Glencore Operations South Africa (Pty) Ltd: Nooitgedacht Colliery

Scoping Report

DRAFT FOR PUBLIC COMMENT

Report date: 6 November 2020

Reference: MP 30/5/1/2/2/303 MR

SHANGONI Management Services (Pty) Ltd

www.shangoni.co.za

Table of Contents

Annexures

Annexure A: Layout plans

Annexure B: Project team expertise

Annexure B1: Curriculum vitae of environmental assessment practitioner

Annexure C: Competent authority correspondence

Annexure C1: Application for environmental authorisation form

Annexure C2: Acknowledgment of application for environmental authorisation form

Annexure C3: Acknowledgment of receipt of draft scoping report

Annexure D: Public Participation Report

References

Department of Environmental Affairs. 2017. *Integrated Environmental Management Guideline: Guideline on Need and Desirability*.

Department of Environmental Affairs. 2014. *National Environmental Management Act, 1998 (Act 107 of 1998). GNR.982 Environmental Impact Assessment (EIA) Regulations, dated December 2014, as amended*.

Department of Environmental Affairs. 2014. N*ational Environmental Management Act, 1998 (Act 107 of 1998). GNR.983 Environmental Impact Assessment Regulations Listing Notice 1 of 2014, dated December 2014, as amended*.

Department of Environmental Affairs. 2014. N*ational Environmental Management Act, 1998 (Act 107 of 1998). GNR.984 Environmental Impact Assessment Regulations Listing Notice 2 of 2014, dated December 2014, as amended*.

Department of Environmental Affairs. *Integrated Environmental Management Information Series. Criteria for determining alternatives in EIA*.

Department of Mineral Resources. *Guideline for Consultation with communities and Interested and Affected Parties*.

Digby Wells. 2014. *Amendment to The Nooitgedacht Environmental Impact Assessment and Environmental Management Programme: Inclusion of Seams 2 and 4*.

eMalahleni Local Municipality. *Integrated Development Plan 2017/18 – 2021/22.*

Golder Associates. 2019. *Glencore Operations South Africa (Pty) Ltd Hydrogeological Investigation – Nooitgedacht.*

Golder Associates. 2019. *Storm Water Management report for the Nooitgedacht Colliery Water Use Licence Application.*

Golder Associates. 2019. *Surface water and Aquatic Biota Impact Assessment Report for the Nooitgedacht Colliery Water Use Licence Application*.

Scientific Terrestrial Services. 2020. *Biodiversity Assessment as Part of The Environmental Impact Assessment (EIA) And Authorisation Process for The Proposed Development of An Incline Shaft and Associated Infrastructure at The Glencore Nooitgedacht Mine, Mpumalanga Province*.

Sidney Miller, 2019. *1st phase Heritage Impact Assessment ("HIA") of a portion of Nooitgedacht 37 IS in the Ogies district, Mpumalanga for Glencore Operations Limited – Nooitgedacht Project ("Glencore")*.

WCS Scientific (Pty) Ltd. 2019. *Glencore Nooitgedacht Shaft Wetland Delineation and Assessment Study*.

1 Details of project applicant and environmental assessment practitioner

1.1 Details of the project applicant

Name of operation	Nooitgedacht Colliery
Applicant	Glencore Operations South Africa (Pty) Ltd
Postal address	PO Box 37119, Birnam Park
Responsible person	Stefan Venter
Telephone no.	(0)13 653 5341
e-mail address	stefan.venter@glencore.co.za
Company registration no.	1997/017998/07

1.2 Details of the environmental assessment practitioner

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

1.3 Expertise of the environmental assessment practitioner

Name and Surname	Qualifications and summary of experience
Nico Brits	Nico obtained a M.Sc. in Water Resources Management and a B.Sc. Hons. degree in Environmental Management from the University of Pretoria and is a registered *Pri.Sci.Nat.* Scientist. He also registered as an EAP with EAPASA in 2020. He is a principal environmental consultant responsible for the Integrated Water Use Licenses ("IWULA") and the Integrated Water and Waste Management Plans ("IWWMP") at Shangoni with over 9 years' experience. He is also involved with Environmental Management, Environmental Impact Assessments ("EIA") and Environmental Management Programmes ("EMP").

2 Description of the property

Table 1: Description of the properties applicable to the proposed activities

Farm Name	**Surface infrastructure:** Shaft area: Portion 14 of the farm Nooitgedacht 37IS. Servitude (linear activities): Portion 13 of the farm Nooitgedacht 37IS. Portion 10, 19(Remaining Extent) and 25 of the farm Klippoortje 32IS. Portion 10(Remaining Extent), 27, 29 and 35 of the farm Blesbokfontein 38IS. **Underground mining activity:** Remaining Extent, Portion 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15 and 16 of the farm Nooitgedacht 37IS. Remaining Extent, Portion 8, 33, 35, 36, 37 and 38 of the farm Vierfontein 61IS.
Magisterial District	The Nooitgedacht Colliery will be situated within the Nkangala District Municipality with the regional services council being the eMalahleni Local Municipality in Mpumalanga Province, South Africa.
Distance and Direction from Nearest Town	14 km to the south of Ogies 19 km north-west of Kriel 28 km sout-west of Leandra 49 km south-east of Bethal
21-digit Surveyor General Code	T0IS00000000003700000, T0IS00000000003700002, T0IS00000000003700003, T0IS00000000003700004, T0IS00000000003700005, T0IS00000000003700006, T0IS00000000003700007, T0IS00000000003700008, T0IS00000000003700009, T0IS00000000003700010, T0IS00000000003700013, T0IS00000000003700014, T0IS00000000003700015, T0IS00000000003700016, T0IS00000000006100000, T0IS00000000006100008, T0IS00000000006100033, T0IS00000000006100035, T0IS00000000006100036, T0IS00000000006100037, T0IS00000000006100038, T0IS00000000003200010, T0IS00000000003200019, T0IS00000000003200025, T0IS00000000003800010, T0IS00000000003800027, T0IS00000000003800029, T0IS00000000003800035.

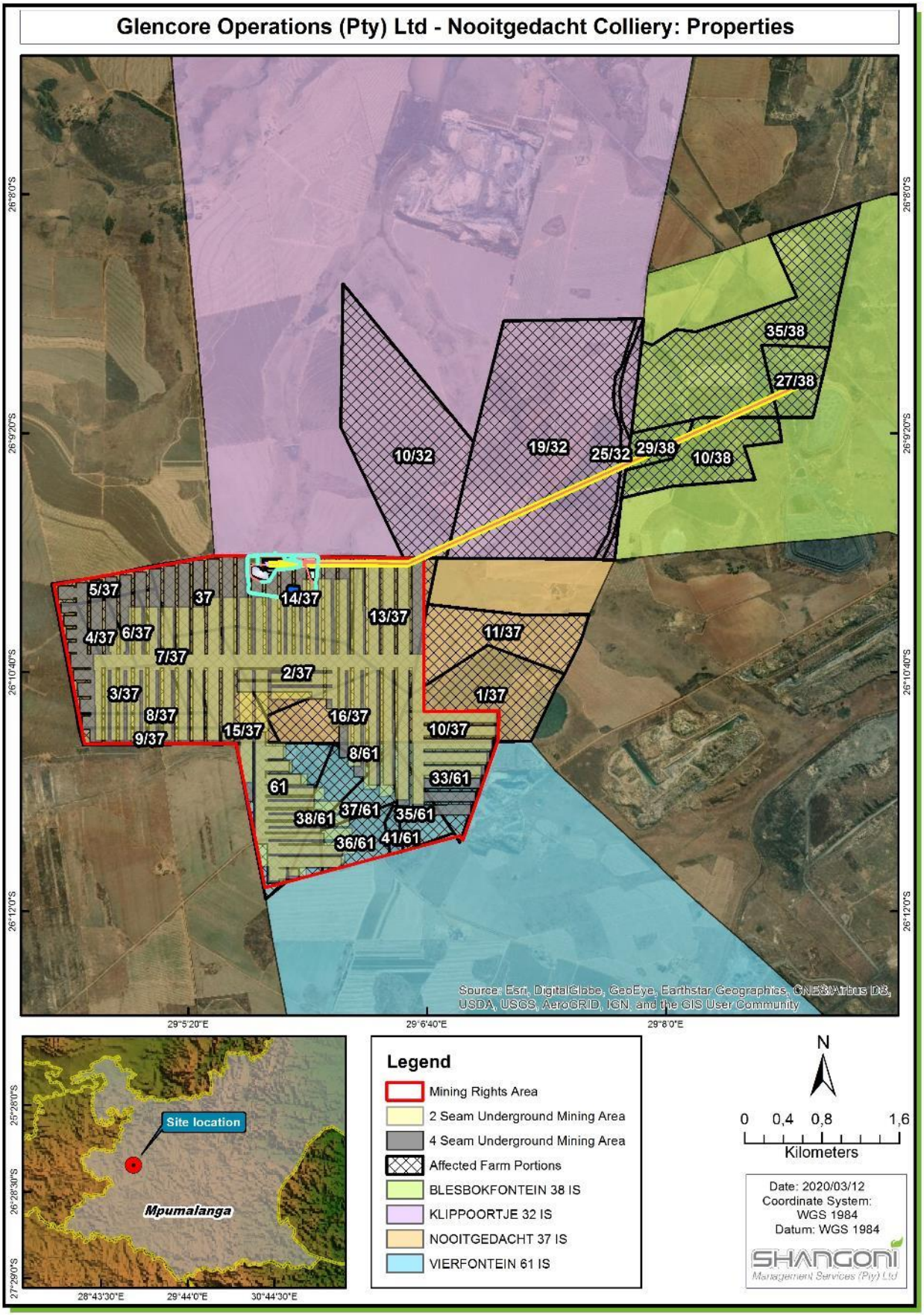


Figure 1: Affected properties associated with the Nooitgedacht Colliery

3 Locality of the project

3.1 Magisterial district and administrative boundaries

Nooitgedacht Colliery will fall within the administrative boundaries presented in Table 2.

Table 2: Administrative boundaries

Province	Mpumalanga Province
District Municipality	Nkangala District Municipality
Local Municipality	eMalahleni Local Municipality
Ward	32
Department of Mineral and Energy ("DMRE") Local Office-the Competent Authority ("CA")	DMRE (eMalahleni)
Department of Water and Sanitation ("DWS") Local Office	DWS (Bronkhorstspruit)
Department of Agriculture, Rural Development, Land and Environmental Affairs ("DARDLEA")	DARDLEA (eMalahleni)
Department of Agriculture, Forestry and Fisheries ("DAFF") Local Office	DAFF (eMalahleni)
Catchment Zone	Upper Olifants catchment
Sub catchments	Rietspruit and Saaiwater
Water Management Area	Olifants Water Management Area (WMA 08)
Quaternary catchment	B11E and B11F

3.2 Location of the mine

Nooitgedacht Colliery will be situated in the Mpumalanga Province of South Africa. The mine will be located approximately 14 km to the south of Ogies, 19 km north-west of Kriel, 28 km south-west of Leandra and 49 km south-east of Bethal (Figure 2). Nooitgedacht Colliery will be situated on the farms Nooitgedacht 37IS, Klippoortje 32IS, Blesbokfontein 38IS and Vierfontein 61IS. Refer to Table 1 above for detail on the portions applicable to these properties as well as Figure 1 for an illustration of the properties applicable to the proposed project.

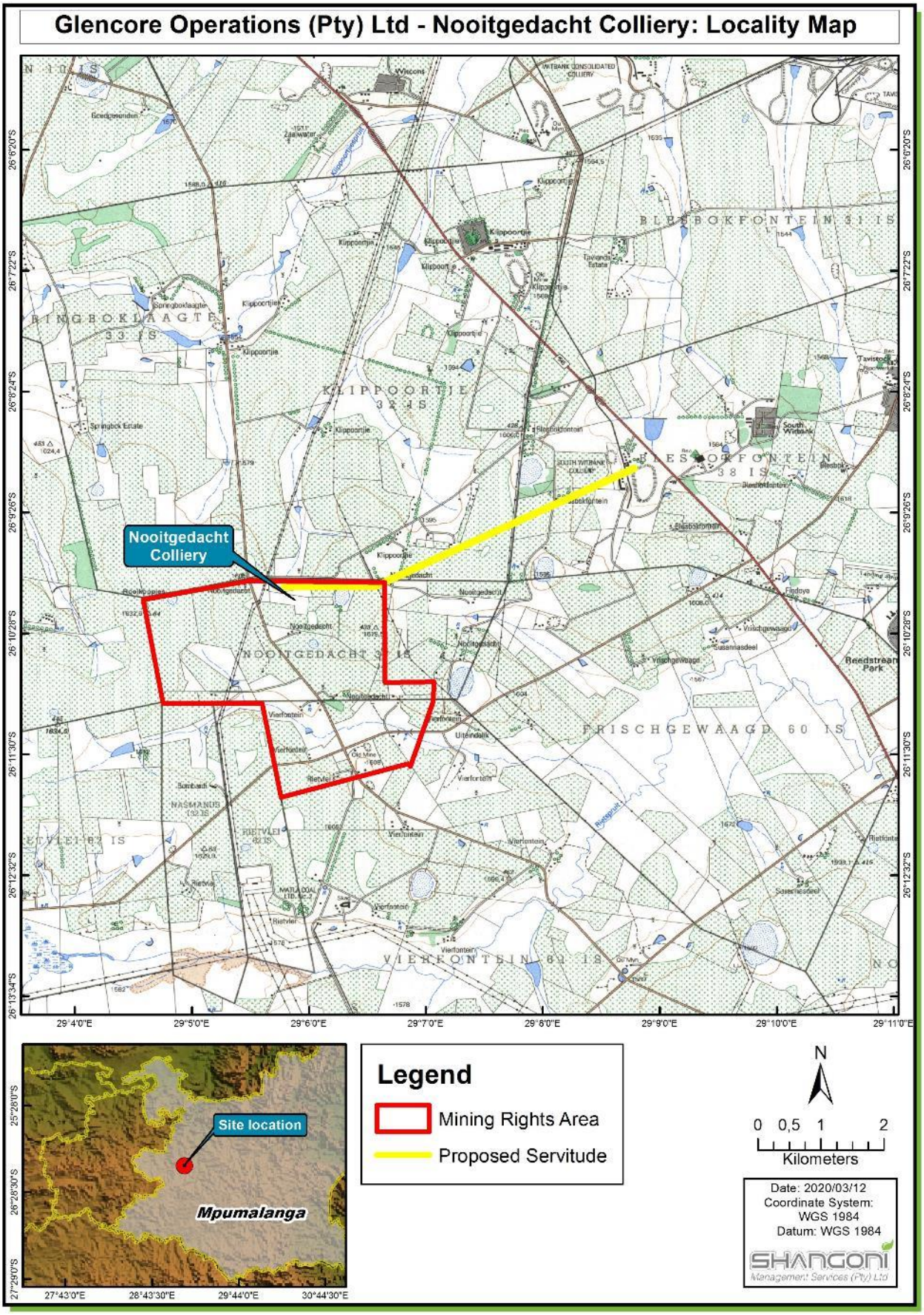


Figure 2: Locality of Nooitgedacht Colliery

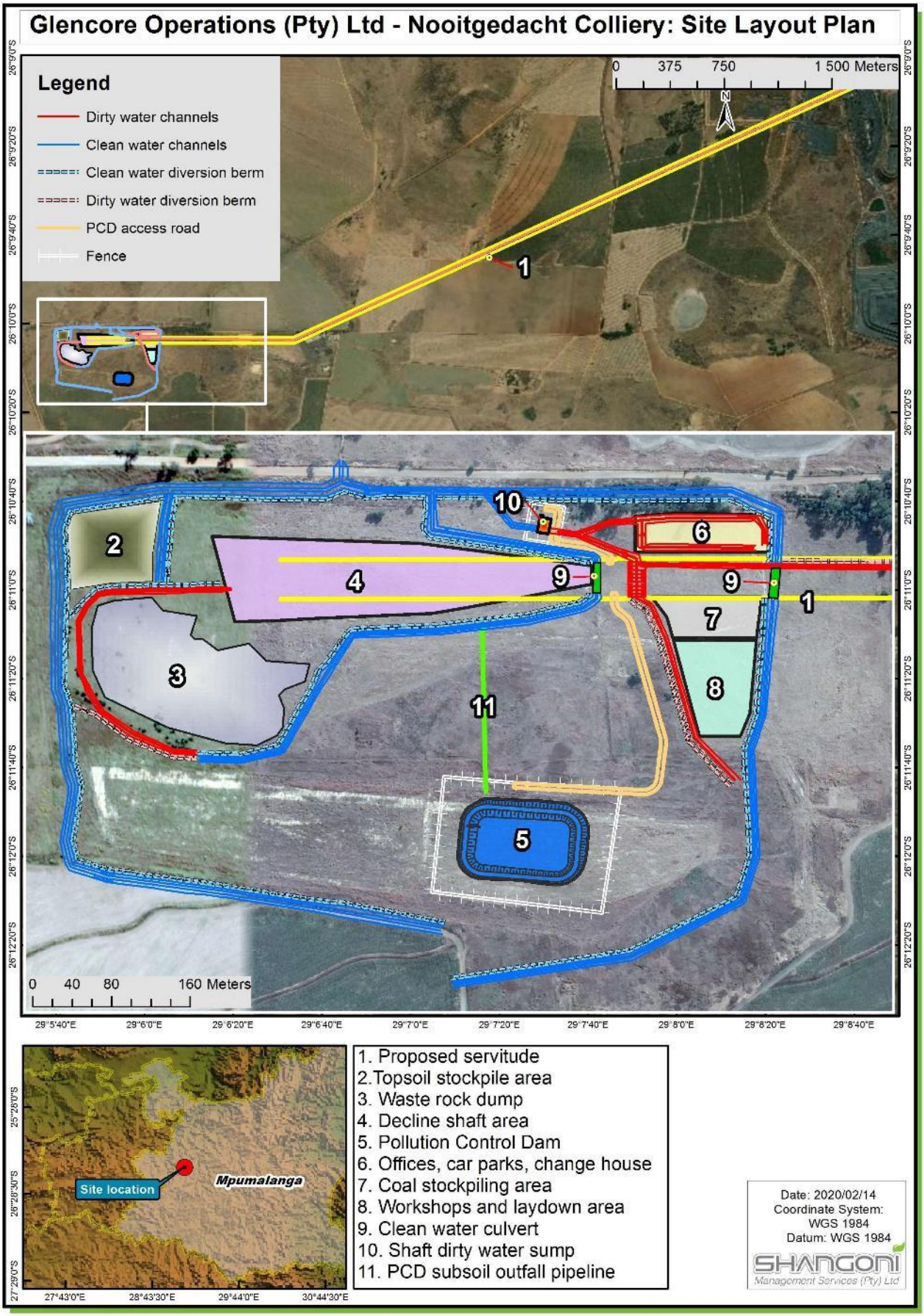


Figure 3: Nooitgedacht Colliery site layout plan

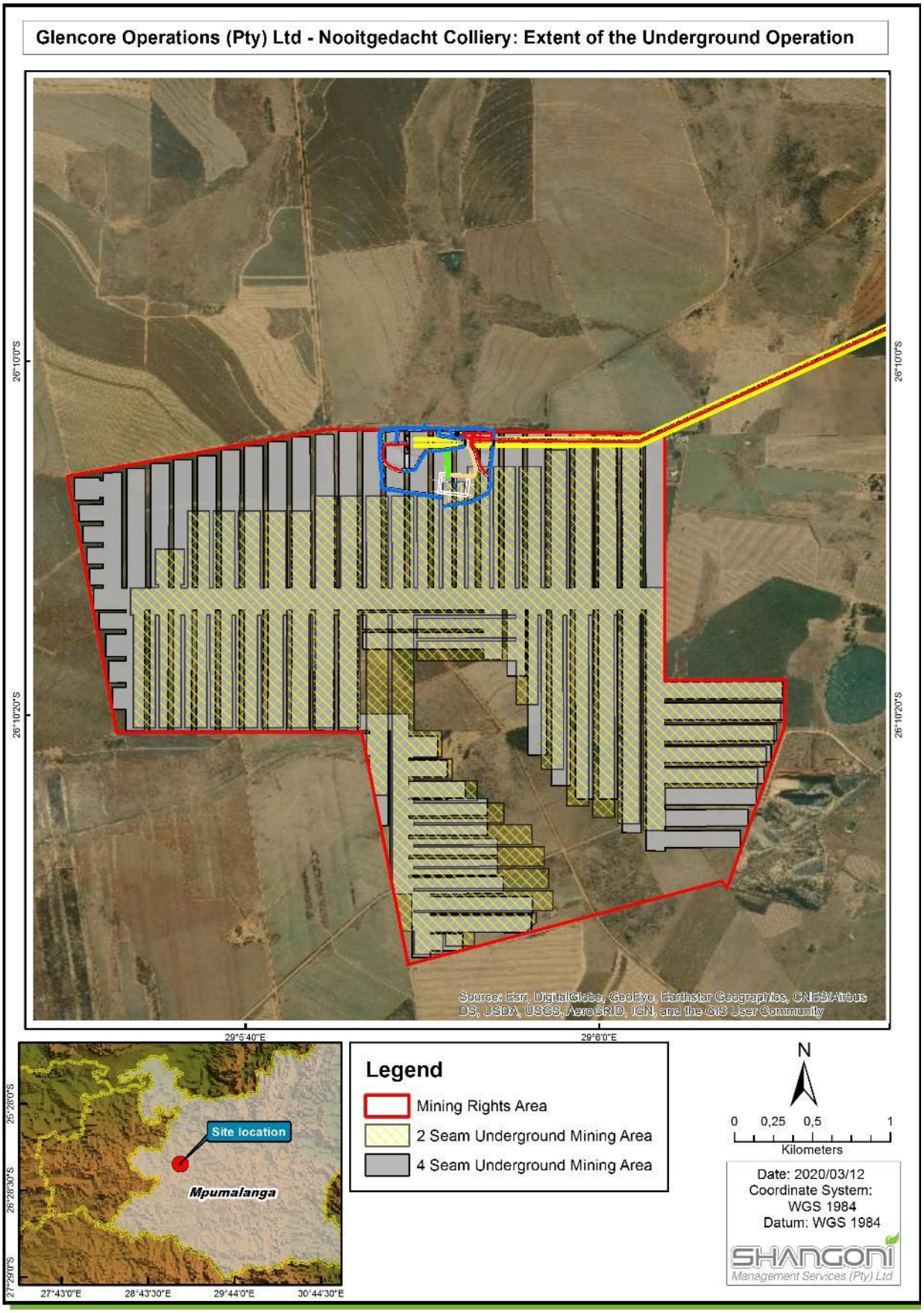


Figure 4: 2 and 4 seam underground mining area

4 Description of the scope of the proposed overall activity

4.1 Listed and specified activities applied for

The Nooitgedacht Colliery requires Environmental Authorisation ("EA") for listed activities contained in the Environmental Impact Assessment Regulations Listing Notice 1 of 2014 (GN R983 of 4 December 2014) ("GNR 983"), as amended in 2017 and Listing Notice 2 of 2014 (GN R984 of 4 December 2014) ("GNR 984"), as amended in 2017 published in terms of Sections 24(2), 24 (5), 24D, 44 and 47(A) (1) (b) of the NEMA.

For the EA application, a Scoping and Environmental Impact Assessment ("S&EIR") will be required in compliance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA") and the NEMA Environmental Impact Assessment Regulations, 2014 (GN R982 of 4 December 2014) ("GN R982"), as amended.

Listed activities have been identified as associated with the proposed Nooitgedacht Colliery are provided in Table 3. The construction and operational activities have been identified and form part of this application. Decommissioning listed activities do not form part of this application and will be applied for as part of a separate environmental authorisation application prior to undertaking decommissioning in future.

Table 3: Activities and listed activities associated with the Nooitgedacht Colliery

Name of Activity	Aerial Extent of Activity ha or m²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity (GN 921)
Shaft area (decline shaft, associated infrastructure, water management infrastructure, topsoil dump and waste rock dump).					
Hazardous chemicals, in excess of 80 cubic metre, will be stored at the Nooitgedacht Colliery workshop areas.	Associated infrastructure, including offices and workshops (1.05 ha)	X	Activity 14 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017, as amended): *The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.*	NA[1]	NA
Sewage generated at the Nooitgedacht Colliery will be treated onsite. The throughput capacity will exceed 2 000 cubic metre but will be less than 15 000 cubic metre.	Associated infrastructure, including offices and workshops (1.05 ha)	X	Activity 25 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017, as amended): *The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.*	NA	NA

[1] If an "NA" is stipulated, the activities were assessed and have been found to be not applicable to a WML.

Name of Activity	Aerial Extent of Activity ha or m²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity (GN 921)
Vegetation clearance in excess of 1 ha will be conducted at the Shaft area. The following areas will be cleared: • Decline shaft • Topsoil stockpile • Waste rock dump • Pollution control dams • Coal stockpiling area • Associated infrastructure • Water management infrastructure	Decline shaft (+/- 2.14 ha) Topsoil stockpile (+/- 0.61 ha) Waste rock dump (+/- 1.83 ha) Pollution control dams (+/- 2.05 ha) Coal stockpiling area (+/- 0.35 ha) Associated infrastructure (+/- 1.05 ha) Water management infrastructure (+/- 8.23 ha)	X	Activity 27 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017, as amended): *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except 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.*	NA[2]	NA

[2] An application for a WML for the waste rock dump is excluded from this application upon request from the applicant. An application to declassify the waste rock material as waste will be compiled and submitted separately from this application.

Name of Activity	Aerial Extent of Activity ha or m²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity (GN 921)
The following activities as part of the Nooitgedacht Project will require a Section 21(g) Water Use Licence ("WUL"): • Pollution Control Dam ("PCD"), • Conservancy tanks / sludge drying beds, • Shaft dirty water sump, and • Dust suppression.	Pollution control dams (+/- 2.05 ha)	X	Activity 6 of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017, as amended): *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.*	NA[3]	NA
The mining of coal at the Nooitgedacht Colliery that requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	Decline shaft (+/- 2.14 ha)	X	Activity 17(a) of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017, as amended): *Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—* *(a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or*	NA	NA

[3] A Water Use Licence Application ("WULA") for the waste rock dump will not be applied for due to an internal GOSA decision on the application processes for waste rock dumps..

Name of Activity	Aerial Extent of Activity ha or m²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity (GN 921)
Servitude (linear activities)					
A dewatering pipeline (5.5 km) will be constructed from the shaft area to the South Witbank Colliery and will have an internal diameter greater than 0.36 metre and a throughput of 120 litre per second.	Dewatering pipeline (+/- 5.5 km)	X	Activity 10(i) and 10(ii) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017, as amended): *The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, wastewater, 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;*	NA	NA
The servitude will be constructed within a Seep Wetland and will exceed a footprint of 100 square metre. Construction of the servitude will also require removing soil of more than 10 cubic metre from a watercourse.	Servitude (40 m wide, 5.5 km long)	X	Activity 12(ii)(a) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017, as amended): *The development of—* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse;*	NA	NA
		X	Activity 19 of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017, as amended): *The infilling or depositing of any material of more than 10 cubic*	NA	NA

Name of Activity	Aerial Extent of Activity ha or m²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity (GN 921)
			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.		
Hauling of ore by truck to the South Witbank Colliery is considered an option as part of the Nooitgedacht Colliery. A haul road (20 metre wide) may be constructed as part of this option.	Haul Road (20 m wide, 5.5 km long)	X	Activity 24(ii) of Listing Notice 1 (GNR 983 of GG 40772 of 7 April 2017, as amended): *The development of a road—* *(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;*	NA	NA
Dewatering activities at Nooitgedacht Colliery will include the abstraction of water from underground and the pumping of such water to impoundment facilities at South Witbank Colliery. The quantity of water pumped will be in excess of 50 000 cubic metre per day.	Dewatering pipeline (+/- 5.5 km)	X	Activity 11 of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017, as amended): *The development of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day, from and to or between any combination of the following —* *(i) water catchments;* *(ii) water treatment works; or* *(iii) impoundments*	NA	NA
Underground Mining					
The mining of coal at the Nooitgedacht Colliery requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	Mining right area (+/- 910.22Ha)	X	Activity 17(b) of Listing Notice 2 (GNR 984 of GG 40772 of 7 April 2017, as amended): *Any activity including the operation of that activity which*	NA	NA

Name of Activity	Aerial Extent of Activity ha or m²	Listed Activity (Mark with X)	Applicable Listing Notice (GN R983, GN R984, GN R985)	Waste Management Authorisation (Mark with X)	Applicable Waste Activity (GN 921)
			requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including— *(b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;* *but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.*		

4.2 Description of the proposed activities to be undertaken

4.2.1 Background information

Anglo American Thermal Coal (a division of Anglo Operations Proprietary Limited) ("AOPL") was the holder of two mining rights for coal in respect of an area known as the Nooitgedacht Colliery. AOPL previously conducted underground coal mining operations at the Nooitgedacht Colliery and specifically at the No. 5 Seam The following information is applicable to the two mining rights:

- Mining right 1 - Reference No. MP 30/5/1/2/2/303 MR) ("303 MR") - This mining right was originally held under ML 11/2004 (DME reference OT 5/3/2/631), issued on 27th April 2004, and thereafter held by AOPL as a registered converted mining right (303 MR). The following properties were included under this mining right:
    - Mineral Area 2 on Portion 1 of the farm Nooitgedacht 37 IS, and
    - Mineral Area 3 (a portion of Mineral Area 1) on Portion 11 of the farm Nooitgedacht 37 IS.
- Mining right 2 - Reference No. MP 30/5/1/2/2/236 MR) ("236 MR") – This mining right was originally held under an old order mining right, namely, ML 13/1997 (DME reference OT 5/3/2/95) issued on 15 May 1997 and thereafter under a registered converted mining right (236 MR). The following properties were included under this mining right:
    - Farm Nooitgedacht 37 IS - RE, portion 13, portion 14, RE portion 2, portion 10, portion 15, portion 16, RE portion 3, portion 4, portion 5, portion 6, portion 7, portion 8 and portion 9.
    - Farm Vierfontein 61 IS – RE, portion 8, portion 33, portion 35, portion 36, portion 37, portion 38 and portion 41.

On 28 November 2017, a mining right transfer from AOPL to Glencore Operations South Africa (Pty) Ltd ("GOSA") in terms of Section 11(1) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) ("MPRDA") was submitted to the then Department of Mineral Resources ("DMR"), now known as the Department of Mineral Resources and Energy ("DMRE"). On 20 August 2018, DMRE granted consent to transfer the mining rights from AOPL to GOSA and on 19 February 2019 the notarial deed of cession of the mining right (MP 30/5/1/2/2/303 MR) was signed by all relevant parties. The following properties were included in this notarial deed:

- Farm Nooitgedacht 37 IS - RE, RE portion 1, RE portion 2, RE portion 3, portion 4, portion 5, portion 6, portion 7, portion 8, portion 9, portion 10, portion of portion 11, portion 13, portion 14, portion 15 and portion 16.
- Farm Vierfontein 61 IS – RE, portion 8, portion 33, portion 35, portion 36, portion 37 and portion 38.

GOSA now proposes to mine the No. 4 seam and the No. 2 seam below the No 5 seam workings. Digby Wells, for AOPL, submitted an EMPr amendment under Section 102 of the MPRDA in June 2014, to include for the mining of the No. 4 seam and the No. 2 seam. This amendment did not consider any surface infrastructure at the Nooitgedacht Colliery with the described approach (then) to access the

underground area from the existing C11 Shaft and South Witbank Colliery Shaft. Also, no NEMA listed activities were applied for as part of this amendment. This Section 102 amendment was approved by the DMRE on 19 September 2019, as was issued to AOPL.

4.2.2 Mineral to be mined

The mineral to be mined is coal located at the No. 4 and No. 2 seam.

4.2.3 Mining method

The bord and pillar mining method will be used, using Continuous Miners (“CM”) feeding shuttle cars (see Figure 5 below). No secondary mining (stooping) will be done.

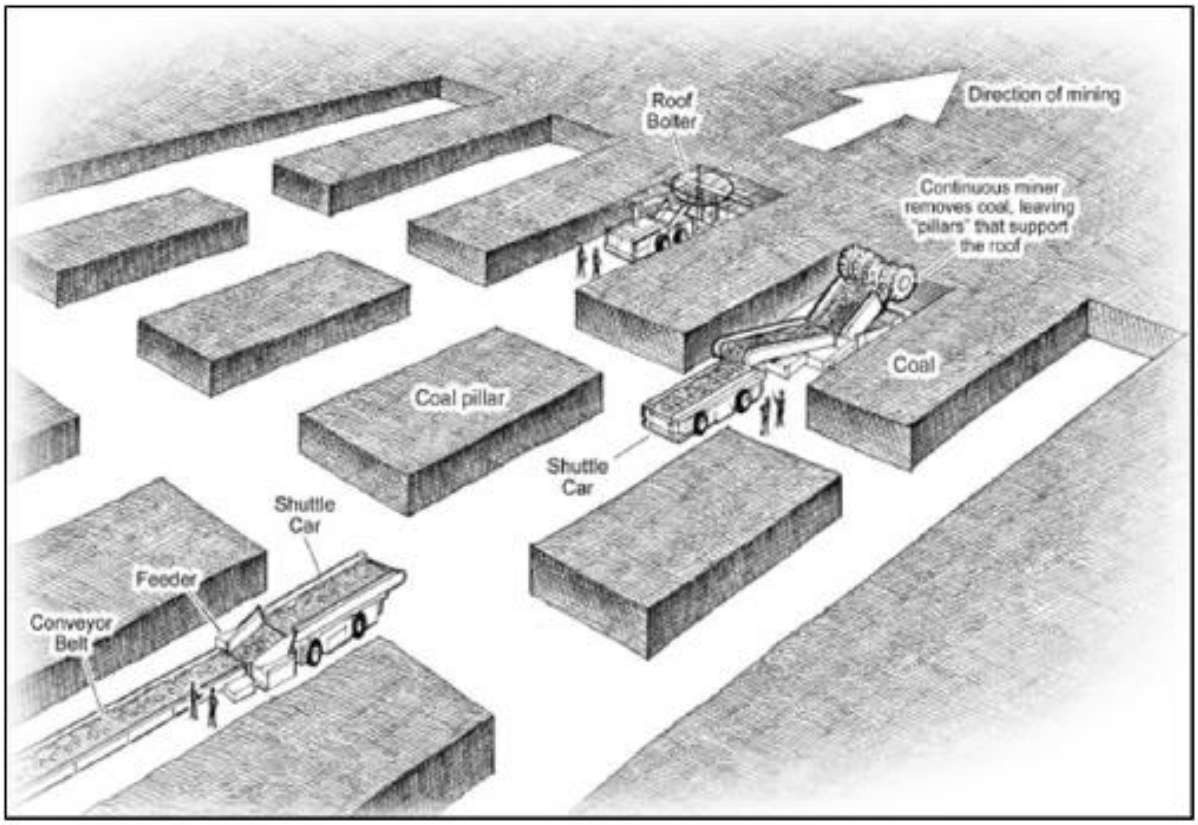


Figure 5: Bord and pillar mining method (www.interdisciplinaryenergystudy.org)

The No. 4 seam is at an approximate depth of 80 m below surface. The No. 2 seam is 24 m below the No. 4 seam (104 m below surface). The No. 4 coal seam, which is approximately 4 m thick, contains a resource of 58 million tons (“Mt") of coal in-situ, with 17.2 Mt of Run of Mine (“RoM”) planned. The No. 2 seam is approximately 6 m thick and contains a resource of 67 Mt of coal in-situ, with 16.5 Mt of RoM planned.

4.2.4 Mineral processing

Coal mined will either be placed on a conveyor or will be trucked to GOSA’s South Witbank Colliery (“SWC”) processing plant. A 40-meter-wide servitude is proposed for this. RoM coal will be beneficiated in a double stage coal handling and processing plant and will be railed and transported to Richards Bay Coal Terminal (“RBCT”).

4.2.5 Project infrastructure

Access to the underground workings will take place via a decline shaft. The location of the decline shaft will be on the same area that was previously used by AOPL. Proposed surface infrastructure will further include for offices, carports, change houses, workshops, etc. A topsoil stockpile and waste rock dump will be established as part of the sinking of the decline shaft. An emergency RoM stockpile area will also be constructed and will be used during conveyor/truck downtime and / or maintenance. One Pollution Control Dam ("PCD") and one shaft dirty water sump will be constructed as part of the Nooitgedacht Colliery. Refer to Figure 3 and Figure 4 for site layout plans for the Nooitgedacht Colliery.

4.2.5.1 Electricity

Electricity is already supplied by Eskom to SWC and this supply will be extended to the Nooitgedacht Colliery mining area. Electricity infrastructure from SWC to Nooitgedacht Colliery will be situated within the 40 m wide servitude.

4.2.5.2 Roads

The Nooitgedacht Colliery will be accessed on a provincial gravel road at right angles to the R545. The gravel road will be used by mine personnel and construction vehicles during the construction phase. Haul trucks conveying ore from Nooitgedacht Colliery to SWC plant, should this be considered the preferred option, will be restricted to the new servitude to be constructed.

4.2.5.3 Potable and process water supply

Potable water is to be sourced from boreholes and are required to supply the underground workings as well as the administration offices and workshop. A maximum consumption of 77 litre per person per day is assumed and a total minimum consumption of 65 m^3/d and a maximum consumption of 72 m^3/d is required. Taking losses into account, the borehole needs to supply a maximum of 74 m^3/d of potable water to the mine.

For the operation of the Continuous Miners ("CM"), a demand of 151 m^3/d is assumed. This value includes dust suppression required for underground usage. Water for the CM will be sourced from the PCD.

4.2.5.4 Storm water management

A storm water model has been prepared for the Nooitgedacht Colliery (Golder Associates, 2020). A clean and dirty storm water system layout has been prepared, with accompanying vertical profiles and geometric details to support engineering design of the system, in compliance with regulatory requirements and in support of the environmental authorisations for the operation.

Figure 6 shows the model layout and the sub-catchments that are relevant to the proposed infrastructure.

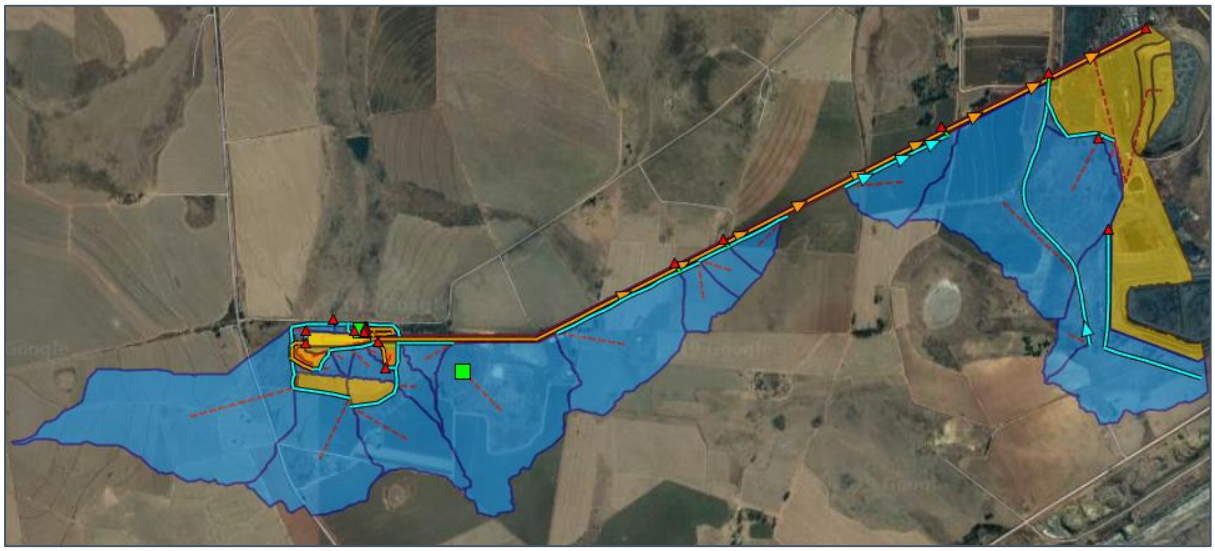


Figure 6: Model layout

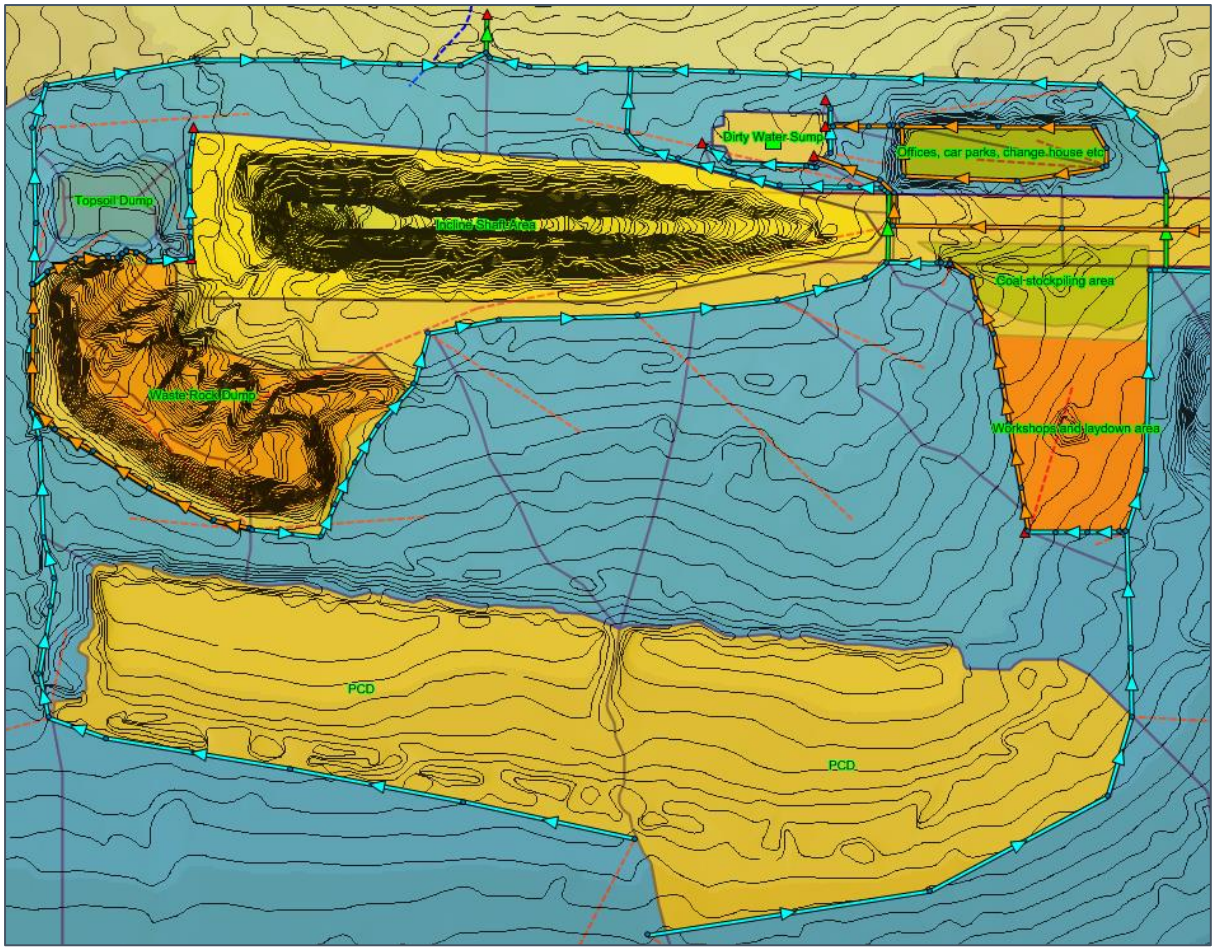


Figure 7: Mine site storm water schematic model layout

From Figure 7:

- Clean water diversion channels are provided, running south to north, and converging north of the site and crossing the gravel road via a culvert, and discharging to the downstream receiving

environment. These channels will isolate the site from clean runoff approaching the site from the south, west and east.

