De Beers Consolidated Mine (Pty) Ltd: Venetia Mine

Storm Water Management Project

Environmental Impact Assessment Report and Environmental Management Programme Report

Report date: 12 November 2021
Application Reference: 58 (MR)
DMRE Reference: LP30/5/1/2/3/2/1/58/EM.

SHANGONI
Management Services (Pty) Ltd

Stewards

Problem Solvers

Team Players

Influencing decisions since 2000 through identification, quantification and mitigation of environmental, safety, health and compliance risks

Executive summary

De Beers Consolidated Mine (Pty) Ltd. ("DBCM"): Venetia Mine is located on the farm Venetia 130 MS, approximately 80 km to the west of the town of Musina, within the Musina Local Municipality of the Vhembe District Municipality in Limpopo Province. Venetia Mine is an existing opencast diamond mine and commenced with operation in 1992. The extent of the Mining Right boundary is approximately 3 000 ha and includes three main kimberlite ore reserves, namely K1, K2 and K3 kimberlite pipes.

As the depth of open pit mining increases, the amount of waste rock increases and opencast mining becomes economically and environmentally unviable. Accordingly, the opencast pit will be developed to a depth of approximately 450 m, whereafter, the K1 and K2 reserves will be mined from underground as part of the Venetia Underground Project ("VUP") in accordance with the following approvals:

- *Environmental Management Programme for Proposed Underground Operations and EMP Consolidation for Existing Operations at De Beers Consolidated Mines, Venetia Mine, Limpopo Province*, dated 2012 and prepared by Environmental Resources Management, DMRE reference number: LP30/5/1/2/3/2/1/58/EM.
- *Environmental Authorisation*, dated 2012. DMRE reference number: LP30/5/1/2/3/2/1/58/EM.
- *Environmental Authorisation*, dated 2012. Limpopo Department of Economic Development, Environment and Tourism ("LEDET") Reference number: 12/1/9/2-V9.
- *Amended Environmental Authorisation*, 2015. LEDET. Reference register number: 12/1/9/2-V9.
- *Water Use Licence No 14/A63E/ABCGIJ/5111*. File No: 27/2/2/A563/1/1. 7 August 2017. Department of Water and Sanitation.
- *Amended Waste Management Licence for Venetia Mine within Musina Local Municipality*, approved 26 February 2018 with LEDET reference number: 12/4/10/8-A/9/V1/A1.
- *Atmospheric Emissions Licence (AEL): De Beers Consolidated Mines (Pty) Ltd within Musina Local Municipality* approved 31 March 2017 with licence number: 12/4/12L-V7.

Venetia Mine has identified the need to construct additional storm water management infrastructure and water containment facilities with the purpose of de-risking the above mentioned VUP from flooding (to ensure the safety of people working in the newly developed underground mine), to ensure legal compliance to the requirements of the GN.R 704 (*Regulations on the use of water for mining and related activities aimed at the protection of water resources*) dated June 1999 as published under the National Water Act, 1998 (Act No.36 of 1998) ("NWA"), to ensure compliance to Section 19 (Duty of care) of the NWA, and to ensure compliance to Section 28 (Duty of care) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"). Venetia Mine commenced with the Storm Water Management Project ("SWMP") conceptual studies in 2011, and applied for the required storm water infrastructure in the 2014 Integrated Water Use Licence ("IWUL") amendment application, as was subsequently approved. Since 2014, various studies have been undertaken, including mine residue waste classifications, geohydrological studies and water balance updates to better inform the detailed designs, capacities and locations of the proposed facilities and proposed expansion with a total required storage capacity of 2.11 Mm^3.

This application is for the NEMA listed activities as will be triggered by the SWMP. A water use licence application will also be submitted to license additional water uses and changes to the capacities and locations of licensed water-storage facilities.

The application for environmental authorisation and the final scoping report was submitted to the DMRE on 18 July 2021 and 16 August 2021 respectively. The final scoping report was accepted on 04 October 2021 (refer to Annexure C). This report is the Environmental Impact Assessment Report and Environmental Management Programme Report ("EIAR/EMPr") for the Venetia Mine Storm Water Management Project.

The following listed activities are applied for:

Listed activity	Activity description
Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017, as amended)	
Activity 9	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water with an internal diameter of 0,36 metres or more; or with a peak throughput of 120 litres per second
Activity 10	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes with an internal diameter of 0,36 metres or more; or with a peak throughput of 120 litres per second or more.
Activity 12	The development of dams, where the dam including infrastructure and water surface area, exceeds 100 square metres within a watercourse;
Activity 13	Construction of facilities for the off-stream storage of water with the capacities of such facilities exceeding 50 000 cubic metres.
Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.
Activity 24	The development of a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;
Activity 34	The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution
Activity 50	The expansion of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, where the combined capacity will be increased by 50 000 cubic metres or more.
Activity 66	Expansion of dams where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, was originally 5 metres or higher and where the height of the wall is increased by 2,5 metres or more
Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017, as amended)	
Activity 6	Development of facilities that require a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent
Activity 15	The site clearance for the proposed activities will result in the clearance of indigenous vegetation in excess of 20 hectares.
Activity 16	Development of dams where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.

Listed activity	Activity description
Listing Notice 3 (GNR 983 of GG 40772 of 7 April 2017, as amended)	
Activity 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres in Limpopo, outside urban areas, in areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas.
Activity 14	The development of dams within a watercourse in Limpopo Outside urban areas in areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area
Activity 18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre in Limpopo, Outside urban areas, in areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.
Activity 23	The expansion of dams within 32 metres of a watercourse in Limpopo, Outside urban areas within 10 kilometres from national parks or world heritage sites

*NOTE: Venetia Mine is situated approximately 20 km south of the Mapungubwe National Park, which represents the nearest declared conservation area. In Government Notice No. 71 Government Gazette 31832 of 30 January 2009 the then Minister of Environmental Affairs and Tourism, announced the Mapungubwe Cultural Landscape as a world heritage site in terms of the World Heritage Convention Act, 1999 (Act No. 49 of 1999). The Mapungubwe National Park also included a buffer zone that encompassed the already existing and operational Venetia Mine. In 2014, a new proposed buffer was assessed and approved by UNESCO at the 38th session of the World Heritage Committee (Doha, Qatar 2014) with such also accepted and welcomed in the Statement on the Cabinet Meeting of 25 June 2014 (dated 26 June 2014): "*2.3. Cabinet welcomes the approval of a new buffer zone for the Mapungubwe World Heritage Site by the World Heritage Committee of UNESCO which held its 38th Session in Doha, Qatar, from 15 to 25 June 2014. The new buffer zone is the result of a long consultation process involving landowners, community representatives, non-governmental organisations, mining companies and various government stakeholders. The approval of this new buffer zone is a welcome development for South Africa's efforts to improve the management and protection of its world heritage sites while allowing for responsible and sustainable development.*" This new buffer excludes Venetia Mine. The listed activities as applied for above under Listing Notice 3 may, therefore, no longer be applicable to the proposed project due to the new buffer being accepted by UNESCO. These listed activities have been included for completeness and consideration for exclusion/inclusion by the DMRE.

Table of Contents

PART A: SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Annexures

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 Details of project applicant and environmental assessment practitioner

1.1 Details of the project applicant

Name of operation	Venetia Mine
Applicant	De Beers Consolidated Mines Limited
Postal address	PO Box 668, Musina,0900
Responsible person	Gavin Anderson
Telephone no.	015 575 2773
e-mail address	Gavin.anderson@debeers.com
Company registration no.	2000/011085/07

1.2 Details of the environmental assessment practitioner

EAP	Shangoni Management Services (Pty) Ltd.: Ashley Miller
Tel No	(012) 807 7036
Fax No	(012) 807 1014
e-mail Address	ashley@shangoni.co.za

1.3 Expertise of the environmental assessment practitioner

Name and Surname	Qualifications and summary of experience (refer also to Annexure B)
Ashley Miller	Ashley obtained his B.Sc (Honours) degree in Environmental Analysis and Management through the University of Pretoria. Ashley is part of the Environmental Authorisations Department at Shangoni Management Services (Pty) Ltd. and has experience in drafting Basic Assessment Reports, Scoping Reports, Environmental Impact Assessments (EIA), Environmental Management Programme Reports (EMPr), Integrated Water and Waste Management Plans (IWWMP) and Integrated Water Use Licence Applications (IWULA). Ashley is also the Product Lead of Environmental Assurance and has the following experience in auditing: Due diligence audits, External Water Use Licence audits, Environmental Authorisation audits, Environmental Management Programme audits, Waste Management Licence audits and Atmospheric Emissions Licence audits. Ashley has also gained valuable experience in Geographic Information

Name and Surname	Qualifications and summary of experience (refer also to Annexure B)
	Systems (GIS) in compiling regional, locality and infrastructure maps and mine plans.
Brian Hayes	Brian has for the past 29 years been actively involved in environmental management and engineering primarily in the mining, FMCH and petrochemical industries. A registered professional engineer (Chemical) with a master's degree in environmental engineering, Brian is responsible for quality assurance within the environmental department whilst also actively involved in consulting to clients on aspects and projects related to environmental assurance.

2 Description of the property

Table 1: Description of the properties applicable to the proposed activities (refer also to Figure 1)

Farm name	**Pollution Control Dam ("PCD") 1A:** Portion 2 of the Farm Venetia 103 MS.
	PCD 2: Portion 5 of the Farm Venetia 103 MS.
	PCD 3: Portion 5 of the Farm 103 MS.
	PCD 1 Compartment 4B: Portion 2 of the Farm Venetia 103 MS.
	Fine Residue Deposit ("FRD") 1 Return Water Dam (RWD") expansion: Portion 5 of the Farm Venetia 103 MS.
	On-mine Water Storage Dam ("OMWSD") North and South compartment: Portion 1 of the Farm Venetia 103 MS. Portion 2 of the Farm Venetia 103 MS.
	OMWSD Compartment 3: Portion 2 of the Farm Venetia 103 MS.
	OMWSD Compartment 4: Portion 1 of the Farm Venetia 103 MS.
	K 03 Pit: Portion 0 (RE) of the Farm Venetia 103 MS
	Mine water discharge: Portion 3 of the Farm Venetia 103 MS. Portion 5 of the Farm Venetia 103 MS.

	Pipelines, pumping systems, storm water management channels and trenches: Portion 0 (RE) of the Farm Venetia 103 MS. Portion 1 of the Farm Venetia 103 MS. Portion 2 of the Farm Venetia 103 MS. Portion 3 of the Farm Venetia 103 MS. Portion 4 of the Farm Venetia 103 MS. Portion 5 of the Farm Venetia 103 MS.
	Relocation of the mine boundary security fence, upgrading of southern access road and re-routing of an 11 kV and a 22 kV powerline: Portion 3 of the Farm Venetia 103 MS. Portion 4 of the Farm Venetia 103 MS. Portion 5 of the Farm Venetia 103 MS.
Magisterial district	Musina Local Municipality, Vhembe District Municipality
Distance and direction from nearest town	80 km west of Musina (refer also to Figure 2).
21-digit Surveyor General Code	T0MS00000000010300000 T0MS00000000010300001 T0MS00000000010300002 T0MS00000000010300003 T0MS00000000010300004 T0MS00000000010300005

3 Locality of the project

3.1 Magisterial district and administrative boundaries

Venetia Mine falls within the administrative boundaries presented in Table 2

Table 2: Administrative boundaries

Province	Limpopo Province
District municipality	Vhembe District Municipality
Local municipality	Musina Local Municipality
Department of Mineral and Energy ("DMRE") Local Office and the Competent Authority ("CA")	DMRE (Polokwane)
Department of Water and Sanitation ("DWS") Local Office	DWS (Polokwane)
The Limpopo Department of Economic Development Environment and Tourism ("LEDET")	LEDET (Polokwane)
Catchment zone	Limpopo River Catchment
Sub-catchments	A6

Water Management Area ("CMA")	Limpopo Water Management Area
Quaternary catchment	A63E

3.2 Location of the proposed activities

Venetia Mine is situated in the Limpopo Province, the Vhembe District Municipality and the Musina Local Municipality. The distances and direction of the various neighbouring towns from Venetia Mine are as follows (refer also to Figure 2):

- Alldays - 35 km south-west;
- Musina - 80 km east;
- Louis Trichardt - 90 km south-east;
- Thohoyandou – 130 km east by south-east; and
- Polokwane – 160 km south.

The activities proposed as part of this project, the Storm Water Management Project ("SWMP"), will be undertaken on the following properties (refer also to Table 1 above):

- Portion 0 (RE) of the Farm Venetia 103 MS;
- Portion 1 of the Farm Venetia 103 MS;
- Portion 2 of the Farm Venetia 103 MS;
- Portion 3 of the Farm Venetia 103 MS;
- Portion 4 of the Farm Venetia 103 MS; and
- Portion 5 of the Farm Venetia 103 MS;

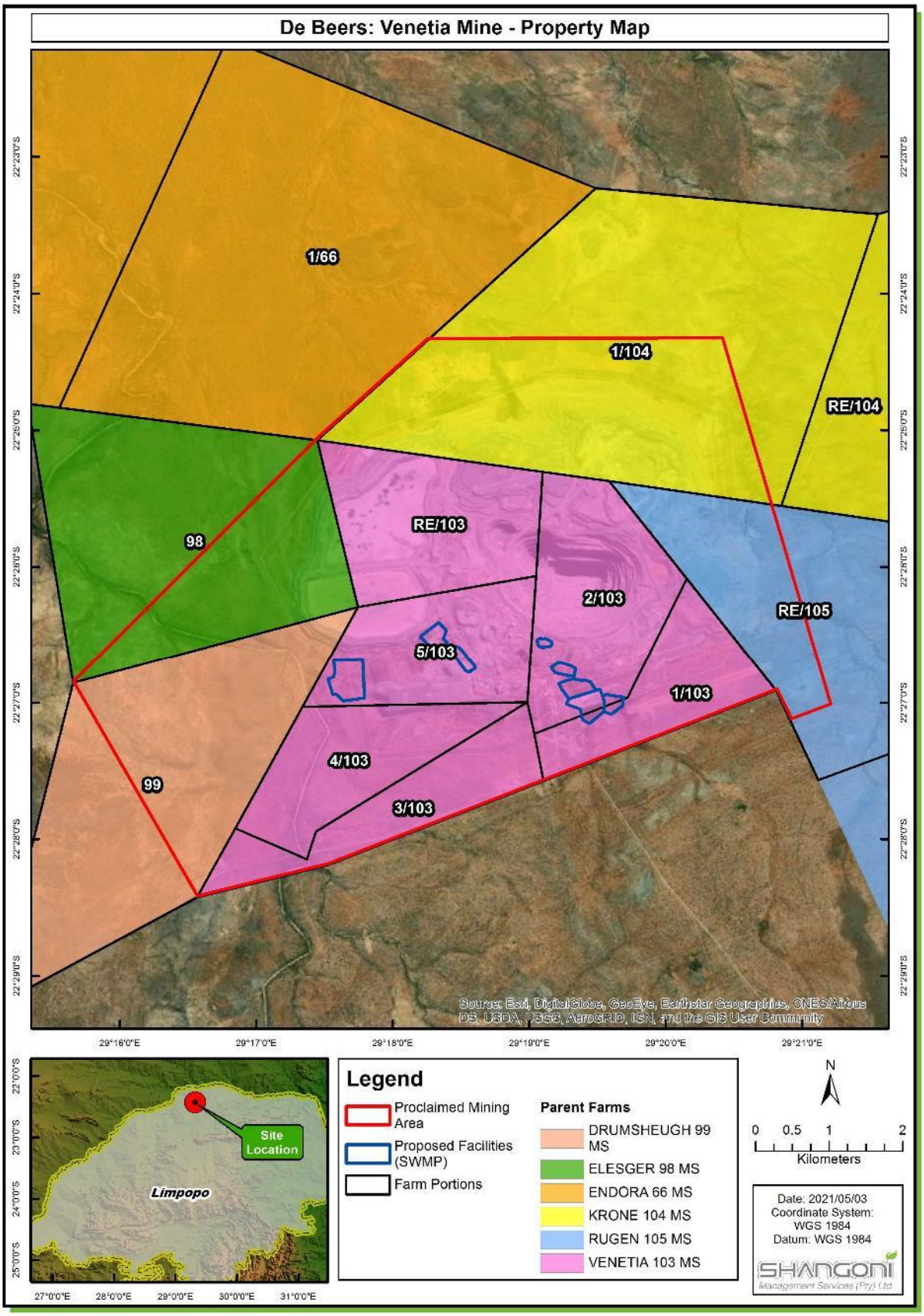


Figure 1: Affected properties associated with the proposed activities. Refer also to Annexure A

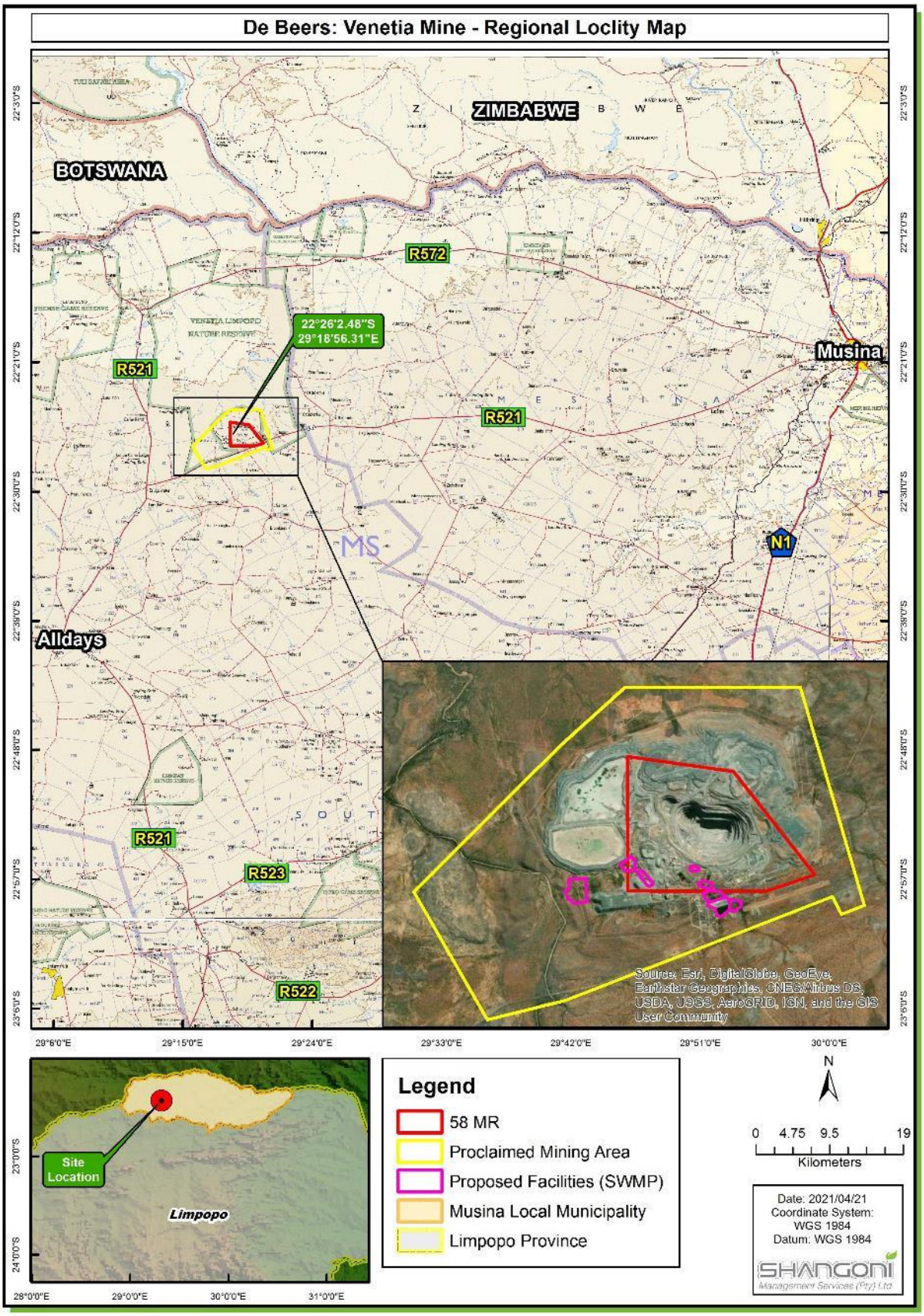


Figure 2: Locality of Venetia Mine. Refer also to Annexure A

4 Description of the scope of the proposed activity

4.1 Description of the proposed activities to be undertaken

4.1.1 Proposed Storm Water Management Project

A short description of the proposed activities associated with the SWMP is provided below.

4.1.1.1 Pollution Control Dam ("PCD") 1:

PCD 1 will be constructed south of the existing Storm Water Control Dams (Dam 1 and Dam 2) ("SWCD"). This facility will be constructed to contain affected water runoff from the VUP surface area, crusher area, main offices and workshops, and will have a capacity of 102 000 m^3. PCD 1 is authorised within the current approved *Environmental Management Programme for Proposed Underground Operations and EMP Consolidation for Existing Operations at De Beers Consolidated Mines, Venetia Mine, Limpopo Province*, dated 2012 and prepared by Environmental Resources Management, DMRE reference number: LP30/5/1/2/3/2/1/58/EM ("approved EMPr") and is licensed by the IWUL (Licence No.: 14/A63E/ABCGIJ/5111). However, changes to the design and capacity of this facility have occurred since the mentioned approvals. A Water Use Licence ("WUL") application will also be submitted for the proposed activity.

4.1.1.2 PCD 2:

PCD 2 will be constructed to the north-west of the plant area (south-east of the FRD 1 RWD). This facility will be constructed as a containment facility and will only receive water as removed from the opencast pit, underground operation and other facilities where capacity is required. PCD 2 will have a capacity of 116 000 m^3 and is authorised within the approved EMPr and is licensed by the IWUL (Licence No.: 14/A63E/ABCGIJ/5111). However, changes to the design, capacity and location of this facility have occurred since the mentioned approvals. A separate WUL application will be submitted for the proposed activity.

4.1.1.3 PCD 1 Compartment 4B:

PCD 1 Compartment 4B will be constructed as a containment facility and will only receive water as removed from the opencast pit and underground operation. PCD 1 Compartment 4B will have a capacity of 34 000 m^3. PCD 1 Compartment 4B is authorised within the approved EMPr and is licensed by the IWUL (Licence No.: 14/A63E/ABCGIJ/5111). However, changes to the design and capacity of this facility have occurred since the EMPr approval but is correct within the IWUL.

4.1.1.4 Fine Residue Deposit ("FRD") 1 Return Water Dam (RWD") expansion:

FRD 1 RWD is an existing facility, authorised within the approved EMPr and licensed by the IWUL (Licence No.: 14/A63E/ABCGIJ/5111) that will be expanded by raising the dam walls by 3 metres (expansion not included in the approved EMPr and IWUL). The facility currently receives water from the FRD 1 penstock and a small portion of the upstream catchment adjacent to the opencast pit. The current

capacity of FRD 1 RWD is 40 000 m^3 and will be expanded to a capacity of 154 000 m^3. A separate WUL application will be submitted for the proposed activity.

4.1.1.5 On-mine Water Storage Dam ("OMWSD") North and South compartment expansion:

The On-mine Water Storage Dam ("OMWSD") North and South Compartments are existing facilities, authorised within the approved EMPr and licensed by the IWUL (Licence No.: 14/A63E/ABCGIJ/5111), whereby the capacity of the facility will be increased by raising the dam walls by 2 metres and increasing the capacity by 190 000 m^3 (expansion not included in the approved EMPr and IWUL). This will increase the current combined capacity of 460 000 m^3 to 555 000 m^3. The OMWSD Dams only receive water from the opencast pits, the plant and the Well Fields. A separate WUL application will be submitted for the proposed activity.

4.1.1.6 OMWSD Compartment 3:

OMWSD Compartment 3 is a new proposed facility that will be constructed north of the OMWSD North Compartment. This facility will be constructed to contain water from opencast pits, the plant, the underground mine and the Well Fields. OMWSD Compartment 3 will have a capacity of 239 000 m^3. This is a new facility it is not included in the approved EMPr and IWUL. A separate WUL application will be submitted for the proposed activity.

4.1.1.7 OMWSD Compartment 4:

OMWSD Compartment 4 is a new proposed facility that will be constructed to the south-east of the OMWSD North and South Compartments and will occupy a portion of the area of the Attenuation Facility (licensed facility). This facility will be constructed to contain water from opencast pits, the plant, the underground mine and the Well Fields. OMWSD Compartment 4 will have a capacity of 192 000 m^3. This is a new facility it is not included in the approved EMPr and IWUL. A separate WUL application will be submitted for the proposed activity.

4.1.1.8 PCD 3:

PCD 3 is the main containment facility proposed for the SWMP and will be the first facility to be constructed to de-risk the VUP and ensure compliance to the requirements of GN.R 704 and to ensure compliance to Section 19 (Duty of care) of the NWA. PCD 3 will be constructed to the west of the mine adjacent to the Course Residue Deposit ("CRD"). This facility will be constructed to contain affected water runoff from the upstream catchments inclusive of runoff from the CRD, FRDs and potential overflow from the other upstream water containment facility. The facility will also be constructed to contain water as removed from the opencast pits and the VUP underground workings. The facility will have a capacity of 1 050 000 m^3. PCD 3 is authorised within the approved EMPr and is licensed by the IWUL (Licence No.: 14/A63E/ABCGIJ/5111). However, changes to the design, capacity and required footprint of this facility have occurred since the approvals and such changes will require authorisation. A separate WUL application will be submitted for the proposed activity.

4.1.1.9 K03 Pit:

K03 Pit is an existing opencast pit. As the ore reserves associated with K03 Pit have been mined out, it is proposed to use K03 Pit as a water containment facility with mine water as removed from the VUP underground mine pumped to K03 Pit before being pumped to the other facilities for containment and reuse. K03 Pit has the capacity to contain 3.5 Mm^3 of water; however, it is anticipated that a volume of 780 000 m^3 of water removed from underground will be stored within the pit. This proposed activity is not authorised in the approved EMPr or IWUL. A separate WUL application will be submitted.

4.1.1.10 Mine water discharge:

Venetia Mine proposes to discharge surplus water to the receiving environment during extreme rainfall events and only when there is insufficient storage capacity, not only as means of managing surplus water but also to ensure safety in the underground workings of the VUP. A total volume of 792 000 m^3 will be required to be discharged. As indicated, the discharge of affected water will only be conducted should there be insufficient capacity and in accordance with the relevant approvals (Environmental Authorisation and WUL). Should such a discharge occur, the discharge will occur from PCD 3 and / or the OMWSD. This proposed activity is not authorised in the approved EMPr or IWUL. A separate WUL application will be submitted for the proposed activity.

4.1.1.11 Relocation of the mine boundary security fence, upgrading of southern access road and re-routing of 22 kV powerlines (including sub-stations):

Mine security fence - As PCD 3 will extend beyond the current Venetia Mine security fence, it is required to relocate the security fence around the boundary of PCD 3.

- 22 kV powerline - A 22 kV mine powerline traverses the proposed PCD 3 area that will require relocation to direct the powerline around PCD 3. Sub-stations will also be made available.
- 22 kV powerline - A 22 kV mine powerline traverses the proposed PCD 1 area that will require relocation to direct the powerline around PCD 1. Sub-stations will also be made available.
- Southern access road – The southern access road will be upgraded and expanded to a 10 m wide road (currently 4 m wide) to provide access of construction vehicles to the proposed PCD 3 locality.

4.1.1.12 Construction storm water management infrastructure including channels and trenches:

Storm water management infrastructure, inclusive of channels and trenches will be constructed to divert affected water runoff to the existing and proposed above-mentioned facilities.

Venetia Mine proposes to construct a seepage collection trench along the western boundary of FRD 1 and FRD 2 to collect any seepage that may occur from the FRDs and direct such to either the North Seepage Dam, FRD 2 RWD or the Southern Seepage Collection Dam (existing facility). The Southern Seepage Collection Dam can discharge to PCD 3.

Venetia Mine also proposes to construct a Northern Seepage Collection trench that will collect seep from the waste rock dump to the north of the mine. The collected seep water will be pumped to FRD 2 RWD for containment.

4.1.1.13 Provision of pipelines and pumping systems:

Pump stations will be constructed, and a pipeline network established to allow for efficient water reticulation and re-use of water.

This proposed activity is not authorised in the approved EMPr.

4.1.2 Typical construction activities considered as part of the proposed SWMP

4.1.2.1 PCDs

The construction of the PCDs will typically include the following activities:

- Site clearance;
- Contractor camp establishment;
- Bulk earthworks, including selection and processing of materials;
- Temporary water management (e.g. berms, canals, storm water inlets, etc.);
- Drainage works including toe drains and below liner drainage systems (where applicable), including manholes, sumps and pump systems;
- Dam liners, including underdrainage, compacted clay layer (including bentonite modification where required), HDPE liner and ballast layer comprising of geocells filled with soilcrete;
- Shaping, topsoiling and vegetating of exposed slopes;
- Safety barriers (including Armco guardrails), where applicable on dam crests;
- Storm water management around dams (including V-drains, canals, etc);
- Hydraulic structures:
    - Spillways;
    - Outlet works;
    - Pump station structures (typically open installations on concrete base slab); and
    - Minor structures.
- Ancillary works such as canal tie ins, storm water management, safety equipment, signage, etc.

4.1.2.2 Silt traps

The construction of the PCDs will typically include the following activities:

Five new dual compartment silt traps will be constructed, two at PCD 3, two at PCD 1 and one at FRD 1 RWD. These will comprise reinforced concrete structures with sloped access to allow cleaning by means of a front-end loader.

The scope of work for the construction of the silt traps will include:

- Site clearance;

- Excavation for silt traps;
- Construction of reinforced concrete silt traps; and
- Installations of related steelwork and mechanical items (e.g. sluice gates).

4.1.2.3 Pumpstations and pipelines

New pump stations will be constructed at the K03 pit, at various pollution control dams (PCD 2, PCD 3, OMWSD Compartment 3 and OMWSD Compartment 4), at the two dirty water collection sumps and at the clean water collection sump (primary and secondary systems). The typical scope of work for the various pump stations will entail the following:

- Construction of pump station civil works (e.g. earthworks, concrete slab, plinths, etc.);
- Supply and installation of pumps, motors, pipework and valves;
- Supply and installation of electrical, control and instrumentation works associated with the pump stations;
- Supply and construction of pipelines (table below), mostly comprising of above ground pipelines; and
- Construction of pipe sleeves / culverts at road crossings.

The approximate pipe lengths and provisional sizes are given in the table below.

Table 3: Pipeline lengths and provisional sizes

Pipeline	Nominal diameter	Length	Material
PCD 1 Pipeline	250	70	Steel
PCD 2 Pipeline	300	432	Steel
	315	50	HDPE
OMWSD Compartment 3 Pipeline	300	720	Steel
	315	80	HDPE
OMWSD Compartment 4 Pipeline	300	12	Steel
	315	55	HDPE
Graveyard Sump Pipeline	300	440	Steel
Refuel Bay Sump Pipeline	150	221	Steel
Clean Water Sump Pipeline	300	620	Steel
	315	26	HDPE
PCD 3 Pipeline	500	110	Steel
	400	2900	Steel
K03 Pit Pipeline	250	3000	steel
	355	550	HDPE
	355	200	HDPE
VUP TO K03 Pipeline	450	2500	Steel

Pipeline	Nominal diameter	Length	Material
	500	1000	HDPE
VUP TO PCD 3 Pipeline	450	1800	Steel
Paleo pipeline	150	1370	Steel
Total		**± 16 200**	

4.1.2.4 Storm water canals, sumps and berms

Channels

Various storm water channels to convey clean and dirty (affected) water on site will be constructed. The total lengths will be approximately as follows:

- Armorflex lined canals: 1.4 km;
- Concrete lined canals: 8.3 km;
- Unlined canals: 0.8 km; and
- A number of berms will also be constructed to function in conjunction with the channels.

The construction of the channels will typically comprise the following activities:

- Site clearance;
- Canal excavation. Excess material to be used elsewhere on site, or used for construction of berms alongside canals, or disposed, as instructed;
- Canal liner installation (e.g. concrete or Armorflex); and
- Shaping, topsoiling and vegetating of exposed slopes.

Affected water sumps

Two affected water collection sumps will be constructed at a disturbed laydown area and the refuel bay area respectively. These are required to contain affected runoff that cannot be gravitated to any of the PCDs and then pump the water to a PCD. The sumps will be similar to the silt trap structures but will comprise a single compartment only and will be equipped with the necessary pumping infrastructure.

The scope of work for the construction of the sumps will include:

- Site clearance;
- Excavation for sump structures;
- Construction of reinforced concrete sumps;
- Construction of flood attenuation berms around sumps;
- Supply and installations of related steelwork; and
- Supply and installation of pumps and pipework.

Clean water attenuation sump

A clean water attenuation sump will be constructed south of PCD 1 to attenuate clean runoff reporting to this natural low-lying area. This will comprise the construction of a flood attenuation berm with pumping infrastructure to pump water into the clean water diversion. A secondary system, comprising

a clean water collection sump and pumps will also be required to manage surface runoff accumulating in between the clean water attenuation berm and PCD 1.

The scope of work for the construction of the clean water attenuation pond and sumps will include:

- Site clearance;
- Construction of clean water attenuation berm using material obtained from other necessary excavations (e.g. PCD 1 and canals);
- Excavation for sump structure;
- Construction of reinforced concrete sump; and
- Supply and installation of pumps and pipework.

4.1.2.5 North seepage collection trench

The construction will typically comprise of the following:

- Bush clearance;
- Topsoiling stripping and stockpiling;
- Box-cut excavation;
- Trench excavation;
- Construction of cut-off drain, including installation of geosynthetics, drainage pipe and filter material;
- Backfilling of box-cut;
- Topsoiling and re-establishment of vegetation;
- Reinstatement of service road, where disturbed by construction activities;
- Construction of manholes and seepage collection sump;
- Construction of soakaway structure for intercepting low flow surface runoff resulting from waste rock dump seepage water; and
- Electrical supply and installations, control and instrumentation, associated with the drainage pumps.

4.1.2.6 Electrical overhead lines

Where impacted by the proposed new storm water management infrastructure overhead lines will be dismantled and replaced with new lines in alternate positions. Some new overhead lines will also be erected to provide power supply to the new pump stations forming part of this project. New and relocated lines will be predominantly 22 kV overhead lines.

The scope of work for the removal of existing overhead lines will include the following:

- Dismantling of overhead cables, transformers and related items;
- Excavation and removal of wooden poles; and
- All items to be placed at the mine's salvage yard for future re-use / recycling.

The scope of work for the erection of new overhead lines will include the following:

- Bush clearance;
- Erection of new poles (concrete / wooden, depending on size and location);
- Supply and installation of new overhead lines and related equipment; and

- Supply and installation of new transformers / mini-substations.

4.1.2.7 Fencing

Where impacted by the proposed new storm water management infrastructure existing fences will be dismantled and replaced with new fences in alternate positions. New fences will also be erected around all PCDs to ensure safety to humans and animals. Fences around dams will typically comprise 1.8 m high mesh fencing, whilst permitter fencing (where impacted by this project) will comply with mine standards for blue area security fencing.

The scope of work for the removal of existing fences will include the following:

- Dismantling of fences; and
- All items to be placed at the mine's salvage yard for future re-use / recycling.

The scope of work for the erection of fences will include the following:

- Bush clearance; and
- Supply and installation of new fences.

4.1.3 Storm water management

The following information was extracted from the report *De Beers Consolidated Mine (Pty) Ltd: Venetia Mine Surface Water Assessment in support of the proposed Storm Water Management Project*, dated June 2021 and prepared by Shangoni Management Services. Refer to Annexure E1 for the specialist report. The information below includes information on the current storm water management measures associated with the facilities included as part of the SWMP. Table 4 below includes a detailed description of the storm water environment using the SWMP map (Figure 3) as a reference.

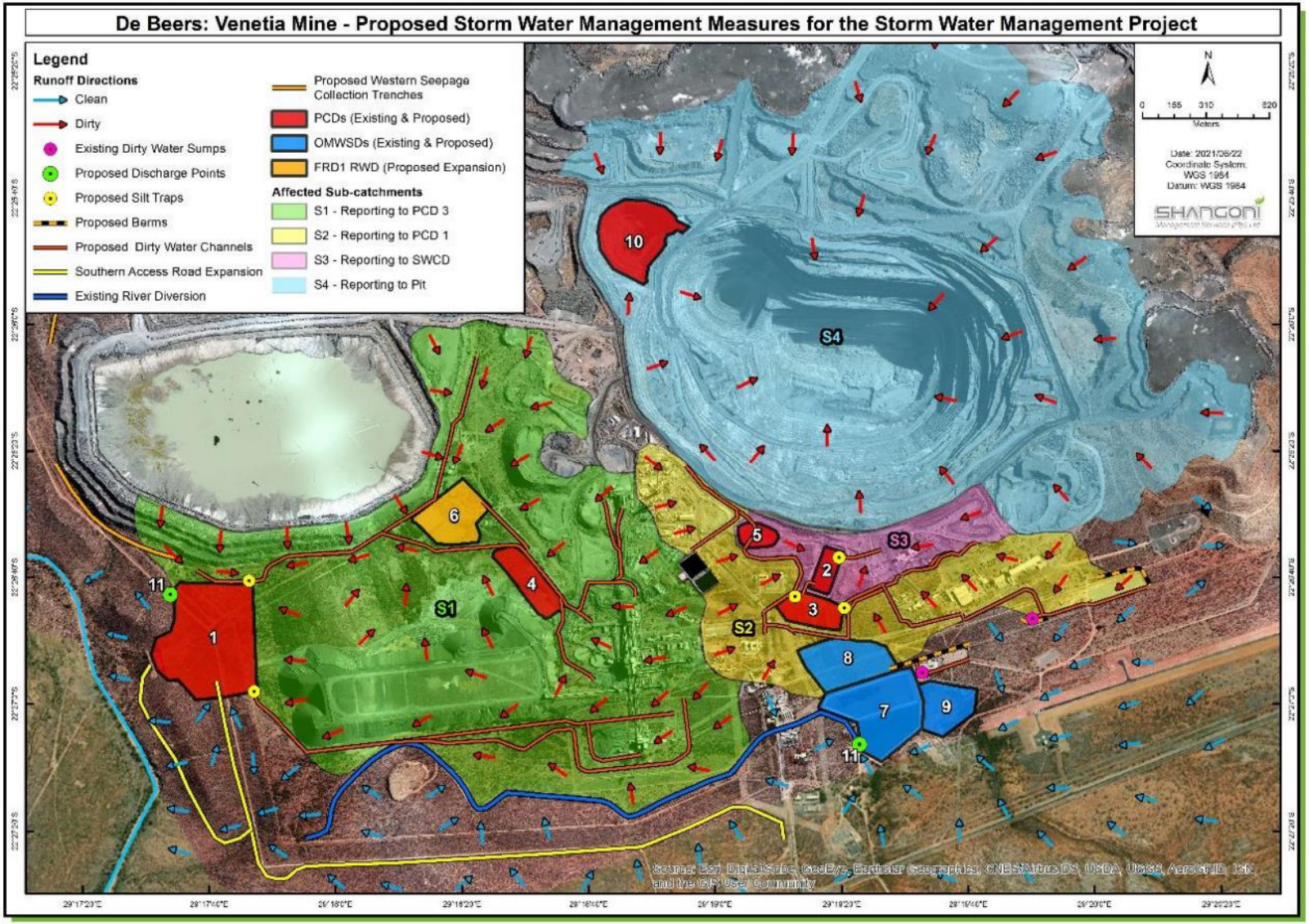
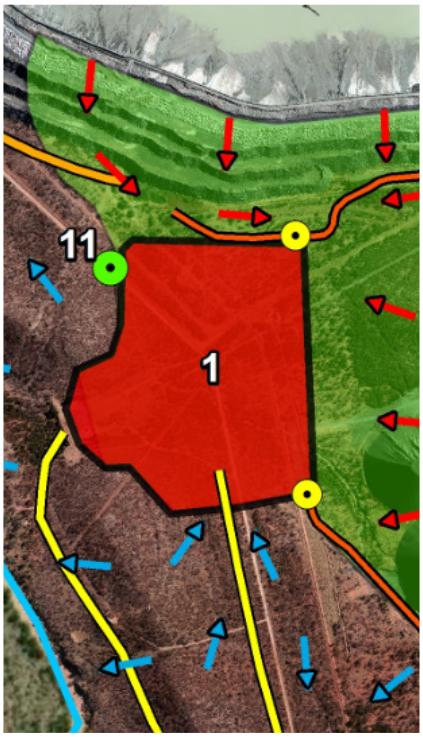


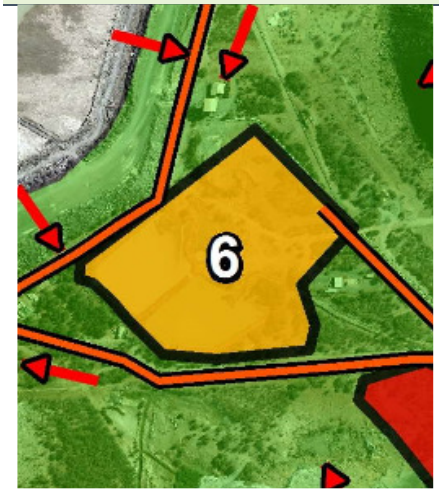
Figure 3: Existing and proposed storm water management measures for the SWMP.

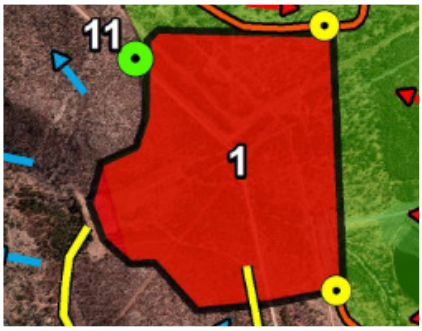
Table 4: Current storm water management.

Reference number corresponding to Figure 3	Current storm water management measures
	**PCD 3 (1)** A large sub-catchment (S1) was identified where affected water is generated during rainfall events from the main plant area, the recovery plant area, the CRD, the southern and eastern slopes of FRD 1, the valley between the CRD and FRD 1, a portion of the ore stockpiles and the crusher area. S1 was delineated based on the geographic location of existing and proposed infrastructure and the on-site topography. PCD 3 is the main containment facility for the Project and will be the first facility to be constructed to de-risk the VUP and to ensure compliance with the requirements of Regulation GN 704. It will be constructed directly west of the CRD and will contain all runoff reporting to S1. Currently, the majority of affected runoff reporting to S1 drains into the Van Zylsrust Dam or into the Kolope River, except for a small portion north in S1 where runoff drains into FRD 1 RWD via an unlined earth canal. However, during heavy rainfall events, affected water spills from FRD 1 RWD into the Van Zylsrust drainage line via the SSD and then enters the Van Zylsrust Dam. In addition, seepage from the western boundary of FRD 1 and FRD 2 also currently drains into the receiving environment (except for seepage collected in the SSD). In order to comply with Regulation GN 704, all affected runoff reporting to S1 and seepage from the FRDs should be collected and contained in a facility capable of handling the volume of water associated with a 1:50-year flood event.
	**SWCD (2)** The SWCD is an existing PCD located directly south of the open pit. Currently all affected runoff reporting both to S2 and S3 is contained in the SWCD in addition to dewatering from the pit. This facility has a storage capacity of 27 500 m^3 and covers an area of approximately 1.6 ha. Currently, the SWCD has insufficient capacity to contain the volume of runoff reporting to both S2 and S3 during a 1:50-year flood event (Jones & Wagner, 2020). Due to the need for the SWCD to contain runoff from both S2 and S3, and water from the pit, it is mostly operated at or near full capacity. During heavy rainfall events water overflows, resulting in ponding of affected water in the surrounding area or affected water draining into the downstream environment. Currently this facility is not fully compliant with the requirements of Regulation GN 704 in terms of its capacity to contain affected runoff.

Reference number corresponding to Figure 3	Current storm water management measures
	
	**PCD 1 (3)** PCD 1 is a proposed facility that will be constructed directly south of the SWCD at a slightly higher elevation. A sub-catchment (S2) was delineated based on the proposed location of PCD 1, its associated affected water channels and the on-site topography, that will collect and convey affected runoff from the VUP surface area, crusher area, main offices and workshops towards PCD 1. As mentioned above, the existing SWCD has insufficient capacity to contain the volume of runoff reporting to both S2 and S3 during a 1:50-year flood event. In order to meet the requirements of Regulation GN 704, an additional PCD is required to contain a portion of the affected runoff that currently reports to the SWCD.

Reference number corresponding to Figure 3	Current storm water management measures
 	**<u>Proposed additions and expansions to dirty water containment facilities</u>** As mentioned previously, Venetia Mine, as part of the Jones and Wagener Water Balance, has identified the need to construct additional storm water management infrastructure and containment facilities and to increase the storage capacity of existing facilities. Additional storage capacity will be essential to de-risk the VUP and to enable Venetia Mine to increase the re-use and recycling of water on mine, to reduce the freshwater intake from the wellfields and to contain affected runoff generated on-site.

Reference number corresponding to Figure 3	Current storm water management measures
 	
	**<u>Temporary storage of affected water in K03 Pit (10)</u>** The K03 Pit is located to the east of FRD 2 on the north-western perimeter of the open pit with a total in-pit storage capacity of 3.5 Mm^3. There is a safety berm surrounding the pit perimeter that restricts surface runoff from entering the pit in an uncontrolled manner. The pits do, however, receive direct rainfall as well as runoff from a portion of the WRDs (S4). This volume of water, together with any seepage water flowing to the K02 and K01 Pits, pose a risk to the safety of workers in the VUP. In order to de-risk the VUP, all water reporting to the underground mine will have to be contained.

Reference number corresponding to Figure 3	Current storm water management measures
 	**Mine Water discharge (11)** Water will accumulate in the open pits and the unground workings of the VUP from surface runoff, direct rainfall and underground seepage. If there is not sufficient capacity available to contain this water, it may pose a risk to the safety of workers in the VUP.

4.2 Listed and specified activities applied for

The SWMP will trigger the following authorisations:

- An Environmental Authorisation ("EA") for listed activities contained in the Environmental Impact Assessment Regulations Listing Notices of 2014, as amended and published in terms of sections 24(2), 24 (5), 24D, 44 and 47(A) (1) (b) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA").
- A Water Use Licence ("WUL") for water use activities listed in terms of section 21 (c), (i), (f) and (g) of the National Water Act (Act 36 of 1998) ("NWA").

For the EA application, a Scoping and Environmental Impact Assessment ("S&EIR") will be conducted in accordance with the NEMA and the Environmental Impact Assessment Regulations, 2014 (GN.R 982 of 4 December 2014) ("GN.R 982"), as amended. Listed activities have been identified and provided in

Table 5.

The WUL application will be submitted in accordance with the *Regulations regarding the procedural requirements for water use licence applications and appeals*, Government Notice 267 ("GN.R 267"), dated 24 March 2017. An exemption from the requirements of the regulations on use of water for mining and related activities aimed at the protection of water resources ("GN.R 704"), dated 1999 will also be submitted.

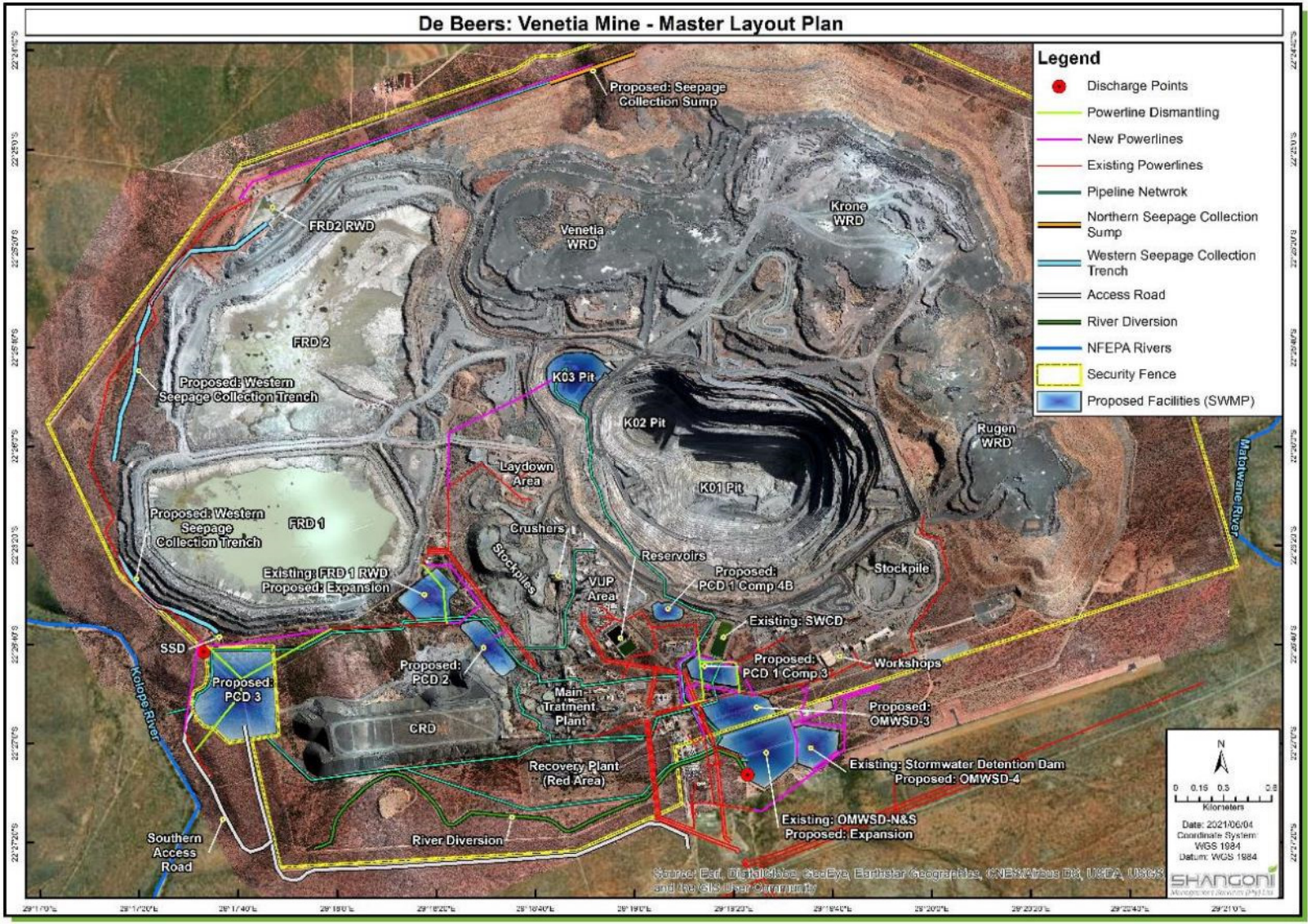


Figure 4: Layout map of the proposed activities associated with the SWMP. Refer also to Annexure A

Table 5: Activities and listed activities associated with the SWMP

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
Site clearing of the footprint areas of the facilities		
PCD 1	3.83 ha	None identified as within mine-disturbed footprint.
PCD 2	4.78 ha	
PCD 1 Comp. 4B	1.77 ha	
FRD 1 RWD expansion	6.73 ha	
OMWSD North and South compartment expansion	12.54 ha	
OMWSD Compartment 3	7.94 ha	
OMWSD Compartment 4	1.77 ha	
PCD 3	26.5 ha	Activity 15 Listing Notice 2: *The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan*
K 03 Pit	12.3 ha	None identified as within mine-disturbed footprint.
Mine water discharge	-	
Relocation of the mine boundary security fence (PCD 3 locality only)	Security fence = 0.73 ha Game fence = 0.35 ha	Activity 15 Listing Notice 2: *The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
Upgrading of southern access road to access the PCD 3 locality	4.96 ha	*(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan*
Re-routing 22 kV powerlines and sub-stations	Approximately 8 km 12 ha	
Construction of storm water management infrastructure including channels and trenches	14.1 km	
Provision of pipelines and pumping systems	25.9 km	
Construction and utilisation of the facilities		
PCD 1	3.83 ha	Activity 13, Listing Notice 1 *The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.* Activity 6, Listing Notice 2 *The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding—* *(i) activities which are identified and included in Listing Notice 1 of 2014;* *(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;* *(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day. Activity 16, Listing Notice 2 *The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.*
PCD 2	4.78 ha	Activity 13, Listing Notice 1 *The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.* Activity 6, Listing Notice 2 *The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding—* *(i) activities which are identified and included in Listing Notice 1 of 2014;* *(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;* *(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or* *(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.* Activity 16, Listing Notice 2 *The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
PCD 1 Compartment 4B	1.77 ha	Activity 6, Listing Notice 2 *The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding—* *(i) activities which are identified and included in Listing Notice 1 of 2014;* *(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;* *(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or* *(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.*
FRD 1 RWD expansion	6.73 ha	Activity 34, Listing Notice 1 *The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, excluding—* *(i) where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;* *(ii) the expansion of existing facilities or infrastructure for the treatment of effluent, wastewater, polluted water or sewage where the capacity will be increased by less than 15 000 cubic metres per day; or* *(iii) the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic meters or less per day.* Activity 50, Listing Notice 1 *The expansion of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, where the combined capacity will be increased by 50 000 cubic metres or more.* Activity 66, Listing Notice 1 *The expansion of a dam where—*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		(i) the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, was originally 5 metres or higher and where the height of the wall is increased by 2,5 metres or more; or *(ii) where the high-water mark of the dam will be increased with 10 hectares or more.*
OMWSD North and South compartment expansion	12.54 ha	Activity 34, Listing Notice 1 *The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, excluding—* *(i) where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;* *(ii) the expansion of existing facilities or infrastructure for the treatment of effluent, wastewater, polluted water or sewage where the capacity will be increased by less than 15 000 cubic metres per day; or* *(iii) the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic meters or less per day.* Activity 50, Listing Notice 1 *The expansion of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, where the combined capacity will be increased by 50 000 cubic metres or more.* Activity 66, Listing Notice 1 *The expansion of a dam where—* *(i) the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, was originally 5 metres or higher and where the height of the wall is increased by 2,5 metres or more; or* *(ii) where the high-water mark of the dam will be increased with 10 hectares or more.* Activity 23, Listing Notice 3 *The expansion of—* *(i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or* *(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more;* *where such expansion occurs—*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		(a) within a watercourse; *(b) in front of a development setback adopted in the prescribed manner; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.* *e. Limpopo* *i. Outside urban areas:* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5* *kilometres from any other protected area identified in terms of NEMPAA or* *from the core area of a biosphere reserve;*
OMWSD Compartment 3	7.94 ha	Activity 13, Listing Notice 1 *The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.* Activity 6, Listing Notice 2 *The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding—* *(i) activities which are identified and included in Listing Notice 1 of 2014;* *(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;* *(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or* *(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		Activity 16, Listing Notice 2 *The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.*
OMWSD Compartment 4	5.12 ha	Activity 12, Listing Notice 1 *The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —* *excluding—* *(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;* *(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;* *(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;* *(dd) where such development occurs within an urban area;* *(ee) where such development occurs within existing roads, road reserves or railway line reserves; or* *(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.* Activity 13, Listing Notice 1 *The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		Activity 19, Listing Notice 1 *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* *but excluding where such infilling, depositing, dredging, excavation, removal or moving—* *(a) will occur behind a development setback;* *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;* *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;* *(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or* *(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.* Activity 6, Listing Notice 2 *The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding—* *(i) activities which are identified and included in Listing Notice 1 of 2014;* *(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;* *(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or* *(iii) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.* Activity 16, Listing Notice 2 *The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		Activity 14, Listing Notice 3 *The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.* *e. Limpopo* *i. Outside urban areas:* *hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.*
PCD 3	26.5 ha	Activity 12, Listing Notice 1 *The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *I if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —* *excluding—*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; *(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;* *(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;* *(dd) where such development occurs within an urban area;* *(ee) where such development occurs within existing roads, road reserves or railway line reserves; or* *(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.* Activity 19, Listing Notice 1 *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* *but excluding where such infilling, depositing, dredging, excavation, removal or moving—* *(a) will occur behind a development setback;* *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;* *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;* *(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or* *(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.* Activity 6, Listing Notice 2 *The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding—* *(i) activities which are identified and included in Listing Notice 1 of 2014;*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; *(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or* *(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.* Activity 16, Listing Notice 2 *The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.* Activity 14 Listing Notice 3: *The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.* *e. Limpopo:* *i. Outside urban areas;* *ff. Critical biodiversity areas or ecosystem services areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.
K03 Pit	12.3 ha	Activity 6, Listing Notice 2 *The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding—* *(i) activities which are identified and included in Listing Notice 1 of 2014;* *(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;* *(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or* *(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.*
Mine water discharge	-	Activity 6, Listing Notice 2 *The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding—* *(i) activities which are identified and included in Listing Notice 1 of 2014;* *(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;* *(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or* *(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.*
Relocation of the mine boundary security fence (PCD 3 locality only)	Security fence = 0.73 ha	None identified.

