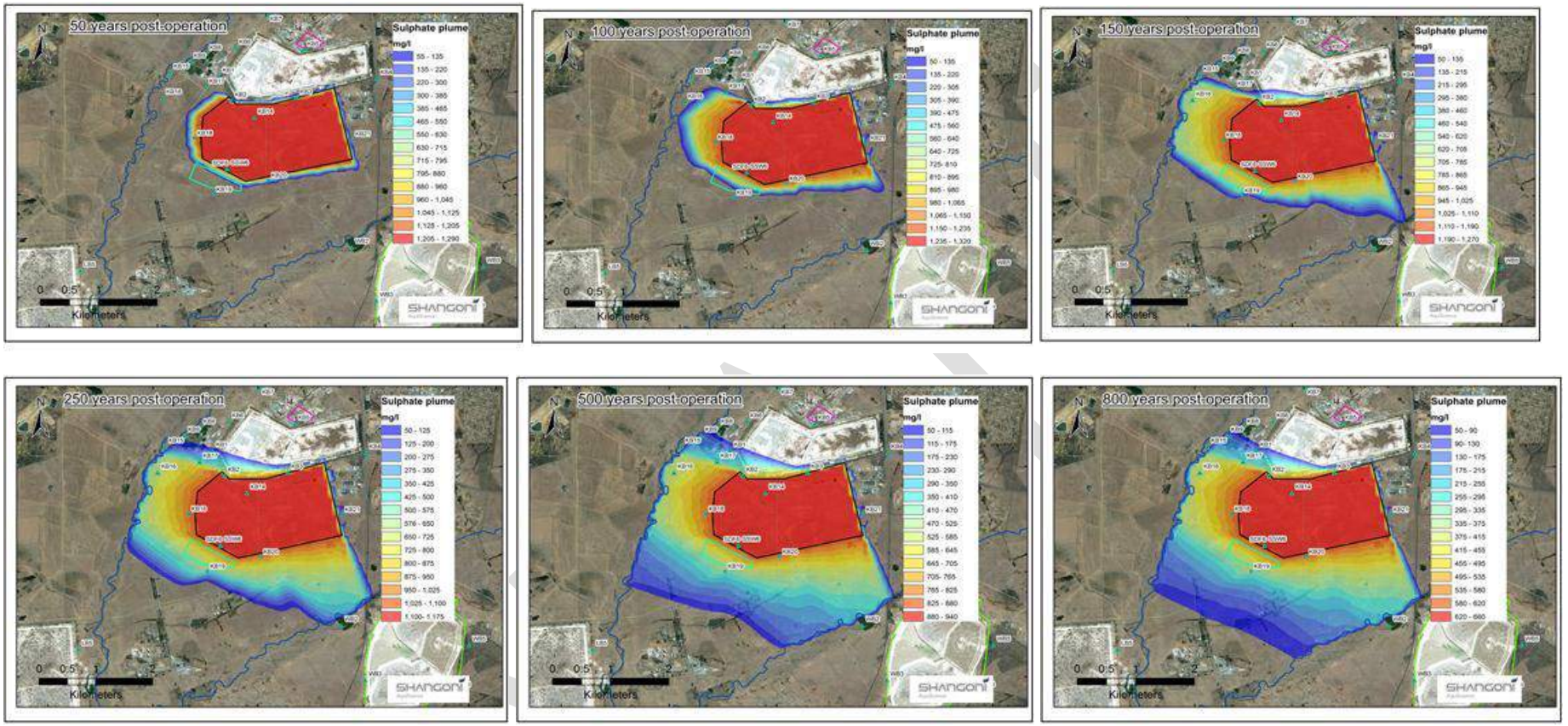


Figure 11: Predicted pollution plume from the New TSF from 50 to 800 years post closure (Shangoni, 2016)

10.1.4 FLORA

The main impacts to the natural vegetation associated with the proposed project is the removal of natural but disturbed grasslands associated with the footprint of the new TSF. This impact is determined to be moderate to low as the grassland areas are unlikely to contribute significantly to the protection of the vegetation type or species of concern, particularly due to uncontrolled grazing impacts and adjacent mining and industrial activities (Dimela, 2016).

The loss of the habitat will however lead to the destruction of the identified SCC including the Declining plant species *Boophone distichia*, *Hypoxis hemerocallidea* and *Eucomis autumnalis,* and a single Near Threatened species (*StenosItema umelluliferum*) (Dimela, 2016- Appendix 10).

It must also be noted that the rehabilitation of the Kinross and Winkelhaak TSF's may result in a positive impact to the catchment as these area currently negatively impact on the environment. Alien and invasive species management may be improved upon through the project.

10.1.5 FAUNA

The most relevant impacts to the faunal species of the area are due to the disturbance to the habitats as captured in the floristic impacts. Faunal diversity is determined to the relatively low for the area (de Wet, 2011), however some negative impacts may still occur through the different phases of the project. Other impacts that may occur include unforeseen activities such as poaching and fish kills through tailings spillage.

If negative impacts are realised to any of the natural terrestrial or aquatic ecosystems, the fauna that are utilising these areas will be harmed or disturbed. The project must be managed in such a way so as to reduce the impacts to all types of fauna.

10.1.6 WETLANDS AND AQUATIC ECOLOGY

A range of impacts to the wetlands and rivers are expected due to the activities associated with the expanded TSF, the hydraulic reclamation of the TSF's, all associated infrastructure and the abstraction of water from Leeuwpan Dam. These impacts will require mitigation and management measures to be put in place, of which some have been included since the design phase; such as minimization of footprint area. The impacts are summarised according to the main activities below.

10.1.6.1 WETLANDS AND RIVERS IMPACTED BY THE NEW TSF

The new TSF will lead to the loss of wetlands as the final design layout has had to place the PCDs in the drainage line to the south (valley bottom wetland). This is the most significant impact as the loss of wetland habitat cannot be mitigated except through offsetting. It is understood that EGM is committed to completing the wetland offset program to ensure a no nett loss of wetland functionality due to their activities.

The proposed new TSF and the additional infrastructure will also affect the natural hydrological catchment from a quality and quantity point of view. The TSF footprint will be incorporated into a dirty water system, essentially removing the water from the environment. This is seen as a negative impact as catchment hydrological recharge is important to the functionality of the downstream wetlands and rivers. This can be mitigated to decrease the impact so that the Grootspruit is not largely affected.

During construction, the removal of vegetation and soils may increase sediment runoff into the environment, which has negative implications for the faunal and floristic functioning of the wetland and aquatic ecosystems of the Grootspruit catchment. This may also occur during the operational and decommissioning phases as the soils of the area may be mobilised. These impacts can be mitigated to ensure their impact is negligible.

The greatest risk to water quality would be the spilling of tailings material into the neighbouring wetlands and rivers due to flooding or system failure. This impact would be seen as major and rehabilitation efforts will be needed immediately.

10.1.6.2 WETLANDS AND RIVERS IMPACTED BY THE HYDRAULIC MINING OF TSF'S

The process of reclaiming the TSF's represents a risk to the wetlands and rivers of the Grootspruit and neighbouring catchments. This is largely managed as the mining process is contained; however, the consequence to the aquatic ecology of a tailings spill is major and thus this must be understood as an impact needing mitigation.

10.1.6.3 IMPACTS TO THE LEEUWPAN DAM

The Leeuwpan dam as it stands today was developed by EGM from a natural pan into an evaporation facility through large volume water deposition, which started in latter part of 1963. Initially the dam did not have a dam wall as it was a natural pan. Dam walls were constructed as the dam area increased over the years due to the volume of water pumped into the dam from the gold mines. The latest upgrading of the dam wall was completed during 1991.

Hydraulic mining is a water intense process and this dam will now be one of the major water sources for the project. A water balance assessment was done for this dam (DRA, 2016) and is included in Appendix 8; which shows that the Leeuwpan Dam is able to sustainably supply the project with its required 8.55 Ml/day. This, however, will have a significant impact on the water body. This abstraction rate will not lead to the complete drying up of the dam but it will decrease the dam from its current size of approximately 730 ha to between 300 - 260 ha.

The functioning of the system will completely change through the life of the project from a water quantity and quality perspective. On-going rehabilitation will be needed as the dam decreases in size. The following risks and impacts are expected:

Increased sedimentation of the remaining water body due to erosion of dried up banks. This could lead to the decreased water quality of the remaining water.

Additionally, sedimentation may lead to the increased evaporation and concentration of contaminants if the dam is made shallower through siltation.

Vegetation habitats and faunal use of this ecosystem will be impacted as the water body shrinks. This will be further exacerbated if the water quality decreases significantly.

Current use of the water body such as recreational fishing and speed boating will be seriously affected.

10.1.7 HERITAGE SITES AND PALAEONTOLOGICAL RESOURCES

The graves (Site 11) seem to be outside of the area of direct impact. However, there always is a secondary impact due to adjacent mining activities and issues with accessibility to the site for descendants. The graves are rated as having a Medium-High Significance. The site should be managed *in-situ.*

Site no.11a is a farm yard, lying right on the edge of the proposed return water dam. At least some of the structures are expected be directly impacted on. The site is rated as having a Low-Medium Significance and therefore a full photographic documentation is recommended, after which it may be demolished. For this a demolition permit is needed form the relevant heritage authority.

The remaining structures at site 11a, which will not be impacted on directly, can be left *in situ*.

No impacts to palaeontological records are expected.

10.1.8 AIR QUALITY

Dust and gaseous emissions are identified for activities at the project site and will likely be emitted from the following key sources:

- Dust and Particulate Emissions:

    - Construction;
    - Land clearing and top soil removal;
    - Materials handling operations;
    - Stack emissions (smelter, carbon-regeneration kilns and calcining);
    - Material storage: Stockpiling and Open Storage Piles;
    - Wind erosion from Tailings Facilities.
- Gaseous Emissions
    - Stack emissions (diesel fired smelter furnace at existing operations and calcining);

Dispersion simulations were undertaken determine predicted ground-level impacts for the proposed and existing operations, the results of which are summarised in Table 37 overleaf. From these results it was found that the proposed land preparation/construction activity over the area of the new Kinross tailings storage facility was identified to be a key source of dust emissions during the construction phase. Although, this activity is only temporary, it is recommended that dust suppression measures are implemented over this area during construction activity, to try reduce the impact as far as possible.

It was found that dust emissions are significantly reduced during the operational phase compared to the construction phase. This is mainly due to the consolidation of the three tailings facilities (Kinross, Winkelhaak and Leslie/Bracken) into one new tailings storage facility.

