GCS Water & Environmental Consultants

63 Wessel Road, Rivonia, 2128 PO Box 2597, Rivonia, 2128 South Africa
Tel: +27 (0) 11 803 5726 **Fax:** +27 (0) 11 803 5745 **Web:** www.gcs-sa.biz

Matla Mine - Integrated Water Use Licence Application (IWULA) and Integrated Water and Waste Management Plan (IWWMP)

Report

Version – Draft for Public Review

29 June 2018

Exxaro Matla Coal Mine

GCS Project Number: 16-1208

Client Reference: Consolidated IWULA/IWWMP

exxaro
POWERING POSSIBILITY

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	Name	**Signature**	**Date**
Author	Linda Sheppard		June 2018
Document Reviewer	Kate Cain		June 2018
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EXECUTIVE SUMMARY

Project Background:

Matla Mine is an existing underground coal mining operation. The Matla Coal Mine's Mineral Rights are held by Exxaro Coal Mpumalanga. The Matla Mine is situated in the Mpumalanga Province, approximately 20 kilometres (kms) west of Ga-Nala (Kriel). The mining area is situated in the Emalahleni Local Municipality of the Nkangala District Municipality as well as the Govan Mbeki Local Municipality of the Gert Sibande District Municipality. Although Matla belongs to the Exxaro group, the mine is an Eskom funded operation, and as such is referred to as a "captive mine" with a defined cost-plus coal supply contract with Eskom and consists of the following complexes:

- E'tingwini (E'tingwini has been completely mined and rehabilitated);
- Mine 1 (Mine 1 shaft has been closed);
- Mine 2;
- Mine 3; and
- New Mine 1 Shaft (to be constructed).

Throughout the years of operation, the Matla Mine has been issued with various authorisations and licences in terms of the relevant environmental legislation. In order to achieve a more streamlined management approach and decrease the duplication in terms of compliance with regards to the various authorisations and Licences, Matla has proposed to consolidate the various authorisation and licences.

The consolidation will be undertaken in accordance with the requirements of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA), the National Environmental Management At, 1998 (Act No. 107 of 1998) (NEMA), and the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

In line with the requirements of the NWA, the Matla Mine has been issued with various Integrated Water Use Licences (IWULs) by the Department of Water and Sanitation for the various water uses taking place on site in terms of Section 21 of the NWA. The following IWULs have been issued to Matla for water uses taking place on site in terms of Section 21 of the NWA:

- Licence No: 24084303 dated 23 October 2017 (previously issued in 2007) in terms of the NWA for river diversion for Section 21 (c) and (i);
- Licence No: 24084303 dated 1 October 2010 in terms of the NWA for Integrated Water Uses for Section 21(a), (b), (f), (g), (j). Amendment issued in terms of Section 158 on the 22nd of November 2013;

- Licence No: 24084303 dated 1 April 2011 in terms of the NWA for controlled release - Section 21(f) EXPIRED;
- Licence No. 04/B11E/ABCFGIJ/2446 of 17 March 2014: Water Treatment Plant – Sections 21(a), (b), (c), (f), (g), (i) and (j); and
- Licence No. 04/B11E/ACFGIJ/3734 of 16 July 2015: New Mine 1 Shaft – Sections 21 (a), (c), (f), (g), (i) and (j).

In addition to the Consolidation of all previous approved IWULs, several amendment are required to some of the existing authorised water uses. These amendment have been included in this report as part of this consolidation process.

Furthermore, new water uses are required for authorisation and are detailed below:
Section 21(g) Water Uses

- Additional new water use activities, as defined in terms of Section 21(g) (disposing of waste in a manner which may detrimentally impact on a water resource) of the NWA have also been included into the consolidation process. The new water uses that have been included are as follows:
- Dust suppression on the stockpiles;
- Strategic main stockpile area at the plant located at Mine 1;
- The transfer stockpiles at Mine 1, 2 and 3;
- Two mega litre tanks at the Mine 2 Emergency Dam (Pan at Mine 2); and
- Sludge drying beds of the existing sewage treatment works at Mine 2 and 3.

Section 21(c) and (i) Water Uses:
Rehabilitation is planned for panels 6, 7 and 8 of the goaf areas (surface depressions) at the Mine 2 complex. A basic framework for rehabilitation of standing water was determined and described in the feasibility design submitted to Matla. Due to the nature of the goaf areas and the rehabilitation that is planned, water uses are triggered and are required to be authorised.

Matla also proposes to stoop (or totally extract) pillars at the previously underground mined areas with the intent to reclaim the remaining coal reserves by using the conventional board and pillar mining method (drill and blast). Only phase 1 of the stooping project is being applied for. The stooping uses previously formed a separate application, however this application has not been submitted to DWS to date. As such, as per the request of DWS, the stooping uses will form part of this Consolidation process.

It is in this regards that GCS Water and Environment (Pty) Ltd (GCS) have been contracted to undertake the consolidation process and compile the respective reports. This report serves as the technical motivation document for the consolidation of the existing IWULs, the identified amendments to existing licensed water uses and new uses in terms of Section 21 of the NWA.

A summary of all the water uses being applied for as part of this application are provided in the Table overleaf. This table presents the new, existing and amended water uses as they should appear in the consolidate IWUL, if authorised.

Water Uses of Matla Coal Mine						
Section 21(a) - Taking water from a water resource.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Volume Applied for (m^3/a)**
1	Abstraction of excess underground water for storage in PCD prior treatment at the WTP	New Mine 1 dewatering	26° 17' 44.5"S 29° 09' 18.8" E		Bakenlaagte 84 IS Remaining Extent	912500 m^3/a
2	Taking of water containing waste from the underground	Mine 3	26° 14' 45.16" S 29° 04' 00.50" E		Vierfontein 61 IS ptn 21	1 460 000 m^3/a
Section 21(b) - Storing of water.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Capacity (m^3)**
3	Storage of Water in dams	Reservoir 1	26° 15.692' S 29° 07.616' E		Haasfontein 85 IS ptn 5	1000 m^3 (allowed to store 1000 m^3)
4	Storage of Water in dams	Reservoir 2	26° 15.692' S 29° 07.632' E		Haasfontein 85 IS ptn 5	2000 m^3 (allowed to store 2000 m^3)
5	Storage of Water in dams	Reservoir 4	26° 12.631' S 29° 06.155' E		Vierfontein 61 IS ptn 26	1000 m^3 (allowed to store 1000 m^3)
6	Storage of Water in dams	Reservoir 5	26° 14.847' S 29° 04.284' E		Vierfontein 61 IS ptn 21	2000 m^3 (allowed to store 2000 m^3)
7	Storage of treated water from the Reverse Osmosis Water Treatment Plant before use in the process and discharge into the Rietspruit River.	Reverse Osmosis Water Treatment Plant	26°15'21.93"S 29° 7'31.92"E		Vaalpan 68 IS Remaining Extent	10 000 m^3 (10 Ml)
Section 21(c) - Impeding or diverting the flow of water in a watercourse & Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Dimensions of diversion**
8	River diversion for continuation of mining	Rietspruit River Diversion	**Start:** 26° 13' 51.5" S 29° 03' 26.0" E	**End:** 26° 15' 21.2" S 29° 02' 59.6" E	Kortlaagte 67 IS Remaining Extent	Height: 4.6 m Width: 61 m Length: 300 m
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	
			Start	**End**		
9	Dirty water pipeline within 500 m from the wetland/pan	Dirty water pipeline	**Start Point:** 26° 15' 28.23" S 29° 07' 31.55" E	**End Point:** 26° 15' 29.27" S 29° 07' 30.43" E	Vaalpan 68 IS portion 0 (remaining extent)	
10	The construction of a Water Treatment Plant and Brine Ponds within 500m from the wetland/pan	Water Treatment Plant and Brine Ponds	**WTP Corner 1:** 26° 15' 07.47" S 29° 07' 40.73" E	**WTP Corner 2:** 26° 15' 15.29" S 29° 07' 49.42" E	Vaalpan 68 IS Remaining Extent	

			WTP Corner 3: 26° 15' 24.58" S 29° 07' 45.20" E	**WTP Corner 4:** 26° 15' 30.49" S 29° 07' 37.61" E	
			Brine Ponds: 26° 15' 20.09 S" 29° 07' 26.14" E		
11	Clean Water Pipeline crossing a tributary of Rietspruit River	Clean Water Pipeline crossing Tributary of Rietspruit	**Start Point:** 26° 14' 22.05" S 29° 06' 38.31" E	**End Point:** 26° 14' 19.32" S 29° 06' 37.06" E	Vierfontein 61 IS ptn 53
12	Clean Water Pipeline crossing various hillslope seepage wetland and unchannelled valley bottom wetlands	Clean Water Pipeline crossing various wetlands	**Start Point:** 26° 15' 28.23" S 29° 07' 31.55" E	**End Point:** 26° 15' 29.27" S 29° 07' 30.43" E	Haasfontein 85 IS portion 5
			26° 13' 41.44"S 29° 06' 19.57" E		Vierfontein 61 IS ptn 26
			26° 14' 16.04" S 29° 06' 35.57" E		Vierfontein 61 IS ptn 53
13	Gabions to act as energy dissipating structures	Gabions	26° 13' 21.18" S 29° 06' 10.44" E		Vierfontein 61 IS ptn 26
14	Construction of culverts	Culverts	26° 17' 35.4"S 29° 09' 35.3" E	26° 17' 31.8"S 29° 09' 32.9" E	Bakenlaagte 84 IS ptn 6
15	Construction of culverts	Culverts	26° 17' 35.4"S 29° 09' 29.8" E	26° 17' 31.8"S 29° 09' 32.9" E	Bakenlaagte 84 IS ptn 6
16	Artificial small ponds associated with the goaf areas within 100m of unnamed perennial drainage line. The small ponds associated with the goaf areas act as sediment traps and allow for the establishment of wetland vegetation. Establishment of artificial wetlands as a result.	Goaf areas/ponds	Top left corner: 26°12'45.34"S; 29° 3'5.24"E Bottom left corner: 26°13'1.27"S; 29° 3'6.80"E	Top right corner: 26°12'50.42"S; 29° 3'37.01"E Bottom right corner: 26°13'0.23"S; 29° 3'38.12"E	Rietvlei 62 IS ptns 3 and 7
17	Artificial small ponds associated with the goaf areas within 500m boundary of Hillslope Seepage wetland and floodplain wetland associated with the Blesbokspruit River. The small ponds associated with the goaf areas act as sediment traps and allow for the establishment of wetland vegetation. Establishment of artificial wetlands as a result.	Goaf areas/ponds	Top left corner: 26°12'45.34"S; 29° 3'5.24"E Bottom left corner: 26°13'1.27"S; 29° 3'6.80"E	Top right corner: 26°12'50.42"S; 29° 3'37.01"E Bottom right corner: 26°13'0.23"S; 29° 3'38.12"E	Rietvlei 62 IS ptns 3 and 7

Water Use No.	Stooping - Description	Activity - Stooping	Co-ordinates		Property	Affected Watercourse from Stooping
			Start	End		

18	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’14.65”S 29°05’16.55”E	26°11’30.87”S 29°05’39.42”E	Rietvlei 62 IS Portion 14	Wetlands on site; Hillslope seepage, unchannelled valley bottom and subsidence wetlands
19	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’30.13”S 29°05’21.74”E	26°11’46.07”S 29°05’23.99”E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence wetlands
20	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’35.74”S 29°05’29.85”E	26°11’42.25”S 29°05’30.17”E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence wetlands
21	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’56.05”S 29°05’25.41”E	26°12’15.46”S 29°05’28.11”E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence, hillslope seepage wetlands and pan
22	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’48.95”S 29°05’31.97”E	26°12’14.44”S 29°05’35.68”E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence, hillslope seepage wetlands and pan
23	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’44.98”S 29°05’38.60”E	26°12’03.91”S 29°05’41.49”E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence, hillslope seepage wetlands and pan
24	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°12’13.35”S 29°05’59.97”E	26°12’11.51”S 29°05’10.53”E	Vierfontein 61 IS Portion 27	Wetlands on site; subsidence, hillslope seepage wetlands and pan
25	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’05.40”S 29°04’30.59”E	26°14’05.84”S 29°04’41.27”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
26	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’10.67”S 29°04’33.00”E	26°14’10.90”S 29°04’41.25”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
27	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’09.46”S 29°04’47.90”E	26°14’09.42”S 29°04’53.58”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
28	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’14.61”S 29°04’47.98”E	26°14’14.61”S 29°04’47.98”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
29	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’19.63”S 29°04’50.72”E	26°14’31.11”S 29°04’51.14”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
30	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’40.39”S 29°04’51.69”E	26°14’47.12”S 29°04’56.32”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland
31	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’47.50”S 29°04’47.97”E	26°14’48.84”S 29°04’54.81”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland
32	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’51.51”S 29°04’57.68”E	26°14’46.17”S 29°05’03.17”E	Grootpan 86 IS Portion 29	Wetlands on site; hillslope seepage wetlands
33	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’44.96”S 29°05’06.37”E	26°14’54.24”S 29°05’06.39”E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland

34	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'42.96"S 29°05'12.26"E	26°14'52.00"S 29°05'11.80"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
35	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'43.61"S 29°05'18.70"E	26°14'49.08"S 29°05'18.05"E	Grootpan 86 IS Portion 29 & 30	Wetlands on site; pan and hillslope seepage wetland
36	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'58.21"S 29°05'00.06"E	26°15'02.91"S 29°05'02.95"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
37	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'05.85"S 29°05'07.87"E	26°15'05.88"S 29°05'17.60"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
38	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'11.54"S 29°05'11.35"E	26°15'11.98"S 29°05'17.73"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
39	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'12.54"S 29°05'24.27"E	26°15'12.10"S 29°05'36.88"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
40	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'17.03"S 29°05'24.39"E	26°15'17.98"S 29°05'31.46"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
41	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'40.68"S 29°04'29.72"E	26°15'58.63"S 29°04'30.67"E	Grootpan 86 IS Portion 10	Wetlands on site; pan and hillslope seepage wetland
42	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°16'01.57"S 29°04'18.59"E	26°16'01.71"S 29°04'33.47"E	Grootpan 86 IS Portions 10 & 23	Wetlands on site; pan and hillslope seepage wetland
43	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°16'09.45"S 29°04'08.31"E	26°16'07.29"S 29°04'33.50"E	Grootpan 86 IS Portions 10 & 23	Wetlands on site; pan and hillslope seepage wetland
44	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°16'15.13"S 29°04'05.93"E	26°16'12.77"S 29°04'33.50"E	Grootpan 86 IS Portions 10 & 23	Wetlands on site; pan and hillslope seepage wetland
45	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°17'25.94"S 29°08'11.50"E	26°17'31.72"S 29°08'07.18"E	Matla Power Station 141 IS	Wetlands on site; hillslope seepage wetland & channelled valley bottom wetland
46	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'40.69"S 29°01'07.32"E	26°13'41.02"S 29°01'14.03"E	Kortlaagte 67 IS Portion 1	Wetlands on site; unchannelled valley bottom wetland
47	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'46.22"S 29°01'05.05"E	26°13'46.04"S 29°01'12.21"E	Kortlaagte 67 IS Portion 1	Wetlands on site; unchannelled valley bottom wetland
48	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'39.22"S 29°01'37.46"E	26°13'38.89"S 29°01'58.84"E	Kortlaagte 67 IS Portion 1	Wetlands on site; hillslope seepage and unchannelled valley bottom wetland
49	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'53.23"S 29°01'30.29"E	26°13'53.39"S 29°01'57.78"E	Kortlaagte 67 IS Portion 1	Wetlands on site; hillslope seepage, Pan and unchannelled valley bottom wetland
50	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'08.20"S 29°01'12.38"E	26°14'07.91"S 29°01'21.97"E	Kortlaagte 67 IS Portion 1	Wetlands on site; channelled and unchannelled valley bottom wetland

51	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'18.02"S 29°01'10.03"E	26°15'22.93"S 29°01'10.50"E	Kortlaagte 67 IS Portion 1	Wetlands on site; pan and hillslope seepage wetland and River Diversion	
52	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'23.85"S 29°01'10.18"E	26°15'28.70"S 29°01'10.32"E	Kortlaagte 67 IS Portion 1	Wetlands on site; pan and hillslope seepage wetland	
53	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'20.95"S 29°01'19.18"E	26°15'20.63"S 29°01'31.85"E	Kortlaagte 67 IS Portion 1	Wetlands on site; hillslope seepage and unchannelled valley bottom wetland and Pan & River Diversion	
54	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'26.74"S 29°01'26.60"E	26°15'26.59"S 29°01'31.71"E	Kortlaagte 67 IS Portion 1	Wetlands on site; unchannelled and channelled valley bottom wetlands, pan, hillslope seepage and river diversion	
55	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'47.97"S 29°00'46.30"E	26°13'47.97"S 29°00'39.30"E	Kortlaagte 67 IS Portion 10	Wetlands on site; quarry and unchannelled valley bottom wetland	
56	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'04.54"S; 29°00'39.30"E	26°14'10.31"S 29°00'39.93"E	Kortlaagte 67 IS Portion 10	Wetlands on site; quarry, unchannelled valley bottom and hillslope seepage wetland, river diversion and dam	
57	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'10.95"S 29°00'39.96"E	26°14'16.48"S 29°00'40.20"E	Kortlaagte 67 IS Portion 10	Wetlands on site; quarry, unchannelled valley bottom and hillslope seepage wetland, river diversion and dam	
Section 21(f) - Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.							
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Volume Applied for (m³/a)**	
58	Discharge of treated effluent from Mine 2 Sewage Treatment Works to the Rietspruit River.	Mine 2 WWTW discharge	26° 13.296' S 29° 06.298' E		Vierfontein 61 IS ptn 26	50 000 m³/a	
59	Discharge of treated effluent from Mine 3 Sewage Treatment Works to the Rietspruit River.	Mine 3 WWTW discharge	26° 13.429' S 29° 03.635' E		Vierfontein 61 IS ptn 21	35 000 m³/a	
60	Discharge of treated water into Rietspruit River.	Water Treatment Plant Discharge	26° 13' 21.18" S 29° 06' 10.44" E		Vierfontein 61 IS ptn 26	2580550 m³/a	
61	Discharge waste water from sewage works into unnamed tributary	New Mine 1 WWTW discharge	26° 17' 42.6"S 29° 09' 23.7" E		Bakenlaagte 84 IS Remaining Extent	66576 m³/a	
Section 21(g) - Disposing of waste in a manner which may detrimentally impact on a water resource.							
Water Use No.	**Section 21(g)**	**Site Name**		**Co-ordinates**	**Property**	**Capacity / Size / Area**	**Throughput as per IWUL (m³/month)**

62	Disposing of water containing waste into the Top PCD.	Top PDC	26° 15.829' S 29° 07.271' E	Haasfontein 85 IS ptn 5	47 353	30 000 m³/month
63	Disposing of water containing waste into the Bottom PCD.	Bottom PCD	26° 15.597' S 29° 06.928' E	Haasfontein 85 IS ptn 5	130 756	72739 m³/month
64	Disposing of water containing waste into the PCD on the farm Vierfontein 61 IS portion 26.	Pollution Control Dam	26° 13.142' S 29° 06.162' E	Vierfontein 61 IS ptn 26	70 000	70000 m³/month
65	Disposing of water containing waste into the Surface Pan (emergency facility)	Mine 2 Emergency Dam	26° 12.481' S 29° 06.999' E	Vierfontein 61 IS ptn 26	500 000	50 0000 m³/month
66	Disposing of water containing waste into the PCD with settling pond	PCD with Settling Pond	26° 14.647' S 29° 04.093' E	Vierfontein 61 IS ptn 26	80 100	80100 m³/month
67	Disposing of water containing waste into the silo dam	Silo Dam	26° 14.429' S 29° 04.548' E	Vierfontein 61 IS ptn 22	24 000	24 000 m³/month
68	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 1	Brine Storage Dam 1	26°15' 12.6" S 29° 07' 40.6" E	Vaalpan 68 IS portion 0 (remaining extent)	5.5 ha 280 000m³ capacity	0.3 – 0.5 Ml/day
69	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 2	Brine Storage Dam 2	26° 15' 16.1"S 29° 07' 45.7" E	Vaalpan 68 IS portion 0 (remaining extent)	5.5 ha 280 000m³ capacity	0.3 – 0.5 Ml/day
70	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 3	Brine Storage Dam 3	26°15' 24.5" S 29° 07' 40.6" E	Vaalpan 68 IS portion 0 (remaining extent)	5.5 ha 280 000m³ capacity	0.3 – 0.5 Ml/day
71	Storage of underground water from the mines before treatment and stormwater from the dirty area	WTP PCD	26°15'17.12"S 29° 7'31.84"E E	Vaalpan 68 IS portion 0 (remaining extent)	5000m³	
72	Excess water from the workings into the Conservancy Tank	Conservancy Tank	26°15' 23.4" S 29° 07' 30.8" E	Vaalpan 68 IS portion 0 (remaining extent)	10 Ml 10 000m³	
73	Pollution Control Dam	New Mine 1 PCD	26° 17' 42.6"S 29° 09' 23.7" E	Bakenlaagte 84 IS Remaining Extent		729 708 m³/a
74	Dust suppression (conveyor belt)	Dust suppression New Mine 1	N/A	Bakenlaagte 84 IS Remaining Extent	N/A	28 335 m³/a
75	Strategic Main Stockpile at Mine 1	Mine 1 Coal Stockpile	26°16'10.85"S 29° 7'47.30"E	Matla Power Station 141 IS	31	30 471 m³/a

76	Transfer point at the silo area at Mine 1	Transfer stockpile Mine 1	26°15'48.60"S; 29° 7'27.57"E	Haasfontein IS 85 ptn 5	1.5Ha footprint	5 238 m^3/a
77	Transfer point at the silo area at Mine 2	Transfer stockpile Mine 2	26°12'58.64"S 29° 6'5.76"E	Vierfontein 61 IS ptn 26	0.4 Ha	6 780 m^3/a
78	Transfer point at the silo area at Mine 3	Transfer stockpile Mine 3	26°14'30.01"S; 29° 4'31.95"E	Vierfontein 61 IS ptn 22	0.05Ha	2 211.3 m^3/a
79	Dust suppression at Main Mine 1 Main Stockpile	Dust Suppression Main Complex	N/A	Matla Power Station 141 IS & Haasfontein IS 85 ptn 5	N/A	26106 m^3/a
80	Sludge Drying Beds 2a, 2b, 2c, 2d at Mine 2 WWTW	Sludge Drying Beds Mine 2	26°12'56.7"S 29°06'18.0"E	Vierfontein 61 IS ptn 26	2a = 16m^3 2b = 15m^3 2c = 15m^3 2d = 14 m^3	134 m^3/a
81	4 Sludge Drying Beds at Mine 3 WWTW (3a, 3b, 3c, 3d)	Sludge Drying Beds Mine 3	26°14'43.4"S 29°04'06.0"E	Vierfontein 61 IS ptn 21	4 x 9m^3	135 m^3/a
82	2 Mega litre tanks at Mine 2 Emergency Dam	Mine 2 Emergency Dam Tanks	26°12'28.86"S 29° 6'59.94"E	Vierfontein 61 IS ptn 26	2 x 1000 m^3	730 000 m^3/a (365 000 m^3/a for each tank)
Section 21(j) - Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**	
83	Abstraction of excess underground water for storage in PCD prior treatment at the WTP	New Mine 1 dewatering	26° 17' 44.5"S 29° 09' 18.8" E	Bakenlaagte 84 IS Remaining Extent	912500 m^3/a	
84	dewatering of underground mine water from Exxaro Matla Mine 2	Mine 2	26° 12' 47.3"S 29° 06' 06.3" E	Vierfontein 61 IS ptn 26	1460 000 m^3/a	
85	dewatering of underground mine water from Exxaro Matla Mine 3	Mine 3	26° 14' 45.16"S 29° 04' 00.5" E	Vierfontein 61 IS ptn 21	1460 000 m^3/a	

Potential Environmental Impacts:

The impacts identified as a result of mining activities were found to be moderate in terms of significance as mitigation measures could be implemented to address these impacts. A risk assessment was conducted based on the policies of the mine and the risks that the mining operation poses to the environment (with specific reference to surface- and groundwater). A management plan on how to deal with the risks was developed in order to mitigate these impacts. This plan relates to the management of water and waste and is reviewed on a continuous basis to achieve the best water and waste management practices necessary for the mining operation.

Public Participation Process:

Public participation is an essential and legislative requirement for any environmental authorisation process. The principles that demand communication with society at large are best embodied in the principles of the National Environmental Management Act 1998 (Act No. 107 of 1998) (NEMA), South Africa's overarching environmental law.

Section 41 (4) of the NWA provides that the competent authority, the DWS, may, at any stage of the application process, require the applicant to place a suitable notice in newspapers and other media, and to take other reasonable steps as directed by the competent authority to bring the application to the attention of relevant organs of state, interested persons and the general public. The required Public Participation Process (PPP) is outlined in the Government Notice Regulation 267, Regulations Regarding the Procedural Requirements for Water Use Licence Applications and Appeals published in Government Gazette 40713 on 24 March 2017.

The Public Participation Process (PPP) for this consolidation application forms an integral part of the environmental authorisation application in terms of the following legislative processes:

- MPRDA: Section 48 (f) and 49(f) respectively of the MPRDA regulation R527, published in terms of Section 107(1) of the MPRDA Government Gazette No. 26275, dated 23 April 2004;
- NEMA: Chapter 6, GN R982, Government Gazette No. 38282 dated 4 December 2014; and
- NWA: Section 41 (4) of the NWA, GNR 267 Government Gazette 40713 dated 24 March 2017.

Due to the legislative requirements listed above, the PPP has been integrated as far as possible to present all environmental authorisation application processes to Interested and Affected Parties (I&APs). Due to the Environmental Authorisations required for this project the information presented herewith was attained from the PPP report, compiled for the Environmental Authorisation Process.

Integrated Water and Waste Management:

This IWULA/IWWMP document includes the current status and proposed activities for the Matla Coal Mine. The main purpose of this document is to present all the various site specific activities such as water balances, storm water management, water reuse, water conservation, waste minimization and recycling into a simple implementable management plan as well as all the water uses required for authorisation.

The IWULA/IWWMP is a living document that will be revised and updated throughout the life of the operations to accommodate additional information and improved technologies. These will ensure that water and waste management is continually optimised and adapted to the changing needs of the mine and the WMA.

Proposed Licence:

It is hereby requested that all the water uses applied for, be authorised under one new consolidated IWUL and that the previous IWULs be replaced with this new IWUL.

The proposed consolidated IWUL is requested to be authorised for a period of 40 years with a review period of 5 years. This authorisation period will enable the operational life span of the mine to be completed and will also provide for the associated closure and rehabilitation phases of the mine.

INTEGRATED WATER AND WASTE MANAGEMENT PLAN (IWWMP) EVALUATION CHECKLISTS

Name of the Applicant	Exxaro Coal Mpumalanga (Pty) Ltd	Application Date	September 2018
Name of the Site/Place:	Matla Coal Mine		

Information		Included? (Yes/No)	Relevant section of IWWMP Report
Evaluate to determine if the following aspects are addressed in the FINAL / BRIEF APPLICATION (IWWMP) REPORT:			
Introduction			
1.1	Activity Background	Yes	1.1
1.2	Contact Detail	Yes	1.2
1.3	Regional setting and location of activity	Yes	1.3
1.4	Property description	Yes	1.4
1.5	Purpose of IWWMP	Yes	1.5
Conceptualisation of activity			
2.1	Description of activity	Yes	2.1
2.2	Extent of activity	Yes	2.2
2.3	Key activity related processes and products	Yes	2.3
2.4	Activity life description	Yes	2.4
2.5	Activity infrastructure description	Yes	2.5
2.6	Key water uses and waste streams	Yes	2.6
2.7	Organisational structure of activity	Yes	2.8
2.8	Business and corporate policies	Yes	2.9
Regulatory water and waste management framework			
3.1	Summary of all water uses	Yes	3.1
3.2	Existing lawful water uses	Yes	3.2
3.3	Relevant exemptions	Yes	3.3
3.4	Generally authorized water uses	Yes	3.4
3.5	New water uses to be licensed	Yes	3.5
3.6	Waste management activities (NEMWA)	Yes	3.6
3.7	Waste related authorizations	Yes	3.6
3.8	Other authorizations (EIAs, EMPs, RODs, Regulations)	Yes	3.7
Present Environmental Situation			

Information		Included? (Yes/No)	Relevant section of IWWMP Report
4.1	Climate	Yes	4.1
4.1.1	Regional Climate	Yes	4.1.1
4.1.2	Rainfall	Yes	4.1.2
4.1.3	Evaporation	Yes	4.1.3
4.2	Surface Water	Yes	4.2
4.2.1	Water Management Area	Yes	4.2.1
4.2.2	Surface Water Hydrology	Yes	4.2.2
4.2.3	Surface Water Quality	Yes	4.2.3
4.2.4	Mean Annual Runoff (MAR)	Yes	4.2.4
4.2.5	Resource Class and River Health	Yes	4.2.5
4.2.6	Receiving Water Quality Objectives and Reserve	Yes	4.2.6
4.2.7	Surface Water User Survey	Yes	4.2.7
4.2.8	Sensitive Areas Survey	Yes	4.3
4.3	Groundwater	Yes	4.4
4.3.1	Aquifer Characterisation	Yes	4.4.1
4.3.2	Groundwater Quality	Yes	4.4.2
4.3.3	Hydro-census	Yes	4.4.3
4.3.4	Potential Pollution Source Identification	Yes	4.4.4
4.3.5	Groundwater Model	Yes	4.4.5
4.4	Socio-economic environment	Yes	4.5
Analyses and characterisation of activity			
5.1	Site delineation for characterisation	Yes	5.1
5.2	Water and waste management	Yes	5.2
5.2.1	Process water	Yes	5.2.2
5.2.2	Storm water	Yes	5.2.3
5.2.3	Groundwater	Yes	5.2.4
5.2.4	Waste	Yes	5.2.5
5.3	Operational Management	Yes	5.3

Information	Included? (Yes/No)	Relevant section of IWWMP Report
5.3.1 Organisational structure	Yes	5.3.1
5.3.2 Resources and competence	Yes	5.3.2
5.3.3 Education and training	Yes	5.3.3
5.3.4 Internal and external communication	Yes	5.3.4
5.3.5 Awareness raising	Yes	5.3.5
5.4 Monitoring and control	Yes	5.4
5.4.1 Surface water monitoring	Yes	5.4.1
5.4.2 Groundwater monitoring	Yes	5.4.2
5.4.3 Bio monitoring	Yes	5.4.3
5.4.4 Waste monitoring	Yes	5.4.4
5.5 Risk assessment / Best Practice Assessment	Yes	5.5
5.6 Issues and responses from public consultation process	Yes	5.6
5.7 Matters requiring attention / problem statement	Yes	5.7
5.8 Assessment of level and confidence of information	Yes	5.8
Water and waste management		
6.1 Water and waste management philosophy (process water, storm water, groundwater, waste)	Yes	6.1
6.2 Strategies (process water, storm water, groundwater and waste)	Yes	6.2
6.3 Performance objectives / goals	Yes	6.3
6.4 Measures to achieve and sustain performance objectives	Yes	6.4
6.5 Option analyses and motivation for implementation of preferred options (Optional)	Yes	6.5
6.6 IWWMP action plan	Yes	6.6
6.7 Control and monitoring	Yes	6.7
6.7.1 Monitoring of change in baseline (environment) information (surface water, groundwater and bio-monitoring)	Yes	6.7.1
6.7.2 Audit and report on performance measures	Yes	6.7.2
6.7.3 Audit and report on relevance of IWWMP action plan	Yes	6.7.3
Conclusion		
7.1 Regulatory status of activity	Yes	7.1
7.2 Statement on water uses requiring authorization, dispensing with licensing requirement and possible exemption from regulations	Yes	7.2

Information	Included? (Yes/No)	Relevant section of IWWMP Report
7.3 Section 27 motivation	Yes	7.4
7.4 Proposed licence conditions	Yes	7.5
References		
Appendixes: Specialist studies		

CHECKLIST AND FINAL STRUCTURE OF IWWMP

Information	Included? (Yes/No)	Relevant section of IWWMP Report
Evaluate to determine if the following aspects are addressed in the FINAL / BRIEF APPLICATION (IWWMP) REPORT:		
QUANTIFICATION OF THE WATER RESOURCE PROBLEM		
Are the existing water quality data adequate to identify contaminants of concern?	Yes	Section 4.2.2 and 4.3.2
How well have the nature, extent and causes of the water management problems on site been identified?	Yes	Section 5.5
To what extent has the analysis and characterization of the problems considered current thinking on water resource management?	Yes	Section 7.4
TARGETS, INDICATORS AND MONITORING		
Does the IWWMP define medium and long-term goals towards sustainable management of water resources?	Yes	Section 6.3
Does the IWWMP make provision for the establishment of indicators of progress and set annual and medium term targets?	Yes	Section 6
Are these indicators and targets appropriate and consistent with the policies and strategies considered for implementation of the IWWMP?	Yes	Section 6
Are the proposed monitoring, review and evaluation as well as auditing systems adequate and sustainable?	Yes	Section 6.6
PRIORITY ACTIONS		
Does the IWWMP describe clear priorities for action, relevant to the goals and targets, feasibility in terms of achieving targets, their estimated costs, available resources, institutional capacities and effectiveness?	Yes	Section 6
To what extent do the structural and sectoral goals and objectives as well as actions of the IWWMP address key performance areas of strategy, institutional matters and the sustainable management of the water resource?	Yes	Throughout the report
Does the IWWMP address the components of section 27(1) of the NWA?	Yes	Section 7.4
CREATING AWARENESS		
Does the IWWMP describe the participatory process used to identify water use and waste related aspects?	Yes	Section 5.6
Does the IWWMP summarise the major issues raised during the consultation process?	Yes	Section 5.6
To what extent have the matters raised impact on the content of the plan?	Yes	Section 5.6

CONTENTS PAGE

LIST OF FIGURES

LIST OF TABLES

LIST OF ANNEXURES

GLOSSARY OF TERMINOLOGY

Catchment - The area from which any rainfall will drain into the watercourse or watercourses or part of the water course, through surface flow to a common point or common points

Constitution – Refers to the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996).

Environment – The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group; these circumstances include biophysical, social, economic, historical, cultural and political aspects. Environment means the surroundings within which humans exist and that are made up of-
(i) the land, water and atmosphere of the earth;
(ii) micro-organisms, plant and animal life;
(iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and
(iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact Assessment - An environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of any proposed project, plan, programme or policy which requires authorisation of permission by law and which may significantly affect the environment. The Environmental Impact Assessment (EIA) includes an evaluation of alternatives. As well as recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures enhancing the positive aspects of the proposal and environmental management and monitoring measures.

Existing Lawful use - An existing lawful use means a water use which has taken place at any time during a period of two years immediately before the date of commencement of the National Water Act 1998, (Act 36 of 1998) or which has been declared an existing lawful water use under section 33 and which was authorised by or under any law which was in force immediately before the date of commencement of the National Water Act.

Hydrogeological -The study of distribution and movement of groundwater.

Hydrological - The study of movement, distribution and quality of surface water and groundwater.

Public Participation Process - A process of involving the public in order to identify issues and concerns, and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of NEMA refers to: a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific matters.

Reserve means the quantity and quality of water required -
(a) to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be -
(i) relying upon;
(ii) taking water from; or
(iii) being supplied from, the relevant water resource; and
(b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.

Special Standards - These are quality standards for waste water or effluent arising in the catchment area draining water to any river specified in Schedule 1, or a tributary thereof at any place between the source thereof and the point mentioned in the Schedule. These standards were published in Government Gazette No. 9225, on 18 May 1984, Regulation No. 991, in terms of the Water Act (Act 54 0f 1956).

The Act - The National Water Act, 1998 (Act No.36 of 1998) (NWA).

The Department - Means the Department of Water and Sanitation (DWS).

Tributaries - A stream or river which flows directly into a larger river or stream.

Mine Residue Deposit - Includes any dump, tailings storage, slimes dam, ash dam, Waste stockpile, in pit deposit and any other heap, pile or accumulation of residue.

Mine risk - Mines are classified into three risk categories namely, categories A, B and C according to the perceived severity of the potential impacts on the water resources due to mining activity.

Watercourse means -
(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

Water quality means the physical, chemical, toxicological, biological (including microbiological) and aesthetic properties of water that determine sustained (1) healthy functioning of aquatic ecosystems and (2) fitness for use (e.g. domestic, recreational, agricultural, and industrial). Water quality is therefore reflected in (a) concentrations or loads of substances (either dissolved or suspended) or micro-organisms, (b) physico-chemical attributes (e.g. temperature) and (c) certain biological responses to those concentrations, loads or physico-chemical attributes.

Water Resource - A water resource includes any watercourse, surface water, estuary or aquifer. Watercourses include rivers, springs, and natural perennial and non-perennial channels. Wetlands, lakes, dams, or any collection identified as such by the Minister in the Government Gazette.

Water use license - An authorisation from the Department to a designated water user to use water. The authorisation will provide details on the time-frames and conditions for the designated water use

ABBREVIATIONS

ABET	- Adult Basic Education & Training
BID	- Background Information Document
CMA	- Catchment Management Agency
CN	- curve number
DARDLEA	- Department of Agriculture, Rural Development, Land and Environmental Affairs
DEM	- Digital Elevation Model
DMR	- Department of Mineral Resources
DWS	- Department of Water and Sanitation
EC	- Electrical conductivity
EE	- Employment Equity
EIA	- Environmental Impact Assessment
EIS	- Ecological Importance and Sensitivity
ELM	- Emalahleni Local Municipality
ELWU	- Existing lawful water use
EMP	- Environmental Management Programme
HDSAs	- Historically Disadvantaged South Africans
HGM	- Hydro-Geomorphic
HIRA	- Health Impact Risk Assessment
IDP	- Industrial Development Programme
I&APs	- Interested and Affected Parties
IUA	- Integrated Units of Analysis
IWRM	- Integrated Water Resource Management
IWULA	- Integrated Water Use License Application
IWUL	- Integrated Water Use License
IWWMP	- Integrated Water and Waste Management Plan
LOM	- Life of Mine
m^3	– Cubic Metres
MAR	- Mean annual runoff
Mamsl	- meters above mean sea level
mbgl	- Metres below ground level
mcm	- million cubic meters
mg/l	– Milligrams per Litre
MPRDA	- Mineral and Petroleum Resources Development Act (Act 28 of 2002)
MTPA	- Mpumalanga Tourism and Parks Agency
NDM	- Nkangala District Municipality
NEMA	– National Environmental Management Act 1998 (Act 107 of 1998)
NEM:WA	- National Environmental Management: Waste Act, 2008 (Act No 59 of 2008).
NWA	- National Water Act 1998 (Act 36 of 1998)
PCD	- Pollution Control Dam
PES	- Present Ecological State
PFD	- Process Flow Diagram
PPP	- Public Participation Process
RoM	- Run of Mine
SAHRA	- South African Heritage Resources Agency
SAWQG	- South African Water Quality Guidelines
SCS	- Soil Conversation Services
SHEQ	- Safety, Health and Environmental Quality
SLP	- Social and Labour Plan
SS	– Suspended Solids
SWMP	- Storm Water Management Plan
TDS	– Total Dissolved Solids
WMA	– Water Management Area
WTP	- Water Treatment Plant
WWTW	- Waste Water Treatment Works

1 INTRODUCTION

1.1 Activity Background

The start of the Matla Mine dates back to the end of 1973 when Eskom awarded a contract to the Trans-Natal Corporation and the Clydesdale (Tvl) Collieries Ltd. Matla Mine is an existing underground coal mining operation. The Matla Coal Mine's Mineral Rights are held by Exxaro Coal Mpumalanga.

The Matla Mine is situated in the Mpumalanga Province, approximately 20 kilometres (kms) west of Ga-Nala (Kriel). The mining area is situated in the Emalahleni Local Municipality of the Nkangala District Municipality as well as the Govan Mbeki Local Municipality of the Gert Sibande District Municipality. Although Matla belongs to the Exxaro group, the mine is an Eskom funded operation, and as such is referred to as a "captive mine" with a defined cost-plus coal supply contract with Eskom and consists of the following complexes:

- E'tingwini (E'tingwini has been completely mined and rehabilitated);
- Mine 1 (Mine 1 shaft has been closed);
- Mine 2;
- Mine 3; and
- New Mine 1 Shaft (to be constructed).

Throughout the years of operation, the Matla Mine has been issued with various authorisations and licences in terms of the relevant environmental legislation. In order to achieve a more streamlined management approach and decrease the duplication in terms of compliance with regards to the various authorisations and Licences, Matla has proposed to consolidate the various authorisation and licences.

The consolidation will be undertaken in accordance with the requirements of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA), the National Environmental Management At, 1998 (Act No. 107 of 1998) (NEMA), and the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

In line with the requirements of the NWA, the Matla Mine has been issued with various Integrated Water Use Licences (IWULs) by the Department of Water and Sanitation for the various water uses taking place on site in terms of Section 21 of the NWA. The following IWULs have been issued to Matla for water uses taking place on site in terms of Section 21 of the NWA:

- Licence No: 24084303 dated 23 October 2017 (previously issued in 2007) in terms of the NWA for river diversion for Section 21 (c) and (i);

- Licence No: 24084303 dated 1 October 2010 in terms of the NWA for Integrated Water Uses for Section 21(a), (b), (f), (g), (j). Amendment issued in terms of Section 158 on the 22nd of November 2013;
- Licence No: 24084303 dated 1 April 2011 in terms of the NWA for controlled release - Section 21(f) EXPIRED;
- Licence No. 04/B11E/ABCFGIJ/2446 of 17 March 2014: Water Treatment Plant – Sections 21(a), (b), (c), (f), (g), (i) and (j); and
- Licence No. 04/B11E/ACFGIJ/3734 of 16 July 2015: New Mine 1 Shaft – Sections 21 (a), (c), (f), (g), (i) and (j).

1.1.1 Consolidation and Amendments

In addition to the Consolidation of all previous approved IWULs, several amendment are required to some of the existing authorised water uses. These amendment have been included in this report as part of this consolidation process.

1.1.2 New Water Uses

1.1.2.1 Section 21(g) Water Uses

Additional new water use activities, as defined in terms of Section 21(g) (disposing of waste in a manner which may detrimentally impact on a water resource) of the NWA have also been included into the consolidation process. The new water uses that have been included are as follows:

- Dust suppression on the stockpiles;
- Strategic main stockpile area at the plant located at Mine 1;
- The transfer stockpiles at Mine 1, 2 and 3;
- Two mega litre tanks at the Mine 2 Emergency Dam (Pan at Mine 2); and
- Sludge drying beds of the existing sewage treatment works at Mine 2 and 3.

1.1.2.2 Section 21(c) and (i) Water Uses

Rehabilitation is planned for panels 6, 7 and 8 of the goaf areas (surface depressions) at the Mine 2 complex. A basic framework for rehabilitation of standing water was determined and described in the feasibility design submitted to Matla. Due to the nature of the goaf areas and the rehabilitation that is planned, water uses are triggered and are required to be authorised.

Matla also proposes to stoop (or totally extract) pillars at the previously underground mined areas with the intent to reclaim the remaining coal reserves by using the conventional board and pillar mining method (drill and blast). Only phase 1 of the stooping project is being applied for. The stooping uses previously formed a separate application, however this application has not been submitted to DWS to date. As such, as per the request of DWS, the stooping uses will form part of this Consolidation process.

The water uses associated with the goaf areas as well as the stooping uses trigger water uses under Section 21 of the NWA in term of the following:

- Section 21(c) – Impeding or diverting the flow of water in a watercourse; and
- Section 21(i): Altering the bed, banks course or characteristics of a watercourse

It is in this regards that GCS Water and Environment (Pty) Ltd (GCS) have been contracted to undertake the consolidation process and compile the respective reports. This report serves as the technical motivation document for the consolidation of the existing IWULs, the identified amendments to existing licensed water uses and new uses in terms of Section 21 of the NWA.

1.2 Contact Details

The applicant for this application is Exxaro Coal Mpumalanga (Pty) Ltd (Exxaro). Refer to Table 1.1 for the contact details of the applicant and the environmental consultant compiling the consolidation.