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
	Game fence = 0.35 ha	
Upgrading of southern access road to access the PCD 3 locality	4.96 ha	Activity 19, Listing Notice 1 *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* *but excluding where such infilling, depositing, dredging, excavation, removal or moving—* *(a) will occur behind a development setback;* *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;* *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;* *(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or* *(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.* Activity 24, Listing Notice 1 *The development of a road—* *(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or* *(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;* *but excluding a road—* *(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;* *(b) where the entire road falls within an urban area; or* *(c) which is 1 kilometre or shorter.* Activity 4, Listing Notice 3 *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* *e. Limpopo* *i. Outside urban areas:*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas. Activity 18, Listing Notice 3 *The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* *e. Limpopo* *i. Outside urban areas:* *gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.*
Re-routing of 22 kV powerlines and sub-station	Approximately 8 km 12 ha	None identified.
Construction of storm water management infrastructure including channels and trenches	14.1 km	Activity 19, Listing Notice 1 *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* *but excluding where such infilling, depositing, dredging, excavation, removal or moving—* *(a) will occur behind a development setback;* *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;* *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;* *(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or* *(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.* Activity 14, Listing Notice 3 *The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		where such development occurs— *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.* *e. Limpopo* *i. Outside urban areas:* hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.
Provision of pipelines and pumping systems	25.9 km	Activity 9, Listing Notice 1 *The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—* *(i) with an internal diameter of 0,36 metres or more; or* *(ii) with a peak throughput of 120 litres per second or more;* *excluding where—* *(a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or* *(b) where such development will occur within an urban area.* Activity 10, Listing Notice 1 *The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes –* *(i) with an internal diameter of 0,36 metres or more; or* *(ii) with a peak throughput of 120 litres per second or more;* *excluding where—*

Name of activity	Arial extent of activity ha or m²	Applicable Listing Notice (GN.R 983, GN.R 984, GN.R 985) and applicable Waste Management Activity (GN.R 921)
		(a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or *(b) where such development will occur within an urban area.*

*NOTE: Venetia Mine is situated approximately 20 km south of the Mapungubwe National Park, which represents the nearest declared conservation area. In Government Notice No. 71 Government Gazette 31832 of 30 January 2009 the then Minister of Environmental Affairs and Tourism, announced the Mapungubwe Cultural Landscape as a world heritage site in terms of the World Heritage Convention Act, 1999 (Act No. 49 of 1999). The Mapungubwe National Park also included a buffer zone that encompassed the already existing and operational Venetia Mine. In 2014, a new proposed buffer was assessed and approved by UNESCO at the 38th session of the World Heritage Committee (Doha, Qatar 2014) with such also accepted and welcomed in the Statement on the Cabinet Meeting of 25 June 2014 (dated 26 June 2014): "*2.3. Cabinet welcomes the approval of a new buffer zone for the Mapungubwe World Heritage Site by the World Heritage Committee of UNESCO which held its 38th Session in Doha, Qatar, from 15 to 25 June 2014. The new buffer zone is the result of a long consultation process involving landowners, community representatives, non-governmental organisations, mining companies and various government stakeholders. The approval of this new buffer zone is a welcome development for South Africa's efforts to improve the management and protection of its world heritage sites while allowing for responsible and sustainable development.*" This new buffer excludes Venetia Mine. The listed activities as applied for above under Listing Notice 3 may, therefore, no longer be applicable to the proposed project due to the new buffer being accepted by UNESCO. These listed activities have been included for completeness and consideration for exclusion/inclusion by the DMRE.

4.3 Description of the existing activities at Venetia Mine

The information below provides a brief summary of the existing operations of Venetia Mine, to place into context the proposed SWMP. The information provided below was extracted from the approved EMPr, *Environmental Management Programme for Proposed Underground Operations and EMP Consolidation for Existing Operations at De Beers Consolidated Mines, Venetia Mine, Limpopo Province*, dated 2012 and prepared by Environmental Resources Management, DMRE reference number: LP30/5/1/2/3/2/1/58/EM.

4.3.1.1 Mineral mined

The mineral mined at Venetia Mine is diamond bearing kimberlite ore from three kimberlite ore bodies namely K1, K2 and K3 and various satellite ore bodies. At the time of finalisation of this EIAR / EMPr, Venetia Mine is mining the above-mentioned resources via open pit mining, Venetia Open pit Project ("VOP"). However, future mining of the resources will be conducted utilising underground mining methods as part of the newly developed Venetia Underground Project ("VUP")

4.3.1 Venetia Open pit Project ("VOP")

4.3.1.1 Mining method

The open pit mining method involves the development of the pit in a series of subsequent cuts. Each cut includes waste rock stripping and the mining of kimberlite ore. In order to fragment the waste rock and ore, holes are drilled into the ground and loaded with explosives. The explosives are detonated to blast the country rock into fragments suitable for loading and hauling. Shovels load the waste rock or ore onto haul trucks which haul the material to the waste rock deposits or primary crusher and/or stockpiles, respectively. The current pit dimensions are approximately 1.4 km (north to south) and 2 km (east to west). The total mineable reserves for the open pit operation extend to approximately 450 m below surface. The pit is designed with slope angles of approximately 58 degrees in the north and approximately 40 degrees in the south, with bench heights varying from 10 to 15m. The vertical advancement of the pit is approximately 5 benches per annum.

4.3.1.2 Infrastructure

Haul roads

Haul roads are strategically designed and developed within the mining area, taking cognisance of the potential environmental impacts as well as the safe optimal hauling of:

- Ore from the pit to the primary crusher;
- Ore to stockpiles;
- Waste rock from the pit to the waste rock dump; and
- Coarse tailings from the CRD back to the open pit for road maintenance.

In addition to the above, haul roads may be required in future with the intention of hauling:

- Waste rock to the FRDs for the construction of the impoundment walls and for rehabilitation and closure requirements;
- Waste rock to the CRDs for rehabilitation and closure requirements; and
- Topsoil to the various topsoil stockpiles and to rehabilitation areas (as required).

Current Ad Hoc Activities

Due to the dynamic nature of the mining operation, certain ad hoc activities have taken place within the ore extraction and supporting infrastructure areas. The occurrence of these activities is likely to increase, during the life of mine, due to temporary access requirements, ore treatment challenges and concurrent rehabilitation requirements. These activities may include the following:

The development of temporary ore, waste rock and topsoil stockpiles:

- Waste rock stockpiles are likely to be hauled to various rehabilitation areas;
- Ore stockpiles are created to defer the treatment of low-grade ore as and when required according to the mine strategic business plan;
- If applicable, stockpiles that cannot be treated or used for rehabilitation as discussed above will be rehabilitated post life of mine in accordance with the rehabilitation and closure plan.

The creation of temporary access roads and haul roads used to access extensions to the open pit or supporting infrastructure, where appropriate, as per the mine plan and to provide access to topsoil and rehabilitation areas. Roads of this nature will be subject to rehabilitation in accordance with the rehabilitation and closure plan.

The creation or alteration of permanent and temporary infrastructure associated with mining activities in order to optimise production process flows and efficiencies. These include EMV parking bays, rest areas, locker rooms and the relocation of infrastructure to accommodate mining activities. These changes will be dealt with via the mine's change management process which is implemented via the Environmental Management System ("EMS").

Topsoil is proactively stripped to prevent sterilisation by the advancing waste rock deposits. Currently a number of stockpiles exist, which are likely to either increase or decrease, subject to its suitability as a growth medium when implementing concurrent rehabilitation activities.

Earthmoving machinery ("EMV") and engineering workshops (Including lay-down areas)

EMV and engineering workshops are located approximately south-east of the open pit. The key activities taking place within this area include the servicing, maintenance and refurbishment of earthmoving machinery, shovels and supporting earthmoving equipment (e.g. bulldozers and graders). The facility includes a boiler making workshop and laydown areas. Activities taking place in this area result in the utilisation of water and electricity and the generation of hazardous, particularly hydrocarbon waste.

Mining office block and control room

The mining office block is located south of the open pit. The control room for the open pit mining operation is situated inside the mining office block.

Pit services workshops and office block

The pit services workshops and office block are situated south- south-east of the open pit. The workshops within this facility are used to maintain and service the drilling machinery and other pit services related equipment (e.g. dewatering equipment). The facility also includes offices.

Explosive Magazine

The explosives magazine is situated south-east of the open pit and is used to store explosives and ammonia prill.

Wash Bays

The wash bay for the earthmoving fleet is located in the vicinity of the pit services workshops and is used to wash the EMV fleet vehicles. The Light Delivery Vehicle ("LDV") wash bay is situated at the vehicle and transport (V&T) workshops and is used to wash the smaller plant and LDV's.

Office building and Laboratory

The office building is situated south-west of the sub-9 raw water reservoirs and east of the engineering workshops. The offices are mainly occupied by the plant management, C&I systems, engineers in training, and training officers. The plant laboratory, connected to the office block, is used for processing the samples taken from the plant.

Engineering workshops and laydown areas

The central engineering workshops are located in the area west of the office building and east of the main treatment plant. The central engineering workshops include the electrical, C&I, fabrication, and fitting and machining workshops. The sectional engineering workshops are located close to the sections they are servicing. These include the crushing and screening section workshop, the scrubbing and screening section workshop, the Dense Media Separation ("DMS") workshop, the water recovery section workshop and the red area workshop.

Belt Shop

The Belt shop is located in the area east of the Coarse DMS stockpile. This shop is responsible for replacing worn out conveyor belts and idlers, the maintenance of the conveyor belt scrappers, and the splicing of conveyors.

Central Control Room ("CCR")

The CCR is located between the fines DMS feed stockpile and the Re-crush stockpile. The process plant operator monitors and controls the treatment process from this building, using the SCADA and AMPLA software. The operators use the SCADA to start and stop the plant equipment/drives. The DMS foreman's office is also in the same building with the CCR.

4.3.2 Venetia Underground Project ("VUP")

4.3.2.1 Mining method

From a depth of below 450 m, open pit mining becomes uneconomical due to the amount of waste rock to be removed. As part of Venetia Mines long term strategy, the mine intends to exploit resources

deeper than the current open pit horizons by changing the current mining method from an open pit mining process to an underground mining process, utilising sublevel caving, open benching and incline caving mining methodologies. This transition will require significant alterations to the existing surface infrastructure. In order to develop the VUP, infrastructure will be constructed within an identified terraced area and within the existing mine site as detailed below. Where relevant, existing infrastructure, with necessary alterations, will be utilised in support of the underground operations.

For the VUP, three mining methods are being considered and current designs indicate that all three methods (described below in more detail) will be utilised to mine the K1 and K2 ore bodies. The intention is that the K1 ore body will be mined using sublevel caving ("SLC") whereas K2 will be mined using sublevel caving with an overdraw strategy. This method is identical to the sublevel caving and differs only in terms of draw control in which more tonnes are drawn per ring blasted on lower levels and the rings are retreated against the contact. The abovementioned mining methods present the lowest technical risks for the respective ore bodies and the highest production rate.

The current design allows for three access levels (stations) at 550, 725 and 900 metre below ground level and an estimated 40 tunnels per level in K1.

- Ore is accessed through multiple levels spaced at regular intervals throughout the ore body;
- Holes are drilled vertically upwards and then blasted;
- Ore is transported as follows:
    - From the drawpoint, using a load-haul-dumper ("LHD") vehicle, to the ore pass;
    - From the ore pass, using an LHD, to the crusher where it is crushed to 300 mm; and
    - The crushed ore is conveyed to the shaft loading level for hoisting to surface.
- Advantages of this mining method are that it is a safer and highly mechanised option; and
- Disadvantages of this mining method are that it is costly and dilution control is difficult.

4.3.2.2 Infrastructure

Main Shaft, shaft loading system and bratticed ventilation shaft

- The main shaft complex will comprise a headgear, winder houses (housing rock, men and materials service and emergency winders) and a permanent concrete batching plant;
- Access to the underground workings will be achieved via a 10 m finished diameter circular shaft with a shaft depth of 1 100 m;
- The main shaft will also serve as a down-cast ventilation shaft to supply fresh air to the underground sections;
- The shaft complex has been situated in close proximity to the main primary crusher;
- The planned shaft hoisting capability is 4 Mtpa for a conventional shift arrangement or 5.9 — 6.5 Mtpa for a continuous operation shift arrangement;
- An 8.0 m diameter bratticed ventilation shaft is proposed that will act as an up-cast ventilation shaft exhausting diluted air to the atmosphere. Underground air will be extracted by main ventilation fans which are situated on surface. This shaft will also serve as the second outlet from underground

when the main shaft has been shut down for an emergency or during an extended period of maintenance;

- The prevailing wind direction at Venetia Mine is westerly; therefore, the ventilation shaft has been positioned downwind of the main shaft and supporting surface infrastructure, in a due westerly orientation; and
- Main underground lateral access tunnels will be developed on 550 m, 725 m and 900 m levels and a shaft loading station on the 950 m level (ore is drawn from the bottom discharge of the ore silos and conveyed to a skip flask, loaded into a skip and hoisted to surface).

Ore silos, overland conveyor system and stockpile

- Underground ore storage will comprise of ore passes and ore silos;
- A 4 m diameter waste pass is available and is designed to handle waste rock from 550 m, 725 m and 900 m levels. The waste pass will discharge into an 8.0 m ore silo on 900 m level (as mentioned above);
- From the discharge of the ore silos, ore is conveyed to a skip flask and loaded into skips and hoisted to the surface;
- Kimberlite or waste will be hoisted to surface and the ore will be diverted to either the waste or the kimberlite stream. The kimberlite stream will consist of short overland conveyors to and from a stockpile; and
- Alternative uses for the waste rock are being investigated (e.g. concrete) and excess waste rock will be transported to the waste rock deposit.

Winders, winder house and headgears

The headgear will consist of various floors, each with an overhead crane level and maintenance platform at the top of the headgear. They will be structural steel buildings with a centre tower supporting the various floor levels. The towers will be propped by means of structural steel raking legs. The raking leg supports will be located on the winder house side of the headgear in order to resist the rope loads induced by the winder. It is envisaged that the raking legs will be used on the opposite side of the headgear during the sinking phase of the project and relocated to the permanent position when the permanent winders come into operation.

Underground main workshops

There will be two underground workshops, one on 725 level that will serve as a maintenance and repair facility for the management, production and material handling fleet, and one on 925 level that will serve as a maintenance and repair facility for the trucks and associated support vehicles for the K01 and K02 truck loops.

Underground bulk fuel and lubricant storage

- The underground bulk fuel storage facility will be linked to the current surface bulk fuel network and storage system; and
- Diesel will be piped down the shaft to the underground workshops. All bulk materials (lubricants, diesel and fuel) will be stored in bunded areas with an impermeable floor.

Underground explosive storage

- The bulk of the explosives will be stored on surface using the existing infrastructure, namely the explosives magazine; and
- Permissible amounts, in accordance with the regulations, will be stored underground in a mobile facility.

Underground explosives storage will comprise of the following:

- Emulsion, cartridges and Anfex; and
- Accessories e.g. fuses and detonators.

Change house and Lamp room

- A new change house facility will be required and will be located near the shaft complex; and
- A lamp room will be located on the shaft bank.

Storage and laydown areas

- Storage and laydown areas will be provided on the terrace. The purpose is to provide temporary storage for items destined to be transported underground.

Compressed air facility

- A compressor will be located on the terrace and used to transfer compressed air, by means of a pipeline system, throughout the underground workings; and
- The air will be used to supply the refuge bays as well as provide pneumatic power, where required.

Refrigeration plant and bulk air coolers

The design of the operations would be suited to the latter provision of a dedicated downcast raise-bore shaft equipped with a refrigeration plant and surface bulk air cooler to provide cooled air directly to the mining areas experiencing temperatures in excess of the reject temperature.

Primary crusher

Existing primary crusher will be utilised for the underground mining operation

4.3.3 Ore processing

Ore stockpiles

Ore is stockpiled for one or a combination of the following reasons:

- Low grade ore (either due to low in-situ grades or waste dilution) may be stockpiled to defer its treatment, as and when required according to the mine strategic business plan and economic factors;
- Ore may be stockpiled due to complexities associated with its treatment related to the chemical and/or physical characteristics of the ore, which may require plant modifications;
- Ore may be stockpiled as part of the internal treatment process to create buffer stockpiles that facilitate a constant feed rate throughout the plant and allow for plant interruptions; and
- Ore may be stockpiled should the ore extraction rate exceed the ore treatment rate, and to allow for crushing or plant interruptions.

Various ore stockpiles currently exist on the mine, and further stockpiles may be created for the reasons above.

The treatment of ore stockpiles

As determined by economic conditions and the mine strategic business plan, low grade ore stockpiles may be treated at various stages during the life of mine. These stockpiles will be loaded and hauled to the primary crusher for treatment. In addition to various low grade stockpiles to be treated, the treatment of the Mix03 stockpile is envisaged.

Mix03 stockpile treatment and reworking facility

Stockpile Mix03 (SPMIX03) is used for the relocation of highly diluted material from the K01 pit. The diluted material is primarily sourced from the K01 pipe and the surrounding satellite kimberlites intersected by the mining shell. The standard practice is to relocate kimberlitic material containing more that 70% external waste (contact material and overspill) and inherently diluted kimberlite and country rock breccias containing more than 70% internal dilution to SPMIX03. The most dominant kimberlite on SPMIX03 is from K01, followed by K02, K04 and the rest of the satellite kimberlites. SPMIX03 material will be loaded and hauled to the primary crusher, where it will be batched during periods when the main treatment plant is shutdown. Material will be diverted from the conveyor to the SPMIX03 reworking facility. The re-working facility will be employed to upgrade the SPMIX03 material by discriminating between ore and waste rock. This facility will use similar processes to those used in the main treatment plant and consists of:

- a scrubbing section where crushed SPMix03 material will be washed;
- a screening sections where the material will be sized; and
- a sorting section where optical sorting technology and/or X-ray fluorescence radiometric technology will be utilized to sort ore from waste rock.

The ore will be discharged onto the conveyor from the primary crusher feeding the main stockpile. The waste rock will be discarded on the WRD and/or crushed into aggregate for construction activities. The aggregate will be stockpiled until required for construction.

Primary crusher

Primary crushing is the first step in the diamond liberation process. The primary crusher is situated southwest of the open pit. Run of Mine (“RoM”) material (i.e. kimberlite ore) or stockpile material is fed into the primary crusher where it is crushed to minus (-) 150mm using a gyratory crusher. The crushed material from the primary crusher is conveyed and discharged onto a 10,000 tonne stockpile, referred to as the main stockpile. Material is drawn from the stockpile and conveyed to the ore processing plant for treatment. The purpose of the stockpile is to provide a constant feed and a buffer between the primary crusher and the ore processing plant.

Gyratory crushers

As mining progresses to the VUP, the Primary Crusher (described above) will be replaced with two new gyratory crushers. Therefore, all ore transported to the surface will be fed onto overland conveyors to transport the ore to the two proposed smaller secondary gyratory crushers with any waste material

(waste rock) taken to the Waste Loadout Facility. The waste material will then be loaded and transported via haulage truck to the designated Waste Rock Dump ("WRD") (approved within the approved EMPr, approved October 2012).

From the two new crushers, the ore will then be fed to a Stacker Reclaimer Stockpile (capacity of 100 kt) via a ground mounted stacker. The ore will then be reclaimed either via a Bridge Scraper Reclaimer or a Bridge Wheel Reclaimer (to still be investigated) and fed to the existing Main Stockpile, which then feeds the MTP.

Ore processing plant

The ore processing plant is situated southwest of the open pit. Material is drawn from the main stockpile and conveyed to the two primary scrubbers for washing. Water is added to each primary scrubber to wash the ore. The material from each scrubber is discharged onto a double deck screen that produces three size fractions: +25 mm size material, -25+8 mm size material and -8 mm size material. The -8 mm size fraction gravitates to the banana screen for dewatering and the separation of the fine residue fraction (-1 mm material). The fine residue fraction is collected in the banana screen launder pan and pumped to the thickener feed launders.

DMS concentrate treatment (Red Area Recovery)

The concentrate from both the fines and the coarse concentrate storage bins is conveyed to the red area section for diamond recovery using x-ray and grease belt machine. The -3+1 mm red area tailings fraction is conveyed to the red area coarse residue deposit ("CRD"). The +3 mm red area tailings fraction is re-circulated to the re-crush stockpile and is combined with the coarse DMS floats. The x-ray machine and grease belt concentrate reports to the glove boxes for hand sorting. The -1 mm material is pumped from the red area to the water recovery section (i.e. thickeners) and then pumped to the FRDs.

Re-crush stockpile treatment

Material is drawn from the re-crush stockpile and conveyed to the two feed bins of the high pressure roll crushers ("HPRC"). Material is drawn from the two feed bins and discharged into the HPRC for further crushing to produce a -8 mm particle size material. The HPRC material is combined with the secondary crusher material that is conveyed to the secondary scrubbing and screening stage of the process.

Red Area Tailings Treatment ("RATT")

The Red Area Tailings Dump at Venetia Mine consists of recovery tailings. Material has been deposited on the dump since the mine began with operations. The dump has been sampled to determine the grade over the length and depth of the dump. The plant consists of a separate feeding system and five containers. Material is fed via a vibrating grizzly to a conveyor feeding into a scrubber. The primary X-ray concentrate will be upgraded in a re concentration X-ray machine to increase the diamond by weight. The tailings are re-circulated back into the existing system. All fines effluent is treated via a de-grit cyclone in order to recover water and separate grits. The X-ray tailings with the grits will be stockpiled in the Red Area.

The main components of the Red Area Tailings Treatment process are:

- Tipping bin and Vibrating grizzly;
- Feed conveyor;
- Scrubber with trommel screen;
- Jet pump system;
- Sizing screen;
- Primary and secondary magnetic separators;
- Primary X-ray machines;
- Infrared drier;
- Re-concentration X-Ray machines;
- Degrit cyclone and dewatering screen;
- Glove box; and
- Tailings conveyor and spreader.

4.3.4 Mineral waste

4.3.4.1 Fines residue deposits (FRD 1 and FRD 2), supporting infrastructure and conveyance systems

There are currently two FRDs on site, namely FRD 1 and FRD 2. FRD 1 is situated west of the open pit and north-northwest of the CRD. FRD 2 is situated north of FRD 1. The fine residue fraction (-1 mm fraction) from the ore treatment process is pumped to the FRDs via an overland pipeline network. The current FRD 1 footprint area is approximately 160 ha and FRD 2 is approximately 215 ha and includes the associated infrastructure (residue conveyance systems and return water systems). The extension of the FRDs to provide the required capacity for the open pit has been investigated in conjunction with the capacity requirements for the proposed underground mining operation. For the open pit and underground life of mine it is expected that approximately 38 Mt and 102 Mt (i.e. approximately 140 Mt in total) of residue needs to deposited and managed. The utilisation of waste rock to buttress (support) and to provide impoundment type walls around the current FRD 1 and FRD 2. The waste rock walls will provide the necessary stability that will enable the FRDs to be raised higher than the conventional FRD 1 and 2 facilities thereby eliminating the need for a new greenfields FRD facility. The intention is to raise the waste rock walls to approximately 720 metres above mean sea level (“mamsl”) and to deposit the fine tailings on the inside of the walls, to form the necessary basin profile, at a design rate of rise of 1.5 meters per year. The rehabilitation of the FRDs will be done concurrently and in accordance with the mine’s rehabilitation and closure plan to achieve the proposed end land use.

4.3.4.2 Coarse residue deposit including supporting infrastructure and conveyance system

The CRD is situated approximately west-southwest of the ore processing plant and south-southeast of the FRD. The fines Dense Media Separation (“DMS”) modules tailings/residue material (-8+1 mm) from the ore treatment process described above is transported to the CRD via a series of conveyor systems and transfer structures. Two spreaders (DT1 spreader 1 and DT2 spreader 1) and a stacker conveyer

system (known as the Racho) are used to advance (deposit) the coarse tailings deposit in a westerly direction at an approximate elevation of 720 mamsl. The current deposition strategy for the CRD briefly entails the advancement of DT1 spreader 1, the Racho and DT2 spreader 1 in a westerly direction at an approximate height of 720 mamsl. The conveyance and deposition systems will then be rotated to advance the CRD in a north-northwesterly direction with the intention of utilising the valley area to the north of the current CRD for future deposition requirements. Similar to the FRDs, the life of the CRD deposit has been planned with both the open pit and the proposed underground capacity requirements in mind thereby potentially minimising impacts and optimising possible synergies. The life of mine deposition strategies for the CRD considered the advancing of the facility in a westerly and northerly direction with no allowance for FRD volumes due to CRD capacity requirements. The rehabilitation of the CRD will be done concurrently and in accordance with the mine's rehabilitation and closure plan to achieve the proposed end land use.

4.3.5 Non-mineral waste management

4.3.5.1 Waste management facilities ("WMF")

Most general and hazardous waste streams (excluding those generated in the red area) are stored and sorted by a waste contractor at the waste management facility ("WMF") on the mine. Some hazardous waste streams are maintained and managed at the source where the waste is generated (e.g. hydrocarbon effluent from the EMV workshop areas). The mine maintains and updates a waste inventory for all waste generated on site. The waste management facility is currently located in an area north of the primary crusher and main treatment plant, to the west of the main haul road around the open pit. It is intended for the WMF to be relocated during the life of mine; the precise location subject to further specialist investigation and detailed design. All activities and processes associated with the generation, handling, transport and disposal of all waste streams are dealt with via a waste management procedure.

4.3.5.2 Industrial and hazardous waste disposal

Hazardous waste includes both solid and liquid streams including:

- Oil, grease, lubricant wastes (used oil is sold to a licensed operator);
- Other hydrocarbon and hydrocarbon contaminated wastes;
- Fluorescent lights, sodium lamps and mercury vapour lamps;
- Empty hazardous reagent containers;
- Non-recyclable electronic waste;
- Incinerator ash;
- Engine coolant;
- Paints, solvents, cleaning chemicals; and
- Batteries.

Hazardous waste is disposed of in a combination of wheelie bins and/or waste skips situated throughout the mine. Most hazardous waste streams are received, classified, segregated and handled in the waste

management facility, from where it is collected to be disposed. Some hazardous waste streams are stored and collected for disposal at the source of the waste generation (e.g. hydrocarbon contaminated sumps at the EMV workshops). Hazardous waste is collected by a licensed waste management contractor from the waste management facility or waste source area on the mine and transported to a licensed hazardous waste disposal facility.

4.3.5.3 General waste

General waste comprises domestic and industrial waste:

- Domestic waste includes - food waste, paper, glass, tins/cans, plastic, other waste derived from offices and kitchens, and garden refuse; and
- Industrial waste includes - empty containers, tyres, scrap steel, building rubble, electrical waste, rubber, wood, and cardboard.

General waste is disposed of in a combination of wheelie bins and/or waste skips situated throughout the mine. General waste is received, classified, segregated and handled in the waste management facility, from where it is collected to be recycled or disposed. A licensed waste contractor is responsible for sorting and baling of recyclable waste and/or the disposal of waste at a licensed facility. General waste within the recovery red area is incinerated using a licensed incinerator, known as the red area incinerator.

Sanitary waste found in the sewage plant waste stream is extracted and incinerated. The incinerator is located at the sewage treatment plant area.

Industrial waste is collected by a licensed waste contractor. Recyclable material is sold and non-recyclable material is disposed of at a licensed waste disposal facility.

4.3.5.4 Medical waste

Medical waste, including pathogenically contaminated wastes, sharps, and medicines that have expired are stored at the Wellness Centre and collected, transported and legally disposed of at a licensed facility by a licensed medical waste contractor.

4.3.5.5 Sewage management

The sewage generated at Venetia Mine is collected by a network of sewers and pipelines and reports to the sewage treatment plant. The sewage plant is situated at the southeast toe of FRD 1. The sewage treatment plant is a package plant consisting of rotating biodisks, a humus tank and a chlorine contact tank. The final effluent is discharged into the RWD of FRD 1 and is re-cycled as part of the return water stream for production.

4.3.6 Water balance

A water balance was developed for Venetia Mine and specifically for the SWMP. The water balance is included as Annexure F to this report.

4.3.7 Water management

4.3.7.1 Groundwater

The main water source required for processing activities at Venetia Mine is obtained from the Greefswald Wellfield and the Schroda Wellfield. The abstraction of water from the wellfields will continue; however, the implementation of the SWMP will reduce the water requirements from the wellfields.

Several existing sources of groundwater contamination at Venetia Mine were identified as part of the 2019 IWWMP update (Gudani Consulting Environmental & Social Scientists, December 2019). These facilities include waste rock dumps (Venetia, Krone and Rugen WRDs), coarse residue facility ("CRD"), fine residue facility ("FRD"), mining area (open pit and underground), process area, explosives magazine, ore stockpiles, containment dams, sewage treatment works, waste management facility (Salvage Yard), workshops and oil-water separators, above ground and underground fuel storage tanks and refuelling bays, general stores and transformers and the truck parking bay. Although some of these activities do not form part of the SWMP, these existing activities will remain a potential source of contamination. The risks and mitigation measures associated thereto are provided in Venetia Mine's approved EMPr (2012).

4.3.7.2 Process water

From review of the report *De Beers Consolidated Mines Venetia Mine Water Balance Life of Mine and Scenario Report*, dated August 2020 and prepared by Jones & Wagener (Annexure F), the following process water characterisation is provided:

- Based on historical data from March 2019, an average of 770 m^3/day of water is pumped from VUP to the Main Treatment Plant ("MTP").
- FRD 1 RWD and FRD 2 RWD are the first sourcing points for makeup water to the MTP.
- Water is sourced from Plant Reservoirs 1 and 2 after water has been sourced from the RWDs.
- 90% of the water sent to the Recovery Plant is recovered and returned to the MTP.
- 70% of the water sent to the Primary Crusher is recovered and returned to the MTP.
- All of the water used for fire water/plant cleaning is recovered and returned to the MTP.

The main process water losses at Venetia Mine are losses associated with the CRDs and the FRDs.

4.3.7.3 Storm water management

Refer to Section 4.1.2 above for a description of the storm water management at Venetia Mine.

4.3.8 Life of Mine ("LoM")

Venetia Mine has sufficient reserves to sustain a Life of Mine ("LoM") to the year 2046.

5 Policy and legislative context

The following table is a summary of the policy and legislative context applicable to the SWMP.

Table 6: Policy and legislative context

Applicable Legislation and Guidelines used to compile the Report	Compliance and response of the SWMP
The Constitution of the Republic of South Africa, 1996.	The Constitution of the Republic of South Africa was considered and applied to throughout the EIAR / EMPr as the Constitution states that everyone has the right: (a) To an environment that is not harmful to their health or well-being; and (b) To have the environment protected, for the benefit of present and future generations.
The Mineral and Petroleum Resources Development Act (Act No. 28 of 2002, as amended).	The EIAR / EMPr has been compiled to comply to the requirements of the Mineral and Petroleum Resources Development Regulations (GN.R 527 dated 2004).
The National Environmental Management Act (Act No. 107 of 1998 as amended).	The EIAR / EMPr has been compiled in terms of GN.R 982, as amended and promulgated in terms of sections 24(5), 24M and 44 of the National Environmental Management Act, Act No. 107 of 1998 ("NEMA").
The Environmental Impact Assessment Regulations (GN.R 982 dated 2014, as amended).	The EIAR / EMPr was compiled in terms of the requirements of Appendix 2 of the Environmental Impact Assessment ("EIA") Regulations (GN.R 982 dated 2014, as amended).
The Environmental Impact Assessment Regulation. Listing Notice 1. (GN.R 983 dated 2014, as amended).	Activity 9, 10, 12, 13, 19, 34, 50, 66 of Listing Notice 1 are applied for as part of the SWMP.
The Environmental Impact Assessment Regulation. Listing Notice 2. (GN.R 984 dated 2014, as amended).	Activity 6, 15, 16 of Listing Notice 2 are applied for as part of the SWMP.
The Environmental Impact Assessment Regulation. Listing Notice 3. (GN.R 985 dated 2014, as amended).	Activity 4, 14,18, 23 of Listing Notice 3 is applied for as part of the SWMP.
Integrated Environmental Management Guideline: Guideline on Need and Desirability (2017).	The need and desirability were assessed for the SWMP.
Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector.	Biodiversity related to the SWMP was considered when sites were selected, and alternatives considered.
The National Water Act (Act No. 36 of 1998, as amended).	The SWMP will require a Water Use Licence ("WUL") for the following: • Section 21 (c) and (i) for PCD 3, access road and OMWSD Compartment 4. • Section 21 (f) for the discharge of mine water. • Section 21(g) for the disposal of mine affected water into the facilities as proposed as part of the SWMP. The WUL will be applied for separately.
Regulations on use of water for mining and related activities aimed at the protection of water resources published in terms of the National Water Act under Government Notice 704 of 4 June 1999 (GN.R 704).	Storm water management measures, in compliance to GN.R 704, will be implemented at the SWMP. Where relevant and licensed by the WUL, exemption to the GN.R. 704 will also be applied for.
The National Environmental Management: Biodiversity (Act 10 of 2004, as amended).	Biodiversity related to the SWMP and the alternatives were considered. Limpopo Department of Economic Development, Environment and Tourism ("LEDET") will be consulted for permits in terms of National Environmental Management:

Applicable Legislation and Guidelines used to compile the Report	Compliance and response of the SWMP
	Biodiversity (Act 10 of 2004, as amended) for the removal of nationally protected plant species, where required.
Alien and Invasive Species Regulations (GN.R 598 dated 2014).	The occurrence of alien and invasive species will be assessed and mitigated (in accordance with these regulations) during the construction and operational phase of the SWMP.
Conservation of Agricultural Resources (Act 43 of 1983).	Erosion potential will be assessed and mitigated (in accordance with this act) during the construction and operational phase of the SWMP.
The National Environmental Management: Air Quality (Act 39 of 2004, as amended).	No Atmospheric Emissions Licence ("AEL") is required for the SWMP.
SABS Code of Practice 0103 of 2008: The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication. SABS Code of Practice 0328 of 2008: Environmental Noise Impact Assessments.	The SABS Code of Practice 0103 will be taken into account when the mitigation measures for the SWMP are identified.
National Environmental Management: Waste Act (Act No. 59 of 2008, as amended).	No Waste Management Licence ("WML") is required for the SWMP.
National Heritage Resources Act (Act No. 25 of 1999, as amended).	No archaeological or historical sites are affected by and in close proximity to the areas where the SWMP will be taking place.
DMRE Guideline for Consultation with communities and Interested and Affected Parties. As required in terms of sections 16(4)(b) or 27(5)(b) of the MPRDA, and in accordance with the standard directive for the compilation thereof as published on the official website of the Department of Mineral Resources.	The public participation process is done in accordance with the DMRE guideline for consultation with communities and interested and affected parties.
Integrated Environmental Management Information Series. Criteria for determining alternatives in EIA.	Alternatives were assessed for the SWMP in section 7 of this EIAR / EMPr.
GN.R 93 Mine Health and Safety Regulations published under the Mine Health and Safety Act 29 of 1996.	Regulation 4.16(2) of the GN.R 93, Mine Health and Safety Regulations should be noted and adhered to as part of this project.

6 Need and desirability of the proposed activities

6.1 Need and desirability in terms of the Guideline on Need and Desirability, 2017

In 2017, the then Department of Environmental Affairs published an Integrated Environmental Management Guideline, the Guideline on Need and Desirability. The following provides information on how the guideline requirements were considered in this EIAR / EMPr and should be read in conjunction with the guideline.

6.1.1 How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?[1]

- The ecological integrity of the area was assessed as part of the specialist assessments (biodiversity and wetland impact assessments) with the baseline environmental description provided in Section 7.4.1 below. The potential impacts that have been identified resulting from the SWMP have been discussed in Section 7.5 of this document.
- Alternatives have been identified to limit the impact to natural resources. Refer to section 7.1 for the alternatives identified and section 7.7 for the advantages and disadvantages of the alternatives identified. Refer to Chapters E, F and L of Section 7.4.1 of this EIAR / EMPr and Section 7.5 for potential impacts.
- The construction of the facilities associated with the SWMP will not result in the generation of any waste and will not impact on renewable resources.
- The preliminary potential impacts on non-renewable resources that have been identified resulting from the SWMP have been discussed in Section 7.5 of this document. Further thereto, a separate WUL application will be submitted for the SWMP.
- The SWMP is proposed to ensure compliance to the requirement of GN.R 704 and prevent mine affected water entering the surrounding the environment. Further thereto, the SWMP is required to ensure sufficient water containment capacity is available to service the VUP.
- Although Venetia Mine is located adjacent to the buffer zone of the Mapungubwe National Park, the Phase 1 Heritage Impact Assessment has not identified any sites of cultural and heritage importance in the proposed footprint areas of the SWMP.
- The preferred alternative will reduce the loss of habitat associated with this project because of the existing impacts on a section of the proposed relocation area.
- The SWMP will allow continuation of mining activities. The SWMP, therefore, ensures that those who are already employed remain employed, which reduces unemployment in the area and transfers skills to employees.
- Knowledge gaps, as well as relevant assumptions to the proposed SWMP are provided in Section 14 below.
- All potential negative and positive impacts associated with the SWMP have been preliminarily identified and discussed in Section 7.5 below. A conservative approach was followed in terms of the identification and assessing of environmental impacts.

6.1.2 Promoting justifiable economic and social development[2]

- The mining industry contributes 7.1% (R 6.4 billon) to the Gross Value Added (“GVA”) of Vhembe District municipality, as at 2018. Further thereto, the mining industry is responsible for 2 640 jobs in the Vhembe District Municipality, as at 2018.

[1] Section 24 of the Constitution and section 2(4)(a)(vi) of NEMA refer.

[2] Section 24 of the Constitution refers.

- A Social and Labour Plan ("SLP") has been developed and implemented for Venetia Mine.
- The SWMP will allow continuation of mining activities and ensure security of the Life of Mine (to the year 2046) of Venetia Mine. The SWMP, therefore, ensures that those who are already employed remain employed, which reduces unemployment in the area and transfers skills to employees. Venetia Mine will also continue to contribute to the GVA of the Musina Local Municipality and Vhembe District Municipality.
- The needs of the community were determined through the public participation process of the Scoping Report with the results of the public participation process presented in the Public Participation Report are further assessed as part of this EIA / EMPr with the results of the public participation process presented in the Public Participation Report and attached as an Annexure to the final EIA / EMPr. The public participation process that has been conducted aims to ensure that all I&APs are provided with an opportunity of access to information regarding the SWMP and to raise any concerns or provide any comments on the SWMP. The SWMP further requires intergovernmental coordination and is undertaken as part of this project through consultation with all relevant stakeholders.
- Venetia Mine will ensure that the financial liability associated with the rehabilitation of the proposed activities of the SWMP is provided for as part the closure liability of Venetia Mine.

7 Motivation for the preferred development footprint within the approved site

7.1 Details of alternatives considered as part of the proposed project

The following information relating to alternatives and the consideration thereof was sourced from the *Technical Note – Conceptual evaluation of polluted water storage options*, dated 28 September 2020 and compiled by Jones & Wagener (Annexure G).

7.1.1 Location alternatives

The mine proposed preferred locations for all the proposed water containment facilities. These locations were selected based on available space either within already disturbed areas or based on the surface drainage for the containment of affected surface water runoff. Only one location was selected for each of the water containment facilities, with the exception of the FRD 1 RWD, where a second compartment alternative site was identified. However, the alternative site was not further assessed as the proposed alternative site slopes relatively steeply from east to west. As a result, a significant amount of earthworks (fill) will be required to construct the dam embankment. From a topographic perspective, it is not regarded as an ideal site for FRD 1 RWD. It is for this reason that it was decided to expand the current FRD 1 RWD by raising the facility's wall by 3 m.

7.1.2 Capacity alternatives

With an exception for PCD 2, PCD 1 - Compartment 4B and OMWSD Compartment 3 and 4, alternatives to the capacities of all the facilities were assessed. Capacity alternatives for PCD 2 and PCD 1 – Compartment 4B were not assessed, as such facilities were approved within the WUL (Licence No.: 14/A63E/ABCGIJ/5111) and the approved volumes considered as part of the SWMP capacity requirements. No alternatives were proposed for the OMWSD Compartment 3 and 4 due to the location of the proposed facilities. The capacity alternatives for the other facilities are summarised below:

- PCD 1:
    - PCD 1A – PCD 1A was identified as a polluted water dam site and designed in 2015, as part of the IWUL amendment project. It is located to the south of the existing SWCD and has a catchment area of 26 ha. This dam will receive runoff from the workshop areas located towards the east that currently flows into to the SWCD, following the construction of various planned dirty water canals. The 2015 design catered for a storage capacity of 60 000 m^3, as required to contain direct runoff to the dam.
    - PCD 1B (preferred) - Construction of a single dam to receive runoff from the workshop area towards the east as well as runoff from the VUP terrace area, requiring a storage capacity of at least 90 000 m^3. To increase the capacity of PCD 1A, a greater portion of the area south of SWCD will be utilised. The wall height will be increased to approximately 8 m. This option has a storage capacity of 102 000 m^3.
- PCD 2 (preferred) – PCD 2 is located north-east of the CRD and was designed with two compartments separated by means of a dividing wall. PCD 2 is constrained by the existing CRD's existing footprint to the south-west and by the future extension of the CRD dump to the west.
- PCD 3:
    - PCD 3A - PCD 3A is located on the western boundary of Venetia Mine, between the FRD and CRD. Hence, to maximise storage capacity without encroaching on the outer security fence line, the facility adopted a "dog-leg" shape. The design entails two compartments (north and south), each having different shapes due to the spatial constraints.
    - PCD 3B – PCD 3B is an alternative location to PCD 3A, with the pollution control dam located predominantly outside of the current security fence line, extending into the 'Vanzylsrus' area. PCD 3B has an estimated maximum storage capacity of 750 000 m^3 and requires approximately 154 500 m^3 of excavation to create a suitably shaped basin. The dam wall height is currently limited to 12 m that will classify it as a 'small dam'.
    - PCD 3C (preferred) - PCD 3C is positioned at the same location as PCD 3B, between the Kolope River and the current mine security fence west of the mine. The main embankment will have a curved-shape (radius of 350m) to maximise the available space between the two koppies at Vanzylsrus. PCD 3C will have an estimated storage capacity of 1 050 000 m^3 at a maximum embankment height of 13 m.

  - PCD 3D - PCD 3D is positioned in between FRD1 and the CRD. This option was assessed as a potential fall-back option should it not be possible to construct PCD 3B or PCD 3C outside the mine fence. To optimise the potential storage capacity of the site, the dam was extended up to the outer mine fence. PCD 3D will have an estimated storage capacity of 750 000 m^3. However, extensive earthworks will be required to build a U-shaped dam embankment with a crest length of approximately 1.35 km.

- PCD 1 – Compartment 4B (preferred) – PCD 1 Compartment 4B is located to the west of the SWCD. This dam formed part of the 2015 design and was intended as an attenuation facility to contain runoff from the VUP terrace area. Water would be released to the SWCD as capacity at the latter facility became available. The dam was designed with a storage capacity of 34 000 m^3.
- OMWSD Compartment 3 (preferred) - The OMWSD Compartment 3 is located north of the existing OMWSD North Compartment. By adopting the same crest height as for the existing OMWSD North Compartment an estimated storage capacity of 239 000 m^3 can be achieved. In addition, the proximity to the existing OMWSD allows for the utilisation of the existing pumping infrastructure at the dam, i.e. essentially operating as an extension to the OMWSD.
- OMWSD Compartment 4 (preferred) - OMWSD Compartment 4 is located on the eastern side of the existing OMWSD South Compartment and falls outside the existing mine security fence. The area is topographically a low point, and due to the location of the existing OMWSD dams, forms a basin at which storm attenuation occurs during major flood events. The OMWSD Compartment 4 crest elevation will be limited to that of the existing OMSWD North Compartment and OMWSD South Compartment (698.25 mamsl) in order to operate the dam as an extension of OMWSD South Compartment and / or OMWSD North Compartment. The footprint of OMWSD Compartment 4 is limited to the east in order to allow for clean water runoff to be diverted around the dam, into the existing clean water diversion system that bypasses south of OMWSD South Compartment. OMSWD Compartment 4 will have an estimated storage capacity of 192 000m^3. Earthworks will require 107 000 m^3 of excavation to establish a suitable dam basin and remove silt transported to low-lying area in previous flood events. The embankment fill volume will be significantly less (in order of 15 000 m^3), which will predominantly constitute the eastern and southern embankments.
- OMWSD North and South Compartments (preferred) - It is understood that the existing OMWSD North and South compartments will be re-lined in the next year or two. This provides the potential opportunity of increasing the capacity of the OMWSD by raising the embankments along the perimeter of the existing facility while it is decommissioned. The existing OMWSD North and South Compartment currently have a combined storage capacity of 460 000m^3 (260 000m^3 and 200 000m^3 for northern and southern compartments respectively). An embankment raise of 2 m will result in a total combined storage capacity of 555 000 m^3 for the northern and southern compartments combined (from the current 460 000 m^3). This assumes the existing divider wall between the two compartments remains as it is. Removing the dividing wall completely could yield an additional ± 30 000 m^3 storage capacity, whilst raising the dividing wall by 2 m would reduce the capacity by a similar order of magnitude.

- K03 pit (preferred)- The K03 pit is located to the east of FRD 2 on the north-western perimeter of the open pit. The K03 pit is separated from the K02 pit by an unmined barrier wall that is approximately 250 m wide. The K3 pit has a total in-pit storage capacity of 3.5 million m^3, i.e. up to a highwall elevation of 640 m. The intention, however, is to limit the allowable storage capacity to a maximum level as defined by geological and geohydrological considerations.

7.1.3 No-go option

The no-go option would mean that the status quo of the environment would stay as is and there would be no additional impacts to the site. However, if the proposed construction of new water containment facilities and expansion of existing facilities do not continue, Venetia Mine will remain in non-compliance with pollution prevention principles and GN.R 704. Further thereto, this will have severe implications on the VUP as there may not be sufficient storage capacity to ensure continued removal of groundwater for the safe continuation of mining. Should the VUP not continue, this will result in the premature closure of Venetia Mine.

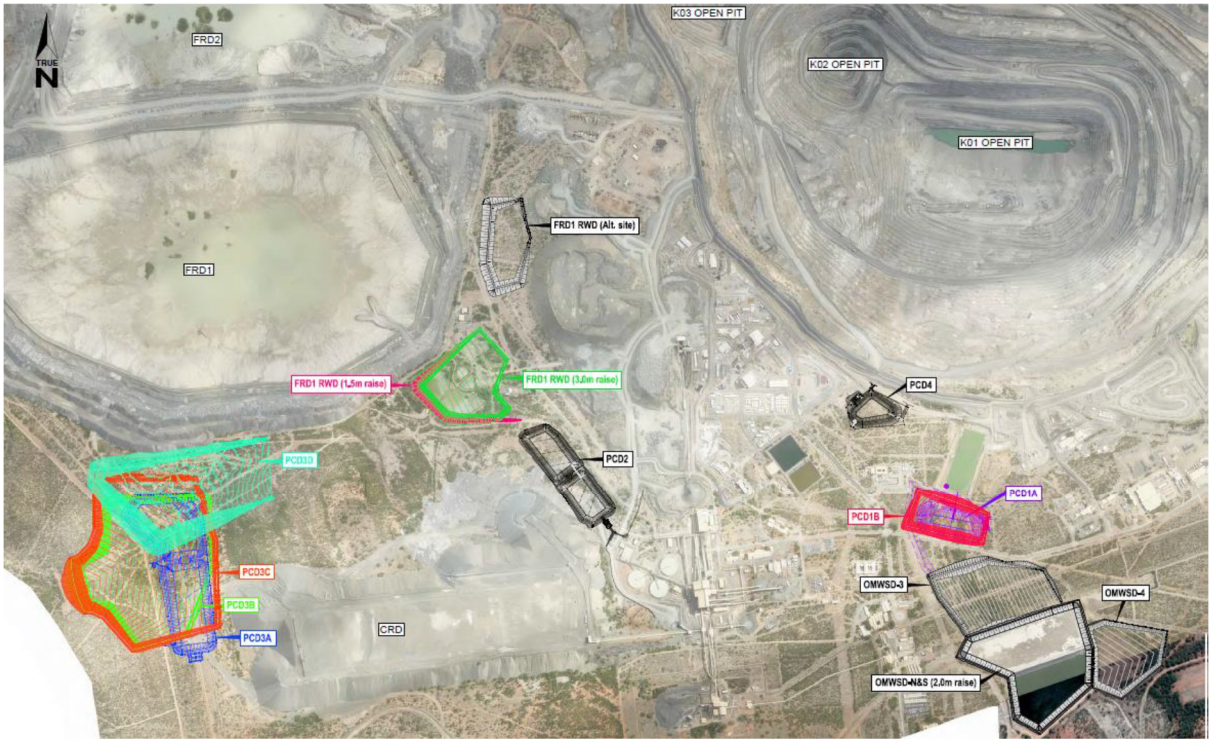


Figure 5: Map presenting the proposed facilities and identified alternatives.

7.2 Details of the Public Participation Process followed

The public participation process for this EA application was conducted by Shangoni Management Services (Pty) Ltd in terms of:

- The procedures and provisions in terms of the NEMA,
- Chapter 6 of the 2014 EIA Regulations,
- GN 807 of 2012; Public Participation Guideline, and
- Other relevant legislation such as the Promotion of Access to Information Act (PAIA), 2000.

7.2.1 Identification and registration of I&APs and key stakeholders

Table 7 below lists the landowners, adjacent landowners and organs of state identified and notified (by means of e-mail, telephone, fax and/or post) of the proposed project. All organs of state that may have jurisdiction in respect of the proposed project is considered to be registered I&APs. The full I&AP register is available on request and will be submitted to the DMRE with the final EIAR / EMPr.

Table 7: List of landowners and adjacent landowners identified and notified

Organs of state and stakeholders
National Departments
South African Heritage Resource Agency (“SAHRA”)
Provincial Departments
Department of Mineral Resources and Energy – Limpopo Region (“DMRE”)
Department of Human Settlements, Water and Sanitation – Polokwane Regional Office (“DHSWS”)
Limpopo Department of Economic Development, Environment and Tourism (“LEDET”)
SANParks
Mapangubwe National Park
Other interested and affected parties
Landowoners
Registered I&APs. The full I&AP register is available on request and will be submitted to the DMRE with the final EIAR / EMPr.
Other
Musina Local Municipality
Vhembe District Municipality
Ward counsellors

7.2.2 Methods of notification

7.2.2.1 Scoping phase

A detailed public participation process is undertaken as part of the initial application- and scoping phase for the SWMP. The following have been conducted as part of the Environmental Authorisation Application (proof hereof is included in the Public Participation Report attached as Annexure G to this report):

- Advertisements:
    - A Newspaper advertisement was placed in the Limpopo Mirror on 25 June 2021.
- Site notices:
    - Nine (9) site notices were placed at different, noticeable and conspicuous locations in Musina Town, Alldays and at the mine.

- Written notices:
    - Written notices, including Background Information Documents ("BIDs"), were distributed to Interested and Affected Parties ("I&APs").
- Short Message Service ("SMS") notifications:
    - SMS notification were distributed to all identified potential I&APs and stakeholders as well as I&APs and stakeholders currently registered with Venetia Mine.
- Availability of Scoping Report for public review:
    - This Scoping Report will be made available for public and stakeholder review for a period of 30 days (from 30 June to 30 July 2021). Notices providing the detail of the public viewing station and review period, were sent to registered I&APs via e-mail. This notification also formed part of the above-mentioned advertisement and site notices.

7.2.2.2 EIAR/EMPr phase

Advertisement(s)

The proposed project was advertised in the Limpopo Mirror on 15 November 2021. The Limpopo Mirror was found to be the most appropriate newspaper in terms of its accessibility to the I&APs. A copy of the advertisement and proof of placement is provided for the in the EIAR / EMPr Public Participation Report attached hereto in Annexure H.

7.2.2.3 Placement of site- and public notices

Notice was also given to Interested and Affected Parties ("I&APs") by notice boards. Notice boards were placed at different, noticeable and conspicuous places on 15 November 2021. A copy of the site notice and proof of placement is provided for the in the EIAR / EMPr Public Participation Report attached hereto in Annexure H.

7.2.2.4 Background Information Document

The Background Information Document ("BID") developed for the proposed project provides background information pertaining to the project and is intended to inform I&APs of the proposed project. The BID also includes a registration form that I&APs, stakeholders and organs of state are encouraged to complete in order to register as an I&AP for the proposed project. The BID was made available on the 15 November 2021 to all registered I&APs, as well as to all organs of state that may have jurisdiction over any aspect of the activity. The BID will also be made available to any other person who becomes involved in the on-going Public Participation Process ("PPP"). A copy of the BID and proof of notification to I&APs is provided for the in the EIAR / EMPr Public Participation Report attached hereto in Annexure H.

7.2.3 I&APs register

Once all landowners, adjacent landowners, organs of state and the public are notified of the proposed project, an I&APs register is kept and will be updated during the process. The full I&AP register is available on request and will be submitted to the DMRE with the final EIAR / EMPr.

7.2.4 Access and opportunity to comment on written submissions

The draft EIAR/EMPr was made available to the public for review for a period of thirty (30) days, from 15 November 2021 to 14 December 2021. A copy of the mentioned document was made available on the Shangoni's website (www. shangoni.co.za) for the I&APs to view. All the registered I&APs were notified of the availability of the EIAR/EMPr for public review by 15 November 2021.

7.2.5 Consultation with the relevant Authorities

7.2.5.1 Application form in terms of the NEMA

The application for environmental authorisation was submitted to the DMRE, via SAMRAD, on 29 July 2021, and in hardcopy format. A copy of the application for environmental authorisation form is attached hereto in Annexure C1. A copy of DMRE's acceptance of the Scoping Report is also attached as Annexure C2.

7.2.5.2 Further consultation with relevant Authorities

Further consultation will be done with the DMRE during the remainder of this application.

7.3 Summary of issues raised by I&APs

Table 8 below has been completed with the comments and issues raised during the Scoping Report PPP.

Table 8: Summary of the issues raised by the I&APs

Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
Ndou Charles Shoni	01 July 2021	Mr. Shoni requested information as to how he apply for a job.	The project and environmental authorisation application was explained to him. He was informed that should he wish to submit his cv, he could provide such to the EAP and the cv would be provided to the applicant for record keeping should any job opportunities become available.	Refer to Annexure D.
Hannes Degenaar	12 July 2021	An email was received from Mr Hannes Degenaar, on 12 July 2021, with the completed I&AP registration form attached. No comments on the project were received.	Good day Hannes, Thank you for providing the completed registration document. You have been registered as an I&AP for the project and will receive further communication as the applications progress. Thanks Hannes.	Refer to Annexure D.
Jeffrey Fhumulani Majuta (Pepper Bark Environmental and Development NPC)	19 July 2021	E-mail – 18 July 2021 I hope this finds you well. Pepper Bark Environmental and Development NPC deals with environmental issues in Musina and we would like to register with you for the De Beers Storm Water project. Please send us relevant info in time.	E-mail – 18 July 2021 Good day Jeffrey, Thank you for the below correspondence and interest in the project. Please find attached the Notification letter relating to the project. Please completed the I&AP registration form as included in the notification letter and provide such back to me by 30 July 2021. Should you have any further queries relating to the project, please do not hesitate to contact me. Thanks.	Refer to Annexure D.

Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
	30 July 2021	E-mail and completed I&AP registration form – 30 July 2021	E-mail and letter of response – 16 August 2021	Refer to Annexure D.
		Question (as per I&AP notification letter): *Do you know of anyone that is affected by the proposed activity who was not informed of the project? (Please provide contact details).* I&AP response: No, we do not know of any but we believe the notification did not reach the desired number of affected parties.	The following methods of notification were conducted as part of the public particpation process: Advertisement(s) The availability of the document for public review was advertised in the Limpopo Mirror newspaper on 25 June 2021. The Limpopo Mirror was found to be the most appropriate newspaper in terms of its accessibility to the I&APs, distribution areas and distribution volume. Placement of site- and public notices Notice was also given to Interested and Affected Parties ("I&APs") by notice boards. Notice boards were placed at nine (9) different, noticeable and conspicuous locations in Musina Town, Alldays and at the mine on the 30 June 2021. Access and opportunity to comment on written submissions The draft Scoping Report was made available to the public for review for a period of thirty (30) days, from 30 June 2021 to 30 July 2021 on Shangoni's website (www. shangoni.co.za) for the I&APs to view. All the potential I&APs were notified of the availability of the document for public review by 30 July 2021. Notificaton emails	

Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
			Email notifications were distributed to all identified potential I&APs and stakeholders as well as I&APs and stakeholders currently registered with Venetia Mine. <u>Short Message Service ("SMS") notifications:</u> SMS notification were distributed to all identified potential I&APs and stakeholders as well as I&APs and stakeholders currently registered with Venetia Mine.	
		We would like to know as to how much water will be consumed each day, monthly and annually.	Venetia Mine is in possession of a Water Use Licence ("WUL") as issued by the Department of Water and Sanitation ("DWS") on 7 August 2017 that allows for the abstraction of water for the safe continuation of mining as well as abstraction from wellfields to supplement the processing water requirements. Venetia Mine operates well within the volumes authorised by the licence and this varies daily, monthly and annually based on a number of factors including but not limited to production requirements, environmental conditions, etc. The proposed Storm Water Management Project ("SWMP") does not constitute any activities resulting in an increase in the volume of water abstracted / consumed but rather, the additional proposed storage capacity will allow for the containment of abstracted water and mine affected water, for re-use. This may, in-turn, decrease Venetia Mine's reliance on- and abstraction of- water from the Wellfields.	
		One of the plans is to block the flow of the Kolope and Matotwane rivers, though they flow seasonally. It is very unenviromental to do so as the Biodiversity Social Projects is trying rejuvinate and restore the	There are no proposals, as part of this project or any other projects at Venetia Mine, to block the flow of the Kolope River or the Motatwane River. The overarching purpose of the Storm Water Management Project ("SWMP") is to ensure legal compliance as per the	

Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
		Mapungubwe landscape. Facing climate change as we are, the rehabilitation of land is critical.	requirements of GN.R 704, and Section 19 (Duty of care) of the NWA and to ensure the safety of people working in the newly developed underground mine.	
		We also would like to know how will you mitigate the flaws that you are going to bring upon the enviroment.	Preliminary potential impacts have been identified for the SWMP and are provided in Table 7 (Chapter 8.5) of the Scoping Report. Specialist studies have also been conducted and a detailed risk assessment will be undertaken as part of the EIAR / EMPr, in which the duration, probability, magnitude and reversibility of the impacts will be determined, and the significance of the impact calculated. Further thereto, as part of the EIAR / EMPr, appropriate mitigation measures will be presented and proposed to limit, reduce and / or prevent impacts to the environment.	
		What are your plans concerning waste water treatment and the suplementing of the Limpopo river flow that you have already disturbed?	Water management and the ecosystem were key considerations when planning for the development of Venetia Mine. Baseline assessments were undertaken in the late 1980s, prior to any development, to understand how to best utilize the water resource sustainably. While Venetia Mine does abstract water from Wellfields (boreholes) along the banks of the Limpopo River, there are a number of controls in place to balance abstraction with the ecosystem's needs. These management and monitoring practices are written into Venetia Mine's Integrated Water Use Licence. The intent of the SWMP is among others, to reduce Venetia Mine's abstraction from the Wellfields. Venetia Mine diverts clean storm water runoff to the south west of the mine towards the Kolope River to prevent the contamination of clean surface water runoff	

Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
			and the reduction of the catchment yield.. The proposed SWMP does not constitute any activities resulting in an increase in the volume of water abstracted / consumed but rather, the additional proposed storage capacity will allow for the containment abstracted water and mine affected water, for re-use. Currently, wastewater treatment is not considered as the contained water will remain in a closed loop for mining and processing activities. The mine has a closure plan to address any rehabilitation requirements associated with Venetia's impacts once activities cease.	
		Did you consider the ecosystem down stream the Kolope and Matotwane? if yes, how are you going to mitigate the risks you pose on it?	As described in Chapter 4 of the Scoping Report, the overarching purpose of the Storm Water Management Project ("SWMP") is to ensure legal compliance as per the requirements of GN.R 704, and Section 19 (Duty of care) of the NWA and to ensure the safety of people working in the newly developed underground mine. As per Figure 3 of the Scoping Report, the proposed activities will be conducted within the Ventia Mine boundary area, to south of Venetia Mine and to the west of Venetia Mine. No activities will be conducted, as part of the SWMP, in the vicinity of the Matotwane River. The proposed PCD 3 and the respective access road will be constructed adjacent to the Kolope River. Further thereto, Venetia Mine also proposes to discharge water during periods of high rainfall. Such discharge will occur from the proposed PCD 3 and / or the On Mine Water Storage Dam ("OMWSD") into the Kolope River. The Kolope River ecosystem was considered with a Watercourse Assessment undertaken to determine the potential impacts to the Kolope River. Further thereto, as previously described, a detailed risk assessment will	

Interested and Affected Parties	Date Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report Where the Issues and or Responses Were Incorporated.
			be undertaken as part of the EIAR / EMPr, in which the duration, probability, magnitude and reversibility of the impacts will be determined, and the significance of the impact calculated. As part of the EIAR / EMPr, appropriate mitigation measures will be presented and proposed to limit, reduce and / or prevent impacts to the environment. As legislatively required, the EIAR / EMPr will also be subjected to a public participation process for a period of thirty (30) days. By submitting your I&AP registration form and comments, you have been captured on the I&AP register and database and you will receive all future correspondence relating to the project and the EIAR / EMPr public participation process.	
		Lastly, on your side, what are the enviromental risks you have identified?	Preliminary potential impacts have been identified for the SWMP and are provided in Table 7 (Chapter 8.5) of the Scoping Report. Specialist studies have also been conducted and a detailed risk assessment will be undertaken as part of the EIAR / EMPr, in which the duration, probability, magnitude and reversibility of the impacts will be determined, and the significance of the impact calculated. Further thereto, as part of the EIAR / EMPr, appropriate mitigation measures will be presented and proposed to limit, reduce and / or prevent impacts to the environment.	