Furthermore, predicted incremental concentrations during the operational phase are shown to be relatively low in relation to the standards at surrounding identified residential areas. However, exceedances of the National ambient air quality standards for background PM10, PM2.5, SO_2 and NO_2 concentrations are frequently observed at the Sasol club air quality monitoring station, particularly during the autumn and winter seasons. Even though for the non-cumulative scenario no exceedances, except for PM10, are observed at nearby surrounding identified sensitive receptors, the implementation of mitigation measures should be conducted where possible to reduce additional levels in background concentrations.

Table 37: Summary of air quality dispersion modelling determining potential impacts of proposed project during construction and operational phases (Rayten, 2017)

Aspect modeled	Construction phase	Operational Phase
Predicted incremental dust fallout rates:	Results comply with the allowable dust fallout limits of 1200 mg/m^2/day for non-residential areas and 600 mg/m^2/day for residential areas at surrounding identified sensitive receptors. Exceedances of the non-residential and residential limits are observed over the existing and proposed plant areas and over the construction (land preparation) area of the new TSF..	Results comply with the allowable dust fallout limits of 1200 mg/m^2/day for non-residential areas and 600 mg/m^2/day for residential areas at surrounding residential areas. Exceedances of the non-residential and residential limits are observed over the existing and proposed plant areas and over the proposed new TSF.
Predicted incremental PM10 concentrations:	Results comply with the daily average standard of 75 µg/m3 at Secunda, the far eastern areas of Evander and at the two residential areas located north of the project site. Exceedances of the daily limit are observed over most of Brendan village, the northern parts of Embalenhle and over the most western parts of Evander. Results comply with the annual average standard of 40 µg/m3 at surrounding sensitive receptors; with exceedances observed over the existing and proposed plant areas and over the construction (land preparation) area of the new Kinross tailings facility. Higher PM10 incremental concentrations occur around the tailings facilities and over the construction (land preparation) area of the new Kinross tailings facility. The land preparation for the proposed extension to the Kinross TSF is identified to be	Results comply with the daily average standard of 75 µg/m^3 north, west and south of the project site; Exceedances of the daily limit are observed over some parts of Evander residential area, particularly to the west. Exceedances are also observed over the eastern parts of the Kinross tailings facility and the existing plant area. Results comply with the annual average standard of 40 µg/m^3 at all surrounding sensitive receptors; with exceedances observed over the existing plant area and the eastern parts of the Kinross TSF.

Aspect modeled	Construction phase	Operational Phase
	a significant source of dust emissions during the construction phase.	
Predicted incremental PM2.5 concentrations	Results comply with the daily average standard of 40 µg/m^3 at identified sensitive receptors; with exceedances observed over the construction (land preparation) area of the new TSF. Results comply with the annual average standard of 20 µg/m^3; with a maximum predicted incremental concentration of 15.5 µg/m^3 observed near construction (land preparation) activity.	Results comply with the daily average standard of 40 µg/m^3; with a maximum predicted incremental concentration of 32 µg/m^3 observed near the existing plant operations, Results comply with the annual average standard of 20 µg/m^3; with a maximum predicted incremental concentration of 6 µg/m^3 observed near the existing plant operations, Predicted incremental PM2.5 concentrations at identified surrounding sensitive receptors are predicted to be relatively low.
Predicted incremental SO_2 concentrations	N/A	Predicted incremental SO_2 concentrations are well within the allowable hourly, daily and annual standards of 350 µg/m^3, 125 µg/m^3 and 50 µg/m^3. Predicted incremental SO_2 concentrations are predicted to be relatively low at identified surrounding sensitive receptors.
Predicted incremental NO_2 concentrations	N/A	Predicted incremental NO_2 concentrations fall below the hourly average standard of 200 µg/m^3 and the annual average standard of 40 µg/m^3. Predicted incremental NO_2 concentrations are predicted to be relatively low at

Aspect modeled	Construction phase	Operational Phase
		identified surrounding sensitive receptors.

10.1.9 NOISE

Existing noise readings taken in 2011 around the Kinross TSF and Plant indicated acceptable noise limits (38-50dB) with slightly elevated noise at stations near the road (<70dB). Noise levels significantly exceeding the current baseline are not expected by the proposed project. However, the following activities may contribute to elevated noise levels and mitigation measures may be put in place to manage this:

- Construction and operation of pump houses at each of the TSFs (x3)
- Hydraulic mining & slurry generation and pumping
- Use of equipment during TSF expansion activities
- Construction and Operation of Elikhulu Plant (CIL plant with dedicated smelt house)

10.1.10 VISUAL

The project will result in the reclamation and rehabilitation of the Leslie/Bracken and Winkelhaak TSFs and both these TSF's visually impact on the surrounding landscape as they stand. The proposed reclamation will thus have a positive effect on the landscape in these areas as the footprints will be rehabilitated and an alternative land use can be developed; totalling 433 ha at Leslie and 350 ha at Winkelhaak.

Furthermore, the current Kinross TSF is an old structure and is not well managed from a dust and visual point of view. Although the expansion of the Kinross TSF will result in the increase of the overall footprint, it is expected that the mining of the current tailings and the deposition onto the new TSF with best practice in place will result in an improved scenario. Effort will go into the concurrent and post-mining rehabilitation of the area to ensure the least possible environmental and visual impact.

10.1.11 SOCIO-ECONOMIC

The following impacts are expected:

Positive impacts:

- Support to national and regional IDP, by supporting SA economic development.
- Direct benefit of employment through the implementation of the SLP.
- Multiplier effect and benefit to local business.

Negative impacts:

- The environmental impacts associated with hydraulic mining, the new CIL plant and the project developments in general.
- Impact on current agricultural activity, neighbouring and on site, due to construction of new TSF.

10.1.12 SAFETY RISK

The preliminary safety classification of the TSF has been carried out in accordance with the requirements of SANS 10286 (1998). The safety classification system serves to provide a consistent means of differentiating between high, medium and low hazard deposits on the basis of their potential to cause harm to life or property. The classification system furthermore provides a basis for the implementation of safety management practices for specified stages of the life cycle of a TSF. The code prescribes the aims, principles and minimum requirements that apply to the classification procedure and the classification in turn gives rise to minimum requirements for investigation, design, construction, operation, decommissioning and closure. In addition the classification also determines the qualifications and expertise required of persons undertaking the investigations, assessments, design and construction of the facility.

The approximate area that may be affected by a flow slide originating from TSF (i.e. zone of influence) is shown in Figure 12. The aerial extent of the zone of influence area has been determined based on the guidelines provided by SANS 10286 (1998) and the general topography of the area. Based on the safety criteria, the TSF is classified as a High Hazard facility.

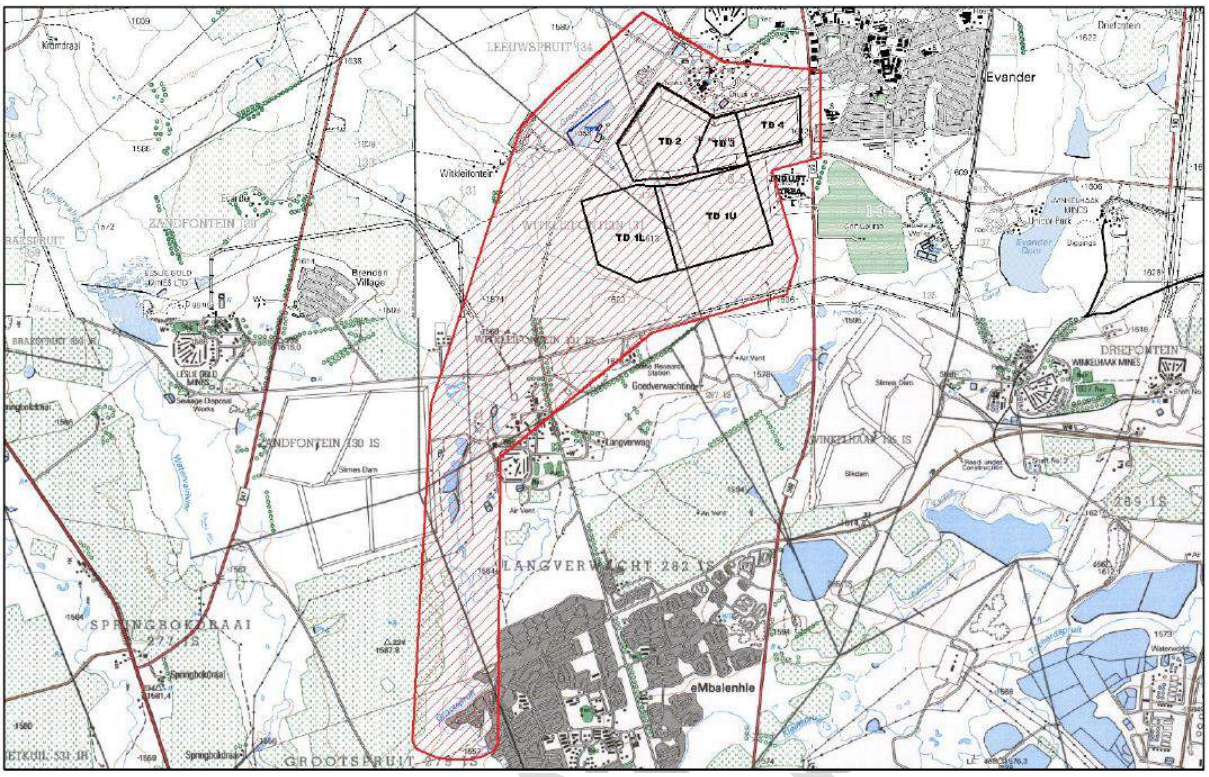


Figure 12: New TSF Zone of Influence

Currently all RWD compartments will be classified as a 'dams with a safety risk' as per the Dam Safety Regulations (R. 139 of February 2012) because the maximum RWD wall heights all exceed 5m (measured from the RWD crest to the downstream toe), in addition to its RWD compartment having a storage capacity well in excess of 50,000 m^3. DWS' Dam Safety Office will need to be approached to confirm this classification after which an Approved Professional Person (APP) will need to be appointed to undertake the detailed design. Applications for a 'Licence to Construct' and 'Licence to Impound' will be necessary and the necessary requirements as per R.139 will need to be adhered to.

With regards to each TSF compartment, it is believed that a supernatant pond depth of 0.5m or less can be maintained during normal operations given the proposed penstock decant system. Approximating the tailings beach surface as an inverted cone, a 0.5m deep pond with beach slopes of 1v:300h and 1v:500h give volumes of 11,800 m^3 and 32,700 m^3 respectively. Therefore, even though each TSF is higher than 5m, less than 50,000 m^3 will be stored on each TSF compartment under normal operating conditions. The TSF is therefore not considered to be a 'dam with a safety risk'.