Table 1.1: Contact Details

Applicant Details (Mining Rights Holder)	
Name of Company	Exxaro Coal Mpumalanga (Pty) Ltd.
Name of Mine	Matla
Physical Address	Matla 26°15'29.65"S 29° 7'0.66"E
Postal Address	Private Bag X 5006, Kriel, Mpumalanga
Telephone Number	017 616 2255 / 082 532 1642
Fax Number	017 616 2205
Contact person	Stephen Badenhorst stephen.Badenhorst@exxaro.com
Environmental Consultant	
Name of Company	GCS Water and Environment (Pty) Ltd
Physical Address	63 Wessel Road Woodmead Rivonia 2128
Postal Address	P.O. Box 2597 Rivonia 2128
Telephone Number	(011) 803 5726
Fax Number	(011) 803 5745
Contact person	Kate Cain Kate@gcs-sa.biz

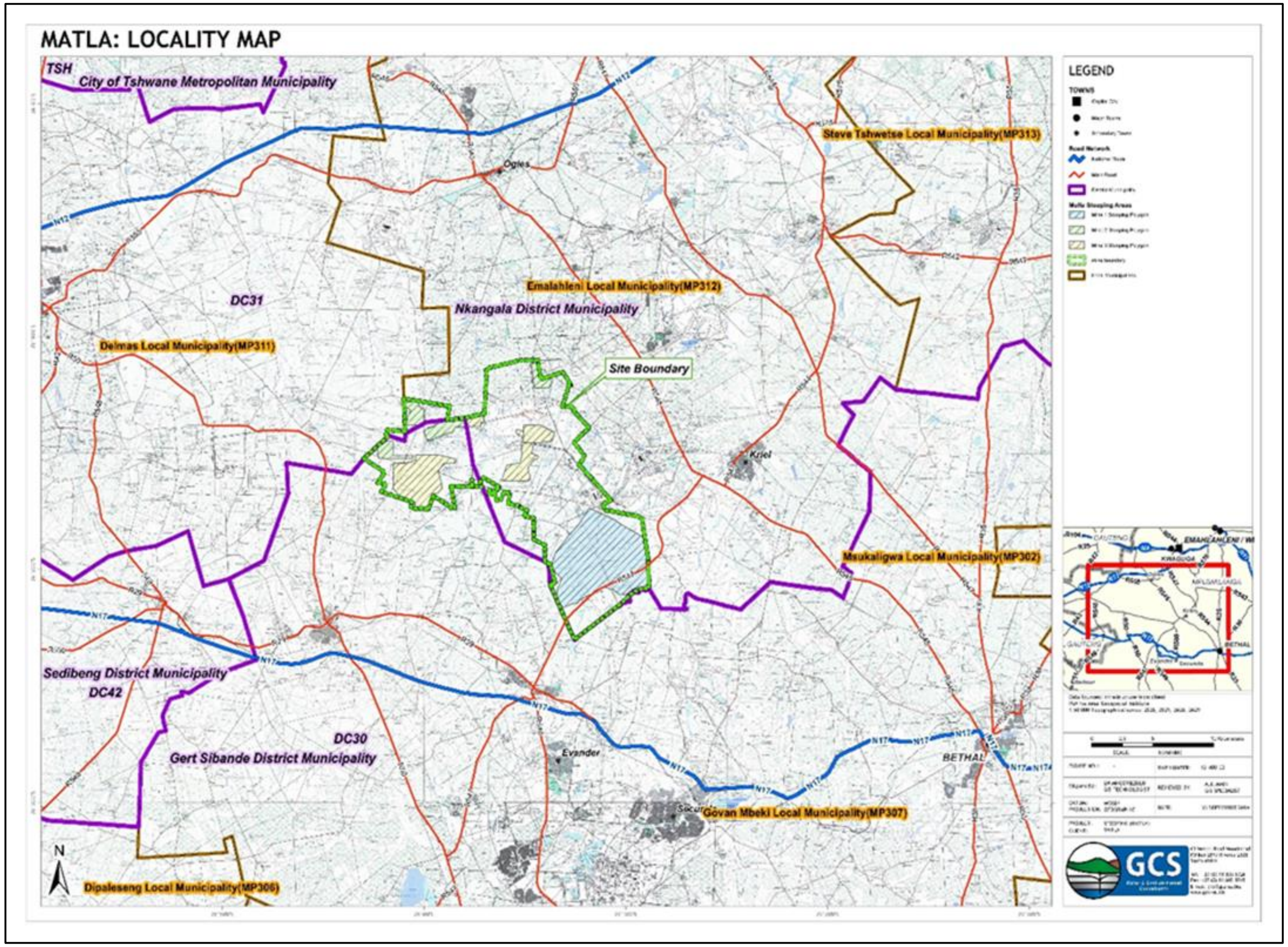
1.3 Regional Setting and Location of Activity

The Matla Mining Operations are located within the following District and Local Municipalities (Figure 1.1):

- Nkangala District Municipality (DC31):
    - Emalahleni Local Municipality (MP312).
- Gert Sibande District Municipality (DC30):
    - Govan Mbeki Local Municipality (MP307).

The Matla Mine Complexes are situated in the Blesbokspruit / Rietspruit River Catchment area which is located in the Olifants Water Management Area (WMA) in the following quaternary catchments:

- B11E;
- B20E; and
- B11D.



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 1.1: Locality within Municipal Boundaries

1.4 Property Description

In general, the land use of the study area is considered to be altered, with a significant portion of the area having been changed from its original grassland biome to commercial farmlands.

The lower lying areas associated with the wetlands and wet based soils are for the most part unchanged, albeit that cultivation and utilisation of areas within this zone for livestock grazing and crop production were noted. The remainder of the site has been developed to either intensive grazing of the natural veld grasses or to commercial crops and cultivated pastures.

Table 1.2 details the properties associated with the current Matla Mining Right. These are illustrated in Figure 1.2.

Table 1.2: Matla Mining Right Properties

Farm name	Farm portion	Farm name	Farm portion
BAKENLAAGTE 84 IS	84	MOEDVERLOREN 88 IS	24/88
BAKENLAAGTE 84 IS	1/84	MOEDVERLOREN 88 IS	25/88
BAKENLAAGTE 84 IS	2/84	MOEDVERLOREN 88 IS	26/88
BAKENLAAGTE 84 IS	3/84	MOEDVERLOREN 88 IS	27/88
BAKENLAAGTE 84 IS	5/84	MOEDVERLOREN 88 IS	28/88
GROOTPAN 86 IS	2/86	NASMANUS 132 IS	132
GROOTPAN 86 IS	3/86	NASMANUS 132 IS	1/132
GROOTPAN 86 IS	5/86	NOOITGEDACHT 9A IS	1/94
GROOTPAN 86 IS	6/86	NOOITGEDACHT 9A IS	2/94
GROOTPAN 86 IS	7/86	NOOITGEDACHT 9A IS	4/94
GROOTPAN 86 IS	10/86	NOOITGEDACHT 9A IS	6/94
GROOTPAN 86 IS	12/86	ONVERWACHT 97 IS	97
GROOTPAN 86 IS	13/86	OVVER WACHT 66 IS	2/66
GROOTPAN 86 IS	14/86	ONVERWACHT 97 IS	1/97
GROOTPAN 86 IS	15/86	ONVERWACHT 97 IS	2/97
GROOTPAN 86 IS	19/86	ONVERWACHT 97 IS	3/97
GROOTPAN 86 IS	20/86	ONVERWACHT 97 IS	4/97
GROOTPAN 86 IS	21/86	ONVERWACHT 97 IS	5/97
GROOTPAN 86 IS	23/86	RIETVLEI 62 IS	2/62
GROOTPAN 86 IS	24/86	RIETVLEI 62 IS	3/62
GROOTPAN 86 IS	25/86	RIETVLEI 62 IS	4/62
GROOTPAN 86 IS	26/86	RIETVLEI 62 IS	6/62
GROOTPAN 86 IS	29/86	RIETVLEI 62 IS	7/62
GROOTPAN 86 IS	30/86	RIETVLEI 62 IS	8/62
GROOTPAN 86 IS	31/86	RIETVLEI 62 IS	9/62
GROOTPAN 86 IS	32/86	RIETVLEI 62 IS	11/62
HAASFONTEIN 85 IS	1/85	RIETVLEI 62 IS	12/62
HAASFONTEIN 85 IS	4/85	RIETVLEI 62 IS	14/62
HAASFONTEIN 85 IS	5/85	RIETVLEI 62 IS	15/62
HAASFONTEIN 85 IS	6/85	SCHAAPKRAAL 93 IS	2/93

Farm name	Farm portion	Farm name	Farm portion
KORTLAAGTE 67 IS	67	SCHAAPKRAAL 93 IS	3/93
KORTLAAGTE 67 IS	1/67	STREHLA 261 IS	10/261
KORTLAAGTE 67 IS	2/67	UITVLUGT 255 IR	1/255
KORTLAAGTE 67 IS	3/67	UITVLUGT 255 IR	2/255
KORTLAAGTE 67 IS	4/67	VAALPAN 68 IS	68
KORTLAAGTE 67 IS	5/67	VIERFONTEIN 61 IS	5/61
KORTLAAGTE 67 IS	6/67	VIERFONTEIN 61 IS	10/61
KORTLAAGTE 67 IS	7/67	VIERFONTEIN 61 IS	11/61
KORTLAAGTE 67 IS	8/67	VIERFONTEIN 61 IS	17/61
KORTLAAGTE 67 IS	9/67	VIERFONTEIN 61 IS	18/61
KORTLAAGTE 67 IS	10/67	VIERFONTEIN 61 IS	19/61
KRUISEMENTFONTEIN 95 IS	1/95	VIERFONTEIN 61 IS	20/61
KRUISEMENTFONTEIN 95 IS	2/95	VIERFONTEIN 61 IS	21/61
MATLA POWER STATION 141IS	141	VIERFONTEIN 61 IS	22/61
MOEDVERLOREN 88 IS	1/88	VIERFONTEIN 61 IS	23/61
MOEDVERLOREN 88 IS	2/88	VIERFONTEIN 61 IS	26/61
MOEDVERLOREN 88 IS	3/88	VIERFONTEIN 61 IS	27/61
MOEDVERLOREN 88 IS	4/88	VIERFONTEIN 61 IS	28/61
MOEDVERLOREN 88 IS	5/88	VIERFONTEIN 61 IS	52/61
MOEDVERLOREN 88 IS	14/88	VIERFONTEIN 61 IS	53/61
MOEDVERLOREN 88 IS	15/88	VLAKPAN 89 IS	7/89
MOEDVERLOREN 88 IS	20/88	VLAKPAN 89 IS	8/89
MOEDVERLOREN 88 IS	21/88	VLAKPAN 89 IS	9/89
MOEDVERLOREN 88 IS	22/88	WELTEVREDEN 307 IR	10/307
MOEDVERLOREN 88 IS	23/88	WELTEVREDEN 307 IR	6/307

Table 1.3 and Figure 1.2 provide the details of the farms on which the proposed phase 1 stooping will be located. The properties provided in Table 1.3 are those properties for which the stooping water uses applied for in this application will take place on.

Table 1.3: Phase 1 Stooping Activities

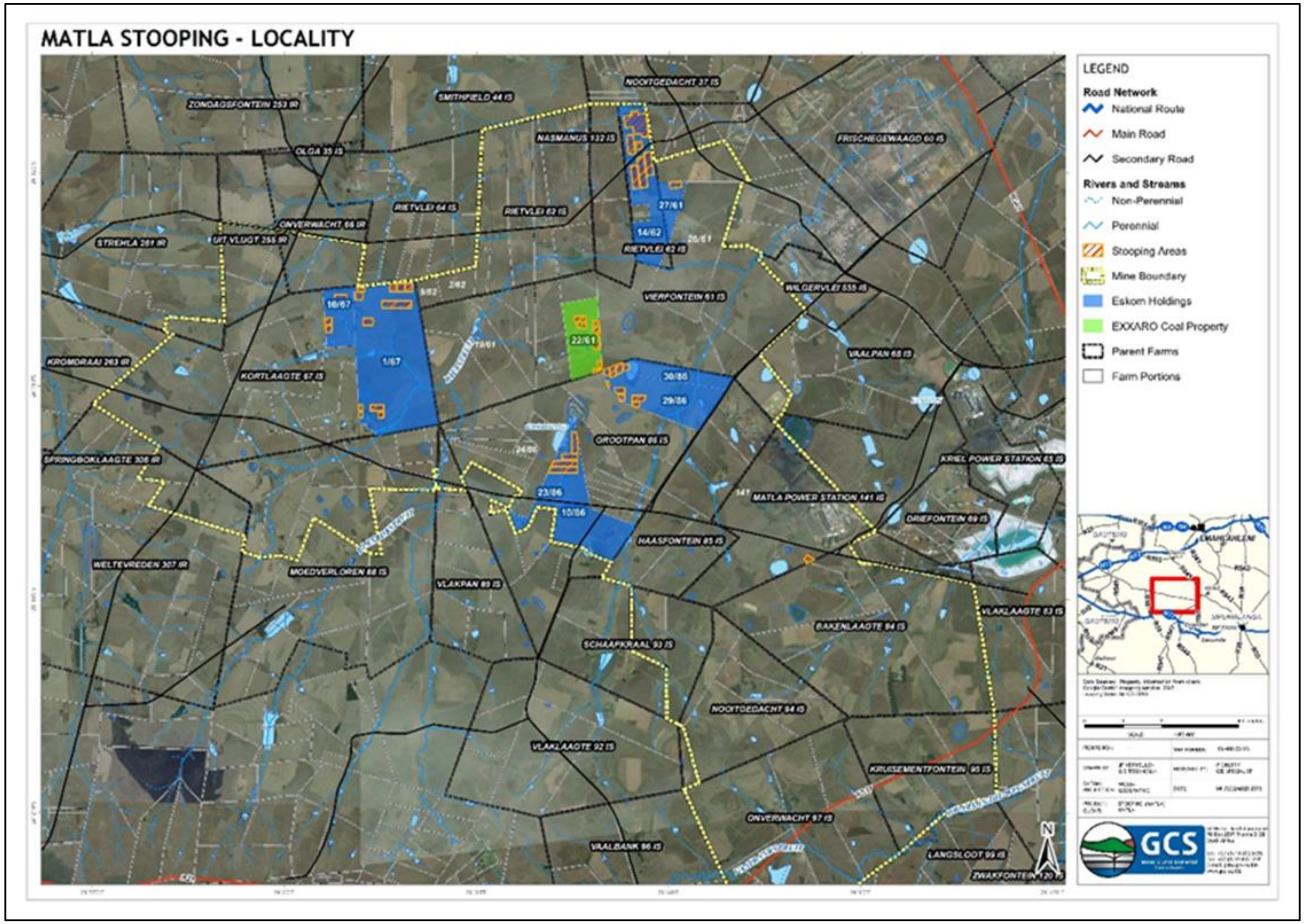
Farm Name	No.	Ptn	Property Owner	Farm Portion SG Codes	Area (Ha)	Title deed no
Kortlaagte	67 IS	1	Eskom Holdings SOC LTD	T0IS00000000006700001	46.5876	T1007/2012
Kortlaagte	67 IS	10	Eskom Holdings SOC LTD	T0IS00000000006700010	11.59176	T1007/2012
Rietvlei	62 IS	14	Eskom Holdings SOC LTD	T0IS00000000006200014	293.8029	T54978/1987
Vierfontein	61 IS	27	Eskom Holdings SOC LTD	T0IS00000000006100027	79.92335	T54978/1987
Vierfontein	61 IS	22	Exxaro Coal Mpumalanga PTY LTD	T0IS00000000006100022	19.20741	T1736/2003
Grootpan	86 IS	23	Eskom Holdings SOC LTD	T0IS00000000008600023	10.17588	T16868/2014

Farm Name	No.	Ptn	Property Owner	Farm Portion SG Codes	Area (Ha)	Title deed no
Grootpan	86 IS	10	Eskom Holdings SOC LTD	T0IS00000000008600010	24.91222	T16868/2014
Grootpan	86 IS	29	Eskom Holdings SOC LTD	T0IS00000000008600029	26.251	T16869/2014
Grootpan	86 IS	30	Eskom Holdings SOC LTD	T0IS00000000008600030	1.25578	T16869/2014
Matla power station	141 IS	0	Eskom Holdings SOC LTD	T0IS00000000014100000	2.869387	T18624/1979

Table 1.4 provide the details of the farms on which the proposed phase 1 stooping will be located. The properties provided in Table 1.3 are those properties for which the stooping water uses applied for in this application will take place on.

Table 1.4: Goaf areas and Section 21(g) new uses

Farm Name	No.	Ptn	Property Owner	Farm Portion SG Codes	Title deed no
Rietvlei	62 IS	3	Eskom Holdings LTD	T0IS00000000006200003	T84392/1989
		4	Eskom Holdings LTD	T0IS00000000006200004	T41418/2006
		6	Eskom Holdings LTD	T0IS00000000006200006	T39184/1991
		7	Eskom Holdings LTD	T0IS00000000006200007	T146034/2003
		11	Eskom Holdings LTD	T0IS00000000006200011	T15203/2001
Matla power station	141 IS	0	Eskom Holdings LTD	T0IS00000000014100000	T18624/1979
Haasfontein	85 IS	5	Exxaro Coal Mpumalanga (Pty) Ltd	T0IS00000000008500005	T1734/2003
Vierfontein	61 IS	26	Exxaro Coal Mpumalanga (Pty) Ltd	T0IS00000000006100026	T46568/2004
		22	Exxaro Coal Mpumalanga (Pty) Ltd	T0IS00000000006100022	T1736/2003
		21	Exxaro Coal Mpumalanga (Pty) Ltd	T0IS00000000006100021	T1735/2003



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 1.2: Property Boundaries

1.5 Purpose of the IWWMP

The purpose of the IWWMP includes:

- Present the new water uses as well as existing licensed water uses that require amendment for the Matla Coal Mine;
- To apply for the consolidation of the previous issued IWULs for the Matla Mine into one streamlined and combined IWUL;
- Compilation of a site specific, implementable, management plan addressing all the identified water use and waste management relates aspects of a specific activity, in order to meet set goals and objectives in accordance with Integrated Water Resource Management (IWRM) principles;
- Provision of a management plan to guide the water user regarding the water and waste related measures which must be implemented on site in a progressive, structures manner in the short, medium and long term;
- Documentation of all the relevant information, as specified in the IWWMP Guideline as compiled by the DWS, to enable DWS to make a decision regarding the authorisation of a water use;
- Clarification of the content of the IWWMP for DWS officials and the water users, as the various regional offices of DWS might have different interpretations regarding the contents of the IWWMP;
- Standardisation of the format of supporting documentation which DWS requires during the submission of a WULA;
- Provision of guidance on the content of information required in an IWWMP as part of the water use authorisation process and level of detail that DWS requires to enable them to evaluate the supporting documentation to make a decision on authorising a water use; and
- Ensuring that a consistent approach is adopted by DWS and the various Regional Offices and Catchment Management Agencies (CMA) with regards to IWWMPs.

The IWWMP also strives to show the DWS that the selected management measures included into the IWWMPs action plan adhere to the SMART concept which refers to:

- S – Sustainable;
- M – Measureable;
- A – Achievable;
- R – Resources Allocated; and
- T – Timeframe Specific.

2 CONCEPTUALISATION OF THE ACTIVITY

2.1 Description of the Activity

2.1.1 Current mining activities

The Matla mine is a fully mechanised underground mine employing continuous mining and shortwall methods. The Matla Mine consists of three separate and independent shaft complexes. That shafts are not interconnected underground.

Mine 1 is currently on stop due to an unsafe primary development nearby the shaft and is awaiting the New Mine 1 box cut to be completed. Once operational, New Mine 1 will have six production sections in 2019 that will commence with phasing in of production over three months. Every month one coal section will be brought into production.

Mine 2 (seam 2) and Mine 3 (seam 4 and the low seam 2) are currently in full production. Expanding the operation to include Mine 2 seam 4 and Mine 3 seam 2 will not have any build-up period. It is anticipated that the projected coal production of the Matla Mine, in the future, will be between 12-13 million tons per annum.

2.1.2 Stooping

Matla proposes to stoop (or totally extract) pillars at the previously underground mined areas with the intent to reclaim the remaining coal reserves by using the conventional board and pillar mining method (drill and blast). The reclamation of the remaining coal reserves will utilise the existing current operations' infrastructure. Table 2.1 outlines all the areas that have been identified for stooping in their entirety.

The proposed activities (those that are relevant to this application) will occur only on farms and portions within the Matla Coal mining boundary currently owned by Eskom or Exxaro. This has been termed Phase 1 of the stooping activities. The applicable proposed stooping activities cover farms within Block B, Block D, Block F, Blocks G & H and Block I (the LOMP stooping area). These areas have been written in red in Table 2.1 and are illustrated in Figure 2.2. As such, due to the ownership of land by Exxaro and Eskom, the total area proposed for **stooping Phase 1 is 232 ha.**

Table 2.1: Total surface area (Ha) of identified stooping areas

Label of Area	Name	Area (Ha)	Year Surveyed
A	Uitvlugt Stooping Area	237.6	2012
B	Block B	291.1	2014
C	Block C	114.5	2014
D	Block D	173.0	2014

Label of Area	Name	Area (Ha)	Year Surveyed
E	Block E	192.3	2014
F	3 Mine Stooping Area	1327.8	2012
G & H	Block G & H	783.4	2012
I	LOMP Stooping Area	4103.0	2012
TOTAL		**7222.6**	

Stooping of pillars or retreat mining is a term used to reference the final phase of an underground mining technique known as room and pillar mining. This involves excavating a room or chamber while leaving behind pillars of material for support. This excavation is carried out in a pattern advancing away from the entrance of a mine. Once a deposit has been exhausted using this method, the pillars that were left behind initially are removed, or 'pulled', retreating back towards the mine's entrance. After the pillars are removed, the roof (or back) is allowed to collapse behind the mining area (Figure 2.1).

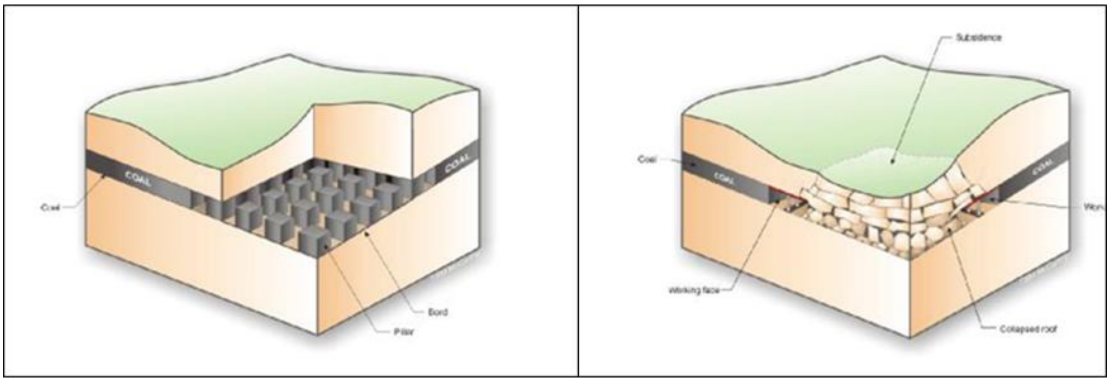
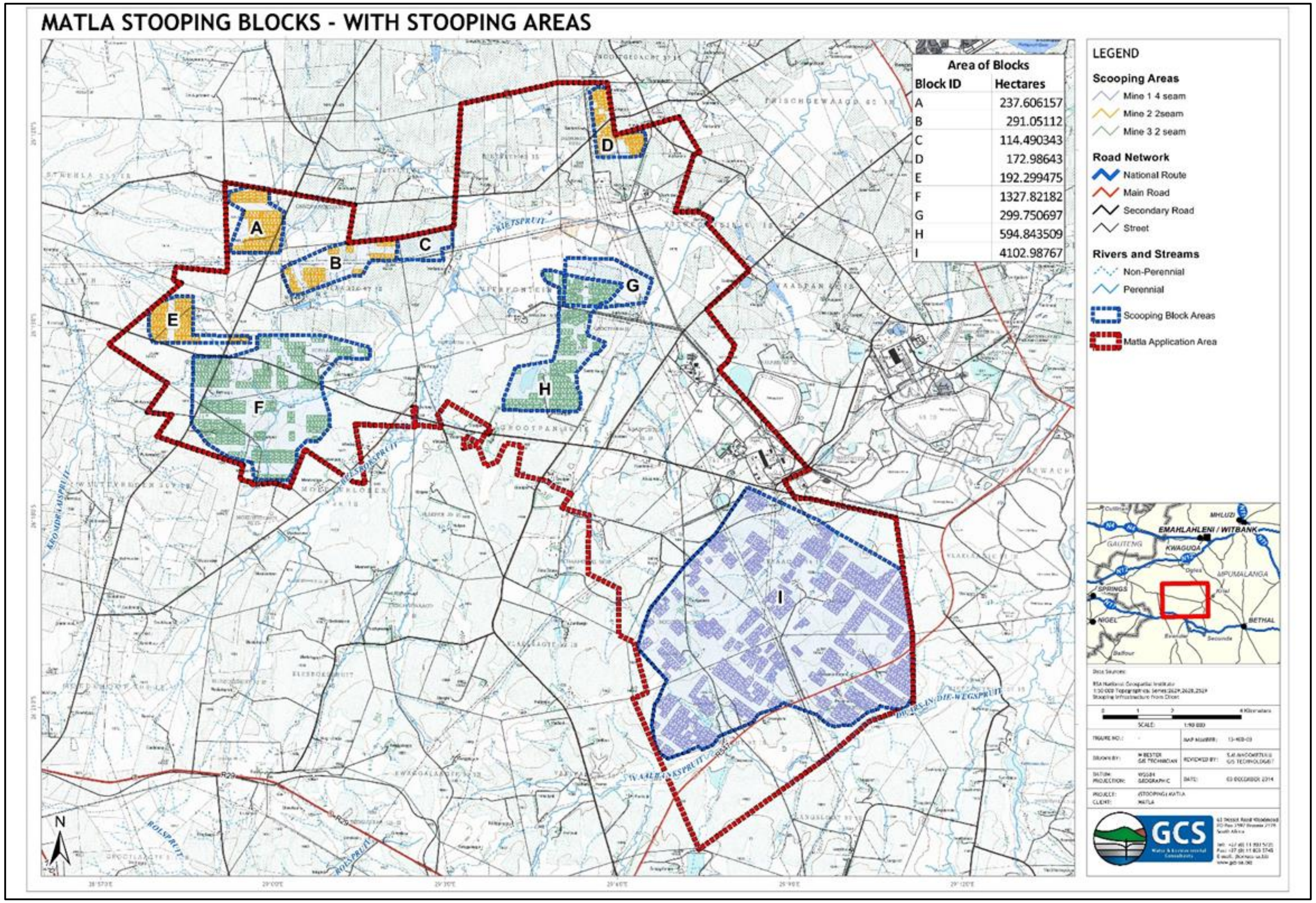


Figure 2.1: Stooping method illustrated

Pillar removal must occur in a very precise order in order to reduce the risks to workers, due to the high stresses placed on the remaining pillars by the abutment stresses of the caving ground.



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 2.2: All Identified Matla Stooping Blocks

2.1.3 Goaf Areas

During 2008, mining of the bottom and final seam commenced at Matla Mine 2. In the area where the seams have been mined, final goaf (surface depression) settlement has now occurred, with the result that the process of rehabilitation of the area can commence. Rehabilitation recommendations were outlined as part of a study conducted by Golder Associates Africa (Pty) Ltd Library (Golder) in 2009.

The areas under consideration as part of this study included panels 6, 7 and 8. The main aims and sub-aims for rehabilitation of the goaf areas area are to:

- Prevent continued oxygen and water ingress into the underground workings through surface cracks and in so doing prevent:
  - Underground fires: and
  - Acid mine drainage by exposure to pyrite in mined-out areas.
- Ensure on-site soil stabilisation:
  - Ensure erosion stabilisation of soil; and
  - Reinstate the land capability according to commitments.
- Prevent off-site effects due to on-site soil disturbance:
  - Prevent wetland sedimentation:
  - Maintain wetland ecology: and
  - Prevent negative effects on downstream water quality.

After clearly establishing the aims for rehabilitation, the drivers for the problem were identified and listed. The drivers causing continued oxygen ingress into the underground workings were determined to be:

- Continued settlement of the goaf area causing further cracking and widening of existing cracks;
- Occurrence of voids below backfill material pushed into cracks. Backfill material collapses or is washed into voids as backfill material settles and further cracking occurs; and
- Runoff from pillar portions collects in slight depressions caused by the crack resulting in the soil to becoming less consistent and then being washed into cracks.

The drivers for continued erosion are:

- Poor vegetative cover of the area;
- Steep and long side slopes;
- Mixed top and subsoil profiles resulting in poor physical properties with increased erosion potential;

- Long central drainage lines causing ephemeral gullies (concentrated flow erosion or Megarill erosion);
- Nick point along pillar area causing concentrated water follows; and
- Shallow soil depth on pillar area acting as a collection area for additional water causing increased erosion on side slopes.

The loss of land capability is driven by:

- Mixed top and subsoil profiles resulting in poor sub-soil material being mixed with high potential soils resulting in lower fertility and poor physical structure (crusting and compaction results);
- Land capability is limited due to the steepness of some slopes;
- Erosion reduces land capability;
- Soil loss due to crack filling and erosion limits the quantity of soil available to improve land capability; and
- Pillar areas have little or no soil to act as growth medium.

From these drivers the main rehabilitation actions required were determined to be:

- Filling side cracks;
- Preventing rill and gully erosion; and
- Reinstate the land capability according to commitments.

Based on the findings from the wetland delineation and assessment conducted at Mine 2 by Digby Wells Environmental (Pty) Ltd (Digby Wells) in 2017, extensive rehabilitation activities and measures have been assessed in the vicinity of panels 6, 7 and 8 in line with recommendations supplied by Golder (2009). Rehabilitation measures implemented which affect the wetland ecology of the Hydro-Geomorphic (HGM) units observed in this area include the following:

- Re-profiling, re-shaping and re-sloping of the areas affected by subsidence;
- The development of a series of small ponds along the wetland areas to serve as sediment traps, to reduce speed of run-off flow, and to allow the establishment of wetland vegetation, which will have a filtering and cleaning effect on water quality
- Aggressive revegetation of the area as for side slopes; and
- Evidence of redirection of the flow paths through barriers to reduce the speed of run-off flow through the wetland areas.

The maintenance of valley bottom and hillslope seepage wetlands are typically characterised by subsurface seepage of water and are maintained by the emergence of interflow and/or shallow groundwater from deeper terrestrial soils in the wetlands catchment area. Thus, maintenance of the supporting hydrology and recharge areas for interflow and shallow groundwater are critical to the maintenance of these wetlands.

The rehabilitation of the goaf areas are required to be applied for authorisation in terms of Section 21(c) and (i) of the NWA due to these activities taking place within the 500m radius of wetlands at Mine 2. As such the goaf areas have been applied for as part of this application. Refer to Section 3.6 for further details of the goaf areas.

2.2 Extent of the Activity

The extent of the Matla Mine is presented in Table 2.2.

Table 2.2: Extent of Matla Coal Mine

Area/Aspect of Matla Mine	Extent (Ha)
Extent of the area required for infrastructures, roads, servitudes etc.	965Ha (includes Mine 1 to 3 plus all other smaller installations)
Extent of the area required for mining	20 666Ha

2.3 Key Activity Related Processes and Product

All Run of Mine (RoM) coal from the underground operations is transported, via overland conveyors, to the main stockpile located near Mine 1. The run of mine product is beneficiated in a crushing and screening plant only. Rocks removed from the run of mine product are put onto a rock dump. After processing, the coal is transported directly, via overland conveyor, to the Eskom Matla Power Station.

The coal deposit at Matla forms part of the Highveld Coalfield (Block IV). The coal seams are found within the Vryheid Formation of the Karoo Supergroup. The stratigraphic sequence within the Matla area includes five coal seams that are numbered from the bottom upwards from 1 to 5. Economic reserves are found in the 2 seam, 4 seam (lower) and the 5 seam. The seam depths vary but are on average as follows:

- 5 Seam: - 35 to 50m below surface;
- 4 Seam: - 75 to 85m below surface; and
- 2 Seam: - 100 to 120m below surface.

Exploration of this field commenced in 1965 and, since then, 2 218 boreholes have been drilled within the Matla Coal Ltd mineral rights area. Mineable in situ coal reserves within the mining rights area total 1 140 million tons from three different coal seams.

Coal from the 4 seam is a low-grade bituminous coal, which is suitable for the generation of power, whereas that from 5 and 2 seams, are a high grade bituminous coal. Matla has a Coal

Supply Agreement with the Eskom Matla Power Station for the coal mined to be used for the generation of electrical power.

Refer to Figure 2.3 for a map showing the location of each mining area within the total mining right area.

2.3.1.1 Mine 1

Matla Mine 1 is an underground bord and pillar mine, which mines the 4 seam.

2.3.1.2 Mine 2

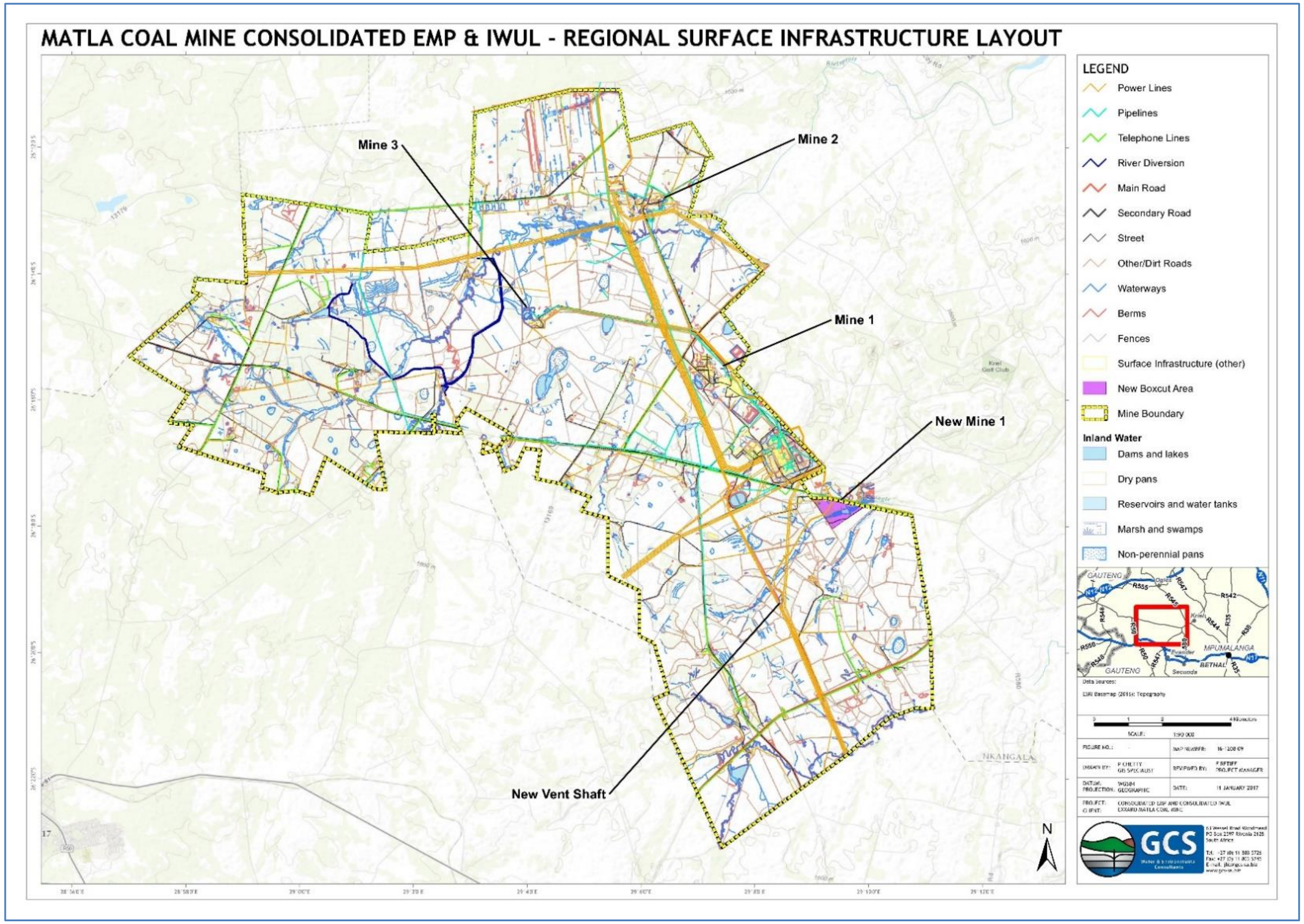
Matla Mine 2 utilises both bord and pillar and total extraction coal mining methods to mine the 2 seam and proposes to mine the 4 seam in future. Total extraction of a wall in the north-east area is currently underway, but bord and pillar mining may also be utilised in that area if required. A wall in the north-west area will also be mined using a combination of both methods.

2.3.1.3 Mine 3

Matla Mine 3 previously utilised bord and pillar method coal mining to mine the 4 seam. It is proposed to extend the current total extraction mining methods at Mine 3 as well as the mining of the 2 seam in future.

2.3.1.4 Mine 1 new shaft

During the past few years, mining activity at Matla Coal has developed to such an extent that the distance from the existing Matla Shaft 1 to the Matla Coal processing plant has increased. This increase has negatively affected the coal transport costs and the financial viability of the mine. Matla Coal therefore propose to improve its current infrastructure by means of developing an additional shaft in the vicinity of the current underground mine workings where the method of mining will be underground bord and pillar.



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 2.3: All Matla Mining Complexes

2.4 Activity Life Description

With the addition of New Mine 1 and the stooping activities, the life of mine for Matla is anticipated as follows:

- Mine 3 (seam 4) and Mine 2 (seam 2) shortwall production will be depleted in 2018. This production method will be replaced with bord and pillar mining method (stooping);
- Mine 2 (seam 2) continuous miner sections will be depleted in 2026 while Mine 2 (seam 4) production will decrease and be depleted by 2034;
- Mine 1 (seam 4) production will slowly decrease due to traveling distances underground. Depletion of Mine 1 (seam 4) reserves will be in 2037; and
- Mine 3 (seam 4) will be depleted in 2022 and the 2 seam known as low seam mining will be depleted in 2040. The normal height seam 2 will be depleted in 2040.

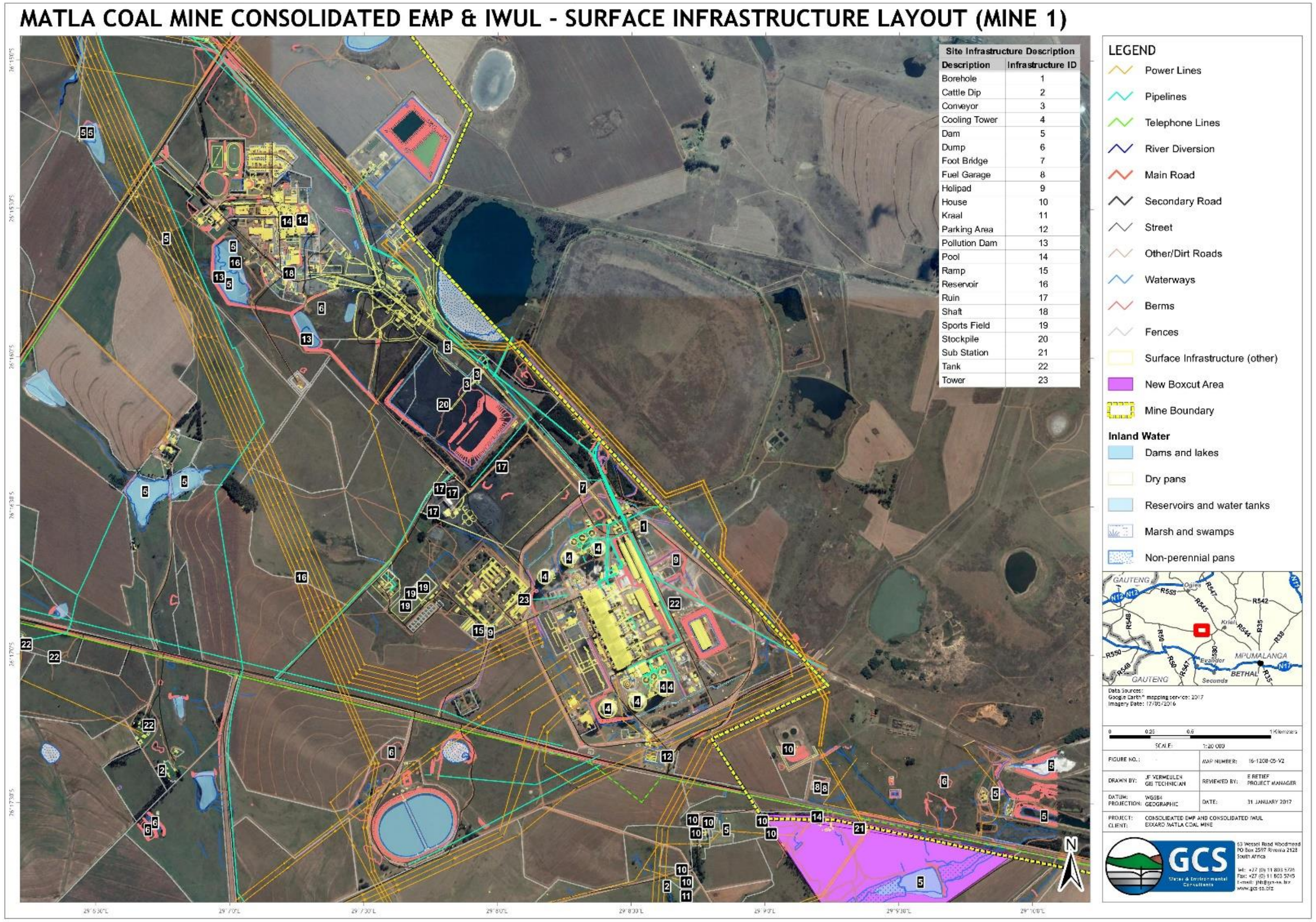
2.5 Activity Infrastructure Description

2.5.1 Existing Infrastructure

Matla is an existing coal mining operation with existing infrastructure in place and described by various authorisations. As mentioned previously Matla currently consists of Mine Complexes 1, 2, and 3, of which various authorisations were obtained at various stages. Electricity is provided directly from the Matla Power Station by Eskom. The existing infrastructure at Matla Coal Mines 1, 2 and 3 includes:

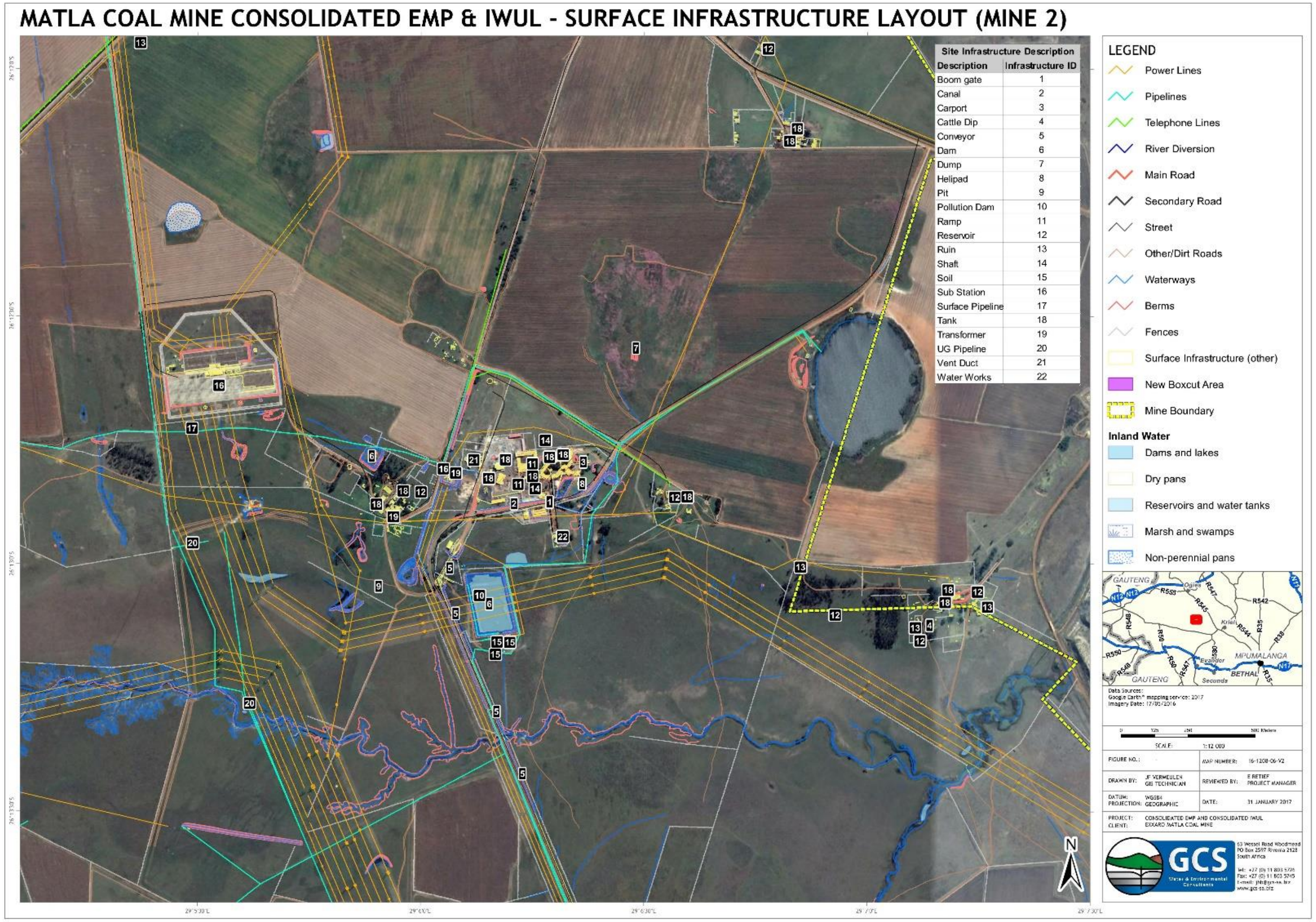
- Stockpile areas;
- Three Shaft Complexes;
- Various Ventilation Shafts;
- Hospital and Clinics;
- Mine Hostels;
- Central Offices;
- Training Centre;
- Visitors Centre;
- Pollution Control Dams;
- Crushing and Screening Plant;
- Stores;
- Fuel Depot;
- On-site roads; and
- A conveyor belt for transport of coal from Matla Coal to the Matla Power Station.

The infrastructure for each Mining Complex is details in Figure 2.4 to Figure 2.6.