7.4 Description on the baseline environment

7.4.1 The type of environment affected by the proposed activity

A baseline description or "status quo" of the of the present environmental situation is provided in this part of the document. The following attributes / aspects have been described in detail, in the following respective chapters:

- Chapter A: Geology;
- Chapter B: Climate;
- Chapter C: Topography;
- Chapter D: Soils, land use and land capability;
- Chapter E: Vegetation;
- Chapter F: Fauna;
- Chapter G: Surface water;
- Chapter H: Groundwater;
- Chapter I: Air quality;
- Chapter J: Noise and vibration;
- Chapter K: Archaeology and cultural history;
- Chapter L: Palaeontological resources;
- Chapter M: Sensitive landscapes - Biodiversity;
- Chapter N: Sensitive landscapes - Wetlands;
- Chapter O: Visual aspects; and
- Chapter P: Socio-economic.

Chapter A: Geology

The following information was sourced from the report *De Beers Consolidated Mine (Pty) Ltd: Venetia Mine, Geohydrological Impact Assessment as part of the Storm water Management Project,* dated August 2021 and compiled by Shangoni Management Services (Pty) Ltd, as attached hereto in Annexure E2

The regional geology is dominated by the Limpopo Belt, which is located between the Kaapvaal and Zimbabwe Cratons. The Limpopo Belt comprises three zones i.e. Northern Marginal, Central and Southern Marginal and is a very complex geological province shaped by many tectono-metamorphic events. The Venetia Mine is situated in the Central Zone of the Limpopo Mobile Belt (Swazian Era).

The Limpopo Belt in the Venetia Mine area is believed to be 10 km thick and contains an ensemble of rocks known as the Beit Bridge Complex that comprises rocks of the Gumbu, Malala Drift and Mount Dowe Groups. This country rock at Venetia Mine comprises mainly quartzofeldspathic gneisses, marbles, gneisses, shists and other metasediments. These rocks have undergone numerous phases of shearing and folding. Outliers of Karoo rocks are present in the area. Diabase in the form of dolerite dykes and sills are also commonly found.

At Venetia Mine, kimberlite pipes are surrounded by four tectonic units. These units include the Gotha Granitic Complex, the Venetian Klippe, the Endora Klippe and the Krone Metamorphic Terrane. The Gotha Granitic Complex bounds the mine to the south and comprises mostly leucocratic tonalite, granodiorite and granite with minor lenses of amphibolite, quartzite and magnetite quartzite. The FRDs and CRD are situated primarily on the Venetia Klippe unit that comprises four units, the lowermost being quartsofeldspathic gneiss and ortho-amphibiolites. These rocks are overlain by an interlayered quartsofeldspathic gneiss, amphibolite and carbonate and calcsilicate rocks that in turn are overlain by a metasedimentary sequence of quartzite carbonate and calc-silicate rocks. The youngest unit comprises granite orthogneisses. The Endora Klippe unit lies to the north of the mine and is primarily comprised of quartzite and magnetite quartsite. Layers in this unit are folded around a north-north west trending axis. The Krone Metamorphic Terrane lies to the north-west, the area drained by the Kolope River. It comprises mostly of quartsofeldspathic gneisses with variable compositions ranging from granitic to tonalitic. Amphibolite, garnet-amphibolite and magnetite quartzite occur as lenses within the quartsofeldspathic gneisses. The contact between the Krone Metamorphic Terrane and the Venetia Klippe is exposed along the west and south-west edges of the klippe.

Chapter B: Climate

The following information was sourced from the following reports:

- *Integrated Water and Waste Management Programme for De Beers Consolidated Mines (Pty) Ltd,* dated December 2019 and compiled by Prescali Environmental Consultants (Pty) Ltd.
- *De Beers Consolidated Mine (Pty) Ltd: Venetia Mine, Geohydrological Impact Assessment as part of the Storm water Management Project,* compiled by Shangoni Management Services (Pty) Ltd, August 2021 (Annexure E2).
- *De Beers Consolidated Mines: Venetia Mine water balance life of mine and scenario report,* dated August 2020 and compiled by Jones & Wagener (Annexure F).

Venetia Mine is located in the Limpopo Province that experiences a sub-tropical climate in most of the province. The site is, however, also located in the western half of the province and close to Botswana where the climate is semi-arid to arid in the southern parts. It may be suggested that the Venetia Mine is located in a transitional zone of the two different climatic zones.

Rainfall

The Mean Annual Precipitation (“MAP”) in this area varies between 300-400 mm, while the Mean Annual Evaporation (“MAE”) is approximately 2050 mm.

Monthly rainfall figures from 1999 to current as recorded from a rainfall station on the mine is shown in Table 9 below. The data shows the majority of rainfall periods occur between the months of October to April.

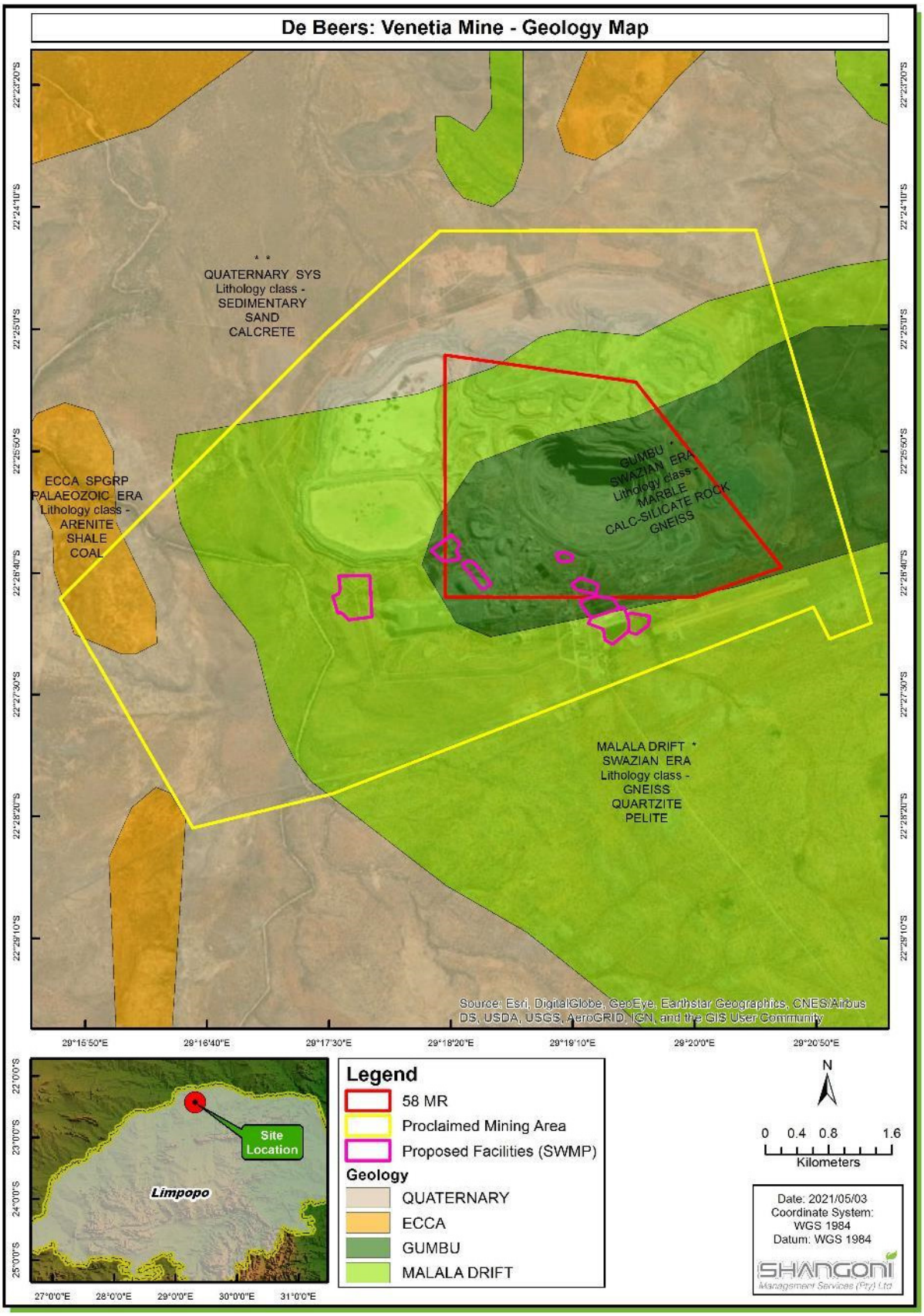


Figure 6: Geology associated with the proposed SWMP

Table 9: Monthly rainfall data as received and recorded at Venetia Mine

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1999	75.0	36.0	14.0	38.0	12.0	0.0	2.0	0.0	0.0	21.0	64.0	86.0	**348.0**
2000	191.0	158.0	331.0	4.0	0.0	9.0	32.0	0.0	0.0	5.0	32.2	63.0	**825.2**
2001	28.0	80.8	24.2	28.8	10.2	11.2	0.0	0.0	2.8	10.0	34.2	69.0	**299.2**
2002	46.4	17.2	3.8	11.8	0.0	4.0	1.0	1.8	11.8	34.0	12.8	6.0	**150.6**
2003	40.4	97.0	37.0	0.0	0.0	16.4	0.0	0.0	0.0	28.4	58.0	143.0	**420.2**
2004	11.0	28.0	182.0	8.0	0.0	0.0	0.0	0.0	0.0	30.0	36.0	71.0	**366.0**
2005	67.0	33.5	21.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	44.5	31.4	**203.4**
2006	77.5	68.0	68.0	0.0	0.0	0.0	0.0	0.3	0.0	10.9	81.0	0.0	**305.7**
2007	5.2	3.1	73.9	2.1	0.3	0.6	0.3	0.0	108.0	41.3	118.0	126.6	**479.4**
2008	75.8	3.0	13.7	73.0	0.8	0.2	0.0	0.0	0.0	0.0	60.4	83.2	**310.1**
2009	250.1	26.1	111.7	0.3	17.5	2.5	0.8	0.0	20.0	8.3	121.6	12.6	**571.5**
2010	124.9	8.0	34.9	262.1	0.5	0.0	0.7	0.0	0.0	0.0	99.0	78.2	**608.3**
2011	165.0	11.8	10.8	32.5	0.0	0.0	1.2	0.0	0.0	50.5	127.9	31.0	**430.7**
2012	46.2	10.7	1.1	0.0	0.0	0.0	0.0	0.0	12.4	26.7	41.1	41.0	**179.2**
2013	452.0	21.8	15.4	24.1	0.0	0.0	2.0	3.8	0.0	40.6	45.2	76.8	**681.7**
2014	109.5	60.4	122.4	3.1	0.0	0.0	0.0	0.0	0.0	2.4	63.1	126.5	**487.4**
2015	3.3	35.9	54.6	37.8	0.0	0.6	0.0	0.0	45.0	12.5	28.5	44.5	**262.7**
2016	92.8	33.4	94.0	1.5	9.0	1.5	2.9	0.0	0.0	21.9	38.5	113.8	**409.3**
2017	116.9	48.4	14.0	5.0	0.6	0.0	0.0	0.0	0.0	57.5	61.3	4.9	**308.6**
2018	10.4	143.3	9.8	1.8	13.6	0.0	0.1	0.0	2.0	9.3	36.1	83.6	**310.0**
2019	102.4	139.1	0.6	46.9	0.0	0.0	0.0	0.0	0.0	0.0	99.4	43.6	**432.0**
2020	8.1	86.7	11.2	3.0	0.0	0.6	0.0	6.7	0.3	28.7	32.7	116.8	**294.8**
2021	231.0	161.2	3.7	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**400.4**
Avg	**101.3**	**57.0**	**54.5**	**25.6**	**2.8**	**2.0**	**1.9**	**0.5**	**8.8**	**19.1**	**58.1**	**63.2**	**394.8**

Temperatures

Average monthly temperatures recorded at Venetia Mine for the period June 2006 to April 2011 are presented in the tables and figures below. The maximum temperature at Venetia Mine occurred during the month of October with the temperature reaching 41.5°C, which is during spring. The minimum temperature was recorded during July (2.7°C). The average temperatures are variable in the project area, ranging from 16.9 to 26.4°C.

Chapter C: Topography

The following information was sourced from the *De Beers Consolidated Mine (Pty) Ltd: Venetia Mine, Geohydrological Impact Assessment as part of the Storm water Management Project,* compiled by Shangoni Management Services (Pty) Ltd, August 2021 (Annexure E2).

The regional topography consists of low hills and wide valleys, varying in elevation from 700 mamsl in the south to 600 mamsl at the topographical lows in the north (refer also to Figure 7). The surface topography and associated landscape within the mine's boundary has been altered by various mine residue deposits such as fine residue deposits (FRDs), coarse residue deposits (CRDs), waste rock dumps (WRDs) and the open pits, K1-K3.

Chapter D: Soils, land use and land capability

The following information was sourced from the *Terrestrial biodiversity impact assessment for the proposed storm water management project for De Beers Consolidated Mines Limited – Venetia Mine, that is situated near Alldays in the Limpopo province,* compiled by Pachnoda Consulting and Bathusi Environmental Consulting, June 2021. Refer to Annexure E3 for the specialist report.

Three soil units are present at Venetia Mine as follows (refer also to Figure 9):

Unit A: Unit A refers to yellow and red soils without water tables and belonging in one or more of the following soil forms: Inanda, Kranskop, Magwa, Hutton, Griffin and Clovelly. The soil units refer to land which does not qualify as a plinthic catena and in which one or more of the above soil forms occupy at least 40 % of the area. In Ae (red-yellow apedal, freely drained soils, red high base status, 450 - 700 mm deep, no dunes) and Ah (red and yellow, high base status), yellow soils occupy less than 10 % of the area while dystrophic and/or mesotrophic soils occupy a larger area than high base status red-yellow apedal soils. Resultant soils are generally poorly suited for arable agriculture and clay contents are generally lower than 15 %. Soil depths vary between 450 and 750 mm.

Unit D: Units Da – Dc accommodate land where duplex soils are dominant, indicating a high erodibility, containing dominant prismacutanic and/ or pedocutanic diagnostic horizons and where the B horizons are generally not red. Upland soils that display duplex character include Estcourt, Sterkspruit, Swartland, Valsrivier and Kroonstad forms. Db refers to land where duplex soils with non-red B horizons comprise more than half of the area covered by duplex soils. Soils in these areas, despite comparatively deep (> 750 mm), are of intermediate suitability for arable agriculture where the climate permits.

Unit F: Unit F mainly includes Glenrosa and/ or Mispah forms (predominantly stony, rocky, but other forms may also occur) and is intended to accommodate pedologically young landscapes that are not predominantly rock and not predominantly alluvial or aeolian and in which the dominant soil forming processes have been rock weathering, the formation of orthic topsoil horizons and, commonly, clay illuviation, giving rise typically to lithocutanic horizons. The soil forms that epitomise these processes are Glenrosa and Mispah. However, exposed rock and soils belonging in almost any of the other soil forms may be found in these land types, provided these other soils do not qualify the land for inclusion in another map unit. Shallow and deep soils of the Oakleaf form (usually on upland sites) developed by rock weathering are accommodated here. Fc refers to land where lime occurs regularly (there do not need to be much of it, and it need not occur in every soil present) in upland and valley bottom soils. Soil depth is generally less than 450 mm; clay percentage is less than 15 %. Resultantly soil potential is of intermediate suitability for arable agriculture where the climate permits.

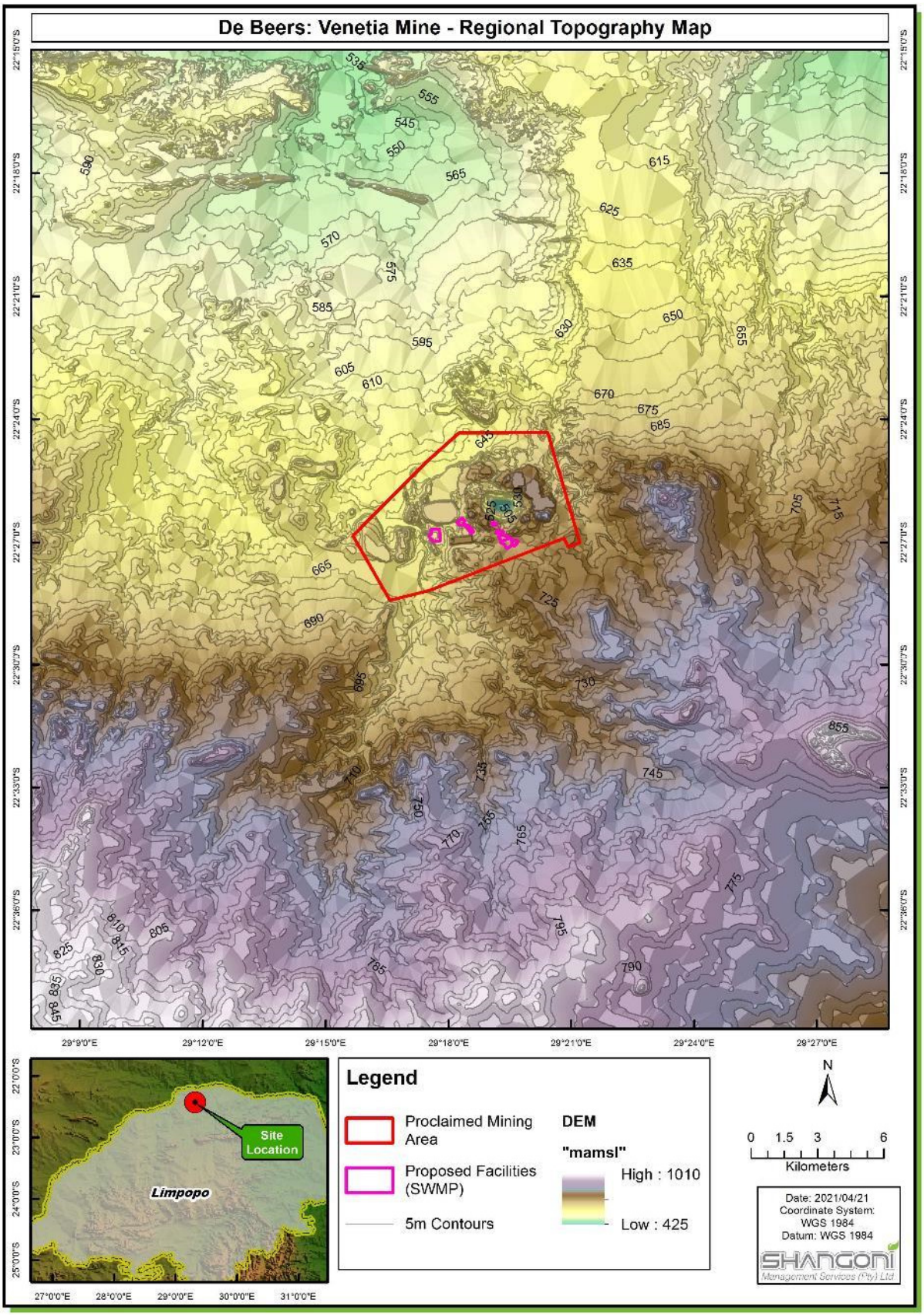


Figure 7: Map showing topography of the proposed SWMP

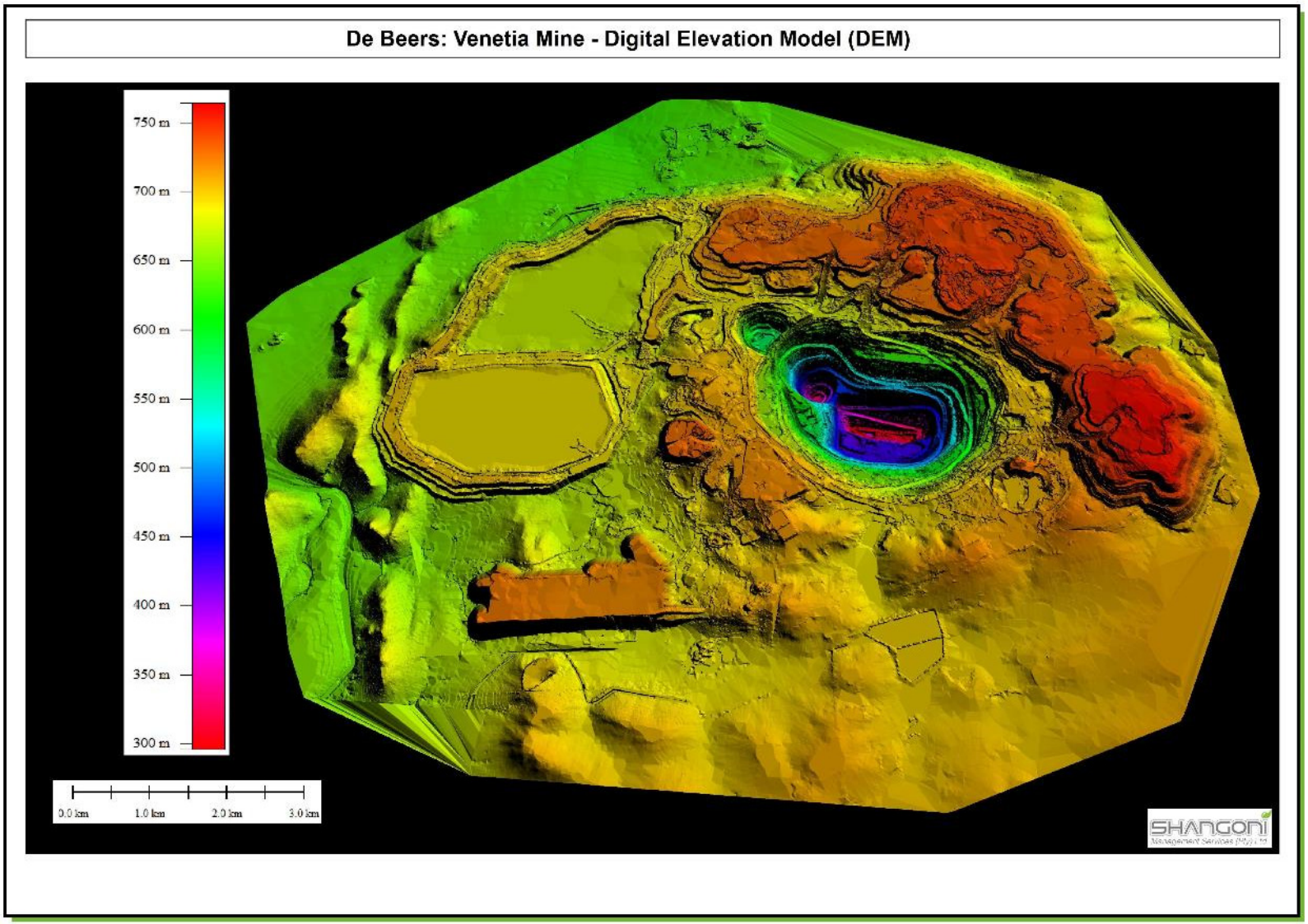


Figure 8: Digital Elevation Model of Venetia Mine

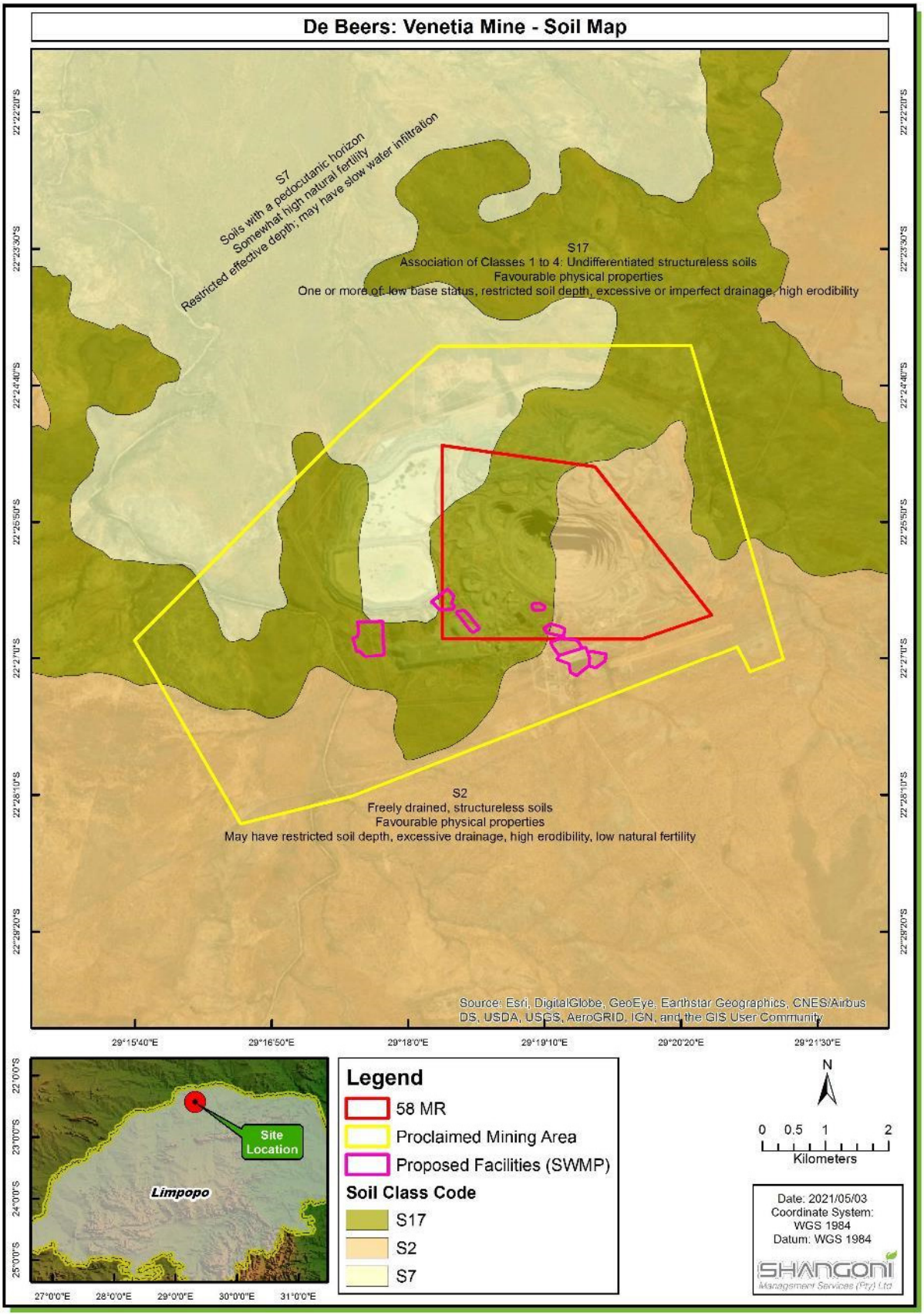


Figure 9: Map showing soils associated with of the proposed SWMP

Chapter E: Vegetation

The following information was sourced from the *Terrestrial biodiversity impact assessment for the proposed storm water management project for De Beers Consolidated Mines Limited – Venetia Mine, that is situated near Alldays in the Limpopo province,* compiled by Pachnoda Consulting and Bathusi Environmental Consulting, June 2021 (Annexure E3).

The regional floristic character is indicated as the Mopane Bioregion, which is spatially situated in the Savanna Biome. More specifically, the local region comprises two ecological types described by Mucina and Rutherford (2006) as the Musina Mopane Bushveld (SVmp1) and Limpopo Ridge Bushveld (SVmp2) (refer also to Figure 10). The conservation status of both these units is indicated as 'Least Threatened' providing insight into the low local and regional transformation status. A review of regional floristic collection records in the wider study area (SANBI, NEWPOSA 2021) indicated the known presence of approximately 517 plant species within the wider study region, reflecting the high regional diversity context of the Savanna Biome and the local ecological types. However, a high paucity of site-specific, accurate and comprehensive floristic data for the local region is indicated from collection records.

Results of the floristic assessment of the proposed development footprints indicated the following key considerations:

- An Alpha Diversity of 105 species was collectively recorded from the study sites, which corresponds (numerically) to 20.3 % of the sampling records from the wider region, also reflecting a moderate floristic diversity;
- A brief review of the growth forms recorded from the site assessments provides insight into the savannoid nature of the immediate region, with the tree and shrub components collectively dominating the physiognomy, which correlates with the physiognomy from the wider region;
- A total of 31 plant families were recorded during this instantaneous survey bout, dominated by the Poaceae family, while Fabaceae and Malvaceae were moderately represented, also correlating with collection records from the wider region;
- A total of 7 plant species of conservation concern (NFA, IUCN, LEMA) are known to occur within the wider region (NEWPOSA 2021);
- Records from the site inspection indicated a total of 5 (five) plant species of conservation concern present within the proposed footprints:
    - *Adansonia digitata* (Baobab, NFA 2014);
    - *Boscia albitrunca* (Shepard's Tree, NFA 2014);
    - *Combretum imberbe* (Leadwood, NFA 2014);
    - *Philenoptera violaceae* (Apple Leaf, NFA 2014); and
    - *Sclerocarya birrea* (Marula, NFA 2014).

The floristic evaluation of the footprints indicated a suite of highly variable woodland types that are largely associated with slopes, rockiness, moisture regimes and also indicating deleterious effects of

mining-related activities. The following broad-scale habitat types were recorded across the various development footprints:

- Artificial Impoundments (not mining containment dams) – mostly exhibiting a moderate floristic sensitivity;
- Deteriorated "Acacia" Woodland – mostly exhibiting a moderate-low floristic sensitivity;
- Deteriorated Mixed Woodland – mostly exhibiting a moderate-low floristic sensitivity;
- Existing water storage facilities – mostly exhibiting a low floristic sensitivity;
- Floodplain grassland – mostly exhibiting a moderate-low floristic sensitivity;
- Mixed woodland (Deteriorated) – mostly exhibiting a moderate-low floristic sensitivity;
- Mixed woodland on quartzitic and calcareous soils – mostly exhibiting a moderate-high floristic sensitivity;
- Natural Mixed Woodland – mostly exhibiting a moderate-high floristic sensitivity;
- Rehabilitated land – mostly exhibiting a low floristic sensitivity;
- Riparian Mopane Thickets and Riparian Thickets – mostly exhibiting a moderate-high floristic sensitivity; and
- Transformed and Deteriorated Land – mostly exhibiting a low floristic sensitivity.

Floristic attributes of the development footprint site

PCD 1

PCD 1 is situated within the existing Venetia mine property and comprises an area of approximately 2.1 ha. Habitat within the site exhibit some evidence of surface disturbances and deterioration from surrounding mining activities, however, portions of natural woodland remain within the footprint. The area and immediate surrounds are characterised by terrestrial, mixed woodland on the upland, outer parts of the site and lowland mesic environment in the central part, which forms part of the drainage line from the nearby (southern) non-perennial system. The characteristic vegetation habitat types within the footprint reflects topographical placement (i.e. terrestrial slopes and lowland floodplains), which are also characterised by varying soils; quartzitic and stony soils are generally encountered on the terrestrial upland areas while the lowland drainage line and floodplains are typically characterised by dark, deep and structured soils. Anthropogenic disruptive events have contributed to deterioration of the vegetatal layer, particularly the lowland, non-perennial drainage habitat. Refer also to Figure 11 below for the broad-scale vegetation types at PCD 1.

PCD 2

The PCD 2 site is situated entirely within the Venetia Mine property and comprises approximately 2.5 ha. It is situated immediately south of an existing waste rock storage areas and extensive parts of the site has been cleared from natural vegetation as a result of mining related activities and remaining vegetation bears evidence of the severity of direct and indirect impacts. Refer also to Figure 12 below for the broad-scale vegetation types at PCD 2.

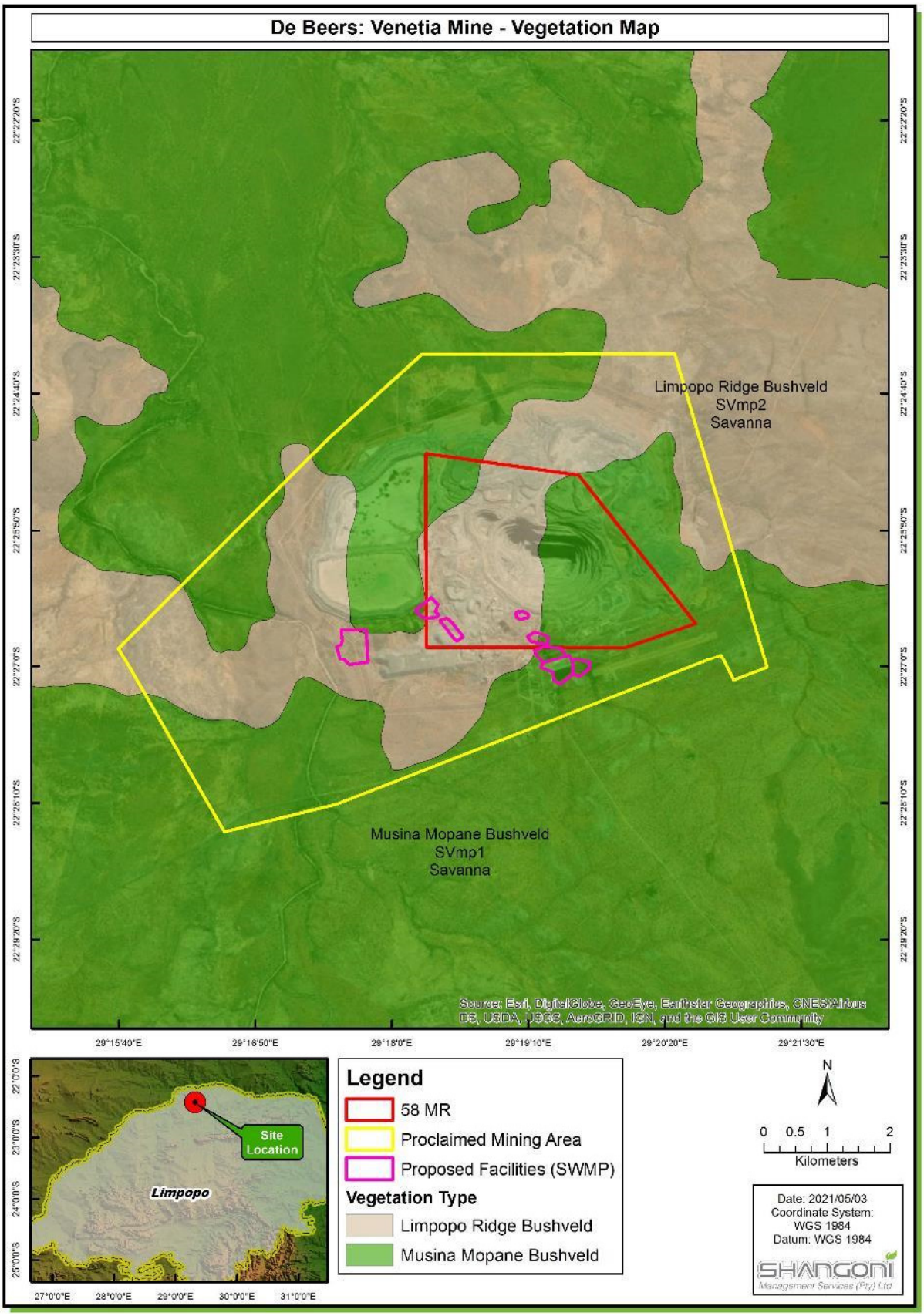


Figure 10: Vegetation associated with the proposed SWMP

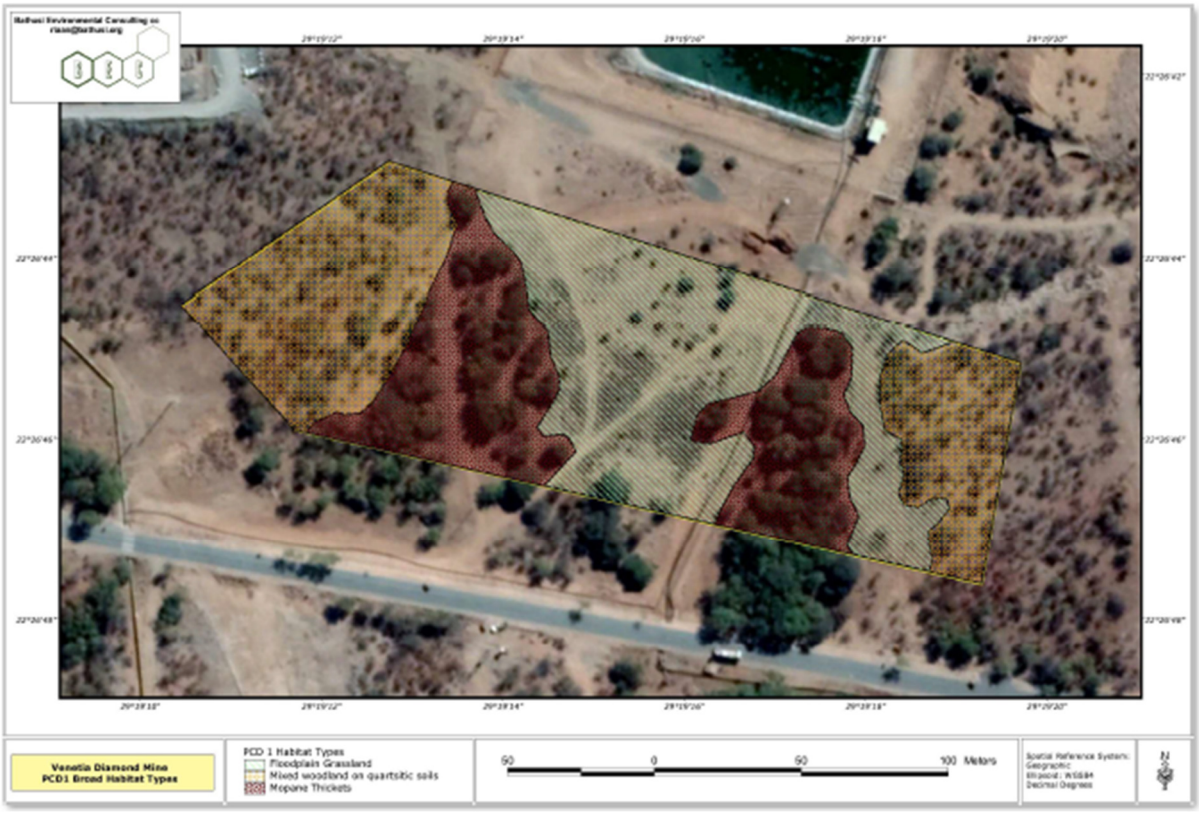


Figure 11: Broad-scale vegetation types at PCD 1 (Bathusi, 2021).

Figure 12: Broad-scale vegetation types at PCD 2 (Bathusi, 2021).

PCD 3

PCD 3 is situated partially within the Venetia Mine property (approx. 12.3 ha) and within the adjacent Venetia Limpopo Nature Reserve (approx. 9.1 ha), comprising an extent of 21.4 ha. Woodland situated within the Venetia perimeter exhibit evidence of the adverse impacts of mining related activities, including road clearance, seepage from nearby waste rock storage areas, land/ vegetation clearance and the infestation by pioneer vegetation, etc., and the physiognomy is generally a deteriorated form. In contrast, woodland habitat that is situated outside the Venetia Mine perimeter, in the Venetia Limpopo Nature Reserve ("VLNR"), exhibit attributes of natural and pristine status that is highly representative of the regional ecological type, i.e. Limpopo Ridge Bushveld) and was found to be comparatively species diverse, which is also a reflection of the habitat diversity that is encountered within these parts. The Beta Floristic Diversity for this site was 76 plant species recorded during the brief site inspection, reflecting the comparatively high habitat- and floristic diversity. Refer also to Figure 13 below for the broad-scale vegetation types at PCD 3.

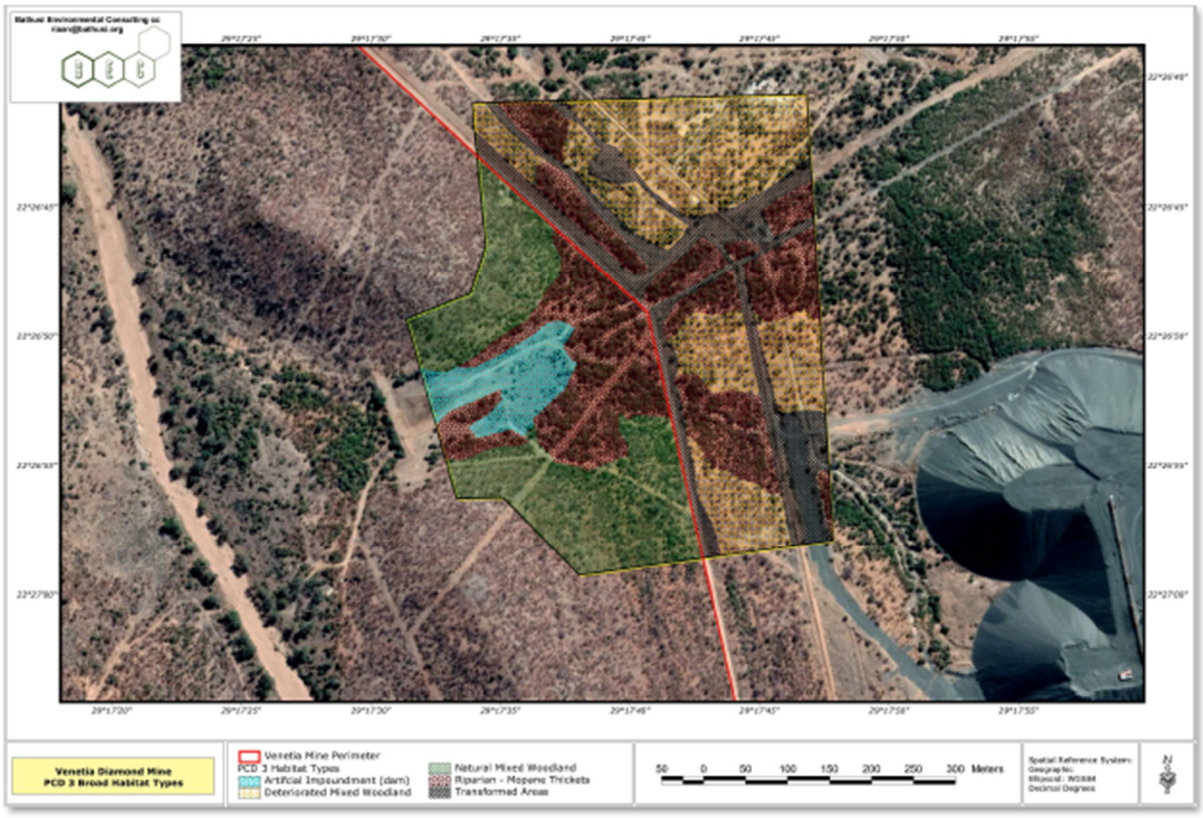


Figure 13: Broad-scale vegetation types at PCD 3 (Bathusi, 2021).

PCD 1 – Compartment 4B

The proposed PCD 1 – Compartment 4B site is situated within the Venetia Mine perimeter (approx. 1.6 ha) and comprises a portion of remaining mixed terrestrial woodland that is completely surrounded, and adversely affected by mining activities, including internal roads, storage areas and an informal drainage channel. This portion of land slopes towards the southeast and soils comprise shallow and gravelly

types that is leached. The Beta Diversity of this site is low; a total of only 35 species was recorded. Refer also to Figure 14 below for the broad-scale vegetation types at PCD 3.

Figure 14: Broad-scale vegetation types at PCD 1 – Compartment 4B (Bathusi, 2021).

FRD 1 RWD

The proposed FRD 1 RWD site is situated within the Venetia Mine perimeter. The site comprises approximately 7.4 ha and is surrounded by existing waste rock storage areas, with limited connectivity to the southwest. The site also comprises 2 existing water storage facilities that will ultimately be expanded to increase capacity. The expansion areas to the northeast and southeast of the existing dams comprises land that has been severely affected by mining and land clearance activities, with a small remaining portion of severely deteriorated woodland. The Beta Diversity of this site is low; a total of only 20 species was recorded during the site inspection period. Refer also to Figure 15 below for the broad-scale vegetation types at FRD 1 RWD.

OMWSD N & S

This site comprises existing water storage facilities, which will be ultimately expanded for increased capacity. The extent of the sites (collectively) is 13.0 ha. Resultant vegetation bears no resemblance to natural vegetation and include opportunistic and pioneer species that have colonised the retaining walls of the facilities. No specific surveys were therefore executed within these areas and a low floristic sensitivity is ascribed to the area.

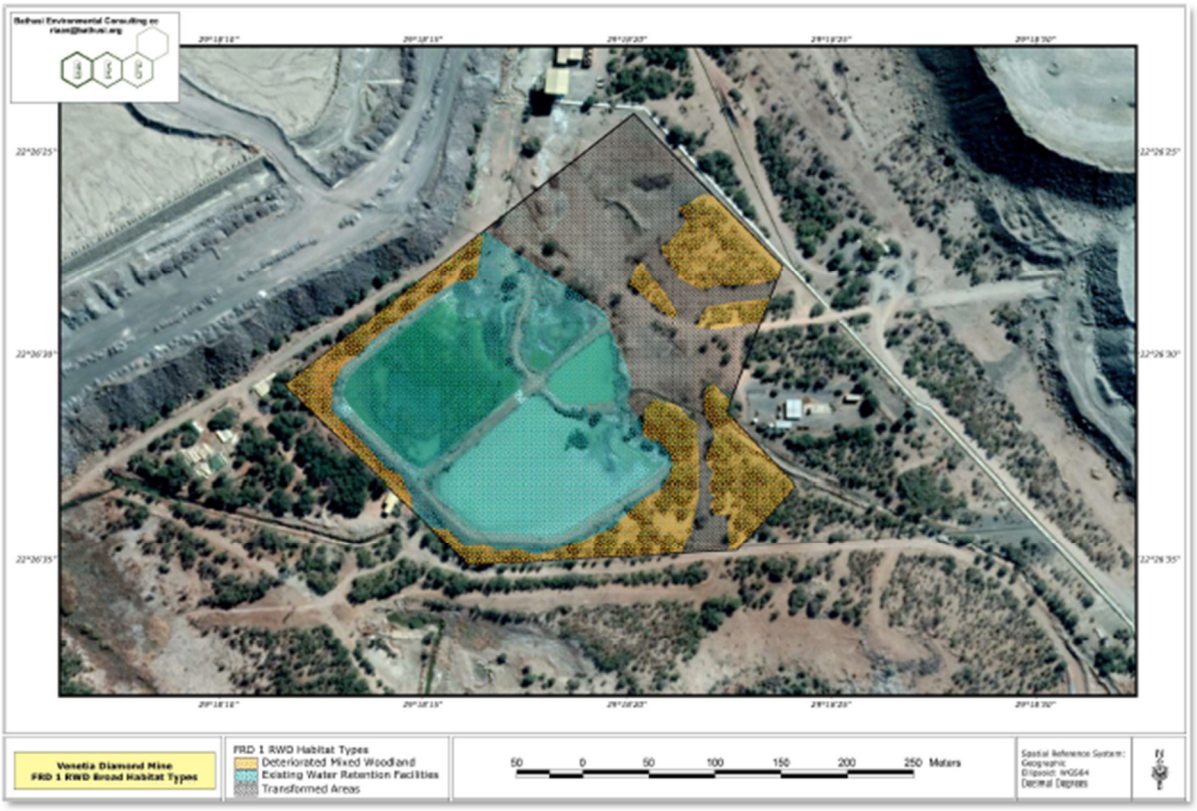


Figure 15: Broad-scale vegetation types at FRD 1 RWD (Bathusi, 2021).

OMWSD Compartment 3

The OMWSD Compartment 3 site is situated immediately downstream (north) of the OMWSD N & S area and upstream (south) from the PCD 1 site, comprising an area of approximately 8.5 ha. In addition to some internal mining access roads and transformed (cleared) land, remaining natural habitat correlates to the nearby PCD 1, manifesting as dense Mopane thickets in the lowland (riparian) parts and surrounding xeric mixed woodland on rocky and stony slopes. These vegetation habitat types within the footprint reflects topographical placement (i.e. terrestrial slopes on shallow undulations and lowland thickets along the riparian lines), and are also characterised by varying soils; quartzitic and stony/rocky soils are generally encountered on the terrestrial upland areas while the lowland drainage line and floodplains are typically characterised by dark, deep and structured soils. Anthropogenic disruptive events have contributed to deterioration of the vegetatal layer, particularly the lowland, non-perennial drainage habitat. Although only the northern section of this site could be accessed during the site inspection, a Beta Diversity of 48 plant species were recorded, indicating a moderate correlation with the regional ecological types in areas that have are not severely deteriorated from surrounding mining- and associated activities. Refer also to Figure 16 below for the broad-scale vegetation types at OMWSD Compartment 3.

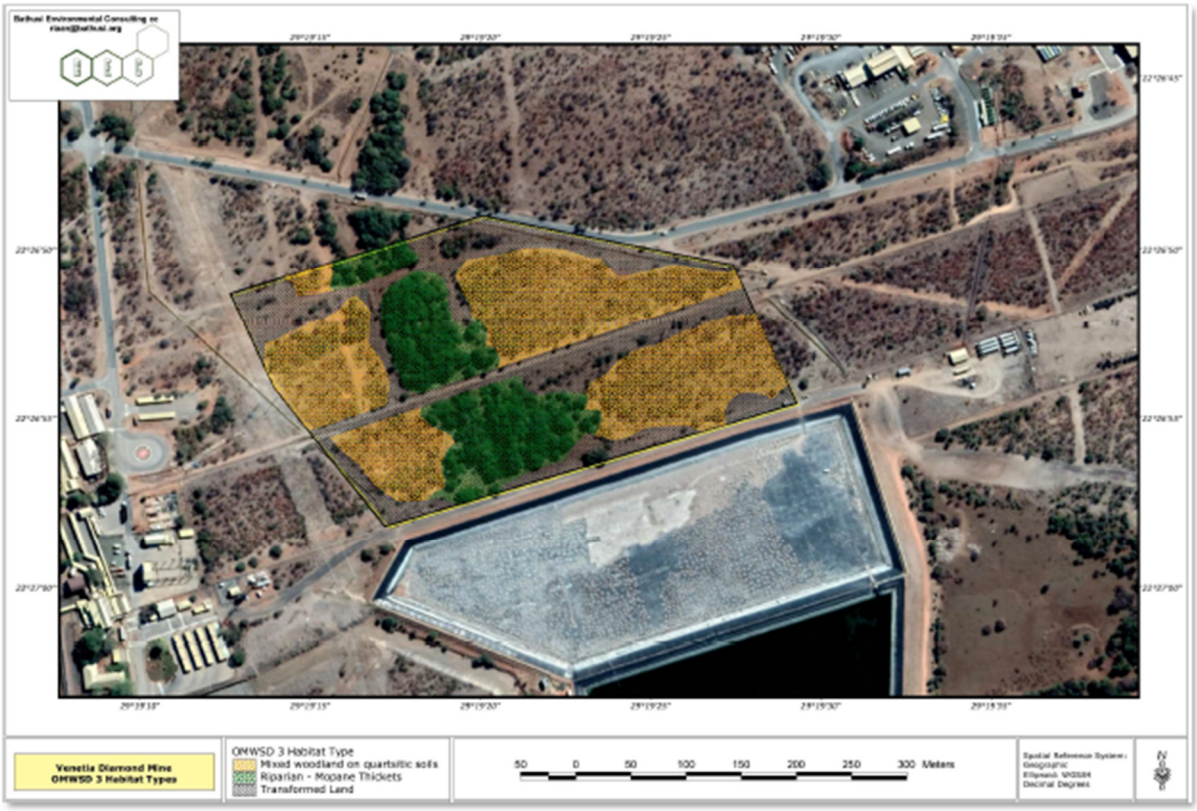


Figure 16: Broad-scale vegetation types at OMWSD Compartment 3 (Bathusi, 2021).

OMWSD Compartment 4

The OMWSD Compartment 4 site is situated outside the Venetia Mine perimeter, immediately adjacent (east) of the OMWSD N & S sites and comprises approximately 3.8 ha. Principally it forms part of the non-perennial drainage line that was transformed during the life of the Venetia mine, specifically form the existing OMWSD N & S facility that resulted in the artificial impeding of normal, perennial water flow, and causing the seasonal (near permanent) water in the dam. Surrounding vegetation has also been affected by land clearance activities (assumed to be from the 'excavation of the dam), as can be noted from aerial imagery from 2006, where much of the original woodland vegetation has been cleared; these areas have subsequently been recolonised by a secondary, depauperate and variable type. It is also evident that the riparian woodland has densified along the nonperennial stream, mostly as a result of the elevated moisture levels in the soils. Soils in these parts are generally red or brown with a moderate to high clay content and slopes are less than 2%. Refer also to Figure 17 below for the broad-scale vegetation types at OMWSD Compartment 4.

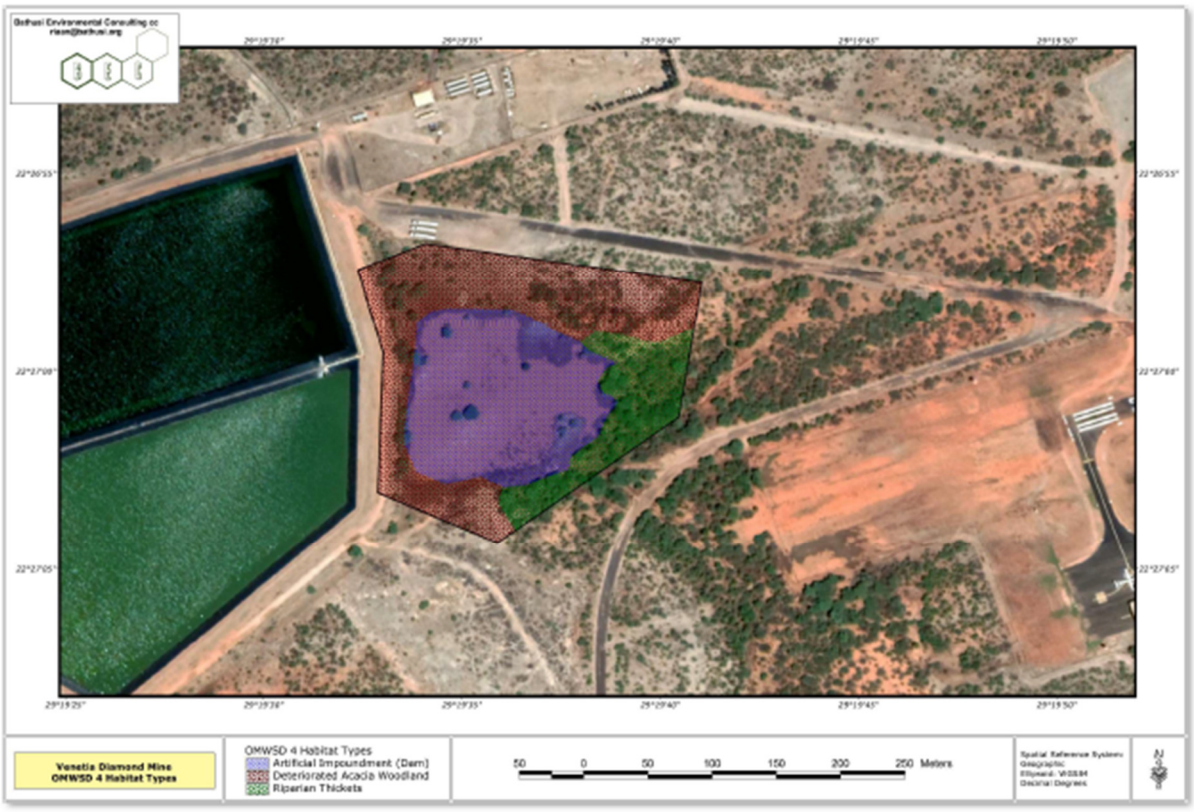


Figure 17: Broad-scale vegetation types at OMWSD Compartment 4 (Bathusi, 2021).