10.2 IMPACT ASSESSMENT AND RANKING METHODOLOGY

The impact identification process commenced by identifying all environmental aspects on site, whether sensitive or not. General environmental aspects that were considered include:

- Topography
- Geology
- Soils, land use and capability
- Surface Water
- Wetlands and Aquatic Ecosystems
- Groundwater
- Flora and Fauna
- Air Quality
- Ambient Environmental Noise
- Archaeological and Heritage Sites
- Local Traffic and Safety
- Socio-Economics, Health and Safety

All potential impacts that may occur to the various environmental aspects as a result of the activities and sub-activities listed in Section 4 of the report were listed under each of the aspects.

As the specialist studies were completed, any additional impacts identified through the specialist investigations were added. All specialists utilise some form of impact rating similar to the process detailed below. The impact rating completed by the specialists was as far as possible translated into the impact assessment process detailed below. As far as practically possible, considering variations in impact assessment methodology by different specialists, the specialist impact assessment is therefore duplicated within a single unified impact assessment process, to allow for all impacts to be assessed in the same way, reducing subjectivity and allowing for direct comparative ranking of all the impacts identified during the environmental process.

Through the PPP, any issues or potential impacts identified by the I&APs were added to the list of potential impacts.

All these impacts were then assessed as per the methodology described below and their significance determined. Impact identification will therefore be a consolidated approach based on Cabanga's professional experience, specialist expertise and I&AP (including organs of state involved in the PPP) input.

The full impact assessment methodology utilised is described below. Impact assessment methods were developed to: (1) identify the potential impacts of a

proposed development on the social and natural environment; (2) predict the probability of these impacts and (3) evaluate the significance of the potential impacts. The methodology used by Cabanga is as follows:

The status of the impact	
Status	Description
Positive:	a benefit to the holistic environment
Negative:	a cost to the holistic environment
Neutral:	no cost or benefit

The duration of the impact		
Score	Duration	Description
1	Short term	Less than 2 years
2	Short to medium term	2 – 5 years
3	Medium term	6 – 25 years
4	Long term	26 – 45 years
5	Permanent	46 years or more

The extent of the impact		
Score	Extent	Description
1	Site specific	Within the site boundary
2	Local	Affects immediate surrounding areas
3	Regional	Extends substantially beyond the site boundary
4	Provincial	Extends to almost entire province or larger region
5	National	Affects country or possibly world

The reversibility of the impact		
Score	Reversibility	Description
1	Completely reversible	Reverses with minimal rehabilitation & negligible residual affects
3	Reversible	Requires mitigation and rehabilitation to ensure reversibility
5	Irreversible	Cannot be rehabilitated completely/rehabilitation not viable

The magnitude (severe or beneficial) of the impact		
Score	Severe/beneficial effect	Description
1	Slight	Little effect – negligible disturbance/benefit
2	Slight to moderate	Effects observable – environmental impacts reversible with time
3	Moderate	Effects observable – impacts reversible with rehabilitation
4	Moderate to high	Extensive effects – irreversible alteration to the environment
5	High	Extensive permanent effects with irreversible alteration

The probability of the impact		
Score	Rating	Description
1	Unlikely	Less than 15% sure of an impact occurring
2	Possible	Between 15% and 40% sure of an impact occurring
3	Probable	Between 40% and 60% sure that the impact will occur

4	Highly Probable	Between 60% and 85% sure that the impact will occur
5	Definite	Over 85% sure that the impact will occur
The Consequence		= Magnitude + Spatial Scale + Duration + Reversibility.
The Significance		= Consequence x Probability.

The rating is described as follows:

Score out of 100	Significance
1 to 20	Low
21 to 40	Moderate to Low
41 to 60	Moderate
61 to 80	Moderate to high
81 to 100	High

Will mitigation be possible? Yes or no?

Finally the negative impacts are rated according to the degree of loss of a resource due to the particular impact. This is only assessed from the pre-mitigation perspective of the impact. The degree of loss of a resource is evaluated in terms of:

- Low degree of loss: where the resource will recover on its own with no/limited rehabilitation over an observable period of time;
- Moderate degree of loss: where the resource will recover over extended period or with rehabilitation or remedial measures to assist recovery of resource; and
- High degree of loss: Where the resource cannot be recovered, or the resource will recover over extended time periods.

10.3 ADVANTAGES AND DISADVANTAGES OF PROPOSED ACTIVITY

A summary is provided in Table 38 in terms of advantages and disadvantages associated with the final proposed project description and alternatives/alterations that were implemented to accommodate I&AP concerns; and/or as a result of the specialist findings.

Table 38: Advantages and Disadvantages regarding the preferred project alternative

Description	Advantages	Disadvantages
Re-processing the existing Kinross, Leslie/Bracken and Winkelhaak TSF	Recovery of residual gold within existing TSFs. The project will result in the reworking of aging TSF, which are	

Description	Advantages	Disadvantages
	located very close to the water resource, ultimately resulting in the rehabilitation and remediation of the Leslie/Bracken and Winkelhaak TSFs. More efficient volumetric storage - because of more innovative TSF planning and operating procedures, compared to the 3 existing TSFs.	
New TSF to be constructed immediately south of the Kinross TSF; incorporating the existing Kinross TSF footprint as it becomes available.	Site is within the approved Mining Right Area. The footprint of the existing Kinross TSF can be incorporated into the new TSF, once this has been re-processed. Area has been impacted on by mining and agricultural activities in the past. Shorter pumping distances to the plant area reducing the potential for pollution due to possible leaks / spills. Existing pipeline servitudes can be utilised. The new TSF will be designed with the aim of closure and therefore on going concurrent rehabilitation of the side slopes will be considered in the design of the cover system – reducing the overall visual aesthetics in the area; and dust generation in the long term. Improved stability and reduced safety risk.	The base and outer walls of the existing Kinross TSF will be sacrificed, so as to reduce the starter wall volumes and costs. The new TSF and associated RWD will directly impact two drainage lines and associated wetland areas. Decrease in urban agricultural areas. Species of conservation concern have been identified within the proposed footprint of the new TSF; these will need to be relocated. Construction activities will impact Heritage Site 11A – farmyard. The new TSF will be constructed in close proximity to the nearby Industrial area. Increased dust during the construction phase of the new TSF.
New Elikhulu Plant to be constructed adjacent to the Kinross Met. Plant	No new areas directly impacted. This area is already disturbed and has up until recently been used for the crushing and screening of rock.	Increased emissions. Existing water management features can be utilised to manage dirty water runoff.

Description	Advantages	Disadvantages
	Site falls within the mine's existing dirty water footprint.	
Refurbishment of Kinross Kariba RWD.	Improved water management.	-
Alterations:		
The new TSF will be designed in accordance with Option 1A	Smaller footprint required. Avoids some wetlands, including a small pan.	Reduced Capacity.
Relocation of soil stockpiles to avoid wetland areas as far as possible	Minimised impact to wetland ecosystems.	-
Offsetting for destroyed wetlands	No nett loss of wetland functionality in the catchment.	Additional cost.
Clean water will be diverted around the TSF and directed to the Grootspruit.	Loss of water from the system is minimised and erosion is managed.	Additional design costs and management effort.

10.4 POSSIBLE MITIGATION MEASURES FOR I&AP-IDENTIFIED IMPACTS

The proposed mitigation measures or alterations that could be implemented specifically to address issues and concerns raised by I&APs are summarised below and discussed in terms of overall risks if these mitigation measures are implemented on site.

Issue raised	Mitigation measures considered including alternatives	Post Mitigation Risk
Rehabilitation	Rehabilitation and remediation of the Leslie/Bracken and Winkelhaak footprints will take place. On-going concurrent rehabilitation of the side slopes will be considered in the design of the cover system.	Moderate - Low

Issue raised	Mitigation measures considered including alternatives	Post Mitigation Risk
Water supply	Leeuwpan Dam is the primary water source for the project. A floating pump station will be installed. Rehabilitation of the affected area will need to take place as the dam shrinks over time.	Moderate - Low
Contamination of the Grootspruit from the Kinross Kariba RWD	The existing RWD will be refurbished and lined to ensure no overflow or seepage will occur.	Moderate - Low
Dust	Additional dust mitigation measures are included in the EMP.	Moderate - Low
Noise	Standard noise mitigation measures are included in the EMP.	Low
Radiation	Continue with current radiation management, monitoring and reporting for the life of mine.	Moderate - Low
Property value	The new TSF will be designed with the aim of closure and therefore on-going concurrent rehabilitation of the side slopes will be considered in the design of the cover system – reducing the overall visual aesthetics in the area; and dust generation in the long term.	Low
Job creation & Business Opportunities	A forum has been established, job vacancies and procurement policies will be communicated via the business forum.	Moderate
Land Use	The need to rezone the existing land use is currently being investigated.	Moderate

10.5 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

Alternatives sites have been considered for the project, please refer to Section 7.

10.6 STATEMENT MOTIVATING THE ALTERNATIVE DEVELOPMENT LOCATION WITHIN THE OVERALL SITE

The location of the new TSF was restricted due to undermining by both EGM and Sasol in the area, and the safety factors required to support the facility. A number of site alternatives were assessed in terms of environmental sensitivity; geometric capacity and cost implications and Option 1 (the current scope) was deemed to the only feasible option.

The position of the RWD was determined based on topography and have been positioned to allow water decanting from the TSF to be gravity fed into the RWD.

The soil stockpiles and water diversion drains / trenches have been relocated to avoid sensitive features as far as possible.

Please refer to Section 7 for more details on the alternatives assessed.