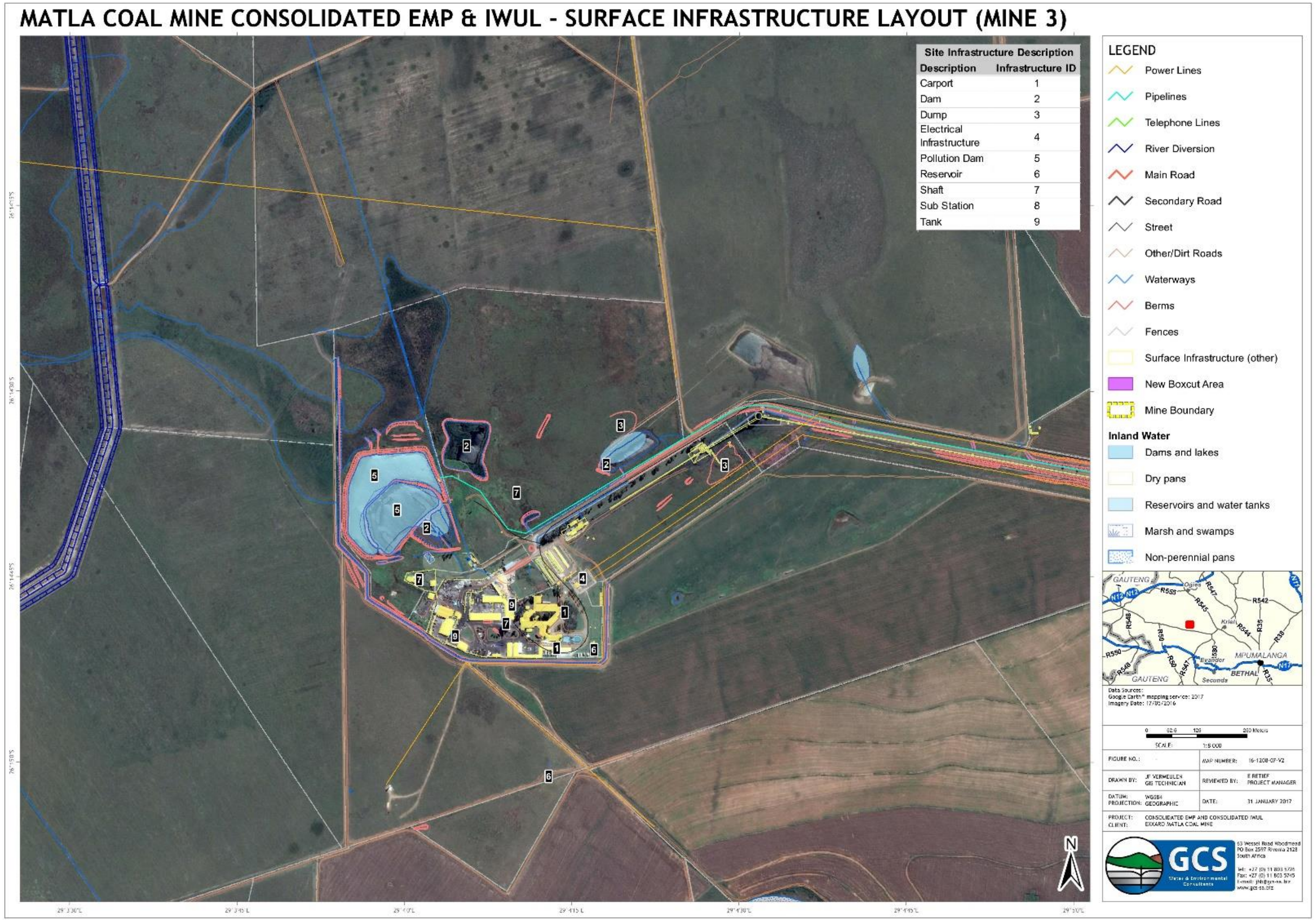
(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 2.4: Mine 1 Infrastructure Layout



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 2.5: Mine 2 Infrastructure Layout



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 2.6: Mine 3 Infrastructure Layout

2.5.2 New Mine 1 Infrastructure

Matla Coal applied for authorisation for a new shaft for Mine 1 to access the coal reserves that are located within the approved mining right area. A proposed new overland conveyor system would deliver the coal to the infrastructure at the Matla Coal Plant. Infrastructure associated with the project included the following:

- An incline shaft to provide employees access to the underground workings and to convey coal to the surface;
- A vertical ventilation shaft;
- Office complex with change house and parking;
- A helicopter landing pad;
- Workshops and consumable store;
- Sewage treatment plant;
- Wash bay;
- Storm water management structures;
- Pollution control structures;
- Potable water pipeline from Matla Power Station;
- Potable water reservoir and pump house;
- Electricity supply from the Matla Power Station;
- Electrical substation;
- Access roads;
- Three additional vertical ventilation shafts that will be developed approximately 3 km south-west of the Matla 1 new access shaft site;
- Coal silos;
- Crusher and screening plant and
- Overland conveyor.

Figure 2.7 presents the new infrastructure planned for the New Mine 1 Shaft.

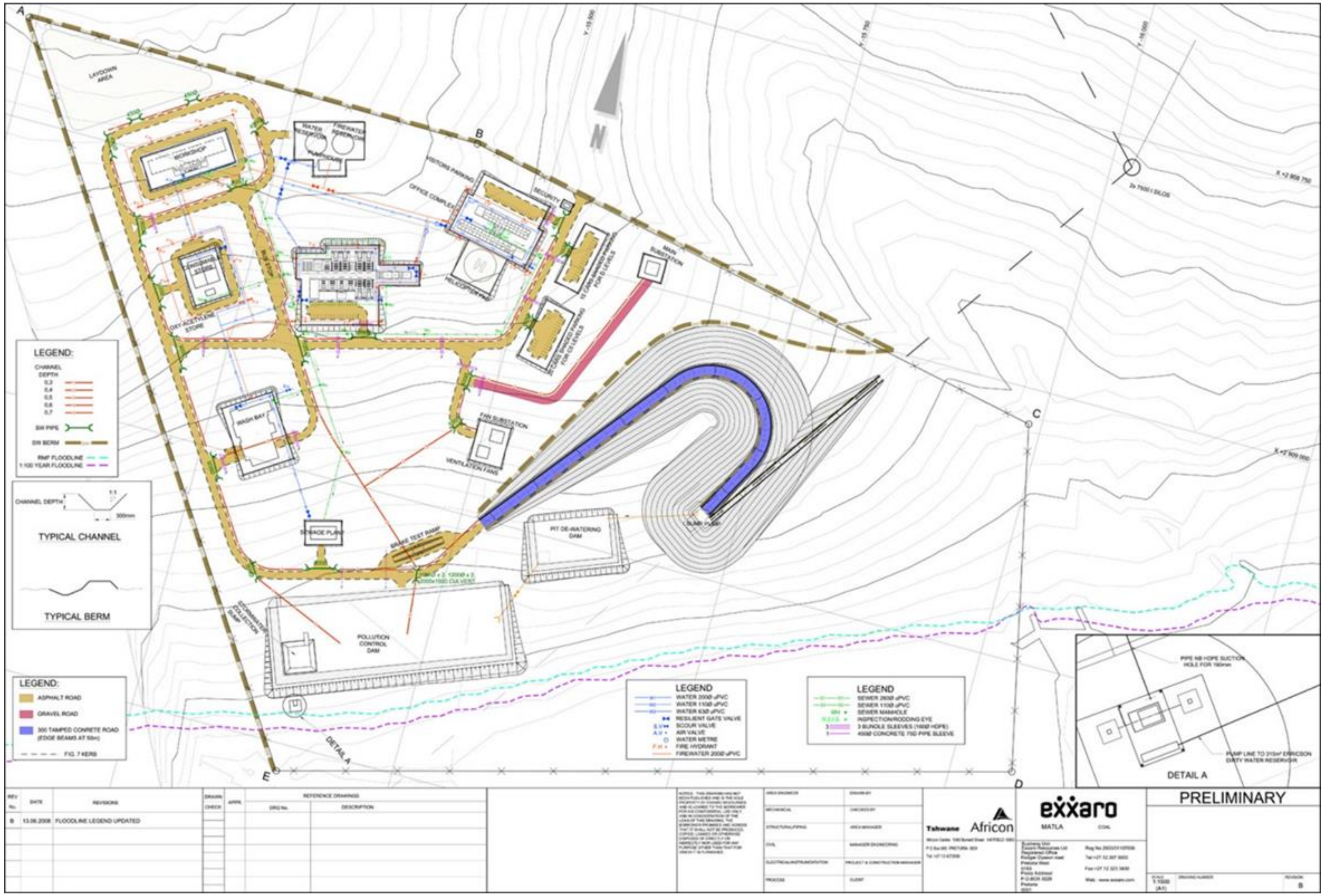


Figure 2.7: New Mine 1 Infrastructure Layout

2.5.3 Stooping and Goafing Infrastructure

The reclamation of the remaining coal reserves (stooping) will utilise the existing current operations' infrastructure. As such there are no new infrastructure requirements resulting from the stooping activities.

There are no new infrastructure requirements resulting from the goaf activities taking place on site.

2.5.4 New Water Uses Infrastructure

2.5.4.1 Transfer Stockpiles

The temporary or transfer stockpile that are located at Mine 1, 2 and 3 will be concrete lined in order to proactively contain and manage any polluted run-off water from the Mine 1, 2 and Mine 3 Silo areas. New sediment traps will also be constructed in these areas. Refer to Section 5.2.2 and Annexure F for further details for these areas.

2.5.4.2 Mega Litre Storage Tanks at Mine 2

Two mega litre tanks are proposed to be constructed at the Mine 2 emergency Dam (Previously authorised as Mine 2 Pan). These tanks will be used to store water from underground workings at Mine 2 in order to reduce the pressure on the Pan. The water will be transferred from the tanks to the WTP. These tanks are new infrastructure and will be built out of galvanised shell plates.

2.6 Key Water Uses and Waste Streams

2.6.1 Key Water Uses

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) defines water use in Section 21 and these water uses relate to the consumption of water, as well as activities which may affect water quality and the condition of the resource itself. Water uses are defined by Section 21 of the NWA as follows:

- Section 21(a) - Taking water from a water resource;
- Section 21(b) - Storing water;
- Section 21(c) - Impeding or diverting the flow of water in a watercourse;
- Section 21(d) - Engaging in a stream flow reduction activity contemplated in section 36;
- Section 21(e) - Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- Section 21(f) - Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;

- Section 21(g) - Disposing of waste in a manner which may detrimentally impact on a water resource;
- Section 21(h) - Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process;
- Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse;
- Section 21(j) - Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- Section 21(k) - Using water for recreational purposes.

The current water uses identified within the Matla Coal mining rights, as per the IWUs issued, area are set out in Table 2.3.

Table 2.3: Section 21 Water Uses of Matla Coal Mine

Section 21	Description	Mine shaft				
		1	2	3	1 New shaft	WTP
(a)	Abstraction of underground water for re-use.	✓	✓	✓	✓	✓
(b)	Storage of potable water.	✓	✓	✓	✓	✓
(c)	Impeding or diverting the flow of water in a watercourse.	✓	✓	✓	✓	✓
(e)	Irrigation of effluent from the sewage works.	-	-	-	-	-
(f)	Discharge of treated water from WTP.	-	-	-	-	✓
	Discharge of treated wastewater from the sewage works.	-	✓	✓	✓	
(g)	Storage of contaminated water for re-use.	✓	✓	✓	-	✓
	Dust suppression.	-	-	-	✓	-
(i)	Altering the bed, banks, course or characteristics of a watercourse.	✓	✓	✓	✓	✓
(j)	Pumping of underground water to continue mining.	✓	✓	✓	✓	✓

2.6.2 Key Waste Streams

Waste is defined in the NWA as any matter, whether gaseous, liquid or solid or any combination thereof, which is from time to time designated by the Minister by notice in the Gazette as an undesirable or superfluous by-product, emission, residue or remainder of any process or activity.

The following waste streams have been identified for the Matla operations:

- Polluted mine / dirty water;

- Domestic waste (i.e. paper, plastic, organic waste, tins, etc);
- Solid waste including:
    - Soft scrap (domestic/general waste);
    - Hard scrap (recyclable);
    - Salvage;
    - Building rubble;
    - Garden refuse;
    - Un-used, damaged coal sample bags (plastic); and
    - Old tyres.
- Hazardous waste including:
    - Used machine/motor oils;
    - Used cooking oils;
    - Degreasers/solvents;
    - Pesticides/herbicides;
    - Paint, old/redundant paint, left over paint, paint tins;
    - Empty containers;
    - Acids/expired chemicals;
    - Expired medicines and other medical waste;
    - Batteries;
    - Asbestos;
    - Fluorescent tubes/lamps; and
    - Contaminated PPE.

Please refer to Section 5.2.5 of this report for more information pertaining to the management of waste generated by the mining operation.

2.7 Regional and National Importance of the Development

The consolidation of the environmental authorisation issued to Matla will aid in the following:

- Better management of the various legal requirements set out in each authorisations;
- Improvement in the management of the costs associated with the implementation of the legal requirements; and
- To avoid duplications in compliance related matters and ensure all reporting requirements are met.

This would ensure that management actions that no longer apply will fall away, and the incorporation of improved management actions where applicable, as some of the EMP's and IWUL's are now 10 years in existence. It would further simplify the process of meeting legal requirements for the mine as one entity as opposed to separate smaller entities in isolation.

The proposed project/activity will result in extension of the life of mine with additional six (6) years. The additional coal resources will supply Eskom with coal for power generation. The activity will also impact positively on the local as well as regional economy. Should this project be approved, and the life of mine increased, the district municipality will continue to benefit from the mining operations. In addition, the proposed activity will have less impacts in the environment as it is to be situated in an area already zoned for mining activities and already impacted by mining.

The LOM extension will ensure:

- Employment opportunities for a further six (6) years. With the increase in job cuts in the mining sector at present, job security is of vital importance;
- Continued positive impact on the local economy; and
- Continued coal supply to Eskom's Matla Power Station for power generation during a time when Eskom is struggling to meet the electricity demand.

2.8 Organisational Structure of the Activity

The organisational structure of the management at Matla is presented in Figure 2.8.

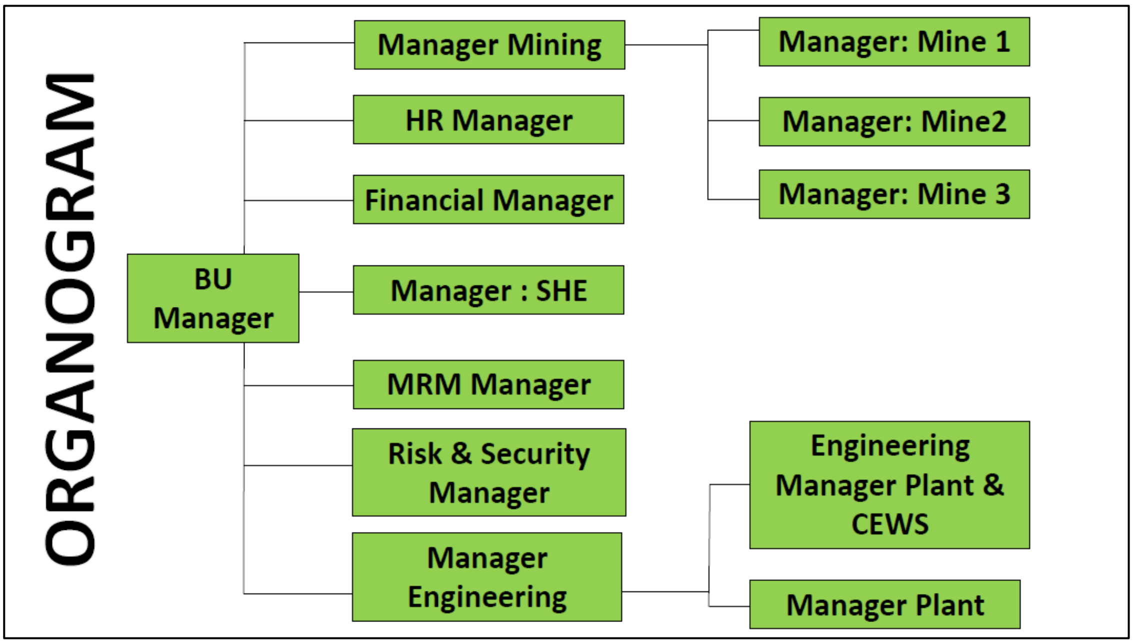


Figure 2.8: Organisation Structure of Matla

2.9 Business and Corporate Policies

From the outset, safety has been management's top priority with mandatory training and induction programmes designed to sustain an environment in which every employee is expected to enjoy the right to work safely.

At Matla, Zero Harm for the employees, the host communities and the environment and much as operationally practicable is a key goal. Matla are committed to and are working towards creating a healthy and safe working environment, preventing pollution, conducting business in an environmentally sound manner and produce the required product, which will conform to quality requirements and customer expectations.

2.9.1 Matla Principles

Underpinning the Matla vision are five fundamental principles:

- Be (in)credible leader;
- A zero tolerance approach will save your life, the environmental and produce the required product;
- Training for life;
- No mini Health Impact Risk Assessment (HIRA), no work; and
- Talk about safety, health, environmental and quality issues every day.

2.9.2 Matla SHEQ Policy

To fulfil this commitment and in support of the Exxaro Corporate Safety, Health and Environmental Quality (SHEQ) policy and commitments, Matla Coal will:

- Maintain open relations with interested and affected parties to ensure that needs of employees, the community and other interested and affected parties are sourced and incorporated within the company's operations, wherever reasonably practical;
- Avoid injury, ill-health, pollution and the supply of inferior product which can arise from the operations, whenever reasonably practical through continual improvement of the SHEQ management system and SHEQ performance;
- Train employees to a standard where the can recognise risks pertaining to the working place, activity, be aware of their legal obligation and to work in an environmentally responsible way and to the able to use and maintain the implemented SHQ management system effectively;
- Lead the way to zero harm through zero tolerance and by continuously identifying, evaluating and managing risks associated with large scale underground coal mining

which can affect all interested parties, under normal, abnormal and under emergency conditions. Where risk elimination is not possible, risks will be minimised through substitution, engineering controls, administrative controls or personal protective equipment as a last resource;

- Avoid, and where this is not possible minimise the adverse impact on the unique ecological and landscape features of the region, through conserving natural resources, preventing pollution and reducing the environmental impact to land and surrounding;
- Comply with applicable Health, Safety and Environmental legislation and other requirements. Other requirements include all stakeholders' needs and expectations and comprise of requirements required by Corporate, MQA, Recognised Unions, Community, Suppliers, Employees, etc.;
- Objectively set and review Safety, Health, Environmental and Quality objectives, targets and management programmes that are realistic and achievable;
- Annually review this policy to ensure that it remains relevant and appropriate to Matla Coal and to this policy displayed in appropriate areas and available for interested parties on request; and
- Lead by example by providing adequate leadership, commitment and essential resources required to improve the SHEQ management system and SHEQ performance.

3 REGULATORY WATER AND WASTE MANAGEMENT FRAMEWORK

3.1 Summary of all Water Uses

The IWULs issued to Exxaro with regards to the Matla mining operation are summarised in Table 3.1.

Table 3.1: IWULs issued for the Matla Mining Operations

License No.	Date Issued	Water Uses Authorised	Comments	Detail on water uses
24084303	23 October 2017 (previously issued in 2007)	Section 21 (c) and (i)	None	Table 3.2
24084303	1 October 2010	Section 21(a), (b), (f), (g), (j)	Amendment issued in terms of Section 158 on the 22nd of November 2013;	Table 3.3
24084303	1 April 2011	Section 21(f)	License has expired	Not Applicable
04/B11E/ABCFGIJ/2446	17 March 2014	Sections 21(a), (b), (c), (f), (g), (i) and (j)	Issued for Water Treatment Plant	Table 3.4
04/B11E/ACFGIJ/3734	16 July 2015	Sections 21 (a), (c), (f), (g), (i) and (j)	Issued for New Mine 1 Shaft	Table 3.5

Table 3.2 to Table 3.5 details the currently licensed water uses as they appear in the IWULs already issued to Matla. As part of the consolidation, amendments to some of these existing water uses have been applied for and form part of this application. These amendments are presented in Section 3.5 along with the new uses being applied for as part of this consolidation application.

Table 3.2: Existing Water Uses - River Diversion IWUL (No. 24084303 issued 2017)

Water Uses - Matla River Diversion IWUL (Licence No. 24084303 dated 23 October 2017)					
Section 21(c) and (i) - River Diversion	Site Name	Co-ordinates		Property	Dimensions of diversion
		Start	End		
River diversion for continuation of mining	Rietpsruit River Diversion	26° 13' 51.5" S 29° 03' 26.0" E	26° 15' 21.2" S 29° 02' 59.6" E	Kortlaagte 67 IS Remaining Extent	Height: 4.6 m Width: 61 m Length: 300 m

Table 3.3: Existing Water Uses - Main Mine IWUL (No. 24084303 issued 2010)

Water Uses - Matla Mine 2010 IWUL (Mine 1, 2 and 3)					
Section 21(a)	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**	
Taking of water containing waste from the underground	Mine 1	26° 15' 45.08" S 29° 07' 13.8" E	Haasfontein 85 IS ptn 5	600 000 m^3/a (1643.84 m^3/day)	
Taking of water containing waste from the underground	Mine 2	26° 12' 47.30" S 29° 06' 03" E	Vierfontein 61 IS ptn 26	745 000 m^3/a (2041.095 m^3/day)	
Taking of water containing waste from the underground	Mine 3	26° 14' 45.16" S 29° 04' 00.50" E	Vierfontein 61 IS ptn 21	255 600 m^3/a (700.27 m^3/day)	
Section 21(b)	**Site Name**	**Co-ordinates**	**Property**	**Capacity (m^3)**	
Storage of Water in dams		26° 15.508' S 29° 07.020 E	Haasfontein 85 IS ptn 5	1000 m^3 (allowed to store 1000 m^3)	
Storage of Water in dams		26° 15.508' S 29° 07.020 E	Haasfontein 85 IS ptn 5	2000 m^3 (allowed to store 2000 m^3)	
Storage of Water in dams		26° 12' 47.30" S 29° 06' 06.03" E	Vierfontein 61 IS ptn 26	1000 m^3 (allowed to store 1000 m^3)	
Storage of Water in dams		26° 12.769' S 29° 06.386' E	Vierfontein 61 IS ptn 21	2000 m^3 (allowed to store 2000 m^3)	
Section 21(f)	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**	
Discharge of treated effluent from Mine 2 Sewage Treatment Works to the Rietspruit River.	Mine 2 WWTW discharge	26° 13' 08.41" S 29° 06' 10.53" E	Vierfontein 61 IS ptn 26	23 640 m^3 (64.767 m^3/day)	
Discharge of treated effluent from Mine 3 Sewage Treatment Works to the Rietspruit River.	Mine 3 WWTW discharge	26° 14' 36.46" S 29° 03' 55.23" E	Vierfontein 61 IS ptn 21	24 484 m^3 (67.079 m^3/day)	
Section 21(g)	**Site Name**	**Co-ordinates**	**Property**	**Capacity / Size / Area**	**Volume Applied for (m^3/month)**
Disposing of water containing waste into the Top PCD.	Top PDC	26° 15.829' S 29° 07.271' E	Haasfontein 85 IS ptn 5	30 000	30 000
Disposing of water containing waste into the Bottom PCD.	Bottom PCD	26° 15.597' S 29° 06.928' E	Haasfontein 85 IS ptn 5	72 379	72 379
Disposing of water containing waste into the PCD on the farm Vierfontein 61 IS portion 26.	Pollution Control Dam	26° 13.142' S 29° 06.162' E	Vierfontein 61 IS ptn 26	70 000	70 000
Disposing of water containing waste into	Surface Pan	26° 12.481' S 29° 06.999' E	Vierfontein 61 IS ptn 26	500 000	500 000

the Surface Pan (emergency facility)	(emergency)				
Disposing of water containing waste into the PCD with settling pond	PCD with Settling Pond	26° 14.647' S 29° 04.093' E	Vierfontein 61 IS ptn 26	80 100	80 100
Disposing of water containing waste into the	Silo Dam	26° 14.429' S 29° 04.548' E	Vierfontein 61 IS ptn 21	24 000	24 000
Section 21(j)	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**	
Removal of underground water from underground and dispose of the underground water into the PCDs located on portion 5 of Haasfontein 85 IS and reuse this water by Eskom and in the operations.	Mine 1	26° 15' 45.08" S 29° 07' 13.8" E	Haasfontein 85 IS ptn 5	600 000 m^3/a (1643.84 m^3/day)	
Removal of underground water from underground for reuse by Eskom and in the operations.	Mine 2	26° 12' 47.30" S 29° 06' 03" E	Vierfontein 61 IS ptn 26	745 000 m^3/a (2041.095 m^3/day)	
Removal of underground water from underground for reuse by Eskom and in the operations.	Mine 3	26° 14' 45.16" S 29° 04' 00.50" E	Vierfontein 61 IS ptn 21	255 600 m^3/a (700.27 m^3/day)	

Table 3.4: Existing Water uses - WTP IWUL (No. 04/B11E/ABCFGIJ/2446 issued 2014)

Water Uses - Matla WTP and Brine Ponds IWUL				
Section 21(a)	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**
Dewatering of underground mine water from Exxaro Matla Mine 1, Mine 2 and Mine 3 to be used for process water purposes	Dewatering of Matla Mine 1, Mine 2 and Mine 3	26° 15' 45.08"S 29° 07' 13.8" E	Haasfontein 85 IS portion 5	913 125
		26° 12' 47.3"S 29° 06' 06.3" E	Vierfontein 61 IS ptn 26	
		26° 14' 45.16"S 29° 04' 00.5" E	Vierfontein 61 IS ptn 21	
Section 21(b)	**Site Name**	**Co-ordinates**	**Property**	**Capacity (Ml)**
Storage of treated water from the Reverse Osmosis Water Treatment Plant before use in the process and discharge into the Rietspruit River.	Reverse Osmosis Water Treatment Plant	26° 15' 16.1"S 29° 07' 45.7" E	Vaalpan 68 IS Remaining Extent	10 Ml
Section 21(c) and (i)	**Site Name**	**Co-ordinates**		**Property**
Dirty water pipeline within 500 m from the wetland/pan	Dirty water pipeline	**Start Point:** 26° 15' 28.23" S 29° 07' 31.55" E	**End Point:** 26° 15' 29.27" S 29° 07' 30.43" E	Vaalpan 68 IS portion 0 (remaining extent)
The construction of a Water Treatment Plant and Brine Ponds within 500m from the wetland/pan	Water Treatment Plant and Brine Ponds	**WTP Corner 1:** 26° 15' 07.47" S 29° 07' 40.73" E	**WTP Corner 2:** 26° 15' 15.29" S 29° 07' 49.42" E	Vaalpan 68 IS Remaining Extent
		WTP Corner 3: 26° 15' 24.58" S 29° 07' 45.20" E	**WTP Corner 4:** 26° 15' 30.49" S 29° 07' 37.61" E	
		Brine Ponds: 26° 15' 20.09 S" 29° 07' 26.14" E		

Clean Water Pipeline crossing a tributary of Rietspruit River	Clean Water Pipeline crossing Tributary of Rietspruit	**Start Point:** 26° 14' 22.05" S 29° 06' 38.31" E	**End Point:** 26° 14' 19.32" S 29° 06' 37.06" E	Vierfontein 61 IS ptn 53
Clean Water Pipeline crossing various hillslope seepage wetland and unchannelled valley bottom wetlands	Clean Water Pipeline crossing various wetlands	Start Point: 26° 15' 28.23" S 29° 07' 31.55" E	**End Point:** 26° 15' 29.27" S 29° 07' 30.43" E	Haasfontein 85 IS portion 5
		26° 13' 41.44"S 29° 06' 19.57" E		Vierfontein 61 IS ptn 26
		26° 14' 16.04" S 29° 06' 35.57" E		Vierfontein 61 IS ptn 53
Gabions to act as energy dissipating structures	Gabions	26° 13' 21.18" S 29° 06' 10.44" E		Vierfontein 61 IS ptn 26
Section 21(f)	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**
Discharge of treated water into Rietspruit River.	Water Treatment Plant Discharge	26° 13' 21.18" S 29° 06' 10.44" E	Vierfontein 61 IS ptn 26	2 580 550
Section 21(g)	**Site Name**	**Co-ordinates**	**Property**	
Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 1	Brine Storage Dam 1	26°15' 21" S 29° 07' 34.8" E	Vaalpan 68 IS portion 0 (remaining extent)	
Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 2	Brine Storage Dam 2	26°15' 24.5" S 29° 07' 40.6" E	Vaalpan 68 IS portion 0 (remaining extent)	
Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 3	Brine Storage Dam 3	26°15' 12.6" S 29° 07' 40.6" E	Vaalpan 68 IS portion 0 (remaining extent)	
Disposal of sludge into the sludge drying beds	Sludge Beds	26°15' 17.7" S 29° 07' 44" E	Vaalpan 68 IS portion 0 (remaining extent)	
Storage of underground water from the mines before treatment and stormwater from the dirty area	Pollution Control Dam (Balancing Dam)	26°15' 12.2" S 29° 07' 48.1" E	Vaalpan 68 IS portion 0 (remaining extent)	
Excess water from the workings into the Conservancy Tank	Conservancy Tank	26°15' 23.4" S 29° 07' 30.8" E	Vaalpan 68 IS portion 0 (remaining extent)	
Section 21(j)	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**
dewatering of underground mine water from Exxaro Matla Mine 1	Mine 1	26° 15' 45.08"S 29° 07' 13.8" E	Haasfontein 85 IS portion 5	379 160
dewatering of underground mine water from Exxaro Matla Mine 2	Mine 2	26° 12' 47.3"S 29° 06' 06.3" E	Vierfontein 61 IS ptn 26	1 474 910
dewatering of underground mine water from Exxaro Matla Mine 3	Mine 3	26° 14' 45.16"S 29° 04' 00.5" E	Vierfontein 61 IS ptn 21	1 795 159

Table 3.5: Existing water uses - New Mine 1 IWUL (No. 04/B11E/ACFGIJ/3734 issued 2015)

Water Uses - Matla Mine 1 Shaft IWUL (Licence No. 04/B11E/ACFGIJ/3734 of 16 July 2015)				
Section 21(a)	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for m³/a**
Abstraction of excess underground water for storage in PCD prior treatment at the WTP	Pit dewatering	26° 17' 44.5"S 29° 09' 18.8" E	Bakenlaagte 84 IS Remaining Extent	729 635
Section 21(c) and (i)	**Site Name**	**Co-ordinates Start**	**Co-ordinates End**	**Property**
Construction of culverts	Culverts	26° 17' 35.4"S 29° 09' 35.3" E	26° 17' 31.8"S 29° 09' 32.9" E	Bakenlaagte 84 IS ptn 6
Construction of culverts	Culverts	26° 17' 35.4"S 29° 09' 29.8" E	26° 17' 31.8"S 29° 09' 32.9" E	Bakenlaagte 84 IS ptn 6
Section 21(f)	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m³/a)**
Discharge waste water from sewage works into unnamed tributary		26° 17' 42.6"S 29° 09' 23.7" E	Bakenlaagte 84 IS Remaining Extent	66 576
Section 21(g)	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m³/a)**
Pollution Control Dam	PCD	26° 17' 42.6"S 29° 09' 23.7" E	Bakenlaagte 84 IS Remaining Extent	729 708
Dust Suppression on conveyor Belt at New Mine 1	Dust Suppression	Bakenlaagte 84 IS Remaining Extent		28 335
Section 21(j)	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m³/a)**
Abstraction of excess underground water for storage in PCD prior treatment at the WTP	Pit dewatering	26° 17' 44.5"S 29° 09' 18.8" E	Bakenlaagte 84 IS Remaining Extent	729 635

It should be noted that these table represent the currently licensed water uses only. Section 3.5 details all the water uses (existing, amended and new) to be included into consolidated IWUL.

3.2 Existing Lawful Water Uses

In terms of Section 22(1) of the NWA a person may only use water:

a) without a licence -
   i. if that water use is permissible under Schedule 1 of the NWA;
   ii. if that water use is permissible as a continuation of an existing lawful use; or
   iii. if that water use is permissible in terms of a general authorisation issued under Section 39.

b) if the water use is authorised by a licence under the NWA; or

c) if the responsible authority, namely the Chief Director: Water use in DWA, has dispensed with a licence requirement.

In terms of Section 32 of the NWA, an existing lawful water use is defined as follows:

Water use which has taken place at any time during a period of two years immediately before the date of commencement of the Act (1 October 1996 to 30 September 1998) and which was authorised by or under any law which was in force immediately before the date of *commencement of this Act, or which has been declared an existing lawful water use in terms of Section 33 of the Act.*

Table 3.6 sets out the stream crossings (roads or conveyors) that have been present since the start of the mine in about 1979, and are therefore considered existing lawful uses.

Table 3.6: Existing Lawful Uses – Matla Mine

Area	Description of the proposed water use	Co-ordinates	
Section 21 (c)			
Mine 2	Conveyor and road from Mine 2 crossing the Rietspruit	S26°13'20.98"	E29°06'10.87"
	Conveyor and road from Mine 2 crossing stream No 3	S26°14'22.43"	E29°06'39.52"
Mine 3	Conveyor and road from Mine 2 crossing the stream No 3	S26°14'51.61"	E29°06'26.03"
Section 21 (i)			
Mine 2	Conveyor and road from Mine 2 crossing the Rietspruit	S26°13'20.98"	E29°06'10.87"
	Conveyor and road from Mine 2 crossing stream No 3	S26°14'22.43"	E29°06'39.52"
Mine 3	Conveyor and road from Mine 2 crossing the stream No 3	S26°14'51.61"	E29°06'26.03"

3.3 Relevant Exemptions

Government Notice 704 (GN 704) was published on 4 June 1999, in Government Gazette No. 20119, Vol. 408, in terms of Section 26 (1) (b), (g) and (i) of the NWA. This section of the NWA makes provision for the Minister to, subject to subsection (4), make regulations:

- Requiring that the use of water from a water resource be monitored, measured and recorded;
- Regulating of prohibiting any activity in order to protect a water resource, or in-stream or riparian habitat; and
- Prescribing the outcome or affect which must be achieved through management practices for the treatment of waste, or any class of waste, before it is discharged or deposited into or allowed to enter a water resource.

Sub-section 4 of 26 provides for the Minister to take all relevant considerations into account when making regulations, including the need to:

- Promote the economical and sustainable use of water;
- Conserve and protect water resources or in-stream and riparian habitat;
- Prevent wasteful water use;
- Facilitate the management of water use and waterworks;
- Facilitate the monitoring of water use and water resources; and
- Facilitate the imposition.

Section 3 of GN 704 makes provision for the Minister to authorise, in writing, an exemption from the requirements of regulations 4, 5, 6, 7, 8, 10 or 11 on his or her own an initiative or on application, subject to such conditions as the Minister may determine.

In terms of the linkages of GN704 with other requirements of the NWA, it is stated in Operational Guideline No. M6 that should an exemption from any requirements of GN704 imply the necessity for a water use Licence, the person in control of the mine or activity need only apply for a Licence. The Licence has higher authority than the GN704. This Licence application therefore serves as a motivation for exemption from GN704, Regulation 4.

Refer to Table 3.7 for the relevant exemptions in terms of GN 704 for the Matla Operations. These exemptions were included in the previous IWULAs. Due to the fact that the various activities were authorised by the issuance of a license, it is assumed that these exemptions, in terms of GN 704, were approved as part of the IWULs issued to Matla.

Table 3.7: Approved GN 704 Exemptions

GN704	CONDITION	Matla operations
4 a	Locate or place any residue deposit, dam, reservoir, together with any associated structure within 1:100 year flood-line or within a horizontal distance of 100 m of a watercourse or borehole, excluding boreholes drilled specifically to monitor the pollution of ground water, or on ground likely to become water-logged, undermined, unstable or cracked.	The WTP and Brine ponds were located and constructed within the boundary of a wetland. The activities were licenced as part of the WTP IWUL (Licence No. 04/B11E/ABCEFGIJ/2446)
		Mines 1, 2 and 3 and associated facilities are all within the 1:100 year flood line of wetlands/streams; Mines 1, 2 and associated facilities are within 100 m of one or more boreholes. Undermining also takes place at Mines 1, 2 and 3.
4 b	No opencast mining, prospecting or any other operation or activity under or within the 1:50 year flood-line or within a horizontal distance of 100 m from any watercourse or estuary (whichever is the greatest).	Underground mining for Mines 1, 2 and 3 is conducted within the 1:50 year flood line of a number of streams crossing the site on which mines 1, 2 and 3 are located.
4 d	Use any area or locate any sanitary convenience, fuel depots, reservoir or depots for any substance which causes or is likely to cause pollution within the 1:50 year flood line of any watercourse or estuary.	These facilities are located within the confines of the mining activity, but outside 1:50 year flood lines
7 a	Prevent water containing waste or any substance which causes or is likely to cause pollution of water resource from entering any water resource, either by natural flow or by seepage and retain or collect such substance or water for use, reuse, evaporation or for purification and disposal.	The WTP and Brine ponds were located and constructed within the boundary of a wetland. The activities were licenced as part of the WTP IWUL (Licence No. 04/B11E/ABCEFGIJ/2446)
7 c	Cause effective measures to be taken to minimise the flow of any surface water or floodwater into mine workings, opencast workings, other workings or subterranean caverns, through cracked or fissured formations, subsided ground,	Dewatering for safe mining activities are already undertaken by Matla as licenced under licence no 24084303.

GN704	CONDITION	Matla operations
	sinkholes outcrop excavations, adits, entrances or any other openings.	
10 1b	Establish any slimes dam or settling pond within the 1:50 year flood line or within a horizontal distance of 100 metres of any watercourse or estuary.	The WTP and Brine ponds were located and constructed within the boundary of a wetland. The activities were licenced as part of the WTP IWUL (Licence No. 04/B11E/ABCEFGIJ/2446)

The following exemptions that are applicable and being applied for in relation to the new water uses (including stooping) as part of this application are provided in Table 3.8.

Table 3.8: Regulation 704 Requested Exemptions

GN704	CONDITION	DESCRIPTION
4 a	Locate or place any residue deposit, dam, reservoir, together with any associated structure within 1:100 year flood-line or within a horizontal distance of 100 m of a watercourse or borehole, excluding boreholes drilled specifically to monitor the pollution of ground water, or on ground likely to become water-logged, undermined, unstable or cracked.	Transfer stockpile at Mine 3 is located within the boundaries of a delineated wetland. The two mega litre tanks will be placed next to the Pan at Mine 2 (this Pan has been licenced as part of the IWUL issued for the Mine)
4 b	No opencast mining, prospecting or any other operation or activity under or within the 1:50 year flood-line or within a horizontal distance of 100 m from any watercourse or estuary (whichever is the greatest).	The stooping activities will take place within the boundaries of the identified wetlands. The stooping activities will take underground and are not surface activities. Goaf areas are located within boundaries of delineated wetlands

3.4 Generally Authorised Water Uses

Matla's mining operation is a coal mining operation, making it a Category A mine. All water uses taking place at the mine have been licenced or are being applied for as part of the IWUL Consolidation Application and not a General Authorisation.

3.5 New Water Uses to be Licenced

3.5.1 New Uses being applied for

New activities in terms of Section 21 of the NWA are included into the consolidation process. The new uses have been identified as follows:

3.5.1.1 Section 21(g)- disposing of waste in a manner which may detrimentally impact on a water resource.

Dust suppression on the stockpiles

Dust suppression for the main stockpile located at Mine 1 has been proposed. This will be done in order to reduce the airborne coal dust thereby reducing the impact on the natural environment. The water for the dust suppression at Mine 1 will be sourced from the Top PCD.

Strategic main stockpile area at the plant

Coal is transported to Matla power station via conveyor belts so that limited stockpiles exist on the Matla Coal site. The main stockpile located at Mine 1 is an existing stockpile. This water use however, has not been licensed as part of the IWULs issued. As such, this stockpile has been included in this consolidation application.

The transfer stockpiles at Mine 1, 2 and 3

Small transfer stockpiles are located at Mine 1, 2 and 3. These transfer stockpiles were required to be upgraded and concrete lined as part of the storm water management plan upgrade to these stockpiles. The footprint areas for these stockpiles are provided in Table 3.10. The design drawings and storm water management plan are provided in Annexure F & I to this report.

Two mega litre tanks at the Mine 2 Emergency Dam (at Mine 2 Emergency Dam)

In order to reduce the pressure on the Mine 2 Emergency Dam (Pan at 2), two galvanised steel mega litre tanks have been proposed to be located next to the Mine 2 Emergency Dam. These tanks will receive water from the underground workings from Mine 2. The design brochure for the mega-litre tanks are attached to this report as Annexure I.

Sludge drying beds of the existing sewage treatment works at Mine 2 and 3.

The WWTWs at Mine 2 and 3 have been upgraded as per Figure 3.1 and Figure 3.2. Mine 2 and Mine 3 both have 4 sewage sludge dryings beds. These beds receive the treated sewage sludge from the WWTW. This sludge is left to dry and the dried waste is removed by a registered waste contractor. Proof of safety disposal certificates are presented in Annexure M.

The discharge from these WWTWs has already been licensed however, the volumes thereof have been requested to be amended as part of this application.

These sludge beds however have not been licensed and as such are applied for as part of this application. The details pertaining to these sludge beds are provided in Table 3.10. The design drawings for the sludge drying beds at Mine 2 and 3 are provided in Annexure F.

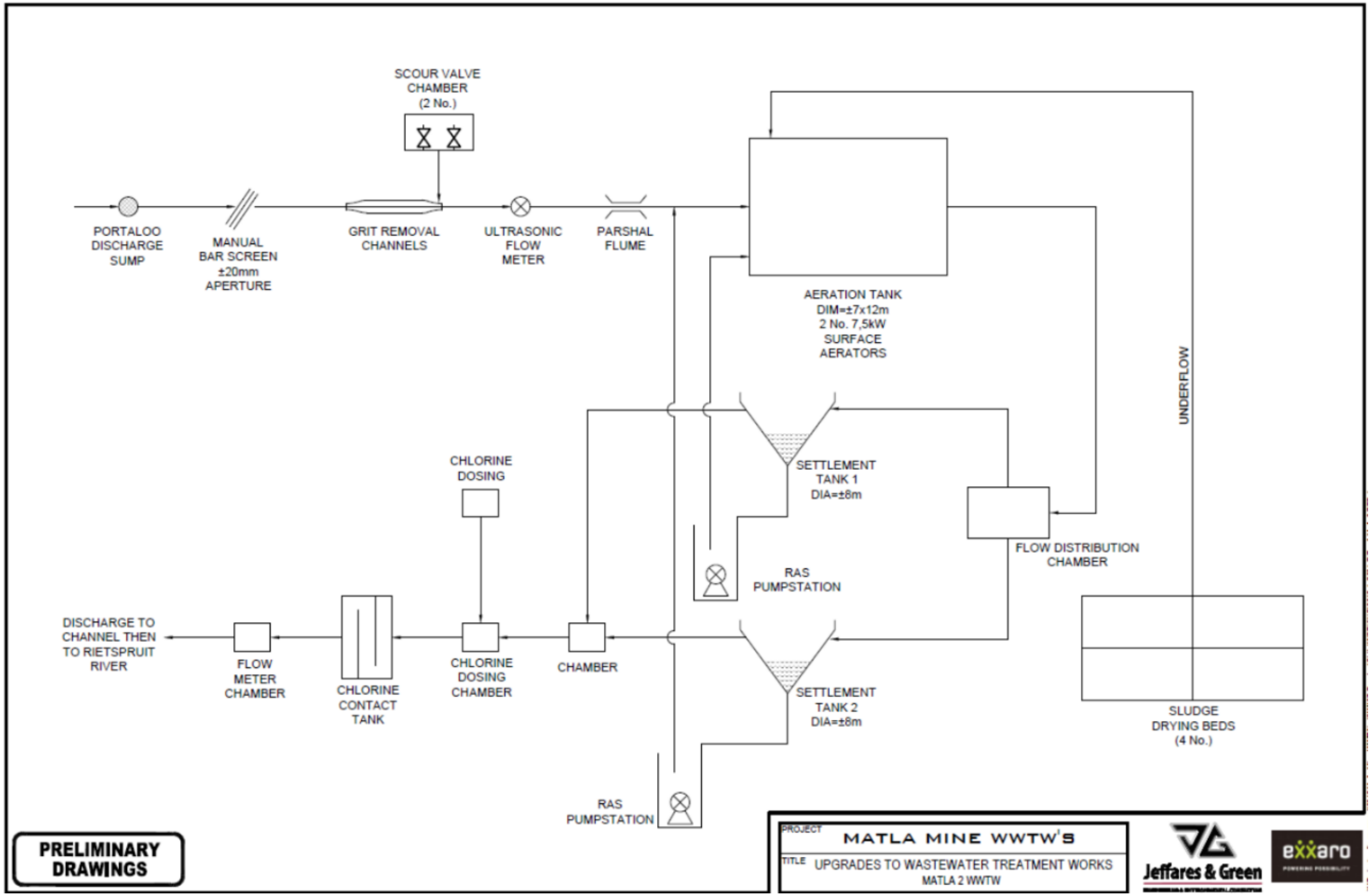


Figure 3.1: Mine 2 WWTW PFD

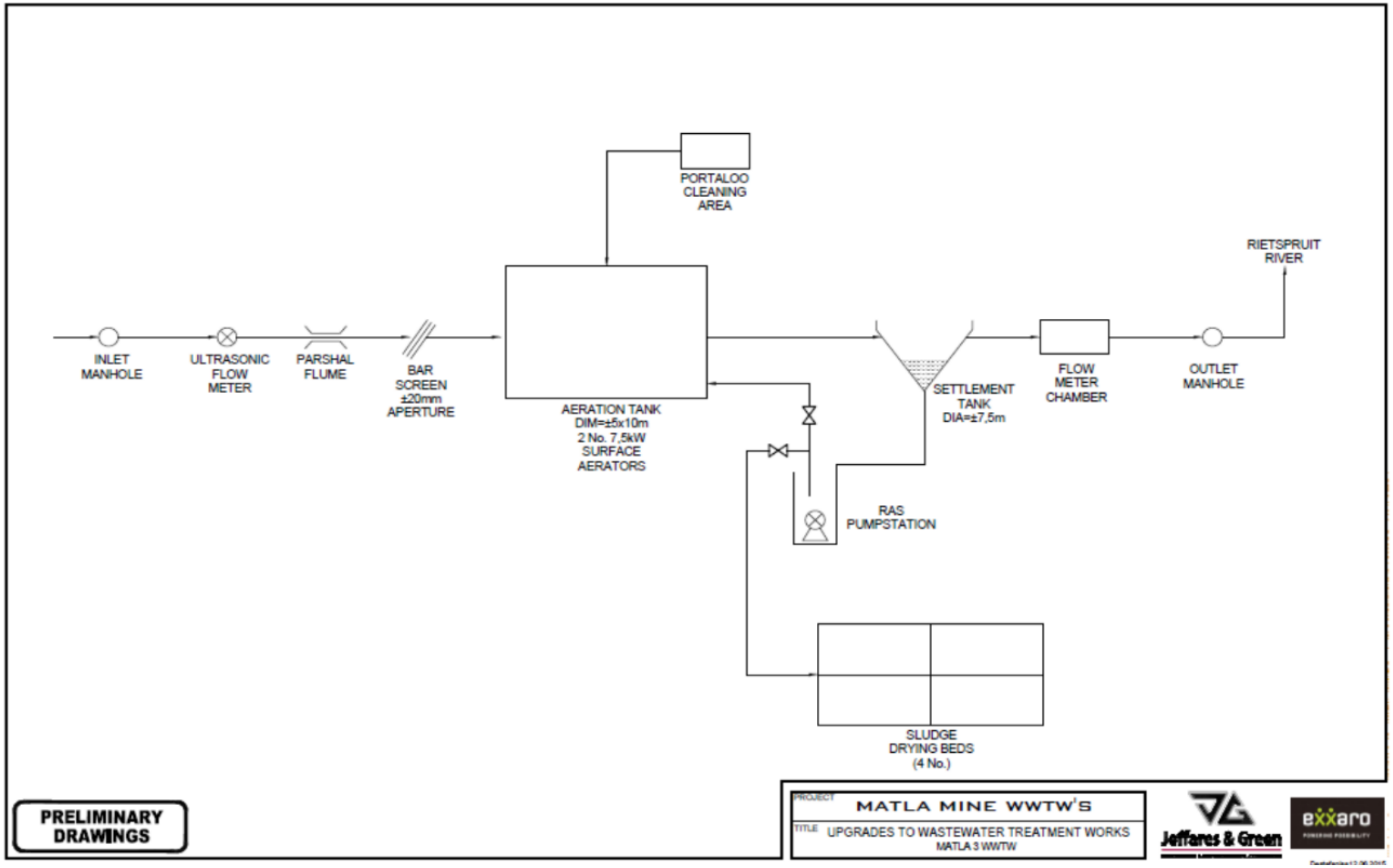


Figure 3.2: Mine 3 WWTW PFD

3.5.1.2 Section 21(c) - Impeding or diverting the flow of water in a watercourse and Section 21(i): Altering the bed, banks course or characteristics of a watercourse

Goaf Areas

Rehabilitation for panels 6, 7 and 8 of the goaf areas (surface depressions) at the Mine 2 complex has also started to take place. A basic framework for rehabilitation of standing water was determined and described in the feasibility design submitted to Matla. Due to the nature of the goaf areas and the rehabilitation that is planned, water uses in terms of Section 21 (c) and (i) are triggered and require authorisation.