- It is proposed that the previous Pollution Control Dam ("PCD") footprint be retained. Dirty water from a section of the haul road, as well as from the offices and stockpile areas, will report to the shaft dirty water sump. From the shaft dirty water sump, dirty water is then pumped to the PCD. It is also recommended that the mine dewatering pipe coming from below surface, be fitted with a T-off line that feeds directly to the PCD, and fitted with a switching valve to direct underground dewatering flow directly to the PCD for temporary storage when maintenance or repair is needed for the pipeline that conveys mine dewatering water to the SWC processing plant. When the repair and maintenance works are complete, underground water temporarily stored in the PCD can be pumped via the same dewatering line to the SWC processing plant.
- It is proposed that the decline shaft be protected from ingress of surface runoff by means of a safety berm around its lip at a distance to be specified by rock mechanics specialists.
- Dirty runoff from the northern side of the Waste Rock Dump ("WRD") as well as from the southern verges of the decline, is to be directed to east of the decline to join runoff from the haul road.
- Dirty runoff from the south of the WRD will be channelled around the WRD and directed into the decline shaft, to be managed with mine dewatering circuits – refer to Figure 8. The actual entry point into the decline is to be determined. The estimated runoff volume resulting from the 1:50-year return interval, 24-hour duration storm is 228 m^3.

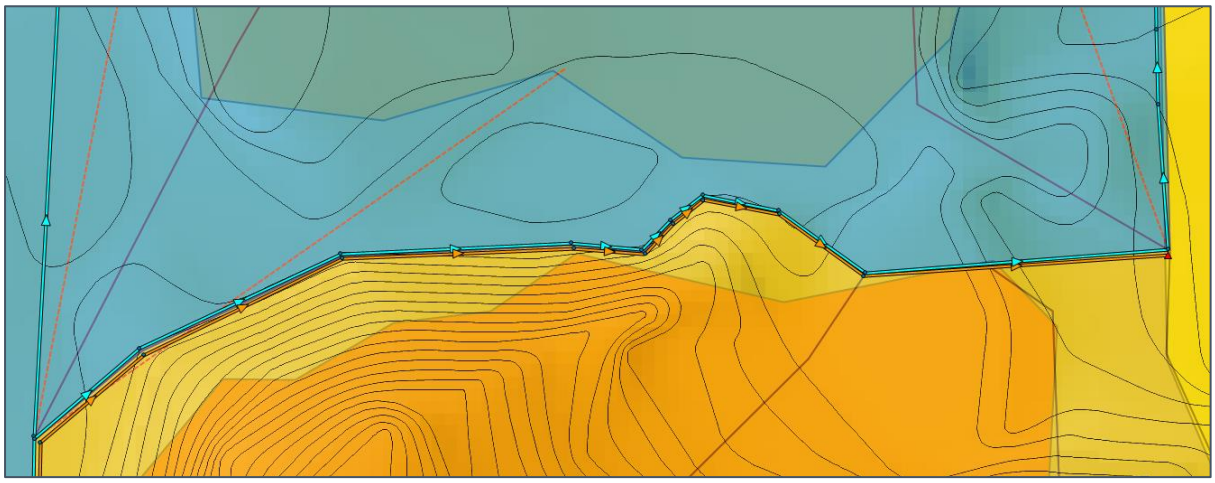


Figure 8: Clean and dirty runoff conveyance channels between the WRD and the topsoil stockpile

- Clean runoff from south of the topsoil stockpile will be collected in a clean channel alongside the dirty channels as shown in Figure 8.
- Clean runoff water from the strip of area to the north of the decline will be collected in channels as shown in Figure 7 and will converge toward the northern culvert outlet.
- Dirty runoff from the stockpile area will be collected in a channel to the west (assuming the ultimate terrace design slopes to the west) and will join runoff from the haul road, refer to Figure 9. All dirty runoff reporting to this area will be conveyed via a wide and shallow V-drain crossing the haul road, trafficable by haul vehicles, to join a channel discharging into the shaft dirty water sump.

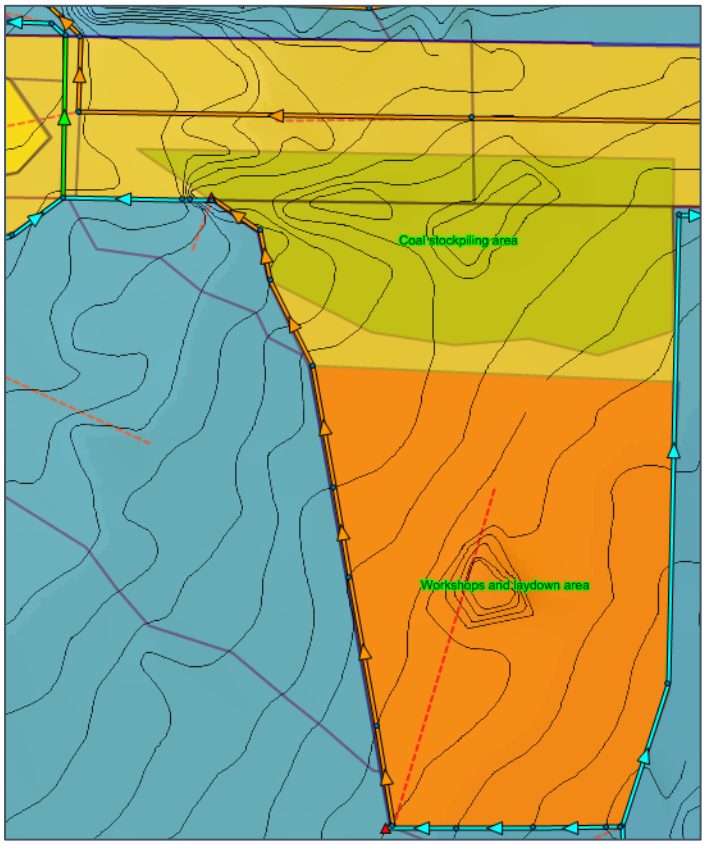


Figure 9: Workshops, laydown area and stockpile area dirty runoff collection and discharge.

- Dirty runoff water from the office terrace will be collected in perimeter channels and will report directly to the shaft dirty water sump, refer to Figure 10.

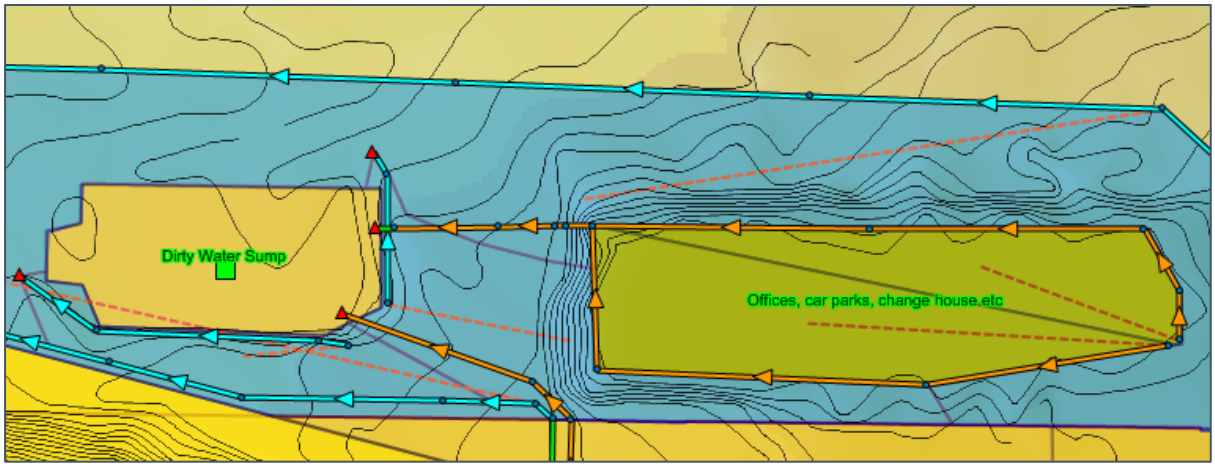


Figure 10: Dirty runoff collection and conveyance from the Office area.

- Clean runoff from the east of the site will join clean water channels as shown in Figure 11, and ultimately be conveyed to the northern clean water discharge culvert.

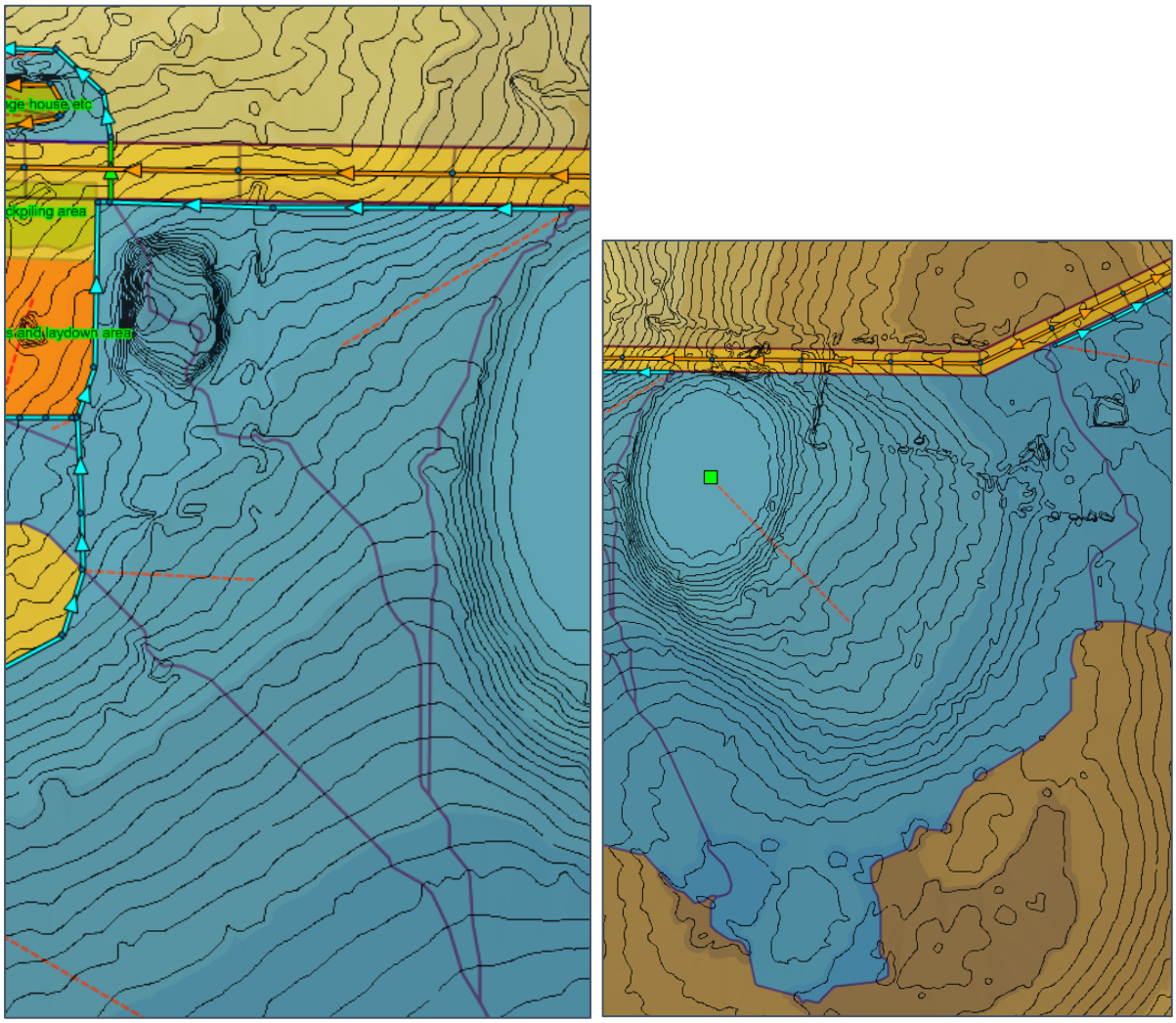


Figure 11(left): Clean water collection east of the decline shaft area and Figure 12 (right): Pan catchment.

- The pan lying south of the haul road has a catchment as shown in Figure 12 and Figure 13.
- Flow to the west will be collected in the shaft dirty water sump, and flow to the east will report to the SWC processing plant, where it will be managed for storage and treatment.

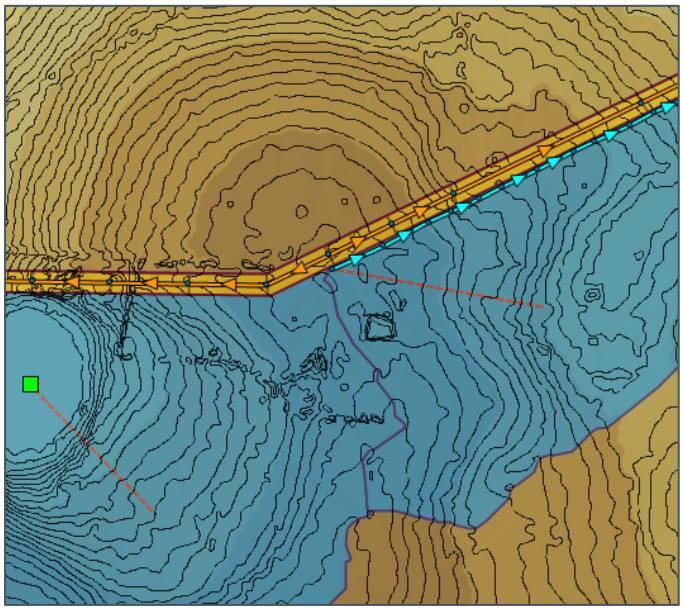


Figure 13: Servitude flow direction split.

- It has been assumed that the haul road, if preferred option, will have safety berms on either side as well as a split cross-fall on the carriageway, and that storm water runoff due to rainfall on the haul road will be conveyed along the verges, refer to Figure 14.

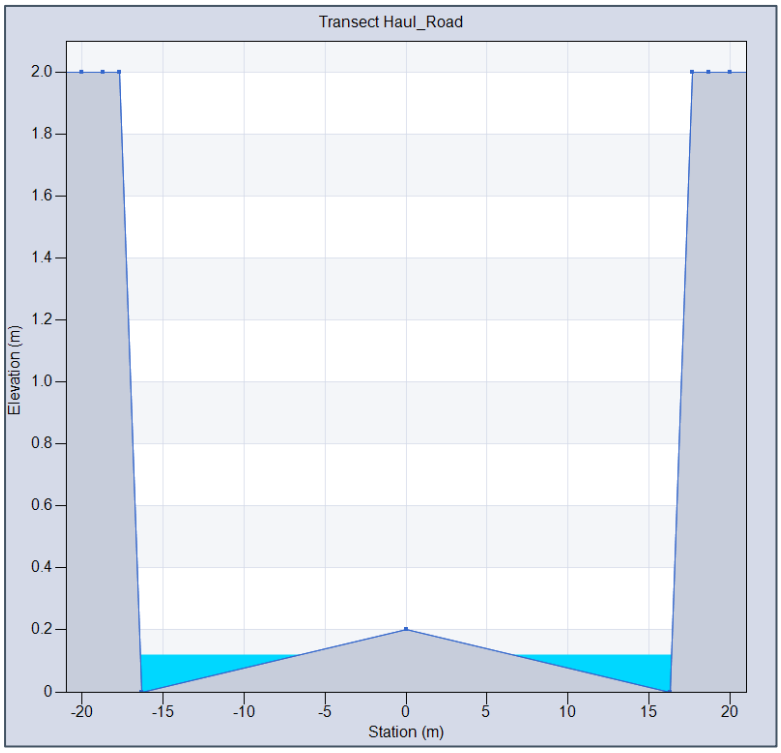


Figure 14: Haul road cross-section flow conveyance (at peak flow, 1:50-yr 24-hr storm event).

- Haul road culvert crossings (culverts) are required in 3 locations to convey clean runoff from the upstream to the downstream catchments, refer to Figure 15.

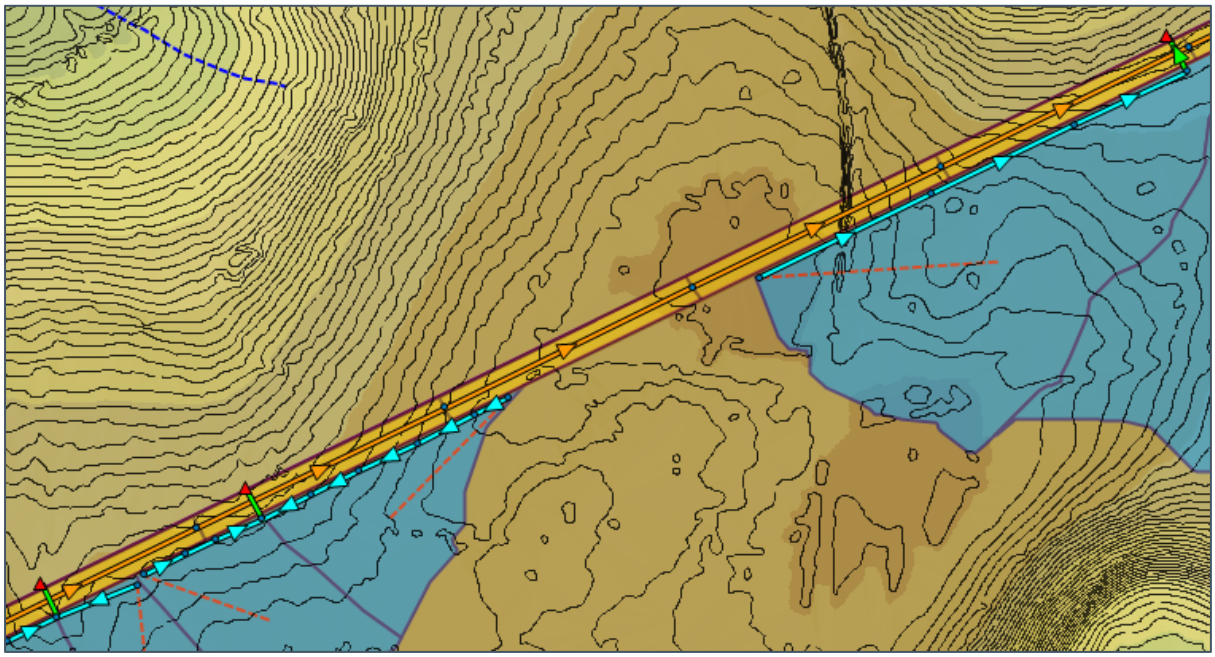
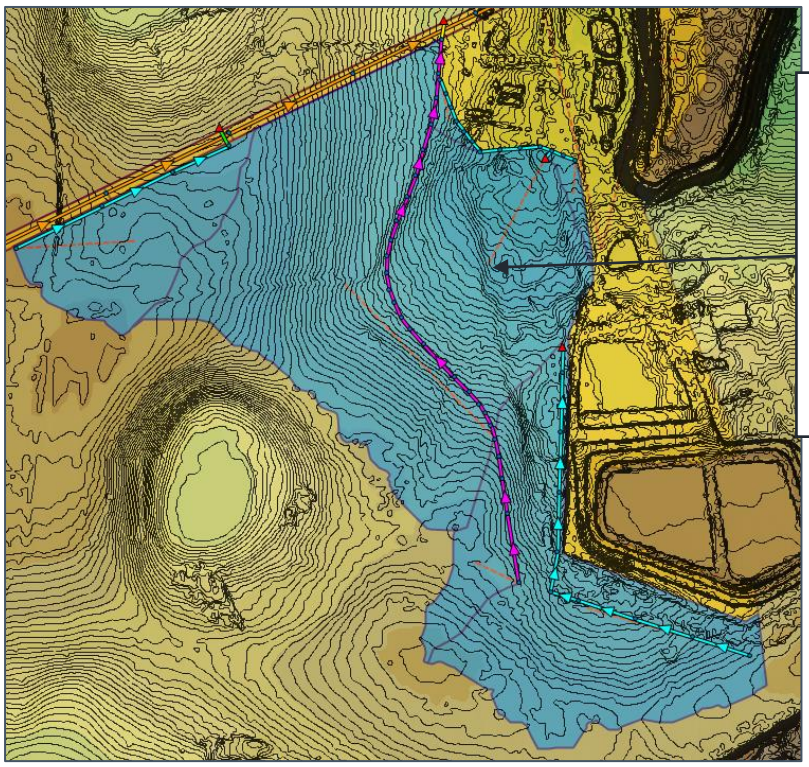


Figure 15: Haul road culvert crossings.

- There is a clean catchment adjacent to the SWC processing plant, traversed by an existing channel as shown in Figure 16. The channel passes through an existing culvert, before crossing the proposed haul road shortly thereafter. Since the channel is existing, it is not proposed to re-design it. The model assumes, however, that the channel is capable of conveying the design storm event, since the channel dimensions are unknown.



This sub-catchment is in a low-lying area and is cut off from discharge by an existing dirty area. It is proposed that a clean water storage dam is constructed here to capture clean runoff for temporary storage, before pumping it into the nearby channel for gravity discharge into the receiving environment. The estimated runoff volume for the design event is 1 704 150 m^3. The volume for the 1:2-year recurrence interval 24-hour duration event is 118 540 m^3.

Figure 16: Clean catchments and existing channel.

A dirty sub-catchment reports to the terminal sections of the haul road as shown in Figure 17. Dirty water from this sub-catchment and from the haul road, can be channelled as required to the dirty water facility to the east (refer inset to Figure 17 below).

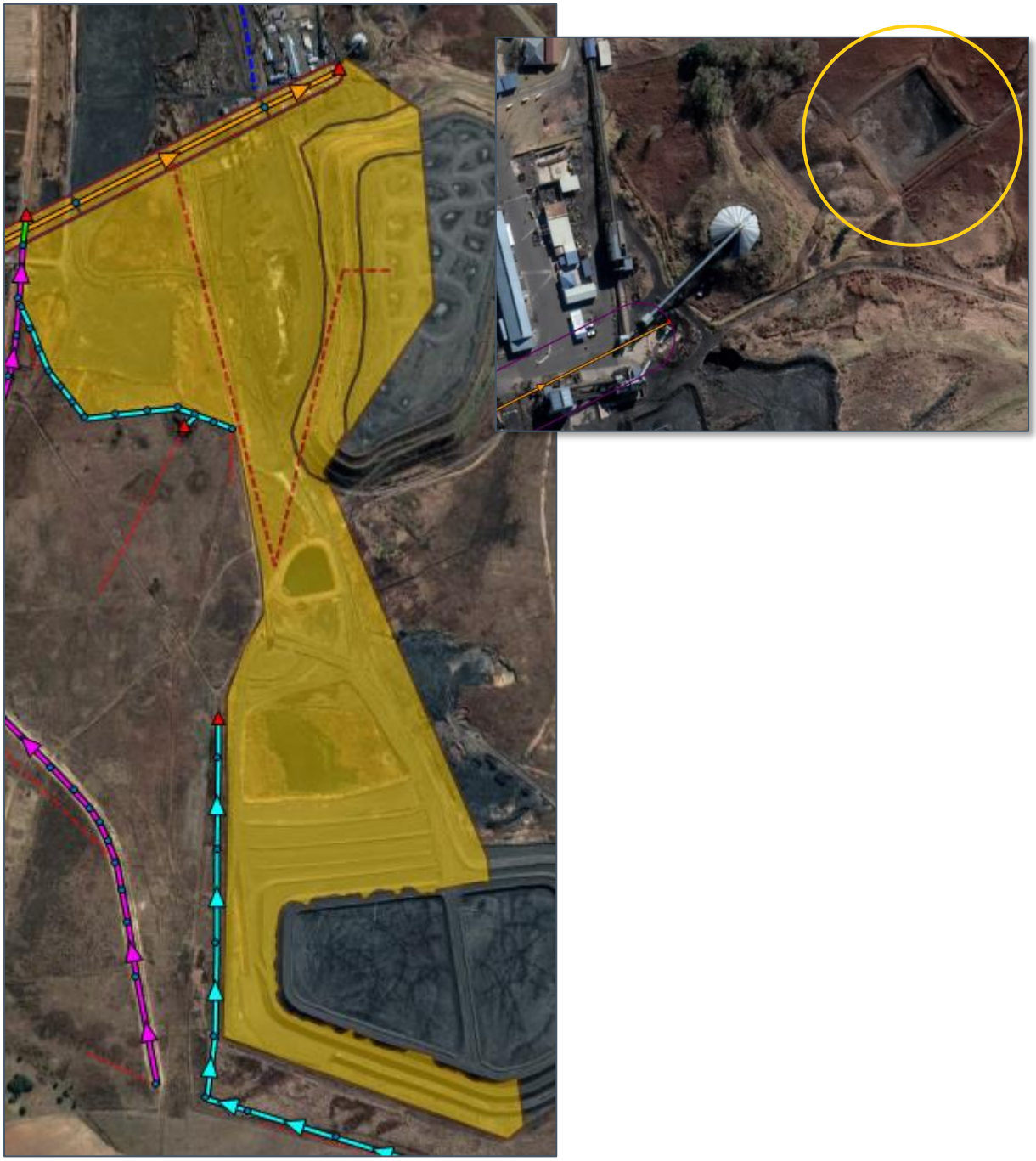


Figure 17: Dirty sub-catchment near SWC processing plant.

4.2.6 Non-mineral waste management

4.2.6.1 Industrial and hazardous waste disposal

Industrial waste from the Nooitgedacht Colliery will be collected on a routine basis and sent to a central waste storage and handling area, and removed off-site. Used oils are to be collected and recycled by a

contractor. Hazardous waste will be removed off-site by a licenced hazardous waste contractor to an appropriate hazardous waste disposal site. The management of industrial and hazardous waste will be undertaken in accordance with a documented waste management procedure.

4.2.6.2 Domestic waste disposal

Domestic waste will include amongst other general paper waste, food residue, glass and plastic bags and bottles (if any). Domestic waste from the various areas at Nooitgedacht Colliery will be collected and disposed of at an appropriate local municipal waste disposal facility. The management of domestic waste will be undertaken in accordance with a documented waste management procedure.

4.2.7 Life of Mine ("LoM")

Nooitgedacht Colliery will be mined for a 12-year life of mine. The 4 Seam will be mined during the first 7 years of the life of the operation. Mining of the 2 Seam will commence in year 6 and will continue until the life of mine.

4.2.8 Estimated reserves depletion

The following tables indicate the estimated reserves mining schedule (Table 4 and Table 5) applicable to the Nooitgedacht Colliery.

Table 4: Coal reserves (4 Seam)

Coal seam	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
4 Seam	1 390 000 tonne	3 280 000 tonne	3 360 000 tonne	3 360 000 tonne	3 360 000 tonne	2 853 651 tonne	2 094 863 tonne

Table 5: Coal reserves (2 Seam)

Coal seam	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
2 Seam	500 000 tonne	1 030 000 tonne	3 064 051 tonne	3 120 000 tonne	3 120 000 tonne	3 120 000 tonne	2 333 386 tonne

5 Policy and legislative context

Table 6 is a summary of the policy and legislative context applicable to the proposed Nooitgedacht Colliery.

Table 6: Policy and legislative context

Applicable Legislation and Guidelines used to compile the Report	Reference where applied	Compliance and response of the proposed project
The Constitution of the Republic of South Africa, 1996.	Throughout this Scoping Report.	The Constitution of the Republic of South Africa was considered and applied to throughout the Scoping report 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 June 2014 EMPr (approved on 19 September 2019) will be amended in terms of section 102 of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002), to include for the activities at the Nooitgedacht Colliery. The amendment will be done as part of the Environmental Impact Assessment Report and Environmental Management Programme Report ("EIAR and EMPr").
The Mineral and Petroleum Resources Development Regulations (GN R527 dated 2004).		The EIAR and EMPr to be conducted will comply to the requirements of the Mineral and Petroleum Resources Development Regulations (GN R527 dated 2004).
The National Environmental Management Act (Act No. 107 of 1998 as amended).		The Scoping Report has been compiled in terms of GN R.982, 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 R982 dated 2014, as amended).		The Scoping Report 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 R983 dated 2014, as amended).	Part 4.1 of this Scoping Report.	Listing Notice 1 and Listing Notice 2 activities are applied for the Nooitgedacht Colliery.
The Environmental Impact Assessment Regulation. Listing Notice 2. (GN R984 dated 2014, as amended).		
Integrated Environmental Management Guideline: Guideline on Need and Desirability (2017).	Part 6.1 of this Scoping Report.	The need and desirability were assessed for the proposed Nooitgedacht Colliery.
Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector.	Chapters E, F and L of Part 8.4.1 of this Scoping Report.	Biodiversity related to the Nooitgedacht Colliery and to alternatives was considered.

Applicable Legislation and Guidelines used to compile the Report	Reference where applied	Compliance and response of the proposed project
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 R704).	Part 9.9 and Chapter G of Part 8.4.1 of this Scoping Report.	Storm water management measures, in compliance to GNR 704, will be implemented at the proposed Nooitgedacht Colliery.
The National Environmental Management: Biodiversity (Act 10 of 2004, as amended).	Chapter E, F and L of Part 8.4.1 of this Scoping Report.	Biodiversity related to the Nooitgedacht Colliery and alternatives was considered. No permits and/or licences in terms of National Environmental Management: Biodiversity (Act 10 of 2004, as amended) will be required for the proposed Nooitgedacht Project.
Alien and Invasive Species Regulations (GN R598 dated 2014).		The occurrence of alien and invasive species will be assessed and mitigated (in accordance to these regulations) during the construction and operational phases of the proposed Nooitgedacht Colliery.
Conservation of Agricultural Resources (Act 43 of 1983).		Erosion potential will be assessed and mitigated (in accordance to this act) during the construction and operational phases of the proposed Nooitgedacht Colliery.
The National Environmental Management: Air Quality (Act 39 of 2004, as amended).	Chapter I of Part 8.4.1 of this Scoping Report.	The proposed Nooitgedacht Colliery does not require an Atmospheric Emissions Licence (“AEL”).
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.	Chapter J of Part 8.4.1 of this Scoping Report.	The SABS Code of Practice 0103 will be taken into account when the mitigation measures for the proposed Nooitgedacht Colliery are formulated.
National Environmental Management: Waste Act (Act No. 59 of 2008, as amended).	Part 4.1 of this Scoping Report.	No waste management activities are applied for as part of the proposed Nooitgedacht Colliery.

Applicable Legislation and Guidelines used to compile the Report	Reference where applied	Compliance and response of the proposed project
National Heritage Resources Act (Act No. 25 of 1999, as amended).	Chapter K of Part 8.4.1 of this Scoping Report.	Heritage resources related to the Nooitgedacht Colliery were identified and considered as part of this report.
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.	Part 8.2 and 9.7 of this Scoping Report.	The public participation process was done in accordance to the DMRE guideline for consultation with communities and interested and affected parties.
Integrated Environmental Management Information Series. Criteria for determining alternatives in EIA.	Part 8.7 and Part 9.1 of this Scoping Report.	Location, conveyance and no-go alternatives were assessed for the proposed Nooitgedacht Colliery.
Government Gazette 39425. Government Notice R.1147 dated 2015, "*Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations*"	The financial provisioning regulations were not considered specifically as part of this Scoping Report. The financial provisioning for the Nooitgedacht Colliery will be included in the EIAR and EMPr.	

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. Table 7 indicates on how the guideline requirements were considered in this Scoping Report.

Table 7: Need and Desirability of the proposed activities

Requirement	Part where requirement is addressed/response
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?[4]	The 2018 National Biodiversity Assessment ("NBA") indicate a few areas within the Nooitgedacht Colliery to be the remaining extent of the vulnerable Eastern Highveld Grassland Ecosystem. According to the NBA (2018) this ecosystem is classified as poorly protected. The majority of the Nooitgedacht Colliery area (± 70%) is classified as heavily modified, mainly due to historic mining activities and agriculture (crop production). The areas have been modified to such an extent that any valuable biological and ecological functions have been lost. Vegetation and fauna sensitivity, wetlands and protected areas and conservation planning are described in Chapters E, F and L of Part 8.4.1 of this Scoping Report.
1.1 How were the following ecological integrity considerations taken into account?	
1.1.1 Threatened Ecosystems[5]	
1.1.2 Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure[6]	
1.1.3 Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs").	
1.1.4 Conservation targets	
1.1.5 Ecological drivers of the ecosystem.	
1.1.6 Environmental Management Framework.	Refer to Chapter M of Part 8.4.1 of this Scoping Report.
1.1.7 Spatial Development Framework.	
1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)[7]	<u>Climate change:</u> A climate change impact assessment will be undertaken with the outcome of this assessment and mitigation measures to be discussed in the EIAR and EMPr. <u>Air quality:</u> The Nooitgedacht Colliery location falls within the Highveld Priority Area ("HPA"), one of South Africa's declared airshed priority areas. The Highveld area in South Africa is associated with poor air quality, and elevated concentrations of

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

[5] Must consider the latest information including the notice published on 9 December 2011 (Government Notice No. 1002 in Government Gazette No. 34809 of 9 December 2011 refers) listing threatened ecosystems in terms of Section 52 of National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

[6] Section 2(4)(r) of NEMA refers.

[7] Section 2(4)(n) of NEMA refers

Requirement	Part where requirement is addressed/response
	criteria pollutants occur due to the concentration of industrial and non-industrial sources.
1.2 How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[8]	The preliminary potential impacts that have been identified and may occur as a result of the proposed project have been discussed in Part 8.5 of this document. The impacts will be further discussed and assessed in greater detail as part of the EIAR and EMPr.
1.3 How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[9]	
1.4 What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?[10]	Refer to Section 4.2.5 of this Scoping Report for detail with regards to non-mineral waste management.
1.5 How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[11]	Refer to Chapter K of Section 8.4.1.
1.6 How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure	The Nooitgedacht Project will, as part of the mining activities, result in the destruction of the geological strata. Due to the nature of this project

[8] Section 24 of the Constitution and Sections 2(4)(a)(i) and 2(4)(b) of NEMA refer.

[9] Section 24 of the Constitution and Sections 2(4)(a)(ii) and 2(4)(b) of NEMA refer

[10] Section 24 of the Constitution and Sections 2(4)(a)(iv) and 2(4)(b) of NEMA refer

[11] Section 24 of the Constitution and Sections 2(4)(a)(iii) and 2(4)(b) of NEMA refer.

Requirement	Part where requirement is addressed/response
responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[12]	(i.e. coal mining), impact on the non-renewable resources is expected. Water supply for processing activities is not relevant as no washing plant will be established at the Nooitgedacht Project. Coal will be transported to the South Witbank Colliery processing plant. Water will be required for mining underground as well as dust suppression on surface. The impact on natural resources is thus regarded to be low.
1.7 How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?[13]	The potential impacts that may occur as a result of the proposed activities have been preliminarily identified and discussed in Part 8.5. The impacts will be described and assessed in detail as part of the EIAR and EMPr.
1.7.1 Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)	
1.7.2 Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)	

[12] Section 24 of the Constitution and Sections 2(4)(a)(v) and 2(4)(b) of NEMA refer.

[13] Section 24 of the Constitution and Sections 2(4)(a)(vi) and 2(4)(b) of NEMA refer.

Requirement	Part where requirement is addressed/response
1.7.3 Do the proposed location, type and scale of development promote a reduced dependency on resources?	
1.8 How were a risk-averse and cautious approach applied in terms of ecological impacts?[14]	A risk-averse and cautious approach will be applied by the undertaking of specialist studies. A conservative approach will be followed in terms of the identification and assessing of environmental impacts associated with the proposed project during the EIAR / EMPr phase.
1.8.1 What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Refer also to Part 8.6.2 of this Scoping Report.
1.8.2 What is the level of risk associated with the limits of current knowledge?	The level of risk associated with the limits of current knowledge (during the Scoping Phase) can be considered low. The potential risks have been identified in Part 8.5 and will be further assessed in detail as part of the EIAR and EMPr.
1.8.3 Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
1.9 How will the ecological impacts resulting from this development impact on people's environmental right in terms following:[15]	
1.9.1 Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	All potential negative and positive impacts associated with the Nooitgedacht Colliery have been preliminarily identified and discussed in Part 8.5 below. These impacts will be discussed, assessed and the significance determined during the EIAR and EMPr.
1.9.2 Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	
1.10 Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-	

[14] Section 24 of the Constitution and Section 2(4)(a)(vii) of NEMA refer.

[15] Section 24 of the Constitution and Sections 2(4)(a)(viii) and 2(4)(b) of NEMA refer

Requirement	Part where requirement is addressed/response
economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	
1.11 Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	
1.12 Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?[16]	Refer to Part 8.1 of this report for an assessment of the alternatives identified.
1.13 Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?[17]	A preliminary determination of the potential impacts associated with the Nooitgedacht Colliery has been included in Part 8.5 of this document. These impacts (including the residual and cumulative impacts) will be described and assessed in detail and the significance determined as part of the EIAR and EMPr.
2. "Promoting justifiable economic and social development"[18]	
2.1 What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
2.1.1 The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,	Refer to Chapter N of Part 8.4.1 of this document. A preliminary determination of the potential impacts associated with the Nooitgedacht Colliery has been included in Part 8.5 of this document. These impacts (including the residual and cumulative impacts) will be described and assessed in detail and the significance determined as part of the EIAR and EMPr phase of the project.
2.1.2 Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	

[16] Section 2(4)(b) of NEMA refer

[17] Regulations 22(2)(i)(i), 28(1)(g) and 31(2)(1) in Government Notice No. R. 543 refer

[18] Section 24 of the Constitution refers.

Requirement	Part where requirement is addressed/response
2.1.3 Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	
2.1.4 Municipal Economic Development Strategy ("LED Strategy").	
2.2 Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	
2.2.1 Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	
2.3 How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?[19]	
2.4 Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term?[20] Will the impact be socially and economically sustainable in the short- and long-term?	
In terms of location, describe how the placement of the proposed development will:[21]	
2.4.1 result in the creation of residential and employment opportunities in close proximity to or integrated with each other,	The negative and positive impacts that have been preliminarily identified as part of the Scoping Phase have been described in Part 8.5 below. These impacts will be further described in detail, assessed and the significance determined during the EIAR and EMPr Phase. The development will be socially- and economically sustainable as the Life of the project will be approximately 12 years. During this period, social and economic structures within the local communities will be supported by the
2.4.2 reduce the need for transport of people and goods,	
2.4.3 result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	
2.4.4 compliment other uses in the area,	

[19] Section 2(2) of NEMA refers

[20] Sections 2(2) and 2(4)(c) of NEMA refers.

[21] Section 3 of the Development Facilitation Act, 1995 (Act No. 67 of 1995) ("DFA") and the National Development Plan refer

Requirement	Part where requirement is addressed/response
2.4.5 be in line with the planning for the area,	project in terms of job creation and social responsibility.
2.4.6 for urban related development, make use of underutilised land available with the urban edge,	
2.4.7 optimise the use of existing resources and infrastructure,	
2.4.8 opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	
2.4.9 discourage "urban sprawl" and contribute to compaction/densification,	
2.4.10 contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	
2.4.11 encourage environmentally sustainable land development practices and processes,	Effective environmental management and mitigation of environmental impacts. Refer to Part 9.9. Detailed management and mitigation measures will be included in the EIAR and EMPr.
2.4.12 take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	The Nooitgedacht Colliery location (i.e. shaft and infrastructure) was determined by the disturbance footprint of the previous mining activities undertaken by AOPL. Refer also to Section 8.1 for details of alternatives.
2.4.13 the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	The proposed mining operation will result in high socio-economic returns. The Nooitgedacht Colliery is anticipated to support jobs and livelihoods for a period of 12 years and is thus regarded as having a positive impact in this regard.
2.4.14 impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	
2.4.15 in terms of the nature, scale and location of the development promote or act as a	A conservative approach will be followed in terms of the identification and assessing of

Requirement	Part where requirement is addressed/response
catalyst to create a more integrated settlement?	environmental impacts associated with the Nooitgedacht Colliery during the EIAR and EMPr
2.5 How were a risk-averse and cautious approach applied in terms of socio-economic impacts?[22]	
2.5.1 What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?[23]	The following assumptions are made: • That socio-economic information provided by the applicant and stakeholders regarding the Nooitgedacht Colliery is correct. • That the mitigation measures proposed in this report and the EIAR and EMPr are implemented correctly and are effective. • All research/reference sources are accurate. • That there will be no significant changes to the proposed project that could affect the findings and recommendations of this report and the EIAR and EMPr. Based on the above descriptions, it is our opinion that the level of risk associated with the limits of current knowledge (in terms of socio-economic aspects) is low.
2.5.2 What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	
2.5.3 Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
2.6 How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.6.1 Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	The negative socio-economic impacts that have been preliminarily identified is that of impacts on the adjacent communities in terms of sense of place, dust, noise generation and water availability (due to dewatering activities). The impacts will be further described and assessed, and the significance determined as part of the EIAR and EMPr phase of the project.
2.6.2 Positive impacts. What measures were taken to enhance positive impacts?	Refer to Part 8.7 of this report for an identification of the positive impacts.
2.7 Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages	The preliminarily identified impacts of the proposed activities are presented in Part 8.5 of this document.

[22] Section 2(4)(a)(vii) of NEMA refers.

[23] Section 24(4) of NEMA refers.

Requirement	Part where requirement is addressed/response
and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	
2.8 What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?[24]	Refer to Part 8.1 of this report for an assessment of the alternatives identified and their potential impacts on the social environment.
2.9 What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?[25] Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	
2.10 What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?[26]	Refer to Point 2.6 (of this table) above.
2.11 What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?[27]	The identification of the potential impacts has been presented in Part 8.5 below. The potential impacts will be further described and assessed in detail and the significance determined as part of the EIAR / EMPr phase of the project. Mitigation measures will also be provided for each potential impact that may occur.
2.12 What measures were taken to:	

[24] Section 2(4)(b) of NEMA refers.

[25] Section 2(4)(c) of NEMA refers.

[26] Section 2(4)(d) of NEMA refers.

[27] Section 2(4)(e) of NEMA refers.

Requirement	Part where requirement is addressed/response
2.12.1 ensure the participation of all interested and affected parties,	Refer to the Public Participation Report attached hereto as Annexure D.
2.12.2 provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,[28]	
2.12.3 ensure participation by vulnerable and disadvantaged persons,[29]	
2.12.4 promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,[30]	
2.12.5 ensure openness and transparency, and access to information in terms of the process,[31]	
2.12.6 ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge[32]*, and*	
2.12.7 ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were being promoted?[33]	Refer to the Public Participation Report attached hereto as Annexure D. The Public Participation Report presents the detail of all Interested and Affected Parties ("I&APs") that were identified, how the I&APs were notified and involved in the process, any issues and concerns raised by the I&APs, and the final results of the Public Participation Process.
2.13 Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of	

[28] Section 2(4)(f) of NEMA refers

[29] Section 2(4)(f) of NEMA refers.