10.7 ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

The full impact assessment table is presented in Appendix 18, **only impacts of moderate, moderate to high and high significance (pre-mitigation)** are summarised below:

Table 39: Summary impact assessment table

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
Reprocessing of Winkelhaak and Leslie/Bracken TSFs & new pump station at Kinross TSF						
Hydraulic mining & slurry generation and pumping	Failure of benches or flooding of trenches will release slurry to the downstream environment	Surface water & associated wetlands & aquatic ecosystems; Groundwater through seepage	Operation	MODERATE	**MODIFY** Existing dirty water management infrastructure must be upgraded where needed to ensure containment of slurry during an emergency incident at the TSFs. **CONTROL** Apply storm water runoff management measures to ensure impact area is contained to activity area to ensure all water runoff and spilled slurry in the area is contained and ensure no discharge to the environment. Ensure mine blocks are mined as per the prescribed mine plan. **REMEDY** Spillages on site must be handled as emergency incidents in line with the requirements of Section 19 of the NWA. Spillages must be controlled through sandbags where necessary to prevent direct spillage to streams. Spillages must be cleared immediately in line with the emergency response procedures. Ensure back-up pumps and pipelines are easily accessible.	MODERATE - LOW
Construction and utilisation of slurry pipelines from pump houses to Elikhulu Plant	Failure of slurry reticulation system and infrastructure will release mine water to the downstream environment, which will be of particular significance at river crossings	Surface water & associated wetlands & aquatic ecosystems; Groundwater through seepage	Operation	MODERATE	**MODIFY** Pipelines have been established in existing servitudes to a large extent to avoid disturbance of new areas. **CONTROL** Pipelines should be laid within the dirty water footprint area or paddocks must be established in clean water area which will serve to contain any leaks. Pipelines should be tested with clean water to ensure no leaks before allowing piping of slurry. Additional containment measures must be provided at river crossings, such as placing pipelines within drains that drain into sumps or other acceptable containment infrastructure. Pipelines should have a series of shut-off valves which can prevent flow of contaminated water should leaks occur. **REMEDY** Inspect, maintain and repair pipelines and pumps. Follow emergency response plan for spills. Keep back-up pumps and pipes on site. **STOP** Dirty water pipelines will remain outside 100m buffer zones / 1:100 year flood lines until authorisations under both NWA and NEMA have been obtained where needed.	LOW
Rehabilitation of Winkelhaak and Leslie/Bracken TSF footprints	Poor rehabilitation will result in sedimentation of downstream environments and water quality impairment.	Topography & land use & capability, surface water & associated wetlands & aquatic ecosystems	Decommissioning, Closure	MODERATE	**REMEDY**The area should be re-landscaped to blend in with the surrounding topography and drainage lines.Runoff must only be allowed to enter the surrounding environment once it is proven that the water is of an acceptable water quality and a radiation clearance certificate is granted.Soil must be ameliorated after application as per specialist recommendations in order to sustain a vegetative cover.The areas should be monitored to ensure that seeds germinate sufficiently, a good vegetative cover is achieved and the vegetation progress through succession stages.Consideration should be given to utilising the	LOW

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
					vegetation removed from the TSF expansion area and placing directly as clods over soil berms where feasible (otherwise herbaceous vegetation should be stockpiled with topsoil to maintain organic content and seed bank). It is recommended that Landscape Functional Analysis (LFA) forms part of the rehabilitation and monitoring process.	
Rehabilitation of Winkelhaak and Leslie/Bracken TSF footprints	Alien invasive establishment and bush encroachment.	Flora & Fauna	Operation	MODERATE	**CONTROL** Clear all vehicles coming to site of any vegetative material to prevent introduction and spread of potential alien and invasive species. Compile and implement an alien and invasive species management plan to eradicate and control all alien invasive species. Mechanical methods should be utilised in preference to chemical methods. Dispose of the eradicated plant material at an approved solid waste disposal site. **REMEDY** Rehabilitate all disturbed areas and seed with self-sustaining indigenous species.	MODERATE - LOW
Rehabilitation of Winkelhaak and Leslie/Bracken TSF footprints	Radiation will persist and affect the immediate environment of the historic TSF footprints.	Soil, flora, fauna, atmosphere and water in the vicinity of the historic TSF footprints.	Decommissioning, Closure	MODERATE	Current radiation monitoring indicates that radiation to the surrounding environment is within acceptable dose limits. The level and depth of penetration of radiation will only be known once the tailings have been removed. Therefore, once the facilities have been mined an independent specialist must be contracted to assess radiation levels of in situ soils, including the depth of penetration of radiation and potential remediation levels required to be granted a clearance certificate from the NNR. Only after this has been completed can appropriate final land uses be determined in conjunction with the specialist. Continue with current radiation management and monitoring on site.	MODERATE - LOW
New TSF (Expansion of Kinross TSF)						
Clearing of vegetation, topsoil and subsoil stripping & base preparation.	Soil erosion and associated sedimentation with reduced ingression and increased runoff with increased hydrological yield to downstream environments	Surface water & associated wetlands & aquatic ecosystems	Construction, Operation	MODERATE	**MODIFY** Temporary attenuation dams must be constructed downstream of activity area if construction occurs during the wet season. **CONTROL** Establish adequately sized storm water control measures before any other activities commence to ensure clean and dirty water separation and dirty water containment. This will include upslope berms to divert clean water around the site of activity into natural drainage lines and silt traps downstream of areas of activity to trap sediment before water drains to the natural area. Vegetation removal must be over as small an area as possible. Establish approved erosion control measures to reduce the risk of transported soils. Road surfaces must be compacted in order to increase stability. Sheet runoff from hard surfaces and roads curtailed through proper drainage control. Install flow dissipaters where rapid flow of diverted clean storm water runoff occurs. **REMEDY** All disturbed areas no longer required must be reshaped and revegetated. All bare surface areas must be re-vegetated in order to avoid the transportation of sediments and the creation of erosion gullies. Flow dissipaters will be installed in any areas with high flow velocity. Erosion control measures (gabions) will be established in areas with severe or persistent erosion. **STOP** 100m buffer zones / 1:100 year flood lines to be demarcated as no-go areas until authorisations are obtained, in terms of NWA and NEMA, to continue activities in such areas.	LOW

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
Clearing of vegetation, topsoil and subsoil stripping & base preparation.	Destruction of channelled and unchannelled valley bottom wetlands.	Wetlands & aquatic ecosystems & associated surface water environment	Construction, Operation	MODERATE-HIGH	**REMEDY** Loss of wetland habitat should be offset by rehabilitating and protecting alternative wetlands with similar functions so that no nett loss is obtained. **STOP** Wetlands cannot be destroyed until the authorisations under NEMA and NWA are obtained and engineered diversion channels established.	MODERATE-HIGH
Clearing of vegetation, topsoil and subsoil stripping & base preparation.	Loss of soil characteristics, erosion and compaction	Soil	Construction	MODERATE	**CONTROL** Demarcate designated activity area and keep as small as possible. I Strip topsoil from all activity areas and stockpile as berms or soil stockpiles (maximum 2m height) to clad the sides of TSF facility. Incorporate herbaceous vegetation into soil stockpiles. Subsoil may also be used for berms if additional material is required, or soil will be stored in designated subsoil stockpile. Keep subsoil stockpiles below 6m. Construct drainage and erosion controls where needed, such as gabion baskets, levees. **REMEDY** Rehabilitate all disturbed areas as soon as they are no longer required and cordon off areas until vegetation has established. Revegetate all bare soils.	LOW
Clearing of vegetation, topsoil and subsoil stripping & base preparation.	Loss in land capability	Land capability	Construction, Operation	MODERATE	**No Mitigation possible; soil preservation required for cladding and rehabilitation of TSF**	MODERATE
Clearing of vegetation, topsoil and subsoil stripping & base preparation.	Destruction of protected species.	Flora & Fauna	Construction, Operation	MODERATE-HIGH	**REMEDY** Retain species in situ where areas are not targeted for development and as far as possible species from targeted development areas should be transplanted to suitable nearby habitat. **CONTROL** Specialist will have to walk area and plot all protected species. Preserve all other species in situ. **STOP** Protected species cannot be removed until the necessary permits are obtained under NEM:BA.	MODERATE
Clearing of vegetation, topsoil and subsoil stripping & base preparation.	Dust generation and particulate matter, which will result in elevated PM10 at Brendan Village, northern parts of Embalenhle and over the western parts of Evander.	Air quality & Social	Construction	MODERATE	**CONTROL** Speed limits must be established on site. Manage dust through water carts or sprinklers. Consider the use of windbreaks, enclosures, shelters or misting at very dusty areas.	MODERATE - LOW
Clearing of vegetation, topsoil and	Sedimentation of downstream water bodies and	Wetlands & aquatic ecosystems & associated surface	Construction, Operation	MODERATE-HIGH	**MODIFY** Consider methods and equipment that will have the least impact on watercourses. Construction in and around watercourses must be restricted to the dryer winter months where	MODERATE

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
subsoil stripping & base preparation.	associated wetlands, including the Grootspruit.	water environment			possible **CONTROL** Effective sediment traps should be installed as well as flow dissipaters where needed. Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area. Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. Protect all areas susceptible to erosion and ensure that there is no undue soil erosion. Runoff from the construction area must be managed to avoid erosion and pollution problems. Implement buffer zones to trap sediments. Monitoring should be done to ensure that sediment pollution is timeously addressed.	
Topsoil and subsoil stockpiling.	Loss of soil characteristics, erosion and compaction	Soil	Construction, Operation	MODERATE	**CONTROL** Demarcate designated stockpile areas and keep as small as possible. Ensure that topsoil from stockpile areas has been stripped and placed as perimeter berms around stockpile areas. Keep topsoil stockpiles below 2m. Subsoil may also be used for berms if additional material is required, or soil will be stored in designated subsoil stockpile. Keep subsoil stockpiles below 6m. All soil stockpiles will have top and toe perimeter berms with no more than 1:3 side slopes. Construct drainage and erosion controls where needed, such as gabion baskets, levees. Compacted soils will be ripped, disced or scarified as needed and vegetated. **REMEDY** Revegetate all bare soils, including all berms and soil stockpiles. Incorporate herbaceous vegetation into soil stockpiles. Apply fertilisers as needed to encourage vegetation growth and cover.	LOW
Topsoil and subsoil stockpiling.	Alien invasive establishment and bush encroachment.	Flora & Fauna	Operation	MODERATE	**CONTROL** Clear all vehicles coming to site of any vegetative material to prevent introduction and spread of potential alien and invasive species. Compile and implement an alien and invasive species management plan to eradicate and control all alien invasive species. Mechanical methods should be utilised in preference to chemical methods. Dispose of the eradicated plant material at an approved solid waste disposal site. **REMEDY** Seed long terms soil stockpiles and berms with self-sustaining indigenous species.	MODERATE - LOW
Topsoil and subsoil stockpiling.	Dust generation and particulate matter.	Air quality	Construction, Operation	MODERATE	**CONTROL** Stockpile heights must not exceed 2m for topsoil, 6m for subsoil.Vegetate soil stockpiles and berms and all exposed areas.Manage dust through water carts or sprinklers.Consider the use of windbreaks, enclosures, shelters or misting at very dusty areas.	LOW
Topsoil and subsoil stockpiling.	Soil erosion and associated sedimentation	Surface water	Construction, Operation, Decommissioning	MODERATE	**MODIFY** Keep topsoil stockpiles below 2m. Keep subsoil stockpiles below 6m. All soil stockpiles will have top and toe perimeter berms with no more than 1:3 side slopes. Construct drainage and erosion controls where needed, such as gabion baskets, levees. Compacted soils will ripped, disced or scarified as needed and vegetated. **REMEDY** Revegetate all bare soils, including all berms and soil stockpiles.	LOW