The goaf areas as described in Section 2.1 and associated subsided wetlands have been applied for as new water uses as part of this application. Table 3.10 details the goafing water uses applicable to this application.

Stooping

Furthermore, Matla proposes to stoop (or totally extract) pillars at the previously underground mined areas with the intent to reclaim the remaining coal reserves by using the conventional board and pillar mining method (drill and blast). Only phase 1 of the stooping project is being applied for. The stooping uses trigger water uses under Section 21(c) and (i).

The stooping process and areas applicable to the stooping are described in Section 2.1 and Section 4.3.

Table 3.9 and Table 3.10 detail the new water uses being applied for as part of this consolidation application.

Table 3.9: New Stooping Uses Being Applied For

Stooping Uses - Section 21 (c) and (i)					
New Water use	**Water Use**	**Description**	**Affected Watercourse**	**Property Details**	**Co-ordinate (start and end)**
New Water Use 1	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; Hillslope seepage, unchannelled valley bottom and subsidence wetlands	Rietvlei 62 IS Portion 14	26°11'14.65"S 29°05'16.55"E 26°11'30.87"S 29°05'39.42"E
New Water Use 2	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; subsidence wetlands	Rietvlei 62 IS Portion 14	26°11'30.13"S 29°05'21.74"E 26°11'46.07"S 29°05'23.99"E
New Water Use 3	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; subsidence wetlands	Rietvlei 62 IS Portion 14	26°11'35.74"S 29°05'29.85"E 26°11'42.25"S 29°05'30.17"E
New Water Use 4	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; subsidence, hillslope seepage wetlands and pan	Rietvlei 62 IS Portion 14	26°11'56.05"S 29°05'25.41"E 26°12'15.46"S 29°05'28.11"E
New Water Use 5	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; subsidence, hillslope seepage wetlands and pan	Rietvlei 62 IS Portion 14	26°11'48.95"S 29°05'31.97"E 26°12'14.44"S 29°05'35.68"E
New Water Use 6	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; subsidence, hillslope seepage wetlands and pan	Rietvlei 62 IS Portion 14	26°11'44.98"S 29°05'38.60"E 26°12'03.91"S 29°05'41.49"E
New Water Use 7	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; subsidence, hillslope seepage wetlands and pan	Vierfontein 61 IS Portion 27	26°12'13.35"S 29°05'59.97"E 26°12'11.51"S 29°05'10.53"E
New Water Use 8	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.	Vierfontein 61 IS Portion 22	26°14'05.40"S 29°04'30.59"E 26°14'05.84"S 29°04'41.27"E
New Water Use 9	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.	Vierfontein 61 IS Portion 22	26°14'10.67"S 29°04'33.00"E 26°14'10.90"S 29°04'41.25"E

New Water Use 10	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.	Vierfontein 61 IS Portion 22	26°14'09.46"S 29°04'47.90"E 26°14'09.42"S 29°04'53.58"E
New Water Use 11	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.	Vierfontein 61 IS Portion 22	26°14'14.61"S 29°04'47.98"E 26°14'14.61"S 29°04'47.98"E
New Water Use 12	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.	Vierfontein 61 IS Portion 22	26°14'19.63"S 29°04'50.72"E 26°14'31.11"S 29°04'51.14"E
New Water Use 13	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; hillslope seepage wetland	Vierfontein 61 IS Portion 22	26°14'40.39"S 29°04'51.69"E 26°14'47.12"S 29°04'56.32"E
New Water Use 14	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; hillslope seepage wetland	Vierfontein 61 IS Portion 22	26°14'47.50"S 29°04'47.97"E 26°14'48.84"S 29°04'54.81"E
New Water Use 15	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; hillslope seepage wetland	Grootpan 86 IS Portion 29	26°14'51.51"S 29°04'57.68"E 26°14'46.17"S 29°05'03.17"E
New Water Use 16	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portion 29	26°14'44.96"S 29°05'06.37"E 26°14'54.24"S 29°05'06.39"E
New Water Use 17	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portion 29	26°14'42.96"S 29°05'12.26"E 26°14'52.00"S 29°05'11.80"E
New Water Use 18	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portions 29 & 30	26°14'43.61"S 29°05'18.70"E 26°14'49.08"S 29°05'18.05"E
New Water Use 19	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portion 29	26°14'58.21"S 29°05'00.06"E 26°15'02.91"S 29°05'02.95"E

New Water Use 20	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portion 29	26°15'05.85"S 29°05'07.87"E 26°15'05.88"S 29°05'17.60"E
New Water Use 21	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portion 29	26°15'11.54"S 29°05'11.35"E 26°15'11.98"S 29°05'17.73"E
New Water Use 22	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portion 29	26°15'12.54"S 29°05'24.27"E 26°15'12.10"S 29°05'36.88"E
New Water Use 23	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portion 29	26°15'17.03"S 29°05'24.39"E 26°15'17.98"S 29°05'31.46"E
New Water Use 24	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portion 10	26°15'40.68"S 29°04'29.72"E 26°15'58.63"S 29°04'30.67"E
New Water Use 25	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portions 10 & 23	26°16'01.57"S 29°04'18.59"E 26°16'01.71"S 29°04'33.47"E
New Water Use 26	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portions 10 & 23	26°16'09.45"S 29°04'08.31"E 26°16'07.29"S 29°04'33.50"E
New Water Use 27	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Grootpan 86 IS Portions 10 & 23	26°16'15.13"S 29°04'05.93"E 26°16'12.77"S 29°04'33.50"E
New Water Use 28	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; hillslope seepage wetland & channelled valley bottom wetland	Matla Power Station 141 IS	26°17'25.94"S 29°08'11.50"E 26°17'31.72"S 29°08'07.18"E
New Water Use 29	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; unchannelled valley bottom wetland	Kortlaagte 67 IS Portion 1	26°13'40.69"S 29°01'07.32"E 26°13'41.02"S 29°01'14.03"E

New Water Use 30	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; unchannelled valley bottom wetland	Kortlaagte 67 IS Portion 1	26°13'46.22"S 29°01'05.05"E 26°13'46.04"S 29°01'12.21"E
New Water Use 31	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; hillslope seepage and unchannelled valley bottom wetland	Kortlaagte 67 IS Portion 1	26°13'39.22"S 29°01'37.46"E 26°13'38.89"S 29°01'58.84"E
New Water Use 32	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; hillslope seepage, Pan and unchannelled valley bottom wetland	Kortlaagte 67 IS Portion 1	26°13'53.23"S 29°01'30.29"E 26°13'53.39"S 29°01'57.78"E
New Water Use 33	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; channelled and unchannelled valley bottom wetland	Kortlaagte 67 IS Portion 1	26°14'08.20"S 29°01'12.38"E 26°14'07.91"S 29°01'21.97"E
New Water Use 34	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland and River Diversion	Kortlaagte 67 IS Portion 1	26°15'18.02"S 29°01'10.03"E 26°15'22.93"S 29°01'10.50"E
New Water Use 35	Activities within a 500m radius of a wetland	Undermining of a wetland area	Wetlands on site; pan and hillslope seepage wetland	Kortlaagte 67 IS Portion 1	26°15'23.85"S 29°01'10.18"E 26°15'28.70"S 29°01'10.32"E
New Water Use 36	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; hillslope seepage and unchannelled valley bottom wetland and Pan & River Diversion	Kortlaagte 67 IS Portion 1	26°15'20.95"S 29°01'19.18"E 26°15'20.63"S 29°01'31.85"E
New Water Use 37	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; unchannelled and channelled valley bottom wetlands, pan, hillslope seepage and river diversion	Kortlaagte 67 IS Portion 1	26°15'26.74"S 29°01'26.60"E 26°15'26.59"S 29°01'31.71"E
New Water Use 38	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; quarry and unchannelled valley bottom wetland	Kortlaagte 67 IS Portion 10	26°13'47.97"S 29°00'46.30"E 26°13'47.97"S 29°00'39.30"E
New Water Use 39	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; quarry, unchannelled valley bottom and hillslope seepage wetland, river diversion and dam	Kortlaagte 67 IS Portion 10	26°14'04.54"S; 29°00'39.30"E 26°14'10.31"S 29°00'39.93"E

New Water Use 40	Activities within a 500m radius of a wetland	Activities within a 500m radius of a wetland	Wetlands on site; quarry, unchannelled valley bottom and hillslope seepage wetland, river diversion and dam	Kortlaagte 67 IS Portion 10	26°14'10.95"S 29°00'39.96"E 26°14'16.48"S 29°00'40.20"E

Table 3.10: New Water Uses for Matla Mine

New Water Use for Matla Mine						
New Water use	Section 21(c) and (i)	Site Name	Co-ordinates		Property	
			Start	End		
New Water Use 1	Artificial small ponds associated with the goaf areas within 100m of unnamed perennial drainage line. Subsidence of wetlands. The small ponds associated with the goaf areas act as sediment traps and allow for the establishment of wetland vegetation. Establishment of artificial wetlands as a result.	Goaf areas/ponds & subsidence of wetlands	Top left corner: 26°11'29.39"S 29° 3'16.41"E Bottom left corner: 26°13'1.27"S; 29° 3'6.80"E	Top right corner: 26°11'12.15"S 29° 4'37.42"E Bottom right corner: 26°12'47.00"S 29° 4'46.89"E	Rietvlei 62 IS ptns 3, 4, 7, 6, 11	
New Water Use 2	Artificial small ponds associated with the goaf areas within 500m boundary of Hillslope Seepage wetland and floodplain wetland associated with the Blesbokspruit River. Subsidence of wetlands. The small ponds associated with the goaf areas act as sediment traps and allow for the establishment of wetland vegetation. Establishment of artificial wetlands as a result.	Goaf areas/ponds & subsidence of wetlands	Top left corner: 26°11'29.39"S 29° 3'16.41"E Bottom left corner: 26°13'1.27"S; 29° 3'6.80"E	Top right corner: 26°11'12.15"S 29° 4'37.42"E Bottom right corner: 26°12'47.00"S 29° 4'46.89"E	Rietvlei 62 IS ptns 3, 4, 7, 6, 11	
Amendment/New Water use	**Section 21(g)**	**Site Name**	**Co-ordinates**	**Property**	**Capacity / Size / Area**	**Volume Applied for (m^3/a)**
New Water Use 3	Strategic Main Stockpile at Mine 1	Mine 1 Coal Stockpile	26°16'10.85"S 29° 7'47.30"E	Matla Power Station 141 IS	31	30 471 m^3/a
New Water Use 4	Transfer point at the silo area at Mine 1	Transfer stockpile Mine 1	26°15'48.60"S; 29° 7'27.57"E	Haasfontein IS 85 ptn 5	1.5Ha footprint	5 238 m^3/a
New Water Use 5	Transfer point at the silo area at Mine 2	Transfer stockpile Mine 2	26°12'58.64"S 29° 6'5.76"E	Vierfontein 61 IS ptn 26	0.4 Ha	6 780 m^3/a
New Water Use 6	Transfer point at the silo area at Mine 3	Transfer stockpile Mine 3	26°14'30.01"S; 29° 4'31.95"E	Vierfontein 61 IS ptn 22	0.05Ha	2 211.3 m^3/a
New Water Use 7	Dust suppression at Main Mine 1 Main Stockpile	Dust Suppression Main Complex	Not Applicable	Matla Power Station 141 IS & Haasfontein IS 85 ptn 5	N/A	26106 m^3/a
New Water Use 8	Sludge Drying Beds 2a, 2b, 2c, 2d at Mine 2 WWTW	Sludge Drying Beds Mine 2	26°12'56.7"S 29°06'18.0"E	Vierfontein 61 IS ptn 26	2a = $16m^3$ 2b = $15m^3$ 2c = $15m^3$ 2d = $14 m^3$	134 m^3/a

New Water Use 9	4 Sludge Drying Beds at Mine 3 WWTW (3a, 3b, 3c, 3d)	Sludge Drying Beds Mine 3	26°14'43.4"S 29°04'06.0"E	Vierfontein 61 IS ptn 21	4 x 9m³	135 m³/a
New Water Use 10	2 Mega litre tanks at Mine 2 Emergency Dam	Mine 2 Emergency Dam Tanks	26°12'28.86"S 29° 6'59.94"E	Vierfontein 61 IS ptn 26	2 x 1000 m³	730 000 m³/a (365 000 m³/a for each tank)

3.5.2 Required Amendments to Licensed Water Uses

In addition to the Consolidation of all previous approved IWULs and new uses, required amendments to existing authorised water uses are also being applied for in the consolidation application. These amendment are being applied for in order to align the authorised water uses with the operations of the Matla Mine and to ensure future legal compliance in this regard.

Table 3.14 presents all water uses (new, existing and amended) for the entire Matla Operations. It is requested that the water uses in Table 3.14 be authorised as part of the consolidated IWUL.

3.5.2.1 River Diversion

No amendments are required to the water uses as authorised as part of the River Diversion IWUL (Licence No. 24084303 issued 2017) are applicable to this application.

3.5.2.2 2010 IWUL for Mine

Amendments required to the 2010 IWUL (No. 24084303) are provided on Table 3.11. The water uses highlighted in red are requested to be removed from the consolidated IWUL. The water uses requested to be removed from the consolidated IWUL, are duplicate water uses pertaining to the dewatering from the underground workings.

The water uses highlighted in yellow are requested to be amended as provided. A table at the end of the section, Table 3.14, provides an overview of the all the water uses applicable to the consolidation.

Table 3.11: Amendments for IWUL No. 24084303 issued 2010

Water Uses - Matla Mine 2010 IWUL (Mine 1, 2 and 3) (Licence No. 24084303 dated 1 October 2010)					
Amendment/New Water use	**Section 21(a)**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m³/a)**
Request to be removed	Taking of water containing waste from the underground	Mine 1	26° 15' 45.08" S 29° 07' 13.8" E	Haasfontein 85 IS ptn 5	600 000 m³/a
Amendment requested	Taking of water containing waste from the underground	Mine 2	26° 12' 47.30" S 29° 06' 03" E	Vierfontein 61 IS ptn 26	745 000 m³/a Amend to: 1 460 000 m³/a
Amendment requested	Taking of water containing waste from the underground	Mine 3	26° 14' 45.16" S 29° 04' 00.50" E	Vierfontein 61 IS ptn 21	255 600 m³/a Amend to: 1 460 000 m³/a
Amendment/New Water use	**Section 21(b)**	**Site Name**	**Co-ordinates**	**Property**	**Capacity (m³)**
Amendment requested	Storage of Water in dams	Reservoir 1	26° 15.508' S 29° 07.020 E Amendment Request: 26° 15.692' S 29° 07.616' E	Haasfontein 85 IS ptn 5	1000 m³ (allowed to store 1000 m³)
Amendment requested	Storage of Water in dams	Reservoir 2	26° 15.508' S 29° 07.020 E Amendment Request: 26° 15.692' S 29° 07.632' E	Haasfontein 85 IS ptn 5	2000 m³ (allowed to store 2000 m³)
Amendment requested	Storage of Water in dams	Reservoir 4	26° 12' 47.30" S 29° 06' 06.03" E Amendment Request: 26° 12.631' S 29° 06.155' E	Vierfontein 61 IS ptn 26	1000 m³ (allowed to store 1000 m³)
Amendment requested	Storage of Water in dams	Reservoir 5	26° 12.769' S 29° 06.386' E Amendment Request: 26° 14.847' S 29° 04.284' E	Vierfontein 61 IS ptn 21	2000 m³ (allowed to store 2000 m³)
Amendment/New Water use	**Section 21(f)**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m³/a)**
Amendment requested	Discharge of treated effluent from Mine 2 Sewage Treatment Works to the Rietspruit River.	Mine 2 WWTW discharge	26° 13' 08.41" S 29° 06' 10.53" E Amendment Request: 26° 13.296' S 29° 06.298' E	Vierfontein 61 IS ptn 26	23 640 m³ (64.767 m³/day) Amendment Request: **50 000 m³/a**

Amendment requested	Discharge of treated effluent from Mine 3 Sewage Treatment Works to the Rietspruit River.	Mine 3 WWTW discharge	26° 14' 36.46" S 29° 03' 55.23" E Amendment Request: 26° 13.429' S 29° 03.635' E	Vierfontein 61 IS ptn 21	24 484 m^3 (67.079 m^3/day) Amendment Request: **35 000 m^3/a**	
Amendment/New Water use	**Section 21(g)**	**Site Name**	**Co-ordinates**	**Property**	**Capacity / Size / Area**	**Throughput as per IWUL (m^3/month)**
No change	Disposing of water containing waste into the Top PCD.	Top PDC	26° 15.829' S 29° 07.271' E	Haasfontein 85 IS ptn 5	30 000 m^3. Amendment request: **47 353m^3**	30 000
No change	Disposing of water containing waste into the Bottom PCD.	Bottom PCD	26° 15.597' S 29° 06.928' E	Haasfontein 85 IS ptn 5	72 379m^3. Amendment request: **130 756m^3**	72 739
No change	Disposing of water containing waste into the PCD on the farm Vierfontein 61 IS portion 26.	Pollution Control Dam	26° 13.142' S 29° 06.162' E	Vierfontein 61 IS ptn 26	70 000	70 000
Amendment requested	Disposing of water containing waste into the Surface Pan (emergency facility)	Surface Pan (emergency). Request Name Amendment To: **Mine 2 Emergency Dam**	26° 12.481' S 29° 06.999' E	Vierfontein 61 IS ptn 26	500 000	500 000
No change	Disposing of water containing waste into the PCD with settling pond	PCD with Settling Pond	26° 14.647' S 29° 04.093' E	Vierfontein 61 IS ptn 26	80 100	80 100
Amendment requested	Disposing of water containing waste into the	Silo Dam	26° 14.429' S 29° 04.548' E	Vierfontein 61 IS ptn 21 Amend to **ptn 22**	24 000	24 000
Amendment/New Water use	**Section 21(j)**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**	
Request to be removed	Removal of underground water from underground and dispose of the underground water into the PCDs located on portion 5 of Haasfontein 85 IS and reuse this water by Eskom and in the operations.		26° 15' 45.08" S 29° 07' 13.8" E	Haasfontein 85 IS ptn 5	600 000 m^3/a (1643.84 m^3/day)	
Request to be removed	Removal of underground water from underground for reuse by Eskom and in the operations.		26° 12' 47.30" S 29° 06' 03" E	Vierfontein 61 IS ptn 26	745 000 m^3/a (2041.095 m^3/day)	
Request to be removed	Removal of underground water from underground for reuse by Eskom and in the operations.		26° 14' 45.16" S 29° 04' 00.50" E	Vierfontein 61 IS ptn 21	255 600 m^3/a (700.27 m^3/day)	

3.5.2.3 2014 WTP IWUL

Amendments for the 2014 IWUL (No. 04/B11E/ABCFGIJ/2446) are provided on Table 3.12. The water uses highlighted in red are requested to be removed from the consolidated IWUL. The water uses requested to be removed from the consolidated IWUL, are duplicate water uses pertaining to the dewatering from the underground workings or water uses no longer required by the mine (i.e. sludge drying beds). The water uses highlighted in yellow are requested to be amended as provided. A table at the end of the section, Table 3.14, provides an overview of the all the water uses applicable to the consolidation.

3.5.2.4 2015 New Mine 1 Shaft IWUL

Amendments for the 2015 IWUL (No. 04/B11E/ACFGIJ/3734) are provided on Table 3.13. The water uses highlighted in yellow are requested to be amended as provided. A table at the end of the section, Table 3.14, provides an overview of the all the water uses applicable to the consolidation.

It should be noted that the dewatering volumes applied for amendment were done so in line with the water balance compiled for this consolidation application.

Furthermore, no other changes to the water uses as licensed for the New Mine 1 Shaft have been applied for. While the water balance shows a reduction in the volumes of the authorised water uses it was deemed unnecessary to amend the water uses due to the fact that the New Mine 1 Shaft is yet to be constructed. Should amendments be required once the New Mine 1 Shaft has been built, these will be applied for at a later stage

3.5.2.5 Summary of All Water Uses for Matla

As previously stated, Table 3.14, provides an overview of the all the water uses applicable to the consolidation. This table presents all the water uses (new, amended and existing water uses) that are required to be considered for authorisation in the consolidated IWUL.

Figure 3.3 to Figure 3.8 graphically present the localities of all the water uses applicable to the Matla Mine.

Table 3.12: Amendments for IWUL No. 04/B11E/ABCFGIJ/2446 issued 2014

Water Uses - Matla WTP and Brine Ponds IWUL (Licence No. 04/B11E/ABCFGIJ/2446 of 17 March 2014)					
Amendment/New Water use	**Section 21(a)**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m³/a)**
To be amended according to new abstraction figures. Mine 1 to be removed from this use	Dewatering of underground mine water from Exxaro Matla Mine 1, Mine 2 and Mine 3 to be used for process water purposes	Dewatering of Matla Mine 1, Mine 2 and Mine 3	26° 15' 45.08"S 29° 07' 13.8" E	Haasfontein 85 IS portion 5	913125 m³/a
			26° 12' 47.3"S 29° 06' 06.3" E	Vierfontein 61 IS ptn 26	
			26° 14' 45.16"S 29° 04' 00.5" E	Vierfontein 61 IS ptn 21	
Amendment/New Water use	**Section 21(b)**	**Site Name**	**Co-ordinates**	**Property**	**Capacity (Ml)**
Amendment	Storage of treated water from the Reverse Osmosis Water Treatment Plant before use in the process and discharge into the Rietspruit River.	Reverse Osmosis Water Treatment Plant	26° 15' 16.1"S 29° 07' 45.7" E Amendment Request: 26°15'21.93"S 29° 7'31.92"E	Vaalpan 68 IS Remaining Extent	10 Ml
Amendment/New Water use	**Section 21(c) and (i)**	**Site Name**	**Co-ordinates**		**Property**
No change	Dirty water pipeline within 500 m from the wetland/pan	Dirty water pipeline	**Start Point:** 26° 15' 28.23" S 29° 07' 31.55" E	**End Point:** 26° 15' 29.27" S 29° 07' 30.43" E	Vaalpan 68 IS portion 0 (remaining extent)
No change	The construction of a Water Treatment Plant and Brine Ponds within 500m from the wetland/pan	Water Treatment Plant and Brine Ponds	**WTP Corner 1:** 26° 15' 07.47" S 29° 07' 40.73" E	**WTP Corner 2:** 26° 15' 15.29" S 29° 07' 49.42" E	Vaalpan 68 IS Remaining Extent
			WTP Corner 3: 26° 15' 24.58" S 29° 07' 45.20" E	**WTP Corner 4:** 26° 15' 30.49" S 29° 07' 37.61" E	
			Brine Ponds: 26° 15' 20.09 S" 29° 07' 26.14" E		
No change	Clean Water Pipeline crossing a tributary of Rietspruit River	Clean Water Pipeline crossing Tributary of Rietspruit	**Start Point:** 26° 14' 22.05" S 29° 06' 38.31" E	**End Point:** 26° 14' 19.32" S 29° 06' 37.06" E	Vierfontein 61 IS ptn 53
No change	Clean Water Pipeline crossing various hillslope seepage wetland and unchannelled valley bottom wetlands	Clean Water Pipeline crossing various wetlands	Start Point: 26° 15' 28.23" S 29° 07' 31.55" E	**End Point:** 26° 15' 29.27" S 29° 07' 30.43" E	Haasfontein 85 IS portion 5
			26° 13' 41.44"S 29° 06' 19.57" E		Vierfontein 61 IS ptn 26

			26° 14' 16.04" S 29° 06' 35.57" E		Vierfontein 61 IS ptn 53
No change	Gabions to act as energy dissipating structures	Gabions	26° 13' 21.18" S 29° 06' 10.44" E		Vierfontein 61 IS ptn 26
Amendment/New Water use	**Section 21(f)**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**
No change	Discharge of treated water into Rietspruit River.	Water Treatment Plant Discharge	26° 13' 21.18" S 29° 06' 10.44" E	Vierfontein 61 IS ptn 26	2 580 550
Amendment/New Water use	**Section 21(g)**	**Site Name**	**Co-ordinates**	**Property**	**Designed maximum operating capacity in cubic metres/annum**
Amendment	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 1	Brine Storage Dam 1	26°15' 21" S 29° 07' 34.8" E Amendment request: 26°15' 12.6" S 29° 07' 40.6" E	Vaalpan 68 IS portion 0 (remaining extent)	0.3 - 0.5 Ml/day 5.5 ha 280 000m^3
Amendment	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 2	Brine Storage Dam 2	26°15' 24.5" S 29° 07' 40.6" E Amendment Request: 26° 15' 16.1"S 29° 07' 45.7" E	Vaalpan 68 IS portion 0 (remaining extent)	0.3 - 0.5 Ml/day 5.5 ha 280 000m^3
Amendment	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 3	Brine Storage Dam 3	26°15' 12.6" S 29° 07' 40.6" E Amendment request: 26°15' 24.5" S 29° 07' 40.6" E	Vaalpan 68 IS portion 0 (remaining extent)	0.3 - 0.5 Ml/day 5.5 ha 280 000m^3
Request to be removed	Disposal of sludge into the sludge drying beds	Sludge Beds	26°15' 17.7" S 29° 07' 44" E	Vaalpan 68 IS portion 0 (remaining extent)	0.03 Ml/day 2 ha 100 000m^3
Amendment	Storage of underground water from the mines before treatment and stormwater from the dirty area	Pollution Control Dam (Balancing Dam). Amendment of Name to **WTP PCD**	26°15' 12.2" S 29° 07' 48.1" E Amendment Request: 26°15'17.12"S 29° 7'31.84"E	Vaalpan 68 IS portion 0 (remaining extent)	5000m^3
Amendment	Excess water from the workings into the Conservancy Tank	Conservancy Tank	26°15' 23.4" S 29° 07' 30.8" E	Vaalpan 68 IS portion 0 (remaining extent)	10 Ml 10 000m^3

Amendment/New Water use	Section 21(j)	Site Name	Co-ordinates	Property	Volume Applied for (m³/a)
Request to be removed	dewatering of underground mine water from Exxaro Matla Mine 1	Mine 1	26° 15' 45.08"S 29° 07' 13.8" E	Haasfontein 85 IS portion 5	379 160 m³/a
Amendment	dewatering of underground mine water from Exxaro Matla Mine 2	Mine 2	26° 12' 47.3"S 29° 06' 06.3" E	Vierfontein 61 IS ptn 26	Amend from 1 474 910 m³/a to **1460 000 m³/a**
Amendment	dewatering of underground mine water from Exxaro Matla Mine 3	Mine 3	26° 14' 45.16"S 29° 04' 00.5" E	Vierfontein 61 IS ptn 21	Amend from 1 795 159 m³/a to **1460 000 m³/a**

Table 3.13: Amendments for IWUL No. 04/B11E/ACFGIJ/3734 issued 2015

Water Uses - Matla Mine 1 Shaft IWUL (Licence No. 04/B11E/ACFGIJ/3734 of 16 July 2015)					
Amendment/New Water use	**Section 21(a)**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for m³/a**
Amendment requested	Abstraction of excess underground water for storage in PCD prior treatment at the WTP	Pit dewatering	26° 17' 44.5"S 29° 09' 18.8" E	Bakenlaagte 84 IS Remaining Extent	729 635m³/a Amend to: 912 500m³/a
Amendment/New Water use	**Section 21(c) and (i)**	**Site Name**	**Co-ordinates Start**	**Co-ordinates End**	**Property**
No change	Construction of culverts	Culverts	26° 17' 35.4"S 29° 09' 35.3" E	26° 17' 31.8"S 29° 09' 32.9" E	Bakenlaagte 84 IS ptn 6
No change	Construction of culverts	Culverts	26° 17' 35.4"S 29° 09' 29.8" E	26° 17' 31.8"S 29° 09' 32.9" E	Bakenlaagte 84 IS ptn 6
Amendment/New Water use	**Section 21(f)**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m³/a)**
No change	Discharge waste water from sewage works into unnamed tributary		26° 17' 42.6"S 29° 09' 23.7" E	Bakenlaagte 84 IS Remaining Extent	66 576
Amendment/New Water use	**Section 21(g)**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m³/a)**
No change	Pollution Control Dam	PCD	26° 17' 42.6"S 29° 09' 23.7" E	Bakenlaagte 84 IS Remaining Extent	729 708
No change	Dust suppression	dust suppression	Bakenlaagte 84 IS Remaining Extent		28 335
Amendment/New Water use	**Section 21(j)**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m³/a)**
Amendment requested	Abstraction of excess underground water for storage in PCD prior treatment at the WTP	Pit dewatering	26° 17' 44.5"S 29° 09' 18.8" E	Bakenlaagte 84 IS Remaining Extent	729 635m³/a & 291 500m³/a Amend to: 912 500m³/a

Table 3.14: Summary of all Water Uses to be licensed for Matla Mine

Water Uses of Matla Coal Mine						
Section 21(a) - Taking water from a water resource.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Volume Applied for (m³/a)**
1	Abstraction of excess underground water for storage in PCD prior treatment at the WTP	New Mine 1 dewatering	26° 17' 44.5"S 29° 09' 18.8" E		Bakenlaagte 84 IS Remaining Extent	912500 m³/a
2	Taking of water containing waste from the underground	Mine 3	26° 14' 45.16" S 29° 04' 00.50" E		Vierfontein 61 IS ptn 21	1 460 000 m³/a
Section 21(b) - Storing of water.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Capacity (m³)**
3	Storage of Water in dams	Reservoir 1	26° 15.692' S 29° 07.616' E		Haasfontein 85 IS ptn 5	1000 m³ (allowed to store 1000 m³)
4	Storage of Water in dams	Reservoir 2	26° 15.692' S 29° 07.632' E		Haasfontein 85 IS ptn 5	2000 m³ (allowed to store 2000 m³)
5	Storage of Water in dams	Reservoir 4	26° 12.631' S 29° 06.155' E		Vierfontein 61 IS ptn 26	1000 m³ (allowed to store 1000 m³)
6	Storage of Water in dams	Reservoir 5	26° 14.847' S 29° 04.284' E		Vierfontein 61 IS ptn 21	2000 m³ (allowed to store 2000 m³)
7	Storage of treated water from the Reverse Osmosis Water Treatment Plant before use in the process and discharge into the Rietspruit River.	Reverse Osmosis Water Treatment Plant	26°15'21.93"S 29° 7'31.92"E		Vaalpan 68 IS Remaining Extent	10 000 m ³ (10 Ml)
Section 21(c) - Impeding or diverting the flow of water in a watercourse & Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Dimensions of diversion**
8	River diversion for continuation of mining	Rietspruit River Diversion	**Start:** 26° 13' 51.5" S 29° 03' 26.0" E	**End:** 26° 15' 21.2" S 29° 02' 59.6" E	Kortlaagte 67 IS Remaining Extent	Height: 4.6 m Width: 61 m Length: 300 m
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	
			Start	**End**		
9	Dirty water pipeline within 500 m from the wetland/pan	Dirty water pipeline	**Start Point:** 26° 15' 28.23" S 29° 07' 31.55" E	**End Point:** 26° 15' 29.27" S 29° 07' 30.43" E	Vaalpan 68 IS portion 0 (remaining extent)	
10	The construction of a Water Treatment Plant and Brine Ponds within 500m from the wetland/pan	Water Treatment Plant and Brine Ponds	**WTP Corner 1:** 26° 15' 07.47" S 29° 07' 40.73" E	**WTP Corner 2:** 26° 15' 15.29" S 29° 07' 49.42" E	Vaalpan 68 IS Remaining Extent	

			WTP Corner 3: 26° 15' 24.58" S 29° 07' 45.20" E	**WTP Corner 4:** 26° 15' 30.49" S 29° 07' 37.61" E		
			Brine Ponds: 26° 15' 20.09 S" 29° 07' 26.14" E			
11	Clean Water Pipeline crossing a tributary of Rietspruit River	Clean Water Pipeline crossing Tributary of Rietspruit	**Start Point:** 26° 14' 22.05" S 29° 06' 38.31" E	**End Point:** 26° 14' 19.32" S 29° 06' 37.06" E	Vierfontein 61 IS ptn 53	
12	Clean Water Pipeline crossing various hillslope seepage wetland and unchannelled valley bottom wetlands	Clean Water Pipeline crossing various wetlands	**Start Point:** 26° 15' 28.23" S 29° 07' 31.55" E	**End Point:** 26° 15' 29.27" S 29° 07' 30.43" E	Haasfontein 85 IS portion 5	
			26° 13' 41.44"S 29° 06' 19.57" E		Vierfontein 61 IS ptn 26	
			26° 14' 16.04" S 29° 06' 35.57" E		Vierfontein 61 IS ptn 53	
13	Gabions to act as energy dissipating structures	Gabions	26° 13' 21.18" S 29° 06' 10.44" E		Vierfontein 61 IS ptn 26	
14	Construction of culverts	Culverts	26° 17' 35.4"S 29° 09' 35.3" E	26° 17' 31.8"S 29° 09' 32.9" E	Bakenlaagte 84 IS ptn 6	
15	Construction of culverts	Culverts	26° 17' 35.4"S 29° 09' 29.8" E	26° 17' 31.8"S 29° 09' 32.9" E	Bakenlaagte 84 IS ptn 6	
16	Artificial small ponds associated with the goaf areas within 100m of unnamed perennial drainage line. The small ponds associated with the goaf areas act as sediment traps and allow for the establishment of wetland vegetation. Establishment of artificial wetlands as a result.	Goaf areas/ponds	Top left corner: 26°12'45.34"S; 29° 3'5.24"E Bottom left corner: 26°13'1.27"S; 29° 3'6.80"E	Top right corner: 26°12'50.42"S; 29° 3'37.01"E Bottom right corner: 26°13'0.23"S; 29° 3'38.12"E	Rietvlei 62 IS ptns 3 and 7	
17	Artificial small ponds associated with the goaf areas within 500m boundary of Hillslope Seepage wetland and floodplain wetland associated with the Blesbokspruit River. The small ponds associated with the goaf areas act as sediment traps and allow for the establishment of wetland vegetation. Establishment of artificial wetlands as a result.	Goaf areas/ponds	Top left corner: 26°12'45.34"S; 29° 3'5.24"E Bottom left corner: 26°13'1.27"S; 29° 3'6.80"E	Top right corner: 26°12'50.42"S; 29° 3'37.01"E Bottom right corner: 26°13'0.23"S; 29° 3'38.12"E	Rietvlei 62 IS ptns 3 and 7	
Water Use No.	**Stooping - Description**	**Activity - Stooping**	**Co-ordinates**		**Property**	**Affected Watercourse from Stooping**
			Start	**End**		

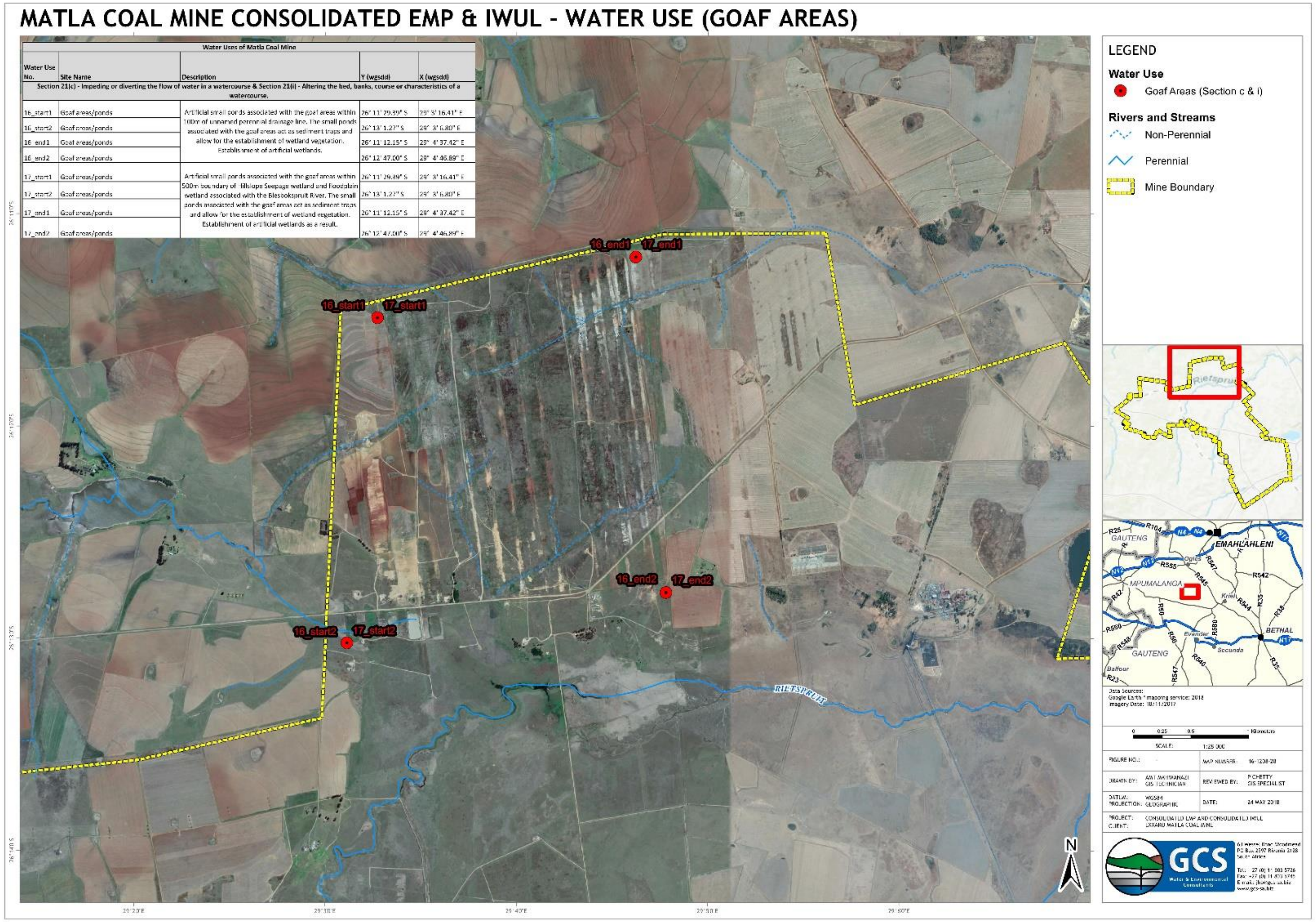
18	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11'14.65"S 29°05'16.55"E	26°11'30.87"S 29°05'39.42"E	Rietvlei 62 IS Portion 14	Wetlands on site; Hillslope seepage, unchannelled valley bottom and subsidence wetlands
19	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11'30.13"S 29°05'21.74"E	26°11'46.07"S 29°05'23.99"E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence wetlands
20	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11'35.74"S 29°05'29.85"E	26°11'42.25"S 29°05'30.17"E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence wetlands
21	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11'56.05"S 29°05'25.41"E	26°12'15.46"S 29°05'28.11"E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence, hillslope seepage wetlands and pan
22	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11'48.95"S 29°05'31.97"E	26°12'14.44"S 29°05'35.68"E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence, hillslope seepage wetlands and pan
23	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11'44.98"S 29°05'38.60"E	26°12'03.91"S 29°05'41.49"E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence, hillslope seepage wetlands and pan
24	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°12'13.35"S 29°05'59.97"E	26°12'11.51"S 29°05'10.53"E	Vierfontein 61 IS Portion 27	Wetlands on site; subsidence, hillslope seepage wetlands and pan
25	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'05.40"S 29°04'30.59"E	26°14'05.84"S 29°04'41.27"E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
26	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'10.67"S 29°04'33.00"E	26°14'10.90"S 29°04'41.25"E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
27	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'09.46"S 29°04'47.90"E	26°14'09.42"S 29°04'53.58"E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
28	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'14.61"S 29°04'47.98"E	26°14'14.61"S 29°04'47.98"E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
29	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'19.63"S 29°04'50.72"E	26°14'31.11"S 29°04'51.14"E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
30	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'40.39"S 29°04'51.69"E	26°14'47.12"S 29°04'56.32"E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland
31	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'47.50"S 29°04'47.97"E	26°14'48.84"S 29°04'54.81"E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland
32	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'51.51"S 29°04'57.68"E	26°14'46.17"S 29°05'03.17"E	Grootpan 86 IS Portion 29	Wetlands on site; hillslope seepage wetlands
33	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'44.96"S 29°05'06.37"E	26°14'54.24"S 29°05'06.39"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland

34	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'42.96"S 29°05'12.26"E	26°14'52.00"S 29°05'11.80"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
35	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'43.61"S 29°05'18.70"E	26°14'49.08"S 29°05'18.05"E	Grootpan 86 IS Portion 29 & 30	Wetlands on site; pan and hillslope seepage wetland
36	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'58.21"S 29°05'00.06"E	26°15'02.91"S 29°05'02.95"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
37	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'05.85"S 29°05'07.87"E	26°15'05.88"S 29°05'17.60"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
38	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'11.54"S 29°05'11.35"E	26°15'11.98"S 29°05'17.73"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
39	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'12.54"S 29°05'24.27"E	26°15'12.10"S 29°05'36.88"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
40	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'17.03"S 29°05'24.39"E	26°15'17.98"S 29°05'31.46"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
41	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'40.68"S 29°04'29.72"E	26°15'58.63"S 29°04'30.67"E	Grootpan 86 IS Portion 10	Wetlands on site; pan and hillslope seepage wetland
42	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°16'01.57"S 29°04'18.59"E	26°16'01.71"S 29°04'33.47"E	Grootpan 86 IS Portions 10 & 23	Wetlands on site; pan and hillslope seepage wetland
43	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°16'09.45"S 29°04'08.31"E	26°16'07.29"S 29°04'33.50"E	Grootpan 86 IS Portions 10 & 23	Wetlands on site; pan and hillslope seepage wetland
44	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°16'15.13"S 29°04'05.93"E	26°16'12.77"S 29°04'33.50"E	Grootpan 86 IS Portions 10 & 23	Wetlands on site; pan and hillslope seepage wetland
45	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°17'25.94"S 29°08'11.50"E	26°17'31.72"S 29°08'07.18"E	Matla Power Station 141 IS	Wetlands on site; hillslope seepage wetland & channelled valley bottom wetland
46	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'40.69"S 29°01'07.32"E	26°13'41.02"S 29°01'14.03"E	Kortlaagte 67 IS Portion 1	Wetlands on site; unchannelled valley bottom wetland
47	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'46.22"S 29°01'05.05"E	26°13'46.04"S 29°01'12.21"E	Kortlaagte 67 IS Portion 1	Wetlands on site; unchannelled valley bottom wetland
48	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'39.22"S 29°01'37.46"E	26°13'38.89"S 29°01'58.84"E	Kortlaagte 67 IS Portion 1	Wetlands on site; hillslope seepage and unchannelled valley bottom wetland
49	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'53.23"S 29°01'30.29"E	26°13'53.39"S 29°01'57.78"E	Kortlaagte 67 IS Portion 1	Wetlands on site; hillslope seepage, Pan and unchannelled valley bottom wetland
50	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'08.20"S 29°01'12.38"E	26°14'07.91"S 29°01'21.97"E	Kortlaagte 67 IS Portion 1	Wetlands on site; channelled and unchannelled valley bottom wetland