Southern access road to PCD 3

The construction and operation of PCD 3 requires an upgrade and widening of the existing access road to the PCD 3 site; an estimated 10 – 15 m widening will be required. To allow for access of large construction vehicles, an additional allowance is also required. This road will be situated within the VLNR and will comprise, apart from the existing road, limited natural and sensitive woodland habitat that is situated directly adjacent to the existing road. As a result of the linear nature of the road; comprising approximately 3.5 km, the topographical variation of the landscape dictate that terrestrial woodland (lowland, rocky slopes and rocky crests) and riparian (non-perennial) and smaller drainage lines will be crossed. A total of 65 species was recorded during the brief inspection period. Refer also to Figure 18 below for the broad-scale vegetation types along the southern access road.

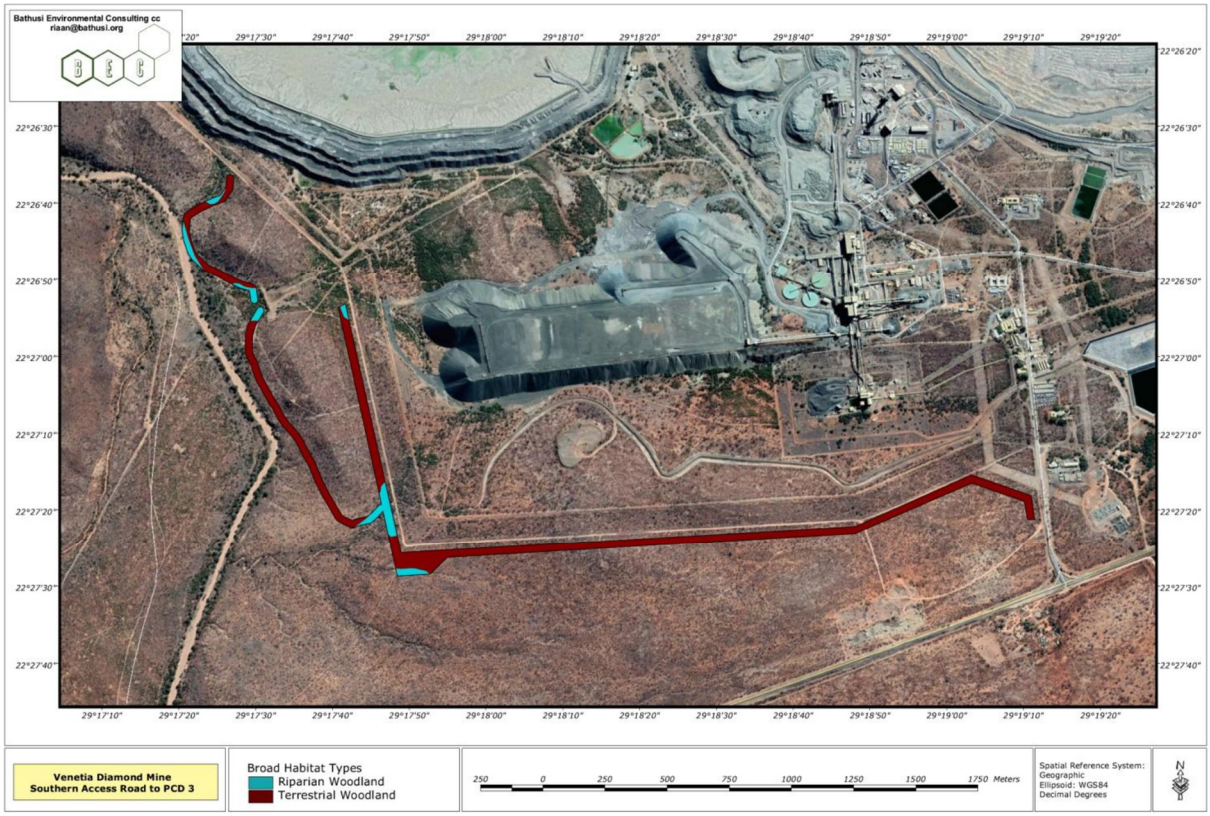


Figure 18: Broad-scale vegetation types along the southern access road (Bathusi, 2021).

Northern storm water and seepage attenuation channel

The proposed seepage and storm water attenuation channel along the northern perimeter of the Venetia Mine will comprise mostly of rehabilitated land, but importantly will cross two small non-perennial drainage lines that feeds northwards into the VLNR. The eastern drainage line originated south of the Venetia Mine, and originally formed part of the non-perennial drainage line that also feeds into the proposed OMWSD Compartment 4 site. Development of the Venetia Mine disrupted the natural flow of this drainage line. Reasoning for the attenuation channel is to provide protection for downstream areas against seepages from waste rock storage areas as the land slopes in a northern direction (into the adjacent mine area and VLNR). The Beta Diversity of these parts is comparatively low; only 30 plant taxa have been recorded during the brief site inspection. Refer also to Figure 19 below for the broad-scale vegetation types along the southern access road.

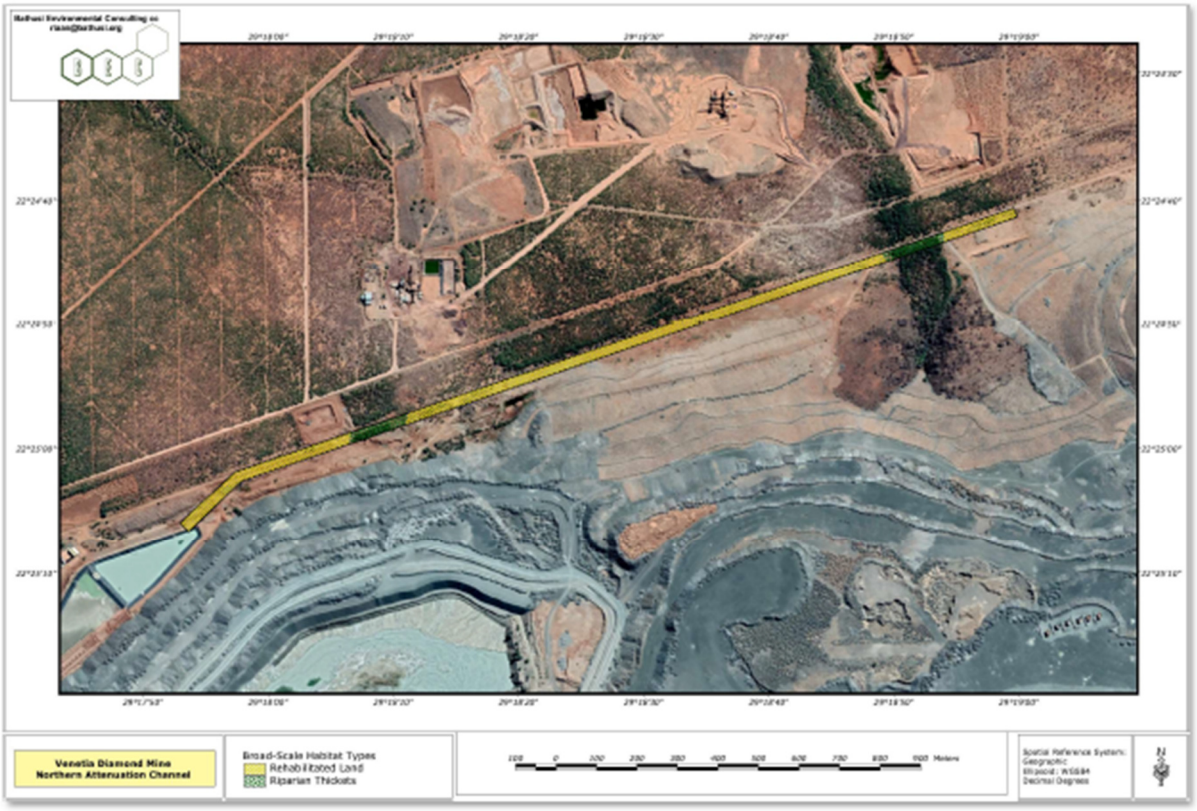


Figure 19: Broad-scale vegetation types along the Northern storm water and seepage attenuation channel (Bathusi, 2021).

Chapter F: Fauna

The following information was sourced from the *Terrestrial biodiversity impact assessment for the proposed storm water management project for De Beers Consolidated Mines Limited – Venetia Mine, that is situated near Alldays in the Limpopo province,* compiled by Pachnoda Consulting and Bathusi Environmental Consulting, June 2021 (Annexure E3).

Mammals

According to the presence of suitable habitat and the extant (or known) distribution ranges of mammal taxa in the study area (*sensu MammalMap*), the expected mammal richness on the study site and immediate surroundings is approximately 79 species, which include the Giant Cane Rat (*Thryonomys swinderianus*), which were not previously recorded from the QDS that overlaps with the study area. It implies comparatively high mammal richness for the study areas explained by the position of the VLNR adjacent to the proposed PDC3 and south access road footprints.

Basically, all the expected species occur within the VLNR, which contributes considerably to the high expected richness for the area. However, a definite decrease in species richness on the study area is expected along a west to east gradient (from PCD 3 towards PCD 1 Compartment 4), with a higher number of species expected from PCD 3 when compared to PCD 1 and PCD 1 Compartment 4, which both are located within areas that are severely affected by intensive mining activities and considerable movement and presence of personnel and mining vehicles.

Of the 79 expected species, 52 mammal species (c. 67 % of the total number of expected species) exhibit a high probability to occur within the proposed footprint sites, especially on PCD 3 and the proposed south access road. In addition, 14 species exhibit moderate probabilities of occurrence, while 13 of the expected species indicate low probabilities of occurrence, although some of these were observed within the VLNR during the site visit (e.g. Lion *Panthera leo* and Elephant *Loxodonta africana*). Species that exhibit low probabilities either share distribution ranges peripheral to the study area or ecological information on their life histories and taxonomy are scant, thereby rendering their presence on the site as uncertain or questionable, even though suitable habitat is present. Many of these species are however known to be (periodically or opportunistically) present within the VLNR (e.g. African Wild Dog *Lycaon pictus*). Those taxa with the highest number of records for the wider study area (dominant taxa - *sensu MammalMap*) include charismatic carnivores, scavengers and pachyderms such as African Wild Dog (*Lycaon pictus* - 1,647records), Black-backed Jackal (*Canis mesomelas* - 364 records), Lion (*Panthera leo* - 94 records), Cheetah (*Acinonyx jubatus* - 76 records), Leopard (*Panthera pardus* - 46 records), Brown Hyaena (*Parahyaena brunnea* - 47 records) and other smaller taxa such the African Savanna Hare (*Lepus saxatilis* - 65 records). Most of these records are biased towards census and research programmes that were (and some are still current) focussed on the VLNR, which is part of the De Beers funded research initiatives.

A total of twenty-one species (21) were confirmed during the site visit, which represent 40% of the anticipated richness with a high probability to occur. This observed diversity includes the following:

- two (2) rodents;
- five (5) bovid antelopes;
- one (1) equid (zebra);
- one (1) canid (jackals);
- two (2) primates (monkeys and baboons);
- one (1) herpestid (mongoose);
- one (1) leporid (hares and rabbits);
- one (1) macroscelid (sengi);
- one (1) suid (pigs);
- one (1) hyaenid (hyaenas);
- one (1) sciurid (squirrel);
- one (1) viverrid (civets); and
- three (3) carnivores (cats).

Apart from those species confirmed on the study area (within the proposed footprint sites), the Lion (Panthera leo) and Elephant (Loxodonta africana) were observed from the adjacent VLNR, although not within the physical footprint sites. During the site visit it became evident that large-bodied game and large carnivore species were common (frequently observed) on the study area, although these occur mostly on areas adjacent to the VLNR.

Biodiversity value and ecological considerations

The following key observations were made:

- It is evident that the mammal richness on the study site was high, which is best explained by the nearby spatial position of the VLNR. Refer also to Figure 20 to Figure 23 below for an illustration of the faunal importance and function
- Domestic cats (*Felis catis*) are prevalent on the study area (within the Venetia Mine perimeter) and may pose an eminent threat to the extant small vertebrate fauna within the wider area. The occurrence of domestic cats may also result in genetic contamination of the indigenous feline population, in particular African Wild Cat (*F. sylvestris*), due to inbreeding.
- The high ecological connectivity of some of the proposed footprint sites (e.g. PCD 3 and the southern access road) with the nearby VLNR explains a high richness of mammal species at these particular areas, with an eastward decrease in richness (e.g. at PCD 1 and PCD 1 Compartment 4).
- The nearby VLNR provide habitat for many charismatic and large-bodies carnivores, scavengers and pachyderms such as African Wild Dog (*Lycaon pictus*), Lion (*Panthera leo* - 94 records), Cheetah (*Acinonyx jubatus*), Leopard (*Panthera pardus*), Brown Hyaena (*Parahyaena brunnea*) and Elephant (*Loxodonta africana*), with some overspill of these species into the study area (e.g. the western and southern parts of the study area).

Threatened and near-threatened mammal taxa

Four regionally threatened and three near threatened mammal species are known to be present in the wider study region (*sensu MammalMap*; Child et al., 2016). Three of these species (Leopard *Panthera pardus*, Serval *Leptailurus serval* and Brown Hyaena *Parahyaena brunnea*) exhibit a high probability of occurrence, and were positively confirmed during the site visit on the study area (mainly from PCD 3 and the proposed southern road.

Another two species, the Lion (*Panthera leo*) and African Elephant (*Loxodonta africana*) are categorised on a national (regional) level as least concern (Child et al., 2016), but were elevated to global threatened categories, with the Lion being globally vulnerable (Bauer et al., 2016) and the African Elephant being globally endangered (Gobush et al., 2021) by the IUCN (2021). Reasons for the elevation of the conservation status of these species were based on new molecular studies that have shown prominent differences in the phylogeography between disparate sub-populations that warrant the treatment of distinct "species" among the population elsewhere in Africa. For this reason, the IUCN has decided to treat the two elephant subspecies, *L. a. africana* (African Savanna Elephant) and *L. a. cyclotis* (African Forest Elephant) as two different species. A similar approach is proposed for the lion population, with splitting *Panthera l. leo* from West, Central and North Africa, from *P l. melanochaita* that occur in South and East Africa. However, the national sub-population of both the Lion and Elephant have remained stable or has even increased in large, protected areas, with most of the national population being adequately conservation in protected areas and national parks (Miller et al., 2016; Selier et al., 1016). Irrespective of their least concern national conservation status, it is evident that both species remain dependant on conservation initiatives. The Lion and Elephant were both confirmed from the VLNR, although being absent from the proposed study areas. Since both species are often involved in human-

animal conflict, it is strongly recommended that security measures and access control measures prevent these species from accessing the actual development sites.

Amphibians - The amphibian richness on the study site is considered low, with 14 frog species expected to occur. Only 11 of these have high probability of occurrence) on the study sites, of which three species were confirmed during the survey. Some of the study site (e.g. PCD 3) when inundated provides breeding habitat for obligate or "true" aquatic frog species such as Tropical Platanna (*Amietia delalandii*) and also offers ephemeral foraging and breeding habitat for widespread species such as Southern Foam Nest Frog (*Chiromantis xerampelina*), Plain Grass Frog (*Ptychadena anchietae*) and Bubbling Kassina (*Kassina senegalensis*).

Threatened and near-threatened

No frog species of conservation concern is expected to be present on the study area.

Reptiles - The reptile composition on the study site is poorly known with only 33 species currently known from the wider study area (c. QDS 2229AD, sensu ReptileMap, including personal observations). The expected reptile richness is underestimated for the study site (and surrounds), and predicted that the richness may be double the known richness. Both the Boomslang (*Dispholidus typus*) and Water Monitor (*Varanus niloticus*) were confirmed from the wider study area, which were not previously recorded from the area (sensu ReptileMap).

Threatened and near-threatened

The Nile Crocodile (*Crocodilus niloticus*) is the only reptile species of conservation concern that was observed on the study area. It is categorised as vulnerable during the 2014 SARCA assessment (sensu Bates et al., 2014), although a recent global assessment downlisted it to the least concern category (IUCN, 2021). A single individual was observed from an inundated dam at the PCD 3 site. In the event that development has to take at PCD 3, all specimens will require relocation to the nearest suitable habitat (e.g. VLNR) with the necessary permission and permits from the local conservation authority.

Butterfly taxa - The results of a screening report as per the outcome of the Environmental Screening Tool (21/06/2021) produced a medium sensitivity for the animal theme on the study site with the potential occurrence of one diurnal butterfly species: Little Ciliate Blue (*Anthene minima minima*). This species is globally least concern, although listed as a national priority butterfly species since it occurs in low densities. It is a small cryptic butterfly species that is easily confused with other similar-looking "blue" butterfly species of the family Lyceanidae, especially due to its habit of congregating at the tops of tree where it joins other small or tiny lycaenids (which makes it difficult to detect among other similar-looking species). Although widespread, it occurs on low numbers where it has been recorded from scattered records in KwaZulu-Natal, northern Limpopo and Mpumalanga. It is ‘on the wing’ from September to April, where the adults are believed to breedon Vachellia tree species (thorn trees). It was not recorded on the study area, although suitable breeding habitat occurs, which is also very widespread and abundant in the area. In addition, it was not collected or observed from 2229AD or any of the QD squares that are located adjacent to 2229AD (sensu Mecenero et al., 2013). The nearest collection records are from areas south of the study area, which appear to coincide with habitat that is

associated with the Soutpansberg mountain range and adjacent plains. The only members of the genus Anthene that were observed during the site visit include *A. definita* (Steelblue Ciliate Blue) and *A. amarah* (Black-striped Ciliate Blue). Therefore, the occurrence of A. minima on the study area remains undetermined, even though suitable habitat was present. It is not possible to comment on its probability of occurrence on the study area in the absence of further detailed sampling programmes owing that it has not been collected from nearby habitat and that it is easily overlooked, as well as the fact that larval host plant taxa are widespread in the area.

Avifauna - Approximately 213 bird species are expected to occur on the wider study area (including adjacent habitat), of which 111 species were observed during the site visit (April 2021). The expected richness was inferred from the South African Bird Atlas Project4 (SABAP2; www.sabap2.birdmap.africa), professional judgement and the presence of suitable habitat on the study site. This equates to 22 % of the approximate 9795 species listed for the southern African subregion6 (and approximately 254 % of the 855 species recorded within South Africa). Although 111 species were recorded on the study sites and immediate surroundings (e.g. adjacent part of VLNR), the average richness for pentad grid 2225_2915 (sympatric to the study area) is lower than the observed richness at 51 species according to three submitted cards, with 30 species being the highest number recorded during two hours. In addition, a mean of 26.6 species is recorded for each full protocol card submitted8 (e.g. when observations took two hours and longer) when the eight adjacent grids are included. The low bird species numbers and number of cards submitted to SABAP clearly illustrates that the avifauna at the study area has been poorly documented. This statement is supported by 13 bird species that was recorded during the site visit on the study area which have not been previously recorded from any of the nine pentad grids that define the wider study area. Many of these species are in fact widespread species, although approximately 50 % are facultative waterbird species which were all observed from inundated dams and ponds on the study area (e.g. PCD 3).

The study site is poorly represented by biome-restricted and regional endemic species, while also being unable to support any local endemic species (species endemic to South Africa). It supports only two regional endemic species and 14 near-endemic species confined to southern Africa, and contains five Biome restricted species that are confined to the Zambezian Woodlands and Kalahari-Highveld. Therefore, the study area is not considered as an important endemic bird area, or "hotspot" area which could sustain avian speciation over evolutionary times.

Of the 213 expected bird species, seven are threatened and/or near threatened species, of which the endangered Martial Eagle (*Polemaetus bellicosus*) was the only threatened bird species observed from habitat nearby the study area (at the VLNR).

Threatened and near threatened

A total of seven (7) species have been recorded in the wider study area (sensu SABAP2 and personal observations) which include five (5) globally threatened species, one (1) globally near threatened species and one (1) regionally near threatened species. The globally/regionally endangered Martial Eagle (*Polemaetus bellicosus*) was the only species observed in the wider study area during the site visit. However, it was only observed at the nearby VLNR with an active nest recorded at approximately

4 km west of the PCD 3 site. The regionally near threatened Greater Painted Snipe (Rostratula benghalensis) is regarded as an irregular visitor to the study area depending on rainfall cycles and the flooding op ephemeral pools and depressions. Although a regular breeding visitor to the nearby Mapungubwe National Park, it could occur on occasion at the pond at PCD 3 during exceptional high rainfall events.

The remaining five species include large scavenger birds of prey, the Secretary bird (*Sagittarius serpentarius*) and the Kori Bustard (*Ardeotis kori*) that are fairly regularly observed in the wider study area, especially in the nearby Mapungubwe National Park and the VLNR. However, these are regarded as high irregular visitors to the proposed study areas. Disturbances associated with mining-related activities are probably responsible for the displacement of most of these species from the proposed study sites.

Important bird and biodiversity areas

The study site does not overlap with any Important Bird and Biodiversity Area (IBA), with the nearest IBA (c. Mapungubwe; SA001) being 17 km north of the study area (sensu Marnewick et al., 2015).

Faunal importance

The fauna importance of the study sites was based on the inherent biodiversity value and ecological function of the respective habitat units corresponding to each site. Refer to Figure 20 to Figure 23 below for an illustration of the faunal importance and function. Major emphasis was placed on the following functional aspects during the sensitivity grading process:

- Presence of habitat of high vertical heterogeneity: Area with intact mixed of riparian woodland tend have taller tree canopies. Habitat containing taller canopy structure, will provide a higher niche space for bird and arboreal animal species though an ecological process of niche packing. Therefore, it allows species with similar guilds (e.g. insectivorous foliage gleaners in birds) to co-occur without too much inter-specific competition for recourses. The result is that more species could occur in habitat with high vertical heterogeneity.
- Presence of specialised habitat: The presence of wetland or aquatic habitat (including functional manmade impoundments) provide habitat for stenotropic animals species with high affinities to either moist conditions or inundated habitat. Many of these habitat units are either spatially limited (azonal) and hence uncommon in the region. Typical species include facultative wetland taxa, such as shorebirds and waterbirds, which will collectively contribute towards the overall species diversity in the area.
- Ecological connectivity: Intact habitat that are located along drainage lines, as well as habitat on the periphery of the mine area that "linked" to the VLNR will promote animal dispersal, thereby allow for more species to utilise the habitat units at a particular site.

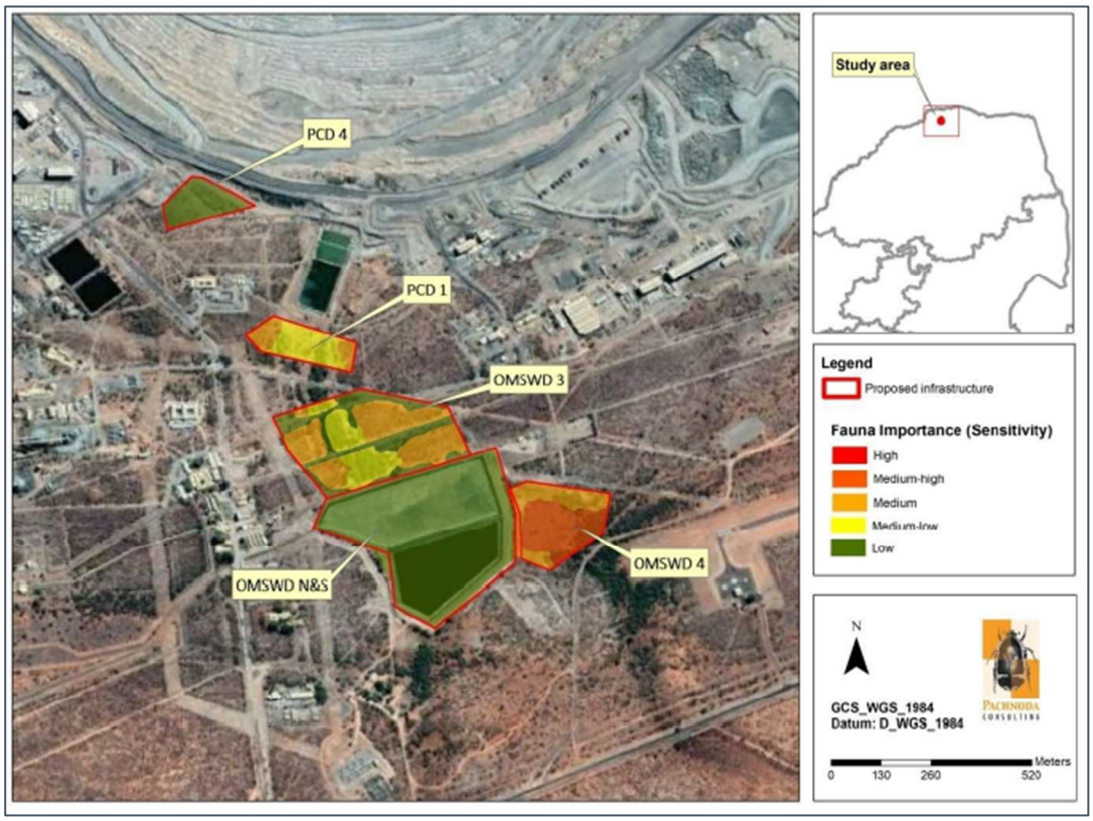


Figure 20: Faunal importance and function (ecological sensitivity) based on the occurrence of terrestrial fauna on PCD 1, PCD 1 Compartment 4, OMWSD North and South Compartments, OMWSD Compartment 3 and OMWSD Compartment 4

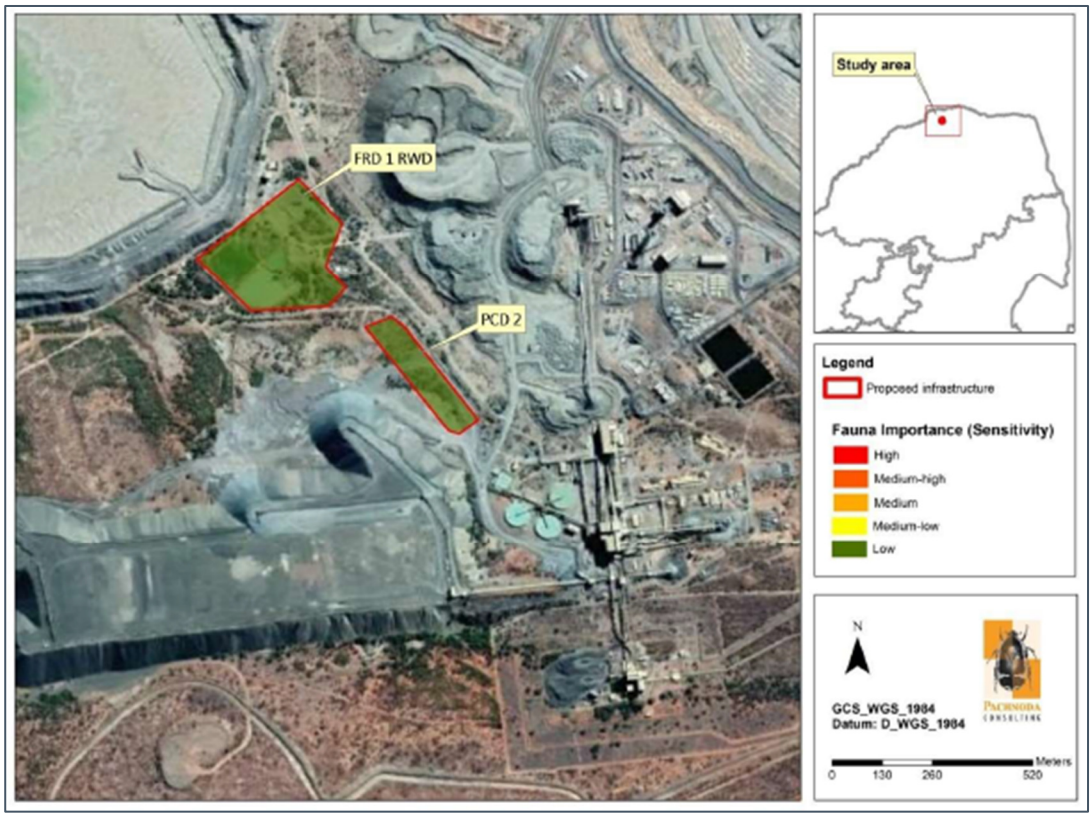


Figure 21: Faunal importance and function (ecological sensitivity) based on the occurrence of terrestrial fauna on PCD 2 and FRD 1 RWD

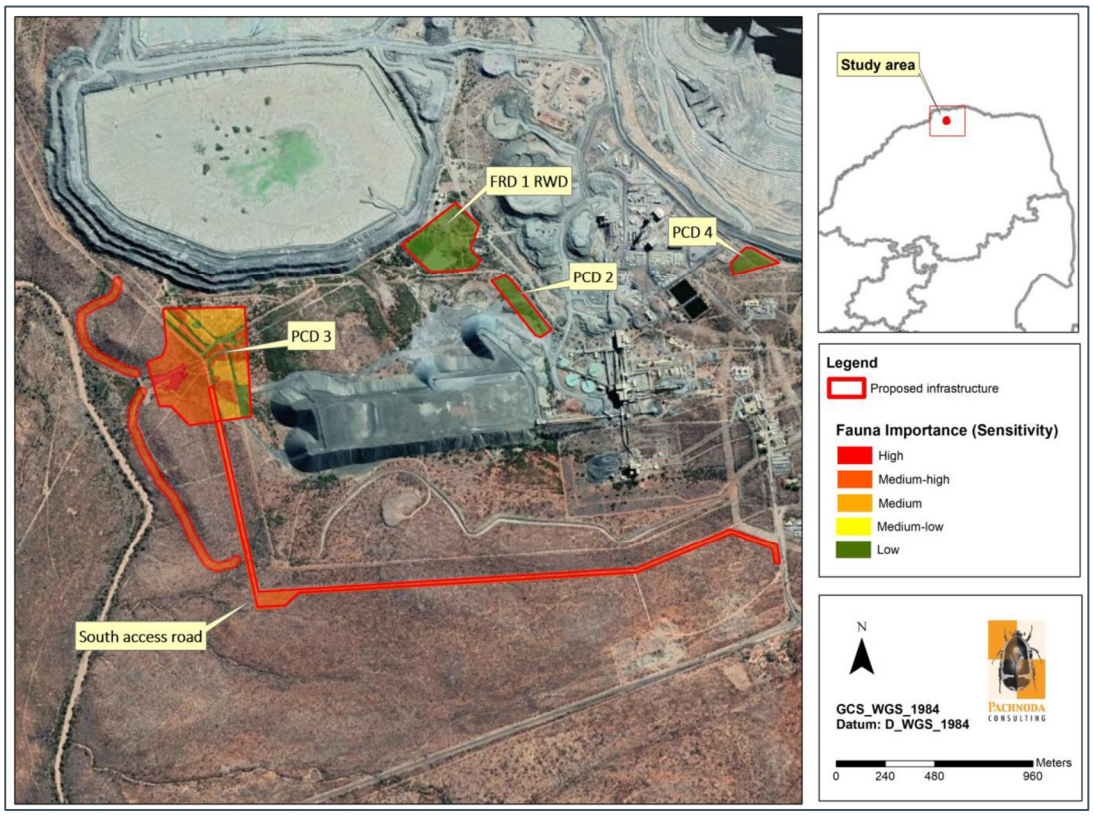


Figure 22: Faunal importance and function (ecological sensitivity) based on the occurrence of terrestrial fauna on PCD 3 and the South Access Road

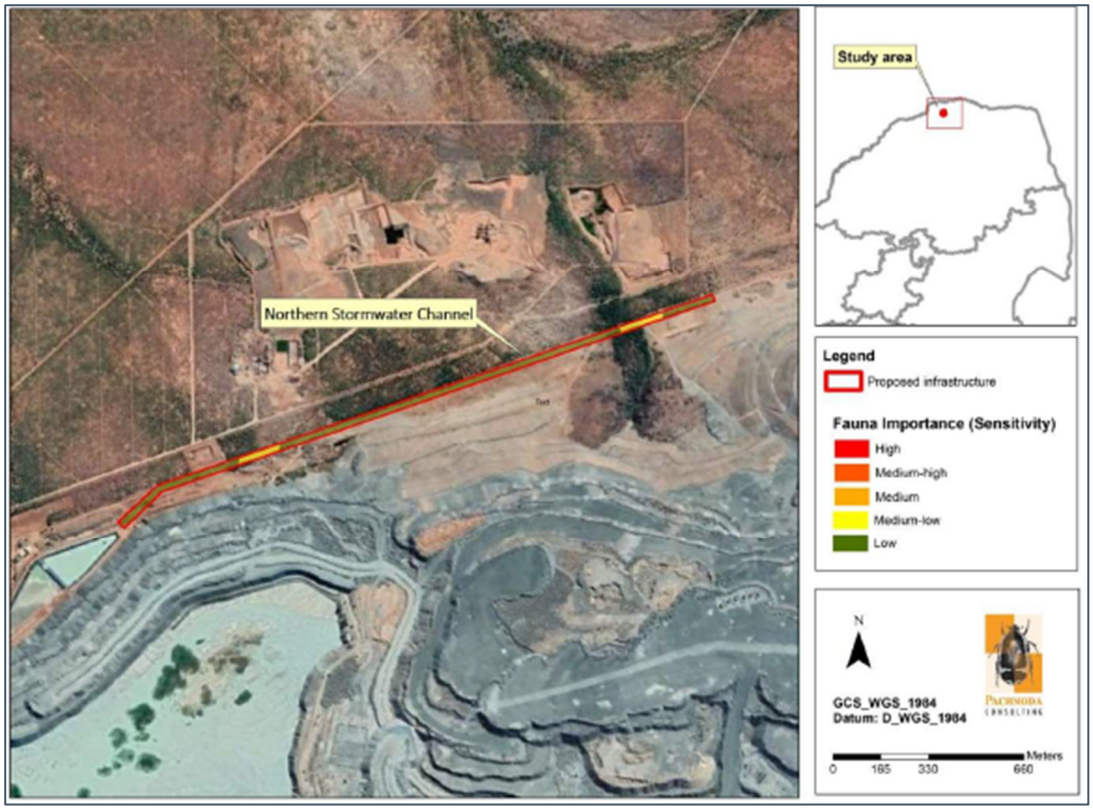


Figure 23: Faunal importance and function (ecological sensitivity) based on the occurrence of terrestrial fauna on the Northern Storm water and Seepage Attenuation Channel

Chapter G: Surface water

The following information was obtained from the report *De Beers Consolidated Mine (Pty) Ltd: Venetia Mine Surface Water Assessment in support of the proposed Storm Water Management Project*, dated June 2021 and prepared by Shangoni Management Services. Refer to Annexure E1 for the specialist report.

Water management area

Venetia Mine is situated within the Limpopo River primary catchment area and the Limpopo water management area. The Limpopo DWS is the responsible water authority. Refer to Figure 24 below for the surface water resources in the vicinity of Venetia Mine.

Surface water hydrology

The area of the quaternary catchment A63E area is approximately 1 992 km^2 with the Kolope being 527 km^2 and the Matotwane River 142 km^2 (refer to Figure 25). There are no perennial rivers on the mine property. The catchment area of the Kolope River at the confluence with the Matotwane River is 669 km^2. The flow record covers the period from October 1920 to September 2003. The Kolope River is located west of the Venetia Mine pit and flows northwards through the western corner of the Venetia Mine property. The Kolope is a non-perennial river that floods for short periods following heavy rainfall events in the catchment area. Flooding of the river does not bare consequence to the mine, due to its location outside the mining area. The Matotwane River is a tributary of the Kolope River. It is located east of the Venetia Mine pit and flows northwards where it meets with the Kolope River around 9.5 km north of the mine site. A further 10 km north-east, the Kolope River joins with the Limpopo River.

It has been noted that prior to the mining excavations, a small ephemeral streambed “Central” passed through the centre of the pit running from south to north and this was deviated via a canal to the west towards the Kolope River. Nevertheless, under extreme rainfall conditions, this area can still transport water into the pit as this remains a preferential water flow path. The general surface topography of the site indicates that the majority of rainfall runoff will flow in a north north-westerly direction along the gentle gradient of 0.008 m/m towards the Kolope River.

Surface water quality

The following surface water quality conclusion was extracted from the report *De Beers Group Venetia Mine Annual Compliance Water Quality Assessment Report*, dated 23 February 2021 and prepared by Aquatico Scientific (Pty) Ltd. Refer to Annexure E4 for the water quality report.

- Pit sumps - Elevated nitrate concentrations were recorded at all of the pit sump localities and can most likely be attributed to the nitrate-based explosives used in opencast mining practices (blasting). It should be noted that this is only speculative at this stage and should be investigated.
- Wastewater containment - Based on the water quality profiles of the majority of the waste water at Venetia Mine, the water poses a significant risk of corrosion with increasing concentrations of chloride, sodium and sulphate, especially to water infrastructure.
- Receiving environment - Two intermittent river courses, the Kolope River the west and Matotwane River to the east are included in the monitoring programme. These streams are only expected to

contain flow during flood events. All the localities were recorded as dry at the time of the scheduled monitoring trips throughout the 2020 annual period.

The following surface water monitoring points (Table 10) are monitored at Venetia Mine. Refer to Figure 26 below, depicting the surface water monitoring points.

Table 10: The surface water monitoring locations

Locality Name	Description	Coordinates		Sampling Frequency and Analyses Package			
		S	E	Monthly (Jan-Dec)	Quarterly (Mar, Jun, Sep, Dec)	Bi-annual (Jun, Dec)	Annual (Dec)
K2	K2 sump in Pit	-22.4338	29.3183	AQP04, COD, NTU, SOG	AQP04, COD, NTU	VPH	AQP06
K3	K3 sump in pit	-22.4293	29.3127				
RR1	Ring road north from Barloworld	-22.4401	29.3289				
RR2	North eastern perimeter of ring road	-22.4304	29.3287				
DB1	Old FRD seepage to the south at dead trees	-22.4434	29.3021	-			
CC1	Clarifying chambers process water to thickeners	-22.4471	29.3102				
MTP	Ore wash water run-off discharge into veld	-22.4459	29.3151				
RWE	Reclaimer Works effluent	-22.4474	29.3162				
S17	RWD at old slimes dam	-22.4442	29.2934				
DBVS01	Kolope River upstream from Venetia Mine	-22.4677	29.2886				
DBVS02	Kolope River downstream from Venetia Mine	-22.3608	29.2624				
DBVS03	Matotwane River upstream from Venetia Mine	-22.4733	29.3676				
DBVS04	Matotwane River downstream from Venetia Mine	-22.3887	29.3406				
FRD2 NS Dam	FRD2 North Seepage Dam	-22.4154	29.3016				
VD2	Venetia waste rock dump seepage 2	-22.4135	29.3146				
CRD	CRD seepage	-22.4468	29.3042				
CRD West	CRD seepage on west	-22.4461	29.2960				
South dam	South Dam storage	-22.4516	29.3244				
North Dam	North Dam storage	-22.4496	29.324				
Res 1 (raw)	Reservoir 1 raw water	-22.4435	29.3155				
Res 2 (raw)	Reservoir 2 raw water	-22.4442	29.3165				
Res 3 (pot)	Reservoir 3 potable water	-22.4445	29.3155				
OLD FRD	Old fines residue deposit (tailings)	-22.4435	29.304				
New FRD	New fines residue deposit (tailings)	-22.4292	29.2991				
Sub 13 RWD-N	Return water dam at Substation 13 Northern Compartment	-22.4425	29.3042				
Sub 13 RWD-S	Return water dam at Substation 13 Southern Compartment	-22.4423	29.3048				
Sub 15 RWD-E	Return water dam at substation 13 Eastern Compartment	-22.4211	29.2979				
Sub 15 RWD-W	Return water dam at substation 13 Western Compartment	-22.4209	29.2971				
Pit storm WCD	Pit storm water control dam	-22.4451	29.3207				
VUP CWD	VUP Clear Water Dam	-22.4392	29.3145				
UG VUP Decline	UG VUP Decline	-22.4443	29.3140				
Treatment plant effluent	Venetia water treatment plant effluent	-22.4421	29.3065	AQP02, ALM40, COD, NTU, SOG			
Red Area French Drain	Red Area Sewage Effluent	-	-				
Red Area Dosing dam	Red Area Dosing dam	-	-				

Locality Name	Description	Coordinates		Sampling Frequency			
		S	E	Monthly (Jan-Dec)	Quarterly (Mar, Jun, Sep, Dec)	Bi-annual (Jun, Dec)	Annual (Dec)
D1	Barloworld - at end of shop	-22.4435	29.3306	SOG	AQP04, COD, NTU, VPH	-	AQP06
D2	Terex - between Barloworld and Terex ("DRIZIT")	-22.4441	29.3295				
D3	Wash bay	-22.443	29.3249				
D4	One stop	-22.4439	29.3233				
D5	Workshop 4	-22.4469	29.3152				
D6	Refuelling bay	-22.4506	29.3274				
D7	VM Diamond	-22.4539	29.3202				
D8	DRIZIT - VM Diamond outside mining area	-22.4542	29.3213				
D9	Drizit at Vehicle and Transport	-22.4457	29.3251				
D10	Core Shed Drizit	-22.4377	29.3129				
D11	EMV Wash bay NEW	-22.4424	29.3315				

Resource class and river health / Receiving water quality objectives and reserve

At the time of this report, the water quality objectives and the reserve for the Limpopo River catchment was not yet available. The (then) Department of Water Affairs ("DWA") has performed a situation assessment at quaternary catchment scale within the Limpopo Water Management Area in 2003. In order to provide some ecological basis for the estimates of water requirements to maintain a particular class of river the DWS (then referred to as the DWA) decided to base estimates of water requirements on an index of the Ecological Importance and Sensitivity Class ("EISC") of the rivers in the quaternary catchment of concern. The EISC of the rivers was used by the DWS to derive the Default Ecological Management Class ("DEMC"), which relates to a Default Ecological Status Class ("DESC"). The DESC and the Present Ecological Status Class ("PESC") have been used by DWS to arrive at a suggested Future Ecological Management Class ("FEMC") to be considered for the water resources.

Table 11: Water Requirements for Ecological Component of the Reserve (DWA, 2003).

Catchment						Ecological Water Requirements for PESC			
Primary		Secondary		Tertiary					
No	Description	No	Description	No	Description	Present Ecological Class	% Virgin MAR	10^6 m^3/a	Impact on 1:50 yr yield + (10^6 m^3/a)
A	Limpopo	A6	Mogalakwena	A63	Kolope	C	12.1	0.9	0.00

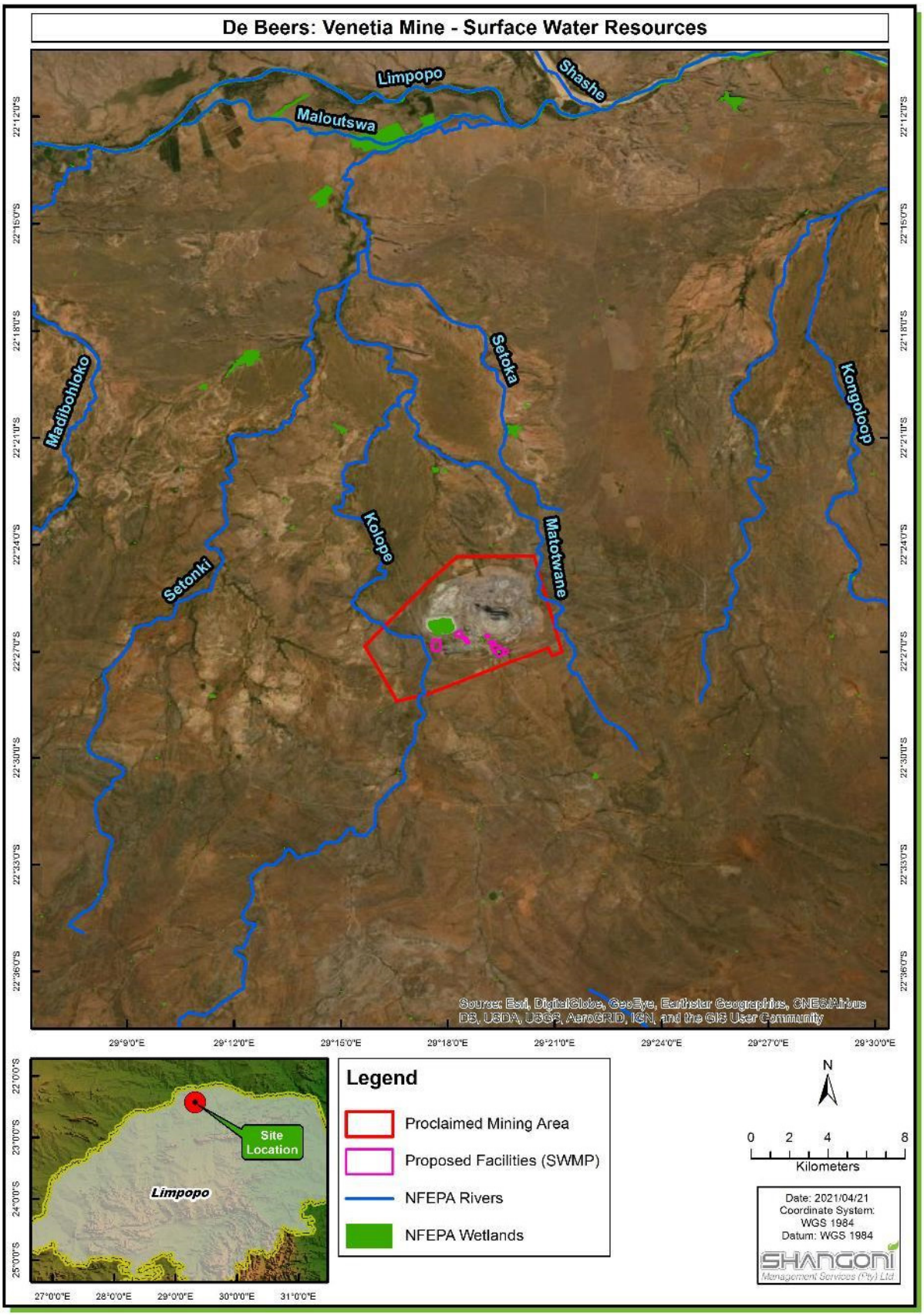


Figure 24: Surface water resources associated with Venetia Mine

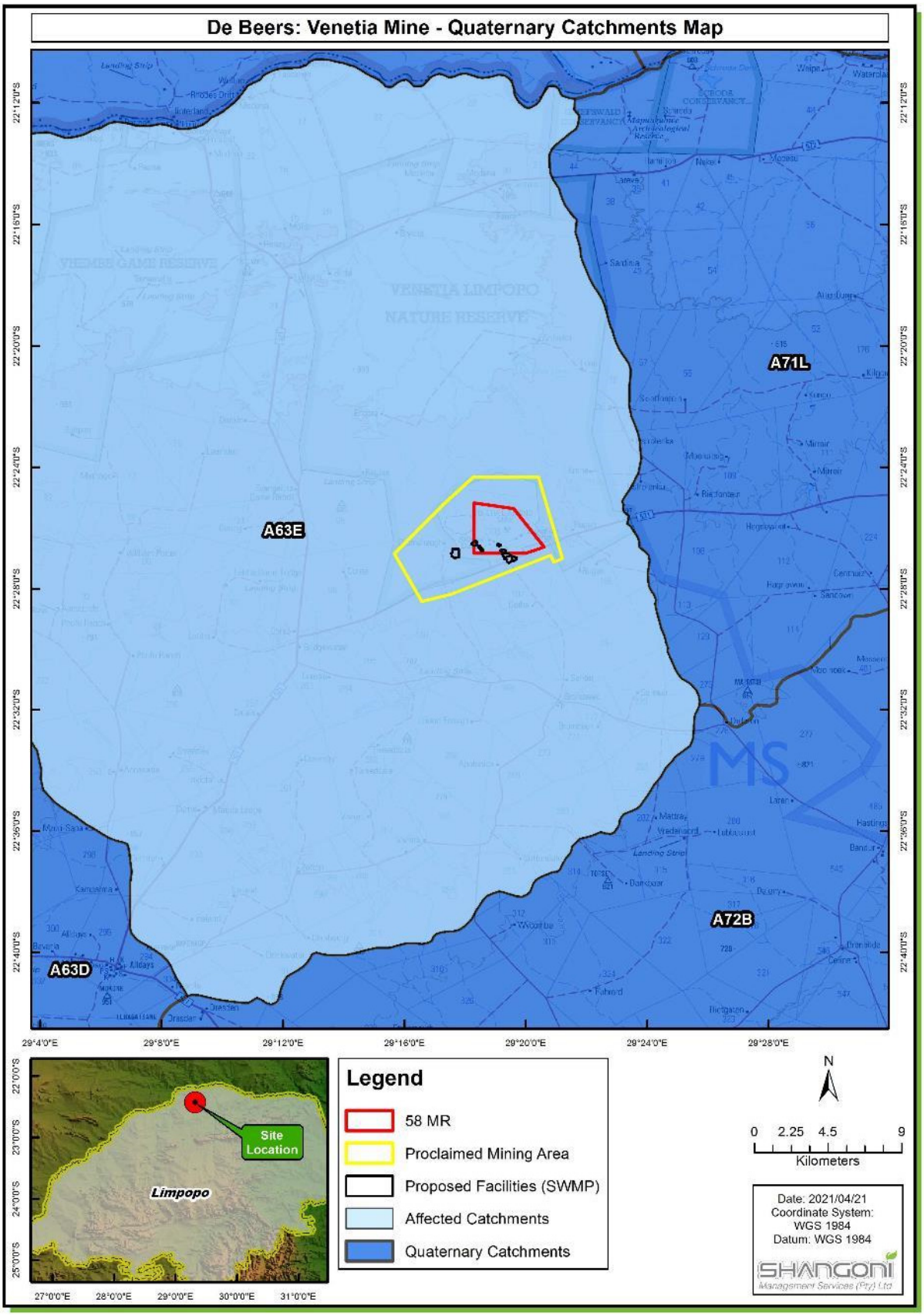


Figure 25: Catchments associated with Venetia Mine

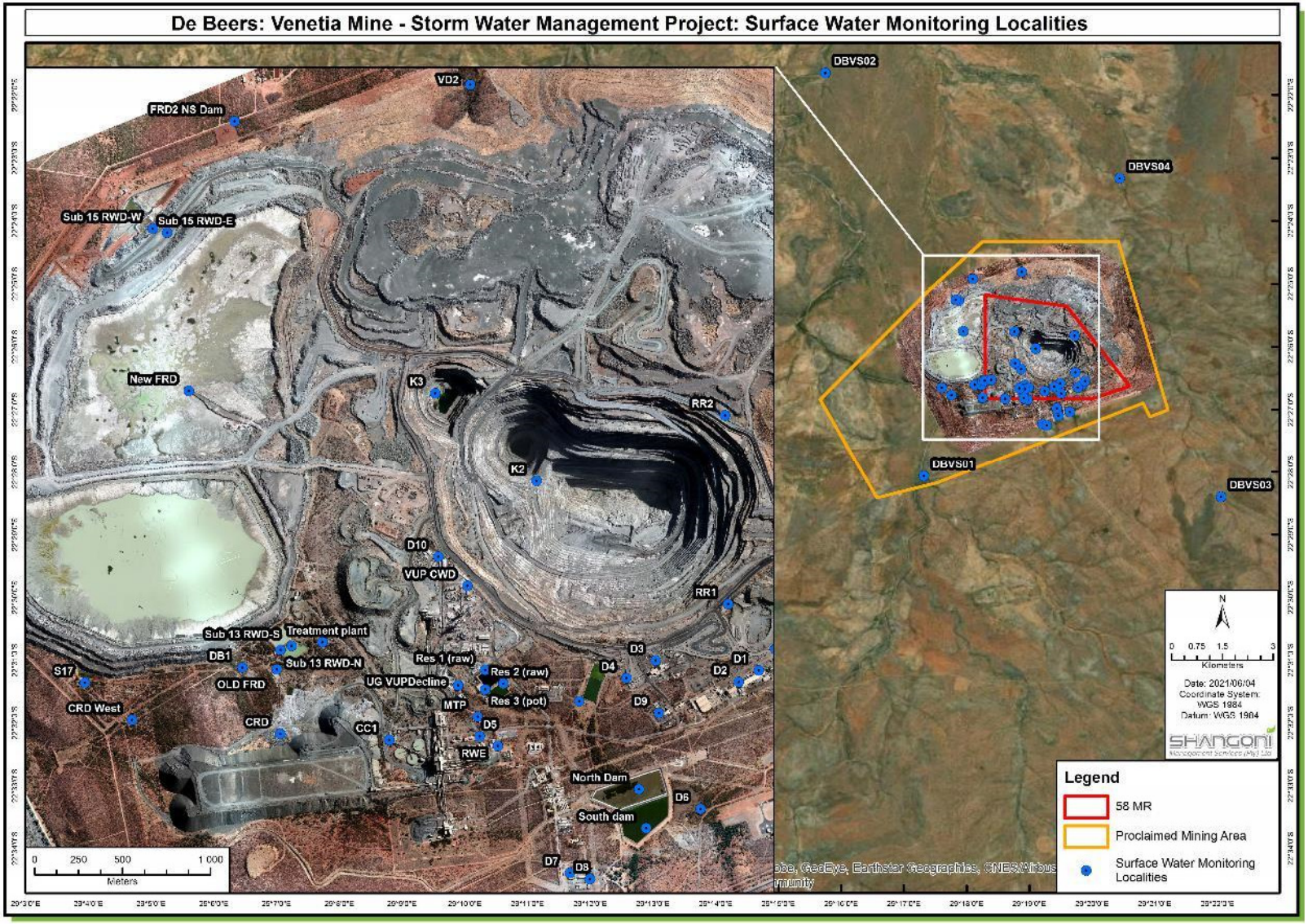


Figure 26: Existing surface water monitoring points.

Chapter H: Groundwater

The following information was obtained from the report *De Beers Consolidated Mines (Pty) Ltd: Venetia Mine Geohydrological Impact Assessment as part of the Storm water Management Project*, dated August 2021 and prepared by Shangoni AquiScience. Refer to Annexure E2 for the specialist report.

Aquifer characterisation

Aquifer vulnerability

Table 12 summarises the aquifer classification vulnerability scores for the aquifer/s in vicinity of the project area. The final DRASTIC score of 94 indicates that the fractured aquifer in the region has a medium susceptibility to pollution.

Table 12: DRASTIC vulnerability scores (fractured aquifer).

Factor	Range/Type	Weight	Rating	Total
D	5 – 15 m	5	7	35
R	0 – 5 mm	4	1	4
A	Fractured and weathered	3	3	18
S	Sandy loam	2	6	12
T	0 – 2%	1	10	10
I	Gneiss	5	3	15
C	-	3	-	-
DRASTIC SCORE - 94				

Aquifer classification

According to the 1:500 000 hydrogeological map (2127) for Messina (Figure 27) the study area is predominantly located in a d3 and d4 aquifer class region. The groundwater yield potential is classed as low to medium on the basis that most of the boreholes on record in vicinity of the study area produce between 0.5 and 5.0 ℓ/s.

The different modes of undisturbed/natural groundwater occurrences associated with the study area include:

- Saturated unconsolidated alluvial deposits along some river systems.
- The fractured transitional zone occurring between weathered and unweathered crystalline and metamorphic bedrock.
- Fractures that occur along the contact zone between dykes / sills and the host rocks. The fractures developed due to the heating and cooling of the rocks involved in these intrusions.