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
					Incorporate herbaceous vegetation into soil stockpiles. Apply fertilisers as needed to encourage vegetation growth and cover.	
Construction of additional RWD (2 compartments), silt trap and dirty water collection trenches from TSF	Failure or flooding of dirty water infrastructure will release mine water to the downstream environment as the RWDs are constructed within a watercourse.	Surface water	Operation	MODERATE	**CONTROL** RWD must be sized and lined according to GN704 as well as the NWA.Pumps and pipelines required for water transfer must be adequately sized to avoid leaks.All dams will be constructed and lined as per designs and managed with a 0.8m freeboard. All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs.Install monitoring boreholes downstream of the dirty water dams to monitor for seepage. **REMEDY** Inspect, maintain and repair all water management features including dams, trenches, berms, silt traps, pipelines and pumps. Follow emergency response plan for spills and keep back-up pumps and pipes on site. **STOP** 100m buffer zones / 1:100 year flood lines to be demarcated as no-go areas until authorisations are obtained, in terms of NWA and NEMA, to continue activities in such areas.	MODERATE - LOW
Construction of additional RWD (2 compartments), silt trap and dirty water collection trenches from TSF	Decrease in hydrological yield due to dirty water containment and downstream flow interruption with RWD constructed within a water course; will additionally impact on aquatic and wetland ecosystems	Surface water & associated wetlands & aquatic ecosystems	Operation, Decommissioning, Closure	MODERATE	**Necessary measure to contain dirty water runoff.** **MODIFY** Keep dirty water runoff areas as small as possible to increase clean water runoff footprint area. **CONTROL** Clean storm water cut off trench or channel must be constructed to divert rainwater away from the dirty catchment area such as the industrial area and the proposed TSF to natural drainage lines. The existing flow patterns in nearby tributaries should be maintained at all times.	MODERATE - LOW
Construction of additional RWD (2 compartments), silt trap and dirty water collection trenches from TSF	Impairment of groundwater quality due to seepage or overflow from RWDs to underlying aquifers.	Groundwater	Construction, Operation, Decommissioning, Closure	MODERATE-HIGH	**CONTROL** RWD must be sized and lined according to GN704 as well as the NWA. Install monitoring boreholes downstream of the dirty water dams to monitor for seepage. Recycle water in RWD within processing plant. All dirty surface water control facilities (dam, drain) must be designed and operated to have a minimum freeboard above full supply level, at such manner that they can always handle 1:50 year flood-event on top of its mean operation level. **REMEDY** Inspect, maintain and repair all water management features including dams, trenches, berms, silt traps, pipelines and pumps. Follow emergency response plan for spills and keep back-up pumps and pipes on site. **STOP** 100m buffer zones / 1:100 year flood lines to be demarcated as no-go areas until authorisations are obtained, in terms of NWA and NEMA, to continue activities in such areas.	LOW
Construction of additional RWD (2 compartments),	Disturbance to nearby (87m) grave yard	Heritage sites	Construction, Operation	MODERATE	**CONTROL** The site should be fenced in with at least a 20m buffer zone prior to any activity commencing in the area.A cultural management plan should be drafted for the sustainable preservation of	LOW

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
silt trap and dirty water collection trenches from TSF					the site which must be drafted by a heritage specialist and should take into account controlled access to the site for descendants and include a monitoring and management plan of the site. **STOP** Cultural site and graves uncovered during construction of the RWDs will be cordoned off, and marked as no-go zones and evaluated by a specialist before proceeding with further activity.	
Construction of additional RWD (2 compartments), silt trap and dirty water collection trenches from TSF	Disturbance to sections of an old farmstead adjacent to the RWD.	Heritage sites	Construction, Operation	MODERATE-HIGH	**CONTROL** Full photographic documentation of the entire site is recommended, after which it may be demolished. The remaining structures not in the vicinity of the RWD can be left in situ. **STOP** Demolition permit from SAHRA must be obtained before an activity proceeds near the site. Cultural site and graves uncovered during construction of the RWDs will be cordoned off, and marked as no-go zones and evaluated by a specialist before proceeding with further activity.	MODERATE
Storm water diversion structures, including berm for the diversion of a water course	Construction & development of the Kinross TSF will change flow regime	Surface water & associated wetlands & aquatic ecosystems	Construction	MODERATE	**MODIFY** Keep dirty water runoff areas as small as possible to increase clean water runoff footprint area. **CONTROL** Clean storm water cut-off trench or channel must be constructed to divert runoffs away from dirty water catchment area of the proposed TSF. The existing flow patterns in nearby tributaries should be maintained at all times.	MODERATE - LOW
Tailings disposal and facility management through progressive rehabilitation	Polluted runoff from dirty areas will release mine water to the downstream environment if not properly contained	Surface water & associated wetlands & aquatic ecosystems	Operation,Decommissioning, Closure	MODERATE	**MODIFY** Upgrade the existing Kariba RWD to engineered designs. **CONTROL** Proper clean and dirty water separation and dirty water containment infrastructure must be in place. These must be designed and operated in line with GN704.Construct the TSF as per engineered designs.Only environmentally friendly materials must be used during the construction of water management features to minimise pollution to water.Apply good housekeeping practices and constantly maintain TSF. **REMEDY** Clad and vegetate TSF as it develops. **STOP** 100m buffer zones / 1:100 year flood lines to be demarcated as no-go areas until authorisations are obtained, in terms of NWA and NEMA, to continue activities in such areas.	LOW
Tailings disposal and facility management through progressive rehabilitation	Impairment of local tributaries and streams and day lighting of contaminated groundwater seepage will contaminate the nearby Grootspruit which is regionally connected and has	Surface water & associated wetlands & aquatic ecosystems	Operation, Decommissioning, Closure	MODERATE-HIGH	**In addition to the other water mitigation measures, the following is relevant in terms of the greater catchment:** **CONTROL** Engineering recommendations regarding designs for all infrastructures must be implemented on site. Remove seepage with drains to RWD. Contain dirty water with sound storm water control measures to reduce the overall volume of water that must be handled in the system. Divert clean water from the site. Rehabilitate, profile, topsoil and vegetate TSF in accordance to best practices to reduce infiltration.	MODERATE - LOW

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
	national implications.				12 months water monitoring must be conducted after mine closure, before runoff from site can be released to the nearby dams.	
Tailings disposal and facility management through progressive rehabilitation	Wetland deterioration due to water quality impacts, should water from the TSF not be contained or through TSF failure.	Wetlands	Operation, Decommissioning, Closure	MODERATE-HIGH	**MODIFY** Upgrade the existing Kariba RWD to engineered designs. **CONTROL** Apply surface water and groundwater mitigation measures stipulated in this table with regards to tailings disposal. **REMEDY** Treatment of pollution identified should be prioritized accordingly as needed.	MODERATE-HIGH
Tailings disposal and facility management through progressive rehabilitation	Sedimentation of downstream water bodies and associated wetlands, including the Grootspruit.	Wetlands	Operation,Decommissioning, Closure	MODERATE-HIGH	**MODIFY** Construction in and around watercourses must be restricted to the dryer winter months where possible.Upgrade the existing Kariba RWD to engineered designs. **CONTROL** Apply surface water and groundwater mitigation measures stipulated in this table with regards to tailings disposal. Consider methods and equipment that will have the least impact on watercourses. Effective sediment traps should be installed as well as flow dissipaters where needed.Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area.Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers If necessary fence off to prevent vehicular, pedestrian and livestock access.Protect all areas susceptible to erosion and ensure that there is no undue soil erosion.Runoff from the construction area must be managed to avoid erosion and pollution problems.Implement buffer zones to trap sediments.Monitoring should be done to ensure that sediment pollution is timeously addressed.	MODERATE
Tailings disposal and facility management through progressive rehabilitation	Transformation/loss of wetlands and changes to the topography and runoff characteristics affecting the flow quantity and fluctuation properties of the Grootspruit	Wetlands	Operation, Decommissioning, Closure	MODERATE-HIGH	**CONTROL** Apply surface water and groundwater mitigation measures stipulated in this table with regards to tailings disposal. Measures should be put in place in critical areas to ensure that changed sources of water input into downstream watercourses does not cause erosion. Measures should be put in place in critical areas to ensure that polluted water from the Tailings Storage Facility is contained and does not seep to downs stream environments. **STOP** No activity within wetlands and 100m buffer zones can commence without an approved IWUL, or within 500m of water resources without a General Authorisation issued by DWS.	MODERATE-HIGH
Tailings disposal and facility management through progressive rehabilitation	Impairment of groundwater quality due to leachate seeping to underlying aquifers from the tailings facility.	Groundwater	Operation,Decommissioning, Closure	MODERATE-HIGH	**MODIFY** Upgrade the existing Kariba RWD to engineered designs. **CONTROL** Proper clean and dirty water separation and dirty water containment infrastructure must be in place. These must be designed and operated in line with GN704.Construct the TSF as per engineered designs.Contain seepage from the proposed tailings and re-direct to the RWD.Rehabilitate, profile, topsoil and vegetate TSF in accordance to best practices to reduce infiltration.Install downstream monitoring boreholes and monitor for potential contaminated seepage. If needed install downstream cut-off trench and direct seepage to RWD. Apply good housekeeping practices and TSF is constantly maintained.	MODERATE

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
					REMEDY Should pollution be identified, a specialist should be consulted regarding the application of appropriate remedial measures for the specific incident. Remedial measures could include the following: Natural Attenuation (through biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants); Interception by means of surface cut-off drains combined with a treatment of the polluted water; interception by means of interceptor boreholes combined with a treatment of the polluted water; installation of reactive barriers; phyto-remediation. **STOP** 100m buffer zones / 1:100 year flood lines to be demarcated as no-go areas until authorisations are obtained, in terms of NWA and NEMA, to continue activities in such areas.	
Tailings disposal and facility management through progressive rehabilitation	Dust and PM generation with hazardous chemical components including arsenic, cadmium, cobalt and chromium from dried tailing material along the outer edges. Elevated PM10 levels may be experienced in Evander.	Air quality & Social	Operation, Decommissioning, Closure	MODERATE	**CONTROL** Apply dust control measures such as water spray or misting during times of high dust generation. Consider the use of windbreaks, enclosures, shelters or misting at very dusty areas. **REMEDY** Construct the TSF as per engineered designs and clad and vegetate the TSF side as it develops.	LOW
Tailings disposal and facility management through progressive rehabilitation	Alien invasive establishment and bush encroachment.	Flora & Fauna	Operation, Decommissioning, Closure	MODERATE	**CONTROL** Clear all vehicles coming to site of any vegetative material to prevent introduction and spread of potential alien and invasive species. Compile and implement an alien and invasive species management plan to eradicate and control all alien invasive species. Mechanical methods should be utilised in preference to chemical methods. Dispose of the eradicated plant material at an approved solid waste disposal site. **REMEDY** Rehabilitate all disturbed areas and seed with self-sustaining indigenous species.	MODERATE - LOW
Tailings disposal and facility management through progressive rehabilitation	Change in land use to mining.	Land use	Construction, Operation	MODERATE	**No mitigation required. This extension eliminates two other TSFs within the mineral boundary.**	MODERATE
Tailings disposal and facility management through progressive rehabilitation	Radiation will affect the immediate environment of the TSF.	Soil, flora, fauna, atmosphere and water in the vicinity of the TSF	Decommissioning, Closure	MODERATE-HIGH	Current radiation monitoring indicates that radiation to the surrounding environment is within acceptable dose limits. Continue with current TSF radiation management and monitoring and apply to the expansion of the TSF as needed.	MODERATE - LOW