51	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'18.02"S 29°01'10.03"E	26°15'22.93"S 29°01'10.50"E	Kortlaagte 67 IS Portion 1	Wetlands on site; pan and hillslope seepage wetland and River Diversion	
52	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'23.85"S 29°01'10.18"E	26°15'28.70"S 29°01'10.32"E	Kortlaagte 67 IS Portion 1	Wetlands on site; pan and hillslope seepage wetland	
53	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'20.95"S 29°01'19.18"E	26°15'20.63"S 29°01'31.85"E	Kortlaagte 67 IS Portion 1	Wetlands on site; hillslope seepage and unchannelled valley bottom wetland and Pan & River Diversion	
54	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'26.74"S 29°01'26.60"E	26°15'26.59"S 29°01'31.71"E	Kortlaagte 67 IS Portion 1	Wetlands on site; unchannelled and channelled valley bottom wetlands, pan, hillslope seepage and river diversion	
55	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'47.97"S 29°00'46.30"E	26°13'47.97"S 29°00'39.30"E	Kortlaagte 67 IS Portion 10	Wetlands on site; quarry and unchannelled valley bottom wetland	
56	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'04.54"S; 29°00'39.30"E	26°14'10.31"S 29°00'39.93"E	Kortlaagte 67 IS Portion 10	Wetlands on site; quarry, unchannelled valley bottom and hillslope seepage wetland, river diversion and dam	
57	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'10.95"S 29°00'39.96"E	26°14'16.48"S 29°00'40.20"E	Kortlaagte 67 IS Portion 10	Wetlands on site; quarry, unchannelled valley bottom and hillslope seepage wetland, river diversion and dam	
Section 21(f) - Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.							
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Volume Applied for (m³/a)**	
58	Discharge of treated effluent from Mine 2 Sewage Treatment Works to the Rietspruit River.	Mine 2 WWTW discharge	26° 13.296' S 29° 06.298' E		Vierfontein 61 IS ptn 26	50 000 m³/a	
59	Discharge of treated effluent from Mine 3 Sewage Treatment Works to the Rietspruit River.	Mine 3 WWTW discharge	26° 13.429' S 29° 03.635' E		Vierfontein 61 IS ptn 21	35 000 m³/a	
60	Discharge of treated water into Rietspruit River.	Water Treatment Plant Discharge	26° 13' 21.18" S 29° 06' 10.44" E		Vierfontein 61 IS ptn 26	2580550 m³/a	
61	Discharge waste water from sewage works into unnamed tributary	New Mine 1 WWTW discharge	26° 17' 42.6"S 29° 09' 23.7" E		Bakenlaagte 84 IS Remaining Extent	66576 m³/a	
Section 21(g) - Disposing of waste in a manner which may detrimentally impact on a water resource.							
Water Use No.	**Section 21(g)**	**Site Name**		**Co-ordinates**	**Property**	**Capacity / Size / Area**	**Throughput as per IWUL (m³/month)**

62	Disposing of water containing waste into the Top PCD.	Top PDC	26° 15.829' S 29° 07.271' E	Haasfontein 85 IS ptn 5	47 353	30 000 m^3/month
63	Disposing of water containing waste into the Bottom PCD.	Bottom PCD	26° 15.597' S 29° 06.928' E	Haasfontein 85 IS ptn 5	130 756	72739 m^3/month
64	Disposing of water containing waste into the PCD on the farm Vierfontein 61 IS portion 26.	Pollution Control Dam	26° 13.142' S 29° 06.162' E	Vierfontein 61 IS ptn 26	70 000	70000 m^3/month
65	Disposing of water containing waste into the Surface Pan (emergency facility)	Mine 2 Emergency Dam	26° 12.481' S 29° 06.999' E	Vierfontein 61 IS ptn 26	500 000	50 0000 m^3/month
66	Disposing of water containing waste into the PCD with settling pond	PCD with Settling Pond	26° 14.647' S 29° 04.093' E	Vierfontein 61 IS ptn 26	80 100	80100 m^3/month
67	Disposing of water containing waste into the silo dam	Silo Dam	26° 14.429' S 29° 04.548' E	Vierfontein 61 IS ptn 22	24 000	24 000 m^3/month
68	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 1	Brine Storage Dam 1	26°15' 12.6" S 29° 07' 40.6" E	Vaalpan 68 IS portion 0 (remaining extent)	5.5 ha 280 000m^3 capacity	0.3 – 0.5 Ml/day
69	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 2	Brine Storage Dam 2	26° 15' 16.1"S 29° 07' 45.7" E	Vaalpan 68 IS portion 0 (remaining extent)	5.5 ha 280 000m^3 capacity	0.3 – 0.5 Ml/day
70	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 3	Brine Storage Dam 3	26°15' 24.5" S 29° 07' 40.6" E	Vaalpan 68 IS portion 0 (remaining extent)	5.5 ha 280 000m^3 capacity	0.3 – 0.5 Ml/day
71	Storage of underground water from the mines before treatment and stormwater from the dirty area	WTP PCD	26°15'17.12"S 29° 7'31.84"E E	Vaalpan 68 IS portion 0 (remaining extent)	5000m^3	
72	Excess water from the workings into the Conservancy Tank	Conservancy Tank	26°15' 23.4" S 29° 07' 30.8" E	Vaalpan 68 IS portion 0 (remaining extent)	10 Ml 10 000m^3	
73	Pollution Control Dam	New Mine 1 PCD	26° 17' 42.6"S 29° 09' 23.7" E	Bakenlaagte 84 IS Remaining Extent		729 708 m^3/a
74	Dust suppression (conveyor belt)	Dust suppression New Mine 1	N/A	Bakenlaagte 84 IS Remaining Extent	N/A	28 335 m^3/a
75	Strategic Main Stockpile at Mine 1	Mine 1 Coal Stockpile	26°16'10.85"S 29° 7'47.30"E	Matla Power Station 141 IS	31	30 471 m^3/a

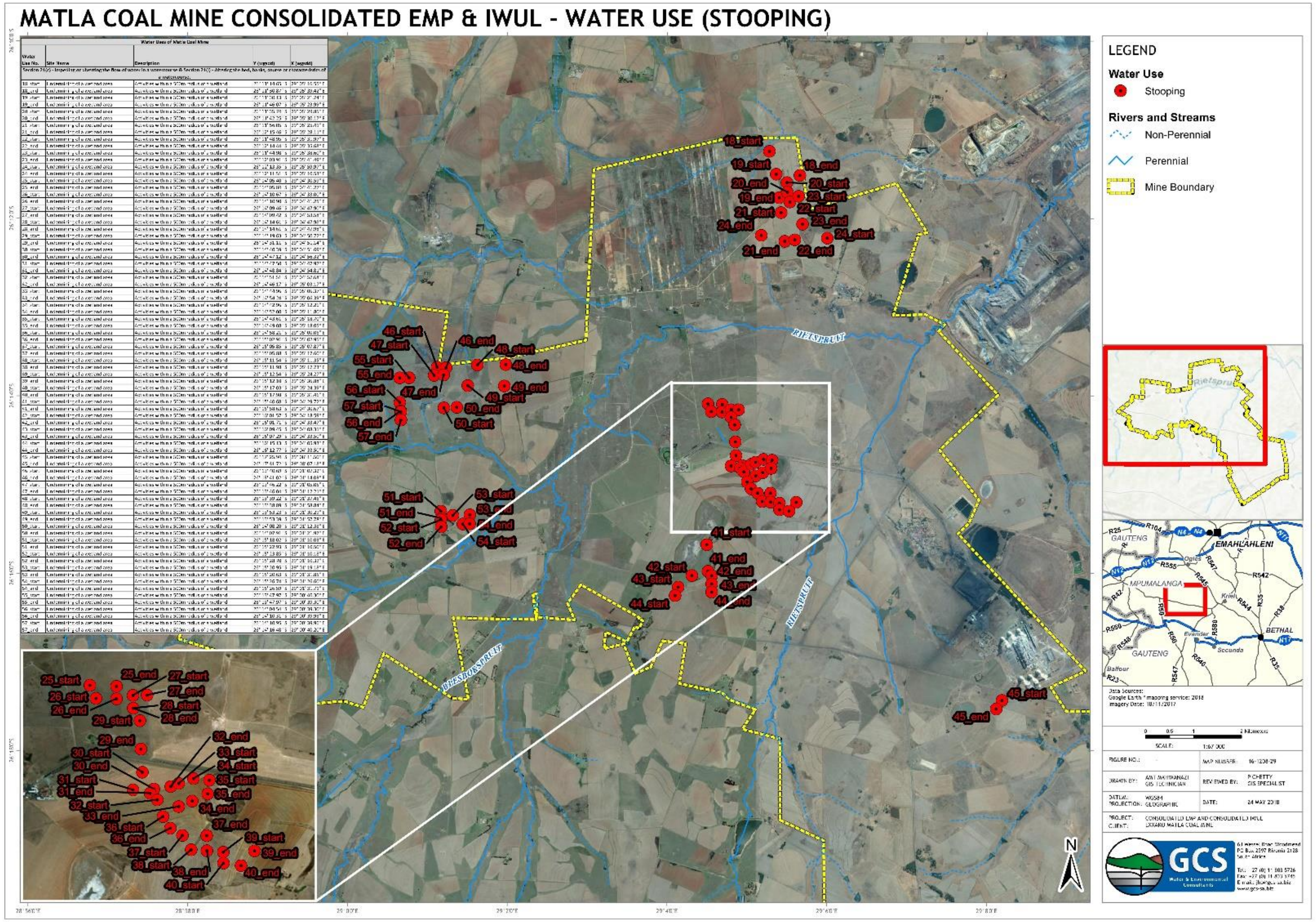
76	Transfer point at the silo area at Mine 1	Transfer stockpile Mine 1	26°15'48.60"S; 29° 7'27.57"E	Haasfontein IS 85 ptn 5	1.5Ha footprint	5 238 m^3/a
77	Transfer point at the silo area at Mine 2	Transfer stockpile Mine 2	26°12'58.64"S 29° 6'5.76"E	Vierfontein 61 IS ptn 26	0.4 Ha	6 780 m^3/a
78	Transfer point at the silo area at Mine 3	Transfer stockpile Mine 3	26°14'30.01"S; 29° 4'31.95"E	Vierfontein 61 IS ptn 22	0.05Ha	2 211.3 m^3/a
79	Dust suppression at Main Mine 1 Main Stockpile	Dust Suppression Main Complex	N/A	Matla Power Station 141 IS & Haasfontein IS 85 ptn 5	N/A	26106 m^3/a
80	Sludge Drying Beds 2a, 2b, 2c, 2d at Mine 2 WWTW	Sludge Drying Beds Mine 2	26°12'56.7"S 29°06'18.0"E	Vierfontein 61 IS ptn 26	2a = 16m^3 2b = 15m^3 2c = 15m^3 2d = 14 m^3	134 m^3/a
81	4 Sludge Drying Beds at Mine 3 WWTW (3a, 3b, 3c, 3d)	Sludge Drying Beds Mine 3	26°14'43.4"S 29°04'06.0"E	Vierfontein 61 IS ptn 21	4 x 9m^3	135 m^3/a
82	2 Mega litre tanks at Mine 2 Emergency Dam	Mine 2 Emergency Dam Tanks	26°12'28.86"S 29° 6'59.94"E	Vierfontein 61 IS ptn 26	2 x 1000 m^3	730 000 m^3/a (365 000 m^3/a for each tank)
Section 21(j) - Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**	
83	Abstraction of excess underground water for storage in PCD prior treatment at the WTP	New Mine 1 dewatering	26° 17' 44.5"S 29° 09' 18.8" E	Bakenlaagte 84 IS Remaining Extent	912500 m^3/a	
84	dewatering of underground mine water from Exxaro Matla Mine 2	Mine 2	26° 12' 47.3"S 29° 06' 06.3" E	Vierfontein 61 IS ptn 26	1460 000 m^3/a	
85	dewatering of underground mine water from Exxaro Matla Mine 3	Mine 3	26° 14' 45.16"S 29° 04' 00.5" E	Vierfontein 61 IS ptn 21	1460 000 m^3/a	



Water Uses of Matla Coal Mine				
Water Use No.	Site Name	Description	Y (wgsdd)	X (wgsdd)
Section 21(c) - Impeding or diverting the flow of water in a watercourse & Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse.				
16_start1	Goaf areas/ponds	Artificial small ponds associated with the goaf areas within 100m of unnamed perennial drainage line. The small ponds associated with the goaf areas act as sediment traps and allow for the establishment of wetland vegetation. Establishment of artificial wetlands.	26° 11' 29.39" S	29° 3' 16.41" E
16_start2	Goaf areas/ponds		26° 13' 1.27" S	29° 3' 6.80" E
16_end1	Goaf areas/ponds		26° 11' 12.15" S	29° 4' 37.42" E
16_end2	Goaf areas/ponds		26° 12' 47.00" S	29° 4' 46.89" E
17_start1	Goaf areas/ponds	Artificial small ponds associated with the goaf areas within 500m boundary of Hillslope Seepage wetland and Floodplain wetland associated with the Blesbokspruit River. The small ponds associated with the goaf areas act as sediment traps and allow for the establishment of wetland vegetation. Establishment of artificial wetlands as a result.	26° 11' 29.39" S	29° 3' 16.41" E
17_start2	Goaf areas/ponds		26° 13' 1.27" S	29° 3' 6.80" E
17_end1	Goaf areas/ponds		26° 11' 12.15" S	29° 4' 37.42" E
17_end2	Goaf areas/ponds		26° 12' 47.00" S	29° 4' 46.89" E

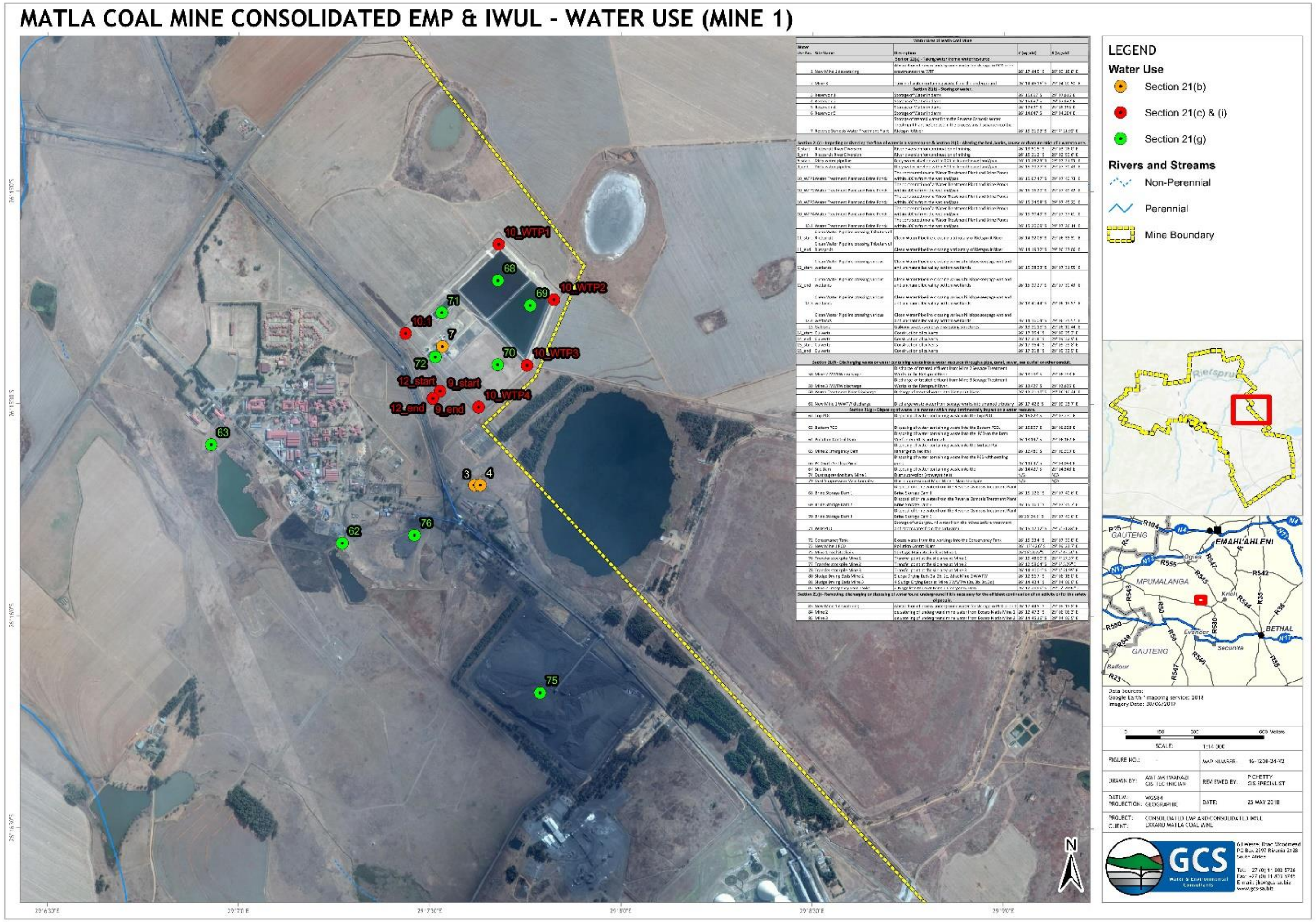
(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 3.3: Matla Goafing Water Uses



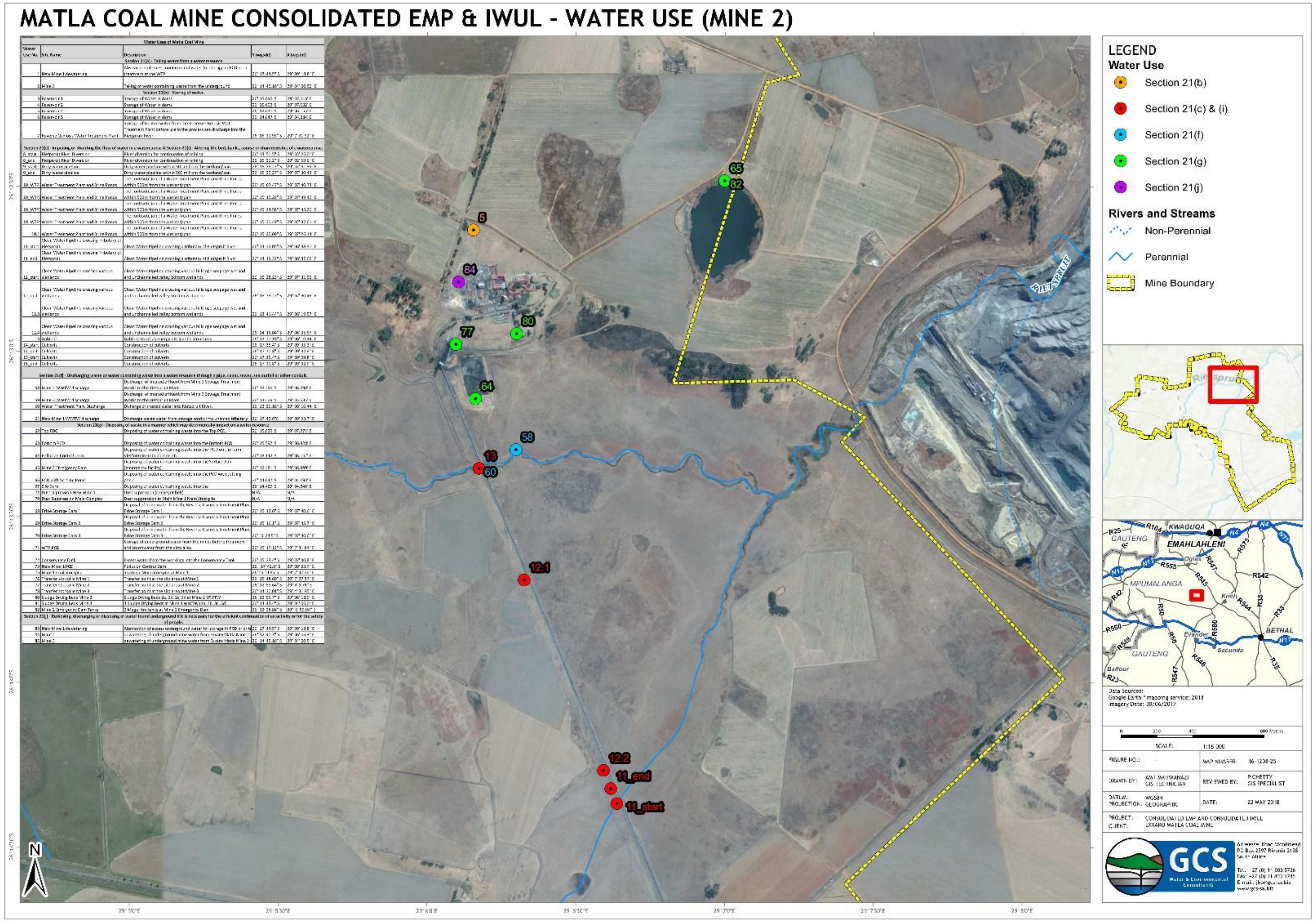
(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 3.4: Matla Stooping Water Uses



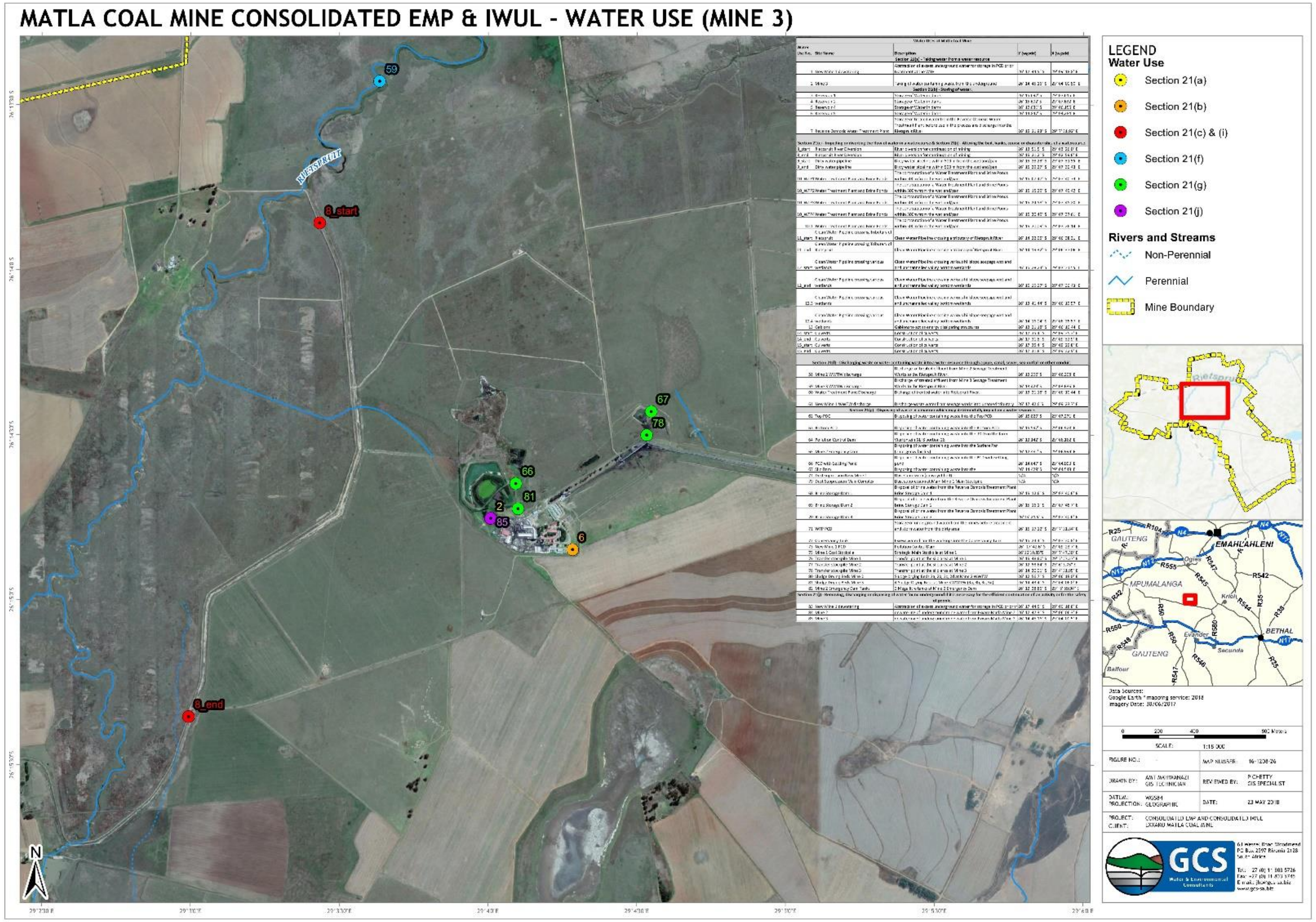
(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 3.5: Matla Mine 1 Water Uses



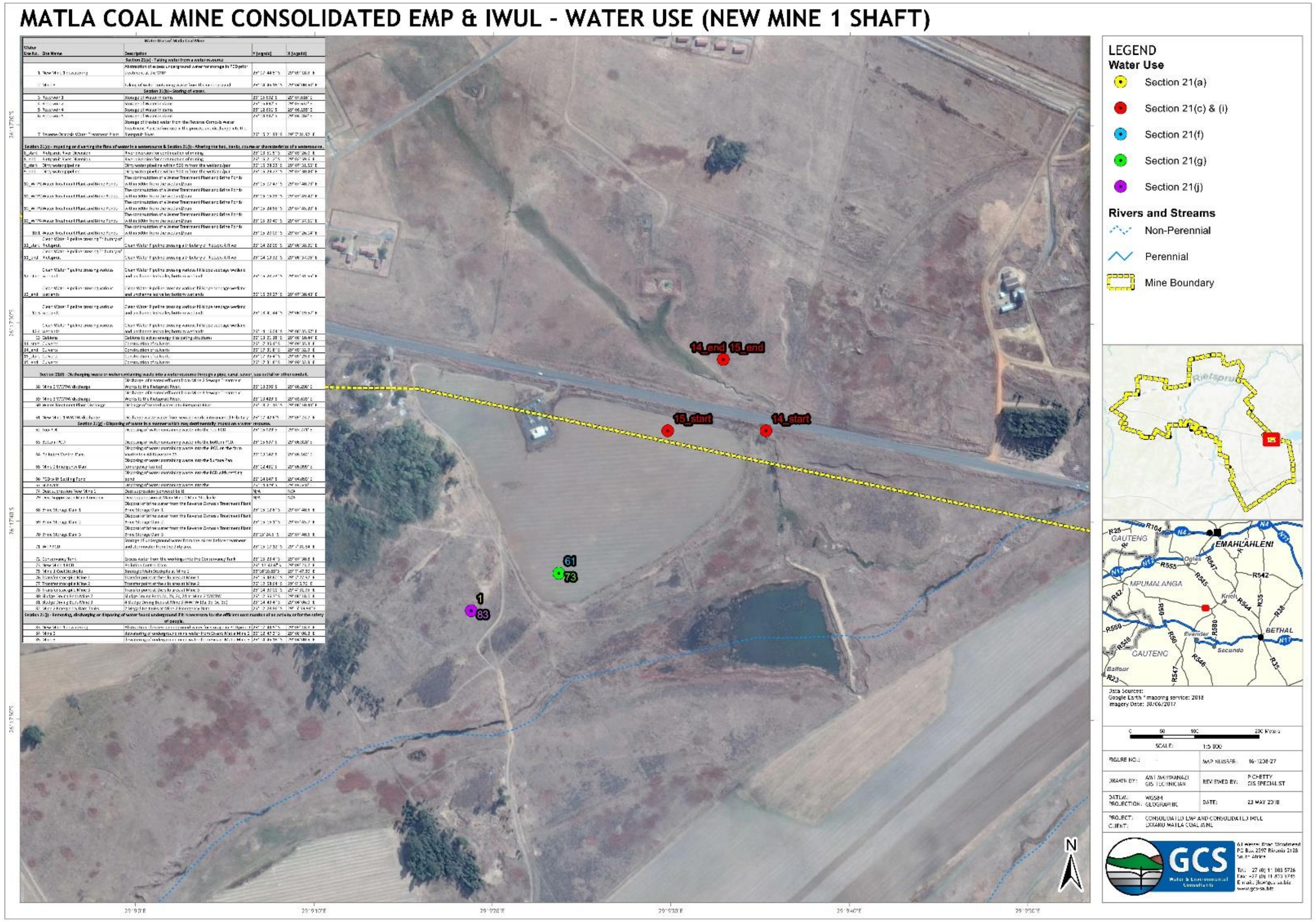
(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 3.6: Matla Mine 2 Water Uses



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 3.7: Matla Mine 3 Water Uses



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 3.8: Matla New Mine 1 Water Uses

3.5.3 Required Amendments to IWUL Conditions

3.5.3.1 Change of Name

The IWUL that was issued for the WTP (IWUL No. 04/B11E/ABCFGIJ/2446) was issued to "Exxaro Coal (Pty) Ltd: Matla Coal Water Treatment Plant and Brine Ponds", while the Main IWUL issued in 2010 (IWUL No, 24084303) was issued to "Exxaro". As part of the Consolidation process, all of the water uses that are relevant to the Matla Mining operations are applied to be issued under one Licensee; Exxaro Coal Mpumalanga (Pty) Ltd.

3.5.3.2 Repeat Conditions

Various repeat conditions have been included in the IWULs that have been issued to the Matla operations. While the consolidated licence, if authorised, will be a new licence that will supersede the existing IWULs, it is requested that the repeat conditions of the current IWULs be taken into consideration during the authorisation process so as ensure that this does not occur in the new consolidated IWUL. Ensuring that that are no repeat conditions will aid in the management requirements of the new IWUL to be issued as well as the auditing processes that are required to ensure compliance to the IWUL. The repeat condition that have been identified for the current IWULs issued to Matla are presented in Table 3.15.

Various other conditions in the IWUL that require amendments, in terms of Section 50 of the NWA, due to typing errors or references within the IWULs have also been identified. These have been included in the Table 3.15 with the repeat conditions. It is requested that these be taken into consideration during the consolidation IWUL process.

Table 3.15: Amendments required to conditions of Existing IWULs

Appendix of Licence	Condition No.	Condition detail	Amendment required to condition
Licence No.24084303 issued October 2010			
Appendix III	2.1	The licensee is not indemnified from any detrimental effect that the dam (s) may have on other properties. The Department does not accept any responsibility or liability for any damages or losses that may be suffered by any other party as a results of the construction and utilization of the dams.	Repeat condition – to be removed from consolidated licence.
	3.5	The licensee is not exempted from compliance with the provision of the Regulations published under Government Notice R1560 of 25 July 1986, read with Chapter 12 of the Act.	The licensee is not exempted from compliance with the provision of the Regulations published under Government Notice R139 of 24 February 2012 in terms of section 123(1).

Appendix of Licence	Condition No.	Condition detail	Amendment required to condition
	4.2	Construction of the dam(s) may not commence before authorization in terms of the Environment Conservation Act, 1989 (Act 73 of 1989) is issued.	Construction of the dam(s) may not commence before authorisation in terms of the National Environmental Management Act, 1998 (Act 107 of 1998).
WTP IWUL 04/B11E/ABCFGIJ/2446 issued 2014			
Appendix VI	2.1	The quality of water containing waste to be disposed of into the dams (WTP PCD, Brine Ponds and conservancy tank) shall be of qualities as set out IN Table 11 of the IWUL:	It is requested that these qualities be excluded from the consolidated IWUL as no discharge from these water facilities will take place.
	4.1	The impact of the activities of the Water Treatment Plant on the groundwater shall not exceed the interim resource water quality objective (RWQO) for the management unit 2	RQWOs are too strict and as such the licensee does not comply. It is requested that this condition be amended to reflect the qualities of the WTP attainable. Furthermore, new RWQOs have been gazetted for the catchment area (as provided in Section 4.2.7).
All IWULs			
All IWULs	All	Calibration certificates in respect of the pumps must be submitted to the Regional Head after installation thereof and thereafter at intervals of two years.	Pumps are not able to be calibrated and as such this conditions cannot be completed. It is requested that this condition be removed from the IWUL.

3.5.3.3 Discharge from the Waste Water Treatment Works at Mine 2 and 3

According to condition 2.1 of Appendix VII of IWUL 24084303 (issued 2010), the discharge from the sewage Waste Water Treatment Works (WWTW) at Mine 2 and 3 are required to adhere to certain limits of the specified parameters. A motivation in this regard has been compiled by JG Afrika (Annexure M).

Table 3.16: Discharge parameters and limits

Variables	WUL limits	General limits*	Special limits*
pH	6.5-9.0	5.5-9.5	5.5-7.5
Temperature	22	Not specified	Not specified
COD (mg/l)	Not specified	75	30
Ammonia (as N) (mg/l)	2.2	6	2
Phosphate (mg/l)	0.54	10	1 (median); 2.5 (maximum)
Nitrate (as N) (mg/l)	0.1	15	1.5
Total Dissolved Solids (mg/l)	356	Not specified	Not specified
Total suspended solids (mg/l)	10.0	25	10
Faecal Coliforms (counts/100ml)	78	1000	0
Conductivity (mS/m)	70	70mS/m above intake to a maximum of 150mS/	50mS/m above background receiving water, to a maximum of 100mS/m

*General and special limits are as per the General Authorisations for Section 21(f) Government Notice Regulation (GNR) 665 of 2013.

It is important to note that the limits provided refer to sewage (i.e. domestic wastewater) only and it must therefore be remembered that the limits are not referring to the mine process wastewater, instream water quality or discharge from the WTP. Certain parameters as specified in the IWUL, such as temperature, were assessed to be errors in the motivation. Furthermore, some of the parameter limits were deemed as potential errors.

Based on the motivating factors, as presented in Annexure M, and due to the fact that the watercourse receiving the discharge is not a listed watercourse, the General Limits should apply to the discharge quality. However, as a sign of commitment to the environment, limits that are stricter that the General limits have been proposed. The requested parameter limits for the discharge of the treated effluent from the WWTWs at Mine 2 and Mine 3 are provided in Table 3.17.

Table 3.17: Proposed Treated Effluent Discharge Limits

Variables	Proposed Limit
pH	6.5-9.0
COD (mg/l)	75
Ammonia (as N) (mg/l)	4
Phosphate (mg/l)	1 (median); 2.5 (maximum)
Nitrate (as N) (mg/l)	6
Total Suspended Solids (mg/l)	10
Faecal Coliforms (counts/100ml)	100
Conductivity (mS/m)	70mS/m above intake to a maximum of 150mS/m

3.6 Waste Management Activities and Waste Related Authorisations

Matla has an approved waste licence in terms of the National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) (NEM: WA), DEA ref 12/9/11/L649/6 of 23 Sept 2013 for the Water Treatment Plant and Brine Ponds.

No other waste licences have been issued for the Matla Mine.

3.7 Other Authorisations and Regulations

The following authorisations, as presented in Table 3.18, are applicable to the consolidation project. A Section 102 Amendment is being compiled for the Matla Mine in order to consolidate all of the current EMPs in terms of the MPRDA and NEMA. This consolidated EMP will provide for all the of the Matla operations.

Table 3.18: Matla Authorisations Applicable to the consolidation project

Applicable Legislation	Licence Number
Minerals Act, 1991 (Act. No. 50 of 1991) Authorisation:	Matla Mining Licence: 9/94 dated 24 November 1994 issued in terms of the Minerals Act, 1991 (Act No 50 of 1991) with reference number: MR/MAT/M7/1 for Mine 1, Mine 2, Mine 3 and E'Tingweni.
National Environmental Management: Waste Act, 2008 (Act No 59 of 2008).	DEA ref 12/9/11/L649/6 of 23 Sept 2013 for the Water Treatment Plant and Brine Ponds.
Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) Authorisations:	MP30/5/1/2//3/2/1/(327)MR dated 20 August 2009 issued in terms of the MPRDA for Mine 1 (Addendum to EMPR)
	MP30/5/1/2//3/2/1/(327)MR dated 2 October 2013 issued in terms of the MPRDA for Water Treatment Plant and Brine Ponds
National Water Act, 1998 (Act No 36 of 1998) Authorisation:	Licence No: 24084303 dated 23 October 2017 in terms of the NWA for river diversion for Section 21 (c) and (i);
	Licence No: 24084303 dated 1 October 2010 in terms of the NWA for Integrated Water Uses for Section 21(a), (b), (f), (g), (j). Amendment issues on 22nd November 2013 in terms of Section 158 of the NWA
	Licence No: 04/B11E/ABCFGIJ/2446 dated 17 March 2014 in terms of the NWA for Section 21(a), (b), (c), (f), (g), (i), (j);
	Licence No: 04/B11E/ACFGIJ/3734 dated 16 July 2015 Integrated Water Uses for Section 21(a), (c), (f), (g), (i), (j);

The inclusion of the Stooping Project into the Matla Operations will trigger the listed activities in terms of NEMA as shown in Table 3.19 and therefore requires an environmental application for approval of the proposed activities before Stooping can commence. The EIA will be submitted in September 2018.

Table 3.19: Listed Activities Triggered for the Matla Consolidation

Name of Activity	**Applicable Listing Notice:** (GNR 983, GNR 984 or GNR 985 as amended by As amended by GNR 324, GNR 326 and GNR 327 of 7 April 2017)
Rehabilitation of goafing areas, where areas are stripped of vegetation and topsoil, shaped and then top soiled and re-vegetated.	Activity 19 of GNR 983
Application for an IWULA for activities triggered in terms of Section 21 of the NWA	Activity 6 of GNR 984
Rehabilitation of goafing areas, where areas are stripped of vegetation and topsoil, shaped and then top soiled and re-vegetated.	Activity 15 of GNR 984
Stooping (mining of pillars)	Activity 17 of GNR 984

Matla has an approved Environmental Management Plan, [Reference Number: MP30/5/1/2/3/2/1(327) EM]. The following Environmental Authorisations have been approved for the Matla Mine (Table 3.20).

Table 3.20: Authorisations received for the Matla Mine

Activity	Number	Authorisation	Date issued / registered
Mining license (Coal) in terms of section 9 of the Mineral Act, 1991	N 2/2001	License	1994
EMP in terms of the Mineral Act, 1991	OT6/2/2/89	EMP	May 1996
Approved in terms of MPRDA. 28 of 2002	MP30/5/1/2/3/2/1(327)EM	EMP amendment	April 2007
Approved in terms of MPRDA. 28 of 2002	MP30/5/1/2/3/2/1(327)EM	EMP amendment	August 2009
Re-routing of the Rietspruit granted in terms of NEMA section 24. EIA regulations, 2006	17/2/1/1 (M) MP-07	Authorisation	August 2007
Matla Mine Water Treatment Plant and brine ponds and associated infrastructure	17/2/3/N-70 MPP/EIA/0000126/2011	ROD	Authorised, 7 August 2012

3.8 Legal Assessment

Water management at mines is primarily controlled by the National Water Act, 1998 (Act 36 of 1998) (NWA) and the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA). Cognisance also needs to be taken of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA).

3.8.1 The Constitution of South Africa (Act No.108 of 1996)

The Constitution of the Republic of South Africa (Act 108 of 1996) compels all to ensure the fundamental rights of all citizens. Section 24 of the act states the following:

Everyone has the right:

a) To an environment that is not harmful to their health or wellbeing, and

b) To have an environment protected for the benefit of present and future generations through reasonable legislative and other measures that-

I. Prevent pollution and ecological degradation;

I. Promote conservation; and

II. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The environmental legislation promulgated since the constitution has given legal effect to this section of the Constitution.

3.8.2 The National Environmental Management Act 1998 (No.107 of 1998)

The National Environmental Management Act (NEMA) provides for a comprehensive array of principles which cumulatively aim to create, among others, corporate socially responsible behaviour by establishing legal liability for environmental damage as well as damage to human health and well-being. Apart from these principles, NEMA also contains mechanisms, procedures and structures to facilitate pollution prevention, minimisation and remediation.

Chapter 7 of NEMA contains essential provisions dealing with liability for environmental damage in South Africa and two key elements form part thereof; namely: pollution prevention and remediation. A duty of care is contained in Section 28, which encompasses the main liability provision which applies retrospectively and therefore also to historical pollution. Section 28(1) applies to all forms of pollution, including mining pollution, and is formulated generally by providing a duty of care to avoid, minimise and/or remedy pollution or environmental degradation. In terms of this subsection, the duty imposes liability on an almost non-exhaustive category of persons, because it refers to "every person". Section 28(2) goes even further and imposes the duty on a range of people including owners or people in control of land or premises and people who have the right to use the land or premises on which, or in which, an activity or process is, or was, performed or undertaken, or any other situation exists which causes, or is likely to cause, significant pollution or degradation to the environment.

The duty of care imposes strict liability since Section 28(1) requires reasonable persons to take reasonable measures. Subsection (3) provides an indicative range of measures that can be considered as “reasonable measures” and these may include measures to investigate, assess and evaluate the impact on the environment; inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation, contain or prevent the movement of pollutants or the causing of degradation, eliminate any source of the pollution or degradation and remedy the effects of the pollution or degradation. One can identify from the wording an obligation to prevent and minimise pollution or degradation and the list indicates that remediation is clearly part of South African law. Where a mine fails to take reasonable measures to prevent or minimise pollution, it can be directed to do so by the relevant authority and if it does not comply with the directive, measures will be taken by government on its behalf, but at the mine’s expense.

Under Section 34(7), liability is specifically extended to the director of the mining company concerned in his or her personal capacity, in other words, the director is personally liable.

Furthermore, Section 43 provides that if directors failed to take all reasonable steps to prevent the offence being committed, and monetary advantage was gained, they may be personally liable for damages or compensation, have to pay a fine, or have to comply with remedial measures determined by the Court, and may even have to pay the State's investigative costs. The latter was confirmed in Minister of Water Affairs and Forestry v Stilfontein Gold Mining Co Ltd and Others 2006 5 SA 333 (W) where the court held, in a telling statement that:

"To permit mining companies and their directors to flout environmental obligations is contrary to the Constitution, the Mineral Petroleum Development Act and to the National Environmental Management Act. Unless courts are prepared to assist the State by providing suitable mechanisms for the enforcement of statutory obligations an impression will be created that mining companies [and their directors] are free to exploit the mineral resources of the country for profit over the lifetime of the mine, thereafter they may simply walk away from their environmental obligations. This simply cannot be permitted in a constitutional democracy which recognises the right of all of its citizens to be protected from the effects of pollution and degradation."

3.8.2.1 Environmental Principles

Section 2(1)(c) of NEMA provides that:

"The principles set out in this section apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and… serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment…"

GCS acknowledge that these principles serve as guiding principles because they are binding, enforceable and justiciable. By adhering to these principles, GCS promotes a cautious approach when advising on the activities, processes and daily operations of the mining operation and advocates compliance with environmental regulatory measures.

These principles all apply directly to mines by virtue of Section 37(1) of the MPRDA which provides that regard must be had to the NEMA principles by stipulating that the principles set out in Section 2 of NEMA:

"a) apply to all prospecting and mining operations, as the case may be, and any matter or activity relating to such operation; and

b) serve as a guideline for the interpretation, administration and implementation of the environmental requirements of this Act."

Section 37(2) of the MPRDA further provides that:
"Any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects in order to ensure that exploitation of mineral resources serves present and future generations."

By virtue of Section 37(1) of the MPRDA, these principles apply to the mining sector and therefore the mining industry must adopt a risk-averse and cautious approach; prevent negative impacts or effects of their activities on the health and well-being of people and the environment; and pay for all their pollution since they remain liable for the effects of their policies, projects, programmes, products, processes, services or activities throughout their life cycles.

The following principles are particularly important and are discussed below.

Polluter Pays Principle

The polluter pays principle is reflected in the provision 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 must be paid for by those responsible for harming the environment.

In essence, the PPP means that "polluters and users of natural resources (should) bear the full environmental and social costs of their activities". The PPP can also be described as an economic principle that requires the polluter (the mining industry in this instance) to be held liable to compensate or pay for pollution prevention, minimisation and remediation. Therefore, the crux of the principle is to impose economic obligations when environmental damage is caused by a polluter and this is achieved by setting minimum rules on liability for environmental damage.

Precautionary Principle

The precautionary principle provides guidance during development or when anything occurs which might harm the environment and where there is scientific uncertainty. NEMA stipulates and requires "a risk averse and cautious approach" to be applied and that decision-makers should take "into account the limits of current knowledge about the consequences of decisions and actions". This approach is also acknowledged in the *White Paper on a Minerals and Mining Policy for South Africa* in that:

"…during decision-making a risk averse and cautious approach that recognises the limits of current environmental management expertise will be adopted and where there is uncertainty, action is required to limit the risk."

The precautionary principle requires the mining industry to take adequate precautionary measures to safeguard against contamination, pollution or degradation of the environment and where there is uncertainty, the action taken should be to limit the risk to the environment.

Preventative Principle

The preventive principle is reflected in the concept that the disturbance of ecosystems and loss of biological diversity are to be ***"…avoided, or…minimised and remedied"***. Furthermore, the principle prescribes that the disturbance of the landscape and the nation's cultural heritage is to be avoided, and where it cannot be altogether avoided, must be minimised and remedied. Any negative impacts on the environment and on people's environmental rights should also be anticipated and prevented, and where they cannot be altogether prevented they should minimised and remedied.

The principle aims to minimise environmental damage by requiring that action be taken at an early stage of the process, and if possible, before such damage actually occurs. Broadly stated, it prohibits any activity which causes or may cause damage to the environment in violation of the duty of care established under environmental law. The preventive principle bestows on the mining industry an obligation to take steps to avoid causing certain types of damage to the environment, including the environment beyond their own territory or property.

Cradle to Grave

A cradle-to-grave stewardship perspective indicates the adoption of a comprehensive ecological view of the impacts of a process on the environment, commencing with research, development and design through the extraction and use of raw materials, production and processing, storage, distribution and use, to the final disposal of the product and the waste generated as a by-product.

The integrated consideration of all the environmental impacts forms part of this cycle. The "cradle-to-grave" principle advocates liability as a result of, or caused by, policies, programmes, projects, products, processes, services and activities. Given the general purpose of NEMA, together with the other sustainability principles, this legal liability may include to rectify, remedy or compensate for environmental damage or degradation. The principle also recognises that environmental impacts, pollution or degradation may be associated with the entire life cycle of a mine, that is, from the identification, exploration phase through project planning, implementation, operations and post-operational closure, decommissioning and rehabilitation. Thus, the mining industry will remain liable for the damage or degradation caused by its activities throughout the life cycle of the mining operations until decommissioning and rehabilitation.

3.8.3 The Mineral and Petroleum Resources Development Act 2002 (No48 of 2002)

Section 43(1) of the MPRDA and Section 24R of NEMA provides key insight into how the MPRDA approaches liability. In terms of this section, mining companies remain liable for, inter alia, any pollution and ecological degradation until the Minister has issued a closure certificate.