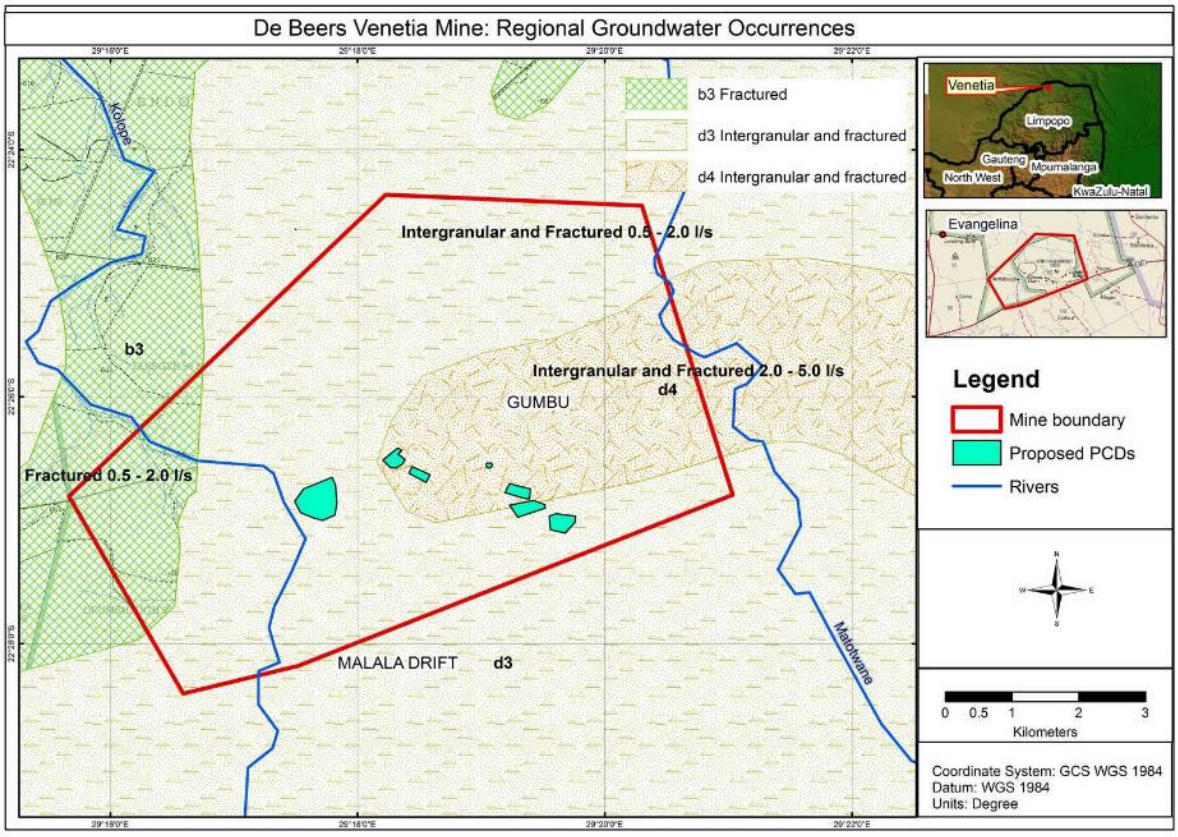


Figure 27: Regional groundwater occurrences within the study area.

According to the regional aquifer classification map of South Africa, the aquifer has been identified as a poor/non- aquifer[3] with poor groundwater quality (300 - 1000 mS/m, a medium vulnerability and a medium to high susceptibility towards contamination. Drill logs (Jones Wagener, 2020b) indicate that the study area is underlain by two types of aquifers. Based on the 'undisturbed' underlying hydrogeology of the project area, the aquifers can be classified as follows according to the Parsons (1995) classification system:

i) Weathered unconfined aquifer.

   a. Poor/non- aquifer

ii) Fractured confined or semi-confined aquifer.

   b. Poor/non- aquifer

[3] These are formations with negligible permeability that are generally regarded as not containing groundwater in exploitable quantities or water quality may also be such that it renders the aquifer as unusable. However, groundwater flow through such rocks, although imperceptible, does take place, and need to be considered when assessing the risk associated with persistent pollutants. Insignificantly yielding aquifer (< 1.0 ℓ/s) of good quality water or moderately yielding aquifer (1.0- 5.0 ℓ/s) of poor quality or aquifer which will never be utilised for water supply and which will not contaminate other aquifers.

Aquifer protection classification

In order to achieve the Groundwater Quality Management Index a point scoring system as presented in Table 13 and Table 14 was used for the naturally occurring undisturbed aquifers in the study area.

The occurring aquifer, in terms of the above definitions, is classified as a non-aquifer system. The vulnerability, or the tendency or likelihood for contamination to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer is classified as medium. The level of groundwater protection based on the Groundwater Quality Management Classification is shown in Table 15.

Table 13: Ratings for the Aquifer System Management and Second Variable Classifications.

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

Table 14: Ratings for the Groundwater Quality Management ("GQM") Classification System.

Aquifer System Management Classification		
Class	**Points**	**Study area**
Sole Source Aquifer System	6	
Major Aquifer System	4	
Minor Aquifer System	2	
Non-Aquifer System	0	1
Special Aquifer System	0-6	
Aquifer Vulnerability Classification		
High	3	
Medium	2	2
Low	1	

GQM Index = Aquifer System Management X Aquifer Vulnerability: 2 X 1 = 2

Table 15: GQM index for the study area.

GQM Index	Level of protection	Study area
<1	Limited	
1-3	**Low level**	**2**
3-6	Medium level	
6-10	High level	
>10	Strictly non-degradation	

The ratings for the Aquifer System Management Classification and Aquifer Vulnerability Classification yield a GQM index of 2 for the study area, indicating that low level groundwater protection is required to adhere to DWS's water quality objectives. However, reasonable and sound groundwater protection measures are nevertheless recommended to ensure that no cumulative pollution affects the aquifer, during short- and long-term. DWS's water quality management objectives are to protect human health and the environment. Therefore, the significance of this aquifer classification is that if any potential risk exists, measures must be taken to limit the risk to the environment, which in this case is the protection of the underlying aquifer.

Groundwater quality

Figure 28 below depicts the groundwater monitoring points as currently monitored at Venetia Mine. The following chemical and physical constituents are monitored at Venetia Mine (as per referred tables).

Table 16: Laboratory analyses packages

LAB METHOD	DESCRIPTIVE	ANALYSES
AQP 02	INORGANIC CHEMICAL	Alkalinity, Cl, SO_4, NO_3, PO_4, NH_4, Fluoride Ca, Mg, Na, K, Fe, Al, Mn pH & Conductivity Total Hardness
AQP 04	INORGANIC CHEMICAL	Alkalinity, Cl, SO_4, NO_3, PO_4, NH_4, Fluoride Ca, Mg, Na, K, Fe, Al, Mn, Cr, Cu, Ni pH & Conductivity Total Hardness
AQP 06	INORGANIC CHEMICAL (Heavy Metals)	Alkalinity, Cl, SO_4, NO_3, PO_4, NH_4, Fluoride Ca, Mg, Na, K, Fe, Al, Mn, Cr, Cu, Ni, Pb, Zn, Cd, Co B, Ba, Be, Mo, Si, Sr, V Ag, Bi, Ga, Li, Rb, Te, Tl pH & Conductivity Total Hardness
ALM 40	BACTERIOLOGICAL	Total Coliforms & *E. coli* (<1 to > 100 000 CFU/100ml)
VPH	VOLATILE PETROLEUM HYDROCARBONS	GROs - Benzene, Toluene, Ethyl benzene, m + p Xylene, o-Xylen, MTBE DROs (C10, C12, C14, C16) PAH - Acenaphthene, Acenaphthylene, Fluorene, Phenanthrene, Anthracene, Naphthalene
SOG	SOAP OIL AND GREASE	Oil & Grease (SOG)
COD	CHEMICAL OXYGEN DEMAND	Chemical Oxygen Demand (COD)
NTU	TURBIDITY	Turbidity (NTU)

Table 17: The groundwater monitoring locations

Locality Name	Description	Coordinates		Sampling Frequency
		S	E	Quarterly
KLM01	Borehole North of On Mine Storage Dam	-22.4469	29.3215	AQP04, COD, NTU, SOG, VPH, WATER LEVEL
KLM03	Borehole North of Krone Waste Dump	-22.4102	29.3241	
KLM04	Borehole North of Venetia Dump	-22.412	29.3143	
KLM05	Borehole West of New FRD	-22.4291	29.2876	
KLM07	Borehole East of Old FRD	-22.4387	29.3055	
KLM08	Borehole South of Red Area	-22.4544	29.3128	
MBH01	Borehole SW of Sub15 RWD	-22.4231	29.2936	
MBH01S	Shallow borehole SW of Sub15 RWD	-22.4232	29.2935	
MBH02	Borehole SW of Sub15 RWD	-22.4225	29.2923	
MBH02S	Shallow borehole SW of Sub15 RWD	-22.4225	29.2923	
MBH03	Borehole NW of Sub15 RWD	-22.4189	29.2951	
MBH03s	Shallow borehole NW of Sub15 RWD	-22.4189	29.295	
MBH04	Borehole North of Sub15 RWD	-22.4182	29.2968	
MBH04S	Shallow borehole North of Sub15 RWD	-22.4181	29.2968	
MBH05	Borehole NE of Sub15 RWD	-22.4165	29.3016	
MBH05s	Shallow borehole NE of Sub15 RWD	-22.2459	29.1805	
MBH06	Borehole in Venetia Reserve	-22.4154	29.2959	
MBH06s	Shallow borehole in Venetia Reserve	-22.4153	29.2959	
MBH07	Borehole in Venetia Reserve	-22.4153	29.3007	
MBH07s	Shallow borehole in Venetia Reserve	-22.4153	29.3007	
EMP R	Old Core West of Pit	-22.4329	29.309	
EMP A	Borehole outside mine boundary west of CRD	-22.4517	29.2928	
B01	Borehole at main gate on road to Abend Rhue	-22.4576	29.3237	
B04	Borehole at Rugen Farm sampled at homestead	-22.4651	29.3418	
Abend Rhue	Tap at Abend Rhue Guesthouse	-22.482	29.3374	

Groundwater quality monitoring is performed by Aquatico on a quarterly basis and interpreted and discussed by Groundwater Complete on an annual basis. To describe status quo groundwater conditions, the on-mine groundwater quality data for the 2019/2020 were reviewed.

A total of 22 purpose-drilled mine monitoring boreholes were sampled during the 2019 evaluation period. The discussion that follows was extracted from the annual assessment by Groundwater Complete (Aquatico, 2020).

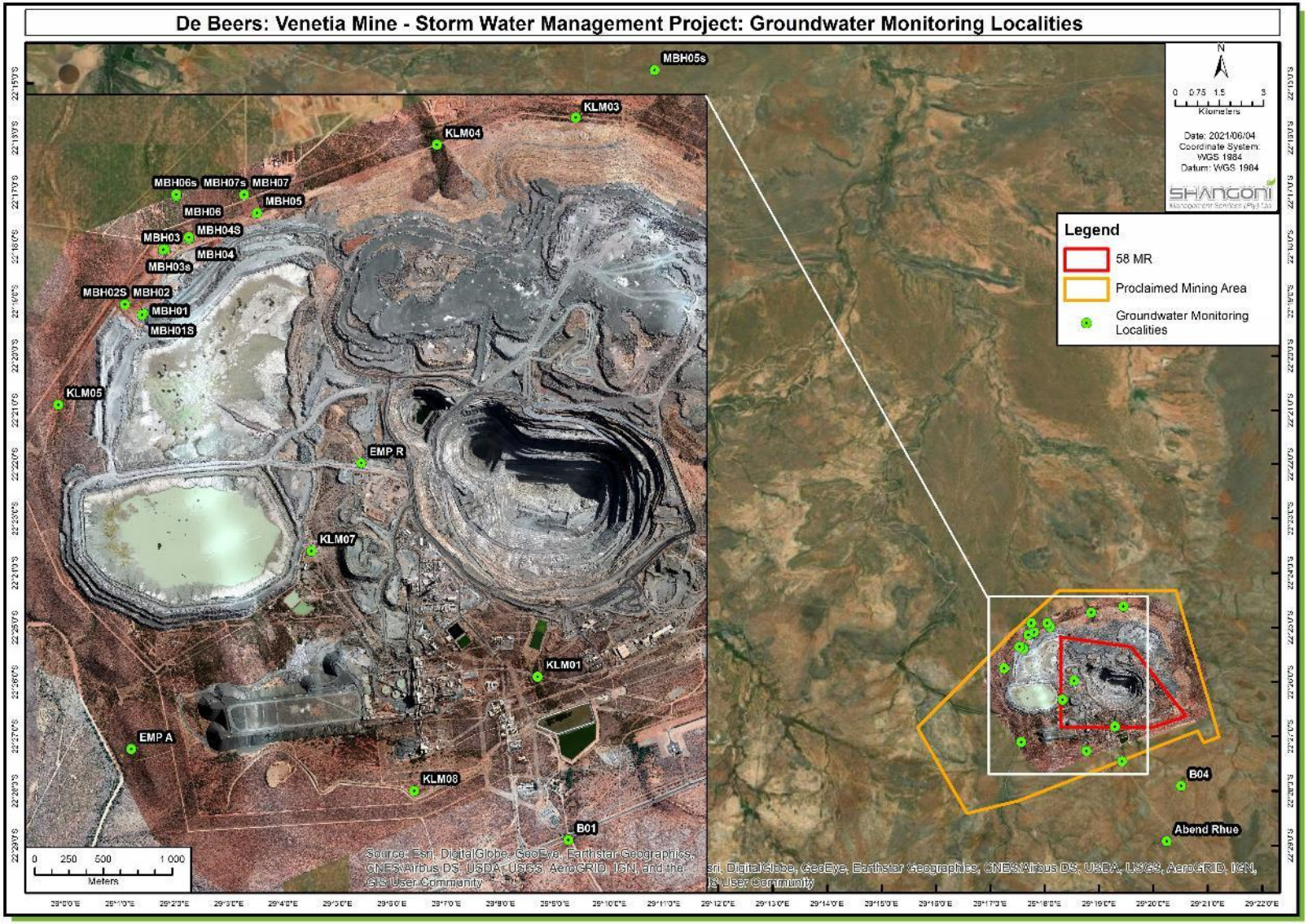


Figure 28: Existing groundwater monitoring points.

Most of the mine boreholes displayed average groundwater EC values of between ±200 mS/m and 710 mS/m. The highest EC values were measured to the north (i.e. downgradient) of the New FRD and its return water dam. No significant increasing or decreasing trends are evident in the time-series graphs, however, a definite long-term increase in EC is observed for borehole KML04 when considering the entire database.

Long-term monitoring information collected from upgradient monitoring borehole B01 suggests that the average ambient/unaffected groundwater EC value is in the order of 150 mS/m (95th percentile). This information suggests that most of the mine monitoring boreholes, especially those located downgradient from the New FRD and its return water dam, are affected by seepage/leachate from the mining and related activities and infrastructure.

Boreholes KLM04, KLM07, MBH03S, MBH05/05S and MBH06/06s display average sulphate concentrations of between ~580 mg/ℓ and 1560 mg/ℓ. Similar to EC, no significant trends are indicated on the time-series graphs, however, borehole KLM04 shows a definite long-term increase in SO_4 when considering the entire data record.

Long-term monitoring information suggests that the average ambient/unaffected groundwater SO_4 content is in the order of 20 mg/ℓ (95th percentile). Most monitoring boreholes are therefore affected by SO_4 type contamination – especially downgradient from the Old FRD (KLM07), New FRD and RWD (MBH03s, MBH05/05s, MBH06/06s) and Venetia WRD (KLM04).

Monitoring boreholes KLM08 and MBH05s recorded average groundwater NO_3 concentrations of ~15 mg/ℓ. An even higher average concentration of approximately 55 mg N/ℓ was measured downgradient from the Venetia WRD in monitoring borehole KLM04. The NO_3-N content in KLM04 not only increased during the past year, but also shows a long-term increasing trend when considering the entire data record. Historical monitoring information also shows a long-term increasing trend for KLM08.

Based on averaged results, the majority of the mine monitoring boreholes recorded groundwater Cl concentrations of between ~310 mg/ℓ and 1260 mg/ℓ. Generally higher concentrations were measured downgradient from the Venetia WRD in borehole KLM04. A long-term increase in the Cl content of KLM04 is evident when considering the entire data record.

The average ambient/unaffected groundwater Cl content was in the order of 120 mg/ℓ (95th percentile), which suggests that most boreholes, especially those downgradient from the Venetia WRD, Old FRD, New FRD and return water dam are affected by Cl type contamination.

Hydrocensus

Jones & Wagener conducted a hydrocensus in March 2017 (Jones and Wagener, 2020b) during which 11 boreholes were identified. The majority of these boreholes are located in the Venetia Limpopo Nature Reserve (VLNR) and are not in use, with the exception of VEN-HC9, VEN-HC10 and VEN-HC11; they are located south of the mine on private farms and are in use. Besides these, there are also 26 boreholes spread across the site (mostly on-mine) and are included in the Venetia monitoring programme. Table 18 lists the monitoring boreholes (hydrocensus and monitoring).

Table 18: Hydrocensus (Jones and Wagener, 2020b) and mine monitoring boreholes.

Borehole ID	Coordinates			Application
	y	x	Z (mamsl)	
Hydrocensus boreholes				
VEN-HC1	-22.4487	29.29189	658	No use, within VLNR
VEN-HC2	-22.4495	29.29215	664	
VEN-HC3	-22.4135	29.27175	633	
VEN-HC4	-22.3979	29.27022	619	
VEN-HC5	-22.4023	29.3079	636	
VEN-HC6	-22.4028	29.31739	645	
VEN-HC7	-22.4104	29.37085	700	
VEN-HC8	-22.411	29.37109	700	
VEN-HC9	-22.4591	29.34055	716	Private use
VEN-HC10	-22.4652	29.34176	720	
VEN-HC11	-22.4609	29.31957	713	
Monitoring boreholes				
Abend Rhue	-22.482674	29.337065	(tap)	Private use
B01	-22.45756	29.32366	721	
B04	-22.46508	29.34178	672	
EMP A	-22.45174	29.292788	703	Mine monitoring
EMP R	-22.432877	29.308973	698	
KLM01	-22.446945	29.321547	658	
KLM03	-22.410247	29.324095	649	
KLM04	-22.411988	29.314305	655	
KLM05	-22.42905	29.28759	680	
KLM06	-22.43939	29.28848	682	
KLM07	-22.43872	29.30546	696	
KLM08	-22.45443	29.31277	647	
MBH01	-22.42312	29.29358	705	
MBH01S	-22.42312	29.29358	721	
MBH02	-22.42253	29.29234	646	
MBH02S	-22.42253	29.29234	646	
MBH03	-22.418892	29.295078	643	
MBH03S	-22.418892	29.295078	643	
MBH04	-22.41815	29.29683	642	

Borehole ID	Coordinates			Application
	y	x	Z (mamsl)	
MBH04S	-22.41815	29.29683	642	
MBH05	-22.41645	29.30157	639	
MBH05s	-22.41645	29.30157	639	
MBH06	-22.41539	29.29591	639	
MBH06S	-22.41539	29.29591	639	
MBH07	-22.41526	29.30072	638	
MBH07S	-22.41526	29.30072	638	

Groundwater model

Pre-facility

Venetia Mine has been in operation since 1992 mining a diamond bearing kimberlite cluster (K1, K2 and K3) mainly with opencast methods. The open pit will be mined to a depth of approximately 450 m, which is envisaged up to 2022/2023 where after mining will shift towards underground. The pre-facility flow scenario can be reasonably represented by the steady state flow model as displayed in Figure 29 below (from Jones and Wagener, 2020b).

During facility (operation of PCDs)

Jones and Wagener (2020) developed a transient state contaminant transport model using steady state heads as initial conditions for the main sources of pollution at Venetia, including the FRDs, CRD, WRDs and current affected water containment facilities and the planned PCDs. For the purpose of this study only the contaminant transport results of the planned PCDs will be discussed further. Jones and Wagener determined source concentrations in the PCDs from the water quality datasets for the current affected storage facilities at Venetia. They used averaged concentration and determined a source concentration of 4000 mg TDS/ℓ. The leakage rates were combined with the source concentration to produce a mass flux into the groundwater regime during the contaminant transport simulations. However, according to Jones and Wagener (2020b) there was limited simulated contamination migration from the potential contaminant sources in contrast to the observed groundwater concentrations for the current status at the mine.

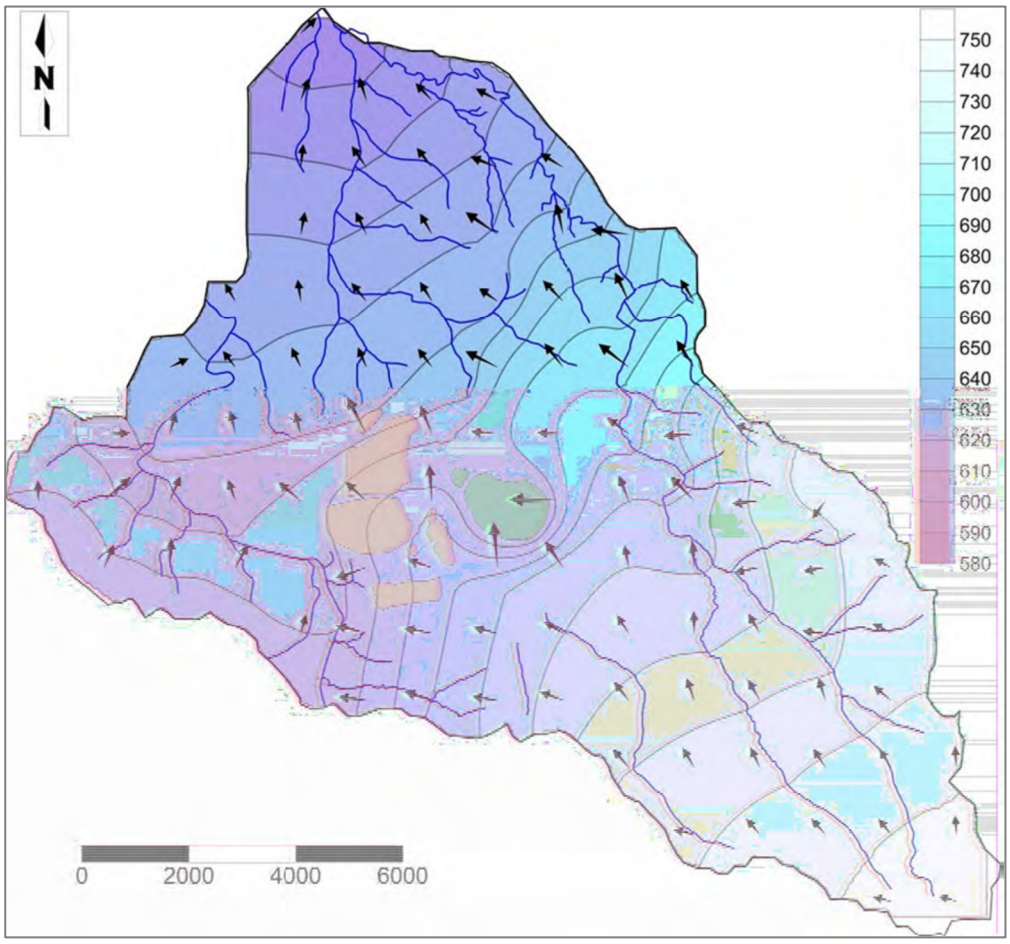


Figure 29: Simulated steady state groundwater gradients (from Jones and Wagener, 2020).

They decided to rather use a constant concentration as the source term to remove any potential errors associated with the calculated leakage rates. In this instance the source concentration is placed directly in the groundwater regime which is a very conservative approach. Nonetheless there was still limited simulated contaminant migration which is attributed to the relatively low permeability and low recharge and flat groundwater gradients of <0.01. Jones and Wagener (2020b) reported that the contaminant transport simulation from the PCDs is observed in the weathered aquifer for all of the PCDs whereas only PCD 1 and PCD 2 have simulated plumes in the fractured aquifer by 2045. For the LOM plumes it is evident that enough residence time has allowed contaminated groundwater to have migrated into the fractured aquifer for most of the sources. However, they concluded that the plumes from the PCDs do not migrate substantially and even after 120 years, will remain small and localised within the mine boundary. No sensitive groundwater receptors will be impacted during the operational phase.

Decommissioning and closure

Post closure, the mine will no longer remove water from underground and dewatering will cease. Jones and Wagener (2020b) simulated the planned PCDs for a total of 120 years, up until 2145 and concluded that because of the very low hydraulic conductivity (permeability), plume movements would not have migrated substantially and will remain within the mine boundary.

Chapter I: Air quality

The following information was obtained from the reports:

- *Environmental Impact Assessment for Proposed Underground Operations and EMP Consolidation for Existing Operations at De Beers Consolidated Mines, Venetia Mine, Limpopo Province, Final Report*, dated February 2012 and compiled by ERM.
- *Annual ambient air quality monitoring report for Venetia Mine, Limpopo Province, Reporting period February 2020 - January 2021*, and compiled by Levego Environmental Services. Refer to Annexure E5 for the report.

Regional description

Venetia Mine and the surrounding land have no other large-scale industrial or mining activity in the area (< 5km away from Venetia Mine), except for the current mining operations at Venetia Mine. The area is characterised as an area that is sparsely populated with the closest town being Musina (± 75km east) and Alldays (± 40 km west). The following sources of air emissions have been identified in the area:

- Mining activities in the region;
- Road network;
- Windblown dust;
- Vehicle tailpipe emissions; and
- Agricultural activities.

Local description

Dust fallout monitoring

Venetia Mine has implemented a dust fallout monitoring network that includes 25 samplers (17 samplers that monitor dustfall around the stockpile areas, slimes dams, as well as along the site boundary and 8 monitoring sites that specifically address the dustfall from the open burning grounds area). The analysed samplers from the majority of monitoring sites returned dustfall rates lower than the Non-Residential standard (1200 mg/m^2/day). The sparse and erratic rainfall throughout the year in this region does not influence dustfall rates significantly. These findings align well with field observations.

Particulate matter (PM10 and PM2.5)

Venetia Mine has established 2 particulate monitoring sites (western fence and main offices). No exceedance to the standards were recorded during the annual reporting period.

SO_2 passive sampling

SO_2 passive diffusive monitors were installed at the four principal directions around the open burning grounds and co-located with dustfall monitoring samplers. The samplers provide an indication of amount of SO_2 that is generated from burning explosives packaging at the burning ground site. All sulphur dioxide concentrations recorded on site during February 2020 – January 2021 demonstrate full compliance with the twelve months running average. Annual average concentrations for the February 2020 – January 2021 are compliant with the relevant standard of 50 µg/m^3.

LDAR sampling

Majority of valves, pumps, connectors, pressure relief devices and open-ended lines were found to be emission free, with TVOC concentrations correlating to normal ambient concentrations at the diesel and oil storage areas. None of the sources exceeded the prescribed leak definition of 500 ppm. These points were only identified for observation, as possible future source of leaks.

Chapter J: Noise and vibration

The following information was sourced from the report *Baseline noise survey along the boundaries of the Venetia Mine – 2020,* dated 22 October 2020 and compiled by dBAcoustics, as attached hereto as Annexure E6.

Sixteen (16) noise measuring points have been identified along the boundaries of the mine to determine the noise levels of the mining activities at Venetia Mine. The noise survey was carried out on 21 October 2020 and 22 October 2020 during the day- and night-time. The temperature during the day was between 31.2ºC to 35.1 ºC and during the night 24.1 ºC to 26.5 ºC.

The noise levels at the measuring points along the Venetia Mine boundaries were well below the 70.0 dBA threshold value according to SANS 10103 of 2008.

The pre-vailing noise levels at the measuring points along the boundaries of the mining area were in line with the recommended noise levels as prescribed in SANS 10103 of 2008 and the Health and Safety Regulations of the IFC.

Chapter K: Archaeology and cultural history

The following information was obtained from the *1st phase H.I.A. of a proposed upgrading and extension of the proposed storm-water management project at Venetia Mine, Limpopo Province, South Africa For De Beers Consolidated Mines (Pty) Ltd.*, compiled by Sidney Miller dated May 2021 and attached hereto as Annexure E7.

The general area is known to contain both Early as well as Later Stone Age sites as well as rock art and engraving sites. These are mainly encountered along main drainage lines such as the Limpopo River and its tributaries such as the Kolope River. None of these were observed during the investigation. The proposed SWMP and associated infrastructure will have no impact on Stone Age archaeological sites or material. In the general area Iron Age sites such as the internationally known Mapungubwe and its associated sites is situated more to the north and east of Venetia Mine, and later sites to the south in the Soutpansberg. None of these were observed during the investigation. The proposed SWMP and associated infrastructure will have no impact on Iron Age archaeological sites or material. The proposed SWMP and associated infrastructure will have no impact on historical sites or material. There are no sites of cultural/spiritual significance located on or near the areas under investigation. There are no sites connected to slavery located on or near the areas under investigation. There are no people of importance connected to the history of the study area. There is no special historical technological or scientific advancement of standing that can be linked to the property under investigation.

Chapter L: Palaeontological resources

The following information was obtained from the *Desktop palaeontological Impact Assessment, Venetia Mine – Storm Water Management Project.*, compiled by Bruce Rubidge dated September 2021 and attached hereto as Annexure E8.

The geological setting of Venetia Mine is deeply underlain by gneisses, metasediments and metavolcanics of the Mount Dowe Group and Malala Drift Groups of the Beit Bridge Complex which is part of the Limpopo Mobile Belt separating the Kaapvaal and Rhodesian Cratons). These Precambrian rocks of the Limpopo Mobile Belt are, to the west of the mine, overlain by Permian Rocks of the Ecca Group and Quaternary alluvial sediments.

The underlying Precambrian rocks of the Beit Bridge Complex do not host fossils and no fossils have been reported from the overlying Quaternary sediments. The rocks of the Ecca group are known to host fossil glossopterid plants but these fall outside the limits of the area. It is thus extremely unlikely that fossils will be found in the proposed project site.

Chapter M: Sensitive landscapes - Biodiversity

The following information was sourced from the *Terrestrial biodiversity impact assessment for the proposed storm water management project for De Beers Consolidated Mines Limited – Venetia Mine, that is situated near Alldays in the Limpopo province,* compiled by Pachnoda Consulting and Bathusi Environmental Consulting, June 2021 (Annexure E3).

A review of available information sources indicates the following local and regional (terrestrial biodiversity and ecology) conservation categories ascribed to the wider study area:

- The proposed SWMP footprint areas are situated, mostly, within the Venetia Mine perimeter, which is situated within the VLNR;
- Venetia Mine is situated approximately 20 km south of the Mapungubwe National Park, which represents the nearest declared conservation area. In Government Notice No. 71 Government Gazette 31832 of 30 January 2009 the then Minister of Environmental Affairs and Tourism, announced the Mapungubwe Cultural Landscape as a world heritage site in terms of the World Heritage Convention Act, 1999 (Act No. 49 of 1999), and delegated specified powers of management to SANParks. The Mapungubwe National Park also included a buffer zone that encompassed the already existing and operational Venetia Mine. In 2014, new proposed buffer was assessed and approved by UNESCO at the 38th session of the World Heritage Committee (Doha, Qatar 2014). This new buffer excludes Venetia Mine;
- The National List of Threatened Ecosystems (2011) information source indicates that the SWMP footprint areas are not situated in proximity to any of the threatened ecosystems from a regional perspective. The closest threatened ecosystem is represented by the Mapungubwe/ Greefswater Riverine Forest that is situated approximately 22 km to the north (spatially included in the Mapungubwe National Park);

- Venetia Mine and proposed development footprints are situated within the Limpopo Ridge Bushveld (SVmp2) and Musina Mopane Bushveld (SVmp1) ecological types, as described by Vegmap (2018), both of which are ascribed a conservation status of Least Threatened; and
- The Limpopo Province C Plan indicates the nodal and transformed status of much of the natural habitat from the Venetia Mine, which is spatially situated within a natural (and conserved) area of natural and pristine habitat, comprising the following categories:
    - No natural habitat remaining;
    - Other natural areas (natural habitat of indeterminate status);
    - Ecological Support Areas ("ESA") 2;
    - Ecological Support Areas 1; and
    - Critical Support Areas 2.

As presented in Figure 30 below, the proposed PCD 3 is located within an ESA 1. Further thereto, there are three drainage lines that traverse the area in which the proposed PCD 3 will be located.

Chapter N: Sensitive landscapes - Wetlands

The following information was extracted from the report *De Beers Venetia Diamond Mine Storm water Management Project, Limpopo Province River and Wetland Ecosystem Specialist Report*, dated September 2021 and prepared by CES Environmental and Social Advisory Services. Refer to Annexure E9 for the specialist report.

Wetland delineation and classification

The infield sampling of soil and vegetation in conjunction with the recording of diagnostic topographical / terrain indicators and features, enabled the delineation of the following distinct watercourse units, as described below. Refer also to Figure 31 below for the delineated wetlands.

Channelled valley bottom wetland 1 (CVB1)

The paleo drainage channel forms a channelled valley bottom wetland CVB1, flowing northwards across the dirt road and fence line, which marks the northern property boundary of Venetia Mine. It is artificially fed by Mine Residue Deposit ("MRD") contaminated storm water run-off and seepage from the northern waste rock dumps during storm events that has created the wetland conditions. In its natural state this watercourse was likely an ephemeral river system with limited wetlands. Upstream of the road, the channel is a 2 m wide by 0.2 m deep flowing stream, which narrows downstream of the road. Alluvium deposition and flooding occurs just off the right bank of the stream, upstream of the road. The flooded area is vegetated by marshy Colophospermum mopane forest, with *Echinochloa sp.* along the fringes of the saturated soil.

Artificial wetland A1

Artificial wetland A1 falls within a low-lying area across the access road and fence line along the north-western property boundary. It is artificially fed by MRD-contaminated by storm water runoff from the road and northern waste rock and FRD dumps during storm events.

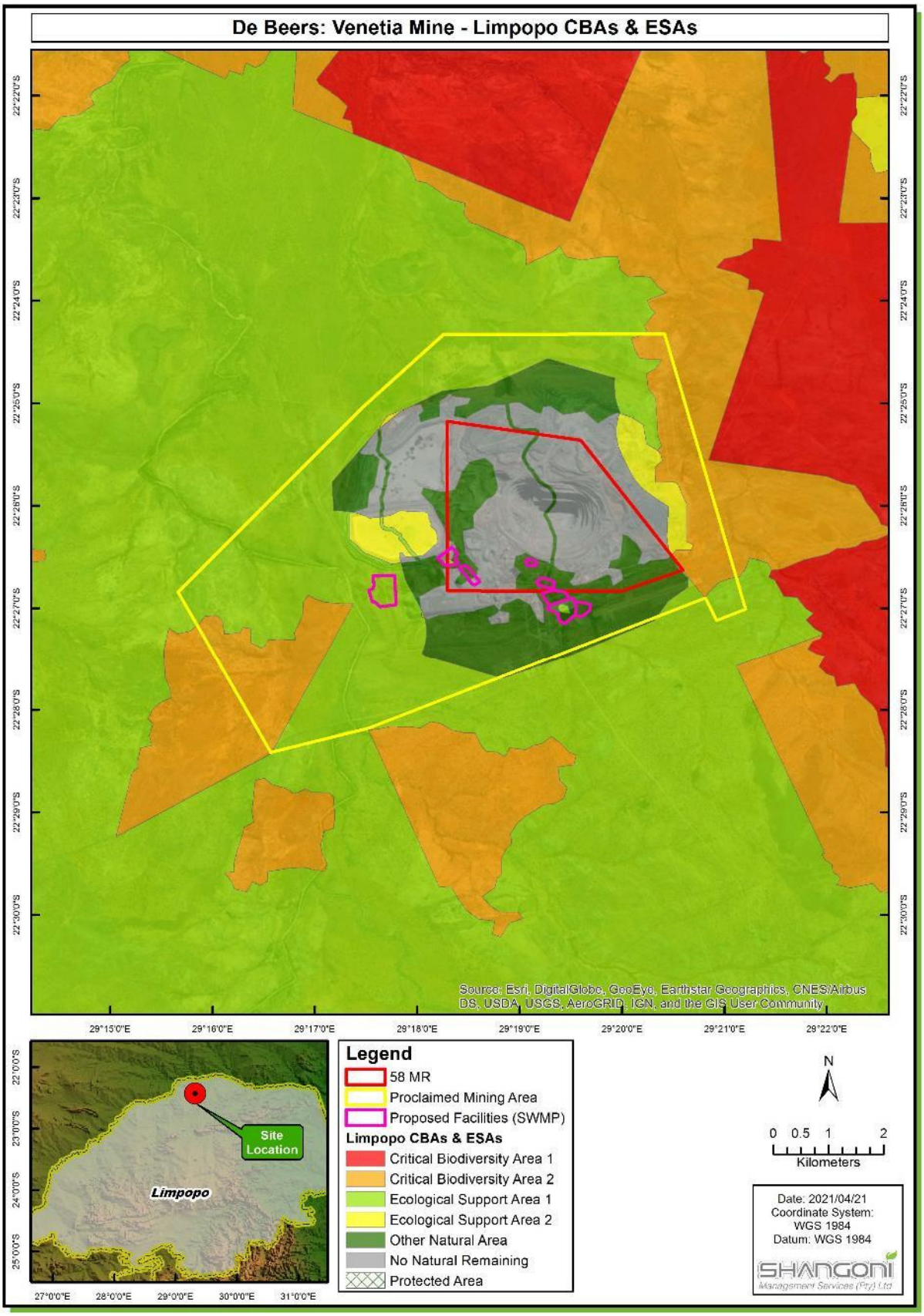


Figure 30: Critical Biodiversity Areas associated with the SWMP

In terms of vegetation, the A1 is dominated by *Phragmites australis* reedland along the lowest lying area, with a moderate abundance of *C. mopane* along the fringes of the wetland to the south of the road and patches of moderately abundant *Flaveria bidentis* on the edge of the road.

Artificial wetland A2, ephemeral stream E1 and diversion channel DC1 (refer to Figure 31 below)

Artificial wetland A2 is situated entirely within the footprint of the mine, falling approximately 200 m south-west and 600 m north-east of the existing FRD 1 RWD and proposed PCD 3 site, respectively. Ephemeral stream E1 and diversion channel DC1 feed into A2 from the south and east, respectively, and excess water flows westwards along FRD 1. Sampling and infield delineation was not undertaken at A2 and E1 due to time and accessibility constraints during the assessment. A2 and E1 were only assessed at the desktop level.

Ephemeral streams E2-5 and dams D1-2 (refer to Figure 31 below)

A number of ephemeral streams and two dams fall within the proposed PCD 3 site, as well as two dams. These are discussed in further detail below.

Two ephemeral streams, one from the north-east (E2) and one from the east (E3), converge on the artificial drain and earthen berm, which run in south easterly direction. The bed of stream E2 is characterised by a very bare, sandy alluvium, with some gravel and stones, as well as a fine sediment layer and light sludge. The banks of the stream are vegetated by *C. mopane* and *Diospyros austro-africana*. Stream E3 is a 1 m wide by 0.2 m deep streamlet, with a dry sand and gravel bed. A small rill channel drains into the main streamlet.

The artificial drain is 1.5 m wide by 1 m deep. The bed of the drain is quite unconsolidated, and its soil is full of a white precipitate / grey-white fine sediment (FRD and water). The berm and drain typically divert storm water to an excavated pond, fringed by a fill bank to the south-east of the confluence of the ephemeral streams. However, a section of the berm has been breached, resulting in some storm water being diverted out of the drain and southwards through the breach, creating seepage dam D1 south of the berm.

From seepage dam D1, the drainage follows along ephemeral stream E4, which passes through a wooded area in a south-westerly direction. The main E4 stream crosses a dirt road via a gabion basket and two-pipe culvert crossing and is joined by four streamlets further downstream before reaching dam D2.

The section of stream E4 upstream of the road crossing is characterised by a single broad sandy river / dry arm, with poorly defined banks. Vegetation in the riverbed within this section is dominated by a high abundance of *Panicum sp.*, with a moderate abundance of an unidentified grass, *Eragrostis sp.*, *Setaria sp.* and *Stipagrostis sp.* Woody vegetation includes a moderate abundance of *C. mopane* and *Vachellia robusta*, with a low abundance of *Senegalia nigrescens*. A clump of *Cyperus textilis* is found off the left bank of the channel, just before the road crossing, suggesting a possible low point upstream in the wooded area.

Downstream of the road, stream E4 is characterised by a 1.5 m deep incised channel, resulting from scouring below the culvert, with a sandy bed, large stones and the presence of sludge. The vegetation on the banks is comprised of a high abundance of *C. mopane*, a moderate abundance of an unidentified herb, and low abundances of *Setaria sp*. and *Eragrostis sp*. A 2 m deep incised gully, originating along the edge of the road, approximately 30 m north of the culvert, converges with the main E4 stream. Further downstream, two dry alluvial streams from the road converge on E4, one from the north and one from the east. The eastern dry alluvial stream is approximately 4 m wide where it crosses the road, with a collapsed gabion wall noted at this point of crossing. The stream banks and bed are lined with *C. mopane* and *V. karroo*, as well as grasses, such as *Eragrostis sp*., *Stipagrostis sp*., *Setaria sp*. and some *Panicum sp*. Stream E4 continues as a single channel in a south-westerly direction downstream of the confluence until it reaches dam D2.

Dam D2 is a large body of open water downstream of E4, fringed by 1-3 m of bare sandy soil. A high abundance of *Setaria sp*. and *V. karroo*, with moderate abundances of *Eragrostis sp., C. mopane* and *Ziziphus mucronata*, occur more than 3 m from the edge of the water. Ephemeral stream E5 emanates from the D2 dam wall. The left bank (~1 m deep) of stream E5 is bare and disturbed, while the right bank is moderately- to sparsely vegetated by *Eragrostis sp*. and an unidentified grass. The bed is characterised as an alluvial river, 4 m wide by 0.5-1 m deep, which has a small, 1 m wide, low flow channel. The low flow channel is characterised by gentle flow, coarse sand and gravel, and an outcrop along the right bank. Riparian vegetation along stream E5 includes a high abundance of *C. mopane*, with a moderate abundance of *Diospyros austro-africana* and low abundance of *S. nigrescens*, as well as some *Panicum sp*. along the banks. From the dam wall, stream E5 flows in a north-westerly direction until it converges with the Kolope River. During the site visit, a pair of Greater Painted Snipe were observed wading along the channel bed.

Kolope river section R1 (refer to Figure 31 below)

This section of the Kolope (R1) is a dry, sandy riverbed, approximately 20-30 m wide, with gradual 5 m wide banks. The base of the banks includes marginal, clumpy vegetation, including a moderate amount of *Cyperus sexangularis, Bothriochloa sp*., with a low amount of *Cynodon dactylon, Setaria sp*. and *Eragrostis sp*. The top of the banks is vegetated by open, wooded grasslands, covered by *Vachellia karroo, S. nigrescens, Diospyros austro-africana* and a low amount of *Grewia bicolor*, as well as grasses, such as *Eragrostis sp*. and *Setaria sp.* Small patches of saturation occur along the banks, coinciding with the base of patchy *C. sexangularis*. A terrapin was observed within one of these saturated patches.

Ephemeral stream E6 and diversion channel DC2 (refer to Figure 31 below)

Ephemeral stream E6 extends from the outlet of diversion channel DC2 in the east, running westwards across at two existing dirt access roads, the second of which will be upgraded as part of the current project, providing the main access route to proposed PCD 3.

The channel upstream of the crossing is characterised by a 10 m wide by 1 m deep sandy river bed with, gravel and stones. The mid-channel bar is partially vegetated by *C. mopane, S. nigrescens* and

clumps of *Setaria sp*, whereas the banks are dominated by a high abundance of *C. mopane*, with a low to moderate abundance of *Schotia sp*. and a low abundance of *V. karroo*. The existing crossing includes a three-pipe culvert, with a gabion headwall at the culvert inlet. A narrow, well-vegetated tributary from the north is slightly diverted by the road and converges with E6, resulting in some ponding at the fence line, with evidence of bare, cracked clay noted. The bed and banks of the tributary are vegetated by *Setaria sp., V. karroo* and *Solanum sp*. The channel downstream of the crossing is characterised by a dry, sandy riverbed, with gravel and stone/cobble alluvium, vegetated by a high abundance of an unidentified grass, a moderate abundance of *C. mopane* and *Setaria sp*., and a low abundance of *Diospyros austro-africana*.

Diversion channel DC2 extends westwards from the existing on-mine water storage dams (OMWSD) at the south-eastern side of the mine, draining into the Kolope River via the E6 channel. The bed of the channel is approximately 10 m wide, mostly flat and devoid of vegetation, comprised primarily of sand, gravel and stones, with isolated sections including larger rocks and exposed bedrock. The right bank of the channel is steep, forming a 3 m wide by 3 m high, well-vegetated, grassy earthen berm, dominated by a mix of *E. lehmanniana, E. curvula* and *Bothriochloa sp*. The left bank is generally more gradual, well-vegetated by grass and fringed by *C. mopane* and *V. karroo* bushveld.

Clean water storage dam D3 (refer to Figure 31 below)

Clean water storage dam D3 is characterised by a large open water area, formed through the impoundment of water along the existing OMWSDs, with few isolated trees and edges lined by *C. mopane* and *V. karroo*. Dam D3 resembles a terrestrial area that has been flooded, as no true artificial wetland vegetation is present on site. The high-water area includes a mix of alluvium, gravel and cobble, with various herbaceous species. The dam is fed from the south-east by a very muddy, back-flooded channel (±10 m wide by 10-20 cm deep), with very gentle, poorly defined banks. A brown, wet mud without mottles is found at a depth of 0-5 cm along the edges of the back-flooded area. This transitions to a brown-red loamy sand without mottles at a depth of 5-10 cm horizon. Weathered sandy, quartz bedrock is found at a depth of 20 cm. The edges of the back-flooded channel are lined with woody vegetation, including C*. mopane, V. robusta, V. karroo* and *V. nilotica*.

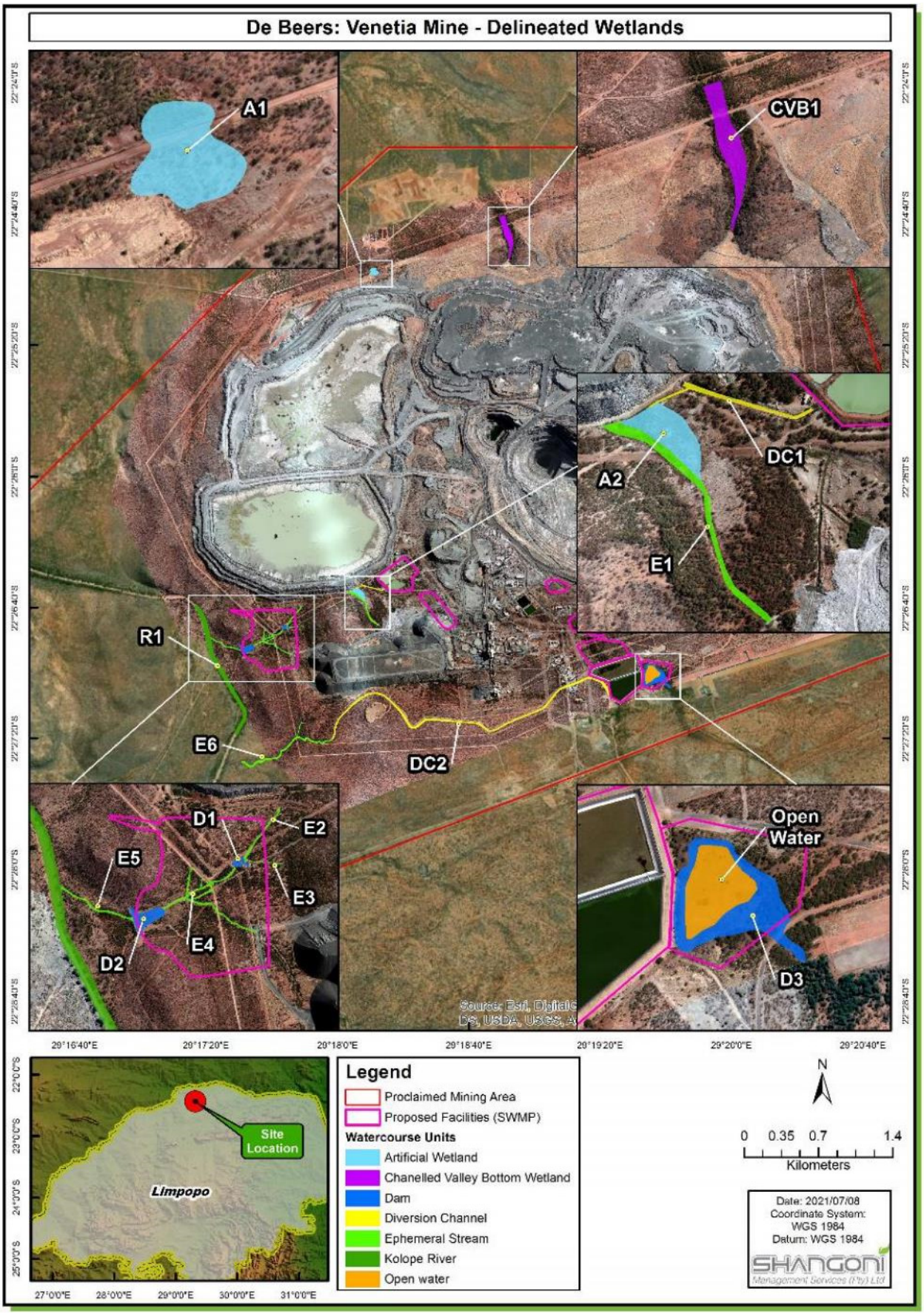


Figure 31: Wetland delineation

Present Ecological State ("PES") of the watercourses and wetlands

The Present Ecological State ("PES") for ephemeral streams E1-6 and the Kolope River Section R1 were assessed using the River Index of Habitat Integrity ("IHI") tool, assessing both the instream and riparian habitats. Although CVB1 is categorised as a wetland, it originated from the back-flooding of the paleo drainage channel. The PES of CVB1 was, therefore, also assessed using the River IHI tool. The results of the IHI assessment are summarised in Table 19 below. The habitat integrity of the streams, rivers and wetland in the project area range from natural / artificially-created to seriously modified.

Table 19: Summary results of the stream and river IHI assessment.

STREAM / RIVER	INSTREAM IHI		RIPARIAN IHI		OVERALL PES	
	SCORE	CLASS	SCORE	CLASS	SCORE	CLASS
E1	6.26	E	8.13	E/F	7.01	E: Seriously Modified
E2	4.50	D	5.75	D	5.00	D: Poor
E3	3.93	C/D	4.11	C/D	4.00	D: Poor
E4	3.34	C	3.80	C	3.52	C: Fair
E5	2.34	C	2.05	C/B	2.23	C: Fair
E6	2.68	C	1.66	B	2.27	C: Fair
R1	0.22	A	0.66	A	0.40	A: Natural
CVB1	5.44	D	5.88	D	5.62	D: Poor

Ecosystem services of the streams, riparian area and wetlands

Ecosystem services were assessed for the ephemeral streams, riparian area and wetlands. With the exception of biodiversity maintenance services, ecosystem services were not assessed for the dams (D1-3) due to their lack of natural riparian and wetland characteristics. The overall importance scores for the goods and services provided by the watercourse units are provided below (Table 20 and Table 21). The rating of the extent to which a benefit is being supplied for each ecosystem service is also listed.

The majority of the ephemeral stream ecosystem services were rated as very low in terms of their overall importance. Although not technically riparian, ephemeral streams do offer some ecosystem services, albeit in an often limited capacity. For example, ephemeral streams supply sediment trapping ecosystem services, as they often cannot convey their load. Despite this, E1-E6 scored very low in terms of sediment trapping due to the low demand for these services from these particular watercourses. With the exception of cultivated foods, which obtained a low importance rating, all other ecosystem services for E1, E2 and E3 received very low ratings. This was attributed to their moderate to high supply scores, as compared to very low demand scores, in terms of the frequency of storm flow distribution across the entire assessment unit and the lack of organic soils, as well as the lack of representation of different wetland hydrological zones, seeing as these streams are ephemeral in nature. Watercourse units E4, E5 and E6 also received low importance ratings for cultivated foods, with

similarly moderate to high supply scores, as compared to very low demand scores, as was the case with E1-3. In addition, E4 and E6 received low scores for flood attenuation due to their high supply scores as a result of their relatively large upstream catchments, as compared to their very low demand scores.

Table 20: Ecosystem Services provided by the ephemeral streams.

ECOSYSTEM SERVICE		E1	E2	E3	E4	E5	E6
Regulating and supporting services	Flood attenuation	0.3 (VL)	0.4 (VL)	0.4 (VL)	0.4 (VL)	1.1 (L)	1.1 (L)
	Stream flow regulation	-	-	-	-	-	-
	Sediment trapping	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
	Erosion control	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
	Phosphate assimilation	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
	Nitrate assimilation	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
	Toxicant assimilation	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
	Carbon storage	0.5 (VL)	0.8 (VL)	0.8 (VL)	0.8 (VL)	0.8 (L)	0.8 (L)
	Biodiversity maintenance	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
Provisioning services	Water for human use	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
	Harvestable resources	0.5 (VL)	0.5 (VL)	0.5 (VL)	1.0 (L)	0.5 (VL)	1.0 (L)
	Food for livestock	0.0 (VL)	0.5 (VL)	0.0 (VL)	0.0 (VL)	0.5 (VL)	0.5 (VL)
	Cultivated foods	1.0 (L)	1.0 (L)	1.0 (L)	1.0 (L)	1.0 (L)	1.0 (L)
Cultural services	Tourism and Recreation	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
	Education and Research	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
	Cultural and Spiritual	0.5 (VL)	0.5 (VL)	0.5 (VL)	0.5 (VL)	0.5 (VL)	0.5 (VL)

Table 21: Ecosystem Services provided by the wetlands and riparian area.

ECOSYSTEM SERVICE		CVB1	A1	A2	R1
Regulating and supporting services	Flood attenuation	0.0 (VL)	0.0 (VL)	0.2 (VL)	0.4 (VL)
	Stream flow regulation	0.3 (VL)	0.3 (VL)	0.3 (VL)	-
	Sediment trapping	1.4 (ML)	1.6 (ML)	1.6 (ML)	0.2 (VL)
	Erosion control	0.7 (VL)	0.0 (VL)	0.4 (VL)	1.2 (L)
	Phosphate assimilation	0.9 (L)	0.7 (VL)	1.1 (L)	0.2 (VL)
	Nitrate assimilation	0.6 (VL)	1.0 (L)	1.4 (ML)	0.3 (VL)
	Toxicant assimilation	1.3 (ML)	0.3 (VL)	1.8 (M)	0.2 (VL)
	Carbon storage	0.9 (L)	1.3 (L)	1.4 (ML)	0.7 (VL)
	Biodiversity maintenance	0.0 (VL)	0.0 (VL)	0.0 (VL)	3.1 (H)

ECOSYSTEM SERVICE		CVB1	A1	A2	R1
Provisioning services	Water for human use	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
	Harvestable resources	1.0 (L)	1.0 (L)	0.5 (VL)	1.0 (L)
	Food for livestock	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.5 (VL)
	Cultivated foods	0.6 (VL)	0.2 (VL)	0.2 (VL)	1.3 (L)
Cultural services	Tourism and Recreation	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.4 (VL)
	Education and Research	0.0 (VL)	0.0 (VL)	0.0 (VL)	0.0 (VL)
	Cultural and Spiritual	0.5 (VL)	0.5 (VL)	0.5 (VL)	0.5 (VL)

Chapter O: Visual aspects

Due to the topography within the Mining Right area, operations at Venetia Mine are only visible from the regional road R521, that runs past the mine connecting All-days to Musina. Current mining operations extend approximately 6 km along the R521 road.

Chapter P: Socio-economic

The following information was obtained from the *Musina Local Municipality, 2021 / 2022 Final Integrated Development Plan*.

Population growth trends

The Musina Local Municipality's population, in 2001, was at 39 310 and by Census 2011 the population was at 68 359, and by Community Survey 2016 the population is at 132 009. The population growth from 2001 Census, 2011 Census and Community survey 2016 is at 63 650. Musina Local Municipality population growth is 63 650 compared to the District municipality's population growth of 99 228.

Population groups - Race

The dominant population group is black africans at 127 621 of the total population followed by whites at 3 645 and the least population group being coloured at 337.

Population groups - Age

The major population by age, of Musina Local Municipality is dominated by the youth aged between 15-34 years and account for 58841 of the total population.

Gross Domestic Product ("GDP")

The greatest contributor to the Vhembe District Municipality economy is the Makhado Local Municipality with a share of 32.87% or R 20.8 billion, increasing from R 9.02 billion in 2008. The economy with the lowest contribution is the Musina Local Municipality with R 8.62 billion growing from R 3.6 billion in 2008. When looking at the regions within the Vhembe District Municipality it is expected that from 2018 to 2023 the Musina Local Municipality will achieve the highest average annual growth rate of 1.98%. The region that is expected to achieve the second highest average annual growth rate is that of Makhado Local Municipality, averaging 1.88% between 2018 and 2023. On the other hand the region

that performed the poorest relative to the other regions within Vhembe District Municipality was the Thulamela Local Municipality with an average annual growth rate of 1.61%.

Gross Value Added ("GVA")

In 2018, the community services sector is the largest within Vhembe District Municipality accounting for R 17.7 billion or 32.2% of the total GVA in the district municipality's economy. The sector that contributes the second most to the GVA of the Vhembe District Municipality is the finance sector at 17.6%, followed by the trade sector with 17.3%. The sector that contributes the least to the economy of Vhembe District Municipality is the agriculture sector with a contribution of R 1.61 billion or 2.94% of the total GVA.

The community sector, which includes the government services, is generally a large contributor towards GVA in smaller and more rural local municipalities. When looking at the regions within the district municipality, the Makhado Local Municipality made the largest contribution to the community services sector at 32.85% of the district municipality. As a whole, the Makhado Local Municipality contributed R 18 billion or 32.71% to the GVA of the Vhembe District Municipality, making it the largest contributor to the overall GVA of the Vhembe District Municipality.

Table 22: Gross Value Added (GVA) by broad economic sector- Vhembe District Municipality, 2018

	Vhembe R billions	Limpopo R billions	National Total R billions	Vhembe as % of province	Vhembe as % of national
Agriculture	1.6	8.5	106.1	18.9%	1.52%
Mining	6.4	90.5	350.9	7.1%	1.83%
Manufacturing	1.7	9.6	572.9	17.9%	0.30%
Electricity	3.0	13.6	166.0	22.1%	1.81%
Construction	2.2	9.4	170.3	23.0%	1.27%
Trade	9.5	48.1	652.7	19.7%	1.45%
Transport	3.2	15.6	426.7	20.3%	0.74%
Finance	9.6	47.1	854.4	20.5%	1.13%
Community services	17.7	75.8	1,041.3	23.3%	1.70%
Total Industries	**54.9**	**318.3**	**4,341.3**	**17.2%**	**1.26%**

7.4.2 Description of the current land uses

Open pit and underground mining (Venetia Mine and adjacent DiamCor Mine), and natural areas (part of the VLNR) are the predominant land uses type on the properties associated with the proposed project. Refer to Figure 32 for an illustration of land cover associated with the area.