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
Establishment of Elikhulu Plant and associated infrastructure adjacent to the existing plant						
Construction and Operation of Elikhulu Plant (CIL plant with dedicated smelt house)	Polluted runoff from dirty areas and slurry spills will pollute the downstream environment if not properly contained	Surface water & associated wetlands & aquatic ecosystems	Construction, Operation	MODERATE	**CONTROL** Ensure water management measures are established before any other activities commence at the plant, including dirty water containment. Ensure water separation and dirty water containment on site as per GN704 requirements. All dams will be constructed and lined as per designs and operated with a 0.8m freeboard. Only environmentally friendly materials must be used during the construction phase to minimise pollution. **REMEDY** Inspect, maintain and repair pipelines and pumps. Follow emergency response plan for spills. Keep back-up pumps and pipes on site.	LOW
Construction and Operation of Elikhulu Plant (CIL plant with dedicated smelt house)	Wetland deterioration due to water quality impacts that may arise from slurry spills and poor water containment at the plant.	Wetlands	Construction, Operation	MODERATE-HIGH	**CONTROL** Ensure water management measures are established before any other activities commence at the plant, including dirty water containment dams, to ensure dirty water containment. Ensure water separation and dirty water containment on site as per GN704 requirements. All dams will be constructed and lined as per designs and operated with a 0.8m freeboard. Only environmentally friendly materials must be used during the construction phase to minimise pollution. **REMEDY** Inspect, maintain and repair pipelines and pumps. Follow emergency response plan for spills. Keep back-up pumps and pipes on site.	MODERATE
Construction and operation of dirty water containment features (trenches, PCD & Event Pond) and process water supply dam (water sourced from Leeuwpan dam)	Failure or flooding of dirty water infrastructure will release mine water to the downstream environment	Surface water	Operation	MODERATE	**CONTROL** PCD & Event Pond must be sized and lined according to GN704 as well as the NWA.Pumps and pipelines required for water transfer must be adequately sized to avoid leaks.All dams will be constructed and lined as per designs and managed with a 0.8m freeboard. All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available if a rainfall event occurs.Install monitoring boreholes downstream of the dirty water dams to monitor for seepage. **REMEDY** Inspect, maintain and repair all water management features including dams, trenches, berms, silt traps, pipelines and pumps. Dirty water dams and trenches must be regularly inspected and silt build up cleared as and when required to ensure adequate capacity and functioning .Follow emergency response plan for spills and keep back-up pumps and pipes on site. **STOP** 100m buffer zones / 1:100 year flood lines to be demarcated as no-go areas until authorisations are obtained, in terms of NWA and NEMA, to continue activities in such areas.	MODERATE - LOW
Construction and operation of dirty water containment features (trenches, PCD &	Impairment of groundwater quality due to seepage or overflow from dirty water dams at the plant to underlying	Groundwater	Construction, Operation	MODERATE-HIGH	**CONTROL** Contain dirty water and reduce infiltration with suitable lining material. Separation of clean water with effective storm water control. All dirty surface water control facilities (dam, drain) must be designed and operated to have a minimum freeboard above full supply level, at such manner that they can always handle 1:50 year flood-event on top of its mean operation level.	LOW

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
Event Pond) and process water supply dam (water sourced from Leeuwpan dam)	aquifers.				Leaks detection system should be incorporated into the design system or install monitoring boreholes downstream of the dirty water dams to monitor for seepage. **REMEDY** Recycle process water. Inspect, maintain and repair all water management features including dams, trenches, berms, silt traps, pipelines and pumps. Follow emergency response plan for spills and keep back-up pumps and pipes on site.	
Chemical / Reagent Storage	Impairment of groundwater quality due to ad hoc spillages at the plant seeping to underlying aquifers.	Groundwater	Construction,Operation	MODERATE	**CONTROL** Materials will be stored within designated areas at all times within concrete bunded areas. Designated areas should be enclosed with appropriate signs and not be exposed to the elements.Chemicals will be stored as per requirements with the MSDS. Wet and dry chemicals, reducing and oxidising agents, will be stored separately. **REMEDY** All spillages must be handled as pollution incidents. Emergency response protocol must be established for contractors.Ensure appropriate spill kits are available on site to clear specific chemical spills and ensure staff is trained to utilise these or have access to appropriate specialists.	LOW
Process water supply and reticulation						
Installation of barge & pump at Leeuwpan Dam, water abstraction from the dam and reticulation through pipelines to TSF sites	Water balance completed for the Leeuwpan Dam indicates the dam can provide the operation with requirements, but increased abstraction will reduce the size of the Leeuwpan Dam. This will expose parts of the dam and aggravate dust generation.	Air quality	Construction, Operation	MODERATE	**REMEDY** Where possible, area should be cleared of fine surface material as the dam recedes and while material is still wet. This material can be disposed of on the tailings facility. This will remove the bulk of the fines which will be more prone to dispersal and generating dust. If available, soil should be applied as the dam recedes to the exposed and cleaned areas and the area vegetated to obtain a good vegetative cover. Consideration should be given to water spray / sprinklers to keep exposed areas moist during dry windy conditions.	MODERATE - LOW
Employment of staff, contractors						
Employment opportunities during construction – 700 jobs	Direct improvement of socio-economic situation of contractors and indirect benefits through multiplier effects.	Socio-economic	Construction, Operation, Decommissioning	MODERATE	Implementing a "local first" recruitment policy. Ensure that the local jobs created are linked to a skills development programme for permanent employment.	MODERATE
Employment opportunities during operations – 250 jobs	Direct improvement of socio-economic situation of contractors and staff	Socio-economic	Construction, Operation, Decommissioning	MODERATE	Implementing a "local first" recruitment policy. Ensure that the local jobs created are linked to a skills development programme for permanent employment.	MODERATE

Activity	Impact	Aspect	Applicable Mine Phase	Significance (pre-mitigation)	Mitigation	Significance (post-mitigation)
	and indirect benefits through multiplier effects.					
Local / Regional business	Local / Regional business support	Socio-economic	Construction, Operation, Decommissioning	MODERATE	Adopt preferential procurement policies towards local suppliers and distributors. Ensuring that principle of "local first" when procuring consumables, construction materials etc.	MODERATE

The supporting impact assessment conducted by the EAP, and detailing all impacts, is attached as **Appendix 18.**

10.8 SUMMARY OF SPECIALIST REPORT RECOMMENDATIONS

All the proposed mitigation and management measures stipulated by specialists have been incorporated into the various tables of the EMP report as well as the overall management plan. Only specific recommendations from specialists are detailed below.

Table 40: Specialist Recommendations

Applicable Study	Specialist Recommendation	Recommendation Included	Reference to Applicable Section in Report
Surface water (Letsolo, 2016)	• Only environmentally friendly materials must be used during the construction phase to minimise pollution. • Clean Stormwater cut off trench or channel must be constructed to divert rainwater away from the dirty catchment area such as the industrial area and the proposed TSF. • RWD and the proposed TSF must be sized and lined according to the GN704 as well as relevant NWA, Water Act. • Pumps and pipelines required for water transfer will be adequately sized to avoid over flowing spillages; • New TSF must be designed as per engineered specification, including the barrier lining as required under the GN704 and NWA. • Dust suppression measures must be in place. • Spillages on site and access roads must be handled as emergency incidents in line with the requirements of	Yes	Sections 27.2.2 ; 27.3.2 & 27.4.3 for Construction phase, Operational phase and Decommissioning phase respectively

Applicable Study	Specialist Recommendation	Recommendation Included	Reference to Applicable Section in Report
	section 19 of the NWA. • Areas which were disturbed during the construction phase must be reshaped and revegetated. • Proper clean and dirty water separation techniques must be implemented to allow uncontaminated water to flow back to the environment (Please refer to Storm Water Designs). • All contaminated water must be contained in a lined return water dam. • The return water dam and trenches must be regularly inspected and silt build up cleared as and when required to ensure adequate functioning of the dams. • The pumps must be placed on top of the diesel collector and oil traps. • Non-mining waste that includes, but not limited to, grease, lubricants, paints, flammable liquids, garbage, abandoned machinery and other combustible materials generated during activities should be placed and stored in a controlled manner in a designated area, and also have an emergency response plan. All spillages from moving construction vehicles must be handled as pollution incidents. Emergency response protocol must be established for contractors.		

Applicable Study	Specialist Recommendation	Recommendation Included	Reference to Applicable Section in Report
Groundwater (Shangoni, 2016)	Construction and Operation: • Contain dirty water with sound storm water control measures to reduce the overall volume of water that must be handled in the system. Divert clean water from the site. • Recycle water in RWD within processing plant. • Contain dirty water and reduce infiltration with suitable lining material. • All dirty surface water control facilities (dam, drain) must be designed and operated to have a minimum freeboard above full supply level, at such manner that they can always handle 1:50 year flood-event on top of its mean operation level. • Recycle process water. Contain dirty water and reduce infiltration with suitable lining material. • Contain seepage from the proposed tailings and re-direct to the RWD. • Pipelines must be maintained and audited (assessed) on regular basis, with particular focus on the leaks detection systems. Leaks detection system should be incorporated into the design system. • It is recommended that current groundwater monitoring conducted by Evander continue as per the current schedule and frequency. However, some additional	Yes	Sections 27.2.3; 27.3.3 & 27.4.4 for Construction phase, Operational phase and Decommissioning phase respectively

Applicable Study	Specialist Recommendation	Recommendation Included	Reference to Applicable Section in Report
	ground- and surface water monitoring points are proposed. It is recommended that the monitoring programme and suitability of current boreholes be evaluated within the first year of operation of the TSF. Decommissioning and Closure: • A rehabilitation plan must be implemented and the plan should be done in the line with the contents of National Water Act (Act No 36 of 1998), to avoid subsequent negative environmental impacts that may occur. • Sloping, top soiling and re-vegetation of the top and side slopes of the proposed tailings dam must be done to reduce water infiltration. Rehabilitation should consist of re-vegetating the site using appropriately chosen indigenous grasses. On-going concurrent rehabilitation of the side slopes will be considered in the design of the cover system. • Containing dirty water and seepage from the TSF to prevent spillage into the catchment. • Effectiveness of existing monitoring borehole positions should be re-evaluated. • Continuation of the monitoring programme to establish post decommissioning trends. • Continue vegetation establishment monitoring until it can be demonstrated that vegetation is self-sustaining and no erosion channels exist.		