[30] Section 2(4)(h) of NEMA refers.

[31] Section 2(4)(k) of NEMA refers.

[32] Section 2(4)(g) of NEMA refers.

[33] Section 2(4)(q) of NEMA refers.

Requirement	Part where requirement is addressed/response
the local area (or that is proportional to the needs of an area)?[34]	
2.14 What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?[35]	All contractors, sub-contractors and workers will attend compulsory environmental awareness training and inductions. This training will highlight the dangers associated with the workplace. Procedures relating to environmental risks will also be put in place and will be regularly updated.
2.15 Describe how the development will impact on job creation in terms of, amongst other aspects	
2.15.1 the number of temporary versus permanent jobs that will be created,	The proposed Nooitgedacht Colliery will contribute to job security and socio-economic well-being of the area.
2.15.2 whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	
2.15.3 the distance from where labourers will have to travel,	
2.15.4 the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and	
2.15.5 the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.16 What measures were taken to ensure:	
2.16.1 that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and	Refer to the Public Participation Report attached hereto as Annexure D. Other government departments are included on the list of I&APs and stakeholders and received the notifications of the proposed activity as well as notifications on the availability of the report for review. All applicable environmental legislation was considered during the scoping process.
2.16.2 that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	
2.17 What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of	During the initial Public Participation Process, all issues and concerns raised by the I&APs,

[34] Section 2(4)(g) of NEMA refers.

[35] Section 2(4)(j) of NEMA refers

Requirement	Part where requirement is addressed/response
environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?[36]	stakeholders and the Organs of State are considered, and responses provided.
2.18 Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?[37]	Mitigation measures for each of the identified impacts will be described in detail in the EIAR and EMPr. The proposed mitigation measures will be realistic to protect both the bio-physical and socio-economic environment in both the short- and long-term.
2.19 What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?[38]	The applicant will be responsible for the costs of any remediation of pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects. The Financial Provisioning for the Nooitgedacht Colliery will be included and discussed in detail in the EIAR and EMPr.
2.20 Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?[39]	The alternatives for the Nooitgedacht Colliery are described in Part 8.1 below. The alternatives will be further assessed in greater detail in the EIAR and EMPr phase
2.21 Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?[40]	The preliminarily identified impacts have been presented in Part 8.5 below. The impacts will be further described and assessed, and the significance determined as part of the EIAR and EMPr. All residual and cumulative impacts will also be described and assessed in the EIAR and EMPr.

[36] Section 2(4)(o) of NEMA refers.

[37] Section 240(1)(b)(iii) of NEMA and the National Development Plan refer.

[38] Section 2(4)(p) of NEMA refers.

[39] Section 2(4)(b) of NEMA refers.

[40] Regulations 22(2)(i)(i), 28(1)(g) and 31(2)(1) in Government Notice No. R. 543 refer.

7 Period for which environmental authorisation is required

The mining activities at Nooitgedacht Colliery will be undertaken over a period of 12 years. Therefore, the period for which environmental authorisation is required will be for at least 15 years (including 1 year for construction) (excluding decommissioning activities).

8 Description of the process followed to reach the proposed preferred site

8.1 Details of alternatives considered

The following alternatives have been identified as part of the Nooitgedacht Colliery and will be further be assessed in the EIAR and EMPr.

8.1.1 Shaft infrastructure layout

Three alternatives in terms of shaft infrastructure layout have been identified (see Figure 18, Figure 19 and Figure 20 below). These include:

- **Alternative SIL1**: All infrastructure on previously disturbed areas.
- **Alternative SIL2**: Change in waste rock dump position to collect runoff in original PCD location. All other infrastructure on previously disturbed areas.
- **Alternative SIL3**: Construct a smaller PCD in the previously disturbed PCD area. All other infrastructure on previously disturbed areas.

8.1.2 Coal conveyance alternatives

Two alternatives in terms of coal conveyance to the South Witbank Colliery (“SWC”) plant have been identified and include the following:

- **Alternative CC1**: Conveying of coal material to the SWC plant via conveyor.
- **Alternative CC2**: Trucking coal material from the Nooitgedacht Colliery to the SWC plant.

Both alternative CC1 and alternative CC2 will be undertaken in the footprint of the servitude that has been assessed as part of this Scoping Report and that will be further assessed as part of the EIAR and EMPr.

8.1.3 No-go option

If the project does not realise, the status quo environmental conditions of the application site will mostly remain as is.

Physical and biophysical environment – The Nooitgedacht Colliery is expected to create a number of environmental impacts of which include potential impacts on water resources, wetlands, and air quality,

including potential cumulative impacts (when considering the location of the proposed project in relation to other mining activities).

Social – A number of social impacts have been provisionally identified and include impacts on sense of place, dust, noise generation and water availability. Furthermore, a number of positive social related impacts have been identified. The Nooitgedacht Colliery is anticipated to support jobs and livelihoods for a period of 12 years and is thus regarded as having a positive impact in this regard.

Economic – Should the environmental authorisation not be granted, job security and the sustaining of livelihoods in the area may be lost and skills development may cease. Further to this, it is envisaged that employees from the Glencore Tugo operation, which will go into closure at the time the Nooitgedacht Project is expected to commence, will be transferred to the Nooitgedacht Colliery. This will ensure the retaining of jobs for employees currently working at the Tugo operation.

8.2 Details of the Public Participation Process followed

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

- Advertisements.
    - A Newspaper advertisement was placed in the Witbank News on the 12th of November 2020.
- Site notices.
    - Site notices were placed around the proposed project site.
- Written notices.
    - Written notices (including Background Information Documents) were distributed to Interested and Affected Parties (“I&APs”).
- Availability of Scoping Report for public review
    - This Scoping Report was made available for public and stakeholder review for a period of 30 days (from 12th of November to 11th December 2020). 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.

8.3 Summary of issues raised by I&APs

Table 8 below will be completed when the final Scoping Report is compiled and will provide a summary of the comments and issues raised and responses thereto.

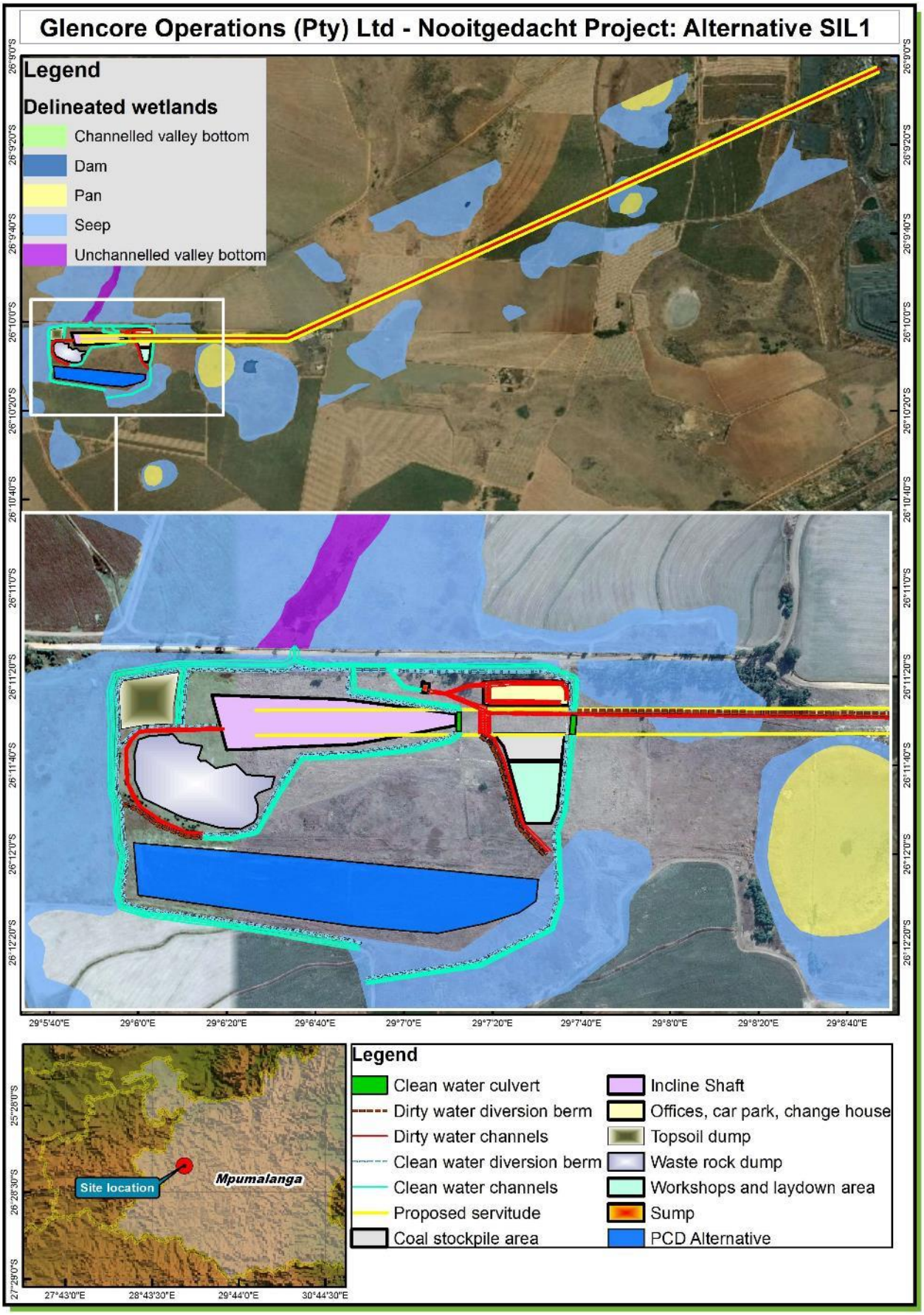


Figure 18: Shaft infrastructure layout alternative SIL1

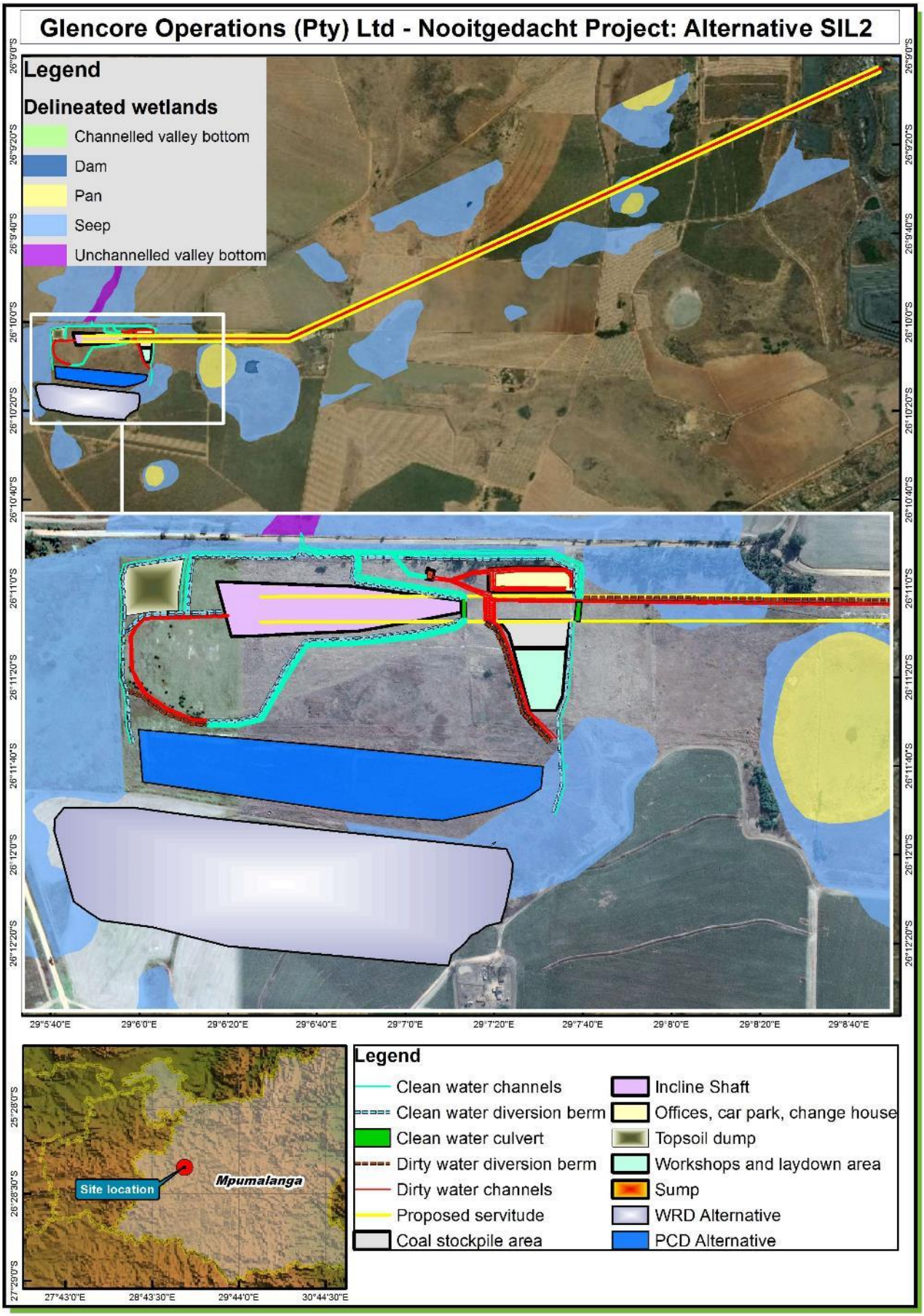


Figure 19: Shaft infrastructure layout alternative SIL2

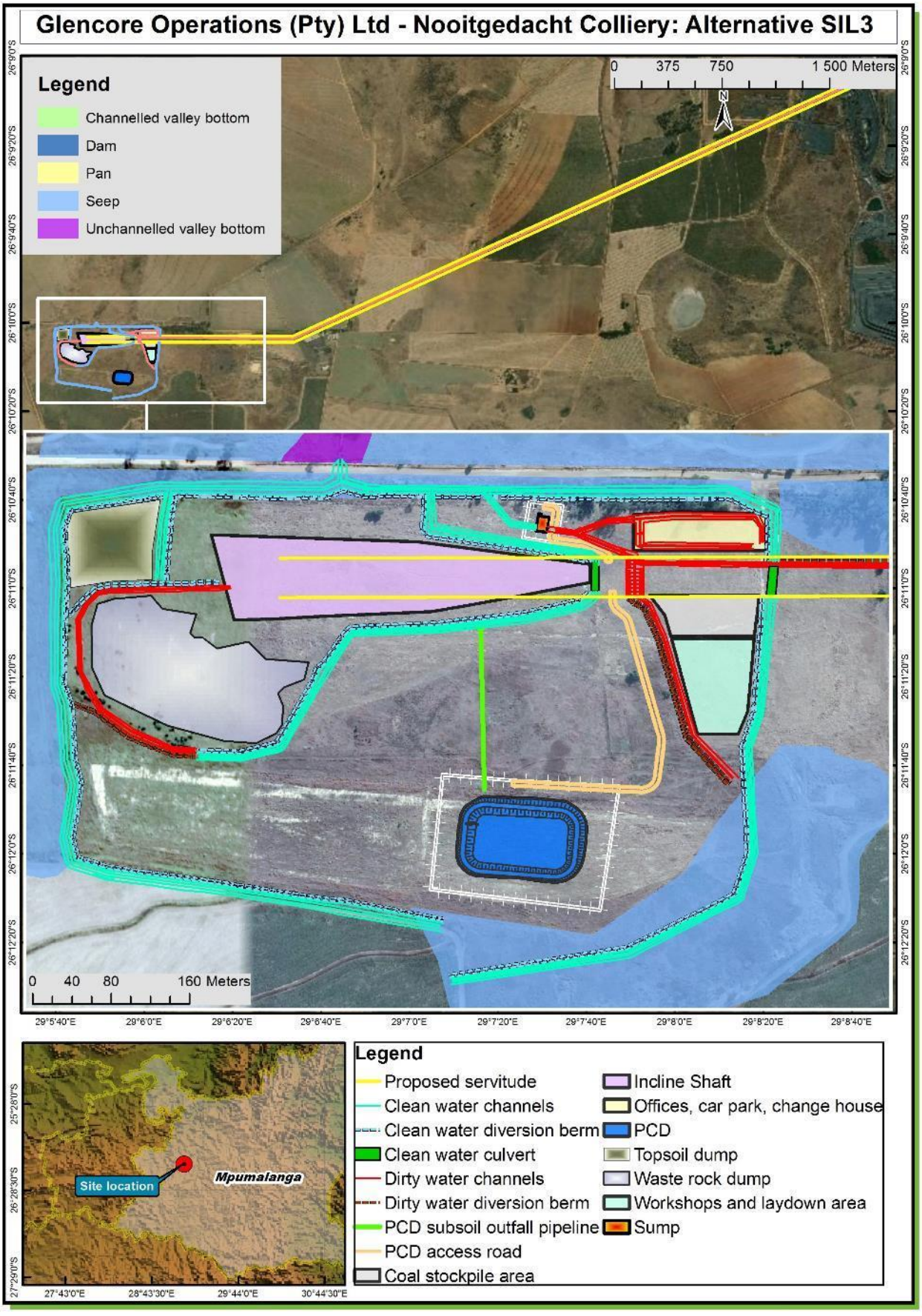


Figure 20: Shaft infrastructure layout alternative SIL3

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.
To be completed upon completion of the public participation process.				

8.4 Description of baseline environment

8.4.1 The type of environment affected by the Nooitgedacht Colliery

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;
- Chapter K: Archaeology and cultural history;
- Chapter L: Sensitive landscapes;
- Chapter M: Visual aspects; and
- Chapter N: Regional socio-economic structure.

Section 8.4.1 provides both a summary of the baseline environment as applicable to the Nooitgedacht Colliery informed by:

- Digby Wells. 2014. *Amendment to The Nooitgedacht Environmental Impact Assessment and Environmental Management Programme: Inclusion of Seams 2 and 4.*
- Scientific Terrestrial Services. 2020. *Biodiversity Assessment as Part of The Environmental Impact Assessment (EIA) And Authorisation Process for The Proposed Development of An Incline Shaft and Associated Infrastructure at The Glencore Nooitgedacht Mine, Mpumalanga Province*.

- Sidney Miller. 2019. *1st phase Heritage Impact Assessment ("HIA") of a portion of Nooitgedacht 37 IS in the Ogies district, Mpumalanga for Glencore Operations Limited – Nooitgedacht Project ("Glencore").*
- eMalahleni Local Municipality. *Integrated Development Plan 2017/18 – 2021/22.*
- Golder Associates. 2019. Glencore Operations South Africa (Pty) Ltd Hydrogeological Investigation – Nooitgedacht.
- Golder Associates. 2019. Storm Water Management report for the Nooitgedacht Colliery Water Use Licence Application.
- Golder Associates. 2019. Surface water and Aquatic Biota Impact Assessment Report for the Nooitgedacht Colliery Water Use Licence Application.
- WCS Scientific (Pty) Ltd. 2019. Glencore Nooitgedacht Shaft Wetland Delineation and Assessment Study.

Chapter A: Geology

The following information was obtained from the *Amendment to The Nooitgedacht Environmental Impact Assessment and Environmental Management Programme: Inclusion of Seams 2 and 4*, dated 2014.

Regional geology

South Africa's coal deposits occur in the Karoo Supergroup, a thick sequence of sedimentary rocks deposited between 300 and 180 million years ago (McCarthy and Pretorius, 2009; Anglo American, 2011). Nooitgedacht Colliery will be located within the Witbank coalfield. The coalfield is underlain by pre-Karoo strata belonging to the Transvaal Supergroup and Bushveld Complex. Glacial events at the beginning of the Permian Period resulted in the deposition of tillite (Dwyka Formation) on the basement rocks over most of the area. Within the Karoo sedimentary sequence, the Ecca Group rest on top of the Dwyka Formation. The coal seams are found within the Ecca Group. Although rocks of the Ecca Group are widespread around the country, conditions suitable for the formation of coal did not occur everywhere and the coal deposits are restricted, occurring in the main Karoo basin in an arc from Welkom in Free State Province to Nongoma in KwaZulu-Natal, and in several smaller outlying remnants of the Karoo Supergroup.

In the Witbank Coalfield, six coal seams (numbered 1 through 6 from the base upwards) are contained in succession comprising dominantly of sandstone with subordinate siltstone, mudstone and shale (Vryheid Formation). Partings between the seams are relatively constant, however, seam splitting is common. All the coal seams of the Witbank Coalfield are found towards the base of the Ecca Group in the Vryheid Formation. The distribution and attitude of the No. 1 and No. 2 seams are largely determined by the pre-Karoo topography. Sub-crop positions of all seams are controlled by the present-day erosion surface. It should be noted that the No. 6 Seam is rarely preserved in the present-day strata of the Vryheid Formation. Generally, the No. 1, 2, 4 and 5 seams are considered economic based on seam thickness and quality. Intrusive dykes and sills, predominately doleritic in composition, are common and devolatilisation of the coal adjacent to the intrusives can be significant.

Local geology

Nooitgedacht Colliery is underlain by a prominent pre-Karoo high consisting of Rooiberg felsite and the stratigraphy is typical of the Witbank Coalfield. Geological logs of the drilled percussion boreholes show that at least three coal seams are present, i.e. the No. 2, 4 and 5 seams. The other seams are either not fully developed or too thin to be identified from percussion drilling.

The local stratigraphic profile can best be represented by the lithological log of borehole NGDBH12. The geology can be summarised as follows:

- All the coal seams terminate towards the south-east, against the North West-South East trending pre-Karoo high,
- Based on the percussion boreholes and exploration data, the average thickness of the coal seams is:
    - No. 5 seam is 2.0 m and varies between 0 and 2.8 m,
    - No. 4 seam is 5.5 m and varies between 4.1 and 6.2 m, and
    - No. 2 seam is 7.0 m and varies between 5.3 and 9.7 m.
- The average depth of the coal seam floors below surface are:
    - No. 5 seam is 41.2 m and varies between 5 and 76.3 m. The depth increases towards the north-west. The Karoo valley shallows out dramatically towards the pre-Karoo outcrop causing the No. 5 seam to climb steeply before it terminates,
    - No. 4 seam is 71.6 m and varies between 35 and 102.4 m. The depth increases towards the north-west, and
    - No. 2 seam floor is 98.1 m and varies between 60 and 126.7 m. The depth also increases towards the northwest.
- In general, the depth of weathering does not extend deeper than the first 10 to 15 metre,
- A dolerite sill ranging in the thickness from 6 m to 18 m was intersected close to surface by a number of exploration and percussion boreholes in the north-western corner of the project area, and
- An aeromagnetic survey had been conducted over the reserve area and no major dykes were indicated. No dykes were also encountered during the percussion drilling.

Faults are rare, but fractures are common in the competent rocks such as sandstone and coal. A fault was interpreted from the geological logs in the south-western corner of the proposed mining area. Refer to Figure 21 for an illustration of the local geology of the area.

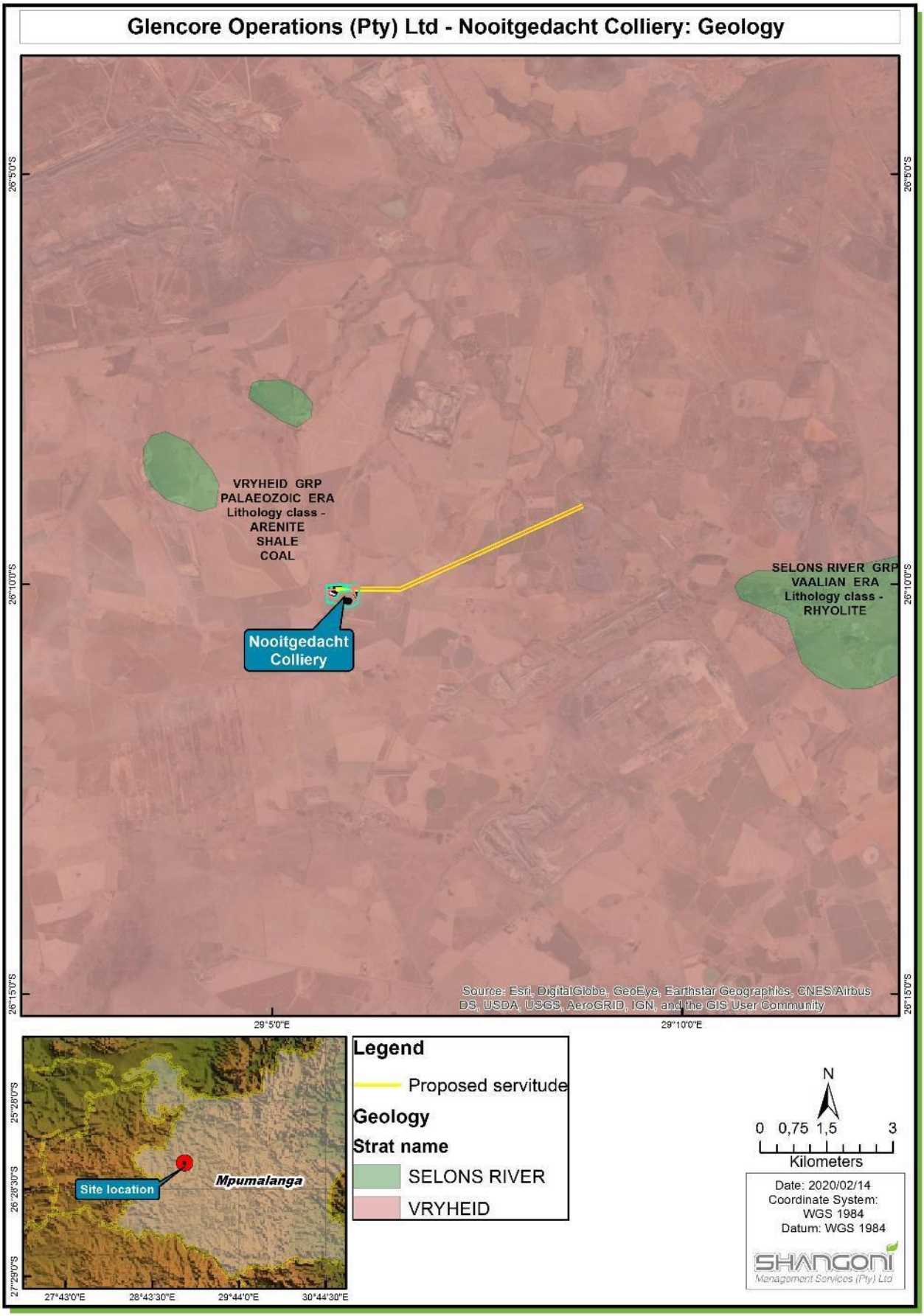


Figure 21: Geology applicable to the Nooitgedacht Colliery

Chapter B: Climate

The Nooitgedacht Colliery will be situated in the Highveld area of South Africa. The Highveld region experiences a subtropical highland climate. This climate type has the following characteristics: hot, humid summers with frequent late afternoon thunderstorms from November to March, and a cooler, dry and sunny winter season lasting from June to September. In a broader climatological sense, the dry season lasts from April and extends all the way into October, nearing the beginning of the hot, humid wet season.

Temperature

A graph of the MM5 AERMET processed meteorological data shows total average summer temperatures of approximately 21.5°C and average winter temperatures of approximately 11.20°C (Refer to Figure 22).

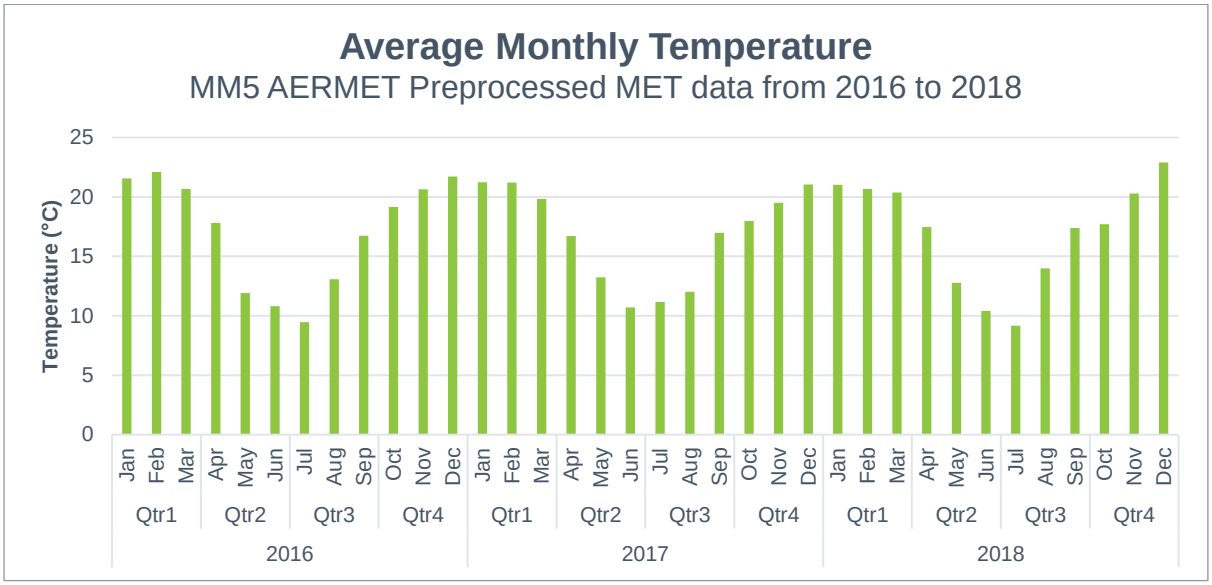


Figure 22: Monthly average temperature.

Rainfall

A graph of the MM5 AERMET processed meteorological data shows most of the rainfall takes place during spring and summer (November to February), with minimum rainfall recorded during winter (June to August). The area receives an average annual rainfall of 853.94 mm. (Refer to Figure 23).

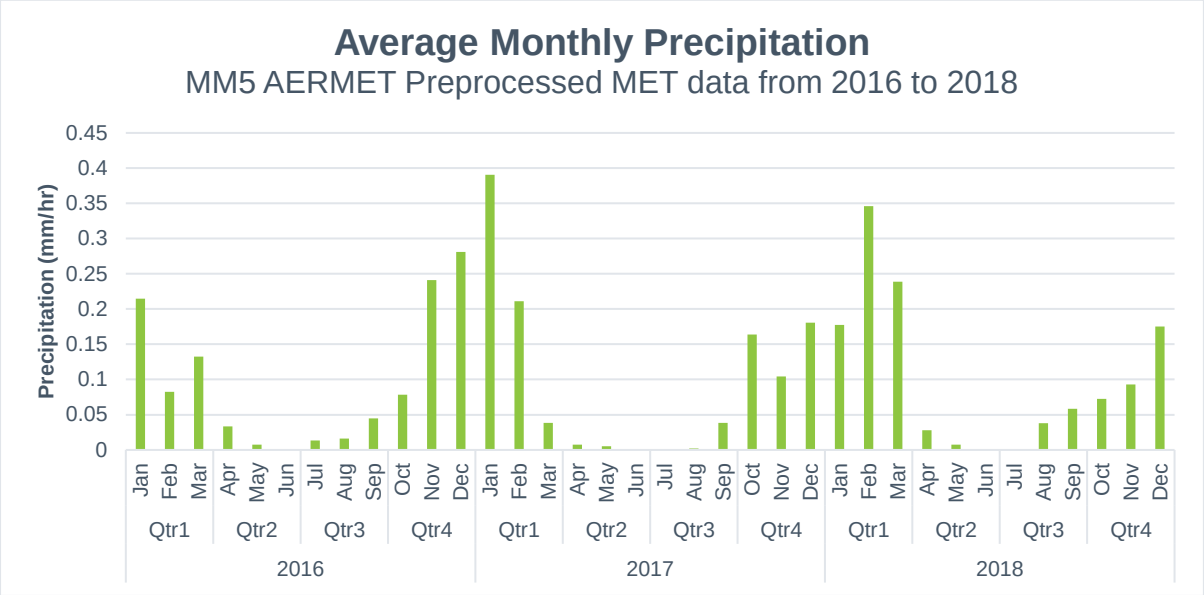


Figure 23: Monthly average rainfall.

Wind direction

The MM5 AERMET processed data shows the prevailing wind direction is from a north-east direction, blowing towards a south-west by south direction at a frequency of 24%. With an annual average wind speed of approximately 3.33 m/s. Winds of this speed can be described as a gentle breeze, characterised by leaves and small twigs in constant motion (SEPA, 2010). Calm winds[41] are experienced 3.24% of the time (Refer to Table 9 and Figure 24).

Table 9: Description of different wind speeds (SEPA 2010)

Force	Description	Observation	m/s
0	Calm	Smoke rises vertically.	0
1	Light air	Direction of wind shown by smoke drift, but not wind vane.	0.2-1.4
2	Light breeze	Wind felt on face; leaves rustle, ordinary vane moved by wind.	1.4-3.0
3	Gentle breeze	Leaves and small twigs in constant motion.	3.0-5.3
4	Moderate breeze	Raises dust and loose paper; small branch is moved.	5.3-8.0
5	Fresh breeze	Small trees and leaves begin to sway; small branches are moved.	8.0-10.8
6	Strong breeze	Large branches in motion; umbrellas used with difficulty.	10.8-13.9
7	Near gale	Whole trees in motion; pressure felt when walking against the wind.	13.9-16.9

41 Calm winds are defined by a wind speed less than the threshold of the wind instrument and coded as a zero-wind speed and direction.

Table 10: Average annual, diurnal and seasonal wind speeds and directions.

Year	Average speed	Calm winds	Directions (from)
Annual	3.24 m/s	6.92 %	NE (42 degrees)
Day	3.09 m/s	8.50 %	N (1 degrees)
Night	3.37 m/s	4.96 %	NE by E (59 degrees)
Autumn	2.83 m/s	7.74 %	E (88 degrees)
Winter	3.25 m/s	6.46 %	SE by E (121 degrees)
Spring	3.62 m/s	6.73 %	N by E (12 degrees)
Summer	3.27 m/s	6.73 %	NE by N (31 degrees)

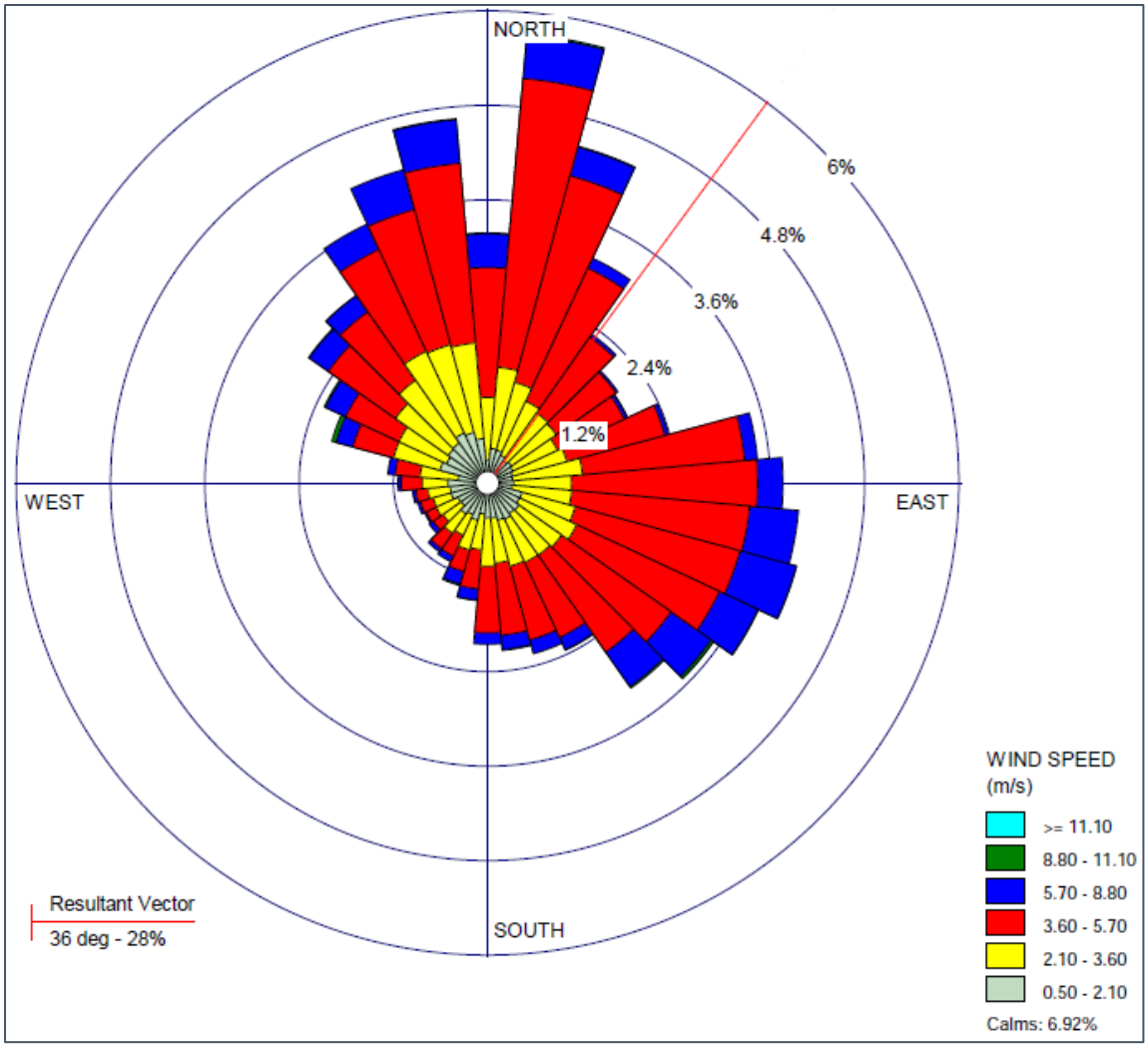


Figure 24: Annual wind rose plot.

Autumn average wind speed and direction

In autumn, the most prevailing wind is from an easterly direction. The average wind direction is from east to south-south easterly direction, blowing towards the north-west direction at a frequency of 17 %. The average wind speed is approximately 2.89 m/s; such winds are described as a light breeze,

characterised by leaves rustle, ordinary vane moved by wind. Calm winds are experienced 4.17 % of the time (Refer to Figure 25 and Table 10).

Winter average wind speed and direction

In winter, the most dominant wind is from the south-east by east direction. The average wind direction is from the south-east direction, blowing towards a north-west direction at a frequency of 16 %. The average wind speed is approximately 3.31 m/s; such winds are described as a gentle breeze, evident by leaves and small twigs in constant motion. Calm winds are experienced 4.06 % of the time (Refer to Figure 25 and Table 10).

Spring average wind speed and direction

In spring, the average wind direction and dominant wind direction is from the north by east direction, blowing towards the south by west direction at a frequency of 40 %. The average wind speed is approximately 3.76 m/s; such winds are described as gentle breeze evident from leaves and small twigs in constant motion. Calm winds are experienced 2.29 % of the time (Refer to Figure 25 and Table 10).

Summer average wind speed and direction

In summer, the most prevailing wind direction is from the north-east by north direction, blowing towards south-west by south direction at a frequency of 47 %. The average wind speed is approximately 3.39 m/s; such winds are described as a gentle breeze, evident in leaves and small twigs in constant motion. Calm winds are experienced 2.43% of the time (Refer to Figure 25 and Table 10).

Chapter C: Topography

The topography of the Nooitgedacht Colliery area can be described as slightly undulating, as is characteristic for this part of the Mpumalanga Province. Nooitgedacht Colliery will be located in a reasonably flat area. There are no major steep slopes within the project boundary, and slopes occurring in the vicinity are low, with no ridges or hills in the area. There is a gently dipping topography towards the southeast with an average elevation above mean sea level of 1 590 metre above mean sea level (mamsl). Refer to Figure 26 for an illustration of the topography of the area.

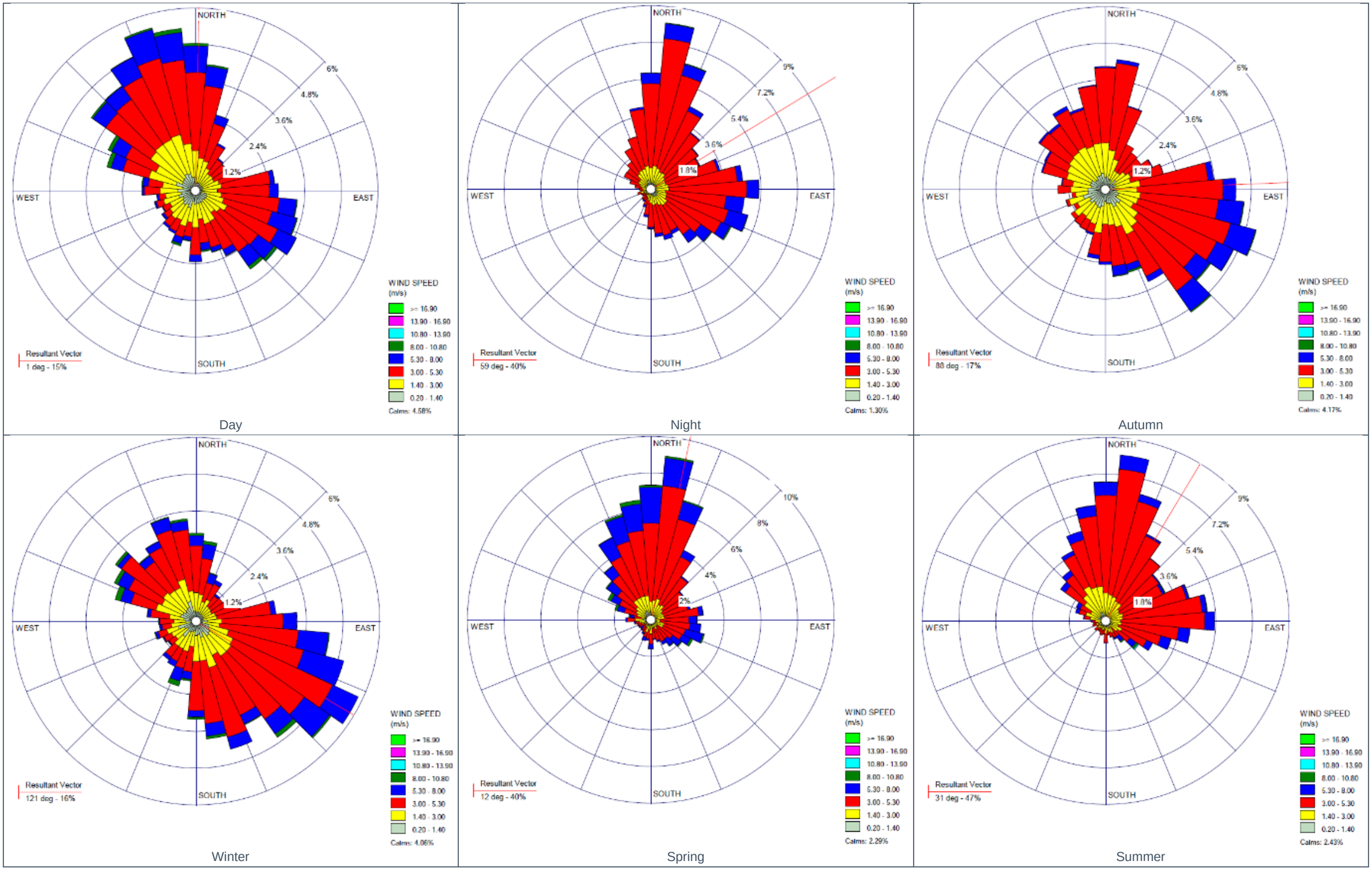


Figure 25: Seasonal and diurnal wind rose plots.