7.4.3 Description of specific environmental features and infrastructure on the site

The specific environmental features on site related to land use, flora, fauna, wetlands and surface water have been described in the relevant chapters in Section 7.4.1 of Part A. In addition to the above, the

infrastructure associated with the proposed project will consist of PCD's, storm water management infrastructure (channels, trenches, berms), access roads, fences, pipelines and pumping stations and powerlines.

7.4.4 Environmental and current land cover map

Refer to Figure 32 below for an indication of the current land use and land cover.

7.5 Impacts and risks identified

The following section contains all the potential impacts and risks identified for the proposed project as sourced from the specialist studies conducted for the project.

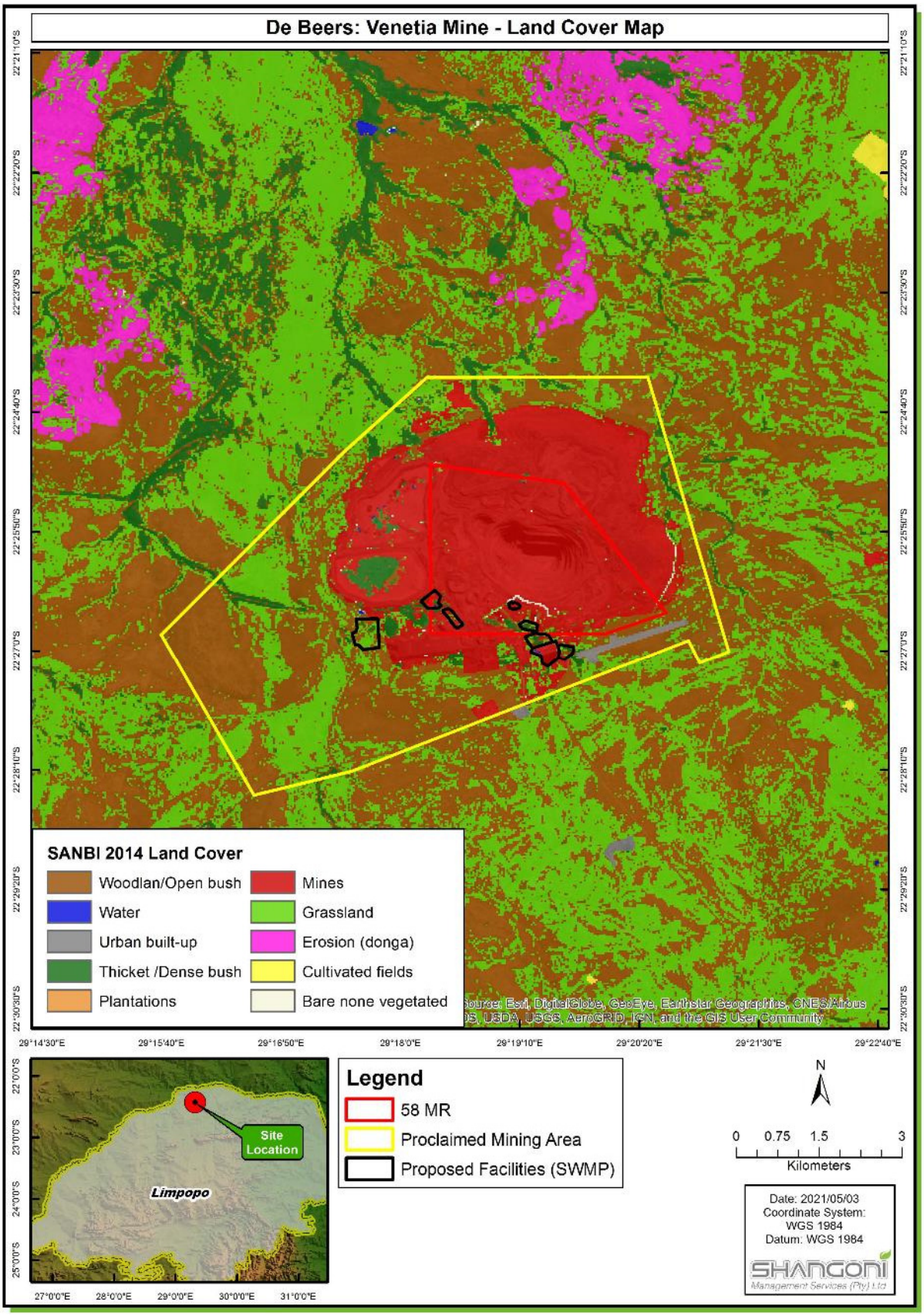


Figure 32: Land cover map

7.5.1 Impacts and risks associated with the proposed SWMP

Table 23: Impacts and risks identified for the proposed SWMP

No.	Aspect affected	Activity	Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
								Probability	Magnitude	Significance		Probability	Magnitude	Significance
1a	Geology	Construction and operations the proposed infrastructure associated with the SWMP.	There are no impacts identified on geology as a result of the construction and operation of the proposed infrastructure.											
2b	Topography, soils, land use and land capability	Construction and operations the proposed infrastructure associated with the SWMP.	The construction and expansion of the facilities associated with the SWMP will influence the nature of the topography that is typical of the surrounding area with such changes stemming from the dam walls. The natural drainage patterns, with specific focus on PCD 3, will also be altered as PCD 3 will be constructed to contain affected water from runoff from site.	Reversible	Low Degree	Construction, Operational, and Decommissioning.	Refer to Table 5 for the areas associated with the activities.	2	2	Medium	Control	2	1	Low
2c		Construction of proposed infrastructure (including temporary contractors camp).	Vegetation clearance and topsoil stripping will be conducted as part of the construction of the proposed infrastructure and contractor camp establishment. The topsoil will then be stockpiled for later use during the rehabilitation of the side walls of the facilities. Soil erosion may occur on the topsoil stockpiles and from bare areas due to wind or surface water runoff.	Low Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	3	Medium	Avoid and Control	2	1	Low
2d			Spillages of hydrocarbons, chemicals other substances from construction vehicles and equipment will result in the contamination of soil.	High Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
2e			The removal of topsoil may result in the mixing of the horizons of the soil that will have an impact on the fertility and production potential of the soil.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	1	Low
2f			The temporary stockpiling of topsoil may result in a decrease in the fertility of the soil and the leaching of minerals due to exposure of the soil to elements.	High Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	1	Low
2g			Ineffective erosion control along access roads may lead to siltation of downstream water resources and scouring of soil.	High Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	1	Low
2h		Construction and operations the proposed infrastructure associated with the SWMP.	Changes to the land use, from natural (currently zoned for Mining 1) to mining, will occur for the long term (LOM) as a moderately sized natural area (with specific reference to PCD 3 and OMWSD Compartment 4) will be disturbed for the construction of the facilities.	High Degree	Low Degree	Construction, Operational and decommissioning	Refer to Table 5 for the areas associated with the activities.	4	3	High	Control	4	2	Medium

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
3a	Vegetation and general ecology	PCD 1	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	Low Degree	Construction, Operational, Decommissioning and Closure.	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, mostly local scale, not anticipate exceeding mine perimeter	2	2	Low	Avoid (buffer area) & Control, recommended mitigation approach	2	1	Low
3b				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Low Degree	Residual and Post-Operational		2	1	Low		2	1	Low
3c		PCD 2	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	Low Degree	Construction, Operational, Decommissioning and Closure.	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, mostly local scale, not anticipate exceeding mine perimeter	2	2	Low	Avoid (buffer area) & Control, recommended mitigation approach	2	1	Low
3d				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Low Degree	Residual and Post-Operational		2	1	Low		2	1	Low
3e		PCD 3A	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	Medium Degree	Construction, Operational, Decommissioning and Closure.	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat (from VLNR), impacts will exceed local area, significance of impacts anticipated to be severe on local scale	3	3	Medium	Avoid (buffer area) & Control	3	2	Medium
3f				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Low Degree	Residual and Post-Operational		3	3	Medium		3	2	Medium

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
3g		PCD 3B	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	High Degree	Construction, Operational, Decommissioning and Closure.	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat (from VLNR), impacts will exceed local area, significance of impacts anticipated to be severe on local scale	5	4	High	Avoid (buffer area) & Control	4	3	High
3h				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Medium Degree	Residual and Post-Operational		4	4	High		4	3	High
3i		PCD 3C Preferred alternative	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	High Degree	Construction, Operational, Decommissioning and Closure.	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat (from VLNR), impacts will exceed local area, significance of impacts anticipated to be severe on local scale	5	4	High	Avoid (buffer area) & Control	3	3	High
3j				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Medium Degree	Residual and Post-Operational		4	4	High		4	3	High
3k		PCD 3D	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	Medium Degree	Construction, Operational, Decommissioning and Closure.	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat (from VLNR), impacts will exceed local area, significance of impacts anticipated to be severe on local scale	3	3	Medium	Avoid (buffer area) & Control	3	2	Medium
3l				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Low Degree	Residual and Post-Operational		3	3	Medium		3	2	Medium

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
3m		PCD 1 – Compartment 4B	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	Low Degree	Construction, Operational, Decommissioning and Closure.	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, mostly local scale, not anticipate exceeding mine perimeter	2	2	Low	Avoid (buffer area) & Control, recommended mitigation approach	2	1	Low
3n				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Low Degree	Residual and Post-Operational		2	1	Low		2	1	Low
3o		FRD 1 RWD	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	Low Degree	Construction, Operational and Residual.	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, mostly local scale, not anticipate exceeding mine perimeter	2	2	Low	Avoid (buffer area) & Control, recommended mitigation approach	2	1	Low
3p				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Low Degree	Residual and Post-Operational		1	1	Low		1	1	Low
3q		OMWSD North and South Compartments	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	Low Degree	Construction, Operational and Residual.	Refer to Table 5 for the areas associated with the activities. No loss of natural habitat, existing infrastructure, but impacts might extend to nearby natural habitat, moderate to low significance	2	2	Low	Avoid (buffer area) & Control, recommended mitigation approach	2	1	Low
3r				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Low Degree	Residual and Post-Operational		2	1	Low		2	1	Low

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
3s		OMWSD Compartment 3	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	Medium Degree	Construction, Operational and Residual.	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, local scale, not anticipate exceeding mine perimeter, impacts anticipated to be of moderate significance, but local	3	2	Medium	Avoid (buffer area) & Control, recommended mitigation approach	2	1	Low
3t				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Low Degree	Residual and Post-Operational		2	2	Low		2	1	Low
3u		OMWSD Compartment 4	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	Medium Degree	Construction, Operational and Residual.	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, local scale, not anticipate exceeding mine perimeter, impacts anticipated to be of moderate significance, but local	3	3	Medium	Avoid (buffer area) & Control, recommended mitigation approach	2	1	Low
3v				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Medium Degree	Residual and Post-Operational		2	2	Low		2	1	Low
3w		Northern Attenuation Channel	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	High Degree	Construction, Operational and Residual.	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, local scale, not anticipate exceeding mine perimeter, impacts anticipated to be of moderate significance, but local	2	1	Low	Avoid (buffer area) & Control, recommended mitigation approach	2	1	Low
3x				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Medium Degree	Residual and Post-Operational		1	1	Low		1	1	Low

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
3y	Fauna and Avifauna	Southern Access Road	Construction, operational and post-operational activities, rehabilitation.	Direct and Indirect Impacts on the botanical and ecological environment	Low Degree	High Degree	Construction, Operational and Residual.	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat (from VLNR), impacts will exceed local area, significance of impacts anticipated to be moderately severe on local scale	3	3	Medium	Avoid (buffer area) & Control, recommended mitigation approach	2	3	Medium
3z				Cumulative Impacts on the botanical and ecological environment.	Low Degree	Medium Degree	Residual and Post-Operational		3	2	Medium		1	1	Low
4a		PCD 1	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	Medium Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, local scale, not anticipate to exceed mine perimeter	3	2	Medium	Avoid (buffer area) & Control	2	1	Low
4b				Indirect Impacts on the faunal and avian environment	Low Degree	Low Degree	Construction, operational and residual		2	2	Low		2	1	Low
4c		PCD 2	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	Low Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, local scale, not anticipate to exceed mine perimeter	3	2	Medium	Avoid (buffer area) & Control	2	1	Low
4d				Indirect Impacts on the faunal and avian environment	Low Degree	Low Degree	Construction, operational and residual		2	2	Low		2	1	Low

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
4e		PCD 3A	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	High Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat, impacts will exceed local area, significance of impacts anticipated to be severe on local scale	3	3	Medium	Avoid (buffer area) & Control	2	2	Low
4f				Indirect Impacts on the faunal and avian environment	Low Degree	High Degree	Construction, operational and residual		3	3	Medium		2	2	Low
4g		PCD 3B	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	High Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat (from VLNR), impacts will exceed local area, significance of impacts anticipated to be severe on local scale	5	4	High	Avoid (buffer area) & Control	3	3	Medium
4h				Indirect Impacts on the faunal and avian environment	Low Degree	High Degree	Construction, operational and residual		4	4	High		3	3	Medium
4i		PCD 3C Preferred alternative	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	High Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat (from VLNR), impacts will exceed local area, significance of impacts anticipated to be severe on local scale	5	4	High	Avoid (buffer area) & Control	3	3	Medium
4j				Indirect Impacts on the faunal and avian environment	Low Degree	High Degree	Construction, operational and residual		4	4	High		3	3	Medium

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
4k		PCD 3D	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	High Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat, impacts will exceed local area, significance of impacts anticipated to be severe on local scale	3	3	Medium	Avoid (buffer area) & Control	2	2	Low
4l				Indirect Impacts on the faunal and avian environment	Low Degree	High Degree	Construction, operational and residual		3	3	Medium		2	2	Low
4m		PCD 1 – Compartment 4B	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	Low Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, local scale, not anticipate to exceed mine perimeter	2	2	Low	Avoid (buffer area) & Control	2	1	Low
4n				Indirect Impacts on the faunal and avian environment	Low Degree	Low Degree	Construction, operational and residual		2	1	Low		2	1	Low
4o		FRD 1 RWD	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	Low Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, local scale, not anticipate to exceed mine perimeter	2	2	Low	Avoid (buffer area) & Control	2	1	Low
4p				Indirect Impacts on the faunal and avian environment	Low Degree	Low Degree	Construction, operational and residual		2	1	Low		2	1	Low

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
4q		OMWSD North and South Compartments	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	Low Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. No loss of natural habitat, existing infrastructure, but impacts might extend to nearby natural habitat, moderate to low significance	2	2	Low	Avoid (buffer area) & Control	2	1	Low
4r				Indirect Impacts on the faunal and avian environment	Low Degree	Low Degree	Construction, operational and residual		2	1	Low		2	1	Low
4s		OMWSD Compartment 3	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	Medium Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, local scale, not anticipate to exceed mine perimeter, impacts anticipated to be of moderate significance, but local	3	2	Medium	Avoid (buffer area) & Control	2	1	Low
4t				Indirect Impacts on the faunal and avian environment	Low Degree	Medium Degree	Construction, operational and residual		2	2	Low		2	1	Low
4u		OMWSD Compartment 4	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	Medium Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat, impacts will exceed local area, significance of impacts anticipated to be moderately severe on local scale	4	3	High	Avoid (buffer area) & Control	3	2	Medium
4v				Indirect Impacts on the faunal and avian environment	Low Degree	Medium Degree	Construction, operational and residual		2	2	Low		2	1	Low

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
4w		Northern Attenuation Channel	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	High Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Minor losses of natural habitat, local scale, not anticipate to exceed mine perimeter, impacts anticipated to be of moderate significance, but local	2	2	Low	Avoid (buffer area) & Control	2	1	Low
4x				Indirect Impacts on the faunal and avian environment	Low Degree	Medium Degree	Construction, operational and residual		2	1	Low		2	1	Low
4z		Southern Access Road	Construction, operational and post-operational activities	Direct Impacts on the faunal and avian environment	Low Degree	High Degree	Construction, operational and residual	Refer to Table 5 for the areas associated with the activities. Loss of moderate size natural habitat (from VLNR), impacts will exceed local area, significance of impacts anticipated to be moderately severe on local scale	4	3	High	Avoid (buffer area) & Control	3	2	Medium
4aa				Indirect Impacts on the faunal and avian environment	Low Degree	Medium Degree	Construction, operational and residual		3	2	Medium		2	1	Low

No.	Aspect affected	Activity	Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
								Probability	Magnitude	Significance		Probability	Magnitude	Significance
5a	Surface water	Grading, vegetation clearing and soil stripping	As part of the construction phase of the Project, several additional water storage facilities will be constructed (including PCD 1, PCD 2, PCD 3, PCD 1 Compartment 4B, OMWSD Compartment 3, and OMWSD Compartment 4) and some existing facilities will be expanded (including FRD 1 RWD, and OMWSD North and South Compartment). A network of affected water channels will also be constructed to convey surface runoff to the runoff receiving PCDs. Furthermore, the existing southern access road that runs adjacent to the south-eastern portion of the mine boundary security fence, will be upgraded and expanded to a 10 m wide road (currently 4 m wide) to provide access of construction vehicles to the proposed PCD 3 locality. Grading, vegetation clearing, and soil stripping will be carried out as part of the construction phase. There may be a decrease in surface water quality when any surface water comes into contact with dust, eroded soil, or other pollutants generated during the construction / expansion phase of the Project. The sediment load within surface water runoff may increase or the chemistry of surface water may be altered if not prevented or mitigated. The construction of PCD 3 and expansion of the southern access road will have the highest risk of contaminating surface water resources, due to its close proximity to the Kolope River and the existing river diversion. <u>Surface water quality</u> Contamination of surface water resources causes deterioration of water quality, affecting the use of surface water as a natural resource.	Low degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	4	3	High	Control, prevent, and avoid	2	2	Low
5b		Use, storage, and handling of hazardous materials.	Spillages of hazardous materials (i.e., cement, oil, fuel and / or grease) used during the construction phase of the Project may impact negatively on the surrounding clean water environment. The construction of PCD 3 and expansion of the southern access road will have the highest risk of contaminating surface water resources, due to its close proximity to the Kolope River and the river diversion. Surface water quality Deterioration of water quality due to chemical contamination affecting the use of surface water as a natural resource.	Medium degree	Low degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	3	Medium	Control and prevent	1	2	Low
5c		Implementation of the project	Currently the main risk associated with surface water at Venetia Mine is the potential deterioration of surface water quality in the receiving environment resulting from affected water leaving the mine site. The implementation of the Project will reduce this risk (i.e. positive impact) as all affected water generated on site will be contained and dirty runoff will be separated from clean runoff more effectively.	Low degree	Medium degree	Operational	Refer to Table 5 for the areas associated with the activities.	Positive Impact						

No.	Aspect affected	Activity	Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
								Probability	Magnitude	Significance		Probability	Magnitude	Significance
5d		Runoff receiving PCDs	<u>Runoff receiving PCDs.</u> PCDs that will receive surface runoff directly include PCD 3, PCD 1 and the SWCD. PCD 3 will be constructed directly west of the CRD with a capacity of 1 050 000 m^3. It will receive runoff from S1, seepage from the FRDs and water from the underground operations (via the K03 Pit). PCD 1 will be constructed south of the existing SWCD with a capacity of 120 000 m^3. It will only receive water in the form of surface runoff from S2. The SWCD is an existing PCD located directly south of the open pit with a capacity of 27 500 m^3. The SWCD will receive runoff from S3 and from the underground operations (via the K03 Pit). Once the runoff receiving PCDs are operational, there are two main potential impacts on surface water quality and quantity. Firstly, there will be a reduction in surface water quantity of the larger catchment, as runoff and precipitation are contained in the runoff receiving PCDs mentioned above. It should be noted that this impact is a continuation of an existing impact due to the existing mining activities at Venetia Mine. The area applicable to the Project is already considered a dirty water area and runoff reporting to S2 and S3 is already being collected and contained in the SWCD. Runoff generated in S1 is currently not being collected and contained and will exacerbate the magnitude of this existing impact (i.e., more runoff will be contained). Secondly, there may be a reduction in surface water quality of the downstream environment in the event of spillages from the facilities. The risk of spillages, based on Jones & Wagner's 2020 water balance, is, however, less than 2% (i.e., less than 1 in 50 years on average), in accordance with Regulation GN 704. **<u>Surface water quality and quantity</u>** • There may be a deterioration of surface water quality due to chemical contamination resulting from spillages, affecting the use of surface water as a natural resource. There will be a reduction in the quantity of water reporting to the larger quaternary catchment (A63E) as runoff from S1, S2 and S3 is contained in the PCDs.	Low degree	Medium degree	Operational	Refer to Table 5 for the areas associated with the activities.	4	2	Medium	Control and prevent	2	2	Low

No.	Aspect affected	Activity	Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
								Probability	Magnitude	Significance		Probability	Magnitude	Significance
5e		Dirty water containment facilities	<u>Dirty water containment facilities.</u> The additional dirty water containment facilities include the construction of PCD 2, PCD 1 compartment 4B, OMWSD Compartment 3, and OMWSD Compartment 4, and the expansion of FRD 1 RWD and OMWSD North and South Compartment. These facilities will not receive any surface runoff directly and will essentially be "pump-to" facilities only, where affected water can be pumped to or from, depending on the situational requirements. PCD 2 will be constructed to the north-west of the plant area with a storage capacity of 130 000 m^3. PCD 1 compartment 4B will be constructed north-west of the existing SWCD with a storage capacity of 34 000 m^3. OMWSD Compartment 3 will be constructed north of OMWSD North and South Compartment with a storage capacity of 275 000 m^3. OMWSD Compartment 4 will be constructed adjacent to OMWSD North and South Compartment within the current low lying storm water detention pond with a capacity of 185 000 m^3. FRD 1 RWD is an existing facility located south-east of FRD 1 and its capacity will be increased from 40 000 m^3 to 130 000 m^3. OMWSD North and South Compartment are existing facilities located south of the SWCD and its capacity will be increased from 460 000 m^3 to 650 000 m^3. The main surface water related risk associated with these facilities is a deterioration of surface water quality due to spillages. The risk of spillages, based on Jones & Wagner's 2020 water balance, is however less than 2% (i.e., less than 1 in 50 years on average), in accordance with Regulation GN 704. Based on the proposed location of PCD 1, PCD 2, PCD 1 Compartment 4B and OMWSD Compartment 3, spillages are likely to drain back into the surrounding affected water channels and will be contained in one of the runoff receiving PCDs, reducing the impact of spillages from these facilities. Spillages from OMWSD North and South Compartment and OMWSD Compartment 4 are, however, likely to drain into the existing river diversion and then into the Kolope River, therefore having a higher impact on water quality. **<u>Surface water quality</u>** There will be a deterioration of surface water quality due to chemical contamination resulting from spillages, affecting the use of surface water as a natural resource.	Low degree	Medium degree	Operational	Refer to Table 5 for the areas associated with the activities.	2	3	Medium	Control and prevent	1	2	Low

No.	Aspect affected	Activity	Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
								Probability	Magnitude	Significance		Probability	Magnitude	Significance
5f		K03 Pit	The K03 Pit is located to the east of FRD2 on the north-western perimeter of the open pit with a total in-pit storage capacity of 3.5 Mm^3. The safety berm surrounding the pit perimeter restricts surface runoff from entering the pit in an uncontrolled manner. The pits do, however, receive direct rainfall as well as runoff from a portion of the WRDs. This volume of water, together with any seepage water flowing to the K02 and K01 Pits, pose a risk to the safety of workers in the VUP. In order to de-risk the underground operations, it is proposed that all water reporting to the K02 and K01 Pits and the VUP be pumped to the K03 Pit temporarily whereafter it will be pumped to the OMWSDs for re-used within the plant. Due to the sheer volume of the K03 Pit, spillages are highly unlikely and, therefore, the impact on surface water quality is negligible. In terms of surface water quantity, there will be a continuation of the current impact (i.e., runoff and rain entering the pit) leading to a reduction in the amount of runoff reporting to the larger catchment. There is no new surface water related impacts associated with the storage of water in the K03 Pit.	Low degree	Low degree	Operational	Refer to Table 5 for the areas associated with the activities.	2	2	Low	Control and prevention	2	2	Low
5g		Southern Access Road	The southern access road is an existing gravel road and will be upgraded and expanded to a 10 m wide road (currently 4 m wide) to provide access of construction vehicles to the proposed PCD 3 locality. There are two main surface water related problems associated with the southern access road. Firstly, the road may impact on the natural drainage of surface water in the surrounding area as it is assumed that the access road will be slightly elevated. If left unmitigated, surface runoff may pond against the road that could lead to a reduction in the volume of runoff (i.e., quantity) reporting to the downstream catchment. Secondly, the surface area of the road will be compacted, creating an impermeable area where runoff cannot infiltrate into the ground. This may increase the volume and velocity of runoff along the road, resulting in higher erosion rates, particularly at points where the flow of water is concentrated. Increased erosion rates may increase the sediment load in the runoff resulting in a reduction is surface water quality downstream. **Surface water quantity and quality** • Deterioration of surface water quality due to increased erosion and sedimentation. • There will be a decrease in clean water runoff reporting to the downstream catchment if runoff is left to pond against the road, potentially reducing the availability of water to downstream users.	Medium degree	Low degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Control and prevention	2	1	Low

No.	Aspect affected	Activity	Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
								Probability	Magnitude	Significance		Probability	Magnitude	Significance
6a	Groundwater Quality	Construction of PCDs	The impacts on groundwater quality are primarily related to the management of materials, wastes and spills and unauthorised disposal of affected/contaminated water. Contamination of groundwater may also arise due to incorrect handling and disposal of waste materials. This risk is considered low. Due to the short exposure and small scale of these potential spills, the impacts will be negligible during the construction phase. Except for lesser oil and diesel spills, there are no activities expected that could impact on regional groundwater quality. This phase should thus cause very little additional impacts. It is expected that the current status quo will be maintained. A very limited groundwater quality impact is expected during the construction phase, generally because of the small surface areas involved and the short duration thereof.	High Degree	Low Degree	Construction	Refer to Table 5 for the areas associated with the activities.	2	1	Low	Prevent or contain	1	1	Low
6b	Groundwater Quality	Operation of PCDs	Unlined dams can result in mounding of the water levels due to artificial and increased recharge to the aquifer. Elevated water elevations result in an increase in flow gradients which means higher rates of groundwater flow and mass transport. Due to the PCDs being lined, their localities and small footprints, these facilities are not expected to contribute to the current extent of contamination observed. The PCDs themselves are seen as remedial measures.	High Degree	Low Degree	Operational	Refer to Table 5 for the areas associated with the activities.	2	2	Low	Prevent or contain	1	1	Low
7a	Air quality	Construction the proposed infrastructure associated with the SWMP.	The construction of the proposed infrastructure will require the stripping of vegetation and earthworks for construction. This may result in the generation of dust in the localised construction areas. Due to the location of the proposed infrastructure, the generation of dust is not anticipated to impact on any sensitive receptors.	High Degree	Low Degree	Construction	Refer to Table 5 for the areas associated with the activities.	2	1	Low	Avoid and Control	2	1	Low
7b		Utilisation of the access road.	The use of the access road during the construction phase of PCD 3 may result in vehicle entrained dust generation limited to the local area.	High Degree	Low degree	Construction and Operational	Refer to Table 5 for the areas associated with the activities.	3	3	Medium	Control	2	2	Low
7c			The access road is a shared access road with the adjacent operation DIAMCOR. The normal use of this road by the adjacent operation and Venetia Mine may result in vehicle entrained dust generation limited to the local area.	High Degree	Low degree	Operation	Refer to Table 5 for the areas associated with the activities.	3	2	Low	Control	2	1	Low
7d		The operation of the proposed storm water management infrastructure.	There are no impacts identified on air quality as a result of the operation of the proposed storm water management infrastructure.											

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
8a	Noise and vibration	Construction the proposed infrastructure associated with the SWMP.		It is anticipated that the construction of the proposed infrastructure will result in the generation of noise in the localised areas of construction. However, due to the location of the proposed infrastructure in relation to the exiting mining activities, the generation of noise is not anticipated to impact on any sensitive receptors.	High Degree	Low degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Low	Control	3	1	Low
8b		The operation of the proposed storm water management infrastructure.		There are no impacts identified on noise as a result of the operation of the proposed storm water management infrastructure.											
9a	Sites of Archaeological and Cultural Importance	Construction and operations the proposed infrastructure associated with the SWMP.		There are no impacts identified on Sites of Archaeological and Cultural Importance as a result of the construction and operation of the proposed infrastructure.											
10a	Palaeontological resources	Construction and operations the proposed infrastructure associated with the SWMP.		The underlying Precambrian rocks of the Beit Bridge Complex do not host fossils and no fossils have been reported from the overlying Quaternary sediments. The rocks of the Ecca group are known to host fossil glossopterid plants but these fall outside the limits of the area. It is thus extremely unlikely that fossils will be found in the proposed project site.	Low Degree	High Degree	Construction	Refer to Table 5 for the areas associated with the activities.	1	1	Low	Avoid and Control	1	1	Low
11a	Sensitive landscapes (wetlands)	Watercourse: CVB1 Direct ecosystem modification or destruction / loss impacts	Construction of seepage sump and associated pipeline	Direct disturbance and removal of wetland soil and vegetation along the edge of the road during the construction of seepage collection sump, laying of the pipeline and use of access road by heavy machinery.	Low Degree	High Degree	Construction	Refer to Table 5 for the areas associated with the activities.	4	2	Medium	Avoid and Control	2	1	Low
11b		Watercourse: A1 Direct ecosystem modification or destruction / loss impacts							2	2	Low	Avoid and Control	1	1	Low
11c		Watercourse: CVB1 Alteration of hydrological and geomorphological processes		Alteration of watercourse unit downstream of road due to construction of seepage collection sump. Reduction of downstream flow.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	4	2	Medium	Avoid and Control	2	2	L
11d		Watercourse: A1 Alteration of hydrological and geomorphological processes		Erosion and/or sedimentation of watercourse units due to catchment land clearing and land cover disturbance during the laying of the pipeline and use of access road by heavy machinery.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	2	2	Low	Avoid and Control	1	1	Low
11e		Watercourse: CVB1 Ecological connectivity and edge disturbance impacts		Permanent loss of ecological connectivity between sections of watercourse unit on either side of the seepage collection sump, as well as an increase in edge effects on the roadward edges of the watercourse sections on either side of the road, during construction.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
11f		Watercourse: A1 Ecological connectivity and edge disturbance impacts		Temporary decrease in ecological connectivity between sections of watercourse unit on either side of the pipeline and access road, as well as an increase in edge effects on the roadward edges of the watercourse sections on either side of the road, during construction.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	4	1	Low	Avoid and Control	1	1	Low
11g		Watercourse: CBV1 & A1 Water pollution impacts		Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g. oil and diesel leaks and spills.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	1	Low
11h		Watercourse: A2 & E1 Direct ecosystem modification or destruction / loss impacts	Construction of upgraded FRD 1 RWD and associated canals	Direct disturbance and removal of riparian and wetland soil and vegetation during the upgrade of the FRD 1 RWD, construction of the canals and use of heavy machinery on site.	High Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11i		Watercourse: A2 & E1 Alteration of hydrological and geomorphological processes		Erosion and/or sedimentation of watercourse units due to catchment land clearing and land cover disturbance during upgrade of the FRD 1 RWD, construction of the canals and use of heavy machinery on site.	High Degree	Low Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11j		Watercourse: A2 & E1 Ecological connectivity and edge disturbance impacts		Temporary decrease in ecological connectivity between sections of watercourse unit on either side of the pipeline and access road, as well as an increase in edge disturbance on the roadward edges of the watercourse sections on either side of the road, during construction.	High Degree	Low Degree	Construction	Refer to Table 5 for the areas associated with the activities.	4	1	Low	Avoid and Control	1	1	Low
11k		Watercourse: A2 & E1 Water pollution impacts		Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g. oil and diesel leaks and spills.	High Degree	Low Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11l		Watercourse: E2, E3, E4, D1 & D2 Direct ecosystem modification or destruction / loss impacts	Construction of PCD 3 (including all alternatives) and associated canals	Direct and permanent destruction / loss of watercourse units and approximately 22 ha of surrounding terrestrial habitats due to vegetation clearance, earthworks and construction works, including excavation and infilling.	Low Degree	High Degree	Construction	Refer to Table 5 for the areas associated with the activities.	2	2	Low	Avoid and Control	1	2	Low
11m		Watercourse: E5 Alteration of hydrological and geo- morphological processes		Alteration of flow, erosion and/or sedimentation regimes downstream of PCD 3 watercourse units due to catchment land clearing, land cover disturbance and permanent loss upstream channels during vegetation clearance, earthworks and construction works.	Low Degree	High Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11n		Watercourse: R1 Alteration of hydrological and geo- morphological processes			Low Degree	High Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	3	Medium	Avoid and Control	2	2	Low

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
11o		Watercourse:E6 & R1 Ecological connectivity and edge disturbance impacts		Decrease in ecological connectivity between catchment up- and down-stream of PCD 3 during vegetation clearance, earthworks and construction works.	High Degree	Low Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	3	Medium	Avoid and Control	2	2	Low
11p		Watercourse:E6 & R1 Water pollution impacts		Pollution of downstream watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g. oil and diesel leaks and spills.	Low Degree	Low Degree	Construction	Refer to Table 5 for the areas associated with the activities.	2	3	Medium	Avoid and Control	1	2	Low
11q		Watercourse:E6 & R1 Direct ecosystem modification or destruction / loss impacts	Construction of access road to PCD 3	Direct disturbance and removal of riparian soil and vegetation during the upgrade of the access road to PCD 3 and use of heavy machinery on site.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11r		Watercourse:E6 & R1 Alteration of hydrological and geomorphological processes		Erosion and/or sedimentation of watercourse units due to catchment land clearing and land cover disturbance during the upgrade of the access road to PCD 3 and use of heavy machinery on site.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	1	Low
11s				Alteration of flow, erosion and/or sedimentation regimes downstream of watercourse units due to catchment land clearing, land cover disturbance and permanent loss of upstream channels during vegetation clearance, earthworks and construction works.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	3	Medium	Avoid and Control	1	2	Low
11t		Watercourse:E6 Ecological connectivity and edge disturbance		Temporary decrease in ecological connectivity between sections of watercourse unit on either side of the access road, as well as an increase in edge effects on the roadward edges of the watercourse sections on either side of the road, during construction.	High Degree	Low Degree	Construction	Refer to Table 5 for the areas associated with the activities.	4	1	Low	Avoid and Control	2	1	Low
11u		Watercourse:E6 & R1 Water pollution impacts		Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g. oil and diesel leaks and spills.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	3	Medium	Avoid and Control	1	2	Low
11v		Watercourse:D3 Direct ecosystem modification or destruction / loss impacts	Construction of OMWSD Compartment 4	Direct and permanent destruction / loss of watercourse unit due to vegetation clearance, earthworks and construction works, including excavation and infilling.	Low Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	2	2	Low	Avoid and Control	1	1	Low
11w		Watercourse:D3 Alteration of hydrological and geomorphological processes		Erosion and/or sedimentation of watercourse unit due to catchment land clearing and land cover disturbance during the vegetation clearance, earthworks and construction works.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	1	Low

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
11x		Watercourse:D3 Water pollution impacts		Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g. oil and diesel leaks and spills.	Medium Degree	Medium Degree	Construction	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	1	1	Low
11y		Watercourse:CVB1 & A1 Alteration of hydrological and geomorphological processes	Operational usage and maintenance of seepage sump and associated pipeline	Erosion and/or sedimentation of watercourse units due to vehicular traffic, operational mismanagement and poor maintenance of seepage sump and pipeline.	High Degree	Low Degree	Operational	Refer to Table 5 for the areas associated with the activities.	2	1	Low	Avoid and Control	1	1	Low
11z		Watercourse:CVB1 & A1 Ecological connectivity and edge disturbance impacts		Long-term decrease in ecological connectivity between sections of watercourse unit on either side of the seepage sump, as well as an increase in edge disturbance on the roadward edges of the watercourse sections on either side of the sump.	High Degree	Low Degree	Operational	Refer to Table 5 for the areas associated with the activities.	2	1	Medium	Avoid and Control	2	2	Low
11aa		Watercourse:CVB1 upstream Water pollution impacts		Accumulation of MRD-contaminated water within the watercourse unit upstream of the seepage collection sump. Due to the collection of contaminated water, this impact is rated as high. However, if successfully implemented, this is offset downstream by the filtration of the contaminated water. If poorly implemented, this may result in the continued contamination of the downstream area.	Medium Degree	Medium Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11bb		Watercourse:CVB2 Downstream Water pollution impacts		Effective implementation and maintenance of seepage sump, resulting in the filtration of MRD-contaminated water through the seepage collection sump and potential improvement of water downstream of the sump.	High Degree	Low degree	Operational	Refer to Table 5 for the areas associated with the activities.	Positive Impact						
11cc		Watercourse:CVB2 Downstream Water pollution impacts		Poor maintenance and/or overflows of seepage sump, resulting in MRD-contaminated water passing through to the downstream area and further impacting upon water quality.	Low Degree	High Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11dd		Watercourse:A1 Water pollution impacts		Poor maintenance and monitoring of pipeline to FRD2 RWD, leading to potential leakages of MRD-contaminated water.	High Degree	Low Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11ee		Watercourse:A2 &E1 Alteration of hydrological and geomorphological processes	Operational usage and maintenance of FRD 1 RWD and associated canals	Erosion and/or sedimentation of watercourse units due to vehicular traffic, operational mismanagement and poor maintenance of FRD 1 RWD and the canals.	Medium Degree	Medium Degree	Operational	Refer to Table 5 for the areas associated with the activities.	2	1	Low	Avoid and Control	1	1	Low
11ff		Watercourse:A2 &E1 Water pollution impacts		Poor maintenance and monitoring of FRD 1 RWD and associated, leading to potential leakages of contaminated water into watercourse units.	High Degree	Low Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low

No.	Aspect affected	Activity		Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
									Probability	Magnitude	Significance		Probability	Magnitude	Significance
11gg		Watercourse:E5 & R1 Alteration of hydrological and geomorphologic al processes	Operational usage and maintenance of PCD 3 (including all alternatives) and associated canals	Indirect destruction / loss of riparian and terrestrial habitats and ecosystems downstream of PCD 3 should a major fault occur.	Low Degree	High Degree	Operational	Refer to Table 5 for the areas associated with the activities.	2	4	High	Avoid and Control	1	4	Low
11hh		Watercourse:E5 Alteration of hydrological and geomorphologic al processes		Long-term alteration of flow, erosion and/or sedimentation regimes downstream of PCD 3 watercourse units due to impoundment of water at PCD 3, as well as the controlled discharge of water via canal into the Kolope River.	Medium Degree	Medium Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11ii		Watercourse:R1 Alteration of hydrological and geomorphologic al processes			Medium Degree	Medium Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11jj				Controlled discharge of contaminated water from PCD 3 into the Kolope River. Current storm water runoff modelling and water balance assessments indicate that on average a volume of 46 000 m^3 will be discharged annually and during a 1:50-year flood event, a total volume of 792 000 m^3 will be required to be discharged.	High Degree	Low Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	3	2	Medium
11kk		Watercourse:E5 & R1 Water pollution impacts		Uncontrolled / accidental discharge of contaminated water from PCD 3 into the Kolope River as a result of breaching and/or seepage.	Medium Degree	Medium Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	4	High	Avoid and Control	3	3	Medium
11ll				Effective implementation and maintenance of PCD 3 and associated canal, as well as effective management of discharge into the Kolope River. Although downstream watercourse units will still be affected, the significance of the impacts will be reduced to moderate.	High Degree	Low Degree	Operational	Refer to Table 5 for the areas associated with the activities.	Positive Impact						
11mm		Watercourse:E5 & R1 Alteration of hydrological and geomorphologic al processes	Operational usage and maintenance of access road to PCD 3	Erosion and/or sedimentation of watercourse units due to poor maintenance of storm water infrastructure.	High Degree	Medium Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11nn		Watercourse: OMWSD Compartment 4 (formerly D3) Alteration of hydrological and geomorphological processes	Operational usage and maintenance of OMWSD Compartment 4	Long-term alteration of flow, erosion and/or sedimentation regimes from drainage into D3.	High Degree	Low Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	2	Medium	Avoid and Control	2	2	Low
11oo		Watercourse: D3, E6 & R1 Water pollution impacts		Poor maintenance and/or overflows of OMWSD and associated canal, as well as mismanagement of discharge into the diversion channel, resulting in contaminated water passing through to the downstream area and further impacting upon water quality.	Low Degree	Medium Degree	Operational	Refer to Table 5 for the areas associated with the activities.	3	4	High	Avoid and Control	2	2	Low

No.	Aspect affected	Activity	Potential Impact	Reversibility	Irreplaceable loss	Phase	Size and scale of disturbance	Significance pre-mitigation			Mitigation Type	Significance post-mitigation		
								Probability	Magnitude	Significance		Probability	Magnitude	Significance
12a	Visual	Construction and operation of the proposed infrastructure associated with the SWMP, excluding PCD 3B and PCD 3C (Preferred alternative)	As the proposed infrastructure will be located within the existing infrastructure of Venetia Mine and due to the nature of the proposed infrastructure, such infrastructure will only be visible once within the Venetia Mine boundary area and will not be visible form the national road. There is thus no additional visual impact associated with the construction and operation of the infrastructure.											
12b		Construction and operation of PCD 3B and 3C (Preferred Alternative) and security fence.	The construction of PCD 3B or PCD 3C (preferred alternative) requires construction outside of the current fenced area of Venetia Mine with an access road in such area for access to the adjacent DIAMCOR mining area. The construction activities as well as the completed PCD and security fence will thus be visible to the employees and visitors of the adjacent DIAMCOR mine. It is noted that the employees and visitors of the adjacent mine are already desensitised to such activities as mining at Venetia Mine commenced in 1992 with mining at DIAMCOR commencing in 2014. Due to its location, PCD 3 will not be visible to the public from any other areas besides from on Venetia Mine or the DIAMCOR access road.	Medium Degree	Low Degree	Construction, operational and decommissioning	Refer to Table 5 for the areas associated with the activities.	2	2	Low	Control, minimise	2	1	Low
13	Socio-economic	Construction and utilisation of the proposed SWMP infrastructure.	Where possible, local contractors will be used for the construction activities. This will lead to a positive impact on the socio-economic aspect of the area that can create jobs opportunities and promote investments.	High Degree	Low degree	Construction	Refer to Table 5 for the areas associated with the activities.	Positive Impact						
			The overarching purpose of the SWMP is to ensure legal compliance as per the requirements of GN.R 704, and Section 19 (Duty of care) of the NWA and to ensure the safety of people working in the newly developed underground mine (the VUP). The construction and upgrading in of the containment infrastructure will allow Venetia Mine to continue to operate in compliance with legislation and further allow for the safe continuation of mining in the newly developed VUP, thus resulting in Venetia Mine's continued contribution to the GDP of the province and continued implementation of the social and economic projects in line with the approved Social and Labour Plan	High Degree	Low degree	Construction and Operational	Refer to Table 5 for the areas associated with the activities.	Positive Impact						

Table 24: Identified cumulative impacts

Environmental component (Aspects affected)	Potential Impact description
Topography	The construction and expansion of the facilities associated with the SWMP will influence the nature of the topography that is typical of the surrounding area with such changes stemming from the dam walls. The natural drainage patterns, with specific focus on PCD 3, will also be altered as PCD 3 will be constructed to contain affected water from runoff from site.
Soil, land use and land capability	The soil characteristics, land use and land capability of the proposed project area is currently associated with mining activities, with the exception of the proposed PCD 3 that will be located in a natural area that currently forms part of the VLNR. The proposed project will have a further contribution to land use and land capability transformation and subsequently have a low cumulative impact (low) on the soil, land use and land capability characteristics of the area.
Biodiversity	The proposed development will result in further loss of natural habitat, diversity, and potential loss of floral SCC in the area, with specific reference to the proposed PCD.
Surface water	Natural flow of water has already been affected by the current mining activities as conducted by Venetia Mine. Although the project will result in the alteration of the natural drainage patterns and flow within the catchment. This is seen as a positive impact as all mine affected water will be contained.
	The discharge of mine affected water to the environment may result in a decrease of the water quality in the catchment of the Kolope River.
Air quality	The construction activities associated with the SWMP may result in the additional generation of dust and cumulatively add (short term) to the existing dust impacts stemming from existing mining activity.
Noise	Noise impacts from the construction activities as well as the mining activities in the area will result in a cumulative noise impact.
Sensitive landscapes	The proposed project and existing mining activities in the area, may cumulatively have an impact on the watercourses, riparian and instream habitat.
Visual	The area directly adjacent to the proposed project is currently characterised by mining activities and the proposed project will contribute cumulatively to the visual impacts.
Socio-Economic	Jobs will be retained, providing income and, therefore, having a further impact on the regional socio-economy aspects of the area.

7.6 Methodology used in determining and ranking potential environmental impacts and risks

7.6.1 Methodology applied for the SWMP

The environmental risk of any aspect is determined by a combination of parameters associated with the impact. Each parameter connects the physical characteristics of an impact to a quantifiable value to

rate the environmental risk. Impact assessments should be conducted based on a methodology that includes the following:

- Clear processes for impact identification, predication and evaluation;
- Specification of the impact identification techniques;
- Criteria to evaluate the significance of impacts;
- Design of mitigation measures to lessen impacts;
- Definition of the different types of impacts (indirect, direct or cumulative); and
- Specification of uncertainties.

After all impacts have been identified, the nature and scale of each impact can be predicted. The impact prediction will take into account physical, biological, socio-economic and cultural information and will then estimate the likely parameters and characteristics of the impacts. The impact prediction will aim to provide a basis where the significance of each impact can be determined and appropriate mitigation measures can be developed.

The risk assessment methodology is based on defining and understanding the three basic components of the risk, i.e. the source of the risk, the pathway and the target that experiences the risk (receptor). Refer to Figure 33 below for a model representing the above principle (as contained in the DWA's Best Practice Guideline: G4 – Impact Prediction).

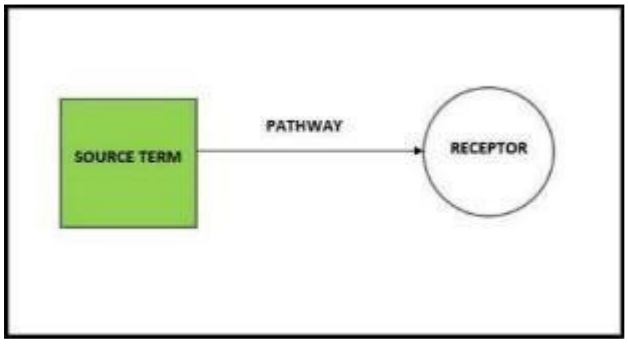


Figure 33: Impact prediction model

Table 25 and Table 27 below indicate the methodology to be used in order to assess the Probability and Magnitude of the impact, respectively, and Table 26 provides the Risk Matrix that will be used to plot the Probability against the Magnitude in order to determine the Severity of the impact.

Table 25: Determination of Probability of impact

Score	Frequency of aspect / unwanted event	Availability of pathway from the source to the receptor	Availability of receptor
1	Never known to have happened, but may happen	A pathway to allow for the impact to occur is never available	The receptor is never available
2	Known to happen in industry	A pathway to allow for the impact to occur is almost never available	The receptor is almost never available
3	< once a year	A pathway to allow for the impact to occur is sometimes available	The receptor is sometimes available

Score	Frequency of aspect / unwanted event	Availability of pathway from the source to the receptor	Availability of receptor
4	Once per year to up to once per month	A pathway to allow for the impact to occur is almost always available	The receptor is almost always available
5	Once a month - Continuous	A pathway to allow for the impact to occur is always available	The receptor is always available

Step 1: *Determine the* ***PROBABILITY*** *of the impact by calculating the average between the Frequency of the Aspect, the Availability of a pathway to the receptor and the availability of the receptor.*

Table 26: Determination of Severity of impact

Environmental Impact Rating / Priority					
	Magnitude				
Probability	**1 Minor**	**2 Low**	**3 Medium**	**4 High**	**5 Major**
5 Almost Certain	Low	Medium	High	High	High
4 Likely	Low	Medium	High	High	High
3 Possible	Low	Medium	Medium	High	High
2 Unlikely	Low	Low	Medium	Medium	High
1 Rare	Low	Low	Low	Medium	Medium

Step 3: *Determine the* ***SEVERITY*** *of the impact by plotting the averages that were obtained above for Probability and Magnitude.*

Table 27: Determination of Magnitude of impact

Score	Source			Receptor		
	Duration of impact	Extent	Volume / Quantity / Intensity	Toxicity / Destruction Effect	Reversibility	Sensitivity of environmental component
1	Lasting days to a month	Effect limited to the site. (metres);	Very small quantities / volumes / intensity (e.g. < 50 ℓ or < 1 ha)	Non-toxic (e.g. water) / Very low potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes will remain unaltered.	Current environmental component(s) are largely disturbed from the natural state.
2	Lasting 1 month to 1 year	Effect limited to the activity and its immediate surroundings. (tens of metres)	Small quantities / volumes / intensity (e.g. 50 ℓ to 210 ℓ or 1 ha to 5 ha)	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	Receptor of low significance / sensitivity
3	Lasting 1 – 5 years	Impacts on extended area beyond site boundary (hundreds of metres)	Moderate quantities / volumes / intensity (e.g. > 210 ℓ < 5000 ℓ or 5 – 8 ha)	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	Current environmental component(s) are moderately disturbed from the natural state.
4	Lasting 5 years to Life of Organisation	Impact on local scale / adjacent sites (km)	Very large quantities / volumes / intensity (e.g. 5000 ℓ – 10 000 ℓ or 8 ha– 12 ha)	Toxic (e.g. diesel & Sodium Hydroxide)	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible	No environmentally sensitive components.
5	Beyond life of Organisation / Permanent impacts	Extends widely (nationally or globally)	Very large quantities / volumes / intensity (e.g. > 10 000 ℓ or > 12 ha)	Highly toxic (e.g. arsenic or TCE)	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	Current environmental component(s) are a mix of disturbed and undisturbed areas.

Step 2: *Determine the* ***MAGNITUDE*** *of the impact by calculating the average of the factors above*

7.7 Positive and negatives that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and community affected

The positive and negative implication of the SWMP and the alternatives identified have been provided below and assessed in terms of the following four categories:

- Environmental.
- Technical/Engineering.
- Economical.
- Social.

Table 28: Advantage and disadvantages of the proposed activities and identified alternatives

Alternative	Advantages	Disadvantages
Capacity alternative for the proposed facilities of the SWMP		
PCD 1		
PCD 1A	**Environmental:** None identified. **Technical/Engineer:** The 2015 design catered for a storage capacity of 60 000 m^3. **Economical:** None identified. **Social:** None identified (as compared to alternative)	**Environmental:** None identified. **Technical/Engineer:** None identified. **Economical:** Greater relative cost per unit volume of storage. **Social:** None identified.
PCD 1B (preferred)	**Environmental:** None identified. **Technical/Engineer:** The wall height will be increased to approximately 8 m. By making use of the natural topography, an inward sloping basin mimicking the natural topography has been adopted; which reduces the volume of cut required. This design yields double the storage capacity, i.e. 120 000 m^3. **Economical:** Lower relative cost per unit volume of storage. **Social:** None identified (as compared to alternative)	**Environmental:** None identified. **Technical/Engineer:** None identified. **Economical:** None identified. **Social:** None identified.
PCD 2 (preferred)	**Environmental:** None identified. **Technical/Engineer:** None identified. **Economical:** None identified. **Social:** None identified (as compared to alternative)	**Environmental:** None identified. **Technical/Engineer:** PCD 2 is constrained by the existing CRD's existing footprint to the south-west and by the future extension of the CRD dump to the west. **Economical:** High earthworks cost per unit volume of storage. **Social:** None identified.
PCD 3A	**Environmental:** Comparatively smaller area of disturbance to PCD 3C. **Technical/Engineer:** None identified. **Economical:** Low relative cost per unit volume of storage. **Social:** None identified (as compared to alternative)	**Environmental:** Area located on relatively undisturbed area that constitutes indigenous vegetation. **Technical/Engineer:** Extensive earthworks (with significant hardrock excavation) will be required due to the site's topography not being ideal for a dam site. Relatively smaller capacity than PCD 3C which does not meet the requirements of the water balance. **Economical:** High earthworks cost.

Alternative	Advantages	Disadvantages
		Social: None identified.
PCD 3B	**Environmental:** Comparatively smaller area of disturbance to PCD 3C. **Technical/Engineer:** Estimated maximum storage capacity of 750 000 m^3. This dam location has the advantage that the natural topography (between two 'koppies') can be utilised for the construction of the dam, resulting in reduced earthworks than for PCD 3A. **Economical:** Low relative cost per unit volume of storage. **Social:** None identified (as compared to alternative)	**Environmental:** Area located on relatively undisturbed area that constitutes indigenous vegetation. **Technical/Engineer:** Extensive earthworks (with significant hardrock excavation) will be required due to the site's topography not being ideal for a dam site. Increasing the wall height above 12 m will increase the classification of the dam to a 'medium-sized' facility that, depending on the hazard rating, may result in the dam being classified as a Category III dam. Furthermore, raising the dam level further would also result in the upstream extent of the facility encroaching into the future CRD's Life of Mine ("LoM") footprint. Relatively smaller capacity than PCD 3C which does not meet the requirements of the water balance. **Economical:** High earthworks cost. **Social:** None identified
PCD 3C (preferred)	**Environmental:** None identified. **Technical/Engineer:** Estimated storage capacity of 1 050 000 m^3. The liner area is 33% larger than PCD 3B, however, it will have just over 50% more storage capacity. **Economical:** Low relative cost per unit volume of storage. **Social:** None identified (as compared to alternative)	**Environmental:** Area located on relatively undisturbed area that constitutes indigenous vegetation. Moderately large area of disturbance with specific reference to the VLNR. The embankment position is restricted on the western side by the 100-year floodline of the Kolope River **Technical/Engineer:** Extensive earthworks (with significant hardrock excavation) will be required due to the site's topography not being ideal for a dam site. **Economical:** High earthworks cost. **Social:** None identified.
PCD 3D	**Environmental:** Comparatively smaller area of disturbance to PCD 3C. **Technical/Engineer:** Dam encroaches on the envisaged footprint of the future CRD extension. PCD 3D will have an estimated storage capacity is 750 000 m^3. A number of layouts were considered for this dam, but due to the relatively wide, open valley on the western edge of the dam and the presence of higher ground on the eastern side the layout presented here proved to be the most favourable for this option. **Economical:** Low relative cost per unit volume of storage. **Social:** None identified (as compared to alternative).	**Environmental:** Area located on relatively undisturbed area that constitutes indigenous vegetation. **Technical/Engineer:** Extensive earthworks will be required to build a U-shaped dam embankment. The dam encroaches on the envisaged footprint of the future CRD extension. Relatively smaller capacity than PCD 3C which does not meet the requirements of the water balance **Economical:** High earthworks cost. **Social:** None identified
PCD 1 Compartment 4B (Preferred)	**Environmental:** None identified. **Technical/Engineer:** The dam was designed with a storage capacity of 30 000 m^3. **Economical:** None identified. **Social:** None identified (as compared to alternative)	**Environmental:** None identified. **Technical/Engineer:** extensive earthworks will be required resulting in an approximate 1:1 earthworks volume to storage volume ratio. **Economical:** Greater relative cost per unit volume of storage. **Social:** None identified.

Alternative	Advantages	Disadvantages
OMWSD Compartment 3 (Preferred)	**Environmental:** None identified. **Technical/Engineer:** Favourable in terms of topography due to the natural valley in which it is positioned. The site is therefore considered economical in terms of its earthworks volumes. **Economical:** The site is considered economical in terms of its earthworks volumes. **Social:** None identified (as compared to alternative)	**Environmental:** None identified. **Technical/Engineer:** None identified. **Economical:** High relative cost per unit volume of storage. **Social:** None identified.
OMWSD Compartment 4 (Preferred)	**Environmental:** None identified. **Technical/Engineer:** None identified. **Economical:** None identified. **Social:** None identified (as compared to alternative)	**Environmental:** None identified. **Technical/Engineer:** Earthworks will require 107 000m^3 of excavation to establish a suitable dam basin and remove silt transported to low-lying area in previous flood events. **Economical:** High relative cost per unit volume of storage. **Social:** None identified.
OMWSD North and South Compartment – expansion (Preferred)	**Environmental:** None identified. **Technical/Engineer:** Raising dam wall by 2 m will result in increase in capacity of 200 000 m^3. **Economical:** None identified. **Social:** None identified (as compared to alternative)	**Environmental:** None identified. **Technical/Engineer:** None identified. **Economical:** High relative cost per unit volume of storage. **Social:** None identified.
FRD 1 RWD – expansion (raising by 1.5 m)	**Environmental:** None identified. **Technical/Engineer:** Raising the wall height by 1.5 m will increase the capacity of the FRD 1 RWD by approximately 60 000 m^3, to a total storage volume of 90 000 m^3. **Economical:** None identified. **Social:** None identified (as compared to alternative)	**Environmental:** None identified. **Technical/Engineer:** None identified. **Economical:** High relative cost per unit volume of storage. **Social:** None identified.
FRD 1 RWD – expansion (raising by 3 m) (Preferred)	**Environmental:** None identified. **Technical/Engineer:** A 3.0 m raise of the embankment, increases the storage capacity of the current facility by an estimated 140 000 m^3 to a total storage capacity of 170 000 m^3. **Economical:** None identified. **Social:** None identified (as compared to alternative)	**Environmental:** None identified. **Technical/Engineer:** None identified. **Economical:** High relative cost per unit volume of storage. **Social:** None identified.
FRD 1 RWD - Alternative site (Preferred)	**Environmental:** None identified. **Technical/Engineer:** Existing FRD 1 RWD can remain operational throughout the period. **Economical:** None identified. **Social:** None identified (as compared to alternative)	**Environmental:** None identified. **Technical/Engineer:** The proposed site for this dam slopes relatively steeply from east to west. As a result, a significant amount of earthworks (fill) will be required to construct the dam embankment. **Economical:** High relative cost per unit volume of storage. **Social:** None identified.
K03 Pit (Preferred)	**Environmental:** None identified. **Technical/Engineer**: Total in-pit storage capacity of 3.5 million m^3.	**Environmental:** None identified. **Technical/Engineer:** None identified **Economical:** None identified

Alternative	Advantages	Disadvantages
	Economical: None identified. **Social:** None identified (as compared to alternative)	**Social:** None identified.
Discharge (Preferred)	**Environmental:** Changes to the ecology in terms vegetation types and faunal species. **Technical/Engineer**: An average annual discharge of 46 000 m^3. A total annual discharge during a 1:50 year flood event of 790 000 m^3. **Economical:** None identified. **Social:** None identified (as compared to alternative)	**Environmental:** Potential downstream water quality deterioration. Increase in large herbivores to the area resulting in ecological disturbances. Changes to the ecology in terms vegetation types and faunal species. **Technical/Engineer:** None identified **Economical:** None identified **Social:** None identified

From review of the table above, the preferred alternatives for the proposed facilities are favoured in terms of project layout as well as capacity required with the purpose of de-risking the VUP from flooding (to ensure the safety of people working in the newly developed underground mine), to ensure legal compliance to the requirements of the GN.R 704, to ensure compliance to Section 19 (Duty of care) of the NWA, and to ensure compliance to Section 28 (Duty of care) of the NEMA.