Applicable Study	Specialist Recommendation	Recommendation Included	Reference to Applicable Section in Report
Flora (de Wet, 2011; Dimela, 2016)	• A management plan for alien species must be developed and implemented with primary attention to the aggressive invaders. • Enter into a discussion with the MTPA with regards to the fate of plant species of conservation concern that were recorded on the site and apply for permits to remove these species and relocate or destroy them as per the conversation with MTPA. • The Aloe species is protected by the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998). These species may not be removed, pruned or damaged without a permit from the Mpumalanga Tourism and Parks Agency (MTPA). This species is present within the small area not ploughed on the north-eastern boundary. Ideally it should remain in situ and protected from the development and operational edge effects. If the species is to be destroyed or relocated, a permit to do so must be obtained from the MTPA. • A rehabilitation plan developed by rehabilitation specialists must be implemented to restore natural biodiversity to areas such as the reclaimed tailings dams and demolished mining infrastructure areas to prevent negative impacts such as erosion and spread of invasive species originating from these areas.	Yes	Sections 27.2.427.3.427.4.5 for Construction phase, Operational phase and Decommissioning phase respectively

Applicable Study	Specialist Recommendation	Recommendation Included	Reference to Applicable Section in Report
Wetlands (Limosella, 2011 & 2016)	Mitigation for the loss of the wetlands on the site is limited to offsetting. This can be achieved by rehabilitating and protecting alternative wetlands with similar functions so that no nett loss is obtained. Mitigation measures to protect the wetlands associated with the Grootspruit from general negative impacts includes: • Changes and consequences of water runoff associated with the loss of the watercourses and altered topography should be modelled by a hydrologist in order to understand the risk and changed pressures on the Grootspruit. • Measures should be put in place in critical areas to ensure that changed sources of water input into downstream watercourses does not cause erosion. • Measures should be put in place in critical areas to ensure that polluted water from the Tailings Storage Facility does not enter the Grootspruit. • Regular monitoring should be done to ensure that pollution or erosion are timeously noted and acted upon.	Yes	Sections 27.2.2 ; 27.3.2 & 27.4.3 for Construction phase, Operational phase and Decommissioning phase respectively
Aquatic ecology (SAS, 2016)	Aquatic biomonitoring has been on-going since 2011 of the full EGM MRA as part of the existing EMP (Appendix 11). This is recommended to continue. The latest biomonitoring reports include the following recommendations for the affected area:	Yes	Sections 27.2.2; 27.3.2 & 27.4.3 for Construction phase, Operational phase and

Applicable Study	Specialist Recommendation	Recommendation Included	Reference to Applicable Section in Report
	• It is recommended that Whole Effluent Toxicity (WET) testing of the Kinross RWD continue. Any groundwater seepage associated to the mine, should also be tested to quantify any impacts this water may pose to the receiving environment; • It is essential that on-going aquatic ecological integrity monitoring take place, complying with the DWS requirements and monitoring any changes that may take place to the ecological integrity of the aquatic recourses in the vicinity of the Evander Operations. This will ensure that any impacting activities upstream will be accounted for; • The same set of monitoring points should be used to allow temporal trends to be analysed. By doing this, the ecological state of the stream can be monitored at any time and any changes in ecological integrity can be noted and possibly linked to new or existing anthropogenic activities occurring in the catchment; • Results should be compared spatially and temporally to the results of previous biomonitoring studies. If it is observed through biomonitoring information that significant changes are taking place in ecological integrity (Change of Class), it should be taken as an indication that the system is suffering stress and mitigatory actions should be identified and, where possible, employed.		Decommissioning phase respectively

Applicable Study	Specialist Recommendation	Recommendation Included	Reference to Applicable Section in Report
Heritage(Archaetnos,2017)	The heritage sites (graves) identified in close proximity to the new TSF must be left *in situ* and maintained to prevent deterioration of the sites. The areas of the old farm yard that may be directly affected should be photographed and a destruction permit can be gained before any activities on site.	Yes	Sections 27.2.5 & 27.3.5 for Construction phase and Operational phase respectively
Air Quality (Rayten, 2017)	Air Quality monitoring is done by EGM and this must continue. Specific recommendations for this project are: • A fugitive dust management plan will need to be developed for proposed onsite activities (construction & operation phase). • Where possible, purchase equipment with lower emissions. • Machinery and equipment will be regularly serviced to ensure they are in proper working condition and to reduce risk of excessive emissions. • Discontinue use of faulty equipment until repaired or replaced. • Basic wetting during construction activity and vegetation cover on the existing tailings facilities are the general standard practices for dust suppression • Other measures that could be considered and their control efficiencies (%) are listed below. o Water sprays / misting at loading and offloading	Yes	Sections 27.2.6; 27.3.6 & 27.4.6 for Construction phase, Operational phase and Decommissioning phase respectively

Applicable Study	Specialist Recommendation	Recommendation Included	Reference to Applicable Section in Report
	points (50% - 70%); o Wind breaks at active stockpiles (up to 30%); o Water spray with chemical binding agents (up to 90%); o Rock cladding or top soiling and vegetating stockpiles (up to 30%); o Vegetation and re-vegetation of exposed areas (30 – 90%); o Chutes at tipping points (up to 75%); o Enclosure of dust sources (up to 99%); and o Abatement equipment for stack emissions (up to 99%). • The choice of mitigation measures will depend on the availability of resources, practicality, effectiveness and affordability. Therefore, it is recommended that a detailed air quality management plan is developed for the mine, incorporating mitigation measures as discussed above. • Monthly dust monitoring and annual PM10 assessments and recording must be done. • Once off registration on NAEIS and annual reporting to NAEIS.		

11 ENVIRONMENTAL IMPACT STATEMENT

11.1 SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT AND POSITIVE AND NEGATIVE IMPACTS IDENTIFIED

The impact assessment in Section 10 above discusses impacts in terms of specialist findings; issues raised by I&APs and provides an overall impact assessment. Although some impacts of high significance have been identified, no fatal flaws have been identified for the project. Impacts of high to moderate-high significance (pre-mitigation) included:

- Destruction of channelled and unchannelled valley bottom wetlands due to the new TSF and RWD placement.
- Destruction of protected species.
- Sedimentation of downstream water bodies and associated wetlands, including the Grootspruit.
- Impairment of groundwater quality due to seepage or overflow from RWDs to underlying aquifers.
- Disturbance to sections of an old farmstead adjacent to the RWD.
- Impairment of local tributaries and streams and day lighting of contaminated groundwater seepage will contaminate the nearby Grootspruit which is regionally connected and has national implications.
- Wetland deterioration due to water quality impacts, should water from the TSF not be contained or through TSF failure.
- Sedimentation of downstream water bodies and associated wetlands, including the Grootspruit.
- Transformation/loss of wetlands and changes to the topography and runoff characteristics affecting the flow quantity and fluctuation properties of the Grootspruit
- Impairment of groundwater quality due to leachate seeping to underlying aquifers from the tailings facility.
- Radiation could affect the immediate environment of the TSF; however, current levels are below the required limits.
- Wetland deterioration due to water quality impacts that may arise from slurry spills and poor water containment at the plant.
- Impairment of groundwater quality due to seepage or overflow from dirty water dams at the plant to underlying aquifers.

The proposed TSF design and project plan has been altered as much as possible since the specialist studies were completed, which allowed the least wetland extent to be affected. However, the proposed project will still lead to the destruction of wetlands due to the PCD and TSF placement and thus EGM has committed to completing a wetland offset strategy for the project to ensure no nett loss of wetland functionality in the catchment.

The design of the new TSF has taken into consideration the loss of water from the natural system as a significant impact. Due to this, clean water diversion will be carried out and water will report to the Grootspruit downstream of the TSF. This will be designed in the best possible way to ensure no erosion or sedimentation of the watercourse is created. Furthermore, once rehabilitation of the two reclaimed TSF's is complete and the area remediated to a satisfactory standard, water may return to the natural hydrological cycle. This will be a positive effect in the catchment.

The 230 ha of grassland that is required for the expansion of the Kinross TSF contain floral species of concern. EGM is committed to a relocation scheme in agreement with the MTPB. These plants will be relocated to an area under EGM management and monitoring will be done to ensure the highest success ratio.

Most of the potential significant impacts are due to contaminated water runoff or seepage reaching downstream environments (rivers and wetlands) as the deposited tailings is toxic to natural environments. This can be mitigated by implementing a proper storm water management plan in accordance with GN704, where the containment of contaminated runoff will prevent such impacts. Furthermore, ensuring properly designed storage areas and practicing good housekeeping practices at all times by ensuring all materials are properly stored within designated areas, will also reduce the potential risk for contamination by surface water runoff. Of greatest significance is that the TSF and RWDs will be constructed on a Class C liner, which will drastically reduce the seepage of contaminated water into the environment.

Although not further detailed here, other impacts of moderate or lower significance must be managed in accordance with the EMP.

11.2 FINAL SITE MAP

Please refer to Plan 3 for an overview of the proposed layout, and Appendix 2 for detailed plans.

11.3 SUMMARY OF RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES

The most significant risk will be impacts to the surrounding hydrological environments through runoff, spilling and / or seepage of contaminated water and the destruction/loss of the wetlands within the new TSF footprint. The tailings material is highly toxic to the natural environment and thus the consequence of an interaction is major.

Other risks include increased erosion, spread of alien and invasive floral species and impacts relating to the decreased size of Leeuwpan Dam wetland. All of these impacts are discussed in this EIA EMP and mitigation measures have been included in the project design.

It is important to note that the reclamation of the TSF's represents a positive impact in the overall area once rehabilitation of the footprints have been completed.

12 IMPACT MANAGEMENT OBJECTIVES AND IMPACT MANAGEMENT OUTCOMES

The objectives of impact mitigation and management are to:

- Primarily pre-empt impacts and prevent the realisation of these impacts - PREVENTION.
- To ensure activities that are expected to impact on the environment are undertaken and controlled in such a way so as to minimise their impacts – MODIFY and/or CONTROL.
- To ensure a system is in place for treating and/or rectifying any significant impacts that will occur due to the proposed activity – REMEDY.
- Implement an adequate monitoring programme to:
    - Ensure that mitigation and management measure are effective.
    - Allow quick detection of potential impacts, which in turn will allow for quick response to issue/impacts.
    - Reduce duration of any potential negative impacts.