Granting of permission to mine or prospect, among others, is conditional on an environmental management programme and plan being submitted and accepted by the relevant government authority. Section 43 is one of the most important provisions as it deals with the responsibility for any environmental liability, pollution or ecological degradation until the issue of the closure certificate. It is important to note that environmental liability will not necessarily cease or fall away by the issuing of a closure certificate. In addition to the broader liability provisions above, Section 45 provides that the relevant authority may direct a mine to undertake remedial measures where:

"...any prospecting, mining, reconnaissance or production operations cause or results in ecological degradation, pollution or environmental damage which may be harmful to the health or well-being of anyone and requires urgent remedial measures."

Where the mine fails to take these measures, the relevant authority will act on its behalf and then recover costs incurred from the mine. If the mine fails to compensate the authority, the latter is empowered to seize and sell the mine's property to recover the costs. The mine will thus remain financially liable for the rehabilitation, even if it chooses to ignore the government directive.

3.8.4 The National Water Act 1998 (No.36 of 1998)

The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled. The National Water Act, 1998 (Act No. 36 of 1998) (NWA) identifies 11 consumptive and non-consumptive water uses that must be authorised under a tiered authorisation system. Authorisation for water uses may be issued as a General Authorisation (in terms of the General Authorisation in terms of Section 39 of the Water Act, 1998 (Act No. 36 of 1998), Gazette No. 26187, No. 399, dated 26 March 2004), as a Schedule 1 use under NWA, or as a Water Use Licence.

The authorisation system allows for the “Reserve” and provides for public consultation processes in the establishment of strategies and decision making and guarantees the right to appeal against such decisions. Section 27 of the NWA outlines various factors to be taken into consideration by the responsible authorities with regard to authorising a water use under a general authorisation or a Licence.
The list includes the following:

- Any catchment management strategy applicable to the relevant water resource;
- The class and resource quality objectives of the water resource;
- Investments made and to be made by the applicant in respect of the water use in question;
- The strategic importance of the water use to be authorised;
- The quality of water in the water in the water resource which may be required for the Reserve and for meeting international obligations

The current authorised water uses for the Matla Mine, Licenced under Section 21 of the NWA, issued in the various IWULs, are included in Section 6 below. This application pertains to the following:

- Consolidation of the existing IWULs;
- Required amendments to existing water uses; and
- Inclusion of additional Section 21(c) (i) and (g) water uses into the consolidated Licence.

4 PRESENT ENVIRONMENTAL SITUATION

4.1 Climate

4.1.1 Regional Climate

The local climate can be described as semi-arid high-veld conditions, with warm summers and moderate dry winters. Average daily summer temperatures of approximately 27°C are experienced, while peak temperatures of up to 36°C do occur. Average daily winter temperatures are approximately 4°C, with minimum temperatures reaching around -4°C. The number of days when heavy frost occurs is, however limited and freezing of wet soils, frost heave and permafrost do not occur. The mean monthly minimum and maximum temperatures as presented in Figure 4.1.

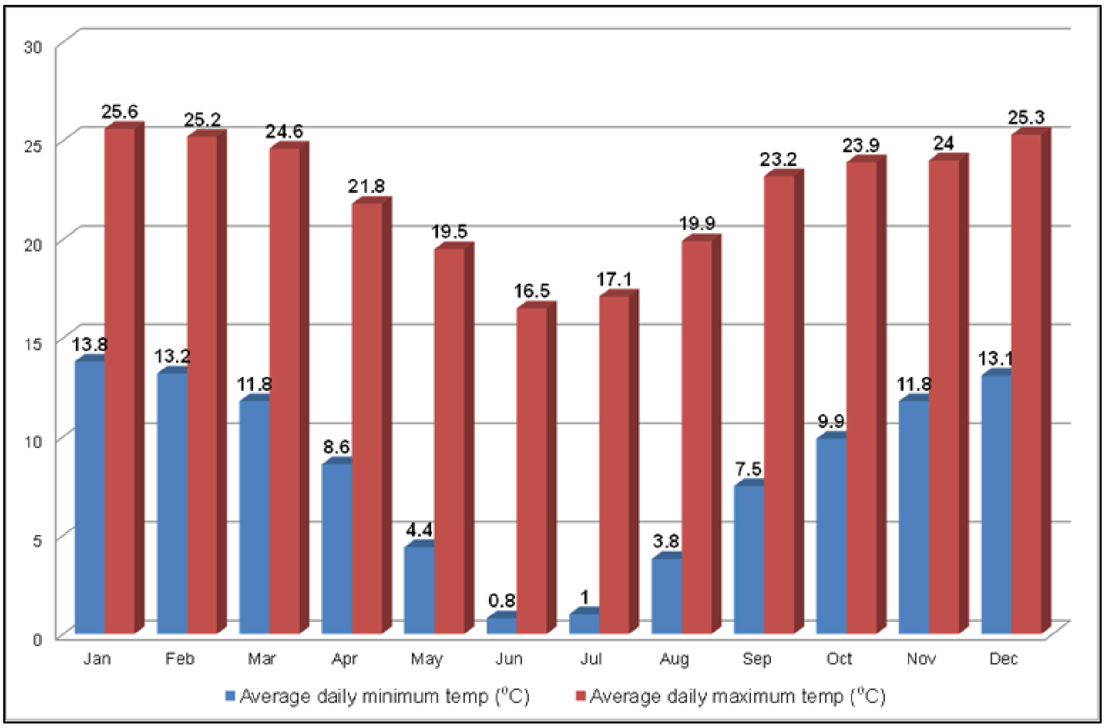


Figure 4.1: Mean monthly minimum and maximum temperatures for Matla

4.1.2 Regional Rainfall

Most of the precipitation occurs from November to January with an average of approximately ninety (90) rain days per annum. Rainfall over the period May to September is generally low or absent, with a noticeable increase in the months of October to April. Rainfall events in the region occur mainly in the form of thunderstorms and heavy showers. The annual average precipitation at Matla Mine is relatively low and variable. Annual rainfall values range from 550mm – 800mm with an average of approximately 754mm per annum (Figure 4.2).

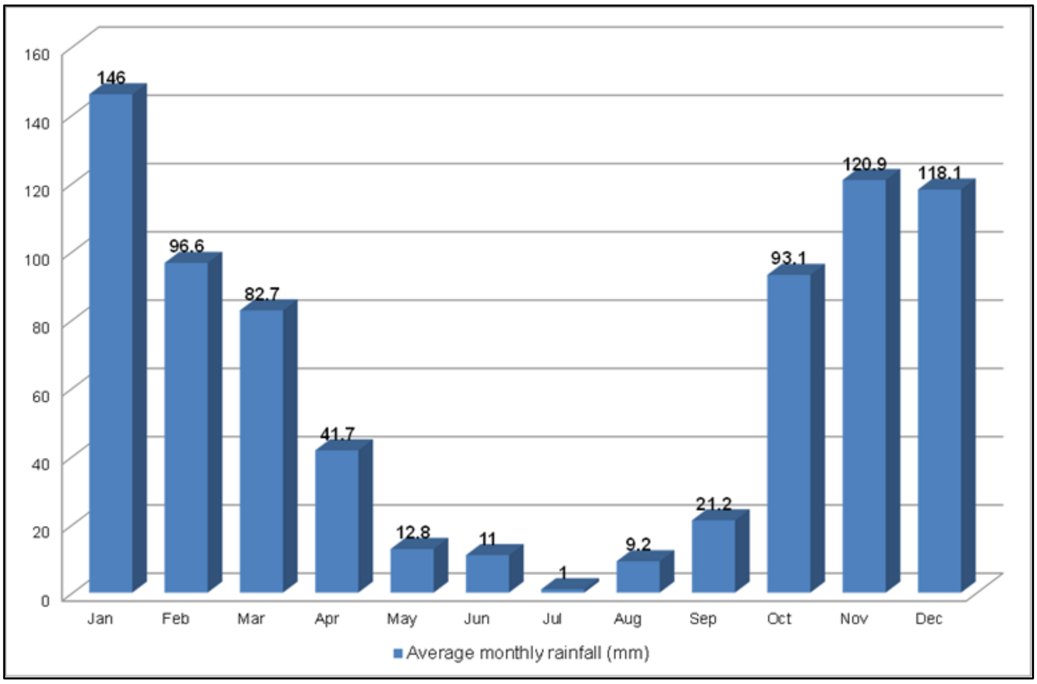


Figure 4.2: Mean monthly rainfall for Matla

4.1.3 Evaporation

The mean annual evaporation rate for the B11E quaternary catchment is in the order of 1 600 mm (Figure 4.3), which far exceeds rainfall. Relative humidity ranges from a minimum of 43 to a maximum of 92%, with dry atmospheric conditions dominating.

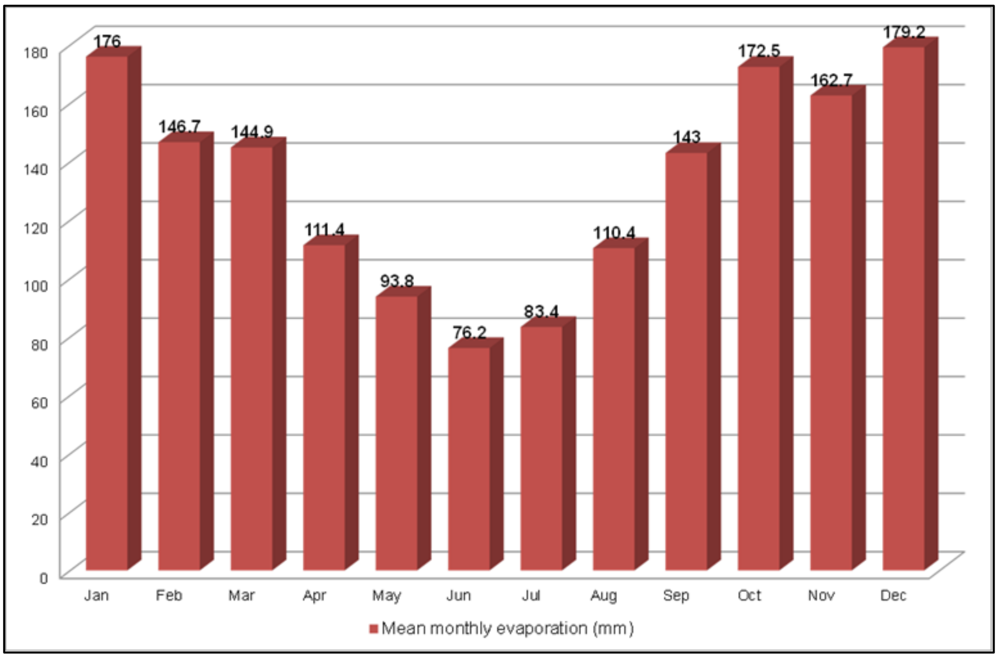


Figure 4.3: Mean annual evaporation

4.2 Surface Water

The consolidated surface water hydrology report for the Exxaro Matla Mine is attached as Annexure E to this report.

4.2.1 Water Management Area

The Matla Mine Complexes are situated in the Blesbokspruit / Rietspruit River Catchment area which is located in the Olifants Water Management Area (WMA) in the following quaternary catchments:

- B11E;
- B20E; and
- B11D

The majority of the mining/stooping activities will take place within quaternary catchment B11E, the Block I stooping activities fall within quaternary catchment B11D.

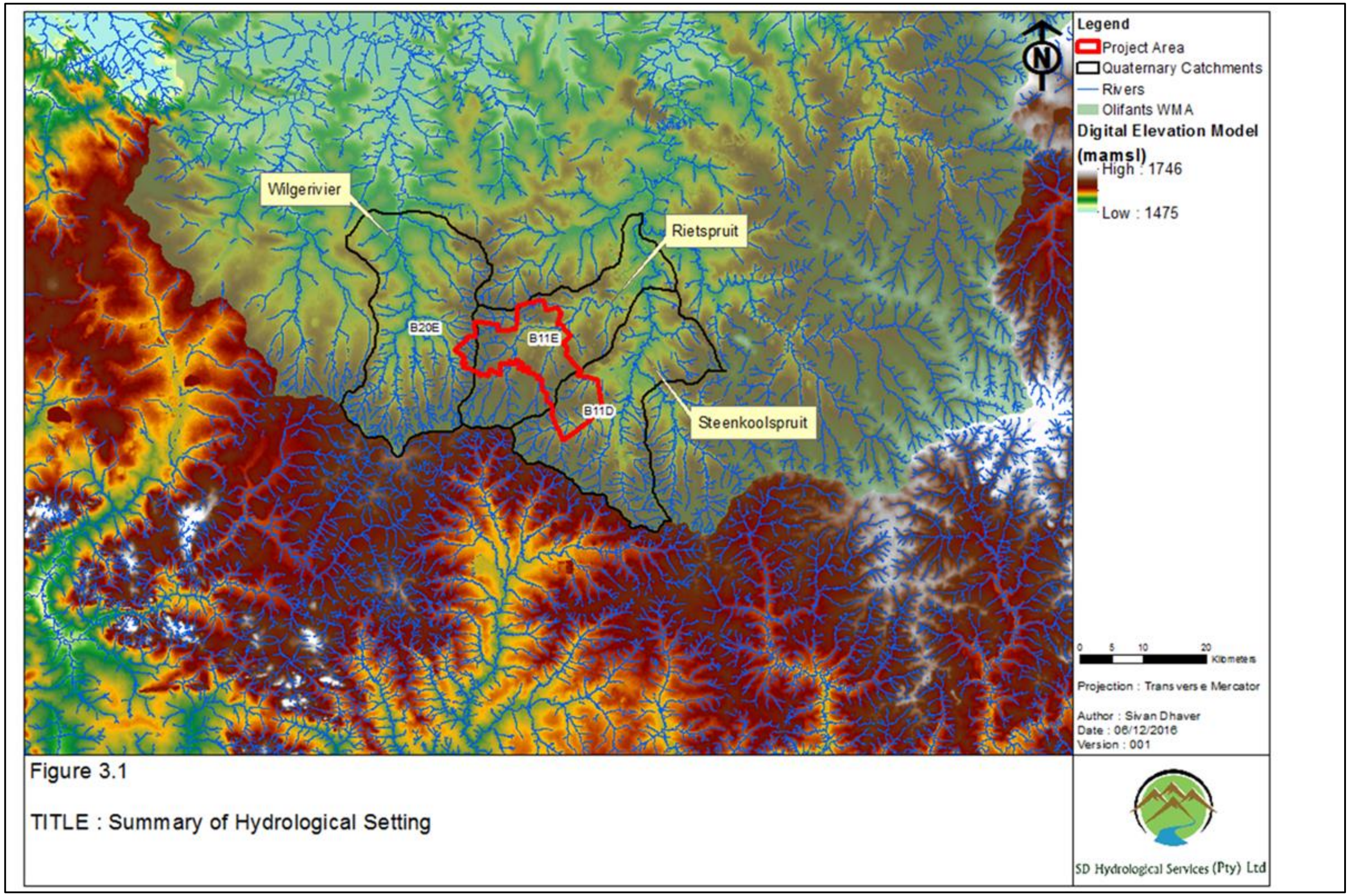
The WMA details are presented in Figure 4.4.

4.2.2 Surface Water Hydrology

The surface topography of the mine lease area is characterised by gently rolling hills and valleys that drain towards the north. Average elevations at the quaternary catchments range from 1 600 meters above mean sea level (mamsl) to 1 630 mamsl, with average catchment slopes within the project area falling below 3% and is therefore characterised as relatively flat.

In various areas, the topography has been altered due to surface subsidence of undermined areas. Surface subsidence (collapse of the roof strata above the high extraction mining areas) has resulted in an uneven topography, which in some places has resulted in the formation of ponds and wetlands *(GCS, 2006)*.

The B11D, B11E and B20E quaternary catchments are located within the Upper Olifants Water Management Area (WMA). Major rivers include the Rietspruit which drains quaternary catchment B11E, with most of the runoff emanating from the mid to northern sections of the Matla Mine boundary being drained by the mentioned river. Minor tributaries of the Steenkoolspruit drain the southern section of Matla Mine boundary which falls within quaternary catchment B11D. Due to the Rietspruit being a tributary of the Steenkoolspruit, most of the runoff eventually ends up in the Steenkoolspruit. Only a small portion of runoff emanating from the furthest north western boundary of the Matla Mine is drained north westerly into the Wilgerivier.



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 4.4: Hydrological Setting and Water Management Area of Matla

4.2.3 Surface Water Quality

A consolidated monitoring report was compiled by GCS in 2017. The purposes of this report was to consolidate the previous eight years of water quality data, for both surface and groundwater, and groundwater levels data into a consolidated water quality report. This monitoring report is attached as Annexure D to this report.

From the available data, 2008 to 2016, there are collectively 27 surface monitoring points which were used in the analyses. For quality analysis, the Matla groundwater monitoring programme requires that the surface water is sampled on a quarterly basis. A master database was created using analyses from 2008 to 2016. A statistical analyses, was done where the minimum, maximum, mean and geomean was calculated. Line graphs were also created to identify annual trends. For the purpose of the monitoring report the following parameters were focused on: pH and nitrate, sulphate, iron and aluminium concentrations.

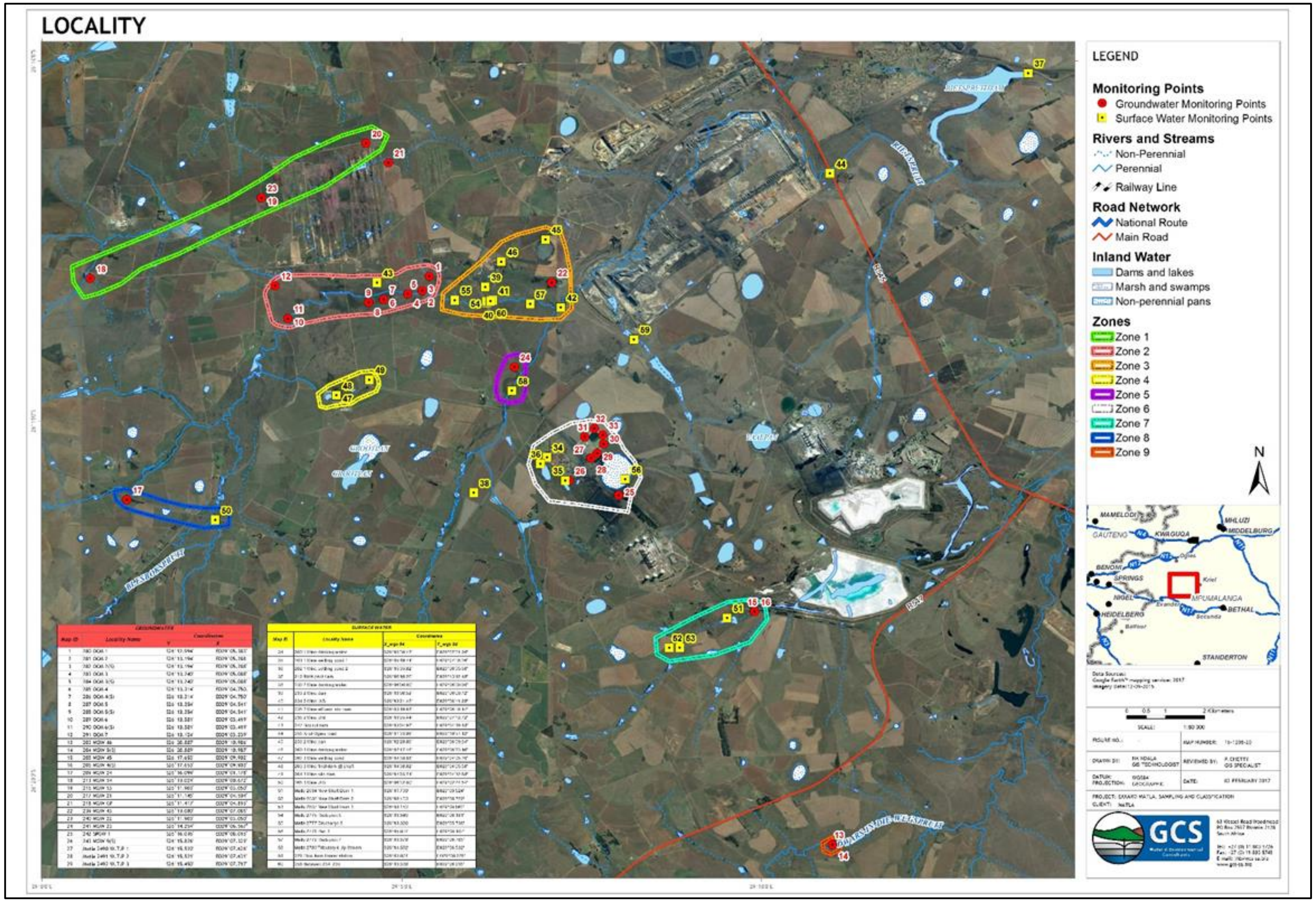
All monitoring points, both surface and groundwater, were divided into zones. In total there are nine zones. All monitoring points, divided into zones, can be seen in Figure 4.5. The monitoring points, both surface and groundwater monitoring localities, and the zones in which they have been designated into are presented in Table 4.1.

Table 4.1: Description of Monitoring Points

Zone	Monitoring point ID	Groundwater	Surface water	Coordinates		Locality description
				X	Y	
Zone 1	213 MGW 54	●		S26°13.024'	EO29°00.672'	North-western side , close to tributary of Rietspruit
	216 MGW 53	●		S26°11.903'	EO29°03.050'	Located North of 291 OCM 7
	217 MGW 21	●		S26°11.145'	EO29°04.504'	Located North-east of 240 MGW 22
	240 MGW 22	●		S26°11.903'	EO29°03.050'	Located North-east of 240 MGW 22
Zone 2	280 OCM 1	●		S26°12.994'	EO29°05.383'	Situated along tributary of Rietspruit River
	281 OCM 2	●		S26°13.194'	EO29°05.288	Located close to Rietspruit River upstream of 280 OCM 1
	282 OCM 2(S)	●		S26°13.194'	EO29°05.288'	Located close to Rietspruit River upstream of 280 OCM 1
	283 OCM 3	●		S26°13.240'	EO29°05.088'	Located close to Rietspruit River upstream of 281 OCM 2
	284 OCM 3(S)	●		S26°13.240'	EO29°05.088'	Located close to Rietspruit River upstream of 282 OCM 2 (S)
	285 OCM 4	●		S26°13.314'	EO29°04.750.	Located close to Rietspruit River upstream of 283 OCM 3
	286 OCM 4(S)	●		S26°13.314'	EO29°04.750'	Located close to Rietspruit River upstream of 284 OCM 3 (S)

	287 OCM 5	●		S26°13.354'	E029°04.541'	Located close to Rietspruit River upstream of 285 OCM 4
	288 OCM 5(S)	●		S26°13.354'	E029°04.541'	Located close to Rietspruit River upstream of 286 OCM 4 (S)
	289 OCM 6	●		S26°13.581'	E029°03.419'	Located close to Rietspruit River upstream of 287 OCM 5
	290 OCM 6(S)	●		S26°13.581'	E029°03.419'	Located close to Rietspruit River upstream of 288 OCM 5 (S)
	291 OCM 7	●		S26°13.124'	E029°03.239'	Located further away from Rietspruit River in line with 290 OCM 6(S) and 289 OCM 6
	247 Box cut dam		●	S26°13'04.92"	E029°04'39.48"	Box cut dam located North of 288 OCM 5(S)
Zone 3	239 MGW 43	●		S26°13.080'	E029°07.085'	Located North of 236 2 Mine D/S
	233 2 Mine dam		●	S26°13'08.52"	E029°06'09.72"	Dam at Mine 2 located North of Matla 2776 Rietspruit 6
	234 2 Mine U/S		●	S26°13'21.48"	E029°06'11.28"	Located upstream of Mine 2
	235 2 Mine effluent into river		●	S26°13'19.68"	E029°06'16.14"	North of Rietspruit River downstream of Mine 2
	236 2 Mine D/S		●	S26°13'25.44"	E029°07'12.72"	Close to Rietspruit River downstream of 235 2 Mine effluent into river
	259 2 Mine pan		●	S26°12'28.86"	E029°06'59.94"	Located North of pan in Mine 2
	260 3 Mine drinking water		●	S26°12'47.46"	E029°06'23.16"	Located North of 233 2 Mine dam
	Matla 2776 Rietspruit 6		●	S26°13.345'	E029°06.181'	Located downstream of Matla 2777 Discharge 8
	Matla 2777 Discharge 8		●	S26°13.326'	E029°05.738'	Located upstream of Matla 2776 Rietspruit 6
	Matla 2779 Rietspruit 7		●	S26°13.378'	E029°06.785'	Located downstream of Matla 2776 Rietspruit 6
	258 Between 234 235		●	S26°13.338'	E029°06.235'	Located between 234 2 Mine U/S and 235 2 Mine effluent into river
Zone 4	262 3 Mine settling pond		●	S26°14'38.88"	E029°04'05.70"	Located South-west of 264 3 Mine silo dam, East of settling pond
	263 3 Mine final dam @ shaft		●	S26°14'38.82"	E029°04'05.58"	Located South-west of 264 3 Mine silo dam
	264 3 Mine silo dam		●	S26°14'25.74"	E029°04'32.88"	Located North-east of 3 Mine settling pond
Zone 5	241 MGW 23	●		S26°14.254"	E029°06.567"	Located North of Matla 2780 Tributary 4 Up Stream
	Matla 2780 Tributary 4 Up Stream		●	S26°14.582'	E029°06.532'	Located upstream in Rietspruit tributary
Zone 6	242 SPGW 1	●		S26°16.036'	E029°08.016'	Located South of pan at Mine 3
	243 MGW 9(S)	●		S26°15.826'	E029°07.329'	Located West of pan at Mine 3
	Matla 2490 W.T.P 1	●		S26°15.520'	E029°07.626'	Located West of pan at Mine 3
	Matla 2491 W.T.P 2	●		S26°15.521'	E029°07.631'	Located West of pan at Mine 3
	Matla 2492 W.T.P 3	●		S26°15.450'	E029°07.717'	Located West of pan at Mine 3

	Matla 2493 W.T.P 4	●		S26°15.324'	EO29°07.805'	Located North of pan at Mine 3
	Matla 2977 W.T.P 7	●		S26°15.223'	EO29°07.545'	Located North of pan at Mine 3
	Matla 2978 W.T.P 8	●		S26°15.106'	EO29°07.677'	Located North of pan at Mine 3
	Matla 2979 W.T.P 9	●		S26°15.200'	EO29°07.'794'	Located North of pan at Mine 3
	200 1 Mine drinking water		●	S26°15'30.48 "	E029°07'01.20 "	Drinking water sampled east of Pan at Mine 3
	201 1 Mine settling pond 1		●	S26°15'49.74 "	E029°07'16.26 "	Located at settling pond East of 202 1 Mine settling pond 2
	202 1 Mine settling pond 2		●	S26°15'35.82 "	E029°06'55.68 "	Located West of 201 1 Mine settling pond 1
	Matla 2778 Pan 3		●	S26°15.814'	E029°08.107'	Located on the eastern side of pan in mine 3
Zone 7	205 MGW 45	●		S26°17.653'	E029°09.902'	Located West of tailings Dam
	206 MGW 4(S)	●		S26°17.653'	E029°09.903'	Located West of tailings Dam
	Matla 2634 New Shaft Dam 1		●	S26°17.739'	E029°09.524'	Located South-west of number 1 shaft
	Matla 2636 New Shaft Dam 2		●	S26°18.153'	E029°08.722'	Located South-west of number 1 shaft
	Matla 2637 New Shaft Dam 3		●	S26°18.153'	E029°08.862'	Located South-west of number 1 shaft
Zone 8	209 MGW 24	●		S26°16.099'	E029°01.178'	Located upstream on Blesbokspruit
	265 3 Mine U/S		●	S26°16'22.80 "	E029°02'24.54 "	Located West of 209 MGW 24
Zone 9	203 MGW 46	●		S26°20.887'	E029°10.986'	On Dwars-In-Die-Wegspruit
	204 MGW 5(S)	●		S26°20.889'	E029°10.987'	On Dwars-In-Die-Wegspruit
No zone allocated	212 Rietspruit dam		●	S26°10'10.26 "	E029°13'42.48 "	Located East of Rietspruit Dam
	230 2 Mine drinking water		●	S26°16'00.00 "	E029°06'00.00 "	Located East of Grootpan between tributaries of Rietspruit
	255 Kriel Ogies road		●	S26°11'33.96 "	E029°10'57.12 "	Sampled at Rietspruit at Kriel Ogies road
	229 Flow from Power station		●	S26°13.871'	E029°08.228'	Located South of power station



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 4.5: Surface and groundwater monitoring localities zones

For each zone the pH, iron, sulphate and sodium concentrations were analyzed to identify annual trends and whether or not the parameter exceeded the South African Water Quality Guidelines. Not all pH graphs are included as pH was normally assessed to be within the SAWQG Limit.

4.2.3.1 Zone 1 Surface Water Quality

No surface water sampling points are located within zone 1.

4.2.3.2 Zone 2 Surface Water Quality

In Zone 2 there was only one surface monitoring point, the 'Box Cut Dam'. The pH remained within the monitoring limits throughout the monitoring period. The sodium, Figure 4.7, and sulphate, Figure 4.8, annually peak in September/October with the most noteworthy increase occurring in 2015. Iron concentration, Figure 4.6, varies dramatically and consistently, throughout the monitoring period, and exceeds the SAWQG Limit.

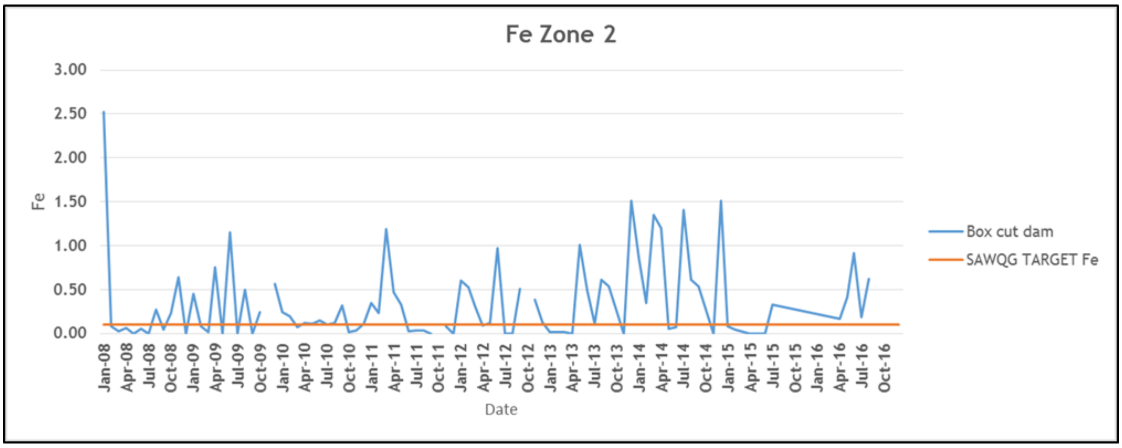


Figure 4.6: Iron Concentration, Zone 2, Box Cut Dam

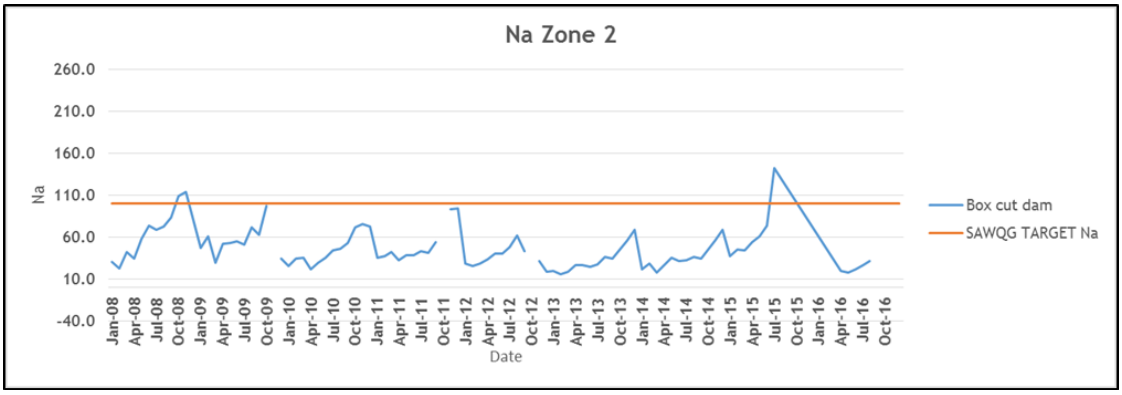


Figure 4.7: Sodium Concentration, Zone 2, Box Cut Dam

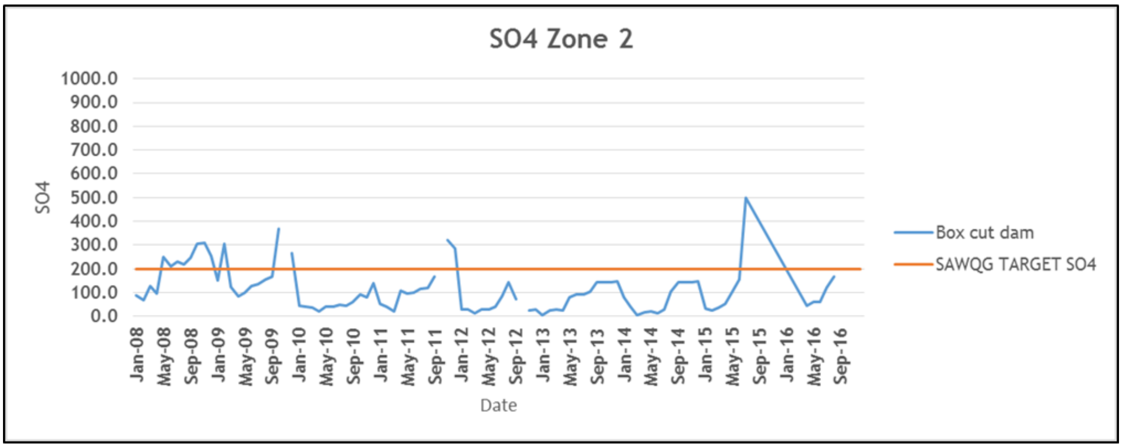


Figure 4.8: Sulphate Concentration, Zone 2, Box Cut Dam

4.2.3.3 Zone 3 Surface Water Quality

The pH (Figure 4.9) for 2 Mine Pan, Discharge 8 and Rietspruit 7 was satisfactory and within SAWQG Limits. Rietspruit 6 also had satisfactory pH with the exception of a sudden decrease in the beginning of 2016. The pH in 2 Mine Dam was elevated at the beginning of the monitoring period but has decreased.

Sodium and sulphate concentration, Figure 4.11 and Figure 4.12, in 2 Mine Dam and 2 Mine Pan follow the same trend; with the concentrations both decreasing throughout the monitoring period in 2 Mine Dam. Sodium and sulphate concentrations in Discharge 8 and Rietspruit 6 and 7 were initially high but decreased and currently remain within SAWQG Limits but are increasing. Rietspruit 6 had high iron concentration, Figure 4.10, in the beginning of the monitoring period but had decreased. Rietspruit 7 and Discharge 8 show varied iron concentrations exceeding the SAWQG Limit.

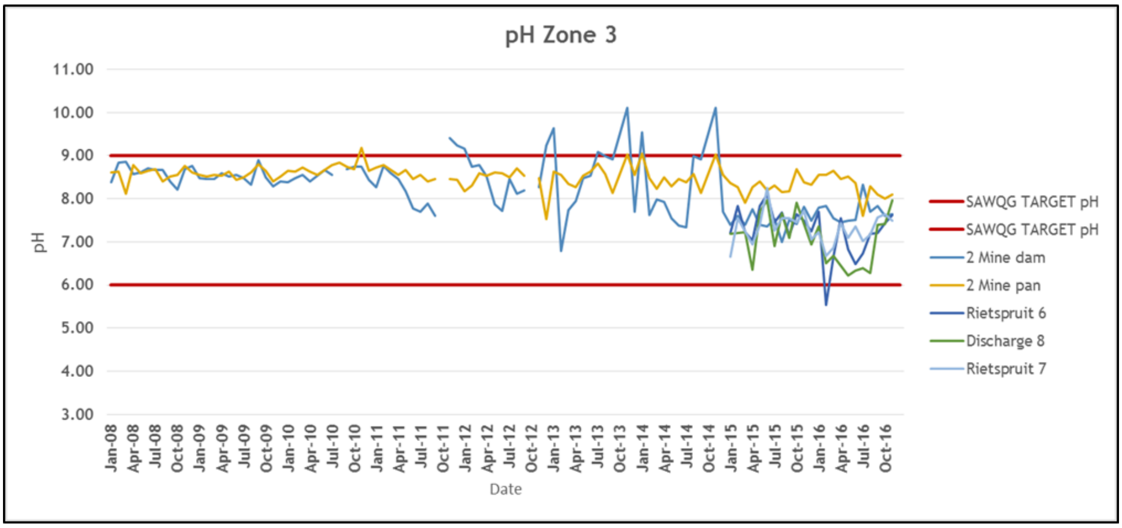


Figure 4.9: pH in surface water monitoring points, Zone 3

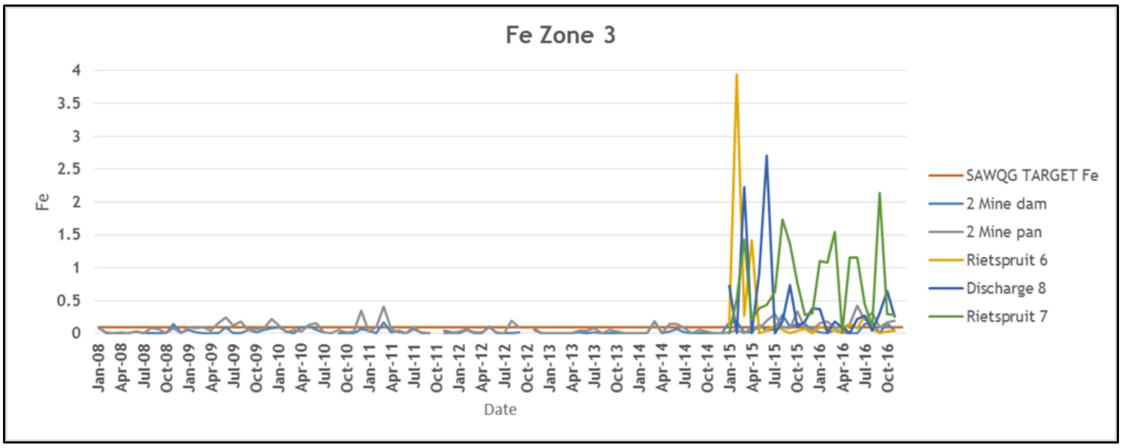


Figure 4.10: Iron concentration in surface water monitoring points, Zone 3

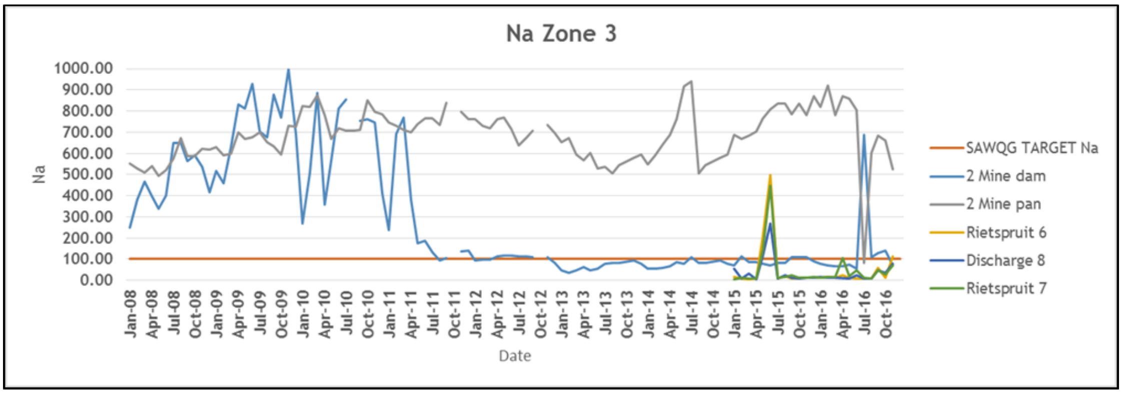


Figure 4.11: Sodium concentration in surface water monitoring points, Zone 3

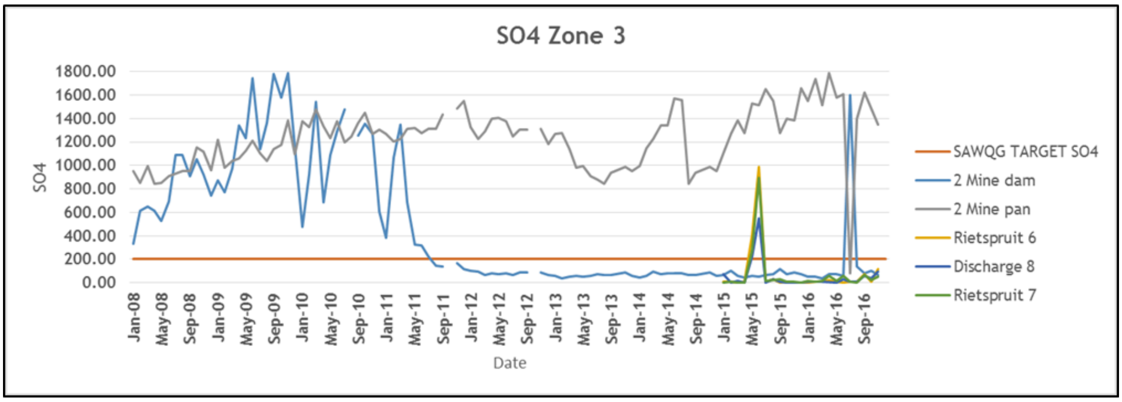


Figure 4.12: Sulphate concentration in surface water monitoring points, Zone 3

4.2.3.4 Zone 4 Surface Water Quality

The water quality in 3 Mine silo was consistently poor throughout the monitoring period with an elevated pH, increasing sodium and sulphate and varying iron concentrations with the most notable spike occurring in April 2012 with an iron concentration of 47.6 mg/l. Water quality in 3 Mine Final Dam at Shaft has progressively become poorer with pH, sodium, sulphate and iron concentrations increasing throughout the monitoring period.

The water quality in 3 Mine Settling Pond has remained consistent with iron, pH and sulphate remaining constant and only sodium increasing and consistently exceeding the SAWQG Limit. Water quality for Zone 4 is depicted in Figure 4.13 to Figure 4.16.

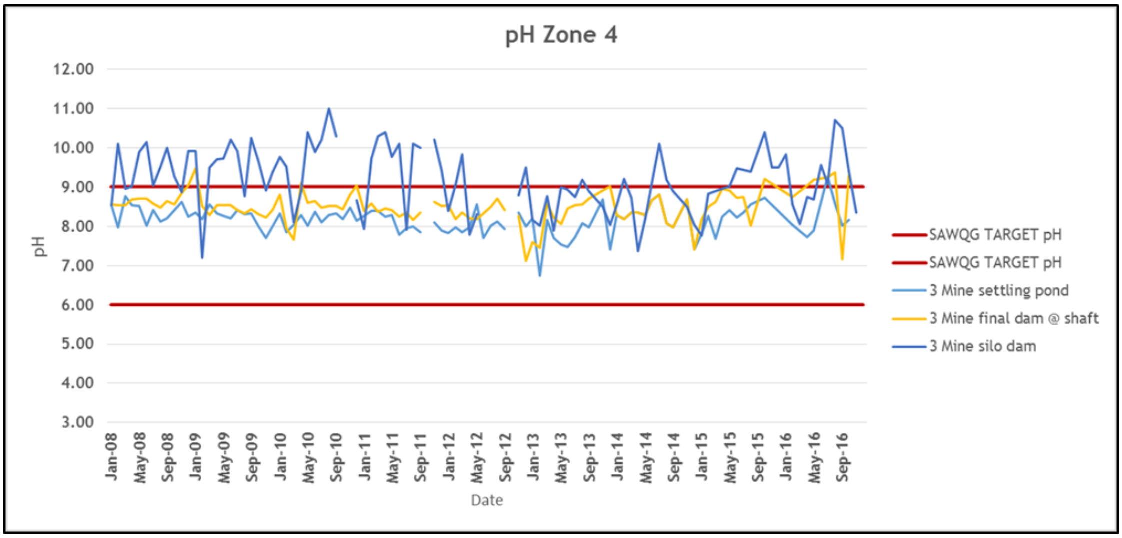


Figure 4.13: pH in surface water monitoring points, Zone 4

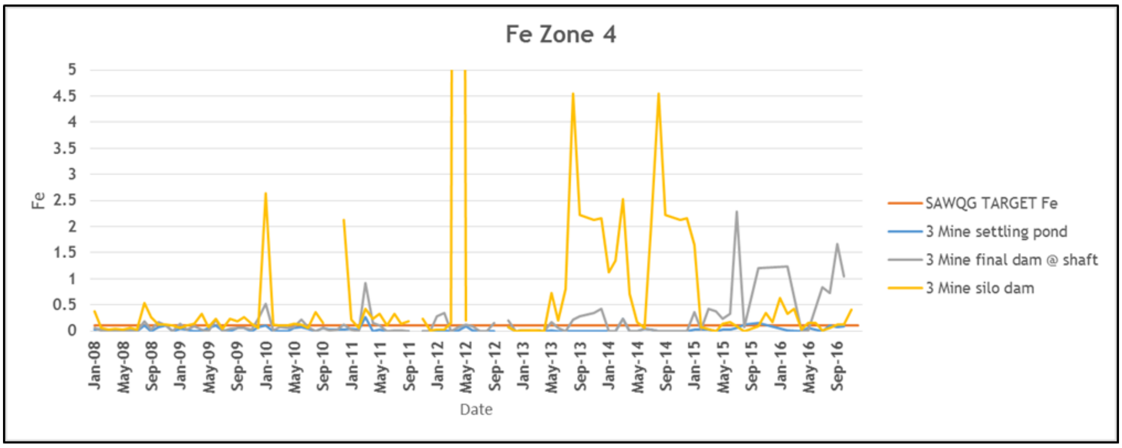


Figure 4.14: Iron concentration in surface water monitoring points, Zone 4

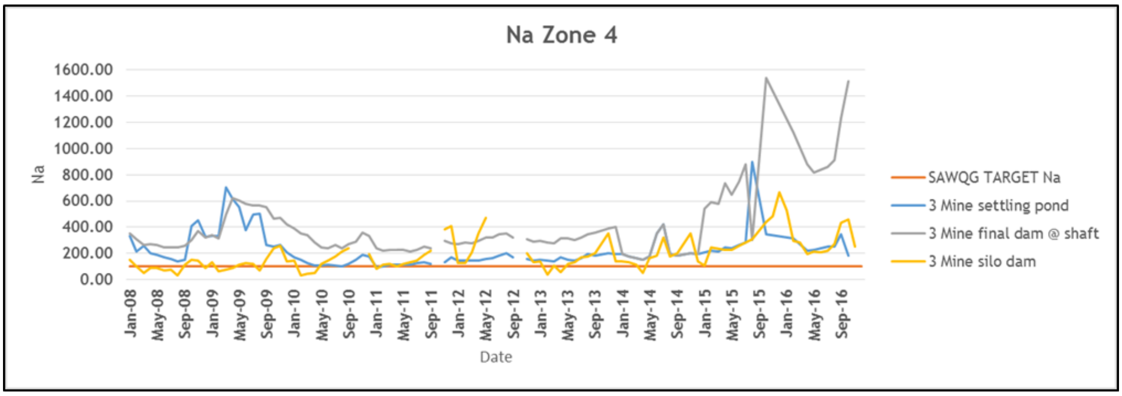


Figure 4.15: Sodium concentration in surface water monitoring points, Zone 4

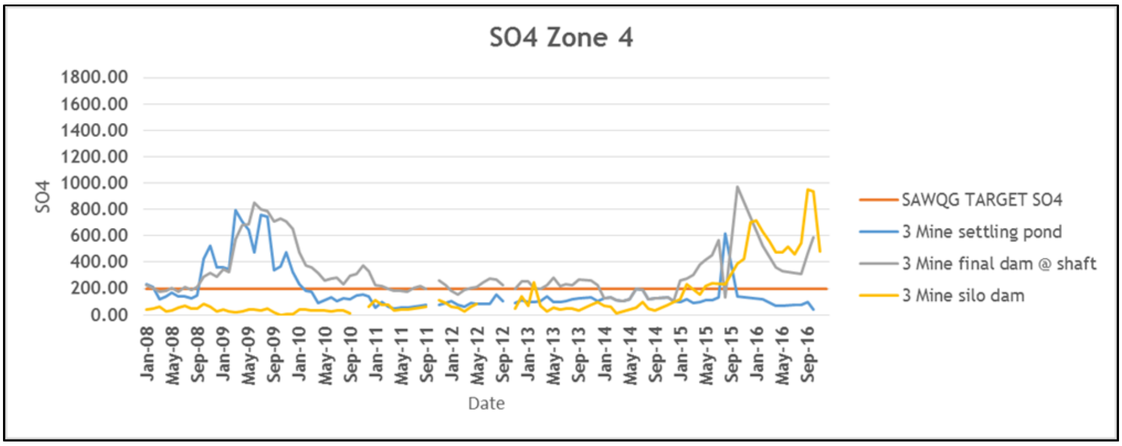


Figure 4.16: Sulphate concentration in surface water monitoring points, Zone 4

4.2.3.5 Zone 5 Surface Water Quality

Monitoring commenced in 2015 and a large variation was observed in water quality over the two monitoring years. There was a decrease in pH, Figure 4.17, from September 2015 to March 2016 but this has since increased to within the SAWQG Limit range.