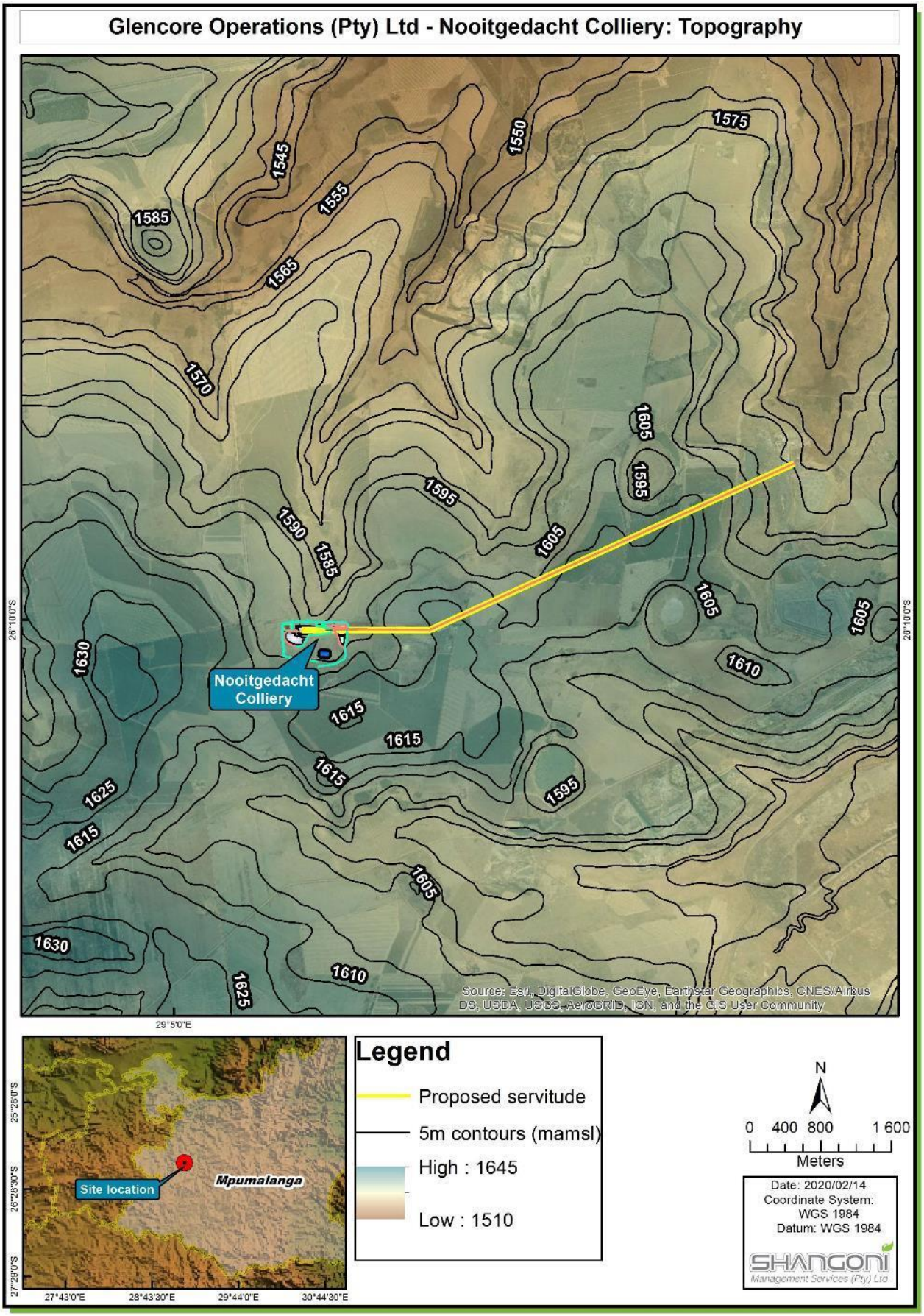


Figure 26: Topography map

Chapter D: Soils, land use and land capability

The following information was obtained from the *Amendment to The Nooitgedacht Environmental Impact Assessment and Environmental Management Programme: Inclusion of Seams 2 and 4*, dated 2014[42].

Soils

Sandstone is the only parent rock type in the area. However, the heavy vlei soils in the bottomland areas are colluvial (accumulated downslope as a result of gravitational action) and reflect the influence of both dolerite and sandstone. Soils within the area are dominated by the Hutton soil on the uplands and grading through Clovelly, Glencoe and Avalon forms on the slopes. Bottom-lands are characterised by Katspruit and Swartland soil forms. Refer to Figure 27 for an illustration of the soils in the area.

It should be noted that the soils within the Nooitgedacht Colliery shaft area were disturbed by previous mining activities.

Land capability and land use

The three classes of land capability defined are arable, wetland and pastures. Farming, opencast and underground coal mining, and power generation activities are the predominant land uses type in the vicinity. Refer to Figure 28 for an illustration of land cover associated with the area.

Chapter E: Vegetation

The following information was obtained from the *Biodiversity Assessment as Part of The Environmental Impact Assessment (EIA) And Authorisation Process for The Proposed Development of An Incline Shaft and Associated Infrastructure at The Glencore Nooitgedacht Mine, Mpumalanga Province*, dated 2020.

Floral Habitat Units

The vegetation associated with the Nooitgedacht Colliery area is severely degraded as a result of continuous anthropogenic related activities. From historic imagery it is evident that the area has been associated with agricultural activities since at least 1954 (earliest imagery obtained from the Department of Rural Development and Land Reform (“DLDLR”), where the majority of the area as well as the surrounding region was already largely transformed to agricultural croplands (Figure 29). The area has also become associated with mining activities between 1997 and 2003 based on satellite imagery (imagery obtained from the DRDLE and Google Earth, 2019[43]), where surface infrastructure associated with underground mining is evident between 2003 and 2013 (Figure 30). The area has been severely impacted either directly or as a result of edge effects from agriculture and mining, with proliferation by Alien Invasive Plant (“AIP”) species considered extensive throughout the area.

---

[42] This amendment to the EIA and EMPr was approved on 19 September 2019. No NEMA listed activities were applied for as part of this amendment.

[43] Google Earth Pro. Version 7.1.5.1557. (Various dates). Glencore, Mpumalanga. 26°10'9.96"S, 29° 6'20.01"E, eye alt 14.34 km. Maxmar Technologies 2019.

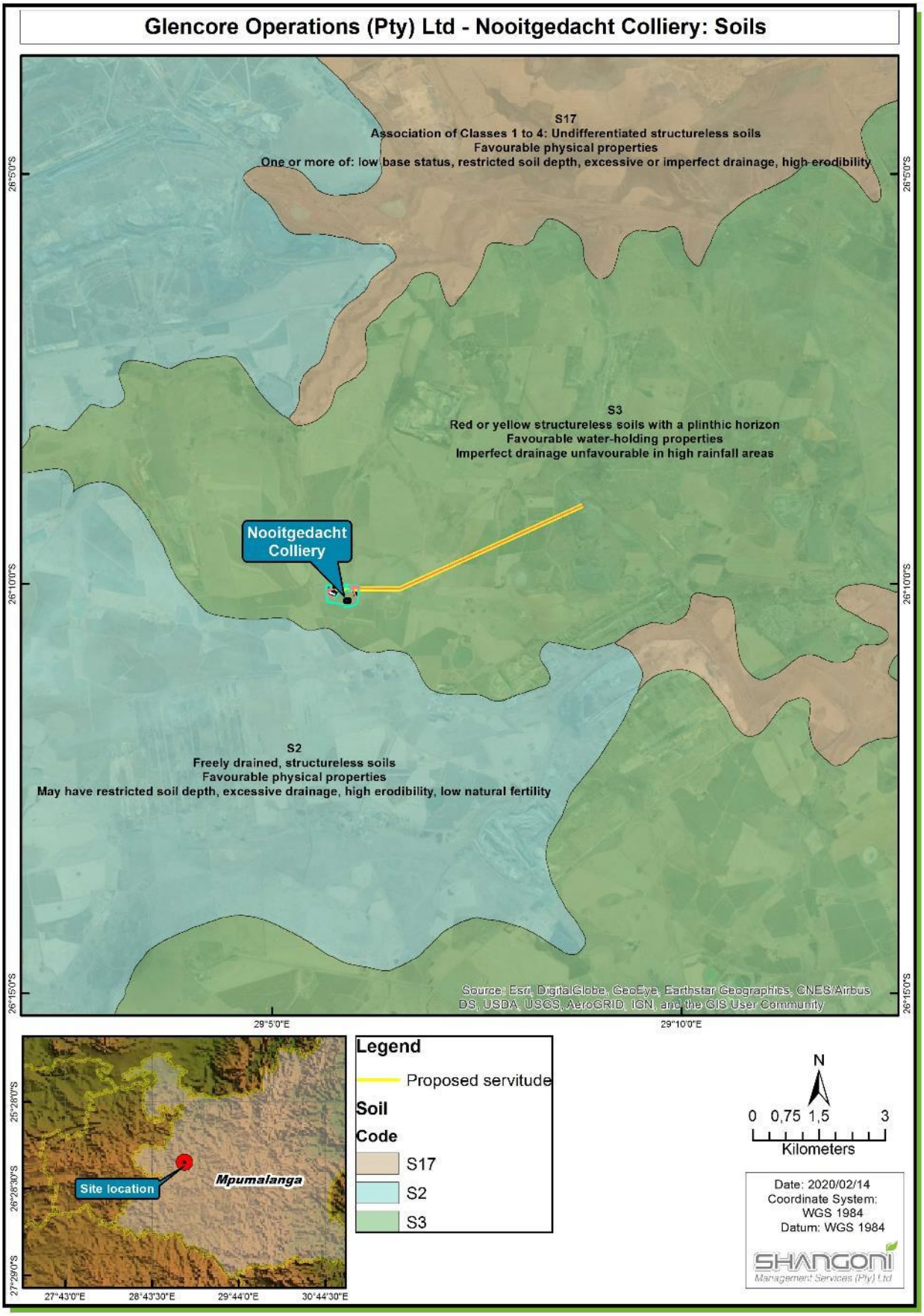


Figure 27: Soils applicable to the Nooitgedacht Colliery

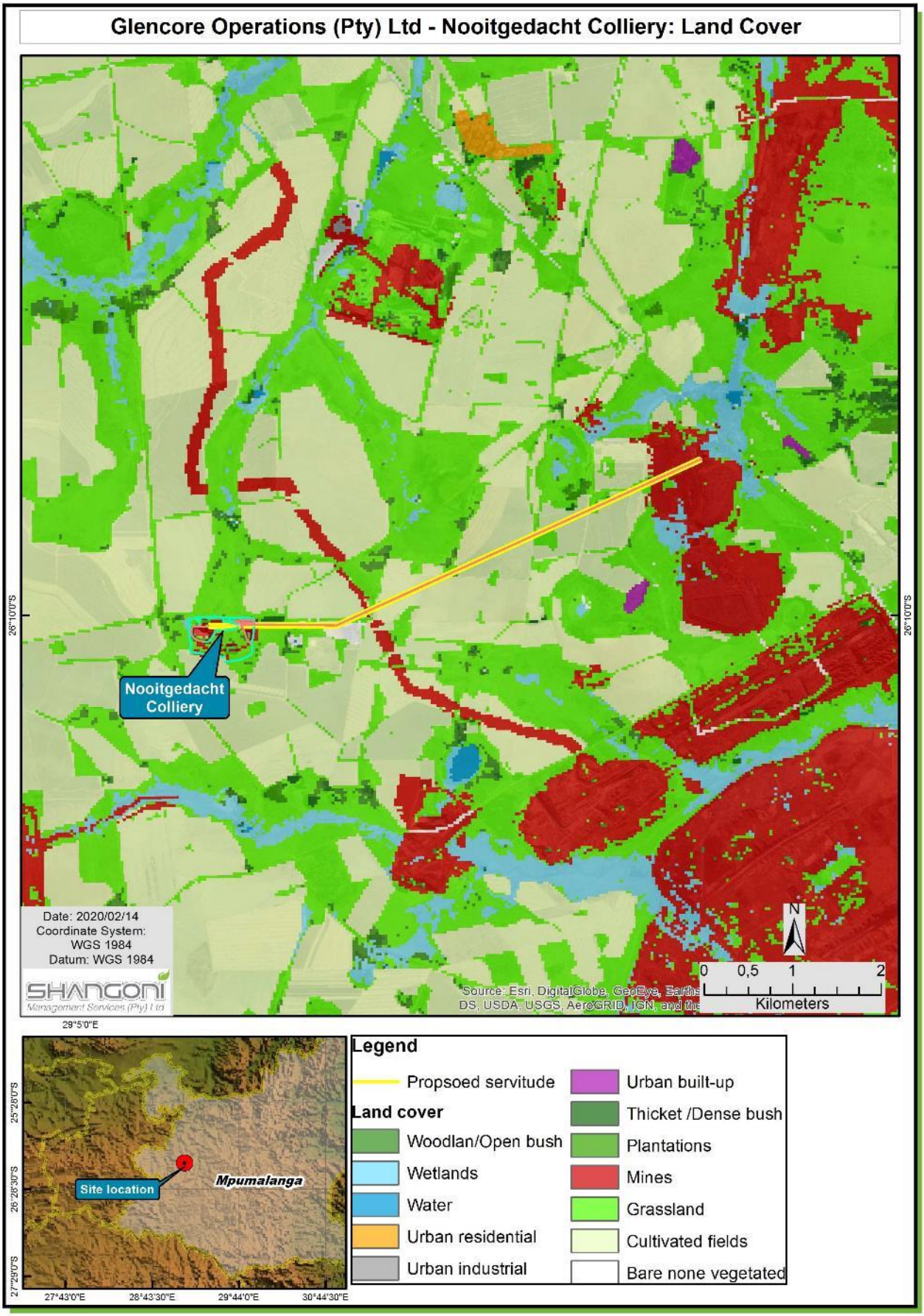


Figure 28: Land cover applicable to the Nooitgedacht Colliery

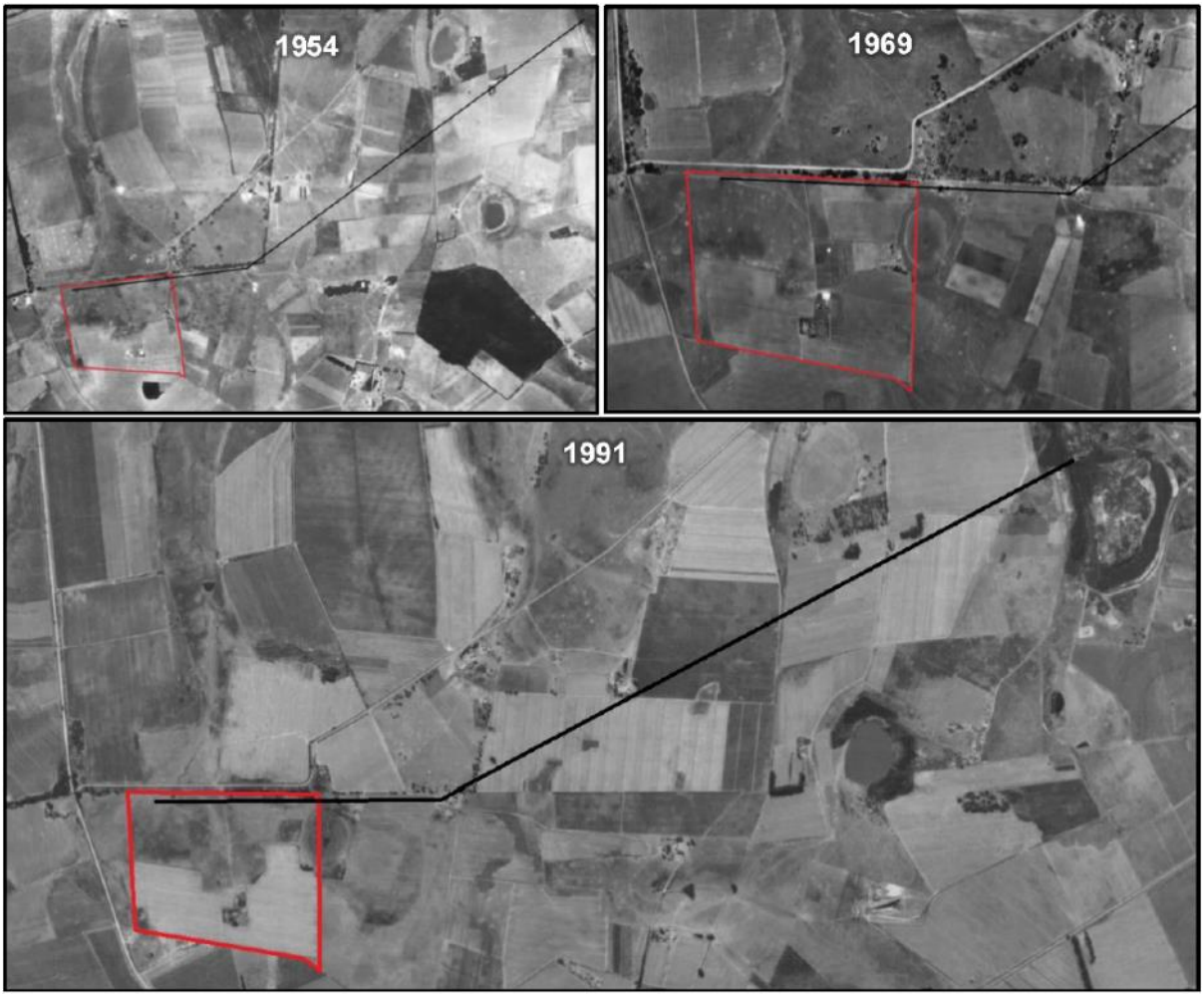


Figure 29: Historic imagery indicating agricultural crop production associated with the study area and surrounding landscape since at least 1954 (Imagery obtained from the DRDLR in 2019).

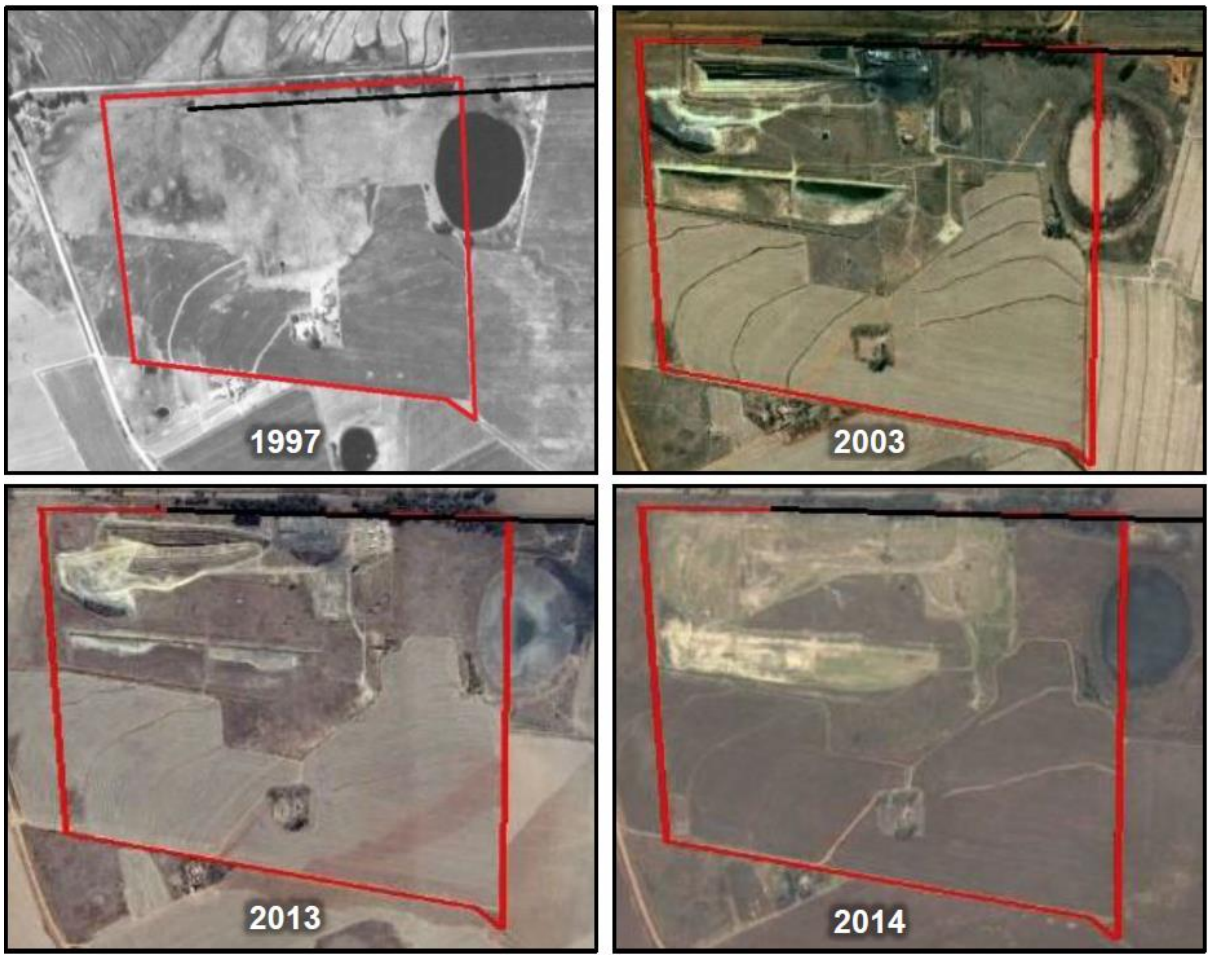


Figure 30: Historic mining activities associated with the surface right area commencing sometime between 1997 and 2003, with decommissioning assumed to take place between 2013 and 2014 based on the imagery above (imagery obtained from DRDLR and Google Imagery[44]).

Due to the severely degraded nature of the area stemming from the anthropogenic modifiers discussed above, the vegetation associated with the study area can no longer be considered representative of the Eastern Highveld Grassland vegetation type. Those portions of the area associated with natural vegetation are classified as either secondary grassland or freshwater habitat, while those areas directly impacted by anthropogenic activities i.e. agricultural crops, mining or farmsteads are classified as transformed habitat (Figure 31).

Secondary grassland

The majority of the northern portion of the surface right area has previously been cleared for infrastructure associated with historic mining activities (Figure 30). Various portions along the servitude, as well as the eastern portion immediately adjacent to the pan wetland has historically been utilised in an agricultural capacity (Figure 29). Although these areas have been allowed to return to a grassland state, the species composition has been significantly altered, and has been classified as secondary

[44] Google Earth Pro. Version 7.1.5.1557. (Various dates). Glencore, Mpumalanga. 26°10'9.96"S, 29° 6'20.01"E, eye alt 14.34 km. Maxmar Technologies 2019.

grassland in accordance with the definition provided by Cadman *et al,* 2013 stating that: "*Secondary grasslands are those that have undergone extensive modification and a fundamental shift from their original state (e.g. to cultivated areas), but have then been allowed to return to a 'grassland' state (e.g. when old cultivated lands are re-colonised by a few grass species). Although secondary grasslands may superficially look like primary grasslands, they differ markedly with respect to species composition, vegetation structure, ecological functioning and the ecosystem services they deliver.*"

Freshwater habitat

All wetlands forming part of this habitat unit have been delineated by WCS Scientific (Pty) Ltd ("WCS") during October 2019 (see Part L for more detail on wetlands).This habitat unit includes various seep wetlands as well as a pan wetland associated with the surface right area. Wetlands considered as part of the freshwater habitat include:

- A seep wetland situated immediately east of the smaller PCD alternative, and located within the central portion of the surface right area,
- A pan wetland and its associated seep wetland is situated on the eastern boundary of the surface right area, and is located approximately 250 m east of the surface infrastructure footprint area and 60 m south of the servitude,
- A third wetland system is associated with the western and northern boundaries of the surface right area. This wetland system has previously been severely modified during the historic mining activities, with post mining rehabilitation failing to re-instate the wetland within the north-western portion of the surface right area. The seep wetland is currently connected to the northern portion of the wetland system via a culvert and a trench immediately south of the existing gravel road, and
- A seep wetland was identified within the south-western portion of the surface right area and is currently surrounded by agricultural fields. The wetland is situated approximately 300 m south of the proposed infrastructure development footprint.

WCS, 2019 also identified a seep wetland associated with the servitude. This wetland is, however, currently utilised for crop cultivation and from a floral perspective no longer provide any freshwater habitat. This wetland has, therefore, been included in the transformed habitat unit.

Transformed habitat

This habitat unit includes all croplands, including the seep wetland currently utilised in an agricultural capacity, farmsteads as well as all mining areas associated with the study area. Due to the highly degraded nature of this habitat unit, the habitat unit is not considered to be of floral biodiversity importance.

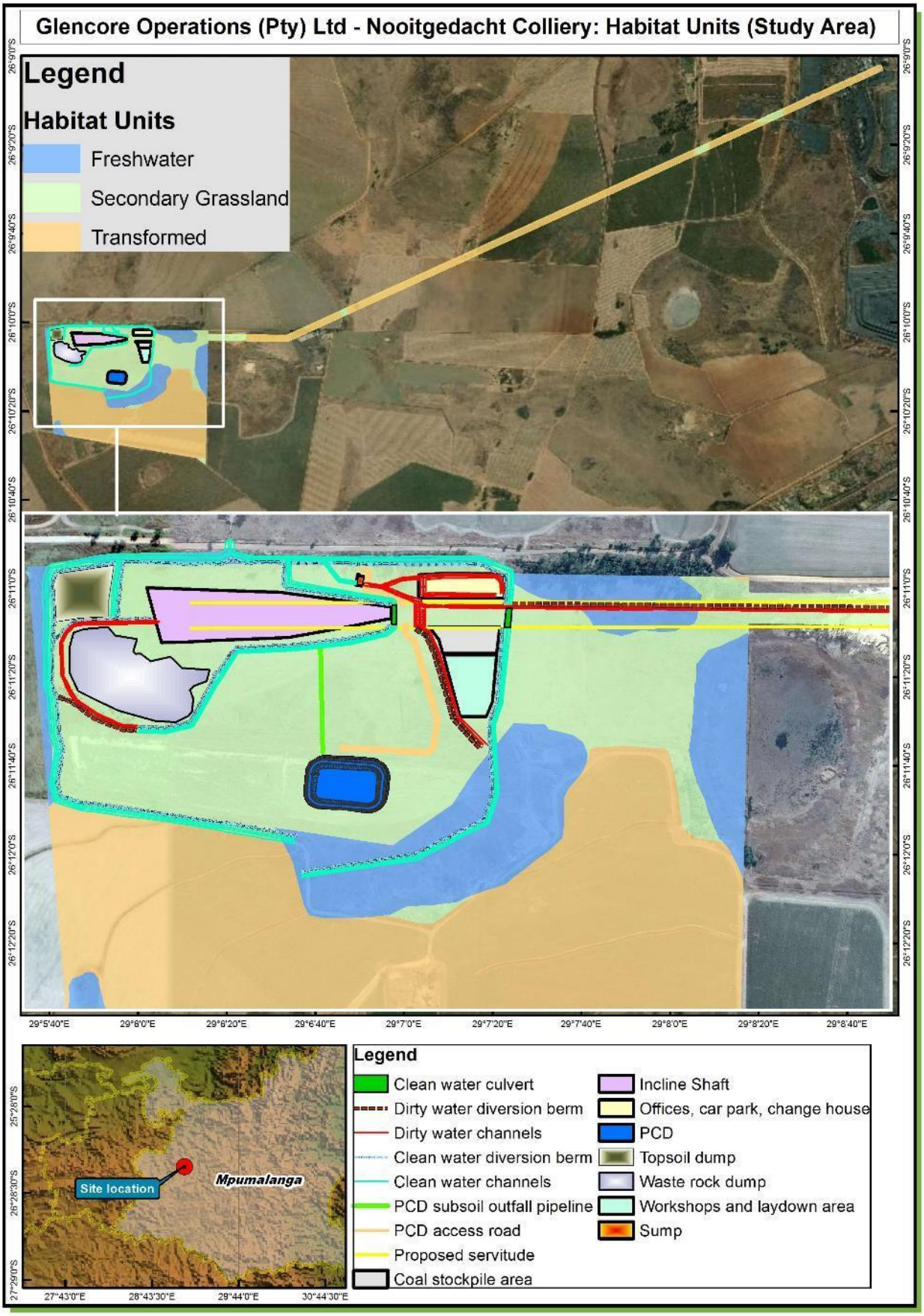


Figure 31: Conceptual illustration of the habitat units within the study area.

Floral species of conservation concern assessment

Threatened/protected species are species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered ("CR"), Endangered ("EN") or Vulnerable ("VU") is a threatened species. Species of Conservation Concern ("SCC") are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild ("EW"), Regionally Extinct ("RE"), Near Threatened ("NT"), Critically Rare, Rare and Declining.

The SCC assessment not only considers floral SCC recorded on site during the field assessment but also includes a Potential of Occurrence ("POC") assessment where the assessment takes suitable habitat to support any such species into consideration. Thus, for the POC assessment, a list of Red Data Listed ("RDL") species recorded within the QDS 2629AA was obtained from the Mpumalanga Tourism and Parks Agency ("MTPA").

Also taken into consideration was the list of Schedule 11 Protected Plants [Section 69 (1) (a)] and Schedule 12 Specially Protected Plants [Section 69 (1)(b)] under the Mpumalanga Nature Conservation Act, 1998 (Act 10 of 1998) (MNCA).

No SANBI Red Data Listed species nor any MNCA protected floral species were encountered during the field assessment. Based on the POC calculations for species previously recorded within the QDS as well as MNCA protected species indigenous to the Eastern Highveld Grassland, none of the species obtained a POC of more than 60%. The lack of these species from the study area can likely be attributed to the severely degraded nature of the area, rendering suitable habitat largely unavailable.

Should any protected floral species be associated with the study area, they are most likely to reside within the pan wetland associated with the eastern boundary of the surface right area. Although no floral SCC or MNCA protected species were observed within the pan during the field assessment, the possibility for *Brunsvigia spp., Gladiolus spp., Crinum spp.*, or *Ammocaris coranica* to occur is likely.

Medicinal plant species

Medicinal plant species are not necessarily indigenous species, with many of them regarded as alien invasive weeds. The table below presents a list of dominant plant species with traditional medicinal value and the plant parts traditionally used, which were identified during the field assessment.

A low abundance of medicinal species was encountered during the field assessment and can be attributed to the extent of veld degradation. The species listed in Table 11 below are common, widespread species and not confined to the area, with the majority of species classified as AIPs. The area does not significantly contribute to the survival of medicinal plant populations in the region.

Table 11: Dominant traditional medicinal floral species identified during the field assessment. Medicinal applications and application methods are also presented (van Wyk, Oudtshoorn, Gericke, 2009).

Species	Name	Plant parts used
Acacia decurrens	Green wattle	Gum

Species	Name	Plant parts used
Agave Americana	Century Plant	Leaves
Bidens pilosa	Blackjack	Herb
Cirsium vulgare	Spear Thistle	Whole Plant
Citrullus lanatus	Wild Watermelon	Fruit
Datura stramonium	Common Thorn Apple	Leaves, sometimes seeds
Gomphocarpus fruticosus (woody)	Milkweed, Wild Cotton	Leaves mainly used, sometimes the roots.
Helichrysum aureonitens	Golden Everlasting	Leaves and twigs, sometimes roots
Helichrysum nudifolium var. pilosellum	Everlasting	Leaves and twigs, sometimes roots
Rumex acetosella	Sheep's Sorrel	Herb
Tagetes minuta	Khaki bush, Khaki weed, African marigold	Leaves, stalks and flowers
Typha capensis	Bulrush	Thick, fleshy rhizomes

Alien and Invasive Plant ("AIP") species

Alien and invasive floral species are floral species of exotic origin that are invading previously pristine areas or ecological niches (Bromilow, 2001). Not all weeds are exotic in origin but, as these exotic plant species have very limited natural "check" mechanisms within the natural environment, they are often the most opportunistic and aggressively growing species within the ecosystem. They are often the most dominant and noticeable within an area. Disturbances to the ground through trampling, excavations or landscaping often leads to the dominance of exotic pioneer species that rapidly dominate the area. Under natural conditions, these pioneer species are overtaken by sub-climax and climax species through natural veld succession. This process, however, takes many years to occur, with the natural vegetation never reaching the balanced, pristine species composition prior to the disturbance. There are many species of indigenous pioneer plants, but very few indigenous species can out-compete their more aggressively growing exotic counterparts.

During the floral assessment, dominant alien invasive floral species were identified and are listed in the table below. Not all alien species, however, become invasive, as such the list below, indicate those species as listed within *NEMBA Invasive Species List* (2016), or those not listed but that readily become proliferate within a Grassland habitat, and that is considered problematic within the area. All species

listed below, including those not falling within a listed category should be actively monitored and controlled to limit further spread of these species.

Of the alien species recorded during the site visit (Table 12 below), five are listed as NEMBA Category 1b, and two as NEMBA Category 2. The remainder are not listed but are still considered problem plants in South Africa (Bromilow, 2001). The majority of alien species encountered are predominantly herbaceous species.

Table 12: Dominant alien floral species identified during the field assessment with their invasive status as per NEMBA: Alien and Invasive Species Lists, GN R598 of 2016.

Species	English name	Origin	Category*
Trees / shrubs			
Acacia mearnsii	Black Wattle	Australia	2
Acacia decurrens	Green Wattle	Australia	2
Agave americana	Spreading Century Plant	Mexico	NL
Forbs			
Argemone ochroleuca	White-flowered Mexican Poppy	Mexico	1b
Bidens pilosa	Common Blackjack	South America	NL
Cirsium vulgare	Spear Thistle	Europe and Asia	1b
Conyza bonariensis	Flax-leaf Fleabean	Americas	NL
Tagetes minuta	Tall Khakiweed	South America	NL
Datura stramonium	Common Thorn Apple	North America	1b
Verbena bonariensis	Tall Verbena	South America	1b
Rumex acetosella	Sheep Sorrel	Europe	NL
Graminoids			
Cortaderia selloana	Pampas Grass	South America	1b

Category 1b – Invasive species that require control by means of an invasive species management programme.
Category 2 – Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.
NL – Not Listed

Chapter F: Fauna

The following information was obtained from the *Biodiversity Assessment as Part of The Environmental Impact Assessment (EIA) And Authorisation Process for The Proposed Development of An Incline Shaft and Associated Infrastructure at The Glencore Nooitgedacht Mine, Mpumalanga Province*, dated 2020.

Mammals

Faunal Species of Conservation Concern ("SCC")

During the field assessment and desktop preparation it was noted that the general locality had been impacted on by both current and historic agriculture as well as historic mining. The general characteristics of the locality are moderately transformed with a few locations, the minority of the study area, that have been left undisturbed. During the assessment, an individual *Leptailurus adspersus* (Serval, NT) was observed in the northern portion of the study area adjacent a road where a game trail was located.

Faunal diversity

Mammal diversity was restricted to mostly common species, besides the serval that was observed on-site. Large mammal assemblages are absent while only common medium sized mammals were observed. Small mammal abundance was very high, and signs, spoor and scat were noted throughout the study area, though small mammal diversity is uncertain. Tall grassland (>1 m) that had previously been transformed through mining appeared to support the greatest densities of small rodents that likely utilize the grass layer for both shelter and forage. This is also likely the preferred habitat for serval that predate mainly on small rodents. The more intact short grass seep wetland habitat, which had previously not been utilized for mining, did not appear to support high densities of rodents as did the secondary grassland locations.

The moderately low diversity recorded on site is a direct result of the largely transformed nature of the location and the surrounding land uses. Anthropogenic disturbances relating to agricultural and mining activities as well as direct persecution (several snares were removed from site) have significantly restricted the potential mammal assemblage of the study area. Furthermore, the degree of fragmentation and the lack of any source populations will reduce the potential for any complete mammal assemblages in the area.

Mammal species observed either directly or via spoor/scat/dung include, but are not limited to, *Sylvicapra grimmia* (Common Duiker), *Hystrix africaeaustralis* (Cape Porcupine), *Lepus saxatilis* (Scrub Hare), *Potamochoerus larvatus* (Bush Pig), *Gerbilliscus brantsii* (Highveld Gerbil) and *Genetta genetta* (Small-spotted Genet).

Avifauna

Faunal SCC

During the field assessment the avifaunal SCC *Tyto capensis* (African Grass Owls, VU) was observed. Additionally, it is considered likely that the avifaunal SCC *Circus ranivorus* (African Marsh Harrier, VU)

may also occur and forage within the wetland pan. No other avifaunal SCC are expected to inhabit or breed within the study area.

Faunal diversity

Avifaunal diversity within the study area is intermediate, largely restricted to grassland and wading birds. The locality largely supports insectivores and mixed feeders with a few predatory raptors. Diversity was limited due to the transformed nature of much of the site. The general location around the wetland pan as well as stands of exotic *Acacia sp*. and *Eucalyptus sp*. has higher diversity than the remainder of the study area. Bird species assemblages in the aforementioned locations are likely more diverse due to the change in structure and would provide good shelter and safe roosting locations for birds. Vegetation structure is often considered the primary determinant of bird species composition.

Species observed on site other than those listed above and below include Spur-winged Goose (*Plectopterus ambiences*), Capped Wheatear (*Oenanthie pileate*), African Stonechat (*Saxicola torquatus*), Marsh Owl (*Asio capensis*), Grass Owl (*Tyto capensis*, VU), Common Waxbill (*Estrilda astrild*), Blacksmith Lapwing (*Vanellus armatus*), Southern Masked Weaver (*Ploceus velatus*), Swainson's Spurfowl (*Pternistis swainsonii*), Namaqua Dove (*Oena capensis*), Common Fiscal (*Lanius collaris*) and others.

Amphibians

Faunal SCC

No amphibian SCC were observed during the assessment, however, one amphibian SCC has a distribution range that overlaps the study area, namely *Pyxicephalus adspersus* (Giant Bullfrog) and is listed as Vulnerable in the Mpumalanga province (MP SoER 2003). Populations of this species are likely to occur in and around the freshwater pan.

Faunal diversity

All freshwater habitats where amphibians are expected to occur were actively searched. However, no amphibian species were observed during the assessment. As the first summer rains had yet to fall amphibian activity was low. Furthermore, the cryptic nature of many amphibian species makes them hard to observe in the field even when abundances are high. The freshwater pan, the channel that has been dug through and adjacent seepage wetland areas are likely ideal habitat for amphibian species, as such the study area is considered to have an intermediate diversity of amphibian species. Amphibians expected to occur within the study area include *Kassina senegalensis* (Bubbling kassina), *Semnodactylus wealii* (Rattling frog), *Xenopus laevis* (Common platanna), *Strongylopus fasciatus* (Striped steam frog), *Cacosternum boettgeri* (Boettger's caco) and *Amietophrynus gutturalis* (Guttural Toad).

Reptiles

Faunal SCC

No reptile SCC were recorded during the assessment, however, the following species *Chamaesaura aenea* (Coppery Grass Lizard) LC, *Chamaesaura anguina anguina* (Cape Grass Lizard, NYBA) and

Homoroselaps dorsalis (Striped Harlequin Snake, LC) that are considered of conservation concern in Mpumalanga, have distributions that overlap with the study area.

Faunal diversity

Reptile diversity within the study area was considered moderately low. Whilst the assessments indicated that reptiles occurred in low densities, a few small skinks, lizards and a single snake where observed. During the site assessments it was noted that the historically transformed grassland habitat appeared to have the highest diversity and abundance of reptiles. However, this is likely due to the more open groundcover layer that allowed a greater chance at observing reptiles. High diversity and abundance are not likely as the habitat suitability is not ideal, it is likely though that the seepage wetland associated with the freshwater habitat will have an increased diversity and abundance of reptiles in comparison to the surrounding secondary grassland habitat. Reptile species observed and likely to occur within the study area other than those listed above include *Trachylepis punctatissima* (Speckled rock skink), *Cordylus vittifer* (Common Girdled lizard), *Pseudocordylus melanotus melanotus* (Common Crag Lizard), *Acontias gracilicausa* (Thin-tailed Legless Skink), *Trachylepis capensis* (Cape Skink), *Agama aculeata distanti* (Eastern ground Agama) and *Leptotyphlops scutifrons* (Peter's Thread Snake). No additional reptiles have been previously recorded by the Animal Demography Unit ("ADU") ReptileMAP for the QDS. It is likely that the study area will present an even higher reptile diversity than that observed and listed above. Reptiles are inherently secretive and shy, making their detection and identification in the field hard. As such, based on the observed diversity, the available food resources and habitat, it is deemed likely that additional species other than those listed above will occur within the study area.

Insects

Faunal SCC

During the field assessment, no insect SCC were observed, however, it remains possible that the SCC *Proischnura rotundipennis* (Round-winged Bluet, VU) and *Pseudagrion newtoni* (Harlequin Sprite, VU). These species all inhabit inland freshwater pools and occur within the region of the proposed project.

Faunal diversity

The study area had a relatively low abundance of insects, which was not surprising considering that the survey took place at the back end of winter before the first summer rains. Orthopterans were the most abundant order located on site.

Insects are generally the most abundant macro-organisms within landscapes and often perform services vitally important for ecosystem functioning. Therefore, high insect abundance can indicate a healthy landscape. Insects serve as pollinators, remove detritus material, bury dung and associated parasites below the surface helping to cycle nutrients back into the soil while decreasing the parasitic load within an environment reducing the risk of disease. Additionally, insects serve as a food resource for fauna within the study area, and as such a low insect diversity and abundance that may reduce forage sustainability for other faunal species from various classes.

Arachnids

Faunal SCC

The Mpumalanga SoER (2003) makes no provision for arachnid species. As such, alternative databases such as the NEMBA TOPS list as well as the IUCN were used in order to ascertain the likelihood of arachnid SCC occurring within the study area. Following the analysis of these databases as well as the site assessment it has been ascertained that no arachnid SCC are expected to occur in the study area, nor are any of the species observed listed as SCC.

Faunal diversity

Arachnid species are notoriously hard to detect over a relatively short period of time that can often lead to the under estimation of diversity and abundance. Taking this into consideration, habitat conditions for arachnids as well as available resources were analysed, whilst additional information on arachnid occurrences and species diversity for the QDS was collected from databases such as iNaturalist and the Animal Demography Unit ("ADU"). Taking into consideration that only two species were captured within the pitfall traps, plus the additional species recording as per the information presented in the various databases, it is assumed that overall arachnid diversity of the study area will be low. According the ADU website only the baboon spider species *Harpactira hamiltoni* has been recorded within the QDS 2629AA, though it is unlikely to occur within the study area.

No scorpions are likely to occur within the location. The study area offers no noticeable features that would provide suitable habitat for the order neither where any burrows noticed.