Environmental impact management outcomes are:

- Mine and rehabilitate responsibly and ensure operation is compliant with legislative requirements.
- Protect the biophysical environment as far as possible.
- Protect the water resources in the area as far as possible.
- Ensure atmospheric pollution is kept to a minimum.
- Ensure socially responsible mining.
- Protect historical and cultural aspects where required.

- Maintain open and transparent dialogue with I&APs.

13 FINAL PROPOSED ALTERNATIVES

Please see the final preferred layout in Appendix 2 and Section 7, where the alterations to the project design are motivated.

14 ASPECTS FOR INCLUSION AS CONDITIONS OF THE AUTHORISATION

As this EIA/EMP comprehensively covers impacts and mitigation of impacts, reference to compliance with the EMP is deemed adequate. Should the proposed project be approved, it is recommended that the following specific conditions be included as per the specialist's findings:

- Surface Water (Letsolo, 2016): Dirty water separation and storm water management are critical.
- Wetlands (Limosella 2016): The wetlands lost should be offset to ensure no nett loss of wetland functionality in the catchment. Altered hydrology, pollution and erosion of the Grootspruit should be effectively mitigated.
- Flora (Dimela, 2016): A management plan for alien species must be developed and implemented with primary attention to the aggressive invaders. EGM must enter into a discussion with the MTPA with regards to the fate of plant species of conservation concern that were recorded on the site and apply for permits (where applicable) to remove these species and relocate / destroy.
- Palaeontological Record (Bamford, 2017): If fossil material is discovered during the development of the site, then it is strongly recommended that a professional paleontologist be called to assess the importance and to rescue them if necessary (with the relevant SAHRA permit).
- Air Quality (Rayten, 2017): Fugitive dust management program must be put in place and the monitoring program must continue.

15 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

All specialist studies are conducted to certain levels of confidence, and in all instances known and accepted methodologies have been used and confidence levels are generally high. This means that in most cases the situation described in the pre-mining environment is accurate at high certainty levels, but there exists a low probability that some issues have not been identified during the studies. Such

situations cannot be avoided simply due to the nature of field work and have therefore not been further discussed below.

In situations where species sampling or sensitive site assessment is conducted (fauna, flora, aquatic ecosystems and wetland assessments), it must be understood that time limitation and conditions on site means that not all species can be identified nor sites can be discovered during the surveys. Again, as accepted methodologies are used, this is not deemed to be a fatal flaw. Therefore this is not re-iterated below for each specialist study. It must be stressed that this has been considered within the EMP, where measures are proposed to reduce impact on specifically protected species and heritage sites should these be discovered in addition to those identified during surveys.

There are inherent errors in GPS and mapping programmes which must be considered when transferring plans to on-site activities.

Furthermore, statistical analyses and mathematical models are merely tools that assist the researcher in assessing field observations and have innate assumptions which can reduce objectivity of the results obtained. This is not seen as a major flaw but should always be considered when assessing results. This is not reiterated below for each specialist who has formulated impact assessment based on modelling.

Lastly, impact assessment is a predictive tool to identify aspects of a development that need to be prevented, altered or controlled in a manner to reduce the impact to the receiving environment, or determine where remediation activities will need to be incorporated into the overall development plan. This does not mean that the impact will occur at the predicted significance, but provides guidance on the formulation of the management and monitoring requirements which need to be incorporated into the EMP.

Specific knowledge gaps identified by the various specialists and the appointed EAP's include:

- No detailed soils assessment was undertaken for the new TSF footprint;
- Many specialists' site visits took place in 2016, which was a year of extreme drought. This may affect some ecological indicators such as wetland indicators, flowering of SCC and faunal presence.

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

16.1 REASONS WHY THE ACTIVITY SHOULD BE AUTHORIZED OR NOT

Section 11 above provides a compact summary of pertinent findings, all of which can be mitigated by varying degrees depending on the type of mitigation measure applied. The EIA/EMPr is a comprehensive document with comprehensive information provided through the specialist studies, none of which identified fatal flaws. Upon review of all specialist input, the project should go ahead with the recommended mitigation measures contained herein.

It is therefore Cabanga Environmental's reasoned opinion that the activity be authorised on condition that the EMP is fully adhered to, annually audited and amended where necessary based on audit findings.

16.2 CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORISATION

16.2.1 SPECIFIC CONDITIONS TO BE INCLUDED INTO THE COMPILATION AND APPROVAL OF THE EMPR

As the EIA/EMPr is a comprehensive document with comprehensive information provided through the specialist studies, the only condition recommended is that the EMP is fully adhered to, annually audited and amended where necessary based on future audit findings.

As per the specialists, the following should be included:

- Surface Water (Letsolo, 2016): Dirty water separation and storm water management are critical.
- Wetlands (Limosella 2016): The wetlands lost should be offset to ensure no nett loss of wetland functionality in the catchment. Altered hydrology, pollution and erosion of the Grootspruit should be effectively mitigated.
- Flora (Dimela, 2016): A management plan for alien species must be developed and implemented with primary attention to the aggressive invaders. EGM must enter into a discussion with the MTPA with regards to the fate of plant species of conservation concern that were recorded on the site and apply for permits to remove these species and relocate / destroy.
- Palaeontological Record (Bamford, 2017): If fossil material is discovered during the development of the site, then it is strongly recommended that a professional paleontologist be called to assess the importance and to rescue them if necessary (with the relevant SAHRA permit.
- Air Quality (Rayten, 2017): Fugitive dust management program must be put in place and the monitoring program must continue.

16.2.2 REHABILITATION REQUIREMENTS

Rehabilitation will be required for the sides of the new TSF; as well as the footprints of the Leslie/Bracken and Winkelhaak TSF's once these have been reprocessed. The new TSF will be a permanent feature and this will include the associated storm water management features and RWD's. The structure must be sustained into the future in a condition that is not detrimental to the social and ecological environment. The contaminated footprints of the Leslie/Bracken and Winkelhaak TSF's must be remediated to allow a new and sustainable land use.

Rehabilitation of the Leslie/Bracken and Winkelhaak footprints will aim to:

- Ensure that the rehabilitated areas are cleared of all contaminating substances (e.g. tailings)
- Ensure that the final shaped landscape matches the surrounding area and that runoff from the area is returned to the natural catchment.
- Ensure that soil is remediated through actions such as ripping, liming and fertilisation to return functioning soil characteristics as far as possible.
- Ensure that vegetation growth and cover on the rehabilitated areas is sustainable. Ensure that self-sustaining indigenous species are establishing on site and that succession and colonisation from surrounding areas is taking place on rehabilitated areas.
- Ensure that alien invasive growth is monitored and eradicated as soon as possible.
- Ensure a self-sustaining post-mining land scape until the area is declared as non-toxic for alternative developments.

Rehabilitation of the new TSF will aim to:

- Ensure the soil is stripped and stockpiled correctly to allow the use of soil for concurrent and final rehabilitation. Best practice guidelines must be adhered to. Wetland soils must be stockpiled separately and used for specific rehabilitation needs.
- Ensure concurrent rehabilitation of the slopes is considered in the design of the cover system as far as possible to minimise erosion of the surface and dust.
- Ensure that self-sustaining indigenous species are used and that growth is monitored and maximum cover is gained. A variety of species must be used to ensure sustainability through different seasons and years as well as to achieve soil stabilisation and contribute towards biodiversity of the area. Herbaceous and woody species may be used.
- Ensure that alien invasive growth is monitored and eradicated as soon as possible.

- Ensure the water management of the area is sustainable and not impacting the surround environment in any way.

The rehabilitation plan is detailed in Section 33.1.3.

17 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The project life is estimated at 14 years, with 1 year estimated for construction and 3 years for decommissioning and closure. Thus the EA is being sought for a period of 18 years.

18 UNDERTAKING

The undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the EIA/EMPr.

19 FINANCIAL PROVISION

As per NEMA financial provision regulations, itemised costs must be provided within the financial provision. As the DMR's closure cost assessment provides itemised costs, this process was used to determine the quantum for financial provision. Section 33 for the financial provision details and findings.

Financial Provision will be made by way of a guarantee acceptable to the DMR, as per the Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations.

20 DEVIATIONS FROM THE APPROVED SCOPING REPORT

20.1 DEVIATIONS FROM THE METHODOLOGY FOR IMPACT AND RISK ASSESSMENT

No deviation has been made.

20.2 MOTIVATION FOR THE DEVIATION

Not applicable as no deviation has been made.

21 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

21.1 COMPLIANCE WITH THE PROVISIONS OF SECTIONS 24(4)(A) AND (B) READ WITH SECTION 24 (3) (A) AND (7) OF NEMA, THE EIA REPORT MUST INCLUDE THE:-

21.1.1 IMPACT ON THE SOCIO-ECONOMICS OF ANY DIRECTLY AFFECTED PERSON

In general, positive impacts will be experienced with job creation and economic development through the life of mine. The main I&APs that may experience direct impact are:

- The industrial area located immediately east of the new TSF may be affected by the new structure from a visual perspective. Mitigation measures will be made to ensure no dust, noise or water issues impact the area.
- Most of the expansion area is used for communal grazing. Loss of this may affect those that occasionally graze here.
- The land owners in the area may be affected by the increased size of the Kinross TSF. However, the new TSF will be designed and managed with best practice and thus there may be an overall positive impact on the environmental management of the area. This is not expected to affect the value of property in the area.

21.1.2 IMPACT ON ANY NATIONAL ESTATE REFERRED TO IN SECTION 3(2) OF THE NATIONAL HERITAGE RESOURCES ACT

The heritage sites (graves) identified in close proximity to the new TSF must be left *in situ* and maintained to prevent deterioration of the sites. If this is done correctly, the resultant impact to heritage resources will be negligible.

A heritage site (an old farm yard) is lying right on the edge of the proposed RWD and at least some of the structures are expected be directly impacted on. The site is rated as having a Low-Medium Significance and therefore a full photographic documentation is recommended, after which it may be demolished with a demolition permit from the relevant heritage authority.

The findings are summarised under sensitive features in Section 9.1.10 and have been incorporated into sensitivity mapping (Plan 30).

22 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(a) & (b) OF THE ACT

Section 24(4) (b) (i) of the Act specifies "investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of

the significance of those potential consequences or impacts, including the option of not implementing the activity".

The alternatives assessed and the impacts associated with the alternatives assessed have been fully presented in Section 7 and the final layout has been motivated in this report. This final layout has formed the basis for the impact assessment in the EIA Report (Part A of this report) and the EMPr (Part B of this report), which reports specific management and monitoring that will be required in terms of the final layout presented.