Iron concentration, Figure 4.18, has decreased during the monitoring period but exceeds the SAWQG Limit. Sodium concentration, Figure 4.19, has decreased but still remains above the limit whereas sulphate concentration, Figure 4.19, also exceeds the limit and has an annual spike during August/July.

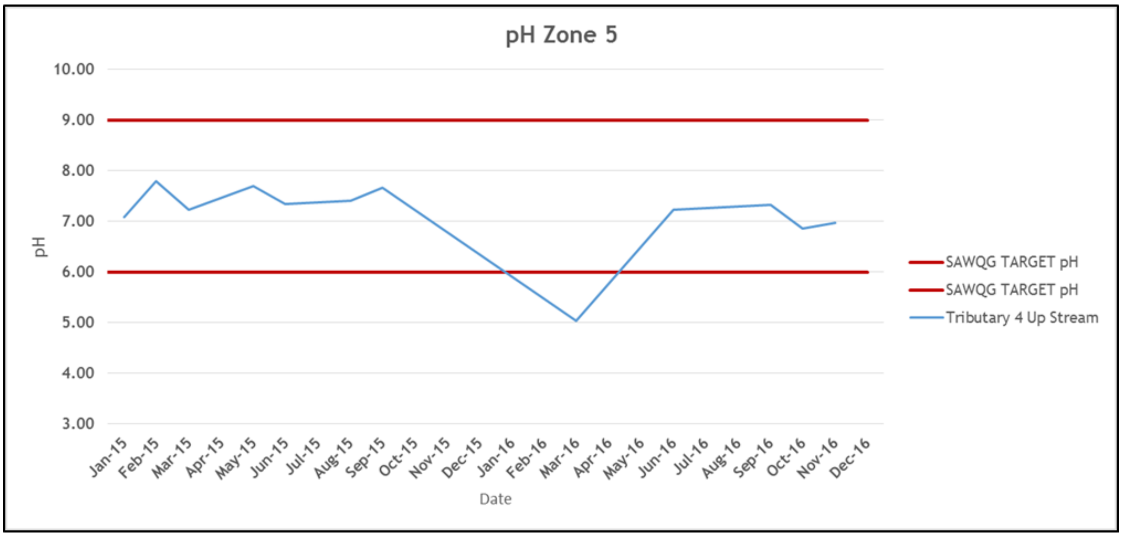


Figure 4.17: pH in surface monitoring pint, Zone 5

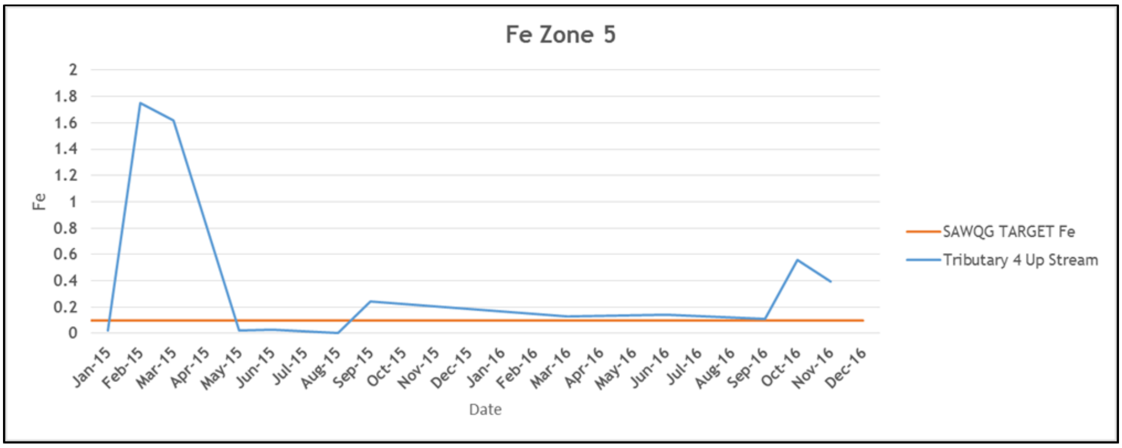


Figure 4.18: Iron concentration in surface water monitoring point, Zone 5

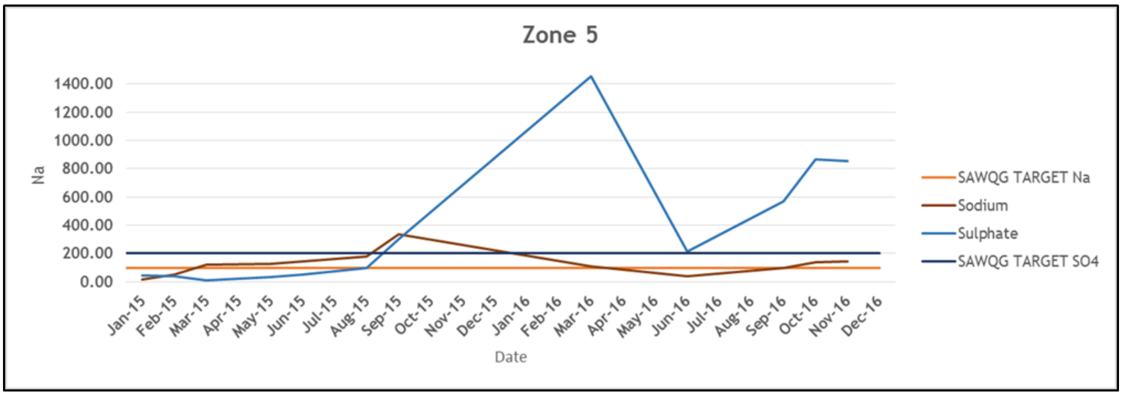


Figure 4.19: Sodium and sulphate concentration in surface water monitoring point, Zone 5

4.2.3.6 Zone 6 Surface Water Quality

Sodium and sulphate concentrations, Figure 4.21, in 1 Mine Settling Pond 1 and 2 increased gradually until a sudden increase in concentration occurred in 2015. The sodium and sulphate concentrations remained constant in Pan 3, Figure 4.22. All three surface monitoring points do however exceed the SAWQG Limits for sodium and sulphate. Iron concentration, Figure 4.20 vary drastically in 1 Mine Settling Pond 1 and 2 with a slight increase occurring in Pan 3.

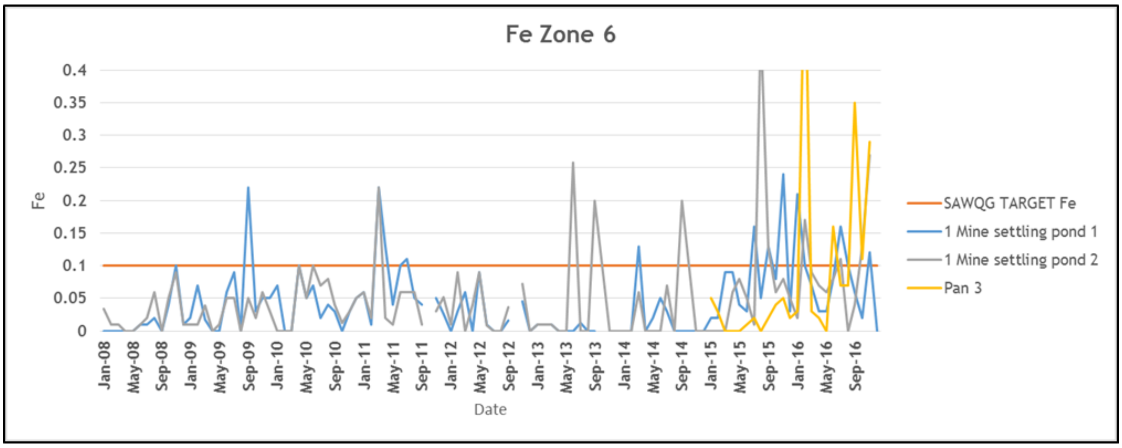


Figure 4.20: Iron concentration in surface water monitoring point, Zone 6

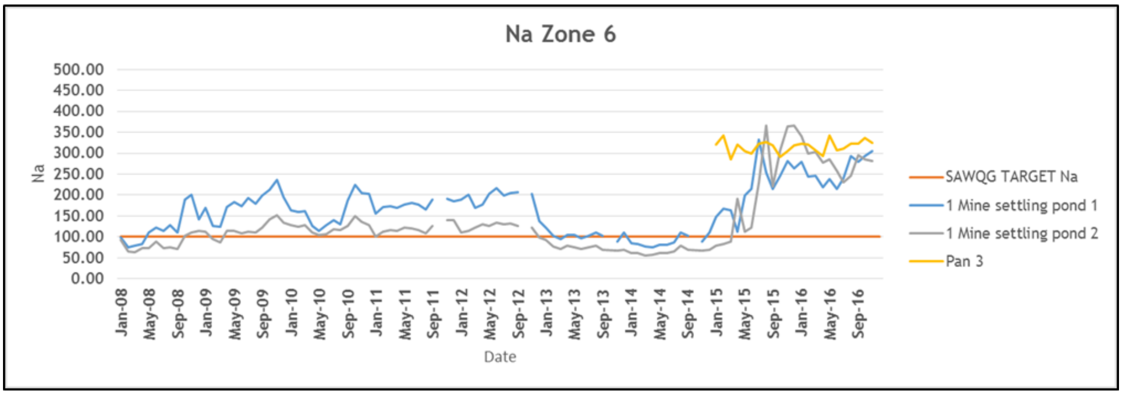


Figure 4.21: Sodium concentration in surface water monitoring point, Zone 6

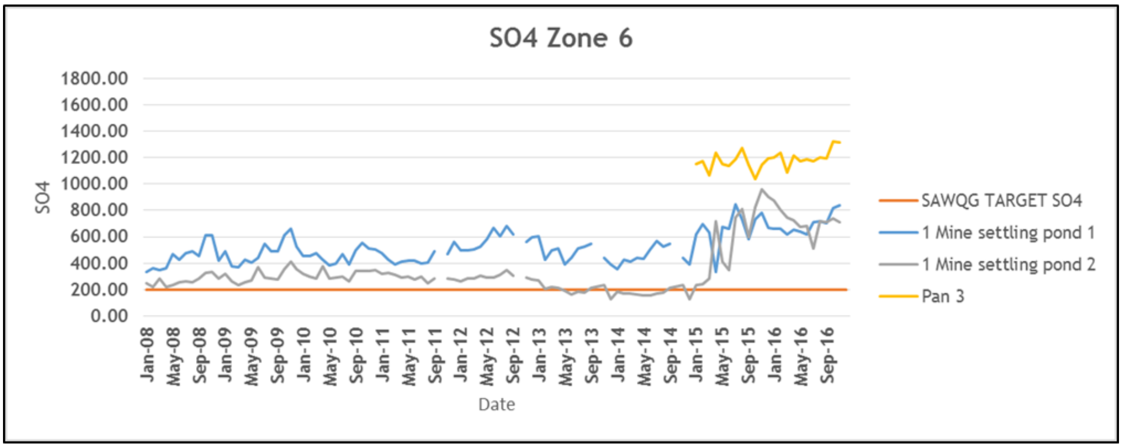


Figure 4.22: Sulphate concentration in surface water monitoring point, Zone 6

4.2.3.7 Zone 7 Surface Water Quality

The sulphate, Figure 4.25, and sodium, Figure 4.24, concentrations in the New Shaft Dam 2 has gradually been increasing with sulphate, exceeding the SAWQG Limits. Of all three dams New Shaft Dam 1 has the highest and most varied iron concentrations, Figure 4.23. Sodium in New Shaft Dam 1 decreased for most of the monitoring period but since September 2016 has started increasing slightly whereas sulphate concentrations were constant until a decrease occurred in July 2016.

The iron concentration, New Shaft Dam 3, remained constant for most of the monitoring period until a sudden increased occurred in October 2016. The sodium and sulphate concentrations, of New Shaft Dam 3, follow the same trend increasing and decreasing at the same time.

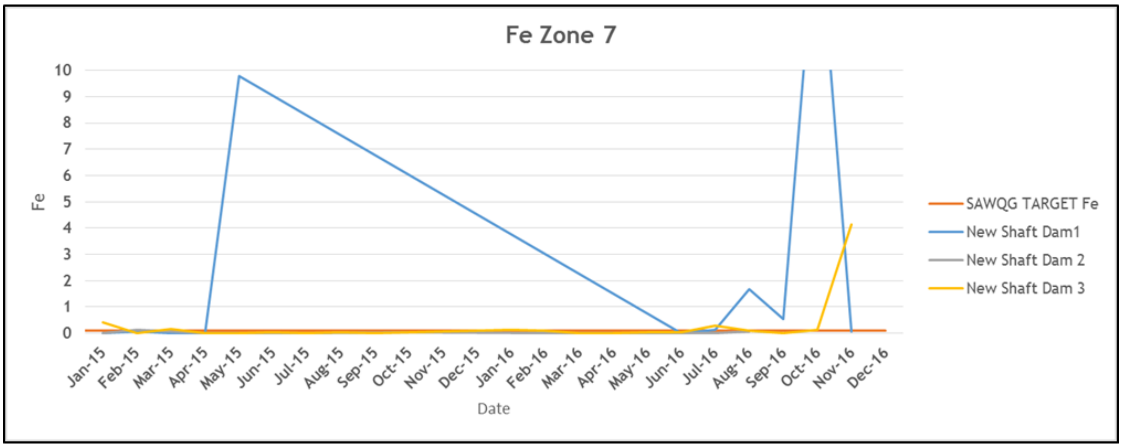


Figure 4.23: Iron concentration in surface water monitoring points, Zone 7

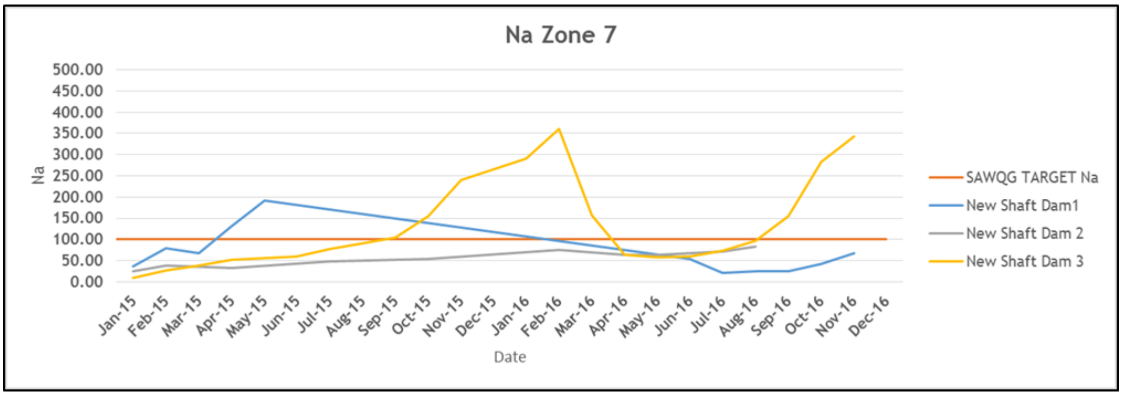


Figure 4.24: Sodium concentration in surface water monitoring points, Zone 7

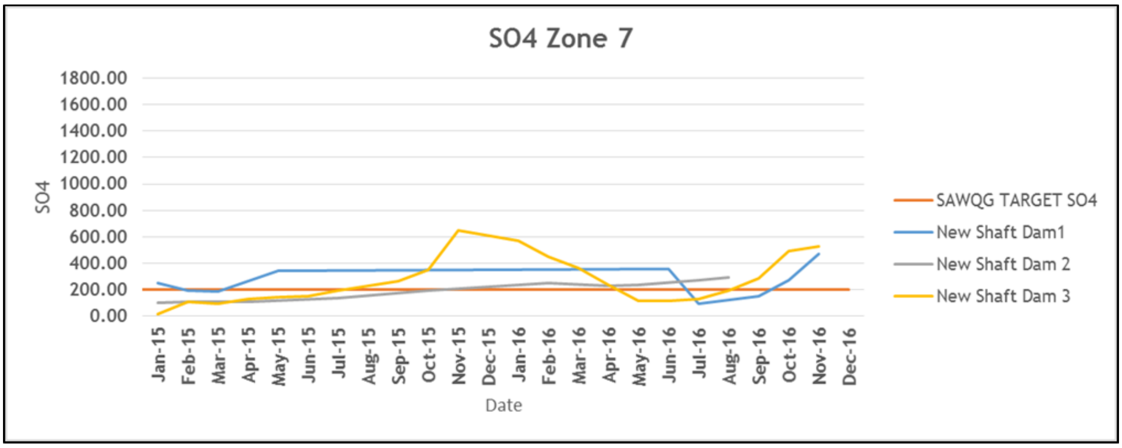


Figure 4.25: Sulphate concentration in surface water monitoring points, Zone 7

4.2.3.8 Zone 8 Surface Water Quality

Zone 8 has one surface water monitoring point, 2 Mine U/P. The iron concentration, Figure 4.26, varies greatly and consistently exceeds the SAWQG Limit. Sodium and sulphate concentrations, Figure 4.27, also vary following similar trends with an irregular increase occurring in 2016.

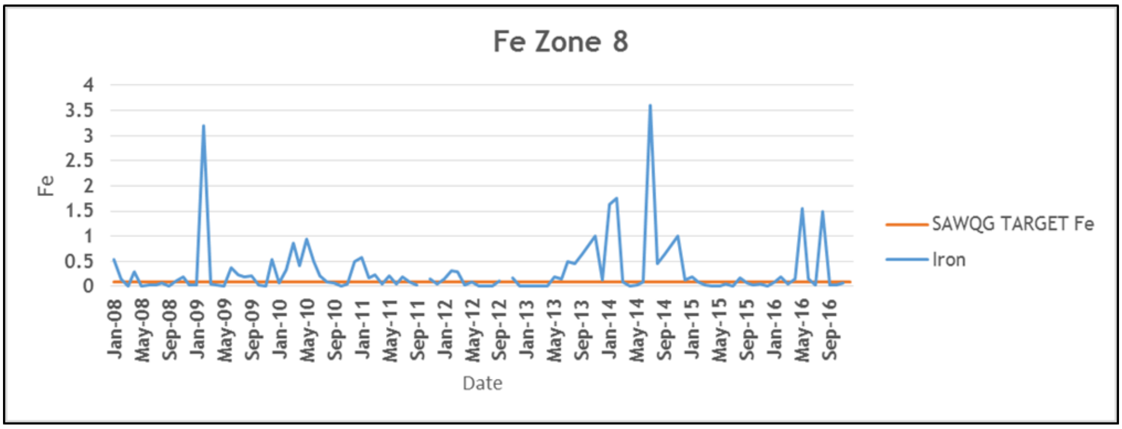


Figure 4.26: Iron concentration in surface water monitoring point, Zone 8

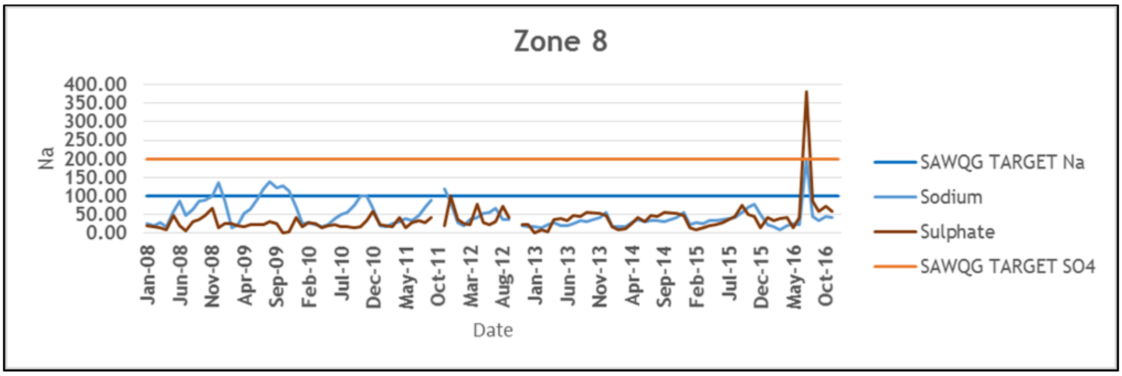


Figure 4.27: Sulphate and sodium concentrations in surface water monitoring point, Zone 8

4.2.3.9 Zone 9 Surface Water Quality

No surface water sampling points are located within zone 1.

4.2.3.10 Drinking Water Monitoring Points

The drinking water samples were not included in their respective zones to allow for a better comparison. 1 Mine Drinking Water and 3 Mine Drinking Water are located in Zone 1 and 3 respectively and 2 Mine Drinking Water is not in an allocated zone. The pH, Figure 4.28, and iron concentration, Figure 4.29, in all three drinking water samples is satisfactory. Turbidity, Figure 4.30, varies in all three drinking water samples but has shown a decrease over the monitoring period.

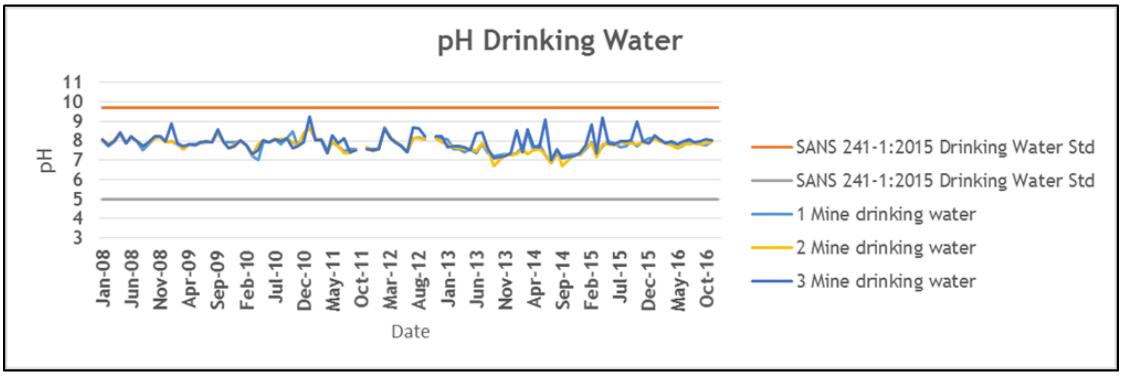


Figure 4.28: pH of all drinking water sampled

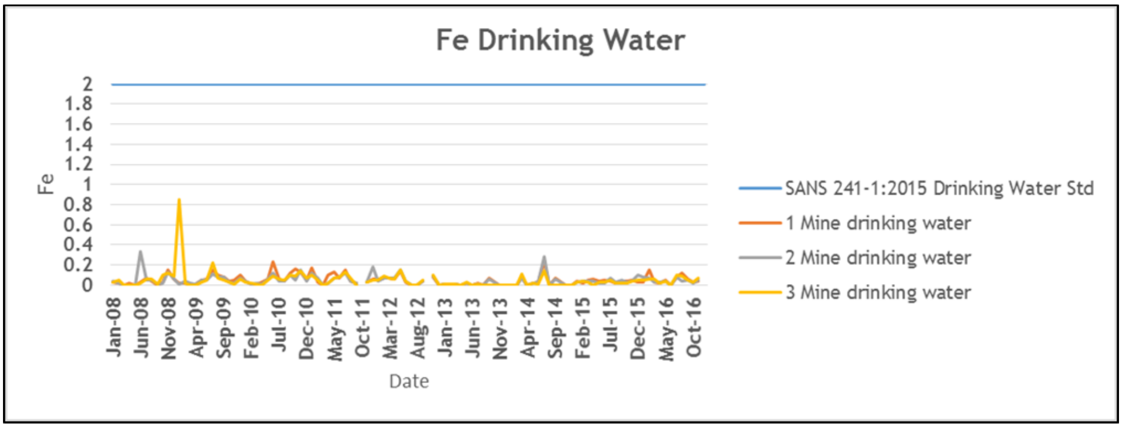


Figure 4.29: Iron concentration of drinking water samples

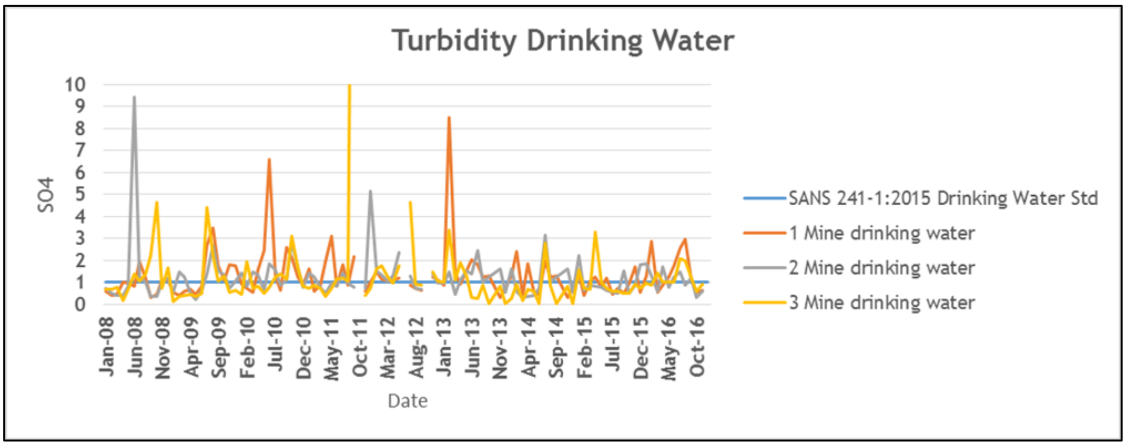


Figure 4.30: Turbidity of drinking water samples

4.2.3.11 Surface Water Quality with no Allocated Zones

A decrease was observed in the sodium, iron and sulphates concentrations of the 'Flow from Power Station'. The Rietspruit Dam showed consistent low sodium and sulphate concentrations with varies iron concentrations. The sampling point, Kriel Ogies Road, is located downstream east of the Matla Mine and shows varying iron, that increased in 2016 and a decrease in sulphates over the monitoring period. The iron, sodium and sulphate concentration, for Kriel Ogies Road monitoring point, can be seen in Figure 8.26 to 8.28.

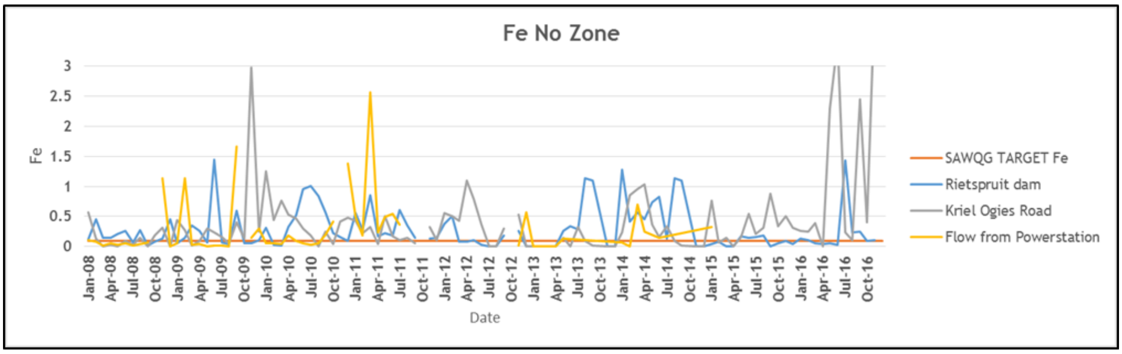


Figure 4.31: Iron concentration in varies unzoned monitoring points

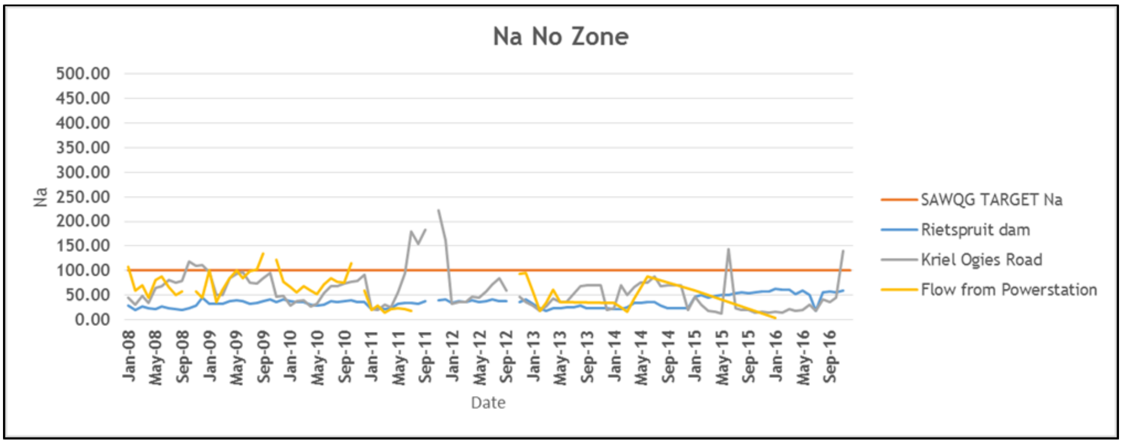


Figure 4.32: Sodium concentration in varies unzoned monitoring points

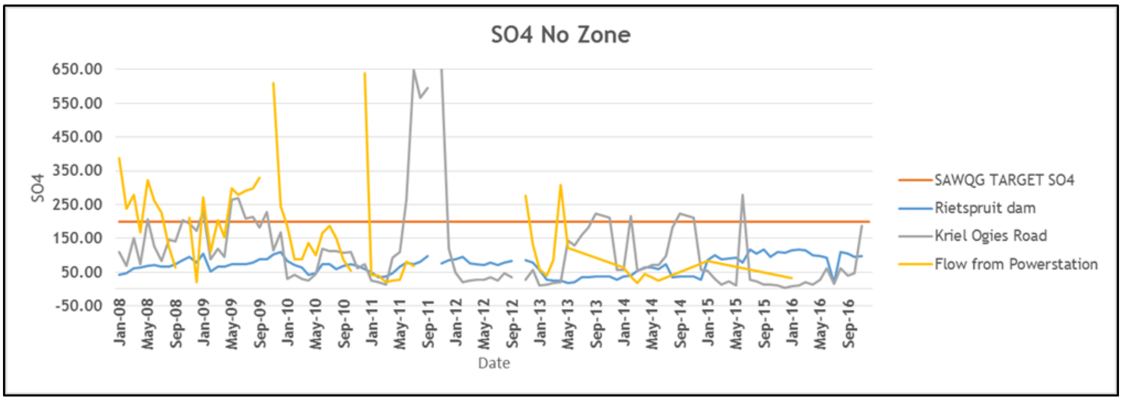


Figure 4.33: Sulphate concentration in varies unzoned monitoring points

4.2.3.12 Overall Conclusions

Table 4.2 summaries all trends seen in each Zone. It is recommended that monitoring in all localities be conducted more consistently as it is difficult to identify trends when there are gaps in monitoring data.

Table 4.2: Summary of Surface Water Quality Trends

Zone	Surface Water Quality	Potable water
Zone 1	N/A	-pH and iron concentration, in 1 Mine Drinking Water, remained satisfactory. - Turbidity varies but has started to decrease.
Zone 2	- The iron concentration, in Box Cut Dam, varied and started to decrease towards the end of the monitoring period. -sodium and sulphate followed the same trends in Box Cut Dam.	N/A
Zone 3	- The iron concentrations decreased in Rietspruit 6 and Discharge 8, remained low in 2 Mine Dam and 2 mine pan and remained consistently elevated in Rietspruit 7. - Sodium concentration decreased in 2 Mine Dam and remained consistently elevated in 2 Mine pan. - Sulphate concentrations decreased in 2 Mine Dam and slightly increased in 2 Mine pan.	-pH and iron concentration, in 3 Mine Drinking Water, remained satisfactory. - Turbidity varies but has started to decrease.
Zone 4	- Iron concentrations decreased in 3 Mine silo dam since 2015 and increased in 3 Mine final dam @ shaft in 2015. - Sodium concentration increased in all three surface monitoring points during the monitoring period. - Sulphate concentration decreased in 3 Mine settling pond whereas it increased in 3 Mine final dam @ shaft and 3 Mine silo dam.	N/A
Zone 5	-Tributary 4 up stream, showed a decrease in both iron and sodium concentrations and an increase in sulphate concentration.	N/A
Zone 6	- Iron concentrations increased in all three surface monitoring points. - Sodium and sulphate concentration increased in 1 Mine settling pond 1 and 1 Mine settling pond 2. - Sodium and sulphate concentration remained constant in Pan 3.	N/A
Zone 7	- iron concentration started increasing in 2016 in New Shaft Dam 3 and varies greatly in New Shaft Dam 1. - Sulphate concentration increased in all three surface monitoring points. - Sodium increased in New Shaft Dam 3, decreased in New Shaft Dam 1 and showed a slight increase in New Shaft Dam 2.	N/A
Zone 8	-In 3 Mine U/S iron concentration decreased and sodium and sulphates concentrations remained constant.	N/A
Zone 9	N/A	N/A
Un-zoned localities	A decrease is observed in the sodium, iron and sulphates concentrations of the Flow from Power Station. - The Rietspruit Dam showed consistent low sodium and sulphate concentrations with variations in iron concentrations. - Kriel Ogies Road shows varying iron, that has increased in 2016 and a decrease in sulphates has also occurred.	-pH and iron concentration, in 2 Mine Drinking Water, remained satisfactory. - Turbidity varies but has started to decrease.

4.2.4 Mean Annual Runoff

The project area falls within the quaternary catchments B11D, B11E and B20E, with majority of the Matla Mine boundary falling within quaternary catchment B11E. The quaternary catchments B11D, B11E and B20E have a net mean annual runoff (MAR) of 24.56 million cubic meters (mcm), 20.68 mcm and 19.28 mcm respectively (WR2005).

4.2.4.1 Floodlines

The HEC-RAS hydraulic programme was used for the purposes of routing the peak flows resulting from the 1:50 year and 1:100 year storm event through the identified watercourses/rivers. HEC-RAS is a hydraulic programme used to perform one-dimensional hydraulic calculations for a range of applications, from a single watercourse to a full network of natural or constructed channels. The software is used worldwide and has consequently been thoroughly tested through numerous case studies.

HEC-GeoRAS is an extension of HEC-RAS which utilises the ArcGIS environment. The HEC-GeoRAS extension is used to extract the cross sections and river profiles from a Digital Elevation Model (DEM) for export into HEC-RAS for modelling, and is used again to project the modelled flood levels back onto the DEM to generate the extent of flooding.

Floodline for the Matla project area where undertaken by GSC (GCS, 2015) and is indicated below in Figure 4.34. Additional floodline delineation, adjacent to the New Mine 1 Area, was undertaken for the drainages flowing along the north eastern boundary (see Figure 4.35) by Golder (Golder, 2013).

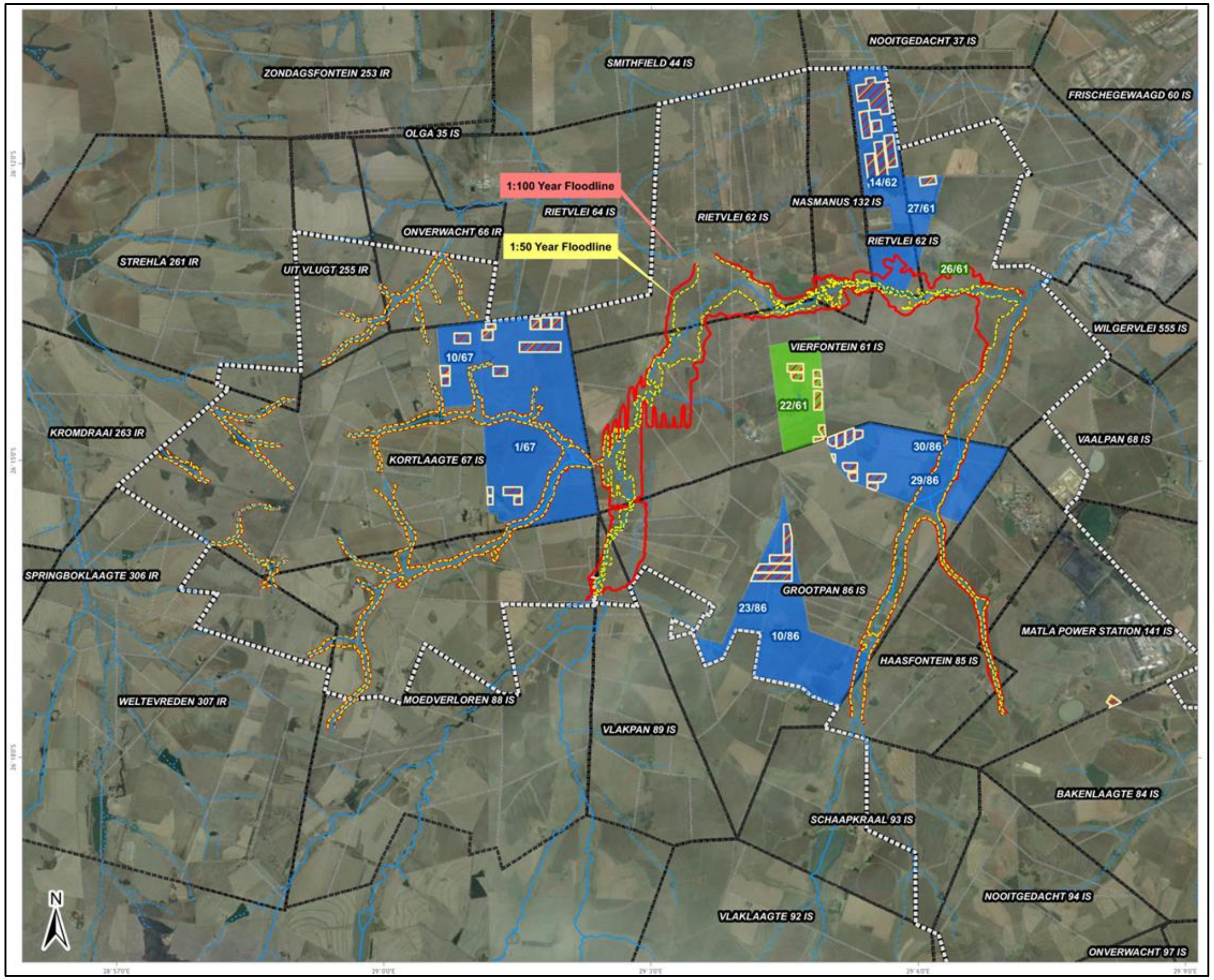


Figure 4.34: Summary of floodlines completed (GCS, 2015)

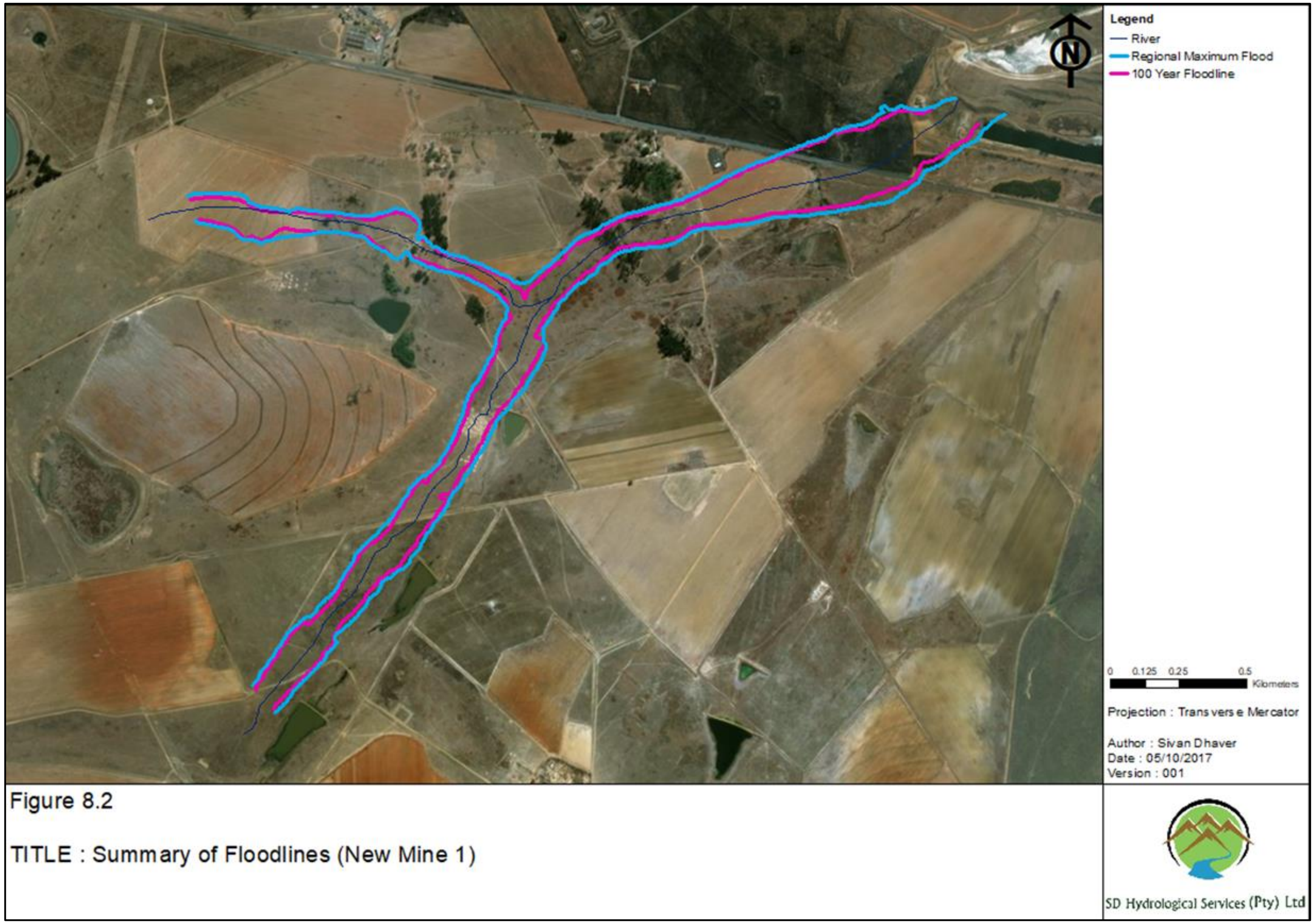


Figure 4.35: Summary of floodlines (New Mine 1), (Golder, 2013)

4.2.5 Receiving Water Quality Objectives

The proposed classes and resource quality objectives for catchments of the Olifants were issued on 22 April 2016 (GN 466), in terms Section 13(4) of the NWA. The Resource Quality Objectives (RQOs), as outlined in this gazette, were applicable from the date of approval by the Minister. As part of these classes, Integrated Units of Analysis (IUAs) were classified in terms of the following:

- Class I (Minimally used):
  - Water resource is one which is minimally used and the overall condition of that water resource is minimally altered from its pre-development condition.
- Class II (Moderately used):
  - Water resource is one which is moderately used and the overall condition of that water resource is moderately altered from its pre-development condition.
- Class III (Heavily used):
  - Water resource is one which is heavily used and the overall condition of that water resource is significantly altered from its pre-development condition.