Chapter G: Surface water

The following information was obtained from the *Surface water and Aquatic Biota Impact Assessment Report for the Nooitgedacht Colliery Water Use Licence Application,* dated 2019 and prepared by Golder Associates.

Regional Hydrology

The Nooitgedacht Colliery area falls within the Olifants Water Management Area ("WMA") 08 on the eastern Mpumalanga Highveld that drains a total catchment area of 3 446 km^2 to the Witbank Dam. There are two water resources within the proximity of the Nooitgedacht Colliery, namely the Rietspruit to the south and Klippoortjiespruit to the north of the site. The Nooitgedacht Colliery is located within the secondary drainage B1 (Upper Olifants River Catchment) and spans over the B11E (Rietspruit) and B11F (Saaiwater) quaternary catchments (Refer to Figure 34).

Surface water quality

The following section describes surface water quality in and around the Nooitgedacht Colliery area. Water quality data have been collected in the area since 2013 by GOSA – Tweefontein Colliery.

Historical data

Water quality data was collected at points SWRS7 and WISR 6 (Figure 32) between 2013 and 2017 in order to characterise baseline surface water quality of the Rietspruit and Klippoortjiespruit streams.

Table 13 and Table 14 presents the 5th, 50th and 95th percentile of water quality data for each sampled constituent. The data were compared against the water quality planning limits set for each stream. Certain parameters do not have limit values assigned to them, however, the data have been included for completeness.

Table 13: A summary of the water quality data collected at point SWRS7

	Units	Rietspruit	95th	50th	5th
pH		6.5-8.4	9.3	8.5	7.6
EC	mS/m	70	96.3	60.3	43.1
TDS	mg/L	500	609.2	355.5	201.9
Tot-Alk	mg/L	230	267.1	156.5	62.6
Cl	mg/L	120	54.7	41.6	14.8
SO_4	mg/L	200	311.0	98.4	13.7
NO_3	mg/L	0.2	1.2	0.2	0.3
F	mg/L	1	0.9	0.5	0.1
Turb	-	-	55240.6	24.9	1.9
SS	mg/L	25	2720.5	30.0	6.9
Ca	mg/L	120	72.7	37.0	24.0
Mg	mg/L	70	54.2	19.2	13.4
Na	mg/L	70	70.2	41.2	27.5
K	mg/L	15	18.2	9.2	4.8
Mn	mg/L	0.15	4.5	0.7	0.1
B	mg/L	0.5	0.1	0.0	0.0
$PO^{4-}P$	mg/L	0.025	1.3	1.2	1.0
Sr	-	-	0.2	0.2	0.1
N_Ammonia	-	-	16.0	0.1	0.0
T/Hard	-	-	165.9	136.2	106.5
SAR		5	3.1	2.7	2.3
Si	-	-	5.8	3.4	0.7

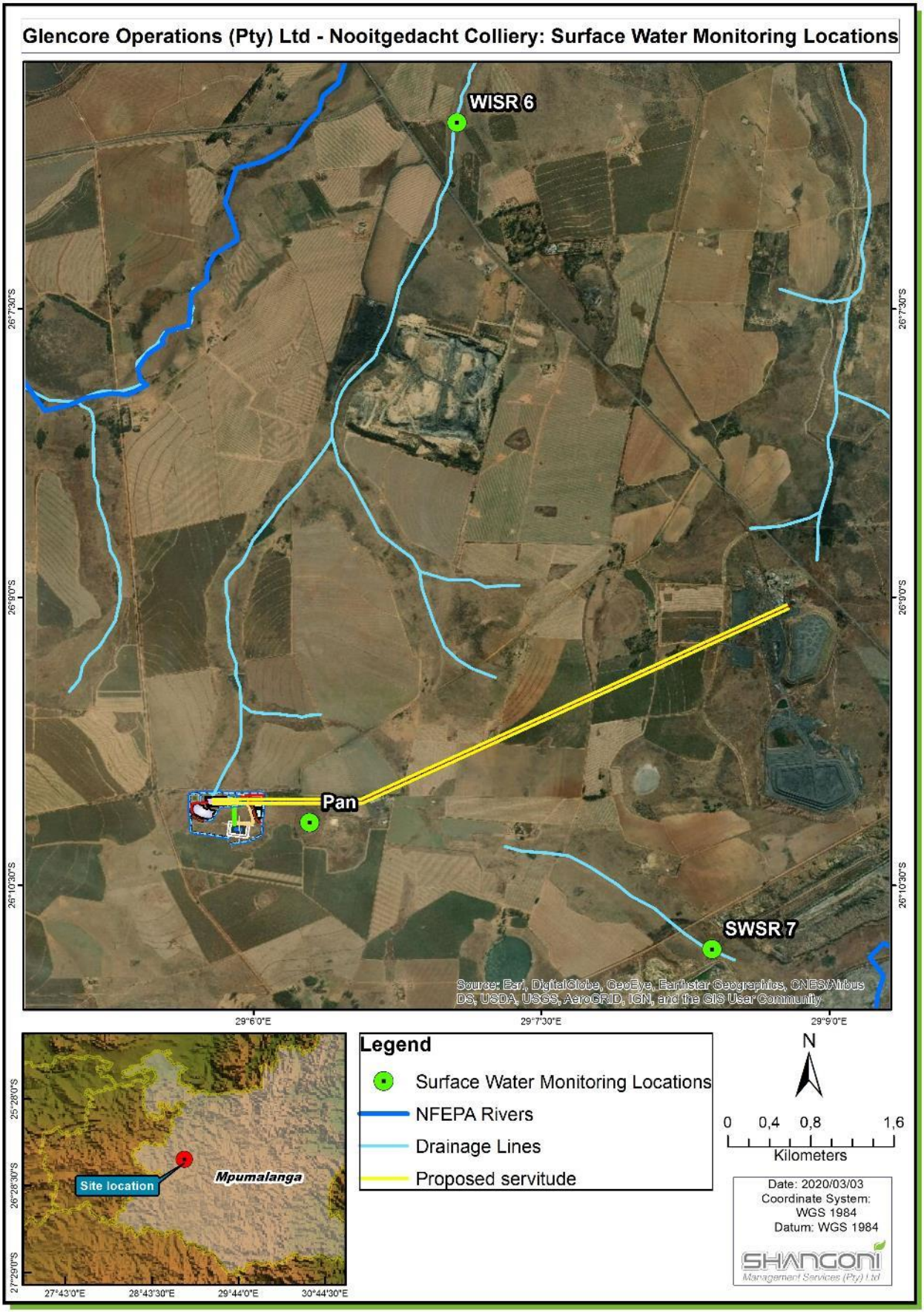


Figure 32: Surface water monitoring points

Table 14: A summary of the water quality data collected at point WISR 6

	Units	Klippoortjiespruit	95th	50th	5th
pH		6.5-8.4	8.5	7.7	6.9
EC	mS/m	35	114.4	47.7	26.9
TDS	mg/l	500	922.0	292.0	170.9
Tot-Alk	mg/l	120	239.0	100.0	19.1
Cl	mg/l	50	72.7	32.3	12.9
SO_4	mg/l	380	582.6	42.4	1.4
NO_3	mg/l	0.5	0.7	0.3	0.2
F	mg/l	0.75	1.3	0.6	0.4
Turb		-	95.3	16.7	3.1
SS	mg/l	25	170.1	32.5	5.3
Ca	mg/l	110	117.7	26.2	15.7
Mg	mg/l	70	52.2	20.9	10.6
Na	mg/l	70	76.9	39.0	17.8
K	mg/l	25	21.0	10.3	5.6
Fe	mg/l	0.3	20.6	0.3	0.0
Mn	mg/l	0.15	4.5	0.6	0.0
Cr	-	-	0.0	0.0	0.0
Cu	-	-	0.0	0.0	0.0
$PO^{4-}P$	mg/l	0.25	0.1	0.0	0.0
Sr	-	-	1.2	0.4	0.1
N_Ammonia	-	-	0.2	0.1	0.0
Cr^{6+}	µg/L	7	0.0	0.0	0.0
T/Hard	-	-	590.4	410.8	73.1
SAR	-	2	1.8	1.0	0.6
Si	-	-	12.2	5.5	0.6

Both the sampled points indicate that 50% of the time suspended solids concentrations were above the water quality planning limit set for both the Rietspruit and Klippoortjiespruit. Manganese concentrations also showed an exceedance of more than 50% in the Klippoortjiespruit. Constituents that were above the planning limit or outside the range more than 5% of the time in both streams include pH, electrical conductivity, total dissolved solids, sulphates, nitrates and sodium.

The level of sulphate in the Klippoortjiespruit occur in concentrations that may adversely affect human health, however, there are low chances of the water being used for domestic use.

Pan water quality

A pan water sample was collected and sent to Waterlab for analysis. In-situ water quality readings taken on site are given in Table 15 and Table 16 and shows the lab results for the sample collected on site. Both in-situ and lab results characterise the pan as being saline.

Table 15: In-situ readings

Parameter	Units		Comment
pH	pH units	9.34	At 11.2°C
Electrical Conductivity	µS/cm	3999	Maximum reading of EC meter was exceeded
Total Dissolved Solids	ppm	2000	Maximum reading of TDS meter was exceeded

Table 16: Lab results

Parameter	Units	Results
pH - Value @ 25 ºC	pH Units	9.1
Electrical Conductivity	mS/m @ 25°C	711
Total Dissolved Solids @ 180°C	mg/ℓ	5744
Suspended Solids at 105°C	mg/ℓ	523
Total Alkalinity as $CaCO_3$	mg/ℓ	3560
Sodium Adsorption Ratio (SAR)	mg/ℓ	20
Chloride as Cl	mg/ℓ	1050
Sulphate as SO_4	mg/ℓ	<2
Fluoride as F	mg/ℓ	11
Nitrate as N	mg/ℓ	<0.1
Total Phosphate as P	mg/ℓ	4.6
Ortho Phosphate as P	mg/ℓ	0.6
Dissolved Oxygen as O_2	mg/ℓ	7.2
Chlorophyll-a (µg/ℓ)	µg/ℓ	148
Faecal Coliform Bacteria / (100 mℓ)	100 mg/ℓ	280
E. coli / (100 mℓ)	100 mg/ℓ	250
Free and Saline Ammonia as N	mg/ℓ	1.2

Parameter	Units	Results
Sodium as Na	mg/ℓ	1365
Potassium as K	mg/ℓ	210
Calcium as Ca	mg/ℓ	17
Magnesium as Mg	mg/ℓ	202
Aluminium as Al	mg/ℓ	1.07
Boron as B	mg/ℓ	0.116
Hexavalent Chromium as Cr	mg/ℓ	<0.010
Iron as Fe	mg/ℓ	1.69
Manganese as Mn	mg/ℓ	2.08
Aluminium as Al	mg/ℓ	1.07
Boron as B	mg/ℓ	0.116
Hexavalent Chromium as Cr	mg/ℓ	<0.010
Iron as Fe	mg/ℓ	1.69
Manganese as Mn	mg/ℓ	2.08

Aquatic biota

Regional aquatic context

The Olifants River Catchment is often described as South Africa's hardest working catchment owing to extreme demand for the natural resources, and subsequently is the most threatened river systems in South Africa (Van Vuuren, 2009). The rivers within this catchment are associated with land modification and pollution, primarily mining-related disturbances, which is the primary cause of impairment of river health, coupled with industrial activities and extensive agricultural activities (DWAF, 2001). As the Olifants River and its adjoining tributaries flow through this heavily utilised economic hub, they are classified as highly stressed (DWAF, 2001) and the overall ecological status being classified as 'poor to unacceptable' (DWAF, 2001; Van Vuuren, 2009; DWS, 2014).

The Nooitgedacht Colliery does not transect any rivers, as they are situated in the headwaters on the watershed between two river systems, namely the Klippoortjiespruit and Rietspruit, situated north and south-east of the colliery respectively. Both these river systems are classified with a Present Ecological State ("PES") of a F (seriously modified) DWS (2014). Being in the headwaters, the surrounding landscape has a network of wetlands around the shaft and along the servitude. These wetlands are mostly made up of seasonal to temporary seep wetland habitat, and an unchanneled valley-bottom wetland that drains away from the site northwards towards the main Klippoortjiespruit and south-eastwards towards the Rietspruit. The wetland systems have been assessed independently and reported on in a separate report by WCS Scientific (Pty) Ltd (2019).

Owing to the extensive mining and agricultural activities, this quaternary catchment has been extensively modified from its natural state. This quaternary catchment, as well as adjacent catchments have thus been studied and monitored extensively. The characteristics of both perennial and non-perennial rivers within this quaternary catchment are typical of the Highveld Ecoregion. Extensive habitat modifications, poor habitat availability and homogenous systems has resulted in the health and integrity of these aquatic ecosystems being completely and seriously modified, with low biotic diversity and inhabited by tolerant and insensitive taxon.

Current aquatic / biotic context

Based on the current and historical results from Clean Stream (2018), a low diversity of aquatic macroinvertebrates has consistently been recorded in the Nooitgedacht Colliery area. This was primarily owing to many of the aquatic systems being representative of valley bottom wetlands and the fact that the SASS5 protocol was designed for application in permanently flowing streams/rivers (Dickens and Graham, 2002).

Nonetheless, the systems that could be surveyed consistently recorded less than 20 taxa in the Nooitgedacht Colliery area (Clean Stream (2018). Majority of the macroinvertebrate communities consisted of air breathing and tolerant taxa (Clean Stream (2018), namely Belostomatidae (Giant water bugs), Corixidae (Water boatmen), Notonectidae (Backswimmers), Pleidae (Pygmy backswimmers), Dytiscidae/Noteridae (Diving beetles), Hydrophilidae (Water scavenger beetles), Culicidae (Mosquitoes), Lymnaeidae (Pond snails) and Physidae (Pouch snails). These tolerant taxa typically represent homogenous and lentic aquatic ecosystems, with no specific flow or habitat preference.

Fish community

Based on available distribution records (Skelton, 2001; DWS, 2014 and IUCN, 2019-2) and the habitats observed (Clean Stream (2018), seven indigenous fish species can be expected to occur in the Nooitgedacht Colliery area under pre-disturbed (reference) conditions (Table 17). None of the expected species are endemic or Red Data listed (Skelton, 2001).

Table 17: Expected indigenous ichthyofaunal composition within quaternary catchment B11J and current IUCN status (Skelton, 2001; DWS, 2014 and IUCN, 2019-2)

Scientific Name	Common Name	IUCN Status (2019-2)	Intolerance Rating
*Enteromius anoplus***	Chubbyhead Barb	Least Concern	2.6
*Enteromius neefi****	Sidespot Barb	Least Concern	3.4
Enteromius paludinosus	Straightfin Barb	Least Concern	1.8
Labeobarbus polylepis	Bushveld Smallscale Yellowfish	Least Concern	3.1
Clarias gariepinus	Sharptooth catfish	Least Concern	1.2
*Pseudocrenilabrus philander***	Southern Mouthbrooder	Least Concern	1.3

Scientific Name	Common Name	IUCN Status (2019-2)	Intolerance Rating
*Tilapia sparrmanii***	Banded Tilapia	Least Concern	1.3

**Fish species recorded during previous aquatic surveys conducted by Clean Stream (Clean Stream (2013b) and (2013a)

***In 2017 the geographical distribution of *E. neefi* (Sidespot Barb) was refined to Zambia and the Democratic Republic of Congo (DRC). As a result, the species identified on site, previously thought to be *E.neefi* is now outdated, and thought to be *Enteromius sp. nov. 'south africa'. Enteromius sp. nov. 'south africa'* is present in the upper catchment of the Olifants River and is classified as Near Threatened. Although, it is known from a large number of locations and is still widespread, continuous threats such as forestry and associated sedimentation and river crossings preventing fish movement as well as stream regulation and mining with associated pollution could lead to this species decline. The taxonomic status of the southern Sidespot Barb (*Enteromius sp. nov. 'south africa'*) needs to be determined, as it is considered a separate species from that of *E. neefi*. However, for the basis of this study, *E. neefi* will continue to be referred to as per Clean Stream (2018) reports. Although it is recommended, that further studies to collect genetic samples be conducted, with samples being donated to SAIAB to aid in their phylogenetic classification.

Diatom community

One must consider habitat in relation to the SASS5 index in order to interpret the results between sites. The SASS5 index was designed for streams and is not considered accurate in wetlands or lentic systems (Dickens and Graham, 2002), as is the case in these aquatic systems surrounding the proposed Nooitgedacht Colliery area. Consequently, diatoms were incorporated into Clean Streams aquatic biomonitoring program to provide further insight into the health and integrity of these aquatic ecosystems (Koekemoer Aquatic Services, 2018). Samples were taken at sites KS-trib-DS, SS-DSN and ADS-DS (Figure 33).

During the most recent survey, the water quality at all sites, except AS-DS, was classified as bad/unacceptable (ecological category F) (Koekemoer Aquatic Services, 2018). The very high Pollution Tolerance Value (PTV%) at the two sites (>90%) indicated heavy contamination with extreme organic pollution and nutrient levels being elevated (Kelly, 1998). The biological water quality at site AS-DS-SS was moderate (ecological category C/D) with a much lower PTV% suggesting that the organic pollution levels were low to moderate with elevated salinity concentrations and nutrient levels (Koekemoer Aquatic Services, 2018).

Whole effluent toxicity

According to Clean Stream (2018), Whole Effluent Toxicity (“WET”) test samples are retrieved from sites RS-R545, KP-US, KS-trib DS, SWS-DSN and AS-DS-SS (Table 18 and Figure 33).

Table 18: Historical hazardous class during the most recent survey (November 2018) (Clean Stream, 2018)

Site	Hazardous class	Description
RS-R545	I	No acute hazard
KP-US	II	Slight acute hazard
KS-trib DS	V	Very high acute hazard
SWS-DSN	I	No acute hazard

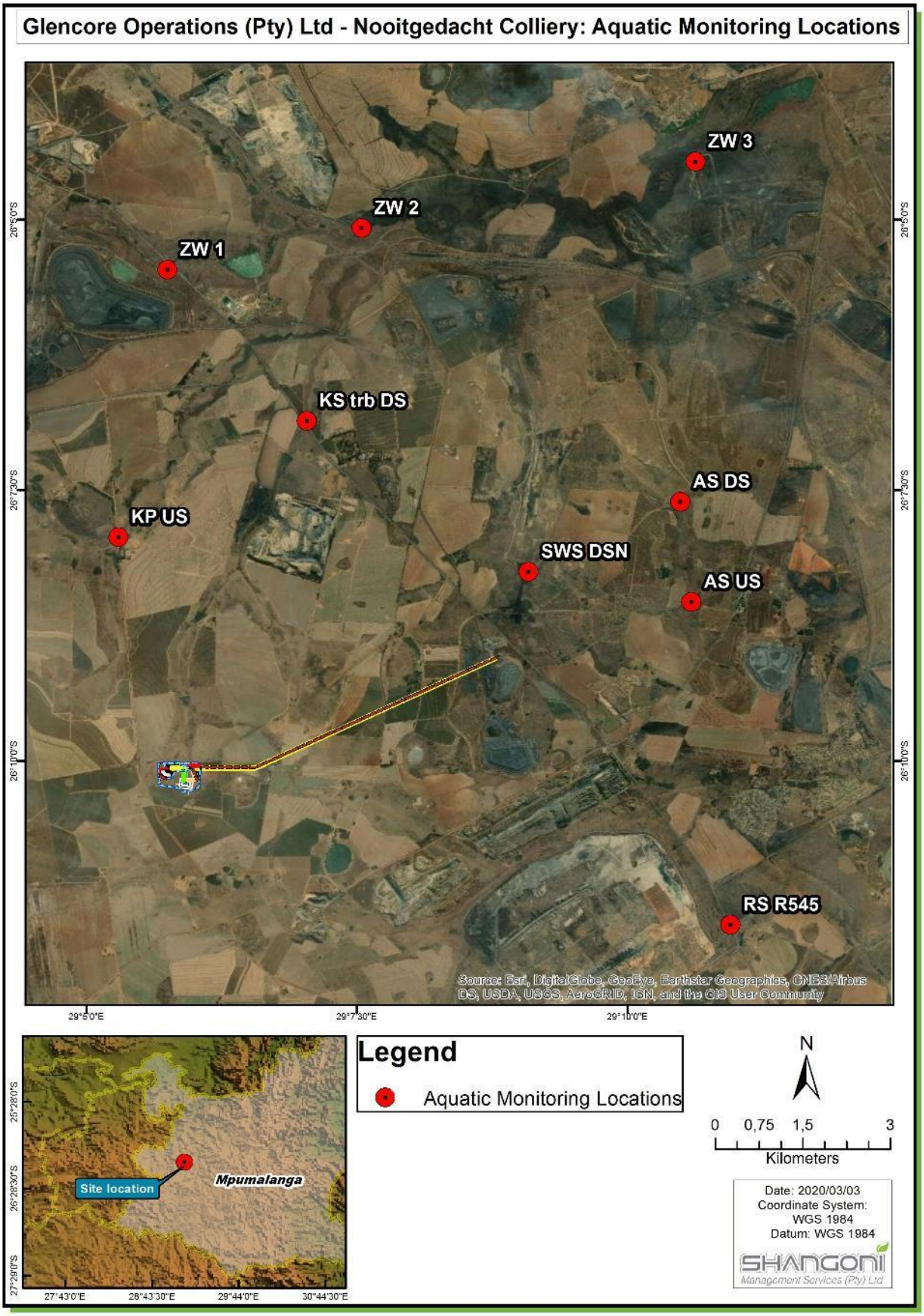


Figure 33: Site illustrations of all available aquatic systems associated with Nooitgedacht Colliery

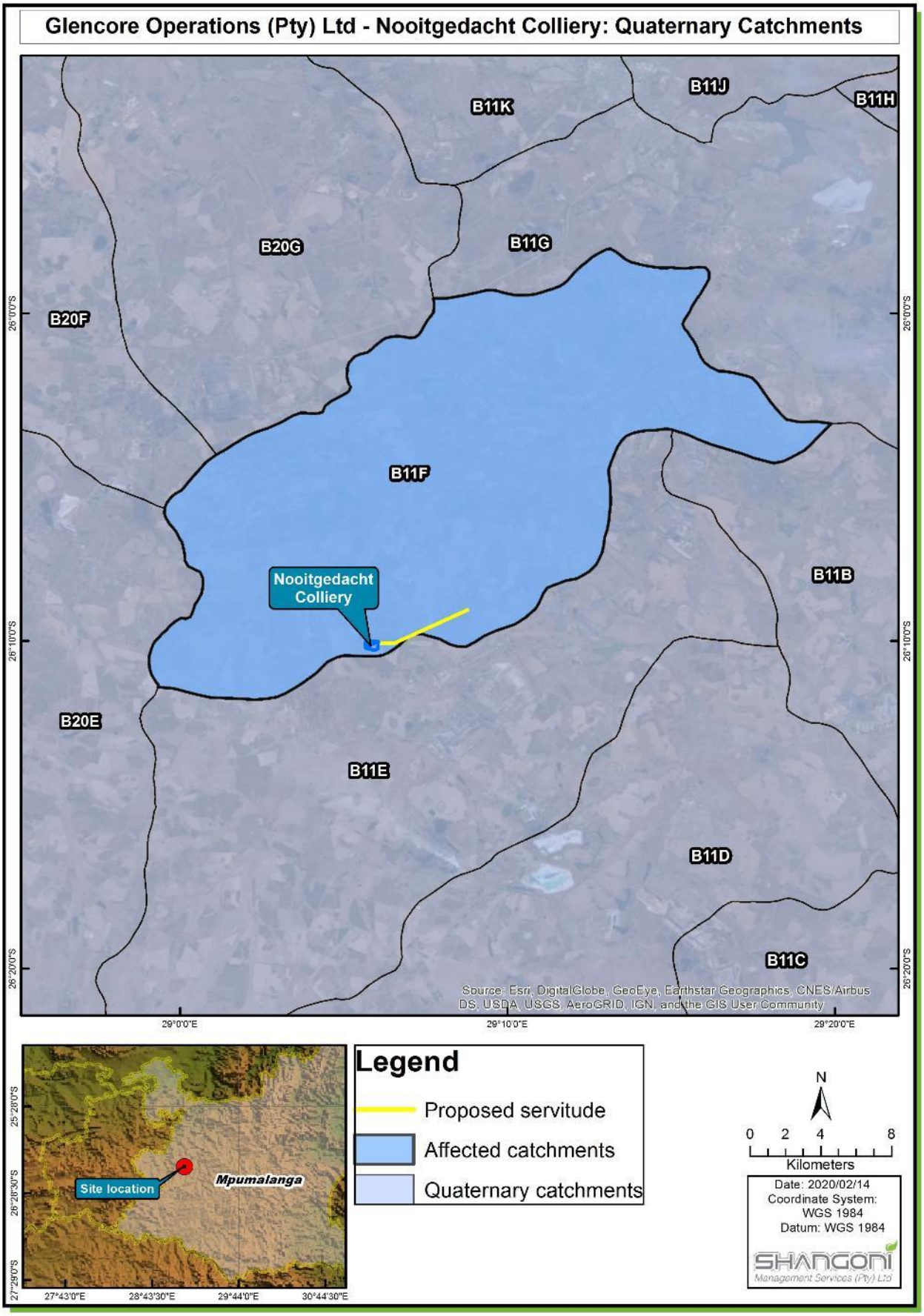


Figure 34: Quaternary catchment applicable to the Nooitgedacht Colliery

Chapter H: Groundwater

The following information was obtained from the *Glencore Operations South Africa (Pty) Ltd Hydrogeological Investigation - Nooitgedacht,* dated 2019 prepared by Golder Associates.

Aquifer characterisation

Groundwater vulnerability

Based on the published vulnerability map (DWAF 1996) the site has a low groundwater vulnerability rating.

Aquifer classification

The aquifer system Nooitgedacht Colliery area is classified as:

- A poor aquifer system based on DWAF 1996 published aquifer classification map series,
- A low yielding (yields 0.1 to 0.5 ℓ/s) intergranular and fractured aquifer system based on the DWAF 1996 published map series. This correspond with the aquifer testing results of the newly drilled boreholes (Digby Wells 2013), of < 0.2 ℓ/s; and
- An aquifer containing largely ideal and good water quality (Class 0 and Class 1) in terms of the hydrochemical signatures. Only the Old Pumphouse boreholes is a Class 2 water quality (Nitrate (N) = 1.05 mg/ℓ) - Marginal water quality, and NGDBH13 and NGDBH17 are of Class 3 poor water quality, due to elevated fluoride (F) concentrations of 2.54 and 2.3 mg/ℓ respectively. The aquifer system is, therefore, regarded mostly as a healthy, un-polluted system.

Aquifer protection classification

The aquifer is in the long-term vulnerable to induced pollution from future mining activities and infrastructure. Direct pollution due to the presence of preferential flow paths to the deeper parts of the aquifer system as a result of the specific weathering patterns host rock formations.

The static water levels (i.e. rest, non-pumping) for the investigation are range from 2.5 meter below ground level (“mbgl”) at Pit 1 to >100 mbgl (Hy14, Hy15 and Hy 16). Average water level is 20.7 mbgl.

The depth to the water level close to the shaft range from 4.60 (BH38) to the north and 5.69 (NV) to the south-west) of the shaft entrance. Groundwater levels measured to the east of the shaft range from 17.6 (HDK01) to 25.7 mbgl (BH1), these two boreholes have depth > 100 m.

The quality of the sampled boreholes surrounding the shaft are Class 0 (BH1) and Class 1 (NGDB 12, NGDB16 and BH38), whereas NGDBH13 is of Class 3 poor water quality. The surrounding water quality does not indicate local pollution from the historical operations.

Acid generation capacity

Five rock samples that were considered to be representative of Nooitgedacht Colliery were collected during 2013 by Digby Wells for acid mine drainage (“AMD”) assessment. The samples were collected from an exploration borehole (2SW21/13) located approximately 750 m east of the Nooitgedacht Colliery. The coordinates of the boreholes are given by X = 11919.94 and Y = -2895859.

The samples represent:

- A sample from the overburden (rocks above 4 seams),
- A sample from the No. 4 coal seam,
- A sample from the interburden (rocks in between the No. 4 and 2 seams),
- A sample from the No. 2 coal seam, and
- A sample from the underburden (rocks immediately below the No. 2 seam that could be exposed after mining.

The samples were submitted to WaterLab in Pretoria for analysis. Test results are discussed below.

Paste pH

The paste pH of samples was found to be neutral to slightly alkaline, ranging between 7.6 and 8.8. None of the samples was found to have acidic paste pH. This may mean that once the different layers are oxidised, the coal seams, the underlying and overlying rocks could potentially be acid neutralising at least in the short-term depending on the sulphide mineral content. However, the paste pH alone is not a conclusive methodology for ABA classification. The sulphide content, acid generating, and acid neutralisation materials of the samples need to be quantified for more comprehensive ABA evaluations (Digby Wells 2013).

The ABA result summary are listed in Table 19.

Table 19: ABA result summary

Sample	Lithology	paste pH	AP (kg/t)	NP	NNP	NPR	Sulphide S%	NAG pH
4-seam overburden (47.1-48 m)	sandstone (interburden)	7.6	15	12	-3.2	0.8	0.36	4.6
4-seam (69-73 m)	Coal	8.8	23.75	37	13	1.6	0.42	4.6
4&2 seams interburden (76.8-91 m)	sandstone (interburden)	8.5	2.19	5.3	3.06	2.4	0.02	4.5
2-seam (96.3-101 m)	Coal	7.9	51.88	55	2.76	1.1	0.86	6.8
2-seam under burden (102-103 m)	sandstone (under burden)	8.1	12.81	61	47.7	4.7	0.37	4.5

Sulphur speciation

The Sulphide-S content of the tested samples shows that:

- The No. 4 seam has 0.42% S that is more than the 0.3% benchmark required to sustainably generate acid. This is, however, less than the typical sulphide values obtained in the No. 4 seam of the Witbank coalfields, which is approximately 1.9%,
- The No. 2 coal seam has 0.86% S. This is also less than the typical sulphide values obtained in the No. 2 seam of the Witbank coalfields, which is approximately 1.0%,
- The sandstone between the No. 4 and 2 seams is found to have 0.02% S and is unlikely to sustainably generate sulphur due to the limited sulphide content,
- The No. 4 seam overburden (sandstone) and 2 seam underburden (also sandstone) contain 0.37% of sulphide, making them to be potential acid generating, especially if the neutralisation potential of the rocks is limited, and
- In summary, all of the samples tested (with the exception of the rocks between the No. 4 and 2 seams) have higher than the 0.3% benchmark required to sustainably generate acid, unless they contain sufficient buffering alkalinity. The rocks between the No. 4 and 2 seams are, however, unlikely to sustainably generate acid (Digby Wells 2013).

Net Neutralisation Potential ("NNP")

The difference between the Neutralisation Potential ("NP") and the Acid Potential ("AP") is defined as the Net Neutralisation Potential ("NNP") of the sample:

NP – AP = NNP

A positive NNP would indicate that there is more neutralising material than acid forming material in any given sample, i.e.:

- NNP < 0 = potential to generate acid,
- 0<NNP<20 = uncertain sample, and
- NNP >20 = potential to neutralise acid.

The overall NP was measured between 5.3 and 60.5 kg $CaCO_3$/tonne, with an average of 33.9 kg $CaCO_3$/tonne. The AP was between 2.9 and 51.9 kg $CaCO_3$/tonne, with an average of 21.1 kg $CaCO_3$/tonne. This means that the average NNP was approximately 12.8 kg $CaCO_3$/tonne, indicating that the samples are marginal and may or may not produce acid in the long-term. Kinetic tests are often required to predict the long-term acid generation potential of such uncertain samples.

- The No. 4 and 2 coal seams have an NNP of 13.0 and 2.8 kg $CaCO_3$/tonne. Although they have slightly higher neutralisation potential, the samples do not contain sufficient buffering capacity to be clearly classified as acid neutralising. Kinetic testing is required for further analysis,
- The rock underneath the No. 2 seam was found to potentially be acid neutralising since the NNP value was 47.7 kg $CaCO_3$/tonne, and
- The overburden material of the No. 4 seam was found to be slightly acid generating with an NNP value of -3.3 kg $CaCO_3$/tonne.

This indicates that the geochemical composition of the rocks at Nooitgedacht Colliery is heterogeneous with some areas to be likely acid generating and in other areas to be acid neutralising. Overall though,

the rocks are slightly acid neutralising, but may not contain sufficient alkalinity to sustainably buffer acid generation in the long-term (Digby Wells 2013).

Neutralisation Potential Ratio

Similar to the NNP, the Neutralisation Potential Ratio ("NPR") is used to identify and separate potentially acid generating from not potentially acid generating materials. The NPR is calculated by dividing the NP by the AP.

The NPR of the rock samples was quantified between 0.8 and 4.7, with an average of 2.1, which may indicate that the rocks at Nooitgedacht Colliery fall in the uncertain zone, with one sample (4 seam overburden) in the slightly acid generating zone and another (2 seam underburden) in the slightly acid neutralisation zone (Figure 35). Samples from both coal seams fell in the uncertain zone and kinetic testing should be conducted to minimise this uncertainty.

Another method for classifying non-potentially acid-generating materials from the potentially acid-generating materials is based on the ratio of NPR versus sulphide-sulphur or total sulphur content (Soregaroli and Lawrence, 1998). Should the NPR be less than 1 and the total sulphur content greater than 0.3%, the sample is considered potentially acid generating. As can be seen in Figure 36, one sample fell in the potentially acid generating zone, one in the non-acid generating zone, another one in the neutralising zone and two in the uncertain zone.

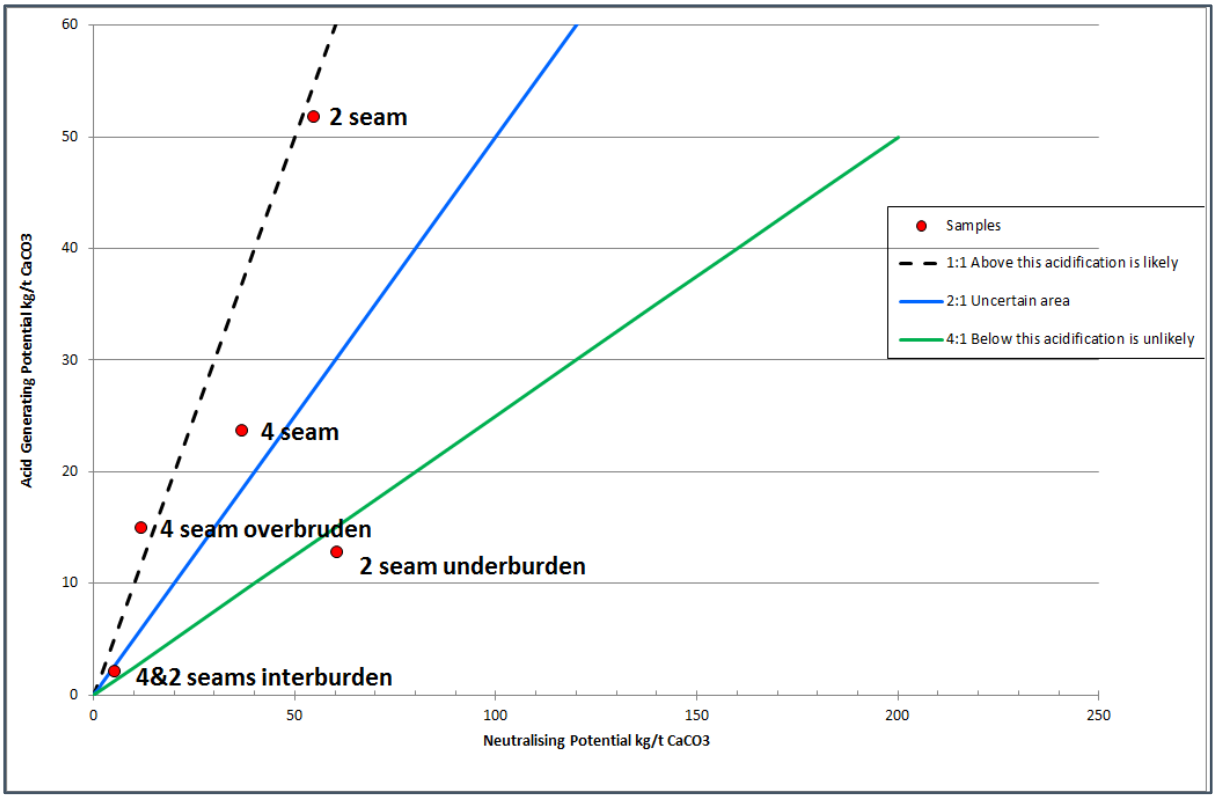


Figure 35: Comparison of the acid neutralisation and generation potential of the samples

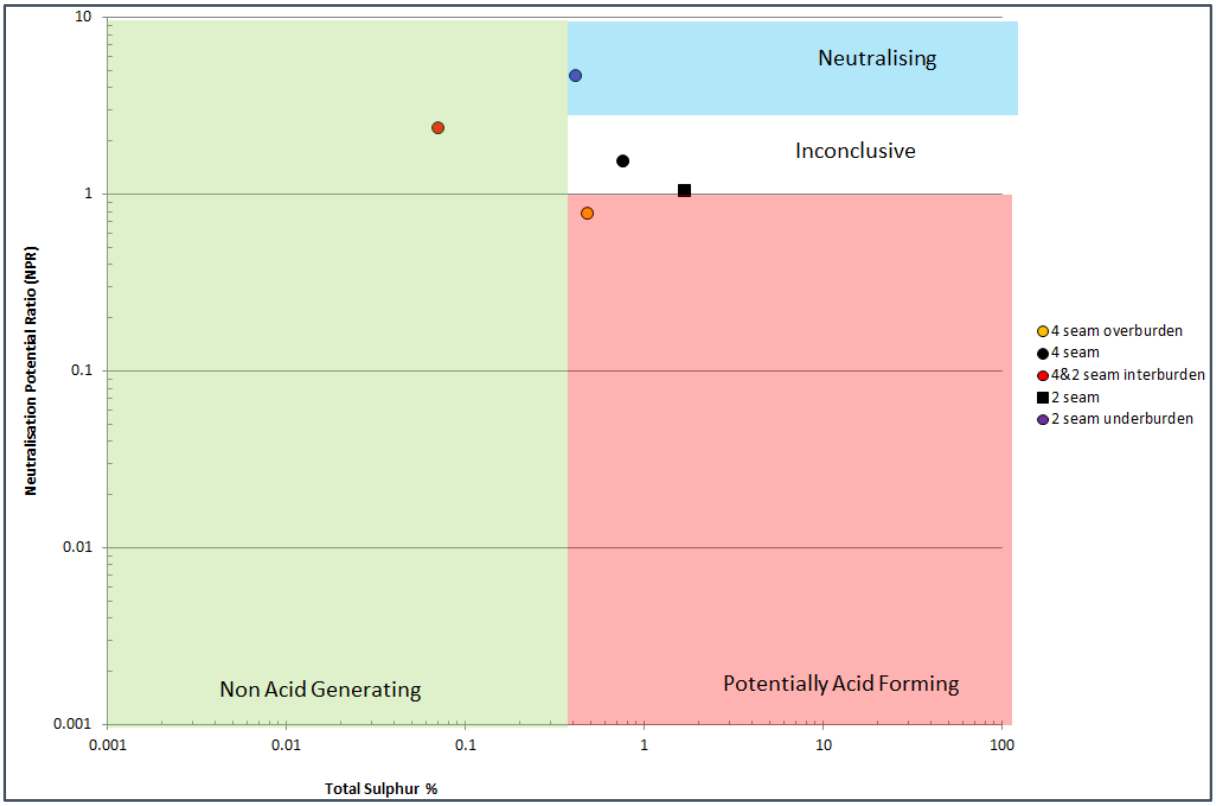


Figure 36: Total Sulphur vs NPR

Hydrogeology

Unsaturated zone

The unsaturated zone consists of soil that has developed from deep weathering of the underlying Karoo, Vryheid Sandstone formations and has a weathering does not extend deeper than the first 10 to 15 metre.

It is expected that this thickness may vary between a thin veneer of unconsolidated soil and rock fragments over the investigation area. As per the conceptual understanding of the area, this sandstone represents the major infiltration area of the underlying aquifer system that reaches down to the deeper fractured aquifer as well.

Saturated zone

The saturated zone at the investigation area consists of the following water bearing formations:

- The lower parts of the Karoo, Vryheid Sandstone formation, and
- Weathered Rooiberg felsite/granite pre-Karoo strata belonging to the Transvaal Supergroup and Bushveld Complex.

Hydraulic conductivity

The hydraulic conductivity on the Nooitgedacht Colliery area as per slug testing, indicate values between of 0.0005 and 0.0251 m/d with an average of 0.012 m/d.

Groundwater levels and flow directions

During the 2019 hydrocensus, water levels (i.e. rest, non-pumping) range from 2.5 mbgl at Pit 1 to >100 mbgl (Hy14, Hy15 and Hy 16). Average water level is 20.7 mbgl.

An 80% correlation is obtained between the altitude and groundwater levels (Figure 37), indicating that the groundwater flow direction mimics the topography and flow are largely towards the drainage systems to the north and south east of the Nooitgedacht Colliery area. At the groundwater flow around the shaft entrance that fall within the B11F quaternary catchment, the groundwater flow is mainly towards Klippoortjiespruit to the north (Figure 38).

The 2019 groundwater contour map corresponds with 2013 Digby Wells contour map (Figure 39, with flows towards the drainage systems to the north, south and southeast sides of Nooitgedacht Colliery.