The impact management measures and level of risk have been included under Section 7.5.1 of Part A and Section 1.4 of Part B. Table 29 below provides for a summary of the issues and concerns as raised by affected parties and an assessment of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered.

Table 29: Summary of issues and concerns raised by I&APs

Concerns as raised by affected parties	Mitigation measures or site alternative
No concerns have been raised thus far with regards to project or layout aspects, for which additional alternatives considerations (to those already identified) are required. Refer to Table 8 for comments received as part of the Scoping Phase PPP. For concerns identified as part of the EIAR/EMPr phase, such will be included in this table at finalisation of this report.	

7.8 Motivation where no alternative sites were considered

As Venetia Mine is limited in terms of available disturbed areas, available space as well as capacity required as part of this proposed project, no site alternatives, with the exception of layout alternatives for the proposed PCD 3 (although also limited to capacity requirements) were identified. Refer to Section 7.1 above for a detailed discussions of the alternatives considered.

7.9 Final site layout plan

The outcome of the final site selection is discussed in Section 13 of Part A and the final layout plan included in Section 11.2 of Part A.

8 Full description of the process undertaken to identify, assess and rank the impacts and risks

All impacts and risks as identified are contained within Section 7.5 of Part A. As further provided is an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. The methodology applied in assessing and ranking the impacts and risks on the preferred site is described in Section 7.6 of Part A.

9 Assessment of each identified potentially significant impact and risk

Refer to the full risk assessment table provided in Section 7.5 (Part A) above.

10 Summary of specialist reports

Table 30: Summary of the recommendations / mitigation measures provided by the specialists

Specialist study	Recommendations of specialists	Reference to applicable section in report where specialist recommendation is included
Biodiversity impact assessment	All recommendations and mitigation / management measures contained in specialist reports contained in Annexure D have been included in Section 1.4 (Part B) of this report.	Section 1.4 (Part B)
Surface water impact assessment		
Geohydrological assessment		
Heritage impact assessment		
Palaeontological Impact Assessment		
Wetland delineation study		

11 Environmental impact statement

11.1 Summary of the key findings of the environmental impact assessment

A summary of the high significant impacts (pre-mitigation) include the disturbance to the floral and faunal ecology, and impacts on surface water and wetland. Mitigation and management measures for

the predicted impacts are included in Part B of this EIAR/EMPr and need to be implemented by the applicant. The implementation of the mitigation measures will result in the minimisation of the significance of the potential impacts (post-mitigation). All high significance impacts pre-mitigation will be lowered to medium and low significance impacts post-mitigation, except for the impacts associated with floral ecology due to the loss of a moderate size of natural habitat.

11.2 Final site map

Figure 4 illustrates the final site map of the project.

12 Proposed impact management outcomes for inclusion into the EMPr

Based on the assessment and where applicable the recommendations from specialist reports, the impact management outcomes for the proposed project for inclusion in the EMPr as well as for inclusion as conditions of authorisation were identified. Impact management outcomes are included in Table 34 of Section 1.4 of Part B.

13 Final proposed alternatives

Refer to Section 7.1 of part A for the alternatives considered.

14 Description of any assumptions, uncertainties and gaps in knowledge

In terms of the EIA Regulations GN R982 Appendix 1(3)(o), the Environmental Impact Assessment Practitioner ("EAP") must provide a description of any assumptions, uncertainties and gaps in knowledge upon which the impact assessment has been based. The table below provides the assumptions and limitations applicable to the various specialist assessments.

Table 31: Assumptions, uncertainties and gaps in knowledge

Specialist study	Assumptions and limitations
Biodiversity impact assessment	• It is assumed that third party information (obtained from government, academic/research institution, nongovernmental organisations) is accurate and true. • Even though care is taken to ensure the accuracy of surveys, data analysis and other aspects of this report, it should be noted that ecological/ biodiversity studies, notably for EIA purposes, are limited in time, budget and scope. It is not the purpose of this report to present exhaustively detailed information. Decisions and discussions are therefore, and to some extent, based on reasonable and informed decisions and assumptions that are extracted from bona fide information sources and from deductive reasoning (Precautionary Principle).

Specialist study	Assumptions and limitations
	• In order to obtain a comprehensive understanding of the dynamics of terrestrial faunal assemblages and local floristic diversity patterns, with particular reference to endemic, rare, or threatened species in any area, biodiversity assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, such long-term studies are generally not part of the terms of reference for EIA assessments. • Results presented in this report are ultimately based on a snapshot investigation of the study area and not on detailed and long-term investigations of all environmental attributes and the varying degrees of biological diversity that may be present in the study area. Specifically, no discipline-specific, long-term and scientific survey methods were employed in the collation of data from the site. Although as much as possible data was obtained from opportunistic observations during the brief survey period, these surveys are customarily limited by budgetary and time constraints – results presented in this report need to be interpreted with these limitations in mind. • Background information that were used to inform and augment the assessment was limited to data and GIS coverage available for the project site on a relevant scale. A paucity of site-specific data is typical of these data sources and should be accepted as a norm. • Notably, rare and endemic species normally do not occur in great densities and, because of customary limitations in the search and identification of Red Listed species, the detailed investigation of these species was not possible. Results are ultimately based on estimations and specialist interpretation of imperfect data. • It is emphasised that information, as presented in this document, only have bearing on the sites as indicated on accompanying maps. This information cannot be applied to any other area, however similar in appearance or any other aspect, without proper investigation. • Additional or supplementary information may become known during a later stage of the process or development. The authors therefore reserve the right to modify aspects of the report, including findings and recommendations, should new information become available from ongoing research or additional work performed in the immediate region of this specific area, or any forthcoming information pertaining to this investigation after the submission of this report. • This report should always be considered in its entirety. Reading and representing portions of the report in isolation could lead to incorrect conclusions and assumptions. In case of any uncertainty, the authors should be contacted to clarify any viewpoints, recommendations and/ or results.
Surface water impact assessment	• Whilst every endeavour has been made by Shangoni to ensure that information provided is correct and relevant, this technical report is, of necessity, based on information that could reasonably have been sourced within the time period allocated to the assessment, and is, furthermore, of necessity, dependent on

Specialist study	Assumptions and limitations
	information provided by management and/or its representatives during the course of the Project. • The relevant information received from the Client during the course of this project will be deemed true and correct. If such information reflected in any documentation relevant to this project is discovered to be misleading, Shangoni does not take any responsibility for the implications of such misrepresentations made by the Client. • Storm water control recommendations are based on industry experience and best practice. Final designs for construction should be authorised by an approved engineer. • Contour and elevation data as provided during the analysis are assumed to be accurate and representative of the site and catchment areas. • There is no storm water quality data available for storm water runoff associated with the haul roads and conveyors. • Upstream catchment activities are interpreted according to common practices and no detailed insight is available on possible storm water measures beyond the site. The assessment does not guarantee the integrity of downstream infrastructure in the event of release or discharge from site. • The measures proposed as part of the storm water management section of the report do not impose preference as this is an operational document to assist in the complete management of clean and dirty surface water in the vicinity of the operation. • The measures proposed in the storm water management plan section of the report do not specifically cover considerations relevant to storm water management for the purpose of safety, like flooding and loss of life; the primary focus being environmental management and the identification of potential environmental concerns.
Geohydrological assessment	• The contents and results from various specialist geohydrological studies and other relevant reports were used to conclude the predicted level of impacts associated with the construction and operation of the facilities
Wetland delineation study	• Species of Conservation Concern (SCC) are difficult to find and difficult to identify, thus species described in this report do not comprise an exhaustive list. It is almost certain that additional SCCs will be found during construction and operation of the development; • Sampling by its nature means that not all parts of the study area were visited. The assessment findings are thus only applicable to those areas sampled, which were extrapolated to the rest of the study area. • A Soil Munsell Colour Chart was used to determine the soil matrix colour of the soil sampled. However, it is important to note that the recording of the colours using the soil chart is highly subjective and varies significantly depending on

Specialist study	Assumptions and limitations
	soil moisture and the prevailing light conditions. In this case, all the soils sampled were dry and sampling was undertaken in sunny conditions. • Soil wetness indicators (i.e. soil mottles, grey soil matrix), which in practice are primary indicators of hydromorphic soils, are not seasonally dependent (wetness indicators are retained in the soil for many years) and therefore seasonality has no influence on the delineation of wetland areas. • All vegetation information recorded was based on the onsite visual observations of the author and no formal vegetation sampling was undertaken. Furthermore, only dominant and noteworthy plant species were recorded. Thus, the vegetation information provided has limitations for true botanical applications. • Although every effort was made to correctly identify the plant species encountered onsite, wetland plants, particularly the Cyperaceae (sedge) family, are notoriously difficult to identify to species level. Every effort as made to accurately identify plants species but where identification to species level could not be determined, such species were only identified to genus level. • Seasonality can also influence the species of flora encountered at the site, with the flowering time of many species often posing a challenge in species identification. Since the wetland vegetation in the study area was found to be largely secondary/degraded with low native plant diversity, seasonality would not be as significant a limitation when compared with a vegetation community that is largely natural or high in native plant diversity. • Sampling and infield delineation was not undertaken at the CVB1, A2 and E1 sites due to time and accessibility constraints during the assessment. The assessment of CVB relied primarily on desktop delineation, with limited site-based observations of the hydrology, terrain and vegetation. A2 and E1 were only assessed at the desktop level. The Matotwane River was not assessed on site. Fieldwork may be required to assess river and associated sedgelands should the existing Section 21c & i not cover this area and/or if any additional activities are planned within 500 m of the river and wetlands. • Proposed PCD 1, 2 and OMWSD Compartment 3 were not assessed because these were deemed to be mainly terrestrial environments, formed after the drainage line was cut off. It is unlikely that these will require further assessment from a riparian or wetland perspective. • This watercourse and wetland assessment excluded the assessment of hydrological, hydrogeological, hydropedological, water chemistry and flood-line impacts. Qualified, independent specialists will need to be appointed to conduct these assessments if required. • Due to the streams and rivers encountered and assessed being dry at the time of assessment, no instream biomonitoring assessments were undertaken i.e. SASS5 (Dickens & Graham, 2002). • Impact and risk ratings for the proposed periodic discharge activities were based on simulated present state runoff patterns for the 1:2-year, 1:5-year, 1:10-year, 1:20-year, 1:50-year and 1:100-year flood events, and estimated

Specialist study	Assumptions and limitations
	pollutant loads, quantified by Shangoni Management Services (2021). The current and anticipated change to mean annual runoff (MAR) was used to determine the impact of surplus discharge into the Kolope River reach. • No assessment of changes in sediment discharge / transport rate was undertaken or any other fluvial geomorphological analysis / assessment to quantify the predicted impacts of the approximately 5% increase in the 1:50yr flood discharges.

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

15.1 Reasons why the activity should be authorised or not

In terms of collectively considering ecological, social and economic impacts it is important to remember that while there might be some trade-offs between the considerations, in South Africa all development must in terms of Section 24 of the Constitution be ecologically sustainable, while economic and social development must be justifiable. There are, therefore, specific "trade-off" rules that apply. Environmental integrity may never be compromised, and the social and economic development must take a certain form and meet certain specific objectives in order for it to be considered justifiable[4].

From all specialists' opinions, the proposed project is not considered a fatal flaw to the environment should the mitigation measures be implemented, considering that the impacts can be mitigated to a medium to low significance rating. Only impacts associated with floral ecology, with specific reference to PCD 3C (preferred alternative) remained high post mitigation. This is due to the moderate size of disturbance resulting from the construction of the preferred alternative. It is noted that Venetia Mine is constrained in terms of available space for the construction of the new facilities, considering that the CRD will in the future expand northwards towards the FRD facility. Further thereto, the capacity and design of the proposed facilities, including preferred alternative to PCD 3 (PCD 3C), were developed based on the information from the water balance to ensure the safety of people working in the newly developed underground mine, to ensure legal compliance to the requirements of the GN.R 704 as published under the NWA, to ensure compliance to Section 19 (Duty of care) of the NWA, and to ensure compliance to Section 28 (Duty of care) of the NEMA.

Although the proposed project is expected to create negative environmental impacts, positive impacts are further expected in terms of the prevention of mine affected water from entering the environment, containment of mine affected water for reuse as well as the potential reduction of freshwater abstraction for the use in the process. Further thereto, should the proposed project not be authorised, this will result

[4] Guideline on need and desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (GN 891 of 20 October 2014)

in Venetia Mine's non-compliance to legislative requirements (GN.R 704, Section 19 of the NWA, and to Section 28 of the NEMA), possible prevention of the continuation of the newly developed underground mine, and possible premature closure of Venetia Mine.

Should the mitigation measures as contained within this EIAR / EMPr and attached specialist studies be implemented, the post-mitigation significance of the identified impacts will be low to medium, with the exception of floral ecology and specifically PCD 3C (preferred alternative).

It is the EAPs opinion that the project be authorised on condition that the mitigation measures, recommendations and monitoring and compliance auditing requirements, as specified by the specialists and as contained within the EIAR and EMPr, are implemented.

15.2 Conditions that must be included in the authorisation

15.2.1 Specific conditions to be included into the compilation and approval of the EMPr

Should the DMRE grant authorisation for Venetia Mine, it should be subject to the following conditions:

- The project should remain in full compliance with the requirements of the EMPr and with all regulatory requirements,
- The EMPr should be implemented by qualified environmental personnel who have the competence and credibility to interpret the requirements of the EIAR and the EMPr. Such persons must be issued with a written mandate by mine management to provide guidance and instructions to employees and contractors, and
- Stakeholder engagement must be maintained during all phases of the proposed project.

16 Period for which Environmental Authorisation is required

The Venetia Mine has a life of mine to the year 2046. Construction is expected to last 1 to 5 years and closure a period of 2 to 3 years. Therefore, the period for which environmental authorisation is required is at least 30 years (from the date of approval provided by the DMRE), to include for the expected LOM and closure related activities.

17 Undertaking

The undertaking by the EAP is provided in Section 2 of Part B below. This undertaking confirms: the correctness of the information provided in the reports, the inclusion of comments and inputs from stakeholders and I&APs, the inclusion of inputs and recommendations from the specialist reports where relevant and the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

18 Financial provisions

18.1 Explain how the aforesaid amount was derived.

The following steps were taken to calculate the environmental closure liability associated with the project:

- The proposed infrastructure database was provided by the engineering team.
- The relevancy of the assumptions was reviewed and adjusted where necessary.
- The following information (Table 32) serves as input into explaining the process followed to calculate the financial provision required.

Table 32: Calculation input based on the DMRE quantum guideline

Aspect	DMRE Guideline Reference	Input
Minerals mined / processed	Table B12	Diamonds
Primary risk class	-	Class B (medium)
Environmental sensitivity	Table B4	High
Specialist studies required	Table B9	-
Preliminary and General	12%	
Contingency	-	10%
Weighing factor 1 – Nature of terrain	Table B7	1.10 (undulating)
Weighing factor 2 – Proximity to urban area	Table B8	1.1 (remote)

The personnel within the DMRE Regional Offices are required to review and approve the quantum, that is, the monetary value of the financial provision that has been computed by the holder of a prospecting right, mining right or mining permit during the annual review as being sufficient to cover the environmental liability at that time and at closure of the mine.

The guideline document has been developed to address this need and is for use by the DMRE personnel in the Regional Offices. The guideline for the calculation of closure cost issued by DMRE in 2021 was used to support the calculation of the closure cost quanta.

The reviewed closure liability amounts to **R66 753 256.81** (including P&G's and Contingencies, excluding VAT).

Table 33: SWMP liability calculation

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m3	7976	R17.40	1	1	R138 782.40
2 (A)	Demolition of steel buildings and structures	m2	17962.4	R238.71	1	1	R4 287 797.34
2(B)	Demolition of reinforced concrete buildings and structures	m2	41500	R351.79	1	1	R14 599 285.00
3	Rehabilitation of access roads	m2	0	R42.72	1	1	R0.00
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	R414.61	1	1	R0.00
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	R226.15	1	1	R0.00
5	Demolition of housing and/or administration facilities	m2	0	R477.42	1	1	R0.00
6	Opencast rehabilitation including final voids and ramps	ha	0	R242 984.15	1	1	R0.00
7	Sealing of shafts adits and inclines	m3	0	R128.15	1	1	R0.00
8 (A)	Rehabilitation of overburden and spoils	ha	0	R166 847.44	1	1	R0.00
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	0	R207 805.47	1	1	R0.00
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (polluting potential)	ha	67	R603 565.59	1	0.81	R32 755 504.57
9	Rehabilitation of subsided areas	ha	0	R139 709.60	1	1	R0.00
10	General surface rehabilitation	ha	2.4931	R132 171.31	1	1	R329 516.29

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
11	River diversions	ha	0	R132 171.31	1	1	R0.00
12	Fencing	m	9170	R150.77	1	1	R1 382 560.90
13	Water management	ha	0	R50 255.25	1	1	R0.00
14	2 to 3 years of maintenance and aftercare	ha	69.4931	R17 589.34	1	1	R1 222 337.76
15 (A)	Specialist study	Sum	0	R0.00	1	1	R0.00
15 (B)	Specialist study	Sum	0	R0.00	1	1	R0.00
					Sub Total 1		**R54 715 784.27**
1	Preliminary and General		6565894.112		**weighting factor 2** 1		**R6 565 894.11**
2	Contingencies		5471578.427				R5 471 578.43
					Subtotal 2		**R66 753 256.81**
					VAT (15%)		**R10 012 988.52**
					Grand Total		**R76 766 245.33**

18.2 Confirm that this amount can be provided for from operating expenditure

The closure liability for Venetia Mine is provided in the form of a bank guarantee. A closure liability assessment is conducted annually whereby the bank guarantee is adjusted accordingly. Once the project is approved and the environmental authorisation is issued by the DMRE, Venetia Mine will ensure that the required amount is incorporated into the bank guarantee and submitted to the DMRE.

19 Deviations from the approved scoping report and plan of study

No deviations from the approved scoping report and plan of study have been undertaken.

20 Other information required by the competent authority

On the acceptance of the final Scoping Report the competent authority issued an acceptance letter with specific requirements for the EIAR and EMPr phase . Refer to Annexure C2 for a copy of the letter.

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

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

Results of investigation, assessment and evaluation of impact on any directly affected person	Reference to where mitigation is reflected
During the Life of Mine, Venetia Mine aims: • To promote employment and advance the social and economic welfare of all employees and uplift all stakeholders within the communities in which they operate. • To contribute to the transformation of the industry. • To ensure that the holders of mining rights contribute to the socio-economic development of the communities in which they operate.	Refer to Section 1.4 of Part B.

20.1.2 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act 25 of 1999

Results of investigation, assessment and evaluation of impact on any directly affected person	Reference to where mitigation is reflected
No impact on national estates as referred to in the HRA will take place.	Section 1.4 of Part B.

21 Other matters required in terms of section 24(4) (a) and (b) of the Act

No other matters required in terms of section 24(4) (a) and (b) have been identified. An impact assessment for the proposed project has been undertaken and include consultation with and participation of interested and affected parties. Applying the hierarchical approach to impact management was firstly considered to avoid negative impacts, but where avoidance was not possible, to better mitigate and manage negative impacts. Where impacts were found to be potentially significant, various mitigation measures to manage and monitor the impacts of the project have been proposed. Furthermore, the environmental impact statement (Part A Section 11) summarises the key findings of the environmental impact assessment and negative implications of the proposed project.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1 Draft environmental management programme

1.1 Details of the EAP

The requirements for the provision of the detail and expertise of the EAP are included in Section 1.2 of Part A.

1.2 Description of the aspects of the activity

The requirement to describe the aspects of the activity that are covered by the draft environmental management programme is included in Section 7.5 of Part A.

1.3 Composite map

Refer to Annexure A for maps that superimpose the proposed project and its associated structures and infrastructures on the environmental sensitivities of the preferred sites.

1.4 Description of the impact management outcomes and actions

Table 34: Measures to rehabilitate the environment affected by the proposed project

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
1a	Geology	Construction and operations the proposed infrastructure associated with the SWMP.	There are no impacts identified on geology as a result of the construction and operation of the proposed infrastructure.			• No mitigation measures required.		
2a	Topography, soil, land use and land capability	Construction and operations the proposed infrastructure associated with the SWMP.	The construction and expansion of the facilities associated with the SWMP will influence the nature of the topography that is typical of the surrounding area with such changes stemming from the dam walls. The natural drainage patterns, with specific focus on PCD 3, will also be altered as PCD 3 will be constructed to contain affected water from runoff from site.	Construction, Operational, and Decommissioning.	Avoid and Control	• Disturbance to the natural topography should be limited to the construction footprint areas as far as possible. • Construction sites and contractors camp should be fenced.	Ensure minimum change in topography. Principles in the MPRDA, 2002, NEMA, 1998, NEM:WA, 2008, Regulations there under and amendments thereto.	1 – 5 years
2b			Vegetation clearance and topsoil stripping will be conducted as part of the construction of the proposed infrastructure. The topsoil will then be stockpiled for later use during the rehabilitation of the side walls of the facilities. Soil erosion may occur on the topsoil stockpiles and from bare areas due to wind or surface water runoff.	Construction	Avoid and Control	• The disturbance area for the construction will be kept at a minimum and in the designated areas as per the approved layout plans. • Topsoil will be stripped from the proposed footprint areas before construction starts. • Should these stockpiles become a source of windblown dust, they must be vegetated with indigenous vegetation. • All alien invasive flora should be removed from the stockpiles.	Ensure minimum change in topography. Preserve sufficient soil volumes to enable pre-mining land capability post-rehabilitation. Principles in the MPRDA, 2002, NEMA, 1998, NEM:WA, 2008, Regulations there under and amendments thereto. Procedures for topsoil amelioration. Rehabilitation, decommissioning- and closure plan and closure objectives.	1 – 5 years
2c			The temporary stockpiling of topsoil may result in a decrease in the fertility of the soil and the leaching of minerals due to exposure of the soil to elements.	Construction	Avoid and Control			1 – 5 years
2d			The removal of topsoil may result in the mixing of the horizons of the soil that will have an impact on the fertility and production potential of the soil.	Construction	Avoid and Control	• Strip topsoil in a manner to prevent the mixing of soil horizons. • Soil will be stockpiled in accordance to soil horizons.		1 – 5 years
2e			The temporary stockpiling of topsoil may result in a decrease in the fertility of the soil and the leaching of minerals due to exposure of the soil to elements.	Construction	Avoid and Control			1 – 5 years
2f			Spillages of hydrocarbons from construction vehicles and equipment will result in the contamination of soil.	Construction	Avoid and Control	• Treat all hydrocarbon spills as hazardous waste and dispose of accordingly. • Emergency spill kits should be available and emergency spills to be cleaned up quickly and effectively with approved absorbent material. • Ensure that mixing practices are conducted on impermeable surfaces. • All vehicle and equipment usage should be limited to designated areas only. • Store fuel and oil in designated bunded areas. • Refuelling of vehicles to take place on an impermeable surface fitted with a sump to contain any spillages. Alternatively where in-field refuelling will take place, this will align with a documented refuelling procedure as well as the use of drip trays	To reduce erosion and siltation resulting from the construction phase. To prevent surface water quality deterioration due to chemical contamination. National Water Act, 1998 and associated Regulations.	1 – 5 years

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
2g			Ineffective erosion control along access roads may lead to siltation of downstream water resources and scouring of soil.	Construction, operational and decommissioning	Control	• The disturbance area for the construction will be kept at a minimum and in the designated areas as per the approved layout plans. • Implement speed limit on access road. • Regularly inspect and maintain access road.	Outcome: To reduce erosion and siltation resulting from the construction phase. To prevent surface water quality deterioration due to chemical contamination. Standard: National Water Act, 1998 and associated Regulations.	1 – 5 years
2h			Changes to the land use, from natural to mining, will occur for the long term (LOM) as a moderately sized natural area (with specific reference to PCD 3 and OMWSD Compartment 4) will be disturbed for the construction of the facilities.	Construction, Operational and decommissioning	Avoid and Control	• The disturbance area for the construction will be kept at a minimum and in the designated areas as per the approved layout plans.	Outcome: Ensure minimum change in topography. Preserve sufficient soil volumes to enable pre-mining land capability post-rehabilitation. Standard: Principles in the MPRDA, 2002, NEMA, 1998, NEM:WA, 2008, Regulations there under and amendments thereto. National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GNR.331 of 2014), thereunder. Rehabilitation, decommissioning- and closure plan and closure objectives.	1 – 5 years
3a	Vegetation and General Ecology	Construction, operational and post-operational activities, rehabilitation (all sites)	Direct and Indirect Impacts on the botanical and ecological environment	Construction and operational and residual	Avoid & Control	• Final walkdown to identify and geolocate protected plant species for permitting purposes. No protected plant species may be affected, removed, excavated, relocated, or impacted in any manner, except under a valid permit granted by the relevant authority and under the supervision of the appointed EO. • Apply for permits from DFFE (and possibly LEDET) for removal of protected plant species. • Develop a biodiversity monitoring programme to establish longterm trends of floristic and faunal diversity patterns and the latent and immediate effects of mining on these receiving environments. • Implement an integrated alien plant control program, which identifies the species that pose the greatest threat, in terms of habitat transformation, within the development areas, and considers all appropriate chemical, mechanical, biological and cultural control methods for the alien species. • No effluent of a damaging nature should be released, or permitted to enter, natural drainage lines or rivers. • Prioritise erosion control during the planning phase where slopes, runoff from paved and tarmac areas and storm water control measures need to be highlighted and planned to prevent erosion of surrounding natural areas. • Demarcate development areas, and no personnel or construction vehicle shall be allowed to access neighbouring properties for any purpose whatsoever, unless authorised with specific reference to the VLNR area. • The PCD 3 site shall be demarcated by permanent fencing to prevent any access for animals to these areas. Typical fencing employed for security purposes around the Venetia Mine is	Appoint of ECO. Demarcation and management of all fenced and development areas, including no-go areas. Identification of target/protected plant species. Acquisition of relevant permits to remove plant taxa. All open space areas and development areas are free of declared of alien vegetation/ or frequency of infestation is controlled at acceptable levels. Any herbicide applications to take place by Certified Pesticide Control Operator (PCO) Induction of labour and staff on specific environmental issues related to the development sites. Avoid impacts to no-go areas and adjacent VLNR. Alien control should be achieved as per threshold level or recommendations specified in the AIP management plan. The ECO to manage/liaise with certified PCO. Conduct yearly assessments to determine the ecological condition of the rehabilitated as well as natural habitat units on development areas and adjacent areas.	Demarcation and fencing of development sites should commence prior to construction activities. Screening of development areas for target species by ECO should be implemented prior to construction. Re-location or rescue of taxa prior to construction. Alien control should be continuous (during operation and rehabilitation). Veld condition monitoring should be conducted annually (in summer). Completion of rehabilitation agreement where applicable after construction. Produce year report (for at least for consecutive years) on the ecological status

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
						considered adequate.Cleared vegetation and debris that has not been utilised must be collected and disposed through an appropriate manner. • No painting or marking of rocks or vegetation (trees) to identify locality or other information shall be allowed, as it will disfigure the natural setting. Marking shall be done by steel stakes with tags, if required. All temporary markings will be removed upon completion of the construction. • Collection of branches, wood (dead or alive), shrubs or any vegetation for fire making purposes is strictly prohibited. • Open fires at site is prohibited, including the burning of waste material. The irresponsible use of welding equipment, oxy-acetylene torches, and other naked flames, which could result in veld fires, or constitute a hazard should be guided by safe practice guidelines. • Provide temporary and suitable on-site ablution, sanitation, litter and waste management and hazardous materials management facilities until such time that adequate permanent and operational facilities can be provided. Ablution anywhere other than in provided ablutions shall not be permitted. Under no circumstances shall use of the veld for ablution purposes be permitted. • A periodic clean-up of the surrounding natural environment should be undertaken to remove litter and prevent unwanted deterioration of the surrounding natural environment. • Implement site induction for contractors and workers to familiarize them with all aspects relating to environmental components of the project. • Use of locally indigenous plant species for landscaping purposes is strongly recommended. Under no circumstances shall exotic and invasive plants be used for landscaping purposes.		quo of the development sites and immediate surroundings.
4a	Fauna & Avifauna	Construction, operational and post-operational activities (all sites)	Direct Impacts on the faunal and avian environment	Construction and operational and residual	Avoid & Control	• Minimize area cleared for construction activities and erect a temporary fence to contain construction operations. • All development sites (apart from the access road) should be fenced with an impermeable fence structure to prevent game and animal species access to the facilities. • Natural corridors (e.g. riparian woodland and drainage lines) must be retained between development sites (PCD 3, OMWSD Compartment 4, Southern Access Road and Eastern Area) and the VLNR to promote the movement of small-bodied fauna. • Should any faunal species be identified during the construction phase, these will be relocated in line with the mine's Animal Management Procedures.If any faunal species of conservation concern (as indicated in this report) is exposed during the construction phase, the ECO shall be informed, who shall then issue instructions for its capture, translocation and safe release to the nearby VLNR "screened" prior to, and during the construction phase for reptile species.	Appoint ECO. Any snake relocations to be undertaken by trained and competent individuals Demarcation (fencing) and management of development sites including any other open space which is regarded as no-go areas (adjacent areas) Identification of target/protected fauna and relocation/rescue of individuals. Acquisition of relevant permits to relocate protected taxa and/or game species Induction of labour and staff on specific environmental issues related to the development sites. Consideration should be given to the position of current transmission and distributions lines to prevent unnecessary 'bird-power line' interactions	Demarcation and fencing of development sites should commence prior to construction activities. Screening of development areas for target species by ECO should be implemented prior to construction. Re-location or rescue of taxa where possible and with guidance from relevant regulatory bodies prior to construction.

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
						• Harvesting of firewood or any plant material is strictly prohibited. • All labour or staff should be advised (induction) by means of environmental awareness training on the ecological significance of the area and its conservation importance. • Intentional killing of any faunal species (in particular invertebrates and snakes) should be avoided. • Indigenous species native to the area should be used during the rehabilitation phase. • Large game species occurring or "trapped" within the development sites are to be relocated to the nearby VLNR. • Dead game on the sites should promptly be removed and should be disposed at a 'vulture restaurant' located on the nearby VLNR.	Avoid impacts to proposed no-go areas or areas that are not part of the development sites. ECO to document number of rescued/relocated animal species and approximate number of affected individuals. Conduct yearly assessments to determine the ecological condition of rehabilitated as well as natural habitat units on development areas and adjacent areas.	Veld condition monitoring should be conducted annually (in summer). Completion of rehabilitation agreement after construction. Produce year report (for at least for consecutive years) on the ecological status quo of the development sites and immediate surroundings.
4b	Fauna & Avifauna	Construction, operational and post-operational activities (all sites)	Indirect Impacts on the faunal and avian environment	Construction and operational and residual	Avoid & Control	• Limit construction activities to daytime. • Minimize the use of earthmoving equipment that results in noise generation. Generic mitigation measures should include dust suppression and noise reducing technologies to reduce ambient noise and dust levels. Implement monitoring to identify areas where erosion or pollution occur, and remediate when observed. • Minimize exterior lighting and implement operational strategies to reduce "spill light" although with the balance to achieve safety and security on the mine. Outside features should be illuminated by using "down-lighting" rather than "up-lighting" as far as possible. Where possible, outside lighting should apply UV filters to high pressure mercury vapour lamps or fluorescent lights to minimise the attraction of nocturnal invertebrates to the light. • Introduce speed limits and road calming devices (e.g. speed humps) to the access road to prevent collisions with animals and unnecessary noise pollution by vehicles. • Natural corridors (e.g. drainage lines and riparian woodland) must be retained between the sites and the VLNR to promote the movement of fauna when a high rate of natural disruption is expected. • Existing access roads must be used (apart from the proposed south and north access road to DMI)) and/or road calming devices should be installed to prevent small-bodied or slow-moving animals from being killed, and to facilitate a safe means of dispersal. • Where possible, ditches/trenches should have slopes of less than 45° rather than vertical sides to allow small animals to escape if they fall into a trench. • All domestic waste generated (if present) should be removed from the study site as soon as possible and be disposed at an authorised landfill to reduce the risk of colonization by feral mammals, scavengers or competitively superior bird species (e.g. Pied Crows Corvus albus).	Appoint ECO with adequate resourcing to be provided to assess and mitigate impacts Demarcation (fencing) and management of development sites including any other open space which is regarded as no-go areas (adjacent areas) Maintenance of natural dispersal corridors and no-go zones. Monthly monitoring of fence structures. Monitoring of water quality and erosion control measures as per the Water Use License requirements. Appropriate remedial action, including the rehabilitation of the eroded areas, where necessary should be undertaken. Implement emergency contingency plan should pollution or spillages occur in natural drainage lines (especially the Kolope River, dams and depressions during operation). An ecologist should be consulted to advice on appropriate remedial measures, which may include fencing of polluted area and the relocation of game and animal species. Avoid impacts to proposed no-go zones and natural corridors. Conduct yearly assessments to determine the ecological condition of rehabilitated as well as natural habitat units on development areas and adjacent areas. Conduct water quality tests at a frequency approved in the Water Use License at standing water sources adjacent to the developed sites and the Kolope River to determine the salt levels and toxicity of the water for fauna (e.g. ingestion of water by fauna). Compare such to relevant control sites as identified in the Water Use License	Demarcation and fencing of should commence prior to construction activities Veld condition monitoring should be conducted annually (in summer). Completion of rehabilitation agreement as part of mine's greater rehabilitation plan after construction. Produce year report (for at least four consecutive years) on the ecological status quo of the development sites and immediate surroundings.

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
						• Disturbed or cleared areas should be rehabilitated where possible and must be maintained. Rehabilitation should make use of indigenous plant species, preferably of species native to the study area and immediate surroundings. The species selected should strive to represent habitat types typical of the ecological landscape prior to perturbation. Reinstate/rehabilitate as a continual process – this will maximise the viability of the natural seed bank and prevent the unnecessary loss of topsoil during storage. • Checks must be carried out at regular intervals to identify areas where erosion is occurring, especially along roads and where slopes occur. • The stormwater design should be effective and should not impede with the natural hydrological regime beyond the modelled/predicted discharge volumes. • The fence structures should be regularly monitored (at least once a month) during operation, and damaged areas should be immediately repaired. • Feeding of animals is strictly prohibited, and signage should be applied at public areas to remind people/staff of the dangers associated with feeding of wild animals. Proper animal-proof dustbins should be used. • Electric cables or earth wires associated with transmission (or distribution) lines crossing wetland areas, dams or important roosting and dispersal networks (e.g. drainage lines) used by birds must be marked with appropriate bird deterrent devices (e.g. the Double Loop Bird Flight Diverter; www.preformedsa.co.za).		
5a	Surface water	Grading, vegetation clearing and soil stripping	As part of the construction phase of the Project, several additional water storage facilities will be constructed (including PCD 1, PCD 2, PCD 3, PCD 1 Compartment 4B, OMWSD Compartment 3, and OMWSD Compartment 4) and some existing facilities will be expanded (including FRD 1 RWD, and OMWSD North and South Compartment). A network of affected water channels will also be constructed to convey surface runoff to the runoff receiving PCDs. Furthermore, the existing southern access road that runs adjacent to the south-eastern portion of the mine boundary security fence, will be upgraded and expanded to a 10 m wide road (currently 4 m wide) to provide access of construction vehicles to the proposed PCD 3 locality. Grading, vegetation clearing, and soil stripping will be carried out as part of the construction phase. There may be a decrease in surface water quality when any surface water comes into contact with dust, eroded soil, or other pollutants generated during the construction / expansion phase of the Project. The sediment load within surface water runoff may increase or the chemistry of surface water may be altered if not prevented or mitigated. The	Construction	Control, prevent, and avoid	• Disturbed areas should be limited to the footprint as depicted in the layout plan. • The laydown areas for each construction site must be kept as small as reasonably possible. • Place topsoil stockpiles in designated areas with measures in place to prevent erosion and to minimise deposition of sediment in the downstream environment. • Particular care should be taken to mitigate the impacts on surface water quality during the construction of PCD 3 and the expansion of the southern access road. Temporary containment berms may have to be constructed downstream of areas where runoff is likely to accumulate. This will allow runoff to settle as it ponds against the berms, resulting in less suspended particles and less sediment being transported downstream in the event of water overflowing from the berms during heavy rainfall events. • Where possible, construction activities should be scheduled to coincide with the dry season.	To prevent / reduce surface water quality deterioration resulting from erosion, siltation and pollution. To preserve surface water quality that entering the receiving environment. Section 19 of the NWA (No. 36 of 1998) and Regulation GN 704 in terms of the NWA.	1 – 5 years

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
			construction of PCD 3 and expansion of the southern access road will have the highest risk of contaminating surface water resources, due to its close proximity to the Kolope River and the existing river diversion. **Surface water quality** Contamination of surface water resources causes deterioration of water quality, affecting the use of surface water as a natural resource.					
5b	Surface water	Use, storage, and handling of hazardous materials.	Spillages of hazardous materials (i.e., cement, oil, fuel and / or grease) used during the construction phase of the Project may impact negatively on the surrounding clean water environment. The construction of PCD 3 and expansion of the southern access road will have the highest risk of contaminating surface water resources, due to its close proximity to the Kolope River and the river diversion. **Surface water quality** Deterioration of water quality due to chemical contamination affecting the use of surface water as a natural resource.	Construction	Control and prevent	• Regular maintenance should be conducted on all vehicles and equipment used during the construction / expansion phase to ensure they are always in a good working order. • Treat all hydrocarbon spills as hazardous waste and dispose of accordingly. • Emergency spill kits should be available, and all chemical spills should be cleaned up quickly and effectively with approved absorbent material. • Ensure that all mixing practices are conducted on impermeable surfaces. • All vehicle and equipment usage should be limited to designated areas only of which access is controlled. • Store fuel, oil, and other hazardous substances in designated bunded areas able to contain 110% of the storage capacity. • Refuelling of vehicles to take place on an impermeable surface fitted with a sump to contain any spillages. Field refuelling to be conducted in line with a documented refuelling procedure that includes controls such as drip-trays	To prevent / reduce surface water quality deterioration resulting from chemical contamination. To preserve surface water quality that entering the receiving environment. Section 19 of the NWA (No. 36 of 1998) and Regulation GN 704 in terms of the NWA.	1 – 5 years
5c		Implementation of the project	Currently the main risk associated with surface water at Venetia Mine is the potential deterioration of surface water quality in the receiving environment resulting from affected water leaving the mine site. The implementation of the Project will reduce this risk (i.e. positive impact) as all affected water generated on site will be contained and dirty runoff will be separated from clean runoff more effectively	Operational	Positive impact			LOM
5d		Runoff receiving PCDs	Runoff receiving PCDs. PCDs that will receive surface runoff directly include PCD 3, PCD 1 and the SWCD. PCD 3 will be constructed directly west of the CRD with a capacity of 1 050 000 m^3. It will receive runoff from S1, seepage from the FRDs and water from the underground operations (via the K03 Pit). PCD 1 will be constructed south of the existing SWCD with a capacity of 120 000 m^3. It will only receive water in the form of surface runoff from S2. The SWCD is an existing PCD located directly south of the open pit with a capacity of 27 500 m^3. The SWCD will receive runoff from S3 and from the underground operations (via the K03 Pit).	Operational	Control and prevent	• The runoff receiving PCDs should at all times be operated below the 0.8 m freeboard requirement as per Regulation GN 704. • The associated affected water channels should be sloped / excavated that the lowest points are located at the PCD inlets to ensure all runoff is conveyed to the PCDs effectively via gravity wherever possible. • The affected water channels should be suitably lined (e.g.., cement) in order to prevent erosion and should be designed to contain the 1:50-year 24-hour flood without spillages. • The twin compartment silt traps located at each PCD inlet should be operated in an alternating fashion to allow efficient servicing of the compartments.	To prevent / reduce surface water quality deterioration resulting from spillages of contaminated water from the PCDs. Section 19 of the NWA (No. 36 of 1998) and Regulation GN 704 in terms of the NWA.	LOM

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
			Once the runoff receiving PCDs are operational, there are two main potential impacts on surface water quality and quantity. Firstly, there will be a reduction in surface water quantity of the larger catchment, as runoff and precipitation are contained in the runoff receiving PCDs mentioned above. It should be noted that this impact is a continuation of an existing impact due to the existing mining activities at Venetia Mine. The area applicable to the Project is already considered a dirty water area and runoff reporting to S2 and S3 is already being collected and contained in the SWCD. Runoff generated in S1 is currently not being collected and contained and will exacerbate the magnitude of this existing impact (i.e., more runoff will be contained). Secondly, there may be a reduction in surface water quality of the downstream environment in the event of spillages from the facilities. The risk of spillages, based on Jones & Wagner's 2020 water balance, is, however, less than 2% (i.e., less than 1 in 50 years on average), in accordance with Regulation GN 704. **Surface water quality and quantity** There may be a deterioration of surface water quality due to chemical contamination resulting from spillages, affecting the use of surface water as a natural resource. There will be a reduction in the quantity of water reporting to the larger quaternary catchment (A63E) as runoff from S1, S2 and S3 is contained in the PCDs.			• Silt accumulation and vegetation growth within the PCDs and silt traps must be regularly cleaned / removed to unsure optimal capacity is always available. • Pumping infrastructure will be essential to maintain the water balance at Venetia Mine and should undergo regular maintenance to ensure they are always in a good working order. • Further, it is proposed that Venetia Mine develops and implements a maintenance schedule to ensure that all components of the dirty water systems are always maintained to ensure optimal serviceability, functionality, and capacity.		
5e		Dirty water containment facilities	Dirty water containment facilities. The additional dirty water containment facilities include the construction of PCD 2, PCD 1 compartment 4B, OMWSD Compartment 3, and OMWSD Compartment 4, and the expansion of FRD 1 RWD and OMWSD North and South Compartment. These facilities will not receive any surface runoff directly and will essentially be "pump-to" facilities only, where affected water can be pumped to or from, depending on the situational requirements. PCD 2 will be constructed to the north-west of the plant area with a storage capacity of 130 000 m^3. PCD 1 compartment 4B will be constructed north-west of the existing SWCD with a storage capacity of 34 000 m^3. OMWSD Compartment 3 will be constructed north of OMWSD North and South Compartment with a storage capacity of 275 000 m^3. OMWSD Compartment 4 will be constructed adjacent to OMWSD North and South Compartment within the current low lying storm water detention pond with a capacity of 185 000 m^3. FRD 1 RWD is an existing facility located south-east of FRD 1 and its capacity will be increased from 40 000 m^3 to 130 000 m^3. OMWSD North and South Compartment are existing facilities located	Operational	Control and prevent	• The dirty water containment facilities should at all times be operated below the 0.8 m freeboard requirement as per Regulation GN 704. • Pumping infrastructure will be essential to the operation of these facilities and for maintaining the water balance. The infrastructure should undergo regular maintenance to ensure they are always in a good working order. • Silt accumulation and vegetation growth within the dams must be regularly cleaned / removed to unsure optimal capacity is always available. • Further, all dirty water containment facilities and associated infrastructure should be included in the maintenance schedule recommended above.	To prevent / reduce surface water quality deterioration resulting from spillages of contaminated water from the dirty water containment facilities. Section 19 of the NWA (No. 36 of 1998) and Regulation GN 704 in terms of the NWA.	LOM

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
			south of the SWCD and its capacity will be increased from 460 000 m^3 to 650 000 m^3. The main surface water related risk associated with these facilities is a deterioration of surface water quality due to spillages. The risk of spillages, based on Jones & Wagner's 2020 water balance, is however less than 2% (i.e., less than 1 in 50 years on average), in accordance with Regulation GN 704. Based on the proposed location of PCD 1, PCD 2, PCD 1 Compartment 4B and OMWSD Compartment 3, spillages are likely to drain back into the surrounding affected water channels and will be contained in one of the runoff receiving PCDs, reducing the impact of spillages from these facilities. Spillages from OMWSD North and South Compartment and OMWSD Compartment 4 are, however, likely to drain into the existing river diversion and then into the Kolope River, therefore having a higher impact on water quality. **Surface water quality** There will be a deterioration of surface water quality due to chemical contamination resulting from spillages, affecting the use of surface water as a natural resource.					
5f		K03 Pit	The K03 Pit is located to the east of FRD 2 on the north-western perimeter of the open pit with a total in-pit storage capacity of 3.5 Mm^3. The safety berm surrounding the pit perimeter restricts surface runoff from entering the pit in an uncontrolled manner. The pits do, however, receive direct rainfall as well as runoff from a portion of the WRDs. This volume of water, together with any seepage water flowing to the K02 and K01 Pits, pose a risk to the safety of workers in the VUP. In order to de-risk the underground operations, it is proposed that all water reporting to the K02 and K01 Pits and the VUP be pumped to the K03 Pit temporarily whereafter it will be pumped to the OMWSDs for re-used within the plant. Due to the sheer volume of the K03 Pit, spillages are highly unlikely and, therefore, the impact on surface water quality is negligible. In terms of surface water quantity, there will be a continuation of the current impact (i.e., runoff and rain entering the pit) leading to a reduction in the amount of runoff reporting to the larger catchment). There is no new surface water related impacts associated with the storage of water in the K03 Pit.	Operational	Control and prevent	• Pumping infrastructure will be essential to the operation of the K03 Pit and to ensure the safety of people working in the VUP. It is imperative that all pumping infrastructure undergo regular maintenance to ensure they are always in a good working order. • Once constructed (in line with the Mine's Rehab & Closure Plan timeframes), the safety berm surrounding the pit perimeter should be included in the maintenance schedule recommended above to ensure that surface runoff does not enter the pit in an uncontrolled manner. • It is recommended that Venetia Mine apply for exemption to Regulation 6 C of GN 704 and to license the pit as a dirty water containment facility in terms of Section 21 (g) of the National Water Act (Act No. 36 of 1998).	To ensure the safety of people working in the VUP. To minimise surface water losses to the larger catchment area by minimising the amount of surface runoff entering the pit. Section 19 of the NWA (No. 36 of 1998) and Regulation GN 704 in terms of the NWA.	LOM
5g		Southern Access Road	The southern access road is an existing gravel road and will be upgraded and expanded to a 10 m wide road (currently 4 m wide) to provide access of construction vehicles to the proposed PCD 3 locality. There are two main surface water related problems associated with the southern access road. Firstly, the road may impact on the natural drainage of surface water in the surrounding area as it is assumed that the access road will be slightly elevated. If	Operational	Control and prevent	• It is recommended that the southern access road be designed and managed in such a manner as to disperse runoff and to prevent the concentration of storm water flow. • The access road should be designed to ensure effective drainage of surface runoff reporting to the receiving environment. • Erosion prevention measures (e.g., cement, rock or gabions) should be installed at flow concentration points to dissipate runoff and decrease erosion rates.	To prevent / reduce surface water quality deterioration resulting from erosion and siltation. To preserve surface water quality that enters the receiving environment. To minimise surface water losses to the larger catchment area by ensuring effective drainage of surface runoff to the downstream environment.	LOM

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
			left unmitigated, surface runoff may pond against the road that could lead to a reduction in the volume of runoff (i.e., quantity) reporting to the downstream catchment. Secondly, the surface area of the road will be compacted, creating an impermeable area where runoff cannot infiltrate into the ground. This may increase the volume and velocity of runoff along the road, resulting in higher erosion rates, particularly at points where the flow of water is concentrated. Increased erosion rates may increase the sediment load in the runoff resulting in a reduction is surface water quality downstream. **<u>Surface water quantity and quality</u>** Deterioration of surface water quality due to increased erosion and sedimentation. There will be a decrease in clean water runoff reporting to the downstream catchment if runoff is left to pond against the road, potentially reducing the availability of water to downstream users.			• Finally, Venetia Mine should conduct regular inspections and implement a maintenance schedule to ensure the integrity and functionality of all storm water management measures and controls are maintained.	Section 19 of the NWA (No. 36 of 1998) and Regulation GN 704 in terms of the NWA.	
5h		Mine Water discharge	Venetia Mine proposes to discharge surplus water from PCD 3 and OMWSD North and South Compartment into the receiving environment, not only as a means of managing surplus water but also to ensure safety in the underground workings of the VUP. The discharge of affected water will only be conducted should PCD 3 or OMWSD North and South Compartment have insufficient capacity and in accordance with the relevant approvals (Environmental Authorisation and Water Use Licence). The impact of this activity on surface water quality will be assessed as part of the aquatic biodiversity impact assessment.	Operational	Mitigation measures associated with the controlled discharge of contaminated water from PCD 3 and OMWSD North and South Compartment into the Kolope River were proposed as part of a specialist wetland assessment, titled *De Beers Venetia Diamond Mine Storm water Management Project: River and Wetland Ecosystem Specialist Report, compiled by CES Environmental and Social Advisory Services and dated August 2021*. Refer to reference no. 11ee, 11ff, 11hh and 11kk below.			
6a	Groundwater quality	Construction of PCDs	Lesser oil and diesel spills	Construction	Avoid, modify, remedy, control or stop	• Develop and maintain a Standard Operating Procedure to contain and remediate any accidental hydrocarbon or other chemical spillages. • Contain spillage, excavate and dispose of soil if required. Utilisation of spill kits and/or excavation of affected soil with subsequent disposal at an accredited disposal site is crucial. • Continue with the status quo groundwater monitoring programme. • Do not discharge affected water into the environment that does not comply with regulatory standards, unless authorised to do so. • All vehicles must be properly maintained and serviced so that no oil leaks occur on site.	Prevent or contain groundwater contamination	N/A
6b		Operation of PCDs	Unlined dams can result in mounding of the water levels due to artificial and increased recharge to the aquifer. Elevated water elevations result in an increase in flow gradients which means higher rates of groundwater flow and mass transport.	Construction	Avoid, modify, remedy, control or stop	• Prevent cumulative contamination of the receiving groundwater environment. • Minimize seepage, prevent contact between clean and dirty areas, and to recycle contaminated water. • Continue with the status quo groundwater monitoring programme.	Prevent or contain groundwater contamination	N/A

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
						• Do not discharge affected water into the environment that does not comply with regulatory standards, unless authorised to do so. • Contain all affected water within the affected water circuit. • PCDs to be designed so that no polluted water system at the mine is likely to spill into any clean water system more than once in 50 years and will have a minimum of 800 mm freeboard above spillway level. • Line with suitable low permeable pollution control layer based on risk and as approved by DWS. • Conduct regular inspections (refer to Section 8.2.4). • Prepare and maintain an Operations Management Plan (Operation Manual). • Regular routine inspections of PCDs should be carried out by Venetia or a suitably qualified person appointed by Venetia Mine.		
7a	Air quality	Construction the proposed infrastructure associated with the SWMP.	The construction of the proposed infrastructure will require the stripping of vegetation and earthworks for construction. This may result in the generation of dust in the localised construction areas. Due to the location of the proposed infrastructure, the generation of dust is not anticipated to impact on any sensitive receptors.	Construction	Control	• Only clear areas required for the construction of the proposed facilities. • Continue the current dustfall monitoring programme. • Limit activities during periods high wind where possible. • Wet down construction areas where possible.	To reduce the impact on the ambient air quality National Ambient Air Quality Standards (South Africa)	During the construction and operational phase, until cessation of mining activities
7b		Utilisation of the access road.	The use of the access road during the construction phase of PCD 3 may result in vehicle entrained dust generation limited to the local area.	Construction and Operational	Control	• Implement speed limit on access road. • Regularly inspect and maintain access road.		
8a	Noise and vibration	Construction the proposed infrastructure associated with the SWMP.	It is anticipated that the construction of the proposed infrastructure will result in the generation of noise in the localised areas of construction. However, due to the location of the proposed infrastructure and the location of the exiting mining activities, the generation of noise is not anticipated to impact on any sensitive receptors.	Construction	Control	No mitigation measures proposed.	N/A	*N/A*
9	Sites of archaeological and cultural importance	Construction the proposed infrastructure associated with the SWMP.	There are no impacts identified on Sites of Archaeological and Cultural Importance as a result of the construction and operation of the proposed infrastructure.	Construction	Avoid	• If any graves or material is exposed during construction activities, all construction activities must cease, a 30 m no-go barrier constructed and SAHRA contacted for further investigation. • The area should be demarcated in order to prevent any further work there until an investigation has been completed. • An archaeologist should be contacted immediately to provide advice on the matter.	Prevent the damage to / or destruction of heritage resources. In compliance with the National Heritage Resources Act (Act No. 25 of 1999)	Construction Phase
10	Palaeontological	Construction the proposed infrastructure associated with the SWMP.	The underlying Precambrian rocks of the Beit Bridge Complex do not host fossils and no fossils have been reported from the overlying Quaternary sediments. The rocks of the Ecca group are known to host fossil glossopterid plants but these fall outside the limits of the area. It is thus extremely unlikely that fossils will be found in the proposed project site.	Construction	Avoid	• If fossils are exposed by excavation, they must be inspected by the environmental officer or designated person. • If fossils are discovered a registered palaeontologist must be contacted to capture and systematically document the finding. This will require routine collecting protocols involving descriptive, diagrammatic, and photographic recording of fossils and exposures. The fossils and appropriate contextual samples will be processed to create an archive collection.	Prevent the damage to / or destruction of heritage resources. In compliance with the National Heritage Resources Act (Act No. 25 of 1999)	Construction

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							• Should a major in situ occurrence be exposed, excavation will immediately cease in that area so that the discovery is not disturbed or altered in any way until the appointed palaeontologist has investigated the find.		
11a	Sensitive landscapes (wetlands)	Watercourse: CVB1 & A1 Direct ecosystem modification or destruction / loss impacts	Construction of seepage sump and associated pipeline	Direct disturbance and removal of wetland soil and vegetation along the edge of the road during the construction of seepage collection sump, laying of the pipeline and use of access road by heavy machinery.	Construction	Avoid/prevent Minimize / reduce Remedy / rehabilitate	**Demarcation of 'No-go' areas and construction corridors:** • Prior to the commencement of any construction activities, the following features must be staked out by a surveyor and demarcated: o Outer edge of the delineated wetland and riparian areas occurring within 100 m of the proposed non-linear storm water infrastructure (e.g. PCDs, OMWSDs and FRD RWDs). o Outer edge of the delineated wetland and riparian areas occurring within 32 m of the proposed access roads, pipelines and canals. • Access to and from the project area should be either via existing roads or within the construction servitude where possible. • Demarcation of all identified access, haulage and service roads to be reviewed by the ECO and/or suitable specialists. • All excavated soils and soil stockpiles must be stored / sited outside of the watercourses. • The demarcation work must be signed off by the Environmental Control Officer ("ECO") before any work commences. • Demarcations are to remain until construction and rehabilitation is complete. • All areas outside of this demarcated working servitude must be considered no-go areas for the entire construction phase. Any contractor found working within No-Go areas must be disciplined in line with the relevant contractual/mine processes. • No equipment laydown or storage areas must be located within delineated wetland or riparian habitats. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated immediately to the satisfaction of the ECO. **Method statements for working in watercourses:** • If applicable, a detailed method statement for the construction activities within all watercourses must be compiled The final method statement must be reviewed by a suitably qualified person prior to commencement and must include all measures provided in this section where relevant and applicable. **General rehabilitation guidelines:** • Land impacted by the proposed development must be rehabilitated by undertaking the following general tasks: • All foreign material must be removed from site.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction. All method statements must be compiled and approved prior to the commencement of construction. Wherever possible, rehabilitation and monitoring should take place throughout construction and operational phases.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							• Land must be regraded / reshaped and topsoils must be reinstated. All topsoil will be managed in line with the mine's topsoil management plan and will be stockpiled for reuse during rehabilitation activities • Compacted soils must be adequately ripped/loosened where compacted, as informed by the ECO. • Restoration of the area's biodiversity (fauna and flora) will take place in line with the mine's Biodiversity Management Plan:For the permanently and seasonally saturated areas (at present) - via translocation / transplanting of resecured sods and, where there are not enough rescued sods, via the translocation / transplanting of sods from the surrounding wetland as advised a wetland ecologist. **Construction phase monitoring measures:** • Compliance monitoring will be the responsibility of a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that monitoring is undertaken effectively and appropriately. • A photographic record of the state of the watercourse prior to the commencement of clearing/construction must be kept for reference and rehabilitation monitoring purposes. • The ECO must undertake compliance monitoring audits based on risks of the activities as the project progresses. Freshwater ecosystem aspects that must be monitored related to monitoring freshwater ecosystem impacts include: o The condition of the demarcation fence. o Evidence of any no-go area incursions. o The condition of the temporary runoff, erosion and sediment control measures and evidence of any failures. o Evidence of sedimentary deposits / plumes and elevated rates of sedimentation (i.e. vegetation smothering / burial). o Evidence of elevated river / stream turbidity levels. o Evidence of gully or bed/bank erosion. o Visual assessment of storm water quality and instream water quality. o The condition of waste bins and the presence of litter within the working area. o Evidence of solid waste within the no-go areas. o Evidence of hazardous materials spills and soil contamination. o Presence of alien invasive and weedy vegetation within the working area. o Rehabilitation and re-vegetation methods and success. o Once the construction and interim rehabilitation (pending life of mine rehabilitation) has been completed, the ECO		