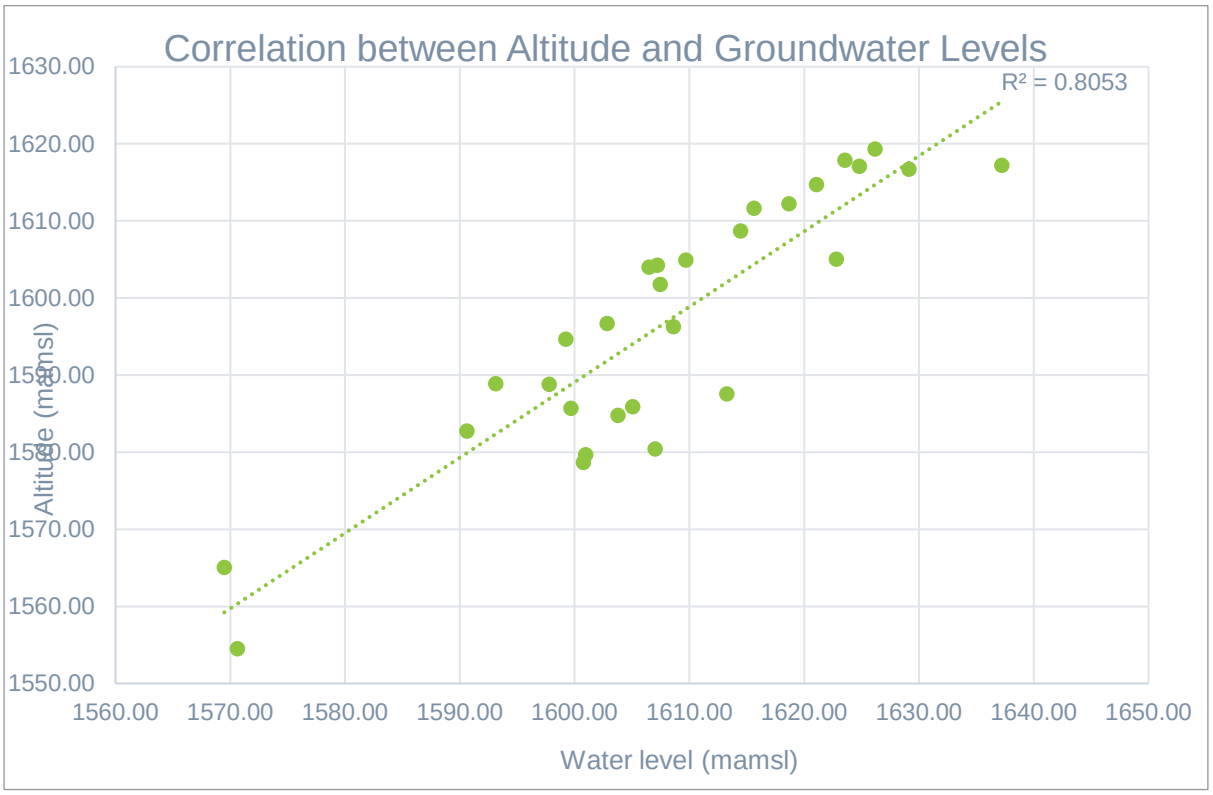


Figure 37: Correlation between Altitude and Water Levels (2019)

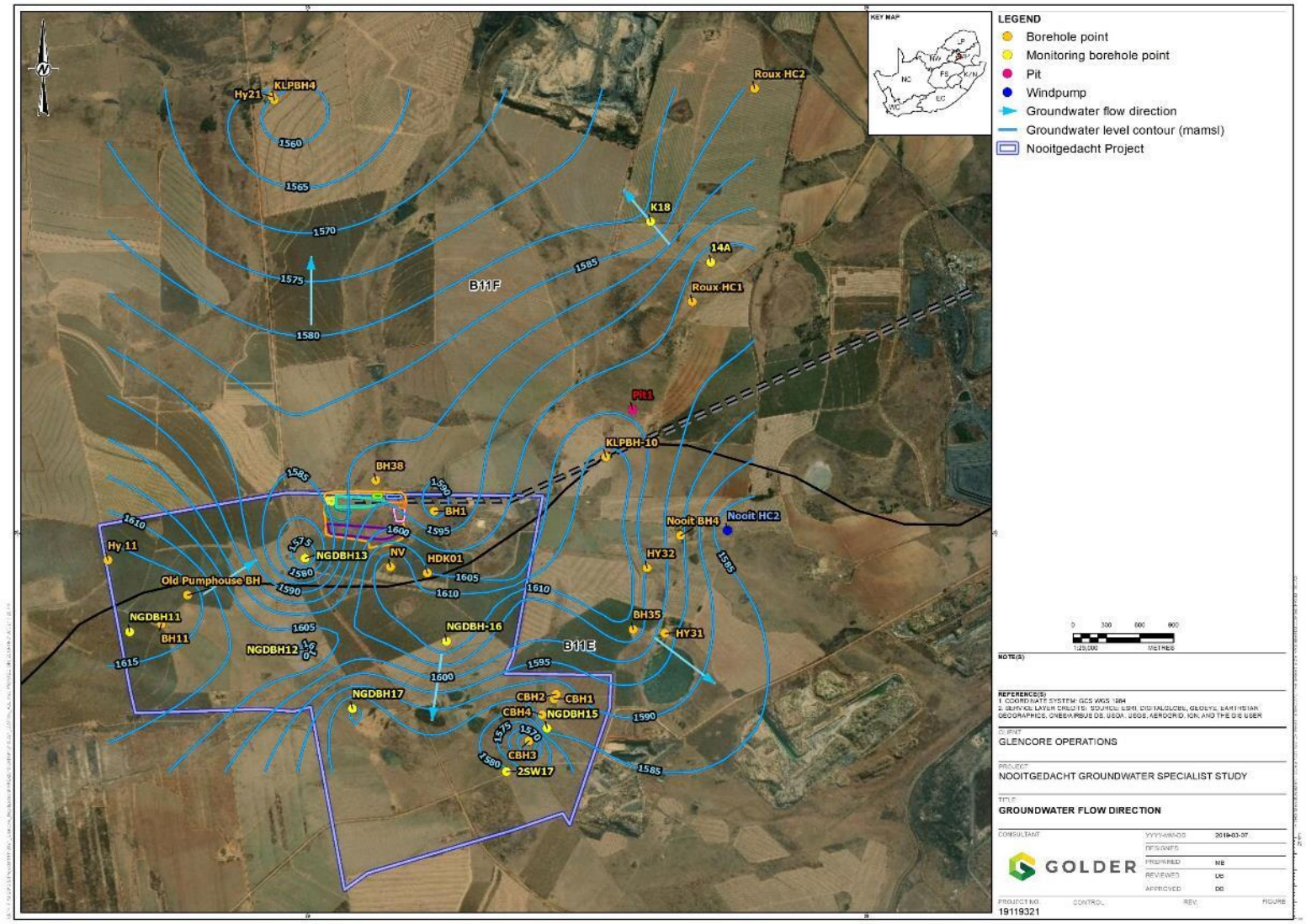


Figure 38: Groundwater Piezometric Contours and Flow Direction (2019) (Golder, 2019)

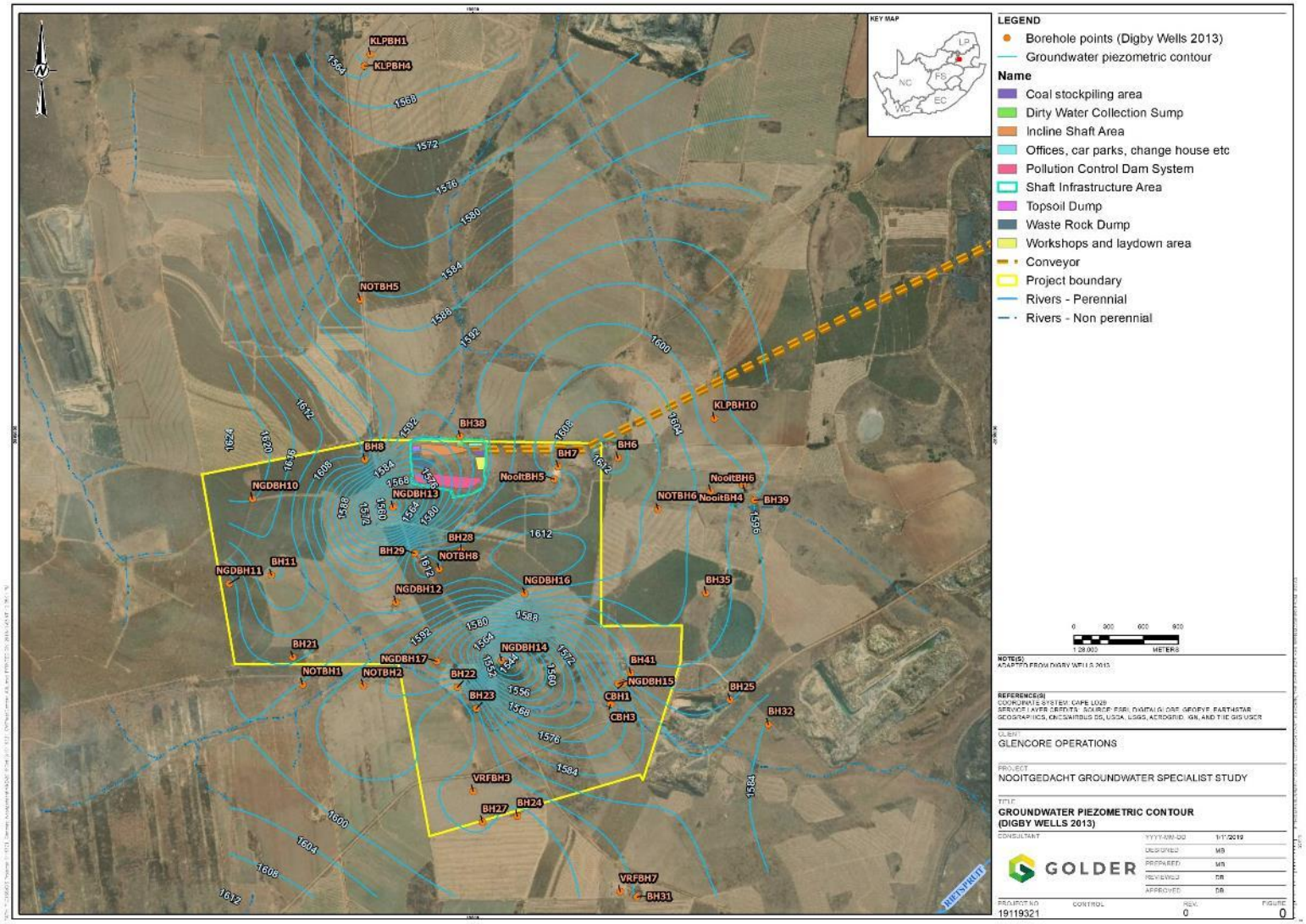


Figure 39: Groundwater Piezometric Contours (Adapted from Digby Wells 2013) (Golder, 2019)

Groundwater quality (Golder 2019)

Groundwater sampling

The positions of the water samples collected during the hydrocensus are indicated Figure 40 and comprises of sixteen groundwater samples and are listed in (Table 20). These samples were collected as per Golder's standard sampling procedures and submitted to UIS Laboratories in Pretoria an accredited laboratory (SANAS accredited).

The objective of the groundwater sampling was to assess and determine the background water quality of the Nooitgedacht Colliery area.

The analytical suite of the groundwater samples included the major cations (Na, K, Mg, Ca), major anions (Cl, F, SO_4), physio-chemical parameters (pH, conductivity, Total Dissolved Solids, Total alkalinity) and trace elements (including Fe, Cr, Se, Pb, Mn, Al, Zn, NO_3 and others determined by ICP-OES).

Water quality standards and analytical results

The analytical results of the sixteen groundwater samples were compared to the following standards:

- South African National Standards, drinking water standards, 2011 (SANS 241:2011), and
- Department of Water Affairs and Forestry (DWAF), domestic water quality guidelines, volume 1,1996 and Water Research Commission, water quality guidelines, 1998.

The SANS 241:2011 standard was used as reference guideline, whereas the DWAF 1998 guidelines were used to classify and discuss the water quality classes. The analytical results are summarised in Table 22, a highlighted value in red exceeds the SANS 2011 maximum allowable limits, whereas the water quality classes listed are classified using the DWAF (1998) drinking water standards.

The water quality of the sampled hydrocensus boreholes are mostly of ideal and good water quality (Class 0 and Class 1), whereas the Old Pumphouse borehole is a Class 2 water quality Nitrate (N) = 10.05 mg/l) - marginal water quality, and NGDBH13 and NGDBH17are of Class 3 poor water quality, due to elevated Fluoride (F) Concentrations of 2.54 and 2.3 mg/ℓ respectively. Class 3 water quality poses a risk of chronic health effects, especially in babies, children and the elderly and should be used for short-term emergency supply only with no alternative supplies available (Table 21).

Most of the constituents of the groundwater samples are below SANS 241-1 (2011) drinking water standards compliance standard, with only Fluoride (F) and Aluminium (Al) concentrations exceeding the limit.

The elevated N concentrations are probably related to point source pollution (irrigation) and the elevated F concentrations to the underlying geology.

Table 20: Summarised hydrocensus boreholes

NR. ON MAP	Date Surveyed	Latitude	Longitude	Site Type	Water Level (mbgl)	Depth (m)	Equipment	Site Status	Owner	Use
Nooit HC2	04/09/2019	-26.17002°	29.12683°	Windpump	26.62	-	Windpump	In use	Private owner	Livestock
BH1	03/09/2019	-26.16849°	29.10324°	Core hole	25.7	100+	None		Glencore	Not in use
14A	04/09/2019	-26.14846°	29.1255°	Monitoring Piezometer Hole	2.98	-	None	Open hole with piezo pipe	Glencore	Monitoring
BH38	03/09/2019	-26.166°	29.09855°	Borehole	4.60		None	Open hole	Private owner	Not in use
NGDBH-16	04/09/2019	-26.17893°	29.10423°	Monitoring Borehole	6.38	-	None	Open Hole	Glencore	Monitoring
W8	04/09/2019	-26.18388°	29.1028°	Borehole	-	-	Submersible	In use	Private owner	Domestic
NGDBH17	03/09/2019	-26.18435°	29.09666°	Monitoring Borehole	22.08	-	None	Open Hole	Glenore	Monitoring
CBH1	04/09/2019	-26.18358°	29.11289°	Borehole	19.01	-	Submersible	In use	Private owner	Domestic and Livestock
NGDBH12	03/09/2019	-26.17963°	29.09315°	Monitoring Borehole	6.45	-	None	Open Hole	Glencore	Monitoring
NGDBH13	03/09/2019	-26.17226°	29.09285°	Monitoring Borehole	48.06	-	None	Open Hole	Glencore	Monitoring

NR. ON MAP	Date Surveyed	Latitude	Longitude	Site Type	Water Level (mbgl)	Depth (m)	Equipment	Site Status	Owner	Use
BH35	04/09/2019	-26.17798°	29.11924°	Borehole	5.78	-	Submersible	In use	Private owner	Livestock and Domestic
NGDBH11	03/09/2019	-29.07873°	26.17817°	Monitoring Borehole	12.45	-	None	Open Hole	Glencore	Monitoring
CBH3	04/09/2019	-26.18693°	29.11086°	Borehole	30.90	-	Windpump	In use	Private owner	Livestock
Nooit BH4	04/09/2019	-26.17044°	29.12305°	Borehole	12.36	-	Solar Pump	In use	Private Owner	Domestic
Old Pumphouse BH	03/09/2019	-26.17523°	29.08339°	Borehole	6.85	-	None	Not in use	Private owner	Not in use, open hole
KLP1	03/09/2019	-26.13514°	29.09063°	Borehole	-	-	Submersible	In use	Private owner	Domestic and Livestock
CBH2	04/09/2019	-26.18319°	29.11304°	Borehole	19.19	-	Submersible	In use	Private owner	Domestic and Livestock
HDK01	03/09/2019	-26.17345°	29.10268°	Core hole	17.76	100+	None	Not in use	Glencore	Core hole samples
NV	03/09/2019	-26.17294°	29.0997°	Borehole	5.69	-	Windpump	Not in use	Private owner	Not in use, windpump broken
BH29	03/09/2019	-26.17524°	29.09514°	Borehole		2	None	Blocked	Private owner	Not in use, blocked
BH11	03/09/2019	-26.17754°	29.08127°	Borehole	7.75	-	Windpump	Not in use	Private owner	Not in use, broken

NR. ON MAP	Date Surveyed	Latitude	Longitude	Site Type	Water Level (mbgl)	Depth (m)	Equipment	Site Status	Owner	Use
Hy 11	03/09/2019	-26.17241°	29.07696°	Borehole	20.04	-	Windpump	Not in use	Private owner	Not in use, broken
Hy12	03/09/2019	-26.17158°	29.07686°	Borehole	-	-	Windpump	Not in use	Private owner	Not in use, broken
Hy13	03/09/2019	-26.17059°	29.07665°	Borehole	-	11.9	None	Not in use	Private owner	Not in use, blocked at 11.9
NotBH1	03/09/2019	-26.18549°	29.0847°	Dewatering Borehole	100+	100+	Submersible	In Use	Mine	Dewatering of shaft
Hy15	03/09/2019	-26.1855°	29.08493°	Borehole	100m+	100+	None	Not in use	Private	Not in use
NotBH2	03/09/2019	-26.18508°	29.09148°	Borehole	100m+	100+	Submersible pump	In Use	Mine	Dewatering of shaft
2SW17	03/09/2019	-26.18942°	29.10905°	Monitoring Borehole	7.89	-	None	Not in use	Mine	Monitoring
KLPBH4	03/09/2019	-26.13541°	29.09037°	Borehole	16.10	-	Submersible pump	In use	Private owner	Domestic and Livestock
Hy21	03/09/2019	-26.13516°	29.0902°	Borehole	4.45	-	Submersible pump	Not in use	Private owner	Not working
CBH4	04/09/2019	-26.18485°	29.11192°	Borehole	9.0	-	None	Not in use	Private owner	Not in use
NGDBH15	04/09/2019	-26.18594°	29.11231°	Monitoring Borehole	4.22	-	None	Not in use	Mine	Monitoring
W8-01	04/09/2019	-26.18332°	29.10395°	Borehole	-	4.17	Windpump	Blocked	Private owner	Not in use, Blocked

NR. ON MAP	Date Surveyed	Latitude	Longitude	Site Type	Water Level (mbgl)	Depth (m)	Equipment	Site Status	Owner	Use
HY31	04/09/2019	-26.17829°	29.1218°	Borehole	6.13	-	None	Not in use	Private owner	Not in use
HY32	04/09/2019	-26.17305°	29.12035°	Borehole	4.78	-	None	Not in use	Private owner	Not in use
Nooit-BH6	04/09/2019	-26.17093°	29.12028°	Borehole	-	-	Windpump	In use	Private owner	Livestock
KLPBH-10	04/09/2019	-26.16413°	29.11705°	Borehole	3.99	-	Windpump	In use	Private owner	Livestock
Pit1	04/09/2019	-26.16031°	29.1192°	Pit	2.50	-	Pit	Not in use	Private owner	Not in use
Roux HC1	04/09/2019	-26.15164°	29.12400°	Borehole	5.71	6.1	None	Not in use	Private owner	Not in use, blocked
K18	04/09/2019	-26.14521°	29.12063°	Monitoring borehole with Piezo monitoring pipe	21.29	-	None	Not in use	Mine	Not in use, monitoring
Roux HC2	04/09/2019	-26.13449°	29.12901°	Borehole	14	-	Windpump	In use	Private owner	Livestock

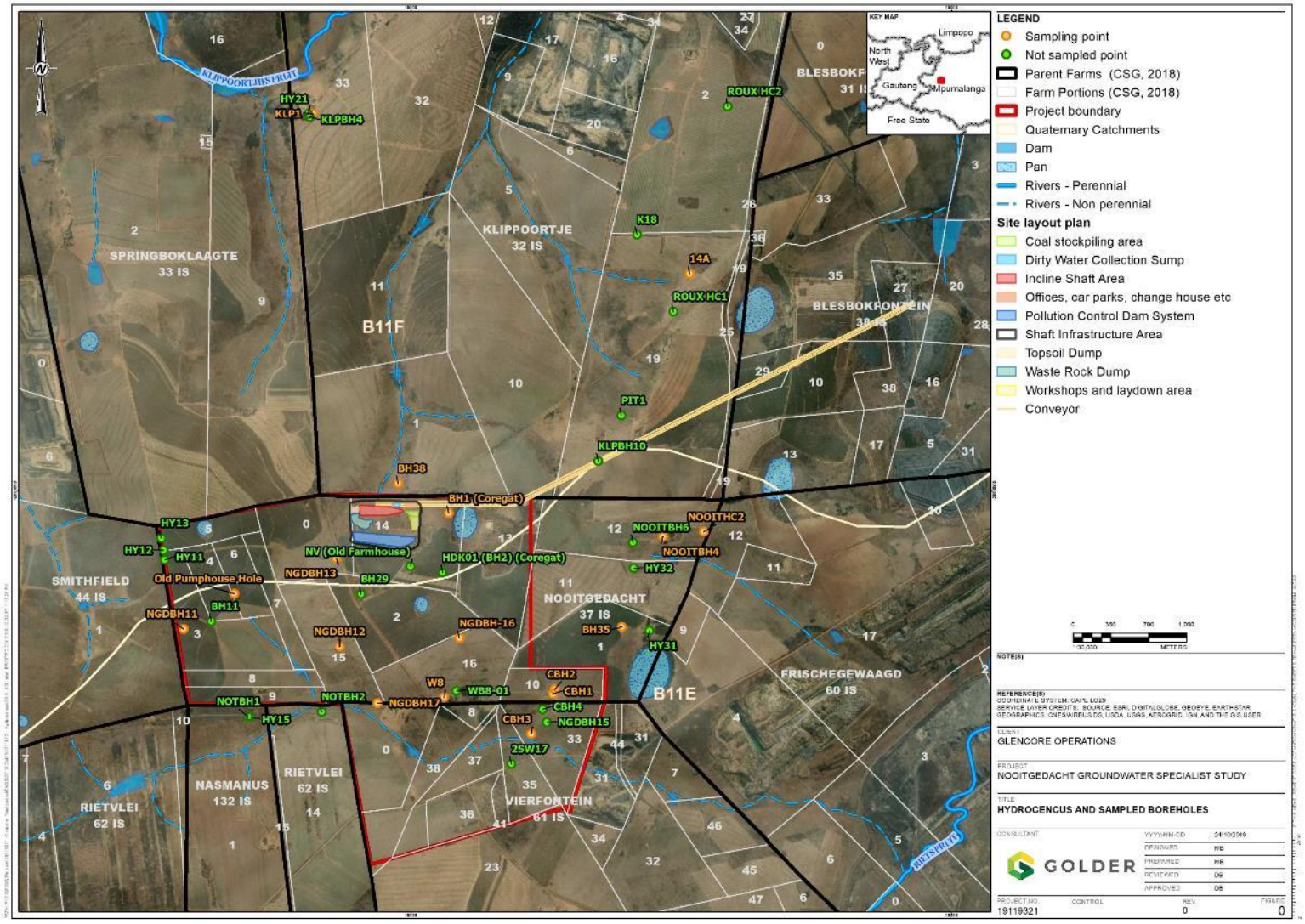


Figure 40: Hydrocensus Boreholes (Golder, 2019)

Table 21: DWAF Water Quality Classes (1998)

Water quality class	Description	Drinking health effects
Class 0	Ideal water quality	No effects, suitable for many generations.
Class 1	Good water quality	Suitable for lifetime use. Rare instances of sub-clinical effects
Class 2	Marginal water quality, water suitable for short-term use only	May be used without health effects by majority of users but may cause effects in some sensitive groups. Some effects possible after lifetime use.
Class 3	Poor water quality	Poses a risk of chronic health effects, especially in babies, children and the elderly. May be used for short-term emergency supply with no alternative supplies available.
Class 4	Unacceptable water quality	Severe acute health effects, even with short-term use.

Groundwater classification

The groundwater quality results of the sampled boreholes are visually represented on an expanded Durov and Piper diagrams to distinguish between the different water quality classes/types.

Expanded Durov

Expanded Durov diagrams graphically represent the relative percentages of anions and cations in water samples. The cation percentages are plotted in the top part of the diagram and the anion percentages in the left part. A projection of these cation and anion percentages onto the central area presents the chemical signature of the major ion composition of the water. The chemical signature can be related to various hydrochemical environments and conditions.

The majority of the samples plot on blue sector of the diagram and represent background groundwater quality, calcium magnesium bicarbonate type of water (Ca,Mg)$(HCO_3)^2$) (Figure 41).

The green sector of the diagram is representative of sodium potassium bicarbonate type of water Na/K–$(HCO_3)^2$. The plot position on the diagram indicates minor sodium enrichment diluted by precipitation.

The red sector of the diagram is representative of sodium potassium sulphate water type (i.e. Na/K–SO_4). The plot position on the diagram indicates water with minor sodium and sulphate enrichment (NGDBH12).

NGDBH12 plot on the red sector (type of water is seldom found), and are representative of magnesium chloride type of water (Mg) Cl. The plot position on the diagram indicates water with minor magnesium and chloride enrichment.

Table 22: Summarised Analytical Results

Borehole Number	PH	EC (mS/m)	TDS (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	Total Alkalinity $CaC0_3$ (mg/l)	Cl (mg/l)	SO_4 (mg/l)	NO_3 as N (mg/l)	F (mg/l)	Cu (mg/l)	Mn (mg/l)	Fe (mg/l)	Zn (mg/l)	Al (mg/l)	Cr (mg/l)	As (mg/l)	Water Quality Class
Nooit HC2	8.91	28.4	174	17.7	7.49	34.2	3.45	137	4.96	0.955	0.27	0.863	0.013	0.004	<0.01	0.047	0.001	0.001	0.001	1
BH1-Core BH	7.18	39.8	262	12.8	7.51	65.9	7.36	192	5.13	6	0.188	0.493	0.009	0.009	<0.01	<0.001	0.006	<0.001	0.001	0
14A	7.31	26.2	154	30.2	7.84	15.1	5.04	132	2.68	<0.7	<0.13	0.104	0.009	0.136	0.026	<0.001	<0.001	<0.001	<0.001	1
BH38	6.8	25.2	172	13.9	6.82	27.4	3.56	87.3	7.16	21.8	<0.13	0.192	0.009	0.162	0.034	0.043	<0.001	<0.001	<0.001	1
NGDBH16	7.18	11.1	60	5.51	3.04	10	4.41	35.4	9.99	<0.7	1.32	<0.042	0.008	0.007	0.098	<0.001	<0.001	<0.001	<0.001	1
W8	6.24	7.72	66	2.03	1.73	7.55	2.03	13.7	2.95	<0.7	4.58	0.105	0.038	0.007	0.051	0.494	0.36	0.001	<0.001	0
NGDBH17	6.62	8.97	72	4.79	1.25	10.7	1.1	32.3	1.68	<0.7	0.252	2.54	0.009	0.009	<0.01	0.009	0.016	<0.001	0.002	3
CBH1&2	7.78	57.6	350	57	18.3	40.7	2.77	198	37.9	32.9	0.43	0.739	0.012	0.015	<0.01	0.343	0.002	<0.001	<0.001	1
NGDBH12	5.57	11.2	90	5.15	3.43	5.78	3.44	4.9	7.05	<0.7	9.77	0.069	0.009	0.009	<0.01	0.004	0.023	0.002	<0.001	1
NGDBH13	7.86	39.2	218	10.7	6.91	60.9	1.95	190	7.53	<0.7	<0.13	2.3	0.009	0.007	<0.01	<0.001	<0.001	<0.001	<0.001	3
BH35	7.12	17	138	14.3	4.33	11.2	4.79	67.2	2.6	0.706	5.69	0.082	0.022	0.005	<0.01	0.037	<0.001	0.001	<0.001	0
NGDBH11	9	10.6	50	7.18	2.41	8.71	3.68	40.8	6.88	<0.7	0.132	<0.042	0.009	0.004	<0.01	<0.001	0.002	<0.001	<0.001	0
CBH3	7.83	55.4	346	55.4	18.2	41.3	2.81	201	37.7	34.2	0.458	0.742	0.013	0.01	<0.01	0.323	0.003	<0.001	<0.001	1
Nooit BH4	6.54	15	120	10.5	4.23	10.5	3.04	32.1	10.1	1.08	5.97	<0.042	0.048	0.01	<0.01	0.04	<0.001	0.001	<0.001	0
Old Pumphouse Hole	6.97	24.6	194	23.3	12.7	6.52	3.85	63.4	11.5	2.48	10.5	<0.042	0.009	0.009	<0.01	0.011	0.001	0.001	<0.001	2
KLP1	7.94	33	230	43.1	13.1	7.78	3.51	93	9.79	59.9	0.605	0.353	0.009	0.026	<0.01	0.002	0.004	0.001	0.002	0
SANS241: 2011	9.7	<170	1200	-	-	200	-	-	300	500	11	1.5	<=2.0	0.5	0.3	<0.5	<0.3	<0.05	-	
Class 0 Max. Allowable Limit	7-9.5	<70	<450	<80	<70	<100	<25	-	<100	<200	<6	<0.7	<0.1	<0.1	<0.01	-	-	-	-	0
Class 1 Max. Allowable Limit	10	150	1000	150	100	200	50	-	200	400	6-10	0.7-1.0	1.0-1.3	0.1-0.4	0.01-0.2	-	-	-	-	1
Class 2 Max. Allowable Limit	10.5	370	2400	300	200	400	100	-	600	600	10-20	1.0-1.5	1.3-2.0	1.0-4.0	0.2-2.0	-	-	-	-	2
Class 3 Max. Allowable Limit	11	520	3400	>300	400	1000	500	-	1200	1000	20-40	1.5-3.5	2.0-15	4.0-10.0	2.0-10.0	-	-	-	-	3
Class 4 Max. Allowable Limit	>11	>520	>3400	>300	>400	>1000	>500	-	>1200	>1000	>40	>3.5	>15	>10.0	>10.0	-	-	-	-	4

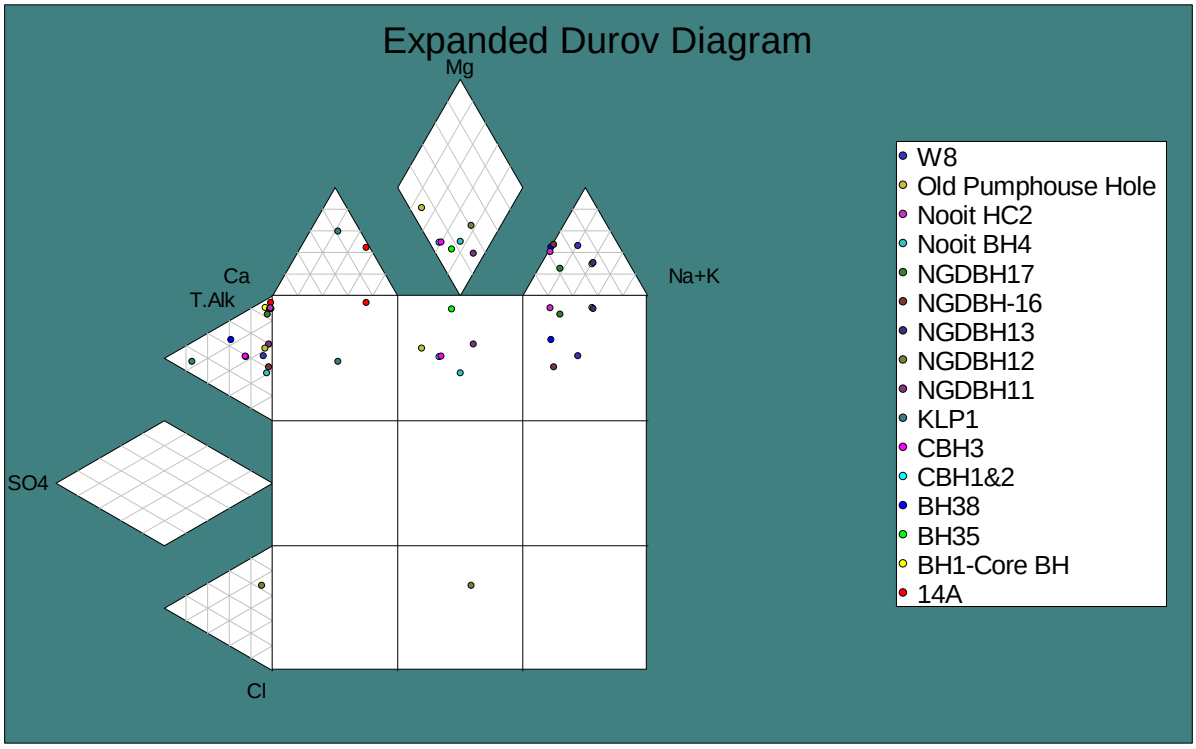


Figure 41: Expanded Durov Diagram

Piper diagram

Piper diagrams graphically represent the relative percentages of anions and cations in water samples. The cation percentages are plotted in the left triangle and the anion percentages in the right triangle. A projection of these cation and anion presentations onto the central diamond presents the chemical signature of the major ion composition of the water.

The majority of the samples plot on blue sector of the Piper diagram and show a signature of calcium magnesium bicarbonate type of water $(Ca,Mg)(HCO_3)^2$. This type of water is associated with recent rainfall recharge and not impacted groundwater (viz. polluted).

The green sector represents a sodium bicarbonate (i.e. $Na–(HCO_3)^2$) water type signature and follows the typical dynamic groundwater flow evolution (Figure 42).

The red sector of the Piper Diagram shows a signature of calcium/sodium sulphate type of water (NGDBH12).

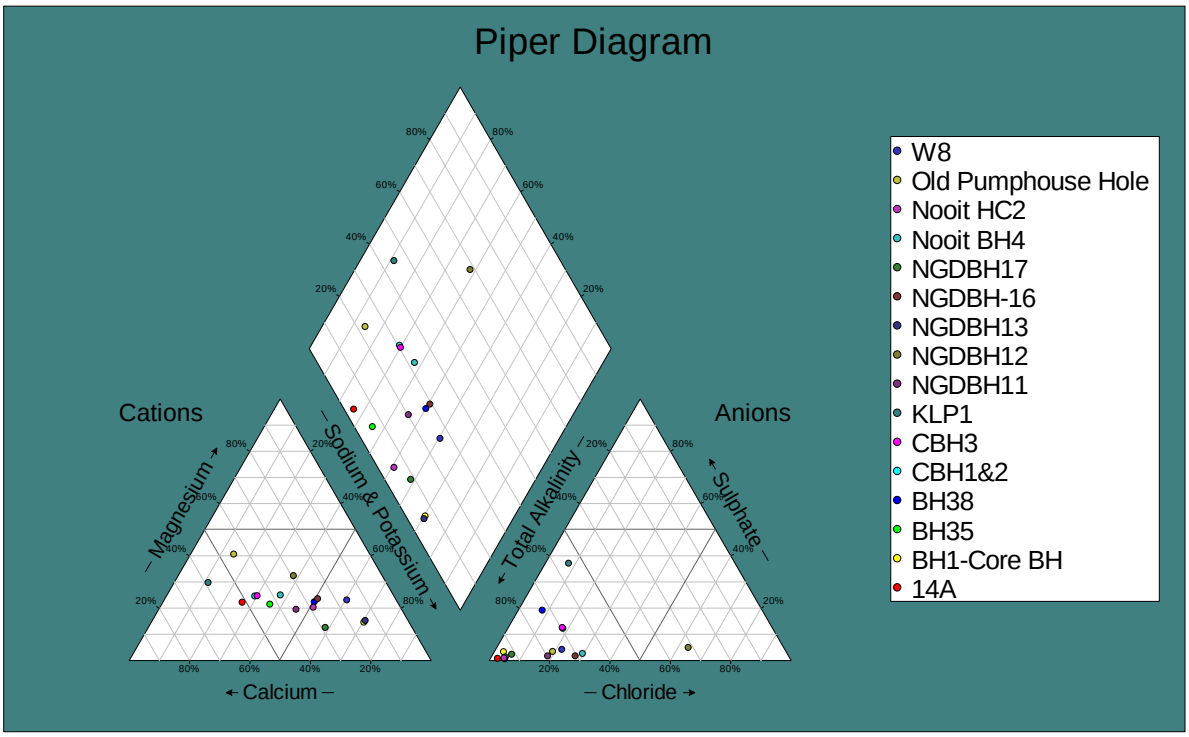


Figure 42: Piper Diagram

Chapter I: Air Quality

The following information was obtained from the *Glencore Operations South Africa (Pty) Ltd: Nooitgedacht Colliery Air Quality Impact Assessment*, dated 2020 and prepared by Shangoni Management Services.

Regional

The Nooitgedacht Colliery falls within the Highveld Priority Area ("HPA") (Refer to Figure 43), one of South Africa's declared airshed priority areas. The Highveld area in South Africa is associated with poor air quality, and elevated concentrations of criteria pollutants occur due to the concentration of industrial and non-industrial sources. The priority area covers approximately 31 106 km^2, including parts of Gauteng and Mpumalanga provinces, with a single metropolitan municipality, three district municipalities, and nine local municipalities. As the area overlaps provincial boundaries, the Department of Environmental Affairs ("DEA") now known as the Department of Environment, Forestry and Fisheries ("DEFF") functions as the lead agent in the management of the priority area and is required in terms of Section 19(1) of the National Environmental Management: Air Quality Act (Act 39 of 2004) ("AQA") to develop an Air Quality Management Plan for the priority area.

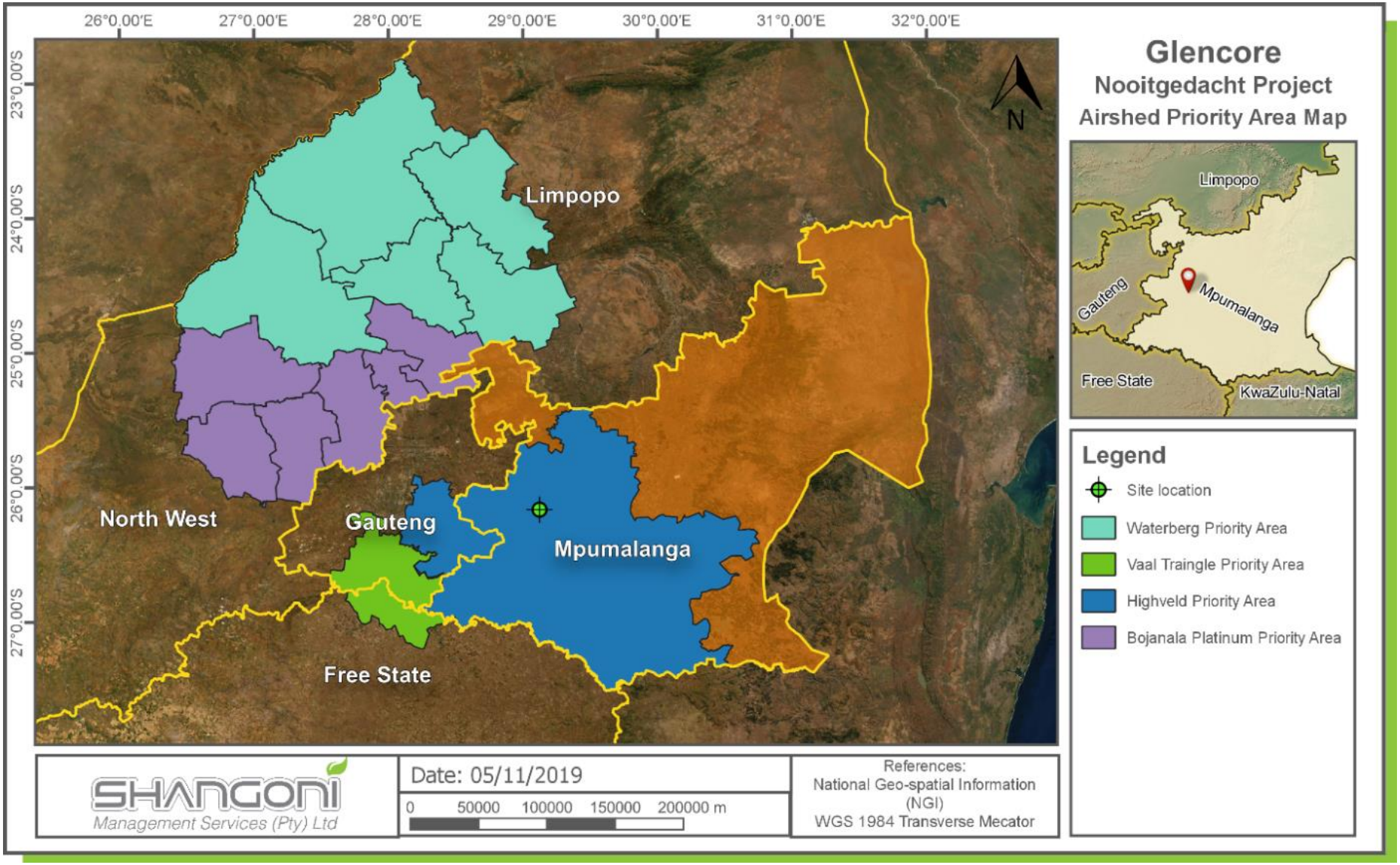


Figure 43: Airshed Priority Area Map

Provincial

The DEA Air Quality Management Plan ("AQMP"), dated 2011, identified eight air quality hotspot areas within the Mpumalanga province. These hotspot areas are: eMalahleni, Kriel, Steve Tshwete, Ermelo, Secunda, Lekwa, Balfour and Delmas. The areas closest to Nooitgedacht is the eMalahleni (Witbank) and Kriel areas. The main pollutant of concern for the eMalahleni hotspot area is PM10 and SO_2 and SO_2 for the Kriel area. These pollutants are mainly due to industrial sources and mining activities such as power generation, coal mining and open cast haul roads in these areas. The Nooitgedacht Colliery is located approximately 35 km north-north-east from the eMalahleni area and 18 km north-west from the Kriel area.

District

The *Nkangala District Municipality's Air Quality Management Plan*, dated 2015, identified industrial, mining and its related activities as one of the main sources of emissions in the eMalahleni Local Municipality.

Site air quality data and SAAQIS background monitoring data

There are no current air quality monitoring taking place on the Nooitgedacht Colliery area. Monitoring will only be implemented during the construction phase and when Nooitgedacht Colliery is operational.

The following background monitoring data was obtained from the South African Air Quality Information System ("SAAQIS") monitoring stations network. The ambient air quality monitoring stations were identified in Witbank (Latitude: -25.877861, Longitude: 29.186472). The primary monitoring objective of the Witbank station is to determine the contribution to ambient air pollution from various air pollution sources such as domestic fuel burning, transportation-related emissions and in particular, power generation, industrial and mining-related emissions.

The ambient air quality monitoring results for Witbank show the average daily CO levels (~3.5 ppm) to fall below the National Ambient Air Quality Standards ("NAAQS") for daily CO levels (26 ppm, 30 mg/m^3) as per the validated retrieved data. (Refer to Table 23)

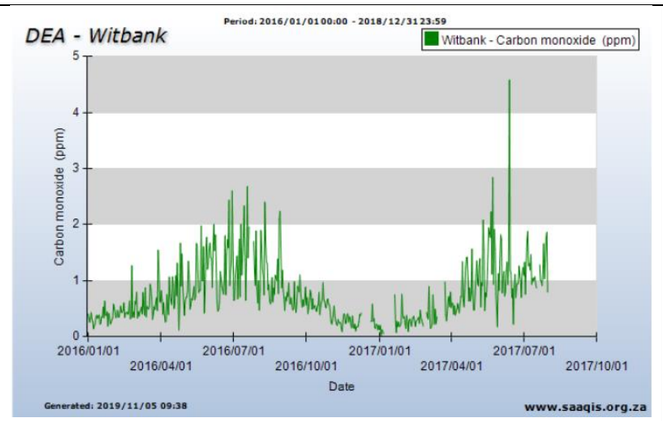
The ambient air quality monitoring results for Witbank show the average daily SO_2 levels (~25 ppb) to fall below the NAAQS for daily SO_2 levels (48 ppb, 125 ug/m^3) with exceedances above the annual maximum permissible exceedances in 2016; the average hourly SO_2 levels (~60 ppb) to fall below the NAAQS for SO_2 levels (134 ppb, 350 ug/m^3) with exceedances falling below the annual maximum permissible exceedances. (Refer to Table 23). The ambient air quality monitoring results for Witbank show the average hourly NO_2 levels (~37 ppb) to fall below the NAAQS for hourly NO_2 levels (106 ppb) as per the validated retrieved data. (Refer to Table 23).

The ambient air quality monitoring results for Witbank show the average daily PM10 levels (~50 ug/m^3) to fall below the NAAQS for daily PM10 (75 ug/m^3) with exceedances above the annual maximum permissible exceedances in 2016 and 2017. (Refer to Table 23).

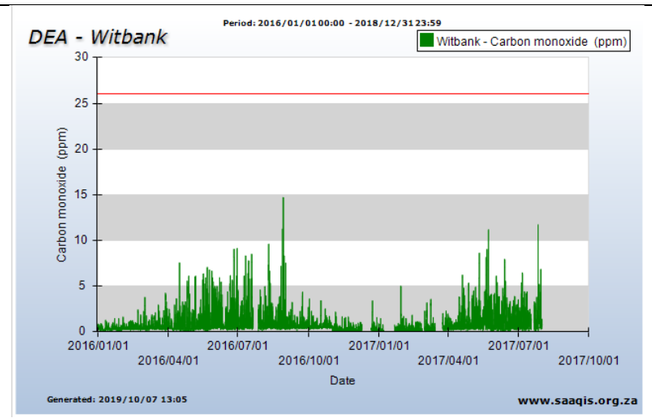
The ambient air quality monitoring results for Witbank show the average daily PM2.5 levels (~40ug/m^3) to fall below the NAAQS for the daily PM2.5 levels (65 ug/m^3). (Refer to Table 23).

Table 23: Background ambient air quality - Witbank

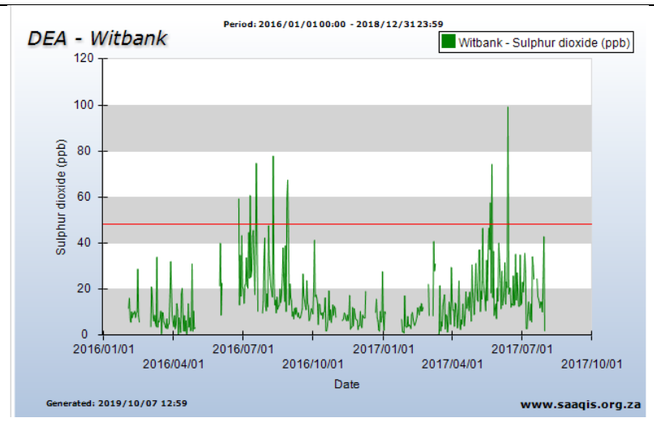
CO daily average



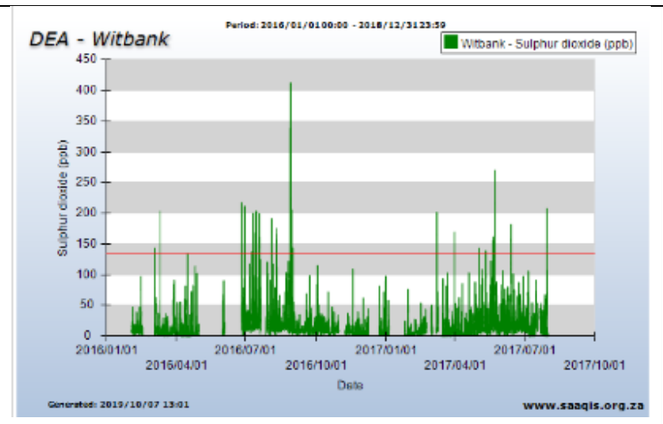
CO hourly concentration



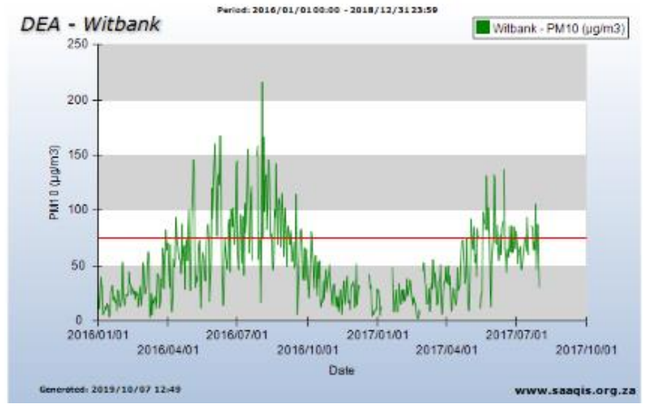
SO_2 daily concentration



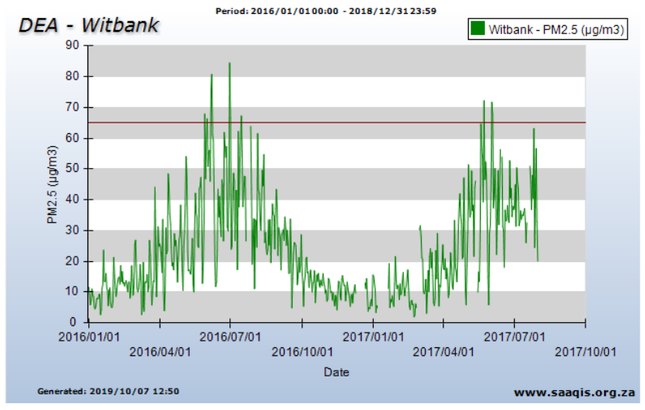
SO_2 hourly concentration



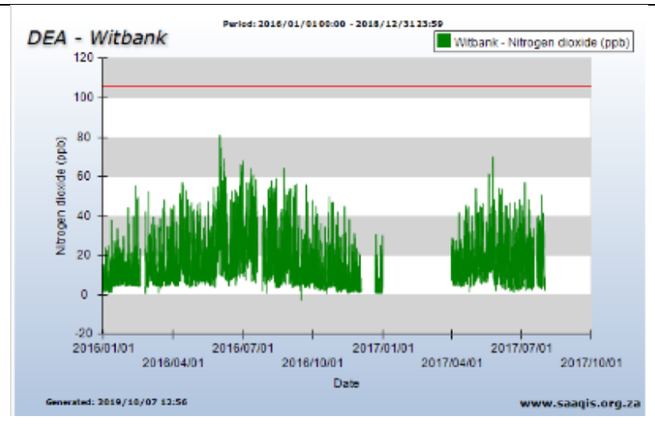
PM10 daily concentration



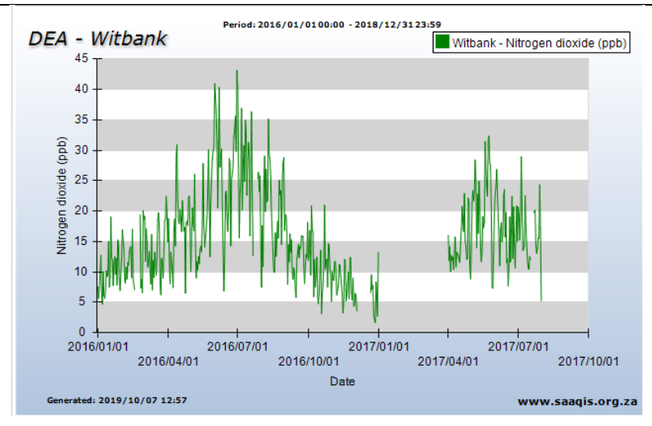
PM2.5 daily concentration



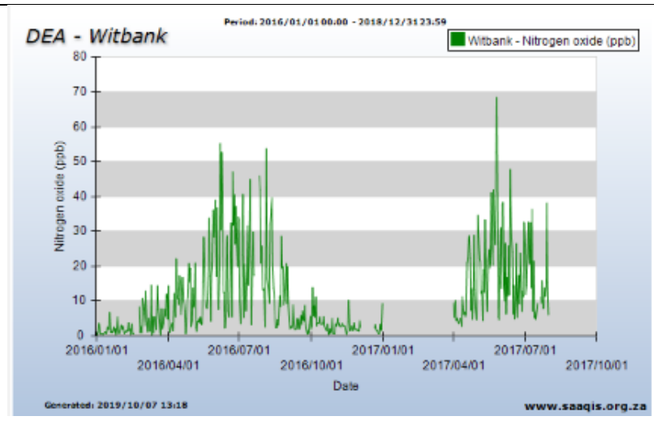
NO_2 hourly concentration



NO_2 daily concentration



NO daily concentration



Chapter J: Noise

The following information was obtained from the *Amendment to The Nooitgedacht Environmental Impact Assessment and Environmental Management Programme: Inclusion of Seams 2 and 4*, dated 2014.

Noise disturbances in the surrounding area include trucks and existing mining activities, in addition to farming activities.

Chapter K: Archaeology and Cultural History

The following information was obtained from the *1st phase Heritage Impact Assessment ("HIA") of a portion of Nooitgedacht 37 IS in the Ogies district, Mpumalanga for Glencore Operations Limited – Nooitgedacht Project ("Glencore")*, dated 2019.

Heritage remains at Nooitgedacht Colliery.

As part of the desktop review of the site, an old mining map was provided indicating the possibility of a number of grave sites at the Nooitgedacht Colliery site. A filed investigation was undertaken to confirm the graves include on the map (Table 24 and Figure 44). The field investigation was hampered by vegetation and only two of the sites could be located and confirmed. An informant, Anna Mashego, that worked on the farm for twenty years and that was living in the discarded farmhouse for sixteen years were able to confirm the location of the two grave sites. Even though these could not be located during this field investigation, one must assume that they are still present.

Table 24: Relevant GPS coordinates for heritage remains.

Beacon	Degrees south	Degrees east	Beacon	Degrees south	Degrees east
GPS coordinates of the are covered as part of site investigation.					
1	26°10'11.6"S	29°5'29.42"E	2	26°10'1.27"S	29°6'15.33"E
3	26°10'31.37"S	29°6'15.25"E	4	26°10'24.54"S	29°5'37.93"E
GPS coordinates of graves.					
Graves 1	26°10'1.76"S	29°6'14.40"E	Graves 2	26°10'5.31"S	29°5'39.59"E
Graves 3	26°10'24.51"S	29°5'37.66"E	Graves 4	26°10'13.68"S	29°6'13.58"E
Graves 5	26°10'8.32"S	29°5'49.91"E			
GPS coordinates of other heritage remains.					
Labourer dwellings	26°10'0.71"S	29°5'36.35"E			
Protected house	26°10'23.16"S	29°5'58.44"E			
GPS coordinates of the servitude.					
Start	26°10'3.74"S	29°5'47.20"E	End	26°9'03.00"S	29°8'46.81"E

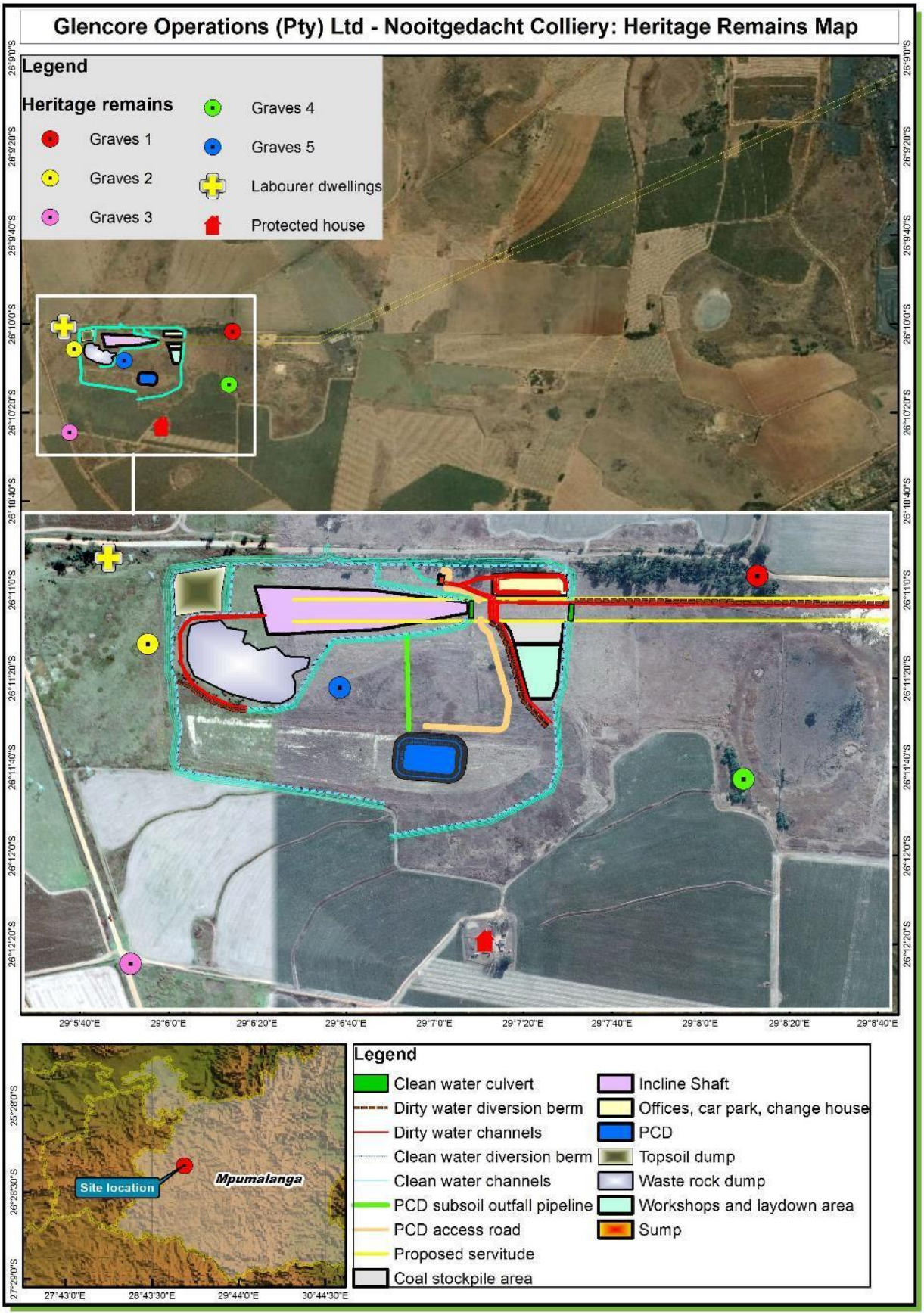


Figure 44: Location of heritage remains as depicted on the old mine map and heritage remains confirmed during the site investigation.

Farmhouse (Figure 45)

On the south side of the property there are the remains of a large farmyard enclosed with a diamond wired fence. Inside the fenced area there is a farm dwelling possibly dating to the 1920's or earlier. The structure is, therefore, protected by Act 25 of 1999, the National Heritage Act.

Figure 45: Farmhouse (Photo S.M. Miller 2019.)

Graves (figure 46 to figure 50)

At the point referenced as "Graves 5" there is a small cemetery containing six graves. Two graves were also identified at the point reference as "Graves 2". These graves are protected by Act 25 of 1999, the National Heritage Act as well as the National Health Act (61/2003): Regulations relating to the management of Human remains (Gazette 36473, Notice 363).

Figure 46: Small cemetery at "Graves 5" (Photo S.M. Miller 2019.)

Figure 47: Two of the graves at the "Graves 5" site. (Photo S.M. Miller 2019.)

Figure 48: Modern grave goods in cemetery marked as "Graves 5" implying visitation by relatives. (Photo S.M. Miller 2019.).

Figure 49: Two of the graves in the cemetery marked as Graves 5. (Photos S.M. Miller 2019.)

Figure 50: Two of the graves in the cemetery marked as "Graves 2" (Photo S.M. Miller 2019.).

Chapter L: Sensitive Landscapes

The following information was obtained from the *Glencore Nooitgedacht Shaft Wetland Delineation and Assessment Study,* dated 2019 and prepared by WCS Scientific (Pty) Ltd.

Wetland delineation & typing

Within the Nooitgedacht Colliery area four hydro-geomorphic ("HGM") types were identified, namely:

- Channelled Valley Bottom wetland.
- Unchannelled valley bottom wetland.
- Seep wetland.
- Pan wetland.

In addition to the delineated wetland habitat, 2 small farm dams were identified.

The wetlands within the Nooitgedacht Colliery area cover approximately 189.5 hectares, or 26.2% of the study area (study area covers 723 ha).

The delineated and classified wetlands within the Nooitgedacht Colliery area and surrounds are illustrated in Figure 51 below, with more detail regarding the extent of the different wetland types also provided in Table 25.

Table 25: Areas of the different wetland types recorded on site.

Type	Area (ha)	% of wetland area	% of study area
Channelled valley bottom	8.6	4.55%	1.19%
Unchannelled valley bottom	2.9	1.51%	0.40%
Seep	167.8	88.56%	23.22%
Pan	10.2	5.38%	1.41%
TOTAL	**189.5**	**100.00%**	**26.22%**
Dams	0.7	n/a	0.10%

Seep wetlands are by the far the most extensive wetland habitat within the area, making up almost 89% of the wetland habitat identified within the Nooitgedacht Colliery area. This is not unexpected within the general Ogies vicinity, where the typically sandy soils derived from the underlying sandstone provide ideal conditions for the development of Seep wetlands. However, the location of the proposed shaft footprint near the head of a small watercourse, as well as the location of the proposed servitude roughly along the watershed between sub-catchments results in few valley bottom wetlands occurring within the Nooitgedacht Colliery area.

As is typical of the Seep wetlands in the area, the Seep wetlands are characterised by sandy soils with impeded vertical drainage due to the presence of typically a soft-plinthic layer within the soil profile that encourages lateral seepage and formation of interflow. The Seep wetlands on site consists of a mosaic of temporary and seasonally saturated habitat, with saturation mostly experienced during the summer rainfall season and into the early dry season. Surface water is mostly absent from the wetlands except immediately after rainfall events and at localised Seep fronts. At the time of the site visit on 15 October 2019, the Seep wetlands were largely dry and no surface water or saturated soils were observed on site.

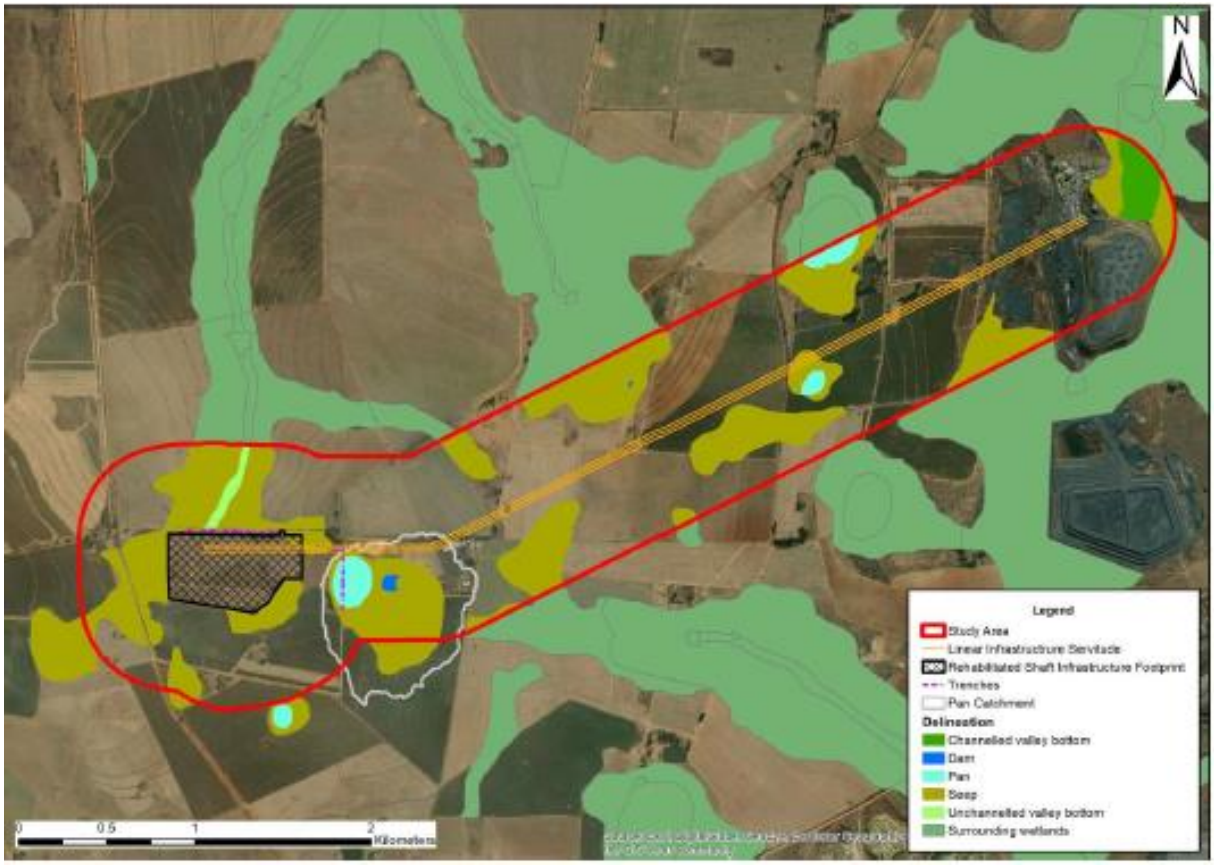


Figure 51: Map of the delineated and classified wetlands within the Nooitgedacht Colliery area and surroundings.

Wetlands of the shaft infrastructure footprint

A number of wetland systems occur within direct vicinity of the shaft footprint, with each of these wetland units briefly described below (wetland units are numbered in Figure 52). No wetland habitat was delineated within the existing rehabilitated shaft footprint. Past disturbance of the soil profile and vegetation due to the previous shaft infrastructure and rehabilitation of the disturbed footprint have resulted in the loss of any wetland habitat that may have historically occurred within the shaft footprint.

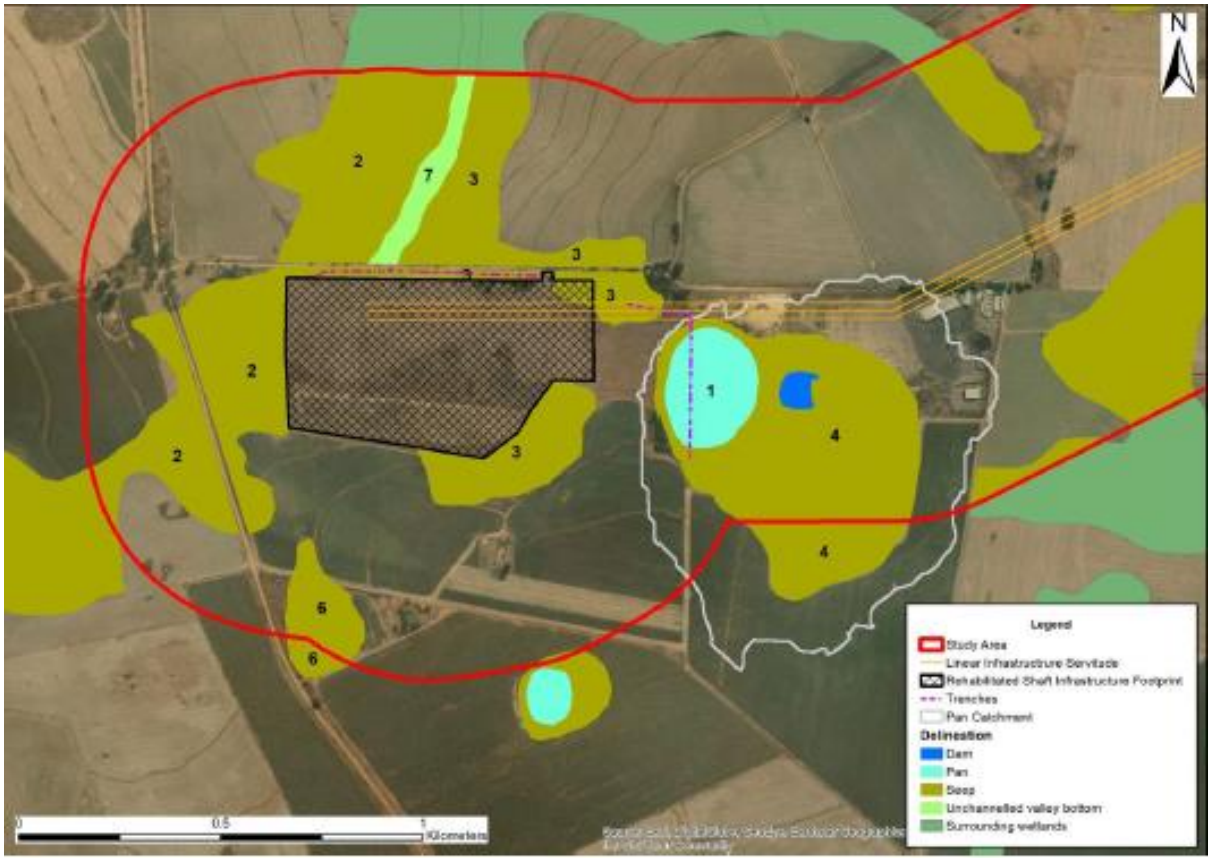


Figure 52: Map of the wetland units located in close proximity to the proposed shaft footprint.

Wetland Unit 1 - Pan wetland

One of the significant wetland features occurring within close proximity to the proposed shaft footprint is a seasonal pan wetland of approximately 5.5 hectares. The pan is located just to the east of the envisaged shaft footprint, with the proposed servitude located just to the north of the pan wetland. The pan is characterised by a shallow vegetated basin that, at the time of the site visit, was still saturated across most of its width and with a small puddle of water remaining within its centre. Using a handheld pH and EC meter, the pH was determined as 9.34, while the maximum reading on the EC meter of 3999 µS/cm was exceeded.

The pan is characterised by short grass cover of *Paspalum distichum* and a *Panicum* species across the basin, with a narrow but well-established ring of *Typha capensis* around the pan perimeter. This indicates the extended presence of water within the pan. Some patches of *Phragmites australis* were also observed along the pan perimeter, mostly associated with a shallow trench that has been excavated across the pan from south to north.

Due to very low water levels, limited bird life was observed on the pan during the 15 October 2019 site visit. However, the pan is known to be utilised by the Vulnerable Greater Flamingo, which were also observed on nearby pans during the site visit. Numerous Marsh Owls were also flushed from the dense vegetation along the pan perimeter.

Indicated in Figure 52 above is also the pan catchment, as modelled in ArcMAP using the available contour data. It is clear from the map that the shaft footprint is located well outside the pan catchment, with the shaft footprint located at a lower elevation than the pan.

Wetland Unit 2 & 3 – Seep wetlands

These are two Seep wetlands that drain from either side of the shaft footprint in a roughly northerly direction into the unchannelled valley bottom wetland (wetland unit 7) that forms a tributary of the Klippoortjiespruit to the north. These wetlands form part of the FEPA wetland system.

Historically it is likely that these wetlands would have extended across the rehabilitated shaft footprint, but any wetland habitat that may have occurred within the shaft footprint has already been lost due to past disturbances.

These Seep wetlands, specifically the section of wetland unit 2 immediately to the west of the shaft footprint, support large and dense stands of the grass *Imperata cylindrica*, which makes ideal African Grass Owl (listed as Vulnerable) roosting and breeding habitat. A single individual of the African Grass Owl was observed on site on the 15 October 2019, being flushed from one of these *Imperata cylindrica* stands.

Downstream of the public gravel road, the Seep wetlands are fringed by cultivated maize fields. These cultivated fields extend marginally into the Seep wetlands, resulting in complete loss of vegetation in some areas of the wetlands.

Wetland Unit 4 – Seep wetland

This is a large Seep wetland draining into the pan wetland (wetland unit 1). A number of disturbances have impacted on this wetland, including past cultivation that has resulted in extensive areas of the wetland being characterised by secondary vegetation with a high prevalence of weeds.

More recently clearance of vegetation has taken place within the Seep wetland to create what appears to be a large unsurfaced parking area for trucks. A small farm dam has also been excavated in the Seep, while a further disturbance of the soil is evident just to the north of the pan.

The Seep is again characterised by temporary to seasonal wetness, with especially the central portions of the Seep being somewhat ephemeral and possibly more accurately described as a mosaic of wetland and terrestrial habitat (though all disturbed and secondary vegetation). The lower edge of the Seep and the upper edge of the Seep display the most extended wetness and saturation. These areas are again characterised by extensive and well-developed stands of *Imperata cylindrica* that are known to support the African Grass Owl, though none were observed during the wetland survey.

Wetland Unit 7 – Unchannelled valley bottom wetland

An unchannelled valley bottom wetland extends northwards from the shaft footprint and forms a tributary to the Klippoortjiespruit. This wetland forms part of the FEPA wetland. Flows discharge into the wetland via a series of box culverts under the public gravel road. Clear signs of sediment inputs are evident immediately downstream of the road. The wetland remains unchannelled for roughly 750 m downstream of the road, at which point a considerable headcut is present in the system and results in a shallow

channel extending down the centre of the wetland up to the small farm dam roughly 1 km downstream of the road.

The wetland is considered to be seasonally saturated and is characterised by a mixture of grass, sedge and rush species, including *Juncus effusus* and *Leersia hexandra*. At the time of the site visit the wetland was dry, though some surface water remained in the small farm dam.

Present Ecological State ("PES")

All of the wetlands within the Nooitgedacht Colliery area are located within an active farming area and have been exposed to agricultural impacts for many years. In addition, mining activity has taken place on site including the establishment and operation of an underground mine with associated shaft infrastructure, with a rehabilitated shaft footprint remaining on site.

The above impacts have resulted in the present ecological state of the wetlands on site departing significantly from the reference condition or un-impacted state of the wetlands. This is reflected in the results of the PES assessment that classes the wetlands on site as being mostly largely modified (PES D), with almost 46 % of wetland habitat falling within this category. The results of the PES assessment are summarised in Table 26 and Figure 53.

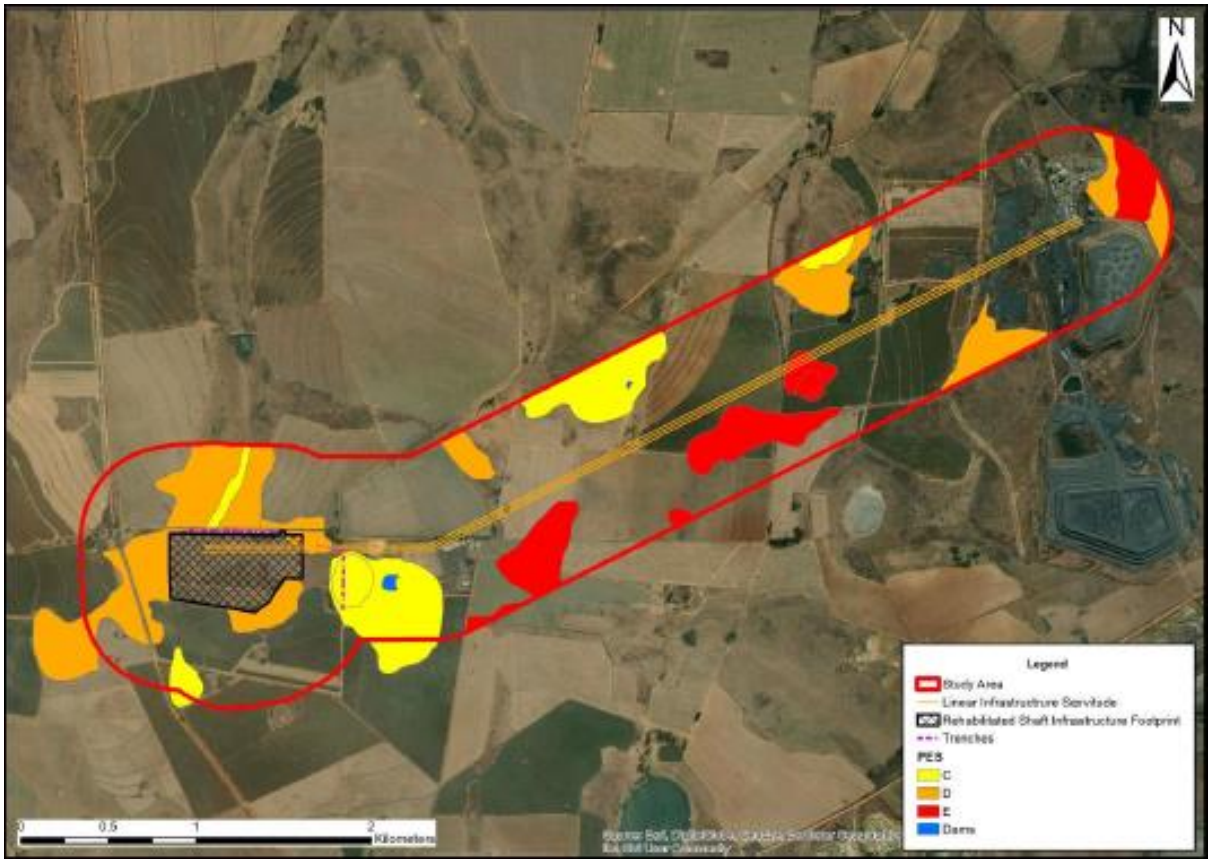


Figure 53: Map showing the results of the PES assessment.

Table 26: Results of the PES assessment for the affected wetlands.

Type	Moderately modified PES C	Largely modified PES D	Seriously modified PES E
Channelled valley bottom			8.6
Unchannelled valley bottom	2.9		
Seep	43.8	86.9	37.0
Pan	8.6		1.5
TOTAL	**55.3**	**86.9**	**47.1**
Percentage	29.2%	45.9%	24.9%

Importance & Sensitivity ("IS")

The wetlands within the Nooitgedacht Colliery area form part of the Olifants River Primary catchment that is a heavily utilised and economically important catchment. Wetlands and rivers within the Olifants River Catchment upstream of Loskop Dam have been greatly impacted upon by various activities, which include mining, power stations, water abstraction, urbanization, agriculture etc. As a result of these impacts serious water quality and quantity concerns have been raised within the sub-catchment. Given this situation, and the fact that wetlands can support functions such as water purification and stream flow regulation, a high importance and conservation value is placed on all wetlands and rivers within the catchment that have as yet not been seriously modified. Within this context an IS assessment was conducted for every hydro-geomorphic wetland unit identified within the Nooitgedacht Colliery area. Further considerations that informed the IS assessment include:

- The location of the Nooitgedacht Colliery area within a vegetation type (Eastern Highveld Grassland) considered extensively transformed and threatened, having been classed as Vulnerable.
- The wetland vegetation types of the area, Mesic Highveld Grassland Bioregion, which have variously been classified from Least Concern (pan wetlands) to Critically Endangered (Seep and Valley-bottom wetlands).
- The largely modified state of the wetlands within the Nooitgedacht Colliery area, with most of the wetland habitat considered largely modified and extensively impacted by surrounding agricultural and mining activities.
- The confirmed presence of Red Data bird species within the wetlands, including the Vulnerable African Grass Owl and Greater Flamingo.
- The importance of the valley bottom wetlands and rivers as ecological corridors in a largely transformed mining landscape.
- The classification of some of the wetlands as Freshwater Ecosystem Priority Areas (FEPAs).

It is these considerations that have informed the scoring of the wetlands in terms of their importance and sensitivity. The results of the assessment and rankings based on our current understanding of the wetlands is summarised in Table 27 and Figure 54.

Wetland habitat associated with the pan wetland and the unchannelled valley bottom wetland is considered of High importance and sensitivity. The bulk of wetland habitat identified, consisting mostly of Seep wetlands, was considered or Moderate importance and sensitivity.

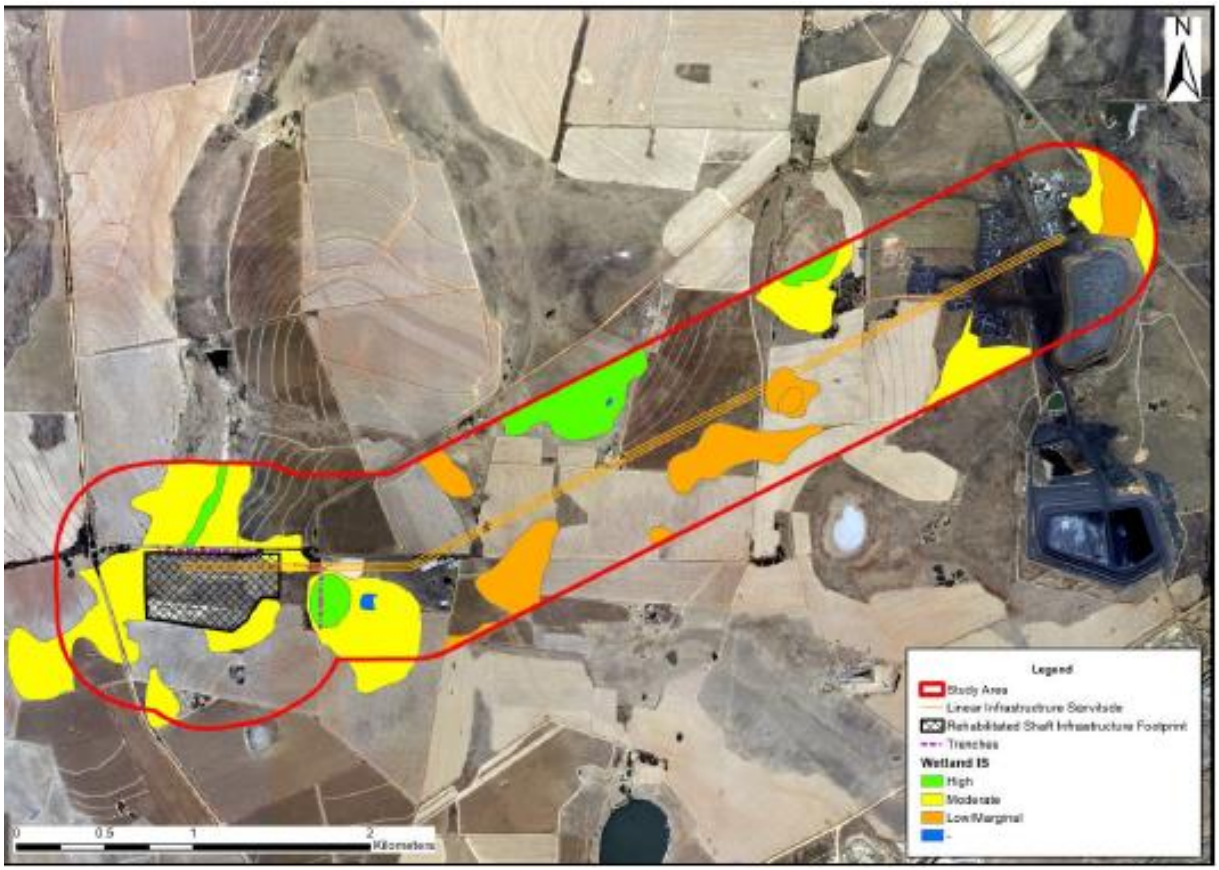


Figure 54: Map illustrating the results of the Importance and Sensitivity Assessment.

Table 27: Results of the Importance and Sensitivity Assessment.

Type	HIGH Importance & Sensitivity	MODERATE Importance & Sensitivity	LOW/MARGINAL Importance & Sensitivity
Channelled valley bottom			8.6
Unchannelled valley bottom	2.9		
Seep	19.9	106.2	37.0
Pan	8.6		1.5
TOTAL	**31.4**	**106.2**	**47.1**
Percentage	17.0%	57.5%	25.5%

Chapter M: Visual aspects;

The Nooitgedacht Colliery is situated in a predominantly rural environment with farming and mining being the two main activities in the vicinity of the area. Currently, no visual aspects are applicable to the

Nooitgedacht Colliery area. The area has been rehabilitation by the previous mine owner, including the removal of all infrastructure.

Chapter N: Regional socio-economic structure

The following information was obtained from the *Integrated Development Plan 2017/18 – 2021/22*.

Population size

According to StatsSA (Community Survey 2016 – CS2016), eMalahleni's population has increased from 395 466 in 2011 to 455 228 people in 2016. It is the 3rd largest population in the province and 31.5% of the total population of Nkangala District Municipality in 2016. Population grew by 59 762 in the relevant period and recorded a population growth rate of 3.2% per annum between 2011 & 2016. The population number for 2030 is estimated at 707 530 people, given the historic population growth per annum. This will put pressure on infrastructure development, service delivery & eventually sustainable job creation.

Increase in population might be due to mining industries and businesses around, which result in:

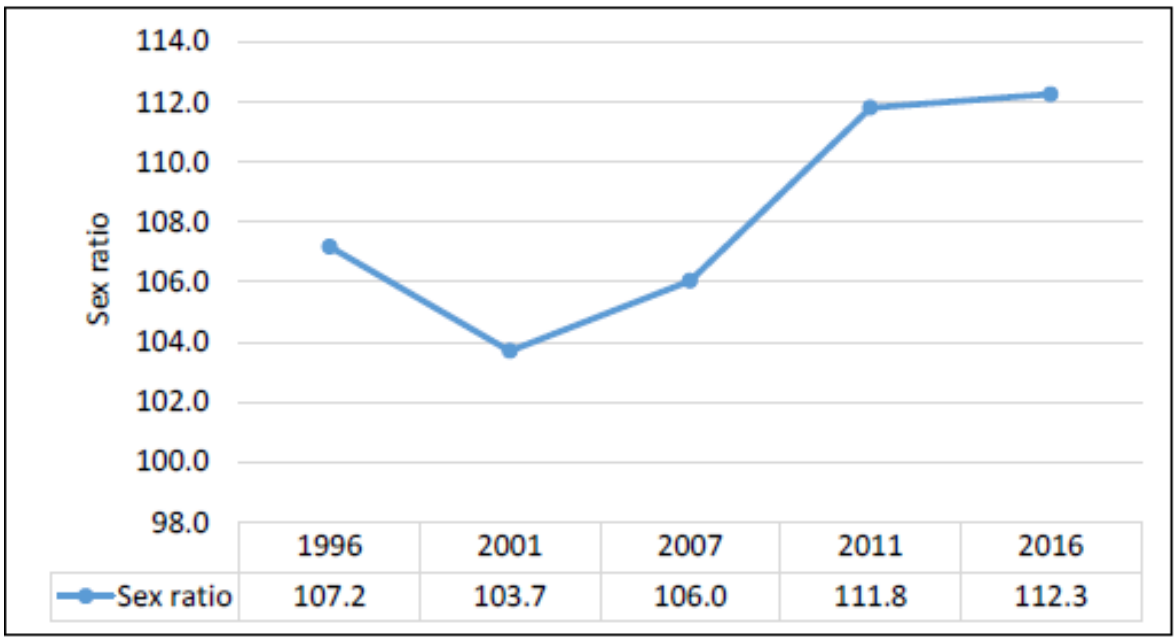
- Informal settlements and back rooms – estimated 10 000 people residing in these areas.
- Water supply to informal settlements costing about R800 000.00 per month and the residents are not contributing to the cost of these services.
- Strain on water, sanitation, electricity and roads resulting in quality and capacity problems.
- Increase in unemployment, particularly amongst youth and unskilled, which might impact on issues of crime, prostitution and drug abuse.

Population distribution

eMalahleni is composed of all racial groups, with 391 982 Black African (an increase since 2011), Coloured 5 450, Indian or Asian 3 762 and White 54 033. The data shows an increase in both African/Black and Indian/Asian and a decrease in both Coloured and White population since 2011.

Gender distribution / sex ratio (Figure 55)

The age and gender structure of the population is a key determinant of population change and dynamics. The shape of the age distribution is an indication of both current and future needs regarding educational provision for younger children, health care for the whole population and vulnerable groups such as the elderly and children, employment opportunities for those in the economic age groups, and provision of social security services such as pension and assistance to those in need. The age and sex structure of smaller geographic areas are even more important to understand given the sensitivity of small areas to patterns of population dynamics such as migration and fertility.