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							should conduct a close out site audit 1 month after the completion of rehabilitation.		
11b		Watercourse: CVB1 Alteration of hydrological and geomorphological processes		Alteration of watercourse unit downstream of road due to construction of seepage collection sump. Reduction of downstream flow.	Construction	Minimize/reduce Remedy / rehabilitate	**Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **Runoff, erosion and sediment control:** • Wherever possible, existing vegetation cover on the development site should be maintained during the construction phase. The unnecessary removal of groundcover from slopes must be prevented, especially on steep slopes which will not be developed. • Clearing activities must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, clearing activities should be put on hold. In this regard, the contractor must be aware of weather forecasts. • Bare slopes and surfaces to be exposed to the elements during clearing and earthworks must be protected against erosion. • Once shaped, all exposed/bare surfaces and embankments must be re-vegetated as soon as possible to prevent erosion. • If re-vegetation of exposed surfaces cannot be established immediately due to phasing issues, temporary erosion and sediment control measures must be maintained until such a time that re-vegetation can commence. • All temporary erosion and sediment control measures must be monitored for the duration of the construction phase and repaired immediately when damaged. All temporary erosion and sediment control structures must only be removed once vegetation cover has successfully recolonised the affected areas. • After every rainfall event, the contractor must check the site for erosion damage and rehabilitate this damage immediately. Erosion rills and gullies must be filled-in with appropriate material and silt fences or fascine work must be established along the gulley for additional protection until vegetation has re-colonised the rehabilitated area. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	All method statements must be compiled and approved prior to the commencement of construction. Run-off, erosion and sediment control measure need to be put in place prior to construction and monitored throughout the construction and operational phases. Rehabilitation and monitoring should take place throughout construction and operational phases.
11c		Watercourse: A1 Alteration of hydrological and geomorphological processes		Erosion and/or sedimentation of watercourse units due to catchment land clearing and land cover disturbance during the laying of the pipeline and use of access road by heavy machinery.	Construction	Minimize / reduce Remedy / rehabilitate			
11d		Watercourse: CVB1 Ecological connectivity and edge disturbance impacts		Permanent loss of ecological connectivity between sections of watercourse unit on either side of the seepage collection sump, as well as an increase in edge effects on the roadward edges of the watercourse sections on either side of the road, during construction.	Construction	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Demarcation of 'No-go' areas and construction corridors:** • Refer to mitigation measure as per 11a above. **Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **General rehabilitation guidelines:**	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction. All method statements must

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							• Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.		be compiled and approved prior to the commencement of construction. Rehabilitation and monitoring should take place throughout construction and operational phases.
11e		<u>Watercourse: CVB1 & A1</u> Water pollution impacts		Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g. oil and diesel leaks and spills.	Construction	Avoid / prevent Remedy / rehabilitate	**Hazardous substances / materials management:** • The proper storage and handling of hazardous substances (e.g. fuel, oil, cement, etc.) needs to be administered. • Mixing and/or decanting of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface and must be protected from the ingress and egress of storm water. • Drip trays should be utilised at all dispensing areas. • No refuelling, servicing or chemical storage should occur outside demarcated areas. • No vehicles transporting concrete, asphalt or any other bituminous product may be washed at construction site unless all controls to mitigate impacts are installed and appropriately managed. • Vehicle maintenance should not take place on site unless a specific bunded area is constructed for such a purpose. • Hazardous storage areas must be bunded prior to their use on site during the construction period. The bund wall should be high enough to contain at least 110% of any stored volume. The surface of the bunded surface should allow for spillages to be collected and satisfactorily disposed of. Refuelling practices must be aligned with the mine's refuelling procedures. • All necessary equipment for dealing with spills of fuels/chemicals must be available at the site. Spills must be cleaned up immediately and contaminated soil/material disposed of appropriately at a registered site. • Contaminated water containing fuel, oil or other hazardous substances must never be released into the environment. It must be disposed of at a registered hazardous landfill site. • Spills must be cleaned up immediately and contaminated soil/material disposed of appropriately at a registered site. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Prevention and emergency response measures must be put in place prior to construction. Spill removal, treatment and rehabilitation must be undertaken immediately should an incident occur. Ongoing monitoring during construction and operational phases. Rehabilitation and monitoring should take place throughout construction and operational phases.
11f		<u>Watercourse: A2 & E1</u> Direct ecosystem modification or destruction / loss impacts	Construction of upgraded FRD 1 RWD and associated canals	Direct disturbance and removal of riparian and wetland soil and vegetation during the upgrade of the FRD 1 RWD, construction of the canals and use of heavy machinery on site.	Construction	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Demarcation of 'No-go' areas and construction corridors:** • Refer to mitigation measure as per 11a above. **Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							General rehabilitation guidelines: • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.		All method statements must be compiled and approved prior to the commencement of construction. Rehabilitation and monitoring should take place throughout construction and operational phases.
11g		Watercourse: A2 & E1 Alteration of hydrological and geomorphological processes		Erosion and/or sedimentation of watercourse units due to catchment land clearing and land cover disturbance during upgrade of the FRD1 RWD, construction of the canals and use of heavy machinery on site.	Construction	Minimize / reduce Remedy / rehabilitate	**Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **Runoff, erosion and sediment control:** • Refer to mitigation measure as per 11b above. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	All method statements must be compiled and approved prior to the commencement of construction. Run-off, erosion and sediment control measure need to be put in place prior to construction and monitored throughout the construction and operational phases. Rehabilitation and monitoring should take place throughout construction and operational phases.
11h		Watercourse: A2 & E1 Ecological connectivity and edge disturbance impacts		Temporary decrease in ecological connectivity between sections of watercourse unit on either side of the pipeline and access road, as well as an increase in edge disturbance on the roadward edges of the watercourse sections on either	Construction	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Demarcation of 'No-go' areas and construction corridors:** • Refer to mitigation measure as per 11a above. **Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction. All method statements must be compiled and approved prior to the commencement of construction. Rehabilitation and monitoring should take place throughout construction and operational phases.
11i		Watercourse: A2 & E1 Water pollution impacts		Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g. oil and diesel leaks and spills.	Construction	Avoid / prevent Remedy / rehabilitate	**Hazardous substances / materials management:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:**	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Prevention and emergency response measures must be put in place

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							• Refer to mitigation measure as per 11a above.		prior to construction. Spill removal, treatment and rehabilitation must be undertaken immediately should an incident occur. Ongoing monitoring during construction and operational phases. Rehabilitation and monitoring should take place throughout construction and operational phases.
11j		Watercourse: E2, E3, E4, D1 & D2 Direct ecosystem modification or destruction / loss impacts	Construction of PCD 3 (including all alternatives) and associated canals	Direct and permanent destruction / loss of watercourse units and approximately 22 ha of surrounding terrestrial habitats due to vegetation clearance, earthworks and construction works, including excavation and infilling.	Construction	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Polluted storm water management:** • The storm water management system for the mine must be sub-divided into clean and dirty water systems. • All mining surfaces that generate dirty or polluted surface runoff / storm water must be included in the dirty water management system where all runoff is ultimately collected in in lined pollution control dams (PCDs). PCDs include process water/return dams, storm water dams and evaporation dams. • All PCDs must be: o Designed to adhere to the 'Best Practice Guideline A4: Pollution control dams (Department: Water Affairs and Forestry, 2007). o Lined to minimise contaminant seepage. o Designed with adequate freeboard to ensure that there are no overtopping events during large / major storm events (i.e. at least 0.8 m above the maximum predicted water level). o Designed to handle (not breach during) 1:50 and 1:100-year flood events. o Sited, sized and operated to maximise the opportunities for water reuse and reclamation; and must adhere to the relevant dam safety criteria based on the safety risk classification of the dam. **Demarcation of 'No-go' areas and construction corridors:** • Refer to mitigation measure as per 11a above. **Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21 Best Practice Guideline A4: Pollution control dams	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction. All method statements must be compiled and approved prior to the commencement of construction. Rehabilitation and monitoring should take place throughout construction and operational phases.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							Construction phase monitoring measures: • Refer to mitigation measure as per 11a above.		
11k		Watercourse: E6 &R1 Alteration of hydrological and geomorphological processes		Alteration of flow, erosion and/or sedimentation regimes downstream of PCD 3 watercourse units due to catchment land clearing, land cover disturbance and permanent loss upstream channels during vegetation clearance, earthworks and construction works.	Construction	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Polluted storm water management:** • Refer to mitigation measure as per 11j above. **Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **Runoff, erosion and sediment control:** • Refer to mitigation measure as per 11b above. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above. **Invasive alien plant control:** • All alien invasive vegetation that colonise the construction site must be removed in line with the mine's relevant procedures. The contactor shall conduct alien vegetation removals based on the recommendations from environmental inspections. • Herbicides should be utilised where hand pulling/uprooting is not possible. ONLY herbicides which have been certified safe for use in wetlands by independent testing authority are to be used. The ECO must be consulted in this regard.. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21 Best Practice Guideline A4: Pollution control dams	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction. All method statements must be compiled and approved prior to the commencement of construction. Run-off, erosion and sediment control measure need to be put in place prior to construction and monitored throughout the construction and operational phases. Alien vegetation monitoring and control throughout construction and operational phases. Rehabilitation and monitoring should take place throughout construction and operational phases.
11l		Watercourse: E6 &R1 Ecological connectivity and edge disturbance impacts		Decrease in ecological connectivity between catchment up- and downstream of PCD 3 during vegetation clearance, earthworks and construction works.	Construction	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Polluted storm water management:** • Refer to mitigation measure as per 11j above. **Demarcation of 'No-go' areas and construction corridors:** • Refer to mitigation measure as per 11a above. **Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction. All method statements must be compiled and approved prior to the commencement of construction. Rehabilitation and monitoring should take place throughout construction and operational phases.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
11m		Watercourse: E6 &R1 Water pollution impacts		Pollution of downstream watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g. oil and diesel leaks and spills.	Construction	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Polluted storm water management:** • Refer to mitigation measure as per 11j above. **Hazardous substances / materials management:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Prevention and emergency response measures must be put in place prior to construction. Spill removal, treatment and rehabilitation must be undertaken immediately should an incident occur. Ongoing monitoring during construction and operational phases. Rehabilitation and monitoring should take place throughout construction and operational phases.
11n		Watercourse: E6 &R1 Direct ecosystem modification or destruction / loss impacts	Construction of access road to PCD 3	Direct disturbance and removal of riparian soil and vegetation during the upgrade of the access road to PCD 3 and use of heavy machinery on site.	Construction	Minimize / reduce Remedy / rehabilitate	**Clean storm water management:** • In terms of general storm water management, all surface runoff / storm water generated by clean water surfaces must be discharged back into the freshwater systems in a manner that does not increase the rates of erosion and sedimentation within the receiving systems. In this regard the following measures are recommended: o Storm water with low pollution risks should be discharged at regular intervals. Storm water outlets should not only be located at low points within the watercourses. o As far as practically possible, storm water conveyance should be via open drains rather than pipes and conveyance from the road drains to the outlets should via open drains with rough surfaces that are armoured with erosion protection. o All outlets must be designed to dissipate the energy of outgoing flows to levels that present a low erosion risk. In this regard, suitably designed energy dissipation and erosion protection structures will need to be installed at appropriate locations. o All erosion protection measures must be established to reflect the natural slope of the surface and located at the natural ground-level. • If the diversion of clean water around the working areas is required, the following is recommended: o All diverted flows must be conveyed into downstream watercourses in a controlled manner that does not	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction. All method statements must be compiled and approved prior to the commencement of construction. Rehabilitation and monitoring should take place throughout construction and operational phases.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							increase the rates of erosion or increase flooding / inundation such that there are measurable changes in hydrology. ○ Where possible, flow should be detained in detention sumps / ponds / dams prior to be discharged to ensure that flood peaks through the systems are not increased. The detention structures should be designed to attenuate flows so that the flood peaks remain the same as present. ○ Energy dissipation and erosion control measures must be built into all diversion trenches along their length. Ideally energy dissipation measures must be established at regular intervals along the trench with the number of structures increasing with increasing slope. ○ All outlet erosion control structures must be designed based on the predicted and modelled discharges and velocities of the incoming flow from the diversion trenches and evidence of such design must be provided. **Access and service roads:** • Where new wetland and stream / river crossings are required, every effort should be made to minimise the impacts by considering the following: ○ For all crossing types and designs, flow through road crossings should not be unnecessarily concentrated (or impeded) and flow velocity should not be increased. ○ Erosion protection and energy dissipation measures should be established at all road crossing outlets. ○ All culvert inlets and outlets and associated outlet erosion protection structures must not be raised above the wetland/riparian surface and/or stream/river bed and must be established to reflect the natural downstream slope of the wetland / riparian surface and/or stream / river bed. ○ Crossing points should be aligned along areas or corridors of existing disturbance wherever possible. ○ The length of wetlands and rivers / streams crossed at each crossing must be minimised by adjusting alignments to coincide with narrower sections and ensuring that crossings are straight and do not involve using long curves and are aligned at right angles to flow. ○ If any road fill is utilised at wetland crossings, a porous layer should be established within the road fill at the appropriate elevation to ensure that wetland interflow and overland flow is able to pass through the road fill. • For existing watercourse crossings, every effort should be made to minimise the impacts by considering the following: ○ Undersized or under-designed pipe culverts must be replaced.		

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							○ Erosion protection and energy dissipation measures should be established at all road crossing outlets. ○ Every effort must be made to minimise the upgraded footprint of the existing roads at watercourse crossings. • The following road storm water management measures are recommended: ○ Storm water generated by the upgraded and new roads should be discharged at regular intervals and many small outlets should be favoured over few large. ○ As far as practically possible, storm water conveyance should be via open drains rather than pipes and conveyance from the road drains to the outlets should via open drains with vegetated or rough surfaces that are armoured with erosion protection. ○ All outlets must be designed to dissipate the energy of outgoing flows to levels that present a low erosion risk. In this regard, suitably designed energy for gravel roads will need to be installed at appropriate locations. ○ All erosion protection measures must be established to reflect the natural slope of the surface and located at the natural ground-level. **Demarcation of 'No-go' areas and construction corridors:** • Refer to mitigation measure as per 11a above. **Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.		
11o		Watercourse: E6 Alteration of hydrological and geomorphological processes	Construction of access road to PCD 3	Erosion and/or sedimentation of watercourse units due to catchment land clearing and land cover disturbance during the upgrade of the access road to PCD 3 and use of heavy machinery on site.	Construction	Minimize / reduce Remedy / rehabilitate	**Clean storm water management:** • Refer to mitigation measure as per 11n above. **Access and service roads:** • Refer to mitigation measure as per 11n above.: **Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **Runoff, erosion and sediment control:** • Refer to mitigation measure as per 11b above. **Invasive alien plant control:** • Refer to mitigation measure as per 11k above. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction. All method statements must be compiled and approved prior to the commencement of construction. Run-off, erosion and sediment control measure need to be put in place prior to construction and monitored throughout the construction and
11p		Watercourse: E6 & R1 Alteration of hydrological and geomorphological processes		Alteration of flow, erosion and/or sedimentation regimes downstream of watercourse units due to catchment land clearing, land cover disturbance and permanent loss of upstream channels during vegetation clearance, earthworks and construction works.	Construction	Minimize / reduce Remedy / rehabilitate			

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							Construction phase monitoring measures: • Refer to mitigation measure as per 11a above.		operational phases. Alien vegetation monitoring and control throughout construction and operational phases. Rehabilitation and monitoring should take place throughout construction and operational phases.
11q		Watercourse: E6 Ecological connectivity and edge disturbance impacts		Temporary decrease in ecological connectivity between sections of watercourse unit on either side of the access road, as well as an increase in edge effects on the roadward edges of the watercourse sections on either side of the road, during construction.	Construction	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Clean storm water management:** • Refer to mitigation measure as per 11n above. **Access and service roads:** • Refer to mitigation measure as per 11n above.: **Demarcation of 'No-go' areas and construction corridors:** • Refer to mitigation measure as per 11a above. **Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction. All method statements must be compiled and approved prior to the commencement of construction. Rehabilitation and monitoring should take place throughout construction and operational phases.
11r		Watercourse: E6 & R1 Water pollution impacts		Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g. oil and diesel leaks and spills.	Construction	Avoid / prevent Remedy / rehabilitate	**Clean storm water management:** • Refer to mitigation measure as per 11n above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	All method statements must be compiled and approved prior to the commencement of construction. Rehabilitation and monitoring should take place throughout construction and operational phases.
11s		Watercourse: D3 Direct ecosystem modification or destruction / loss impacts	Construction of OMWSD Compartment 4	Direct and permanent destruction / loss of watercourse unit due to vegetation clearance, earthworks and construction works, including excavation and infilling.	Construction	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Demarcation of 'No-go' areas and construction corridors:** • Refer to mitigation measure as per 11a above. **Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	No-go and/or sensitive areas need to be demarcated prior to the commencement of construction. All method statements must be compiled and approved prior to the commencement of construction.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
									Rehabilitation and monitoring should take place throughout construction and operational phases.
11t		Watercourse: D3 Alteration of hydrological and geomorphological processes		Erosion and/or sedimentation of watercourse unit due to catchment land clearing and land cover disturbance during the vegetation clearance, earthworks and construction works.	Construction	Minimize / reduce Remedy / rehabilitate	**Method statements for working in watercourses:** • Refer to mitigation measure as per 11a above. **Runoff, erosion and sediment control:** • Refer to mitigation measure as per 11b above. **Invasive alien plant control:** • Refer to mitigation measure as per 11k above. **General rehabilitation guidelines:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	All method statements must be compiled and approved prior to the commencement of construction. Run-off, erosion and sediment control measure need to be put in place prior to construction and monitored throughout the construction and operational phases. Alien vegetation monitoring and control throughout construction and operational phases. Rehabilitation and monitoring should take place throughout construction and operational phases.
11u		Watercourse: D3 Water pollution impacts		Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during construction e.g. oil and diesel leaks and spills.	Construction	Avoid / prevent Remedy / rehabilitate	**Hazardous substances / materials management:** • Refer to mitigation measure as per 11a above. **Construction phase monitoring measures:** • Refer to mitigation measure as per 11a above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Prevention and emergency response measures must be put in place prior to construction. Spill removal, treatment and rehabilitation must be undertaken immediately should an incident occur. Ongoing monitoring during construction and operational phases. Rehabilitation and monitoring should take place throughout construction and operational phases.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
11v		Watercourse: CBV1 & A1 Alteration of hydrological and geomorphological processes	Operational usage and maintenance of seepage sump and associated pipeline	Erosion and/or sedimentation of watercourse units due to vehicular traffic, operational mismanagement and poor maintenance of seepage sump and pipeline.	Operational	Minimize / reduce Remedy / rehabilitate	**Maintenance and management:** • It is the mine's responsibility to ensure the proper functioning of all surface mining infrastructure that is likely to require regular on-going maintenance. • It is important that the location and extent of the wetlands and rivers in the vicinity of project activities be incorporated into all formal maintenance and repair plans for the project. • In terms of management, alien invasive plant control must be practiced on an on-going basis in line with the requirements of Section 2(2) and Section 3 (2) the National Environmental Management: Biodiversity Act (NEM:BA), which obligates the landowner/developer to control Invasive alien plants on their property. **Monitoring** • It will be important that long-term monitoring of the potential freshwater ecosystem impacts be undertaken to proactively to identity any environmental issues and impacts that may arise as a result of the operational phase of the project. The following key aspects should be monitored: o PCD and river water quality (only when the latter is in flow). o PCD discharges. o Evidence of erosion and/or sedimentation in affected watercourses. o Assess the changes in sediment transport, channel form and erosion. o Aquatic diatom (algae) sampling and analysis as per Taylor et al. (2005) is recommended in the wet season as part of biomonitoring of river health, in the event that there is continuous flow within the Kolope River. o Evidence of water quality issues in affected watercourses. o Presence of alien invasive plants.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Rehabilitation and monitoring should take place throughout construction and operational phases.
11w		Watercourse: CBV1 & A1 Ecological connectivity and edge disturbance impacts	Operational usage and maintenance of seepage sump and associated pipeline	Long-term decrease in ecological connectivity between sections of watercourse unit on either side of the seepage sump, as well as an increase in edge disturbance on the roadward edges of the watercourse sections on either side of the sump.	Operational	Minimize / reduce Remedy / rehabilitate	**Maintenance and management:** • Refer to mitigation measure as per 11v above. **Monitoring** • Refer to mitigation measure as per 11v above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Rehabilitation and monitoring should take place throughout construction and operational phases.
11x		Watercourse: CBV1 upstream Water pollution impacts	Operational usage and maintenance of seepage sump and associated pipeline	Accumulation of MRD-contaminated water within the watercourse unit upstream of the seepage collectionsump. Due to the collection of contaminated water, this impact is rated as high. However, if successfully implemented, this is offset downstream by the filtration of the contaminated water. If poorly implemented, this may result in the continued contamination of the downstream area. See below scenarios.	Operational	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Maintenance and management:** • Refer to mitigation measure as per 11v above. **Monitoring** • Refer to mitigation measure as per 11v above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Rehabilitation and monitoring should take place throughout construction and operational phases.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
11y		Watercourse: CBV2 downstream Water pollution impacts		Effective implementation and maintenance of seepage sump, resulting in the filtration of MRD-contaminated water through the seepage collection sump and potential improvement of water downstream of the sump.	Operational	N/A		Low positive impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	
11z				Poor maintenance and/or overflows of seepage sump, resulting in MRD contaminated water passing through to the downstream area and further impacting upon water quality.	Operational	Avoid / prevent Minimize / reduce Remedy / rehabilitate		Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	
11aa		Watercourse: A1 Water pollution impacts		Poor maintenance and monitoring of pipeline to FRD 2 RWD, leading to potential leakages of MRD-contaminated water.	Operational	Avoid / prevent Minimize / reduce Remedy / rehabilitate		Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	
11bb		Watercourse: A2 & E1 Alteration of hydrological and geomorphological processes	Operational usage and maintenance of FRD 1 RWD and associated canals	Erosion and/or sedimentation of watercourse units due to vehicular traffic, operational mismanagement and poor maintenance of FRD 1 RWD and the canals.	Operational	Minimize / reduce Remedy / rehabilitate	**Maintenance and management:** • Refer to mitigation measure as per 11v above. **Monitoring** • Refer to mitigation measure as per 11v above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Rehabilitation and monitoring should take place throughout construction and operational phases.
11cc		Watercourse: A2 & E1 Water pollution impacts		Poor maintenance and monitoring of FRD 1 RWD and associated, leading to potential leakages of contaminated water into watercourse units.	Operational	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Maintenance and management:** • Refer to mitigation measure as per 11v above. **Monitoring** • Refer to mitigation measure as per 11v above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Rehabilitation and monitoring should take place throughout construction and operational phases.
11dd		Watercourse: E5 & R1 Alteration of hydrological and geomorphological processes	Operational usage and maintenance of PCD 3 (including alternatives) and associated canals	Indirect destruction / loss of riparian and terrestrial habitats and ecosystems downstream of PCD 3 should a major fault occur.	Operational	Minimize / reduce Remedy / rehabilitate	**Erosion control measures for discharges:** • All diverted flows must be conveyed into downstream watercourses in a controlled manner that does not increase the rates of erosion or increase flooding / inundation such that there are measurable changes in hydrology. In this regard the following is recommended: ○ Energy dissipation and erosion control measures must be built into the discharge canal. Ideally energy dissipation measures must be established at regular intervals along the canal with the number of structures increasing with increasing slope. • The canal discharge outlet must be designed to dissipate the energy of outgoing flows to levels that present a low erosion risk. In this regard, suitably designed energy dissipation and erosion protection structures will need to be installed at the outlet. • Erosion control structures must be designed based on the predicted and modelled discharges and velocities of the incoming flow from the diversion trenches and evidence of such design must be provided.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Run-off, erosion and sediment control measure need to be put in place prior to construction and monitored throughout the construction and operational phases. Periodic monitoring of water quality during operational phase. Rehabilitation and monitoring should take place throughout construction and operational phases.
11ee		Watercourse: E5 & R1 Alteration of hydrological and geomorphological processes		Long-term alteration of flow, erosion and/or sedimentation regimes downstream of PCD 3 watercourse units due to impoundment of water at PCD 3, as well as the controlled discharge of water via canal into the Kolope River.	Operational	Minimize / reduce Remedy / rehabilitate			
11ff		Watercourse: E5 & R1 Water pollution impacts		Controlled discharge of contaminated water from PCD 3 into the Kolope River. Current storm water runoff modelling and water balance assessments indicate that on average a volume of 46 000 m^3 will be discharged annually and during a 1:50-year flood event, a total volume of 792 000 m^3 will be required to be discharged.	Operational	Minimize / reduce Remedy / rehabilitate		Moderate residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	
11gg				Uncontrolled / accidental discharge of contaminated water from PCD 3 into the Kolope River as a result of breaching and/or seepage.	Operational	Avoid / prevent Minimize / reduce Remedy / rehabilitate			

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
11hh				Effective implementation and maintenance of PCD 3 and associated canal, as well as effective management of discharge into the Kolope River. Although downstream watercourse units will still be affected, the significance of the impacts will be reduced to moderate.	Operational	N/A	• All erosion protection measures must be established to reflect the natural slope of the surface and located at the natural ground-/bed-level. • The outlet canal and associated energy dissipation / erosion control measures should ideally tie into the Kolope River. **Operational discharge rules:** • The discharge of surplus water from PCD 3 and the OMWSD into the Kolope should be carried out in a planned and controlled manner. • Due to the highly ephemeral nature of the Kolope River, controlled discharges should be undertaken during the wet season (December-January), preferably coinciding with storm flow events so as to avoid discharges during low flow periods. • All mine discharges to the Kolope River should be under / within the limits of the approved water use licence. **Maintenance and management:** • Refer to mitigation measure as per 11v above. **Monitoring** • Refer to mitigation measure as per 11v above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	
11ii		Watercourse: E6 Alteration of hydrological and geomorphological processes	Operational usage and maintenance of access road to PCD 3	Erosion and/or sedimentation of watercourse units due to poor maintenance of storm water infrastructure.	Operational	Minimize / reduce Remedy / rehabilitate	**Maintenance and management:** • Refer to mitigation measure as per 11v above. **Monitoring** • Refer to mitigation measure as per 11v above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Rehabilitation and monitoring should take place throughout construction and operational phases.
11jj		Watercourse: OMWSD Compartment 4 (formerly D3) Alteration of hydrological and geomorphological processes	Operational usage and maintenance of OMWSD Compartment 4	Long-term alteration of flow, erosion and/or sedimentation regimes from drainage into D3.	Operational	Minimize / reduce Remedy / rehabilitate	**Erosion control measures for discharges:** • Refer to mitigation measure as per 11dd above. **Operational discharge rules:** • Refer to mitigation measure as per 11dd above. **Maintenance and management:** • Refer to mitigation measure as per 11v above. **Monitoring** • Refer to mitigation measure as per 11v above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Run-off, erosion and sediment control measure need to be put in place prior to construction and monitored throughout the construction and operational phases. Periodic monitoring of water quality during operational phase. Rehabilitation and monitoring should take place throughout construction and operational phases.
11kk		Watercourse: D3, E6 & R1 Water pollution impacts		Poor maintenance and/or overflows of OMWSD and associated canal, as well as mismanagement of discharge into the diversion channel, resulting in contaminated water passing through to the downstream area and further impacting upon water quality.	Operational	Avoid / prevent Minimize / reduce Remedy / rehabilitate		Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	
11ll		Watercourse: CBV1 & A1 Direct ecosystem modification or destruction / loss impacts	Decommissioning of seepage sump and associated pipeline	Direct disturbance and poor implementation of rehabilitation during the decommissioning and removal of the seepage sump and pipeline, and use of access road by heavy machinery.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • If applicable, a detailed watercourse and wetland rehabilitation plan must be prepared to inform the dismantling and	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
							decommissioning of structures within the watercourses and wetlands. **Ecological monitoring** • A photographic record of the state of the watercourse prior to the commencement of decommissioning must be kept for reference and rehabilitation monitoring purposes. o During decommissioning: ▪ Erosion and/or sedimentation in the watercourses downslope of the PCDs, FRD FWDs and OMWSDs. ▪ Erosion and/or sedimentation in the watercourses upstream and downstream of road crossings. ▪ Presence of alien invasive plants. ▪ Rehabilitation and re-vegetation methods and success. ▪ Once the rehabilitation has been completed, the ECO should conduct a close out site audit after a reasonable period to allow for vegetation growth / establishment. o After decommissioning: ▪ River water quality. ▪ Evidence of seepage. ▪ Evidence of erosion and/or sedimentation in affected watercourses. ▪ Evidence of water quality issues in affected watercourses. ▪ Presence of alien invasive plants.		decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11mm		Watercourse: CBV1 & A1 Alteration of hydrological and geomorphological processes		Erosion and/or sedimentation of watercourse units due to decommissioning, excavation and removal of seepage sump and pipeline, use of access road by heavy machinery, and poor implementation of rehabilitation.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11nn		Watercourse: CBV1 Alteration of hydrological and geomorphological processes		Alteration of watercourse unit downstream of road due to decommissioning, excavation and removal of seepage sump and pipeline, use of access road by heavy machinery, and poor implementation of rehabilitation. Increase in downstream flow.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
11oo		Watercourse: CBV1 & A1 Ecological connectivity and edge disturbance impacts		Temporary decrease in ecological connectivity between sections of watercourse unit on either side of the pipeline and access road, as well as an increase in edge effects on the roadward edges of the watercourse sections on either side of the road, during decommissioning.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11pp		Watercourse: CBV1 & A1 Water pollution impacts		Poor management, incorrect treatment/disposal of residual MRD contaminated water upon decommissioning, resulting in contaminated water remaining on site or flowing downstream. Poor rehabilitation of decommissioned areas.	Decommissioning	Avoid / prevent Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11qq				Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during decommissioning e.g. oil and diesel leaks and spills.	Decommissioning	Avoid / prevent Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11rr		Watercourse: A2 & E1 Direct ecosystem modification or destruction / loss impacts	Decommissioning of FRD 1 RWD and associated canals	Direct disturbance and poor implementation of rehabilitation during the decommissioning and removal of the FRD 1 RWD and associated canals.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11ss		Watercourse: A2 & E1 Alteration of hydrological and geomorphological processes		Erosion and/or sedimentation of watercourse units due to decommissioning, excavation and removal of FRD 1 RWD and associated canals, and poor implementation of rehabilitation.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
11tt		Watercourse: A2 & E1 Water pollution impacts		Poor management, incorrect treatment/disposal of residual contaminated water upon decommissioning, resulting in contaminated water remaining on site or flowing downstream. Poor rehabilitation of decommissioned areas.	Decommissioning	Avoid / prevent Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11uu				Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during decommissioning e.g. oil and diesel leaks and spills.	Decommissioning	Avoid / prevent Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11vv		Watercourse: E5 & R1 Alteration of hydrological and geomorphological processes	Decommissioning of PCD 3 (including alternatives) and associated canals	Erosion and/or sedimentation of watercourse units due to decommissioning and removal of PCD 3 and canals, and poor implementation of rehabilitation.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11ww				Alteration of watercourse unit downstream of PCD 3 due to decommissioning and removal of PCD 3 and canals, and poor implementation of rehabilitation. Increase in downstream flow.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11xx		Watercourse: E5 & R1 Water pollution impacts		Poor management, incorrect treatment/disposal of residual contaminated water upon decommissioning, resulting in contaminated water remaining on site or flowing downstream. Poor rehabilitation of decommissioned areas.	Decommissioning	Avoid / prevent Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.

No.	Aspect affected	Activity		Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
11yy				Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during decommissioning e.g. oil and diesel leaks and spills.	Decommissioning	Avoid / prevent Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11zz		Watercourse: E6 Alteration of hydrological and geomorphological processes		Erosion and/or sedimentation of watercourse units due to decommissioning, excavation and removal of access road to PCD 3, and poor implementation of rehabilitation.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11aaa		Watercourse: E6 Ecological connectivity and edge disturbance impacts	Decommissioning of access road to PCD 3	Temporary decrease in ecological connectivity between sections of watercourse unit on either side of the access road, as well as an increase in edge effects on the roadward edges of the watercourse sections on either side of the road, during decommissioning.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11bbb		Watercourse: E6 & R1 Water pollution impacts		Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during decommissioning e.g. oil and diesel leaks and spills.	Decommissioning	Avoid / prevent Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11ccc		Watercourse: OMWSD Compartment 4 (formerly D3) Direct ecosystem modification or destruction / loss impacts	Decommissioning of OMWSD Compartment 4	Direct disturbance and poor implementation of rehabilitation during the decommissioning and removal of OMWSD Compartment 4, and use of access road by heavy machinery.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
11ddd		Watercourse: OMWSD Compartment 4 (formerly D3) Alteration of hydrological and geomorphological processes	Erosion and/or sedimentation of watercourse units due to decommissioning and removal of OMWSD Compartment 4, and poor implementation of rehabilitation.	Decommissioning	Minimize / reduce Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11eee		Watercourse: OMWSD Compartment 4 (formerly D3) Water pollution impacts	Poor management, incorrect treatment/disposal of residual contaminated water upon decommissioning, resulting in contaminated water remaining on site or flowing downstream. Poor rehabilitation of decommissioned areas.	Decommissioning	Avoid / prevent Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
11fff			Pollution of watercourse units due to the mishandling of hazardous substances and/or improper maintenance of machinery during decommissioning e.g. oil and diesel leaks and spills.	Decommissioning	Avoid / prevent Remedy / rehabilitate	**Wetland rehabilitation** • Refer to mitigation measure as per 11ll above. **Ecological monitoring** • Refer to mitigation measure as per 11ll above.	Low residual negative risk/impact following the implementation of mitigation measures. NEMA EIA Regulations NWA Section 21	Watercourse and Wetland rehabilitation plan to be compiled and approved prior to the decommissioning phase. Ecological monitoring prior, during and after decommissioning.
12	Visual	Construction and operation of PCD 3 (PCD 3B and PCD 3C)	The construction of PCD 3B or PCD 3C (preferred alternative) requires construction outside of the current fenced area of Venetia Mine with an access road in such area for access to the adjacent DIAMCOR mining area. The construction activities as well as the completed PCD and security fence will thus be visible to the employees and visitors of the adjacent DIAMCOR mine. It is noted that the employees and visitors of the adjacent mine are already desensitised to such activities as mining at Venetia Mine commenced in XXX with mining at DIAMCOR commencing in 2014. Due to its location, PCD 3 will not be visible to the public from any other areas besides from on Venetia Mine or the DIAMCOR access road.	Construction, operational and decommissioning	Control	• Construction footprint to be limited to only what is required as per the approved footprint of the facilities. • Ensure effective rehabilitation of the sidewalls of the facilities.	Outcome; Minimise the clearance of vegetation to the proposed footprint. Standard: Rehabilitation standards In compliance with the approved EMPr (and its associated documentation).	Life of Mine
13a	Socio-economic	Implementation of the SWMP.	Where possible, local contractors will be used for the construction activities. This will lead to a positive impact on the socio-economic aspect of the area that can create jobs opportunities and promote investments.	Construction	Control	• Ensure a transparent employment system is in place. • The beneficiaries of local economic opportunities must as far as possible be from the local community. • Develop a recruitment policy that allows equal opportunity to all people (woman, disabled) and give preference to local labour.	Outcome: To maximise economic opportunities for local employment and development. Standard:	1-5 Years

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome/ Standard to be achieved	Time period for implementation
						• A complaints register should be kept and the following should be recorded, investigated and feedback provided to complainants: o Name and surname of complainant, o Contact details of complainant, o Date of complaint, o Person or department responsible for complaint, o Actions for implementation (if any), o Date of implementation, o Date of feedback provided to complainant, and o Indication if complaint is closed or open.	Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002). Social and Labour Plan.	
13b			The overarching purpose of the SWMP is to ensure legal compliance as per the requirements of GN.R 704, and Section 19 (Duty of care) of the NWA and to ensure the safety of people working in the newly developed underground mine (the VUP). The construction and upgrading in of the containment infrastructure will allow Venetia Mine to continue to operate in compliance with legislation and further allow for the safe continuation of mining in the newly developed VUP, thus resulting in Venetia Mine's continued contribution to the GDP of the province and continued implementation of the social and economic projects in line with the approved Social and Labour Plan	Construction and operation	Control	• Implementation of the social and economic projects in line with the Venetia Mine Social and Labour Plan.		Life of Mine

1.5 Closure objectives and financial provision

1.5.1 Closure objectives identified

The following closure objectives, identified in the *Venetia Mine Preliminary Closure Plan*, dated 2011 and compiled by Golder Associates, are applicable to Venetia Mine:

Physical stability

- Ensure physical stability to facilitate the implementation of the planned end land use, by:
    - Closing, dismantling, decontaminating, removing and disposing of surface infrastructure with no post closure beneficial use;
    - Stabilising the upper surfaces and outer slopes of the WRD, CRD and FRDs in order to create sustainable vegetation growth;
    - Ensuring long term stable landforms, by limiting surface erosion; and u Limiting dust generation
    - Ripping, shaping, and vegetating of haul roads with no beneficial post-closure use and the integrating of these into the surrounding surface topography; and
    - Creating an enviro-berm around the open pit outside the perimeter of the SFI break back zone. This berm will be integrated with the toe paddocks (berm plus associated cross walls) along the inside slopes of the waste rock dumps, creating a barrier and collection for sediment wash-down along the inside waste rock slopes what will be unmodified. The berm with associated collection will also form a protection against pit lip erosion.

Environmental quality

- To ensure that local environmental quality is not adversely affected by possible physical effects and chemical contamination arising from the mining area as well as to sustain catchment yield as far as possible after closure, by:
    - Limiting dust generation on the rehabilitated mining area that could cause nuisance and/or health effects to surrounding landowners/communities as well as compromise the desired long term post mining land use;
    - Cleaning-up of sources of possible surface water contamination on the rehabilitated mining area to protect the water quality of the downstream receiving surface water environment;
    - Providing the required land form protection measures in such a manner that these, when implemented, will limit the adverse effect on catchment yield as far as possible;
    - Leaving and/or creating the required sediment interception structures to protect the down slope instream habitats against sedimentation and hence habitat impairment;
    - Providing the required measures to limit at source the generation of contaminants which could adversely affect local groundwater quality, especially relating to the FRDs;
    - Confirming that the mine residue deposits do not pose an unacceptable long term contamination potential to shallow groundwater quality by conducting the required geochemical analysis;

- Demonstrating, through a review of monitoring data and/or predictive modelling, if required, that the effect of contaminant plumes that could be arising and/or are already evident from the FRDs could be remediated by natural attenuation;
- Ensure that the rehabilitated mining area is free-draining where possible and run-off is routed to local/natural drainage lines as far as possible; and
- Removing off-site, on an ongoing basis, hazardous material and disposing it at the closest hazardous waste disposal facility. As removal is an ongoing process, no on-site hazardous waste build-up, requiring attention at mine closure, should occur.

Biodiversity

- To create a biological diverse rehabilitated mine site landscape that although it will not fully matching the premining situation, it will not detract from it and possibly add some enhancing features, by:
  - Establishing by means of a dedicated biodiversity assessment the key features comprising local biodiversity and replicating these on the rehabilitated mine site as far as possible but also adding additional features, such as rocky faces along the waste rock dumps that will provide habitat for small mammals;
  - Re-establishing, where appropriate, native vegetation on the rehabilitated mining area;
  - Stabilising disturbed areas to prevent erosion in the short- to medium-term until a suitable vegetation cover has established; and
  - Establishing viable self-sustaining vegetation communities that will encourage the re-introduction of local fauna, as far as possible.

Land capability

- To re-instate suitable land capabilities over the various portions of the mining area to support the establishment of the desired end land use of conservation, by:
  - Ensuring that the rehabilitated portions of the mining area are safe and stable in the long-term;
  - Cleaning-up and reclaiming of contaminated soil areas;
  - Constructing an enviro-berm / rock barrier around the open pit to limit/prevent access and hence in that way not compromising the planned end land use; and
  - Implementing those key aspects as far as practically possible to establish a bio-diverse rehabilitated mine as indicated by the dedicated biodiversity work.

Health and safety

- To limit the possible health and safety threats to humans and animals, by:
  - Shaping the outer slopes of the waste rock dumps to slopes not steeper than those found in the surrounding undisturbed landscape, provided that these created slopes are stable against collapse;
  - Constructing an enviro-berm / rock barrier around the open pit (which will not be in-filled) and associated dense vegetation between the pit rim and the inner toe of the berm to limit access further;

- Covering the upper surface of the combine FRD with a rocky pioneer layer as far as possible to limit ingress of rainfall into the fines as well as to limit the surface extent of the surface water pool that could be remaining on the upper surface and/or created after rainfall;
- Determining the water quality of the remaining upper surface pool to confirm that although this water will be saline, it will not contain hostile contaminates that could pose a threat to animals drinking this water;
- Anchoring the waste rock skin to improve the outer slope stability of the FRD in a waste rock drain to limit contaminated seepage along the FRD toe, adding to the above concern of animals' drinking water containing hostile contaminants;
- Removing, for safe disposal, all potential process-related contaminants to ensure that no hazardous waste is present on the rehabilitated mine site after closure; and
- Demonstrating through a review of monitoring data that no possible surface and/or groundwater contaminant sources remain on the rehabilitated mining area that could compromise the planned land use and /or pose health and safety threats.

Aesthetic quality

- To leave behind a rehabilitated mining site that, in general, is not only neat and tidy, giving an acceptable overall aesthetic appearance that does compromise the planned end land use, by:
  - Tiding-up the rehabilitated mining area from demolition waste and rubble;
  - Conducting a dedicated visual assessment to direct the landscaping and rehabilitation of the remaining mining residues to make these amenable for integration into the surrounding landscape;
  - Landscaping the remaining mine residue deposits as directed by the visual assessment to blend in with the surrounding landscape, as far as possible;
  - Shaping and levelling rehabilitated areas to create landforms that emulate the surroundings and are free draining; and
  - Ensuring that the rehabilitated mining area is free draining and disturbed areas are suitably vegetated, where feasible.

Social

- To ensure that the any infrastructure transfers, measures and/or contributions made by the mine towards the long-term socio-economic benefit of the local communities are sustainable, by:
  - Identifying infrastructure that will be of value/benefit to local communities and transferring these to third parties as agreed between the mine and these parties and/or the stakeholders;
  - Timeously communicating and negotiating with local communities and stakeholders on the closure of the mine;
  - Training and awareness creation to empower the ex-employees and community to effectively manage the financial and/or commercial resources transferred from the mine; and
  - Clearly defining the roles of the parties responsible for future management of the transferred facilities.

1.5.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties

This EIAR / EMPr is made available to the public for review for a period thirty (30) days. The public is also encouraged to comment on sections of this report (with specific reference to the closure objectives as presented in Section 1.5.1 above), any aspect of the proposed project and raise any concerns and / or issues they may have. All comments, concerns and / or issues are addressed and / or responded to in this EIAR / EMPr. Refer also to Annexure G (Public Participation Report).

1.5.3 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline

Refer to Section 18 (Part A) of this EIAR / EMPr and Annexure J.

1.5.4 Confirm that the financial provision will be provided as determined

The financial provision as determined above will be provided.

1.6 Mechanisms for monitoring compliance

The following environmental monitoring is proposed by the various specialist studies.

1.6.1 Floral monitoring

Through implementation and execution of a botanical monitoring programme, the anticipated and actual impacts of the proposed activities within the floristic environment can be established and monitored. Collated information data and results will contribute towards a responsive management approach to minimize the impact footprints and associated spheres of influence.

- Frequency: annual.
- Responsibilities: client, Environmental Manager, appointed specialist(s).

The following phases are relevant:

- Pre- construction environment – the baseline ecological report will suffice in highlighting existing conditions and terrestrial botanical attributes;
- Construction phase – implementation of the botanical monitoring protocol at a frequency of at least annually, taking cognisance of seasonal variations; and
- Post-construction environment – execution of the botanical monitoring protocol annually until such time that closure has been granted by the authorities.

While the details of a monitoring plan is subject to negotiations prior to appointment, the following aspects (inter alia) should form part of the monitoring protocol, as a minimum:

- Fixed point monitoring should be applied as the preferred method of monitoring. The selection of monitoring points should consider the spatial layout of mining activities and infrastructure in relation to sensitive environments, also taking note of control points to provide a comparative assessment;

- All data gathered should be measurable (qualitative and quantitative) – attention should be provided to species diversity and abundance;
- Monitoring report should be repeatable and temporally and spatially comparable, with specific reference to seasonal variation;
- Data, when compared to previous sets, should show spatial and temporal trends; and
- General habitat unit overviews should also be undertaken to augment quantitative data.

The recommended terrestrial biodiversity monitoring protocol will comprise the following aspects, or a variation thereof:

- Alien and Invasive plant species monitoring; and
- Vegetation/ ecological monitoring.

These aspects should ideally be executed during an optimal period of the year, considering seasonal variation in vegetation attributes. Ultimately, the objectives are to demonstrate the stability of the surrounding environment and sensitive receptors, monitoring results should therefore ideally be repeated during the same time of year. The responsibility of the implementation and auditing of monitoring performance would remain with the client, notably the Environmental Manager.

Requirements for the appointed specialists should conform to the guidelines of the South African Council for Natural Scientific Professions Act (2019), and specifically adhere to regulations pertaining to the minimum requirements as per the National Environmental Management Act, 1998 (Act No. 107 of 1998).

1.6.1.1 Alien and invasive plant management plan

- Conduct a brief assessment of the legal framework pertaining to the management, responsibilities and requirements of the landowner pertaining to the occurrence of alien and invasive plants on the property and immediate surrounds;
- Undertake a site assessment/ ground-truth to identify and record alien invasive vegetation, identify threats to the ecology of the area, etc.;
- Compile GIS spatial maps to support the Control Compilation of an AIS Plan as per the requirements of the AIS Regulations, 2015 and Invasive Species List, 2016;
- Spatially map the parcels of land within the immediate surrounds of the mining footprint, with reference to land use activities;
- Compile a working inventory of Invasive Species for each management unit compartment;
- Describe the prioritization of the land parcels in the management unit compartments in accordance with the categories as per the Alien and Invasive Listing, 2016; and
- Provide targets and timelines for the Control Plan;
- Provide responsibilities and reporting requirements of the Control Plan;
- Provide control and/or eradication methods for identified invasive species in the Control Plan;
- Indicate how the Control Plan will be monitored and evaluated as part of the vegetation monitoring plan;

- Provide a suitable report for implementation as part of the EMP for the development; and
- Execute the AIP monitoring protocol on an annual basis.

Monitoring of the presence, abundance, and diversity of alien and invasive plants on the site, while forming an integral part of the terrestrial monitoring programme, is partly the responsibility of the following persons:

- Environmental Manager (Project);
- Subcontractor responsible for alien and invasive plant control; and
- Vegetation/ Ecology Monitoring Programme subcontractor.

1.6.1.2 Vegetation / Ecological monitoring protocol

As part of the proposed (annual) Monitoring Programme, the following aspects will be executed:

- Selection of a suitable number of sampling points that is representative of the mining activities within a natural, receiving environment, with particular reference to sensitive habitat types and species of conservation concern;
- Annual monitoring of vegetatal aspects during the active mining phase, including aspects of diversity, compositional and structural attributes as well as accumulation of impacts within nearby habitat;
- Prevalence and continued persistence of plants of conservation concern;
- Prevalence and continued persistence of plants with ethno-botanical properties;
- Prevalence and management of alien and invasive plant species; and
- Land change/ habitat loss and transformation.

1.6.2 Faunal monitoring

- Conduct yearly assessments to determine the ecological condition of rehabilitated as well as natural habitat units on development areas and adjacent areas;
- Conduct water quality monitoring at standing water sources adjacent to the developed sites and the Kolope River (when inundated) at frequencies specified in the IWUL to determine the salt levels and toxicity of the water for fauna (e.g. ingestion of water by fauna);
- Monitoring of water quality and erosion control measures based on risk;
- Monthly monitoring of fence structures; and
- Produce year report (for at least four consecutive years) on the ecological status quo of the development sites and immediate surroundings.

1.6.3 Surface water monitoring

- Monitoring as per the current monitoring programme, and in line with the approved IWUL, is to continue;
- Conduct water quality monitoring on standing / flowing water within the Kolope River when in flow to determine the salt levels and toxicity of the water; and
- Conduct water quality monitoring during a discharge event (inclusive of discharge volume monitoring) to determine the quality in comparison to the applicable water quality standards /

approved water quality limits as well as to determine the volume of water discharged in comparison to the approved discharge volumes.

1.6.4 Groundwater

Monitoring as per the current monitoring programme, and in line with the approved IWUL, is to continue except for the inclusion of hydrocensus boreholes VEN-HC1 and VEN-HC2, located downgradient of PCD 3. If these boreholes are to be destroyed during the construction phases, it is recommended that a shallow weathered (~15m) and deeper fractured (~50 m) borehole be drilled to replace them and included in the programme. For water quality parameters, monitoring as per the current monitoring programme to continue.

Table 35: Proposed monitoring boreholes

Borehole ID	Coordinates
VEN-HC1	S-22.448683 E29.291891
VEN-HC1	S-22.449458 E29.292149

1.6.5 Sensitive landscapes monitoring

1.6.5.1 Construction phase monitoring measures

- Compliance monitoring will be the responsibility of a suitably qualified/trained Environmental Control Officer (“ECO”) with any additional supporting Environmental Officers (“EO’s”) having the required competency skills and experience to ensure that monitoring is undertaken effectively and appropriately;
- A photographic record of the state of the watercourse prior to the commencement of clearing/construction must be kept for reference and rehabilitation monitoring purposes;
- The ECO must undertake compliance monitoring audits based on risk of activities as the project progresses. Freshwater ecosystem aspects that must be monitored related to monitoring freshwater ecosystem impacts include:
    - The condition of the demarcation fence;
    - Evidence of any no-go area incursions;
    - The condition of the temporary runoff, erosion and sediment control measures and evidence of any failures;
    - Evidence of sedimentary deposits / plumes and elevated rates of sedimentation (i.e. vegetation smothering / burial);
    - Evidence of elevated river / stream turbidity levels;
    - Evidence of gully or bed/bank erosion;
    - Visual assessment of storm water quality and instream water quality;
    - The condition of waste bins and the presence of litter within the working area;
    - Evidence of solid waste within the no-go areas;
    - Evidence of hazardous materials spills and soil contamination;

- Presence of alien invasive and weedy vegetation within the working area;
- Rehabilitation and re-vegetation methods and success; and
- Once the construction and rehabilitation has been completed, the ECO should conduct a close out site audit 1 month after the completion of rehabilitation.

1.6.5.2 Operational phase monitoring

It will be important that long-term monitoring of the potential freshwater ecosystem impacts be undertaken to proactively to identity any environmental issues and impacts that may arise as a result of the operational phase of the project. The following key aspects should be monitored:

- PCD and river water quality when in flow;
- PCD discharges (quantity and quality);
- Evidence of erosion and/or sedimentation in affected watercourses. It is recommended to assess the changes in sediment transport, channel form and erosion in the local reach of Unit R1;
- Evidence of water quality issues in affected watercourses; and
- Presence of alien invasive plants.

1.6.5.3 Ecological monitoring during the decommissioning phase

It will be important that long-term monitoring of the potential freshwater ecosystem impacts be undertaken to proactively to identity any environmental issues and impacts that may arise as a result of the decommissioning and post-closure project. The following key aspects should be monitored:

- A photographic record of the state of the watercourse prior to the commencement of decommissioning must be kept for reference and rehabilitation monitoring purposes;
- During decommissioning:
  - Erosion and/or sedimentation in the watercourse's downslope of the PCDs, FRD RWDs and OMWSDs;
  - Erosion and/or sedimentation in the watercourses upstream and downstream of road crossings;
  - Presence of alien invasive plants;
  - Rehabilitation and re-vegetation methods and success; and
  - Once the rehabilitation has been completed, the ECO should conduct a close out site audit at a reasonable timeframe after vegetation establishment after the completion of rehabilitation.
- After decommissioning:
  - River water quality;
  - Evidence of seepage;
  - Evidence of erosion and/or sedimentation in affected watercourses;
  - Evidence of water quality issues in affected watercourses; and
  - Presence of alien invasive plants.

1.6.6 Other monitoring requirements

No.	Monitoring requirements	Description of monitoring requirement	Final output	Responsibility)	Frequency
1	Environmental authorisations audit (internal)	Auditing of environmental authorisation, environmental management programme and closure plan must be done in accordance with the Regulation 34 and Appendix 7 of the EIA Regulations (2014) under the NEMA (1998).	Records of internal audits will be retained at the mine.	Environmental Department	As per the environmental authorisation
3	Environmental authorisations audit (external)	Auditing of environmental authorisation, environmental management programme and closure plan must be done in accordance with the Regulation 34 and Appendix 7 of the EIA Regulations (2014) under the NEMA (1998).	A formal audit report will be submitted to the DMRE.	Environmental Department	As per the environmental authorisation
4	Water quantity & quality monitoring	Monitoring of surface and ground water resources will take place according to the IWUL. The mine's water quality monitoring is conducted by an external consultant.	Water quantity & quality monitoring results will be reported to DWS as per the IWUL requirements.	Environmental Department	As per the IWUL and WUL (to be authorised)
5	Rehabilitation progress monitoring	Rehabilitation will be undertaken in accordance with the mine's 5-Year Rehabilitation Plan.	Progress made with the implementation of the 5-Year Rehabilitation Plan will be reported to DMRE on an annual basis	Environmental Department	Every 5 years
6	Dustfall monitoring	Dustfall monitoring is conducted monthly.	Monthly and annual dustfall monitoring reports will be retained at the mine and submitted to the competent authority as required.	Environmental Department	Monthly
7	Biodiversity Monitoring	Biodiversity monitoring will be undertaken according to the biomonitoring protocol. Biodiversity monitoring will be undertaken jointly by the mine and external consultants.	Biodiversity monitoring results will be retained by the mine.	Environmental Department	Annually
8	EMS audits (internal)	Internal EMS audits will be undertaken by a team of internal auditors according to a yearly audit schedule.	Records of internal EMS audits will be retained at the mine.	Environmental Department	Annually
9	EMS audits (external)	An external EMS audit will be undertaken by an independent third party.	Records of external EMS audits will be retained at the mine.	Environmental Department	Annually
10	Legal compliance	An external legal compliance audit will be undertaken by an	Records of external legal audits will be	Environmental Department	biennial

No.	Monitoring requirements	Description of monitoring requirement	Final output	Responsibility)	Frequency
	audits (external)	independent third party on an biennial basis..	retained at the mine.		
11	IWUL compliance audit (external)	An external IWUL compliance audit will be undertaken in accordance to the IWUL.	The outcomes of the IWUL compliance audit will be submitted to DWS in accordance to the IWUL.	Environmental Department	As per the IWUL and WUL (to be authorised)

1.7 Programme for reporting on compliance

Unless otherwise instructed by the Competent Authority (in this case, the DMRE) or as a condition to the EA, environmental compliance audits on the EMPr will be undertaken annually, and the resultant audit reports will be submitted to the DMRE. The auditing process, as well as report format will comply with the requirements as contained in the EIA Regulations, GN R982, dated December 2014, as amended.

1.8 Environmental awareness

The following awareness and training measures are implemented at Venetia Mine (refer to Annexure I for the *Venetia Mine EMS Competence and Awareness Procedure*). The following is a summary of the awareness and training implemented at Venetia Mine.

Venetia Mine differentiates between two types of EMS-related training:

- Awareness training, and
- Competency training

Awareness training that includes the following as a minimum, but not limited to:

- The environmental policy;
- The significant aspects and related actual or potential environmental impacts;
- Employees contribution to the effectiveness of the EMS, including the benefits of enhanced environmental performance; and
- The implications of not conforming to the requirements of the EMS, including not fulfilling the mine's compliance obligations.

Competency training that includes the following as a minimum:

- Identifying persons requiring specific levels of competence (those employees that can affect the environmental performance of the organization or the ability to fulfil the compliance obligation requirements);
- Ensure that these employees are competent on the basis of appropriate education, training or experience.
- Determine training needs associated with the mine's environmental aspects and EMS; and

- Taking action to acquire the necessary competence, and evaluate the effectiveness of these actions taken;

1.9 Specific information required by the Competent Authority

The information, as presented in Table 36 below, will be required by the competent authority.

Table 36: Monitoring information required by the competent authority

Information	Frequency of submission
Quantum of financial provision	Annually
Annual rehabilitation plan	Annually
Environmental audit report on approved EIAR/EMPr and other environmental authorisations	Annually or as per auditing timeframe indicated in authorisation(s)
Surface water monitoring reports	As per IWUL
Groundwater monitoring reports	As per IWUL
Fall-out dust monitoring reports	As per the National Dust Control Regulations (GN827, 2013)

2 Undertaking

The EAP herewith confirms

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

_____	_____
Signature of EAP	**Date**

3 Declaration of independence

Shangoni hereby declares that it is an independent consultant in that it has no business, financial, personal or other interest in this project in respect of which Shangoni is appointed. Furthermore, no circumstances exist that may compromise the objectivity of Shangoni, excluding fair remuneration for work performed in connection with this project.

Report compiled by:	**Report reviewed by:**
Ashley Miller	**Brian Hayes (Pr Eng)**