Source: Statistics South Africa

Figure 55: Sex ratio

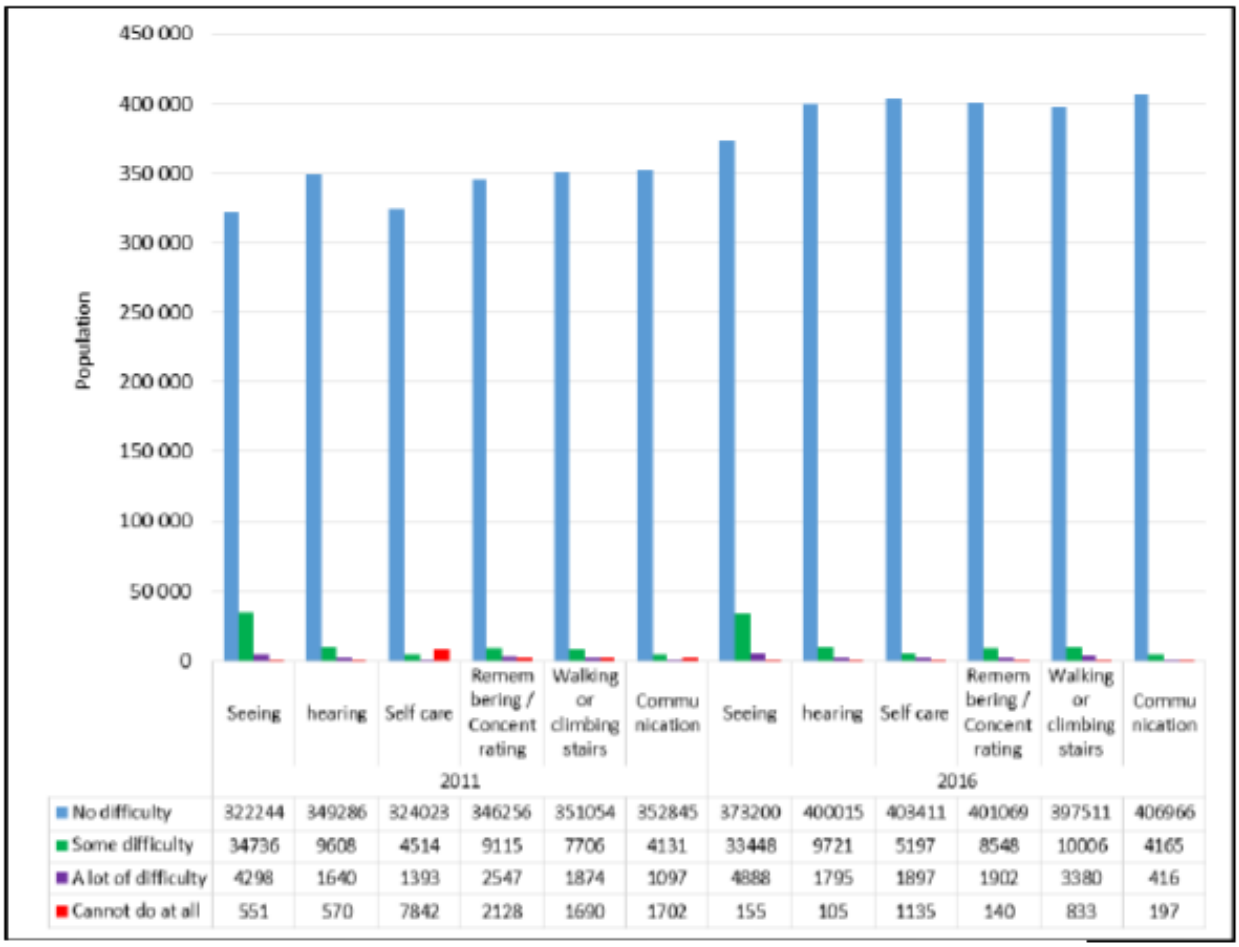
Disability (Figure 56)

Disability is one measure used to evaluate the health of a population. It is defined as a health condition that limits functioning. eMalahleni has people with difficulties of walking or climbing stairs as shown in the below graph. This is an important disaggregation to note for knowledge of what types of resources are needed by disabled persons within eMalahleni.

Education attainment

Educational attainment is a key indicator of development in a population. To evaluate long term provision of education, it is important to disaggregate educational attainment for persons older than 20 years. This is an ideal group since they would have completed attending educational institutions. Statistics South Africa generated a measure of educational attainment for persons over age 20. This group is expected to have completed educational enrolment, therefore, giving a good measure for completed level of education. According to the 2016 census of StatsSA, the population in eMalahleni aged 20+ completed grade 12, increased from 117 021 in 2011 to 146 952 (increase of 29 931) in 2016, an increase of 25.6% in the relevant period. eMalahleni's grade 12 pass rate improved from 75.8% in 2011 to 84.6% in 2015, which was the 6th highest of the municipal areas of the Province. The municipality achieved an admission rate to university/degree studies of 27.7% in 2015.

The challenge is to accommodate and integrate the educated young people in the area into the labour market, especially those with Grade 12 certificates, the unemployment rate is more or less 30%.



	2011						2016					
	Seeing	hearing	Self care	Remembering / Concentrating	Walking or climbing stairs	Communication	Seeing	hearing	Self care	Remembering / Concentrating	Walking or climbing stairs	Communication
No difficulty	322244	349286	324023	346256	351054	352845	373200	400015	403411	401069	397511	406966
Some difficulty	34736	9608	4514	9115	7706	4131	33448	9721	5197	8548	10006	4165
A lot of difficulty	4298	1640	1393	2547	1874	1097	4888	1795	1897	1902	3380	416
Cannot do at all	551	570	7842	2128	1690	1702	155	105	1135	140	833	197

Source: Statistics South Africa

Figure 56: Disability graph

Poverty and inequality

The share of population in eMalahleni is below the so-called lower-bound poverty line (of StatsSA). The lower-bound poverty line = R575 per capita per month. In 2015, eMalahleni's share of population was below the lower-bound poverty line and was the lowest (favourable) among the municipal areas. The number of people below the lower bound poverty line was however relatively high at more than 90 000 people in 2015.

According to the 2016 Community Survey of StatSA, the so-called poverty headcount (multi-dimensionally) of eMalahleni deteriorated from 8.0% in 2011 to 10.9% in 2016 and second highest in the Province and the so-called poverty intensity also increased from 43.6% to 45.4% in the same period.

The best way to improve and fight inequality & poverty is to improve people's levels of education and skills and eventually their employability in the labour market. Creation of jobs will impact positively on the reduction of poverty and inequality.

Human development index

The municipality recorded a Human Development Index ("HDI") of 0.63 as per 2011 statistics, which is the best in the province, but that is deteriorating. Per capita personal income is higher than the district

municipality and is second highest in the province. The HDI is measured using indicators like literacy levels, infant mortality rate, annual household income and life expectancy.

Household income

According to Mpumalanga Department of Finance, the average annual household income in eMalahleni was R12 492 in 2012 from R51 130 in 2001. It is number 3rd in the Province below Steve Tshwete (R134 026) and Govern Mbeki (R125 480), which are number one and two respectively. However, the economy of eMalahleni is bigger than that of Steve Tshwete. This might imply that high income earners working in eMalahleni and resides in Steve Tshwete. Most household's annual income is between R9 601 to R153 800 per annum and with the majority earning between R38 201 to R76 400.

Chapter N: Climate change

A climate change impact assessment will be undertaken with the outcome of this assessment and mitigation measures to be discussed in the EIAR and EMPr.

8.5 Impacts and risks identified

Table 30 below contains preliminary potential impacts that have been identified for the activities described in the Nooitgedacht Colliery site layout plan. A detailed risk assessment will be undertaken as part of the EIAR and EMPr, during which the duration, probability, magnitude and reversibility of the impacts will be determined, and the significance of the impact calculated. Potential cumulative impacts have also been determined and are presented in Table 31.

Table 28: Preliminary determination of potential impacts of the Nooitgedacht Colliery

Environmental component (Aspects affected)	Activity	Potential Impact
Geology	Mining of the No. 2 Seam and No. 4 Seam.	The No. 2 and No. 4 coal seams will be mined out as part of the Nooitgedacht Colliery. A permanent impact on the geology of the area is expected.
		Subsidence and / or fracturing of rocks may impact on overlying geological strata, alter topography and/or reduce land capability, as well as cause an increased risk of erosion within wetlands.
Topography	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure.	The establishment of infrastructure, including the activities associated with the servitude, may influence the topography.
		The storage of waste rock and topsoil on the waste rock dump and topsoil dump respectively, will influence the nature of the topography, which will be typical of the surrounding area.

Environmental component (Aspects affected)	Activity	Potential Impact
	• Temporary coal stockpiling area.	
Soils[45], land use and land capability	• Site clearance activities. • Construction of shaft and associated infrastructure. • Topsoil stockpiling. • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area.	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.
		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.
		A loss of microbes and viable seed may occur as a result of the temporary stockpiling of topsoil.
		Soil compaction and topsoil loss through erosion may occur as a result of mining related activities (including the temporary stockpiling of topsoil). This will further lead to a loss of soil fertility.
		The ineffective handling of hydrocarbons and associated hydrocarbon spillages (e.g. from trucks) may lead to the contamination of soil.
		Ineffective erosion control along roads may lead to siltation of downstream water resources and scouring of soil.
		Inadequate waste management may lead to soil contamination.
		The construction activities will leave the area exposed (cleared of vegetation), which may lead to erosion.
Fauna and Flora	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area.	Activities associated with the Nooitgedacht Colliery may lead to a loss of floral and faunal habitat, loss of floral and faunal species diversity and potential loss of floral and faunal SCC.
		AIP establishment along the infrastructure footprint areas, as well as the perimeter fence, leading to subsequent spread to surrounding natural areas.
		Dust pollution may impact on plant growth and recovery and may lead to the displacement of faunal species.
		The servitude activities may disturb the movement of faunal species and may result in roadkill.

[45] It should be noted that the soils were disturbed as part of the previous mining activities at Nooitgedacht Colliery.

Environmental component (Aspects affected)	Activity	Potential Impact
		Noise generated may disturb faunal species.
Surface water	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area.	Due to the proximity of the Nooitgedacht Colliery to the identified wetland systems, surface water quality of such resources may be impacted upon.
		In the event of chemical or hydrocarbon spillages on soil, surface water runoff that comes into contact with the soil may become contaminated and enter the receiving environment and / or water resources. This will have an impact on, not only the surface water quality, but the aquatic vegetation, animal life and any other downstream water users.
		Surface water contamination may occur if clean and affected water is not separated.
		The construction activities will leave the area exposed (cleared of vegetation), which may lead to compaction and a change in surface water flow patterns.
Groundwater	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area. • Mining of the No. 2 Seam and No. 4 Seam.	Potential seepage of water to the groundwater regime as a result of waste rock stockpiling and coal stockpiling may contaminate groundwater resources.
		Groundwater quality may be impacted in the event of a spillage of chemicals or hydrocarbon materials (e.g. oil spill from vehicles and machinery).
		Groundwater availability to adjacent water users may be impacted on due to the dewatering activities to be undertaken.
		Groundwater quality may be impacted due to the underground mining activities to be undertaken.
Sensitive landscapes (including wetlands)	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area.	The Nooitgedacht Colliery activities will be undertaken within an area that falls within wetland systems or within their buffer areas. The wetlands may, therefore, be impacted upon. Potential impacts to be taken into account include: • Loss and disturbance of wetland habitat (including possible diatom and invertebrate communities) and fringe vegetation. • Introduction and spread of alien invasive vegetation. • Changes in the amount of sediment entering the system.

Environmental component (Aspects affected)	Activity	Potential Impact
	• Mining of the No. 2 Seam and No. 4 Seam.	• Changes in water quality due to toxic contaminants and increased nutrient levels entering the system. • Changes in water flow regime due to the alteration of surface characteristics. • Impacts on sensitive areas due to subsidence (associated with underground mining).
Air quality	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area.	During the coal tipping activities (at temporary coal stockpile), site clearance activities, topsoil and waste rock stockpiling, and transport of the coal material (either by conveyor or trucks) as well as rehabilitation activities, dust (particulate matter, PM10 and PM2.5) may be generated that may have an impact on the ambient air quality of the area.
		All vehicles and mining machinery may have an impact on the air quality of the surrounding area as a result of the emissions released by the vehicles and machinery.
		A potential impact on climate change may be expected from the Nooitgedacht Colliery.
Noise	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area.	The coal tipping activities (at temporary coal stockpile), site clearance activities, topsoil and waste rock stockpiling, and transport of the coal material (either by conveyor or trucks) as well as rehabilitation activities, will produce noise that may impact on the surrounding landowners / communities and fauna species.
Visual	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area.	The Nooitgedacht Colliery may be intrusive, in terms of visual aspects that may result in a change of sense of place to the local community. It is however important to note that the surrounding area is currently characterised by mining activities. Therefore, it is likely that regular passers-by and the local residents are desensitised to the mining activities.

Environmental component (Aspects affected)	Activity	Potential Impact
Sites of archaeological and cultural importance	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area.	Some activities undertaken in close proximity to identified heritage sites may have some impact on such sites, if not appropriately managed. However, it is not anticipated that heritage sites will be damaged.
Socio-economic	Nooitgedacht Colliery project.	The Nooitgedacht Colliery will create job security, along with the implementation of other socio-economic responsibilities.
		Some health or nuisance impacts on surrounding communities / landowners may occur as a result of dust generation, noise, visual aspects etc.
	Closure	During closure, a loss of jobs will occur that may not only impact on the employees but on the socio-economic status of the local community and economy.

Table 29: Preliminary identification of potential cumulative impacts of the Nooitgedacht Colliery

Environmental component (Aspects affected)	Activity	Potential Impact description
Topography, land use and visual aspects	Nooitgedacht Colliery project and all mining activities conducted in a regional context.	The Nooitgedacht Colliery will be located in a region where coal mining and electricity generation infrastructure is commonplace. The large number of coal mines and power stations in the region, together with the historical nature of the mining in the Mpumalanga Province (over 100 years of mining history) will most likely have desensitised local residents and frequent travellers through the area.
Soil, land capability and socio-economic conditions		Agriculture is one of the largest economic sectors in Mpumalanga. The number of mines in Mpumalanga, particularly large operations, have led to a significant loss of high agricultural potential soils that would otherwise continue to be capable of supporting crop cultivation. Loss of high potential agricultural land due to mining activities in the area will reduce the food production capability of the region. It should be noted that the shaft infrastructure for the Nooitgedacht Colliery will be situated on already disturbed footprints. In addition, large areas of the surface have been affected by agriculture and mining, that has led to loss of soil structure and function, and ultimately to loss of biodiversity due to the

Environmental component (Aspects affected)	Activity	Potential Impact description
		transformation and fragmentation of natural habitats and ecosystems.
Surface and groundwater		The bulk (65%) of water resources available in Mpumalanga comes from surface water resources, water transfers into the province provide 19% of total water availability, groundwater contributes 6% of available water and return flows from mining, industrial, irrigation and urban sectors contribute 10%. Water quality indicators have shown a general decrease in water quality over time. Median levels of surface water nutrients have increased and indicate a potential for enrichment. The consequences of these elevated levels are: A greater potential for algal blooms; an impact on riverine ecosystems; and impairment of human health. High (and increasing) TDS levels in the Olifants Water Management Area ("WMA") have the potential for decreasing the aesthetic value of the water. Exceedance of the guideline levels for certain metals in the Olifants WMA may be attributed to the numerous industrial and mining activities taking place in that area. At the WMA scale, high exceedance above water quality guideline levels exist for pH levels in the province. Groundwater is used for irrigation and domestic consumption in the surrounding agricultural region. Groundwater levels are drawn down at all operational mines in the region, leading to an overall impact on groundwater levels but have also led to a complicated flow of groundwater between mines. The Nooitgedacht Colliery may contribute to a cumulative impact in terms of water quality and quantity in the region.
Biodiversity and sensitive landscapes		The establishment and spreading of alien invasive plant species could impact cumulatively in terms of the loss of natural vegetation in the area. A cumulative impact is also expected on floral and faunal SCC. From a sensitive landscape perspective, a cumulative impact may occur with regards to the identified wetland areas located in close proximity to the Nooitgedacht Colliery.
Air quality		Air quality is an issue of concern in Mpumalanga, as it is in many other parts of South Africa. A wide variety of air pollution exist in Mpumalanga, ranging from veld fires to industrial processes, agriculture, mining activities, power generation, paper and pulp processing, vehicle use and domestic use of fossil fuels. The project site also falls within a priority area.
Noise		Noise generated by mining activities in the area is related to blasting (not the case for Nooitgedacht Colliery) and use of equipment and vehicles. However, noise is directional, and dissipates with distance. The spatial distribution of mines and related operations in the region reduces noise impacts inherently. However, when the noise is generated near residential areas, the location of the I&APs within the noise

Environmental component (Aspects affected)	Activity	Potential Impact description
		transmission paths together with the actual generation of noise cumulatively increases the significance of the impact.
Traffic		Possible cumulative impacts may arise from the Nooitgedacht Colliery along with current and other planned traffic related impacts within the region.
Socio-economic		Job security along with other socio-economic benefits will contribute cumulatively towards the well-being of the local municipality's residents and communities.
		Cessation of the Nooitgedacht Colliery along with the closure of other mines within the area, may result in a significant negative socio-economic impact on the region's communities.

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

8.6.1 Methodology to be applied during the EIAR and EMPr phase

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 from which 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 58 below for a model representing the above principle (as contained in the DWA's Best Practice Guideline: G4 – Impact Prediction).

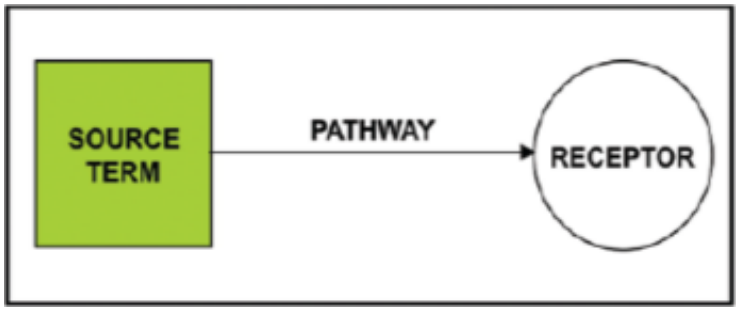


Figure 57: Impact prediction model

Table 32 and Table 33 below indicate the methodology to be used in order to assess the Probability and Magnitude of the impact, respectively, and Table 34 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 30: 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
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 31: 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. (metre);	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	Bio-physical and/or social functions and/or processes will remain unaltered.	Current environmental component(s) are largely disturbed from the natural state.

Score	Source				Receptor	
				the environment		
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.

Table 32: 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	Low	Low	Medium	Medium	High

Environmental Impact Rating / Priority					
Unlikely					
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.

8.6.2 Knowledge gaps, assumptions and limitations

The knowledge gaps, assumptions and limitation that were identified are described below:

- Specialist studies that have been identified and will be conducted during the EIA phase, include:
  - Heritage impact assessment.
  - Air quality impact assessment.
  - Traffic impact assessment.
  - Biodiversity (fauna and flora) impact assessment.
  - Climate change impact assessment.
  - Geohydrological impact assessment.
  - Wetland delineation study and impact assessment.
  - Hydrological (storm water management) study.
- Detailed designs and layout plans for infrastructure associated with Nooitgedacht Colliery will be included in the EIAR / EMPr.
- A Closure Plan, Rehabilitation Plan and Closure cost calculations for the Nooitgedacht Colliery will be compiled in terms of GN R1147.

Possibility for a change in the initial site layout

As mentioned above, a number of further specialist studies are to be conducted for the Nooitgedacht Colliery during the EIA phase. Furthermore, although various alternatives have been identified during the scoping process, project alternatives will be further assessed during the EIA process, and such alternatives will also be investigated by the EAP and relevant specialists from an environmental perspective.

Therefore, there is a possibility that the initial site layout (as included in Figure 3 in this Scoping Report) may change, based on information obtained through the conducting of specialist studies as well as the alternatives assessment process. The final site layout plan will be included in the EIAR / EMPr.

8.7 Positive and negatives that the proposed activity and alternatives will have on the environment and community affected

The positive and negative implication of the Nooitgedacht Colliery and the alternatives identified have been provided in Table 35 below and assessed in terms of the following four categories:

- Environmental.

- Technical/Engineering.
- Economical.
- Social.

The positive and negative impacts of both the Nooitgedacht Colliery and the preliminary identified alternatives will be further assessed as part of the EIAR and EMPr.

Table 33: Advantage and disadvantages of the Nooitgedacht Colliery and preliminary identified alternatives

Alternative	Advantages	Disadvantages
Shaft infrastructure layout		
Alternative SIL1	**Environmental:** All infrastructure will be limited to the previously disturbed areas, reducing additional environmental impact (i.e. soil and vegetation) at Nooitgedacht Colliery. **Technical/Engineer:** Having the decline shaft on the previously disturbed area will make sinking of the shaft easier (no blasting required). **Economical:** It will be more favorable in terms of costs if the old shaft area is utilised. **Social:** Local communities may be desensitised to the mining activities if they are used to the layout of the previous mine.	**Environmental:** Keeping the footprint to the previously disturbed area assumes that the old layout was optimal in preventing environmental impacts. **Technical/Engineer:** None identified. **Economical:** None identified. **Social:** None identified.
Alternative SIL2	**Environmental:** Runoff from the WRD will be collected in the PCD. No new water management infrastructure will be required to contain runoff from the WRD. The location of the WRD will also act as a visual screen for the activities. **Technical/Engineer:** None identified. **Economical:** None identified. **Social:** None identified.	**Environmental:** Additional footprint will be disturbed. The location of the WRD will be situated within a wetland area. **Technical/Engineer:** None identified. **Economical:** Hauling costs (construction and rehabilitation) will increase due to the increased distance from the shaft area. **Social:** The WRD will have a bigger footprint, increasing the impact on sense of place.
Alternative SIL3	**Environmental:** The decrease in footprint of the PCD will further reduce the environmental impact of construction within undisturbed areas. **Technical/Engineer:** None identified. **Economical:** Construction costs will be reduced (i.e. less clearance, site preparation, liner costs, etc.). **Social:** None identified.	**Environmental:** The buffer capacity for water storage will be reduced increasing the risk of spillages during an unplanned event (i.e. a storm event in excess of 1:100 year). **Technical/Engineer:** None identified. **Economical:** None identified. **Social:** None identified.
Coal conveyance alternatives		

Alternative	Advantages	Disadvantages
Alternative CC1	**Environmental:** From a biodiversity point of view, the conveyor is preferred due to the lower risk of faunal mortalities. The footprint of the conveyor compared to the haul road will be smaller, reducing the disturbance of flora species. **Technical/Engineer:** None identified. **Economical:** Will reduce fuel costs. **Social:** Creation of additional employment opportunities during the construction and operational phases of the project.	**Environmental:** Spillages from the coal conveyor could result in water pollution. Transfer points, with additional environmental impacts, may be required. **Technical/Engineer:** Intensive maintenance will be required on the conveyor. **Economical:** Much more expensive to construct and maintain the conveyor than the haul road. Any downtime on the conveyor will impact on production. **Social:** None identified.
Alternative CC2	**Environmental:** No transfer points are required. No additional impacts are expected as a result of these transfer points. Easier to change road layout to prevent impact on sensitive landscapes (i.e. wetlands). **Technical/Engineer** Easier to construct and maintain. **Economical:** Low construction and maintenance costs. **Social:** Creation of additional employment opportunities during the construction and operational phases of the project as this project will be done by a contractor from the local community.	**Environmental:** Bigger disturbance footprint with a higher risk of faunal mortalities. **Technical/Engineer:** More detailed water management infrastructure is required to reduce the environmental impact and to ensure safety. **Economical:** None identified. **Social:** Trucks used in the conveyance of coal may impact on the sense of place as well as increase noise levels for local communities.
No-go versus development		
Nooitgedacht Colliery	**Environmental:** Revisiting an area previously disturbed by mining activities allows for implementation of rehabilitation measures (after operation) that may not have been implemented by previous mine owner. **Technical/Engineer** None identified. **Economical:** Mining at Nooitgedacht Colliery will generate revenue for Glencore Operations South Africa (Pty) Ltd. **Social:** The development alternative will result in job creation and sustaining livelihoods, with specific reference to the closure of the Tugo operation. Therefore, a positive socio-economic impact.	**Environmental:** A number of environmental impacts may arise as a result of the construction and operational phase activities associated with Nooitgedacht Colliery, which would require management and mitigation. **Technical/Engineer:** None identified. **Economical:** Construction costs associated with the establishment of a mine may be high. **Social:** Impacts on the sense of place of local communities.
No-go option	**Environmental:** No additional environmental impacts that may arise	**Environmental:** The environmental status quo will remain for the rehabilitated areas. **Technical/Engineer:** None identified.

Alternative	Advantages	Disadvantages
	as a result of the construction and operational phase activities. **Technical/Engineer** None identified. **Economical:** No costs associated with construction and operational phase. **Social:** No impact on sense of place.	**Economical:** No revenue will be generated. **Social:** No job creation and sustaining of livelihoods.

9 Plan of study for the Environmental Impact Assessment Process

9.1 Description of alternatives

Refer to Sections 8.1 and 8.7 above for a description of the alternatives that have been identified.

9.2 Description of the aspects to be assessed as part of the environmental impact assessment process

As part of the Nooitgedacht Colliery project, the following aspects of the environment will be considered and include:

- Geology.
- Topography.
- Soil, Land use and land capability.
- Fauna and Flora.
- Surface water.
- Groundwater.
- Sensitive landscapes (including wetlands).
- Air quality.
- Noise.
- Visual aspects.
- Sites of cultural and archaeological importance.
- Socio-economic aspects.

9.3 Description of aspects to be assessed by specialists

The following specialist studies were identified:

- Heritage impact assessment.
- Air quality impact assessment.
- Traffic impact assessment.
- Biodiversity (fauna and flora) impact assessment.
- Climate change impact assessment.

- Geohydrological impact assessment.
- Wetland delineation study and impact assessment.
- Hydrological (storm water management) study.

These specialist studies, and their respective reports will be included and discussed in the EIAR / EMPR.

9.4 Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives

9.4.1 Proposed method of assessing environmental aspects

The method for assessing the environmental aspects have been described in Part 8.6.1 above.

9.4.2 Proposed method of assessing alternatives

Refer to Parts 8.1 and 8.7 above for the description of alternatives identified and for the advantages and disadvantages of the identified alternatives.

9.5 The proposed method of assessing duration and significance

The method used in determining the significance and the duration of the impact is described above in Table 36. Duration is divided into five (5) periods. A score of between 1 and 5 is assigned to the impact based on the characteristics of the impact and the period for which the impact will occur and have an impact on the socio-economic, cultural and biophysical environment. The score assigned to the specific impact for duration is then used in determining the magnitude of the impact.

Table 34: Determination of the duration of the impact

Duration of impact	Score
Lasting days to a month	1
Lasting 1 month to 1 year	2
Lasting 1 – 5 years	3
Lasting 5 years to Life of Organisation	4
Beyond life of Organisation / Permanent impacts	5

9.6 The stages at which the Competent Authority will be consulted

The Competent Authority, in this case the Mpumalanga Department of Mineral Resources and Energy (“DMRE”) will be consulted throughout the application process.

This Scoping Report is compiled and will be made available for public and stakeholder review for a period of thirty (30) days. This Scoping Report will be submitted to the DMRE, where after the DMRE

will have 44 days to either refuse environmental authorisation or accept the Scoping Report and inform the applicant to proceed with the tasks contemplated in the plan of study for the EIA.

The Competent Authority (the DMRE) will further be involved during the EIA phase of the project. The EIAR and EMPr will also be made available for a public and stakeholder review period of thirty (30) days. Upon completion of the review period, the EIAR and EMPr will be finalised and submitted to the DMRE, where after the DMRE will have a period of 107 days to consider the application and, in writing, notify the applicant of the decision to grant or refuse environmental authorisation.

9.7 Particulars of the public participation process with regard to the Impact Assessment process that will be conducted

9.7.1 Steps to be taken to notify interested and affected parties

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

- Advertisements.
    - A Newspaper advertisement was placed in the Witbank News on the 12th of November 2020.
- Site notices.
    - Site notices were placed around the proposed project site.
- Written notices.
    - Written notices (including BIDs) were distributed to Interested and Affected Parties (I&APs).
- Availability of Scoping Report for public review
    - This Scoping Report was made available for public and stakeholder review for a period of 30 days (12th of November to 11th December 2020). 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.

9.8 Description of the tasks that will be undertaken as part of the environmental impact assessment process

The Environmental Impact Assessment Report (“EIAR”) and Environmental Management Programme Report (“EMPr”) will be submitted, once the Scoping Report has been accepted by the Competent Authority. The EIAR will be compiled in accordance to Appendix 3 of the EIA Regulations 2014, as amended and the EMPr will be compiled in accordance to Appendix 4 of the EIA Regulations 2014, as amended.

Required content of Environmental Impact Assessment Report

An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-

(a) Details of-

(i) The EAP who prepared the report; and

(ii) The expertise of the EAP, including a curriculum vitae;

(b) The location of the activity, including:

(i) The 21-digit Surveyor General code of each cadastral land parcel;

(ii) Where available, the physical address and farm name; and

(iii) Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.

(c) A plan that locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-

(i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; and

(ii) On land where the property has not been defined, the coordinates within which the activity is to be undertaken.

(d) A description of the scope of the proposed activity, including-

(i) All listed and specified activities triggered and being applied for; and

(ii) A description of the associated structures and infrastructure related to the development.

(e) A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;

(f) A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;

(g) A motivation for the preferred development footprint within the approved site;

(h) A full description of the process followed to reach the proposed development footprint within the approved site, including:

(i) Details of the development footprint alternatives considered;

(ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;

(iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;

(iv) The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(v) The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-

(aa) Can be reversed;

(bb) May cause irreplaceable loss of resources; and

(cc) Can be avoided, managed or mitigated;

(vi) The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;

(vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community, that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(viii) The possible mitigation measures that could be applied and level of residual risk;

(ix) If no alternative development locations for the activity were investigated, the motivation for not considering such; and

(x) A concluding statement indicating the preferred alternative development location within the approved site;

(i) A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-

(i) A description of all environmental issues and risks that were identified during the environmental impact assessment process; and

(ii) An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;

(j) An assessment of each identified potentially significant impact and risk, including-

(i) Cumulative impacts;

(ii) The nature, significance and consequences of the impact and risk;

(iii) The extent and duration of the impact and risk;

(iv) The probability of the impact and risk occurring;

(v) The degree to which the impact and risk can be reversed;

(vi) The degree to which the impact and risk may cause irreplaceable loss of resources;

(vii) The degree to which the impact and risk can be mitigated;

(k) Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;

(l) An environmental impact statement which contains-

(i) a summary of the key findings of the environmental impact assessment:

(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and

(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives; based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;

(m) Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;

(n) The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;

(o) Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation

(p) A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;

(q) A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

(r) Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;

(s) An undertaking under oath or affirmation by the EAP in relation to:

(i) The correctness of the information provided in the reports;

(ii) The inclusion of comments and inputs from stakeholders and I&APs;

(iii) The inclusion of inputs and recommendations from the specialist reports where relevant; and

(iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;

(t) Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;

(u) An indication of any deviation from the approved scoping report, including the plan of study, including-

(i) Any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and

(ii) A motivation for the deviation;

(v) Any specific information that may be required by the competent authority; and

(w) Any other matters required in terms of section 24(4) (a) and (b) of the Act.

Required content of EMPr

An EMPr must comply with section 24N of the Act and include-

(a) Details of

(i) The EAP who prepared the EMPR; and

(ii) The expertise of that EAP to prepare an EMPR, including a curriculum vitae;

(b) A detailed description of the aspects of the activity that are covered by the EMPR as identified by the project description;

(c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;

(d) A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-

(i) Planning and design;

(ii) Pre-construction activities;

(iii) Construction activities;

(iv) Rehabilitation of the environment after construction and where applicable post closure;

(v) Where relevant, operation activities;

(e) A description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);

(f) A description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to –

(i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;

(ii) Comply with any prescribed environmental management standards or practices;

(iii) Comply with any applicable provisions of the Act regarding closure, where applicable;

(iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation;

(g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);

(h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);

(i) An indication of the persons who will be responsible for the implementation of the impact management actions;

(j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;

(k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);

(l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;

(m) An environmental awareness plan describing the manner in which-

(i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and

(ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment;

(n) Any specific information that may be required by the competent authority.

9.9 Measures to avoid, reverse, mitigate, or manage identified impacts

Table 37 below is the risk assessment table in which preliminarily identified impacts have been identified. Mitigations measures (to avoid, reverse, mitigate, or manage identified impacts) as well as the extent to which these impacts are anticipated to result in residual risks are also provided.

Table 35: Risk assessment table for the Nooitgedacht Colliery

Environmental component (Aspects affected)	Activity	Potential Impact	Mitigation type Modify/Remedy/ Control/Stop	Potential for residual risk
Geology	Mining of the No. 2 Seam and No. 4 Seam.	The No. 2 and No. 4 coal seams will be mined out as part of the Nooitgedacht Colliery. A permanent impact on the geology of the area is expected.	No mitigation measures applicable.	A residual risk will remain.
		Subsidence and / or fracturing of rocks may impact on overlying geological strata, alter topography and/or reduce land capability, as well as cause an increased risk of erosion within wetlands.	Remedy and control.	Medium potential for residual risk, if not mitigated appropriately.
Topography	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area. •	The establishment of infrastructure, including the activities associated with the servitude, may influence the topography.	Control.	Medium potential for residual risk, if not mitigated appropriately.
		The storage of waste rock and topsoil on the waste rock dump and topsoil dump respectively, will influence the nature of the topography, which will be typical of the surrounding area.	Control and remedy.	

Environmental component (Aspects affected)	Activity	Potential Impact	Mitigation type Modify/Remedy/ Control/Stop	Potential for residual risk
Soils, land use and land capability	• Site clearance activities. • Construction of shaft and associated infrastructure. • Topsoil stockpiling. • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area. •	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.	Stop, control and remedy.	Low potential for residual risk, if not mitigated appropriately.
		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.		
		A loss of microbes and viable seed may occur as a result of the temporary stockpiling of topsoil.		
		Soil compaction and topsoil loss through erosion may occur as a result of mining related activities (including the temporary stockpiling of topsoil). This will further lead to a loss of soil fertility.		
		The ineffective handling of hydrocarbons and associated hydrocarbon spillages (e.g. from trucks) may lead to the contamination of soil.		
		Ineffective erosion control along roads may lead to siltation of downstream water resources and scouring of soil.		

Environmental component (Aspects affected)	Activity	Potential Impact	Mitigation type Modify/Remedy/ Control/Stop	Potential for residual risk
		Leakage of hydrocarbons from trucks may lead to soil contamination.		
		Inadequate waste management may lead to soil contamination.		
		The construction activities will leave the area exposed (cleared of vegetation), which may lead to erosion.		
		The Nooitgedacht Colliery areas will continue to be used as part of “mining and related activities” for the life of the project, where after only the land use and land capability can be returned / changed to the agreed end land use.		
Fauna and Flora	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road).	Activities associated with the Nooitgedacht Colliery may lead to a loss of floral and faunal habitat, loss of floral and faunal species diversity and potential loss of floral and faunal SCC.	Stop, control and remedy.	Low potential for residual risk, if not mitigated appropriately.
		AIP establishment along the infrastructure footprint areas, as well as the perimeter fence, leading to subsequent spread to surrounding natural areas.	Control and remedy.	

Environmental component (Aspects affected)	Activity	Potential Impact	Mitigation type Modify/Remedy/ Control/Stop	Potential for residual risk
	• Construction of water management infrastructure. • Temporary coal stockpiling area. •	Dust pollution may impact on plant growth and recovery and may lead to the displacement of faunal species.	Control.	
		The servitude activities may disturb the movement of faunal species and may result in roadkill.	Modify and control.	
		Noise generated may disturb faunal species.	Control.	
Surface water	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area.	Due to the proximity of the Nooitgedacht Colliery to the identified wetland systems, surface water quality of such resources may be impacted upon.	Modify, stop and control.	Medium potential for residual risk, if not mitigated appropriately.
		In the event of chemical or hydrocarbon spillages on soil, surface water runoff that comes into contact with the soil may become contaminated and enter the receiving environment and / or water resources. This will have an impact on, not only the surface water quality, but the aquatic vegetation, animal life and any other downstream water users.	Stop and remedy.	
		Surface water contamination may occur if clean and affected water is not separated.	Modify and control.	

Environmental component (Aspects affected)	Activity	Potential Impact	Mitigation type Modify/Remedy/ Control/Stop	Potential for residual risk
		The construction activities will leave the area exposed (cleared of vegetation), which may lead to compaction and a change in surface water flow patterns.	Control.	
Groundwater	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area. • Mining of the No. 2 Seam and No. 4 Seam.	Potential seepage of water to the groundwater regime as a result of waste rock stockpiling and coal stockpiling may contaminate groundwater resources.	Control and remedy.	Medium potential for residual risk, if not mitigated appropriately.
		Groundwater quality may be impacted in the event of a spillage of chemicals or hydrocarbon materials (e.g. oil spill from vehicles and machinery).	Stop and remedy.	
		Groundwater availability to adjacent water users may be impacted on due to the dewatering activities to be undertaken.	Control.	
		Groundwater quality may be impacted due to the underground mining activities to be undertaken.	Control.	
Sensitive landscapes (including wetlands)	• Site clearance activities. • Construction of shaft and associated infrastructure.	The Nooitgedacht Colliery activities will be undertaken within an area that falls within wetland systems or within their buffer areas. The wetlands may, therefore, be impacted upon.	Control and remedy.	Medium potential for residual risk, if not mitigated appropriately.

Environmental component (Aspects affected)	Activity	Potential Impact	Mitigation type Modify/Remedy/ Control/Stop	Potential for residual risk
	• Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area. • Mining of the No. 2 Seam and No. 4 Seam.	Potential impacts to be taken into account include: • Loss and disturbance of wetland habitat (including possible diatom and invertebrate communities) and fringe vegetation. • Introduction and spread of alien invasive vegetation. • Changes in the amount of sediment entering the system. • Changes in water quality due to toxic contaminants and increased nutrient levels entering the system. • Changes in water flow regime due to the alteration of surface characteristics. • Impacts on sensitive areas due to subsidence (associated with underground mining).		
Air quality	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock).	During the coal tipping activities (at temporary coal stockpile), site clearance activities, topsoil and waste rock stockpiling, and transport of the coal material (either by conveyor or trucks) as well as rehabilitation activities, dust (particulate matter, PM10 and PM2.5) may be generated that may	Control.	Medium potential for residual risk, if not mitigated appropriately.

Environmental component (Aspects affected)	Activity	Potential Impact	Mitigation type Modify/Remedy/ Control/Stop	Potential for residual risk
	• Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area. •	have an impact on the ambient air quality of the area. All vehicles and mining machinery may have an impact on the air quality of the surrounding area as a result of the emissions released by the vehicles and machinery. The Nooitgedacht Colliery will contribute to the global climate change impact.		
Noise	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area. •	The coal tipping activities (at temporary coal stockpile), site clearance activities, topsoil and waste rock stockpiling, and transport of the coal material (either by conveyor or trucks) as well as rehabilitation activities, will produce noise that may impact on the surrounding landowners / communities and fauna species.	Stop and control.	Low potential for residual risk, if not mitigated appropriately.

Environmental component (Aspects affected)	Activity	Potential Impact	Mitigation type Modify/Remedy/ Control/Stop	Potential for residual risk
Visual	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure. • Temporary coal stockpiling area. •	The Nooitgedacht Colliery may be intrusive, in terms of visual aspects that may result in a change of sense of place to the local community. It is however important to note that the surrounding area is currently characterised by mining activities. Therefore, it is likely that regular passers-by and the local residents are desensitised to the mining activities.	Control and remedy.	Low potential for residual risk, if not mitigated appropriately.
Sites of archaeological and cultural importance	• Site clearance activities. • Construction of shaft and associated infrastructure. • Stockpiling (topsoil and waste rock). • Activities as part of servitude (conveyor or haul road). • Construction of water management infrastructure.	Some activities undertaken in close proximity to identified heritage sites may have some impact on such sites, if not appropriately managed. However, it is not anticipated that heritage sites will be damaged.	Stop and control.	Low potential for residual risk, if not mitigated appropriately.

Environmental component (Aspects affected)	Activity	Potential Impact	Mitigation type Modify/Remedy/ Control/Stop	Potential for residual risk
	• Temporary coal stockpiling area. •			
Socio-economic	Nooitgedacht Colliery project.	The Nooitgedacht Colliery will create job security, along with the implementation of other socio-economic responsibilities.	Control (positive impact)	No potential for residual risk.
		Some health or nuisance impacts on surrounding communities / landowners may occur as a result of dust generation, noise, visual aspects etc.	Modify, remedy and control.	Low potential for residual risk, if not mitigated appropriately.
	Closure	During closure, a loss of jobs will occur that may not only impact on the employees but on the socio-economic status of the local community and economy.	Stop and control.	Medium potential for residual risk, if not mitigated appropriately.

10 Other information required by the Competent Authority

10.1 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. The EIA report must include the:

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

Table 36: Impact on the socio-economic conditions of any directly affected person

Table 38 contains the impacts on the socio-economic conditions of any affected person.

Results of investigation, assessment and evaluation of impact on any directly affected person	Reference to where mitigation is reflected
Social – A number of social impacts have been provisionally identified and include impacts on sense of place, dust, noise generation and water availability. Furthermore, a number of positive social related impacts have been identified. The Nooitgedacht Colliery is anticipated to support jobs and livelihoods for a period of 12 years and is thus regarded as having a positive impact in this regard. *Economic* – Should the environmental authorisation not be granted, job security and the sustaining of livelihoods in the area may be lost and skills development may cease. Further to this, it is envisaged that employees from the Glencore Tugo operation, which will go into closure at the time the Nooitgedacht Project is expected to commence, will be transferred to the Nooitgedacht Colliery. This will ensure the retaining of jobs for employees currently working at the Tugo operation. This impact will be further discussed in detail, assessed and the significance determined during the EIAR and EMPr Phase of the project.	Part 9.9

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

Table 37: Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act 25 of 1999.

Table 39 contains a discussion on the impacts on any national estate.

Results of investigation, assessment and evaluation of impact on any national estate	Reference to where mitigation is reflected
Refer to Chapter K of Section 8.4.1. Refer also to Figure 44.	Part 9.9

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

Section 24(4)(b) of the NEMA (1998), as amended, states that the following:

"24(4) Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment -

(b) must include, with respect to every application for an environmental authorisation and where applicable-

(i) investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity;"

The positive and negative implication of the Nooitgedacht Colliery and the alternatives identified have been provided above under Section 8.7. The positive and negative implications of both the Nooitgedacht Colliery and the preliminary identified alternatives will be further assessed as part of the EIAR and EMPr.

12 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**

13 Declaration of independence

Shangoni hereby declares that it is an independent EAP 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:	**DRAFT FOR REVIEW**	**Report reviewed by:**	**DRAFT FOR REVIEW**
	Nico Brits (*Pr.Sci.Nat*)		**Brian Hayes (Pr Eng)**