The watercourses that are applicable to the Matla study area form part of the Upper Olifants River Catchment. The proposed classification of the Upper Olifants River catchment is Class III, requiring sustainable minimal protection and indicating high utilisation. In terms of report No. RDM/WMA04/00/CON/RQO/0613 from DWS (October, 2014), the Upper Olifants River Catchment has the following RQO which applies to the regional rivers in the Olifants WMA (Table 4.3):

Table 4.3: RQO applies for the regional rivers in the Olifants WMA

IUA	RQO
1 (Upper Olifants River Catchment)	The water quality, quantity and habitat of the headwater streams in this IUA are heavily impacted on by land use and mining activities. Increasing nutrients, salts and likely toxins are having a negative impact on the ecosystem and need to be managed at a D or better ecological category so that instream ecosystem structure and functioning is not suppressed. The loss of alkalinity in the water as a result of mining activities poses a threat of acidification of the ecosystem, thus alkalinity concentrations must be kept high enough to prevent this from happening. The consumption of fish harvested from rivers in the IUA must not pose a threat to human health. Riparian habitat is also negatively impacted in the IUA and needs to be maintained in a D or better ecological category. The recommended ecological category (REC) of any river reach as described in the Classification (Annexure A of the report No. RDM/WMA04/00/CON/RQO/0613) must be adhered to unless superseded by the detailed Resource Quality Objectives for the RUs below. The consumption of fish in this IUA must not pose a threat to human health.

The Water Resource Classes per IUA and Ecological Categories per Biophysical Node are presented in Table 4.4. No chemical parameter limits in terms of RQOs were set for the directly relevant nodes. The closest site to Matla, in terms of RQOs that was presented in GN 466 is HN9 - Olifants (releases from Witbank Dam).

As such, the RQOs for these sites needs to be considered for the Matla consolidation. The RQOs for these two sites is provided in Table 4.5.

Table 4.4: Water Resource Classes per IUA and Ecological Categories per Biophysical Node

IUA	Water Resource Class	Biophysical Node Name	Quaternary Catchment	River Name	Ecological Category to be maintained
Upper Olifants River Catchment	III	HN1	B11A, B11B	Olifants (confluence with Steenkoolspruit)	C
		HN2	B11C	Piekespruit (confluence with Steenkoolspruit)	B
		HN3	B11D	Dwars-indieWegspruit (confluence with Trichardtspruit)	C
		HN4	B11D	Steenkoolspruit (outlet of quaternary)	D
		HN5	B11E	Blesbokspruit (confluence with Rietspruit)	B
		HN6	B11E	Steenkoolspruit (confluence with Olifants)	D
		HN7	B11F	Olifants (outlet of quaternary)	D
		EWR site - NOU-EWR1	**B11G**	**Noupoortspruit**	**C/D**
		HN9	B11G	Olifants (releases from Witbank Dam)	D
		HN10	B11H	Spookspruit (confluence with Olifants)	C
		EWR site 1	**B11J**	**Olifants**	**D**
		HN12	B11K, B11L	Klipspruit (confluence with Olifants)	D
		HN14	B12A	Boschmansfontein (confluence with Klein Olifants)	C
		HN15	B12A	Klein Olifants (outlet of quaternary)	C
		HN16	B12B	Klein Olifants (outlet of quaternary)	D
		OLI-EWR1 (Rapid site)	**B12C**	**Klein Olifants**	**C**
		HN18	B12C	Klein Olifants (releases from Middelburg Dam)	D
		HN19	B12D	Vaalbankspruit (confluence with Klein Olifants)	D
		HN20	B12D	Klein Olifants (outlet of quaternary)	D

Table 4.5: RQOs for sites relevant to Matla

IUA	Class	Biophysical Node Name	River	REC	RQO	Indicator/ Measure	Numerical Limits
1	III	HN9	Olifants (releases from Witbank Dam)	D	Nutrient concentrations must be maintained in the river at mesotrophic or better levels	Phosphate(PO_4)	≤ 0.125 mg/L P
						Nitrate (NO_3) & Nitrite (NO_2)	≤4.00 mg/L N
						Total Ammonia	≤0.100 mg/L N
					Salt concentrations need to be maintained at levels where they do not render the ecosystem unsustainable.	Sulphates	≤ 500 mg/L
						Electrical conductivity	≤ 111 mS/m
					Alkalinity must be maintained at concentrations which do not allow for a dramatic rise in acidity.	Alkalinity	≥ 60 mg/L $CaCO_3$
						Turbidity	≤ 10 NTU
						Dissolved Oxygen	≥ 6.5 mg/L O_2
					Toxicity levels must comply with the fitness for use which is acceptable for lifetime consumption (Class 1#) after treatment in the existing infrastructure.	F	≤ 3.00 mg/L
						Al	≤ 0.150 mg/L
						As	≤ 130 mg/L
						Cd hard	≤ 5.0 µg/L
						Cr(VI)	≤ 200 µg/L
						Cu hard	≤ 8.0 µg/L
						Hg	≤ 1.70 µg/L
						Mn	≤ 1.300 mg/L
						Pb hard	≤ 13.0 µg/L
						Se	≤ 0.030 mg/L
						Zn	≤ 36.0 µg/L
						Chlorine	≤ 5.0 µg/L free Cl
						Endosulfan	≤ 0.20 µg/L
						Atrazine	≤ 100.0 µg/L

4.2.6 Resource Class and River Health

The Upper Olifants River Catchment is characterised by intensive coal mining and an associated energy and manufacturing economy. The IUA is highly used and impacted. As previously stated, this IUA has a recommended class of III. The Ecological Importance (EI), Ecological Sensitivity (ES), Present Ecological Status (PES) and recommended Ecological Class to be maintained for sites relevant the Matla study area are presented in Table 4.6. This table is a combination of information presented in DWS reports (report No. DM/WMA04/00/CON/CLA/0213 & RDM/WMA04/00/CON/RQO/0613) and GN 466.

Table 4.6: IUA 1 - Upper Olifants: Summary of Eco-Classification and EWR

Node	Quaternary	River	EI	ES	PES	Ecological Class to be maintained
HN3	B11D	Dwars-indieWegspruit (confluence with Trichardtspruit)	Moderate	High	C	C
HN4	B11D	Steenkoolspruit (outlet of quaternary)	Moderate	High	D	D
HN5	B11E	Blesbokspruit (confluence with Rietspruit)	High	High	B	B

4.2.7 Surface Water User Survey

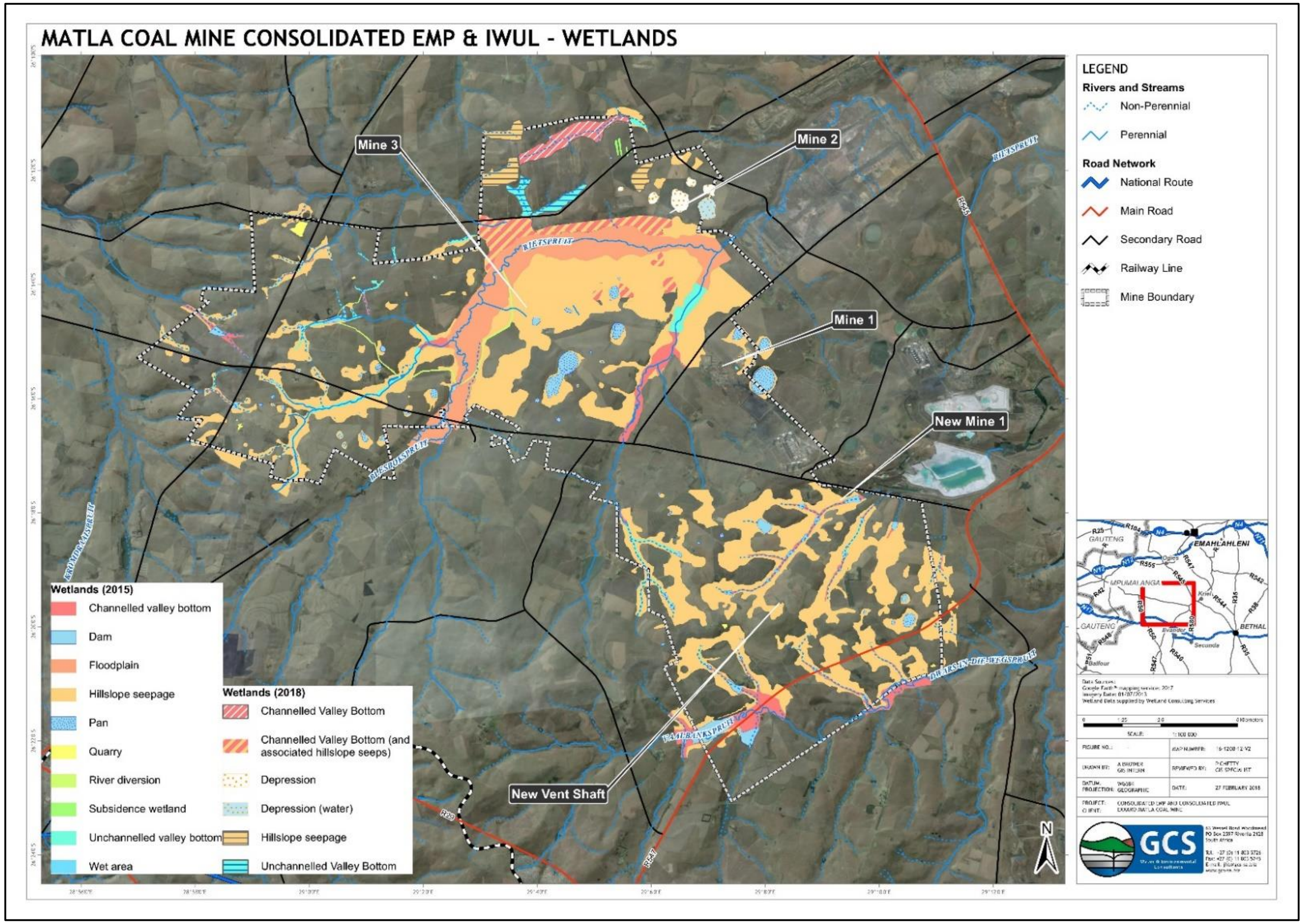
As previously stated in Section 4.2.6 and 4.2.7, the Upper Olifants River Catchment is characterised by intensive coal mining and an associated energy and manufacturing economy. The IUA is highly used and impacted.

The stooping uses that are applicable to this application will take place underground and will only occur on properties owned by Exxaro or Eskom. All other new water uses are proposed to take place within the approved infrastructure areas. All water uses will take place within the mining right area of Matla.

4.3 Sensitive Areas (Wetlands)

The information contained in this section of the report was obtained from the various previous wetland reports compiled and submitted for the Matla operations. These reports and assessments have been attached in Annexure H to this report. The 2015 wetland delineation and assessment study update conducted by Wetland Consulting Services (Pty) Ltd, attached herewith in Annexure H, provided the information required for the stooping uses

Based on the various studies conducted, all of the identified and delineated wetlands for the Matla Mining Right Area are presented in Figure 4.36.



(Map not to scale, please refer to Annexure Q for A3 Maps)

Figure 4.36: Delineated wetlands of the entire Matla Mining Right Area

The Matla Coal field is situated in the Blesbokspruit / Rietspruit River Catchment area. The Blesbok/Rietspruit wetland is one of three extensive alluvial wetland systems in the Upper Olifants River Catchment. The topography comprises broad valleys and wetland formed of shallow sloping gradients and hillslope seepage wetlands.

The most common wetland type within the overall Matla Mining Right Area was assessed to be hillslope seepage wetlands. This is followed by valley bottom wetlands, pan wetlands, and dams. The high percentage of hillslope seepage wetlands observed is partly due to the fact that hillslope seepage wetlands typically form the majority of wetland habitats within the Mpumalanga Highveld.

4.3.1 Previous Wetland Assessments

Previous wetland assessments and investigations were conducted for the various Matla operations. These previous reports have been consulted in order to gain a more holistic overview of the type of wetlands that occur within the Matla Mining Right Area.

4.3.1.1 River Diversion Wetland Assessment

As per the Ecological Wetland Assessment compiled by ECOSUN CC. in April 2006, for the River Diversion IWULA, the following was determined:

- All of the Matla wetlands that were affected by the river diversion formed part of the Rietspruit catchment;
- Valley bottom wetland systems were the dominant wetland types assessed for the River Diversion. However, there were also occurrences of hillslope seepage wetlands within the study area;
- The Blesbokspruit wetland was assessed to be degraded due to the following factors:
  - Poor land management
  - Constriction of flows under bridges
  - Subsidence from mining; and
  - Interception of flows in dams.
- Despite substantial plant and avifaunal species richness, the wetlands have been subjected to anthropogenic impacts for a long time, resulting in an overall impoverishment of the biota. This affected their conservation status which was considered to be a ‘moderate’; and
- Due to the planned diversion, it was recommended that, in order to retain the diversity of wetlands within the Upper Olifants River Catchment, a site containing the remaining threatened wetland types be conserved, According to Palmer *et al.* (2002), the only other site within the Upper Olifants River Catchment observed to contain the remaining examples of seasonally inundated non-channelled valley

bottom floodplain and non-channelled riparian wetlands was identified north of the town of Bethal. It was recommended that this site be conserved so as to retain the wetland diversity of the Upper Olifants River Catchment.

As open cast mining would have completely destroyed the ecological integrity of the study area, short wall mining techniques combined with a river diversion with control release of water through the wetland were implemented as a way of mitigation (Golder Report 11613447-12099-1, 2013).

Biomonitoring has been conducted on the River Diversion, as per the relevant IWUL (No. 24084303). Refer to Section 5.4 for the biomonitoring assessment results.

Matla Wetland Monitoring and Management Plan

In order to meet the requirements stipulated by the previous IWUL issued for the river diversion, and RoD a Wetland Monitoring and Management Plan (WMMP) was proposed by Golder in 2010. The report has been attached as part of Annexure H. The study area that formed part of this WMMP is provided in Figure 4.37.

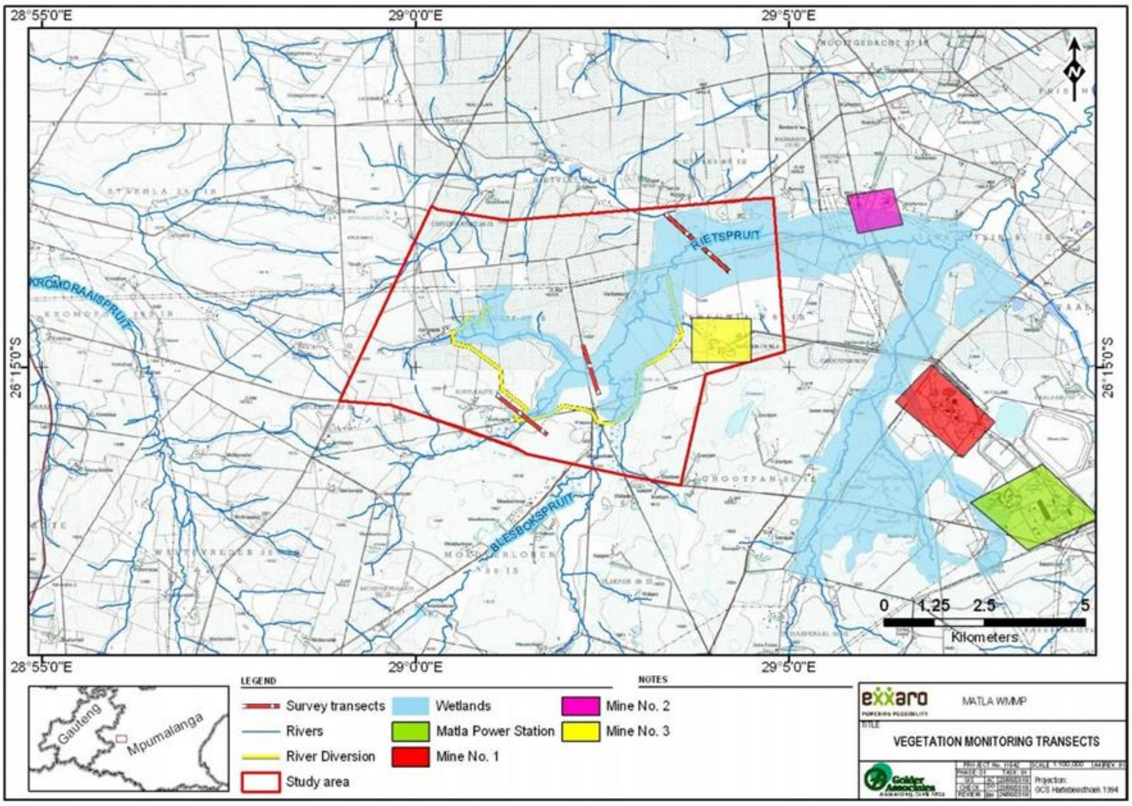


Figure 4.37: WMMP Study Area

Overall, the aim of this study was to understand the biodiversity and functioning of the affected wetlands and compile a dynamic management plan for the monitoring and management of the wetland areas. As part of this report, a detailed monitoring programme and reporting schedule was provided (refer to Section 6.6 of this report for this schedule). This monitoring programme and schedule deals with the following types of monitoring:

- In-stream monitoring;
- Out of stream monitoring;
- Surface water monitoring;
- Groundwater monitoring; and
- Additional ground and surface water monitoring points

Overall it was recommended that this be seen and used in collaboration with the other environmental and water management tools that Matla have in place namely; the EMP, IWULs and IWWMP. It was further recommended that the WMMP be expanded into a Biodiversity Action Plan or used with the Biodiversity Action Plan.

Matla Mine River Diversion Erosion Assessment and Recommended Rehabilitation Interventions

An investigation was conducted in 2017 by Digby Wells along the River Diversion at Mine 3 (attached as part of Annexure H). The aim of the assessment was to identify areas that require rehabilitation interventions and provide recommendations for measures could be implemented. As part of this investigation the following was undertaken:

- An infield assessment along the Matla Mine River Diversion at Mine No.3 to assess erosion damage, as well as damage to gabions and other related structures within the constructed river diversion;
- To conceptually calculate the material balance per erosion area and/or damaged structures identified within the river diversion to recommend rehabilitation interventions within the river diversion;
- Compile and submit a rehabilitation report containing rehabilitation interventions and recommendations per identified area in order the rehabilitation intervention of eroded areas and/or gabions and other related structures;
- Presentation to Mine Management of the draft findings of the assessment prior to finalisation; and
- Provide estimated costs to implement the recommended rehabilitation interventions.

Based on the findings of the assessment, it was determined that the eastern side of the diversion would require minimal remedial work to be undertaken and that most of the diversion was stable and in a good functional condition. One area of concern within the eastern section of the diversion was an area that contained alien invasive plant species that would need to be eradicated and controlled; besides this majority of this section of the diversion was good.

The western portion of the diversion however has more significant remedial actions that will be required. Severe erosion was evident further down the diversion and may require engineering input and earth moving machinery to assist with the repairs and rehabilitation of this section of the diversion.

As for the proposed stooping areas, very little remedial action can be implemented, however understanding the severity of the impact will assist with providing some possible migratory measures and will determine what the end land use should be. As a minimum, the areas impacted by stooping should be free draining and that cracks are sealed appropriately.

Based on the assessment undertaken the following recommendations are provided:

- Undertake a detailed risk assessment to determine the severity of impacts that will occur as a result of stooping areas. In addition to this modelling can be undertaken to predict the severity of the collapse, which could be included into the risk assessment;
- Appointment of an engineering firm to assist with designs for areas of the diversion that will require significant work to be undertaken;
- Monitoring of the diversion on an annual basis to identify areas of erosion and implement remedial action as required;
- Control of alien invasive plant species along the entire diversion; and
- Limit access of cattle to the diversion as this has assisted in damage that has occurred to the diversion.

4.3.1.2 New Mine 1 Shaft Wetland Assessment

A report was conducted in June 2008 for the new Matla No.1 shaft by Golder (Report No. 10749). The following observations and assessments were made for the study area:

- The study sites were relatively poor with regard to both faunal and floral species richness. Although this area is not classified as a high biodiversity area, biodiversity in the area has been further reduced due to destruction of habitat in order to cultivate mainly maize, but also other commercial crops such as potatoes and sugar beans. Further destruction of habitat has occurred in some areas due to overgrazing, although only a few small areas still exist where habitat has not been cleared to make way for maize fields. Wetlands in the area have been heavily impacted upon by the adjacent agricultural practices. These agricultural practices affect the pans by changing the hydrology of the area due to increased transpiration, increased turbidity and siltation of the pans due to runoff from exposed soil in surrounding ploughed fields and increased nutrient levels due to leaching of surrounding ploughed fields and dissolved fertiliser in the water runoff;

- The impact of proposed new Mine 1 shaft will be significant without mitigation, especially in the area of the infrastructure where the long term loss of biodiversity would be total, and the lost biodiversity due to the mining would be unrecoverable. Although the local impacts are, as mentioned high, the area is already impacted to a large extent and the loss of biodiversity would be considerably less than it would be at a more natural site in this area; and
- Due to the fact that investigations of this nature are but "snapshot" surveys during an annual seasonal cycle, results are purely indicative of the biological biodiversity. Following this, due to the highly degraded nature of the site, the complete extent of this impact as well as the number of species that will be impacted upon can be determined without the aid of an extensive study.

4.3.1.3 WTP and Brine Ponds Wetland Assessment

A further wetland investigation report was conducted in 2011 for the Water Treatment Plant (WTP) and associated Brine Ponds. This study was undertaken and compiled by Wetland Consulting Services (Pty) Ltd. The WTP was constructed to deal with the increasing volumes of decant and dirty water generated by current and past mining activities. The three potential sites for the WTP that had been identified as possible locations were assessed as part of the study. All three sites assessed were located north of the power station (Figure 4.38).

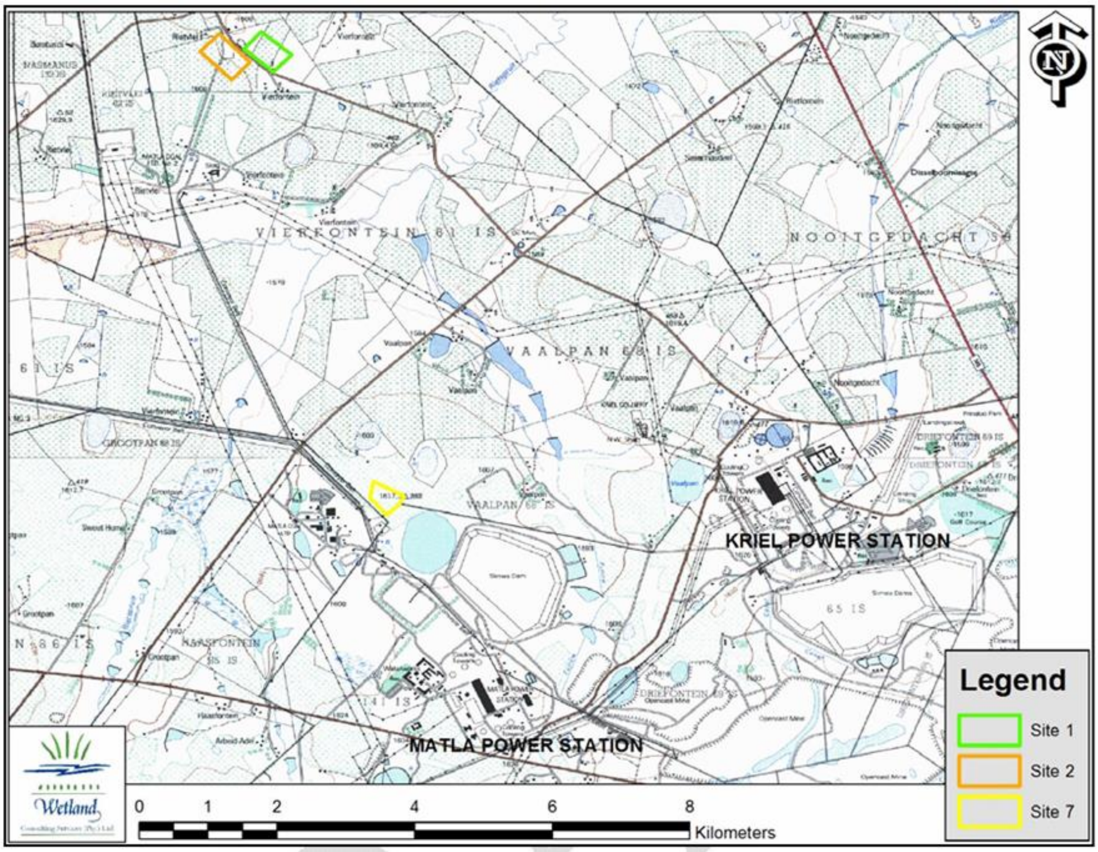


Figure 4.38: Location of three sites for WTP (Wetland Consulting Services, 2008)

The following assessments and observations were made regarding the three sites:

- The wetlands within the three sites, are considered to conform to the Eastern Temperate Freshwater Wetlands vegetation type;
- Hillslope seepage wetlands were identified on all three of the sites;
- In the case of Sites 1 and 2, only hillslope seepage wetlands were identified within 500m of the proposed sites, though a channelled valley bottom wetland, a tributary to the Rietspruit, flows past approximately 700m to the north of the two sites.
- In the case of Site 7, in addition to several hillslope seepage wetlands, a total of 4 pans were found to occur within 500m of the proposed site.
- Site 7 was selected as the preferred site;
- Roughly 5.7 ha of hillslope seepage wetland were identified and delineated within the boundaries of Site 7 (Table 4.7), while a total of almost 50 ha of wetland, including part of 4 pans, were identified within a 500m radius of the site.
- The wetlands on site have been seriously impacted by agricultural activities, with the majority of the wetlands being currently under cultivation and the remaining extent having been previously cultivated and being characterised by planted pastures. The wetland on site, at site 7, is considered to be of Low ecological importance and sensitivity. However, especially the two larger pans located to the north of the site

but within 500m of the site boundaries, are considered to be of High ecological importance and sensitivity (refer also to the specialist aquatic ecosystems report).

- The WTP and Brine Ponds development on Site 7, would unavoidably result in the loss of the wetland habitat on site.
- The proposed WTP was also identified and expected to have a positive impact in terms of water quality as the poor quality mine water would no longer discharge into the environment (be it surface water or groundwater) untreated.

Table 4.7: Extent of Wetlands delineated within the three sites

Site	Size of site (Ha)	Extent of wetlands on site	% of wetlands on site	Extent of wetlands within 500m (Ha)
Site 1	15.60	9.11	58.4%	79.94
Site 2	18.34	5.35	29.2%	54.37
Site 7	10.21	5.73	56.1%	49.24

4.3.1.4 Wetland Offset Strategy and Rehabilitation Plan

A wetland offset strategy and rehabilitation plan, dated January 2018, was developed for the WTP and brine ponds, by Digby Wells. This report has been included in Annexure H. The wetland offset plan was compiled in order to deal with the wetland loss and/or impacts associated with the Matla Water Treatment Plant (MWTP) and its related infrastructure by identifying potential candidate wetlands on site for rehabilitation purposes.

During the construction of the MWTP, a hillslope seep and a pan, situated within the footprint area of the two brine ponds, were impacted and almost totally destroyed. This resulted in the loss of 13.2ha of wetlands. To compensate for the loss of wetlands and wetland functionality, DWS has included a condition in the approved Water Use License (WUL) that a wetland offset and rehabilitation plan should be compiled and submitted to the DWS for approval prior to implementation.

The Present Ecological State (PES) of the impacted seep was ‘E’ (seriously modified) and for the pan/depression was ‘D’ (largely modified). The Ecological Importance and Sensitivity (EIS) of the pan/depression and seep was ‘D’ (low). The low integrity and functionality scores were due largely to the impacts of crops agriculture within the buffer and the actual wetland area.

The South African National Biodiversity Institute (SANBI) and the DWS have compiled and published a Best Practice: Wetland Offset Guideline (DWS and SANBI 2013) and wetland offset calculator to determine hectare equivalents to compensate for wetlands that have been lost or impacted by development. This Best Practice: Wetland Offset Guideline and offset calculator was utilised and implemented as part of this study.

Due to the functionality of the wetland area that was lost already being impaired prior to construction, a total of 5.1 hectare equivalents will be required as a minimum to compensate for this loss. This calculation is based on the wetland offset calculator results and Best Practice Wetland Offset Guideline. The consequence of this is that this area (single wetland) should be rehabilitated to a point that the PES and EIS can be improved by at least one category.

Three sites were investigated to select a candidate wetland offset. All three of these sites are located within the Matla Coal Mine's Mining Right area and within close proximity to the impacted wetland. The candidate wetland offset sites are provided in Figure 4.39.

The surface rights of the wetland areas belong to Eskom and three private farmers. While option 1 was regarded as the most suitable wetland for offsetting with the highest net gain in hectare equivalents (net gain is expected to be 1.8 hectare equivalents more than the minimum requirement of 5.1 hectare equivalents), landowner consent could not be obtained. Similarly, option 2 was regarded as unsuitable as all portions of this wetland require landowner consent for the proposed rehabilitation activities. Thus, option 3 (also referred to as Pan 3) was investigated and focussed on in this report. This wetland offset project will result in an improvement in wetland functionality of the rehabilitated offset wetland and will contribute to biodiversity maintenance in the area due to improved habitat. The proposed rehabilitation interventions include: the establishment of a buffer area around the wetland and the consequent removal of crops, ripping and re-profiling of roads within the offset area, ripping and re-profiling of areas affected by active erosion, the removal of alien forbs by mechanical means and the re-vegetation of cleared, ripped and re-profiled areas using hydrophilic (wetland / water associated) grass and sedge species that are native to the Highveld grasslands. Species recommended include: *Agrostis lachnantha, Andropogon appendiculatus, A. eucomus, Cynodon dactylon, Eragrostis spp*. and *Juncus* spp. Monitoring is regarded as imperative to ensure that rehabilitation is a success.

Monitoring guidelines have been presented and should take at up to 7 years.

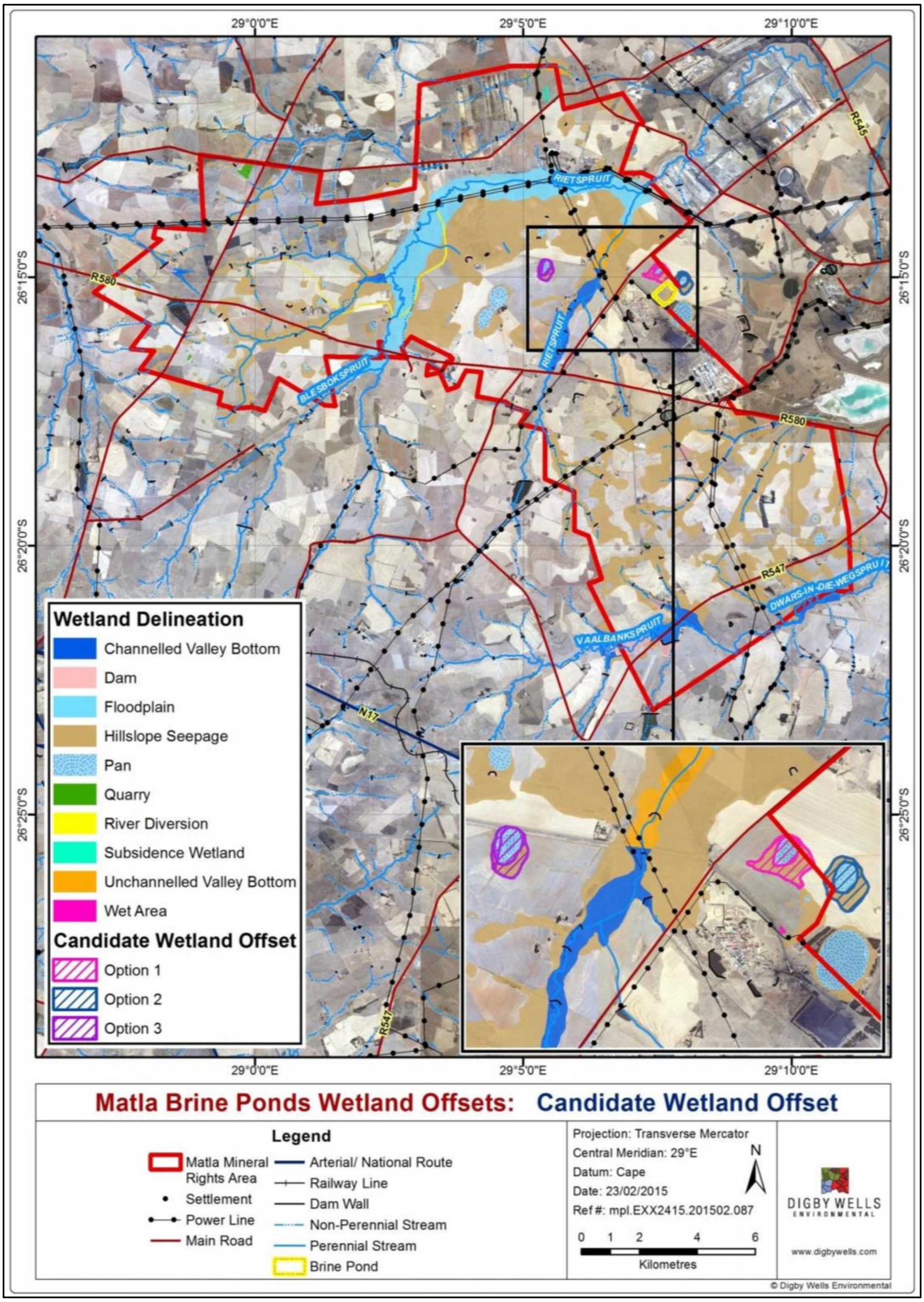


Figure 4.39: Candidate Offset Wetland Areas

4.3.2 Wetland Delineation for goaf areas at Mine 2

Digby Wells was appointed by Exxaro to conduct a wetland assessment including sensitivity mapping of wetlands in areas earmarked for future underground mining, as well as an updated wetland sensitivity map and wetland integrity assessment of wetland habitat in the vicinity of Panels 6, 7 and 8 associated with Matla Mine 2 (goaf areas), where rehabilitation measures have commenced. This study is attached as part of Annexure H.

The Matla Mine 2 Project Area is characterised by multiple wetland systems totalling 1494.8ha. Fourteen HGM Units were identified on site, with the largest system being a Channelled Valley Bottom wetland which drains to the east of the project area and is fed by various hillslope seeps and valley bottom wetlands. The breakdown of the wetland types per area is detailed in Table 4.8 and presented in Figure 4.40.

Table 4.8: Mine 2 Wetland HGM Units

HGM Unit	HGM Unit Type	Area (ha)
1	Seep	63.9
2	Channelled Valley Bottom (and associated hillslope seeps)	1096
3	Seep	42.9
4	Seep	37.2
5	Depression	1.7
6	Depression	8.1
7	Depression	29.1
8	Depression (water)	27.2
9	Depression	9.9
10	Depression	6.3
11	Depression	0.8
12	Un-channelled Valley Bottom	43.3
13	Channelled Valley Bottom	148.5
14	Un-channelled Valley Bottom	43.8

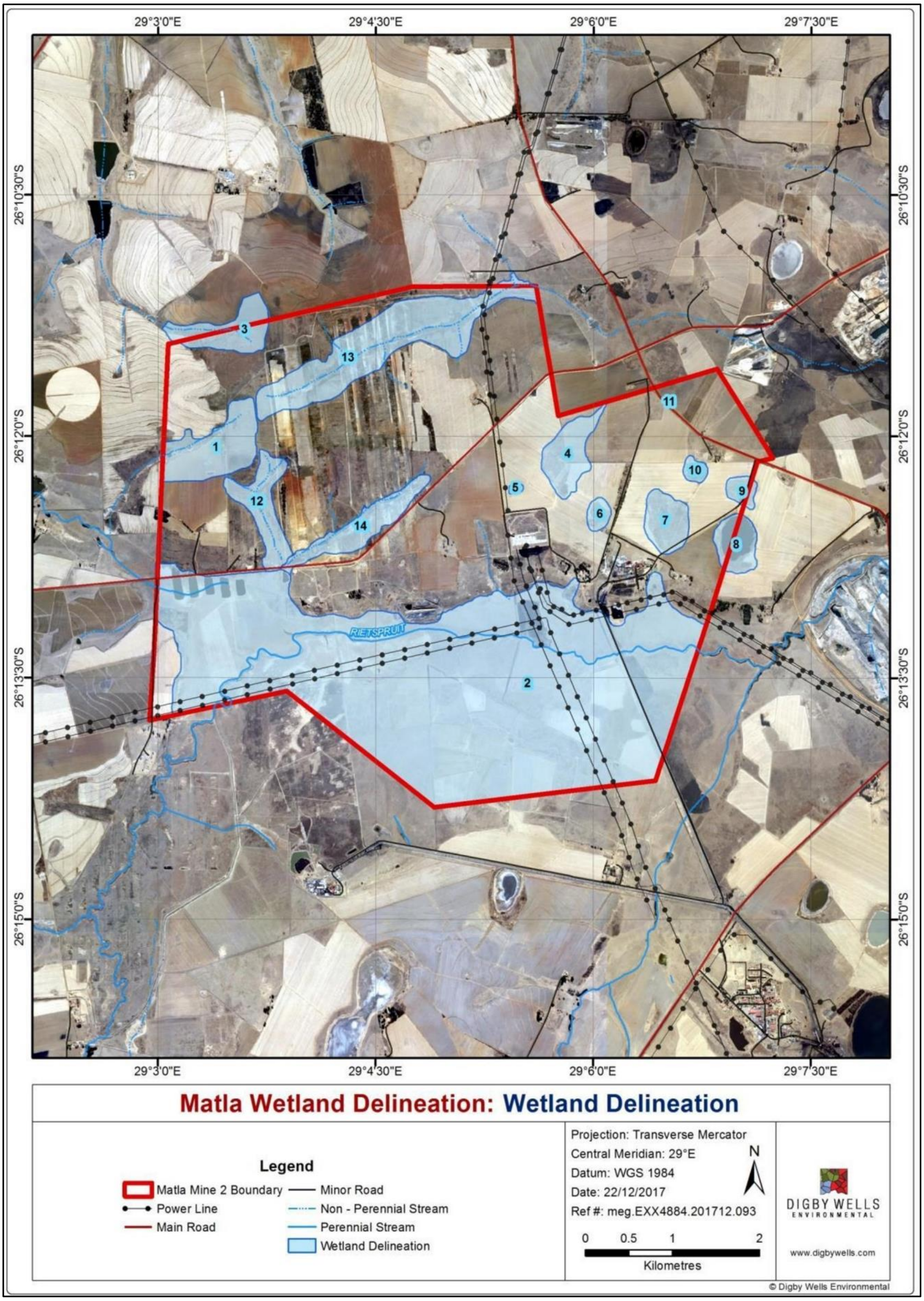


Figure 4.40: Mine 2 Delineated Wetlands

4.3.2.1 Present Ecological State (PES)

The present ecological state assessment (PES) scores were rated according to the scores as presented in

Table 4.9: PES Categories used by WET-Health

Impact Category	Description	Combined Impact Score	PES Category
None	Unmodified, natural.	0-0.9	A
Small	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota has taken place.	1-1.9	B
Moderate	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.	2-3.9	C
Large	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4-5.9	D
Serious	The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognisable.	6-7.9	E
Critical	Modifications have reached a critical level and ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8-10	F

Overall, the wetlands within the Project Area exhibit a variety of PES values, ranging from *Seriously Modified* (Category E), to *Largely Natural* (Category B) (Table 4.10).

HGM Unit 8 and HGM 10 are classified as *Largely Natural* (Category B) wetlands. These pans have not been impacted on to a great extent. The geomorphological and hydrological regimes have not been altered significantly and very little disturbance was observed with regards to vegetation.

Eight *Moderately Modified* (Category C) wetlands were identified (HGM units 2, 3, 4, 5, 6, 7, 9 and 11). These wetlands were mainly impacted on by cultivation and/or grazing with few geomorphological impacts.

Two *Largely Modified* (Category D) wetlands are present in the Project Area - HGM Unit 1 and HGM Unit 12. The *Largely Modified* category is mainly attributed to the subsidence in the area.

Two *Seriously Modified* (Category E) wetlands were present. HGM Unit 13 and HGM Unit 14 have been seriously impacted on through subsidence, which has altered the hydrology of the wetland significantly as the subsidence has occurred perpendicular to the flow of the original wetlands, unlike that of HGM Unit 12, where subsidence occurred parallel to the wetland, therefore not completely altering the natural hydrology. Some canals have been constructed through the crests of the subsidence areas of HGM 13 and 14 to allow water to flow in the same direction of the original wetlands, however, the flow has been significantly impacted on.

Table 4.10: Mine 2 PES Health Scores

HGM Unit	Hydrological Health Score	Geomorphological Health Score	Vegetation Health Score	Final Ecological Health Score	PES Score
1	7.5	4	5.5	5.9	D
2	1	3	6.7	3.2	C
3	0	0.3	8.1	2.4	C
4	3.5	0.1	7	3.5	C
5	1	0.2	5.4	2.0	C
6	2	0.4	4.1	2.2	C
7	2	0.4	5.7	2.6	C
8	2	0.2	3.2	1.8	B
9	3.5	0.5	4.6	2.9	C
10	1	0.2	4.2	1.7	B
11	3	0.4	6	3.1	C
12	7	0.2	8.1	5.3	D
13	8.5	3.3	8.3	7	E
14	8.5	2.4	7.6	6.5	E

4.3.2.2 Ecological Importance and Sensitivity

The Ecological Importance and Sensitivity (EIS) tool was derived to assess the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred. In this method there are three suites of importance criteria; namely:

- Ecological Importance and Sensitivity: incorporating the traditionally examined criteria used in EIS assessments of other water resources by DWS and thus enabling consistent assessment approaches across water resource types;
- Hydro-functional Importance: which considers water quality, flood attenuation and sediment trapping ecosystem services that the wetland may provide; and
- Importance in terms of Basic Human Benefits: this suite of criteria considers the subsistence uses and cultural benefits of the wetland system.

These determinants are assessed for the wetlands on a scale of 0 to 4, where 0 indicates no importance and 4 indicates very high importance. It is recommended that the highest of these three suites of scores be used to determine the overall Importance and Sensitivity category of the wetland system, as presented in Table 4.11.

Table 4.11: Interpretation of Overall EIS Scores for Biotic and Habitat Determinants

Ecological Importance and Sensitivity Category (EIS)	Recommended Ecological Management Class
Very high Systems that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	A
High Systems that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	B
Moderate Systems that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	C
Low/marginal Systems that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	D

Table 4.12 indicates the EIS scores for the various HGM Units with the final EIS score for the wetlands ranging from *Low* (0.7) to *Very High* (3.1).

Although the wetlands are modified, they do still provide predominantly *Moderate* to *Low* hydrological importance services (mostly ranging between 0.5 and 1.7), such as flood attenuation and assimilation of toxicants and nitrates. HGM Unit 2 is an exception, with a *High* score.

The Ecological Importance and Sensitivity category is ranging from *Low* (0.7) to *Very High* (3.1). Some HGM units have been completely transformed and therefore provide little habitat for fauna and flora, whilst others HGM units such as HGM Unit 2, still have intact vegetation where red data species were observed.

In general, the values are *Low* for 'Direct Human Benefits' (most ranging between 0.1 and 1) as these wetland mainly fall within the mine fences and mining rights area and therefore are not utilised as they would be in a unrestricted area. HGM unit is the only exception (2.5) as it is contains standing water utilised for fish purposes.

Table 4.12: EIS Scores

HGM Unit	Ecological Importance and Sensitivity	Hydrological/ Functional Importance	Direct Human Benefits	Final EIS Score	Final EIS Category
1	1.4	1.4	0.2	1.4	C
2	3.1	2.1	0.6	3.1	A
3	1.8	1.6	0.4	1.8	C
4	1.8	1.5	0.5	1.8	C
5	1.9	1.7	0.8	1.9	C
6	1.8	1.7	1	1.8	C
7	2.1	1.7	0.8	2	C
8	1.8	1.7	2.5	2.5	B
9	1.8	1.7	1	1.8	C
10	1.9	1.7	1	1.9	C
11	1.4	1	0.4	1.4	C
12	0.9	0.6		0.9	D
13	0.7	0.5	0.1	0.7	D
14	0.8	0.5	0.1	0.8	D

Overall, while impacts to the geomorphology have resulted in some loss of continuous flow and fragmentation in these systems, they do serve to reduce flow speed, thus reducing the potential for erosion and allowing for the re-establishment of wetland vegetation in ponded areas and while impacts to the hydrology of the area are extensive, evidence of both surface and groundwater recharge were observed.

It is recommended that an annual assessment of the wetland integrity of these systems take place so as to monitor any degradation or improvement in the systems over time.

4.3.3 Wetlands Associated with Stooping Activities

Various different wetland types have been identified and delineated within the Matla study area. As previously detailed, numerous sites have been identified for the proposed Matla stooping activities. The identified wetlands cover approximately 36.5 % of the proposed Matla stooping sites. The most common wetland type was found to be hillslope seepage wetlands, which covered 32.5 % of the site and made up almost 90 % of the wetland area. This is followed by valley bottom wetlands (2.8 % of the wetland area), pan wetlands (2.7 %), and dams (2.7 %). The very high percentage of hillslope seepage wetlands and relatively low percentage of valley bottom wetlands is at least partly the result of the proposed mining sites being located away from the large valley bottom wetlands of the area. However, hillslope seepage wetlands do typically form the majority of wetland habitat within the Mpumalanga Highveld.

The delineated wetlands associated with the proposed stooping activities are presented in Table 4.13. The extent of the delineated wetlands for the proposed stooping area is presented in Table 4.14.

The highest wetland cover percentage, 42.5 %, was found to occur in the LOMP Stooping Area (Block I), which is also the largest of the proposed stooping areas at 4 103.3 ha. Next highest was the 3 Mine Stooping Area (Blocks F, G & H) at 36.2 % wetland cover, while the lowest wetland cover percentage was recorded in Blocks B & C at only 5.2 %.

Table 4.13: Overall extent of the various wetland types delineated for the proposed Matla stooping activities

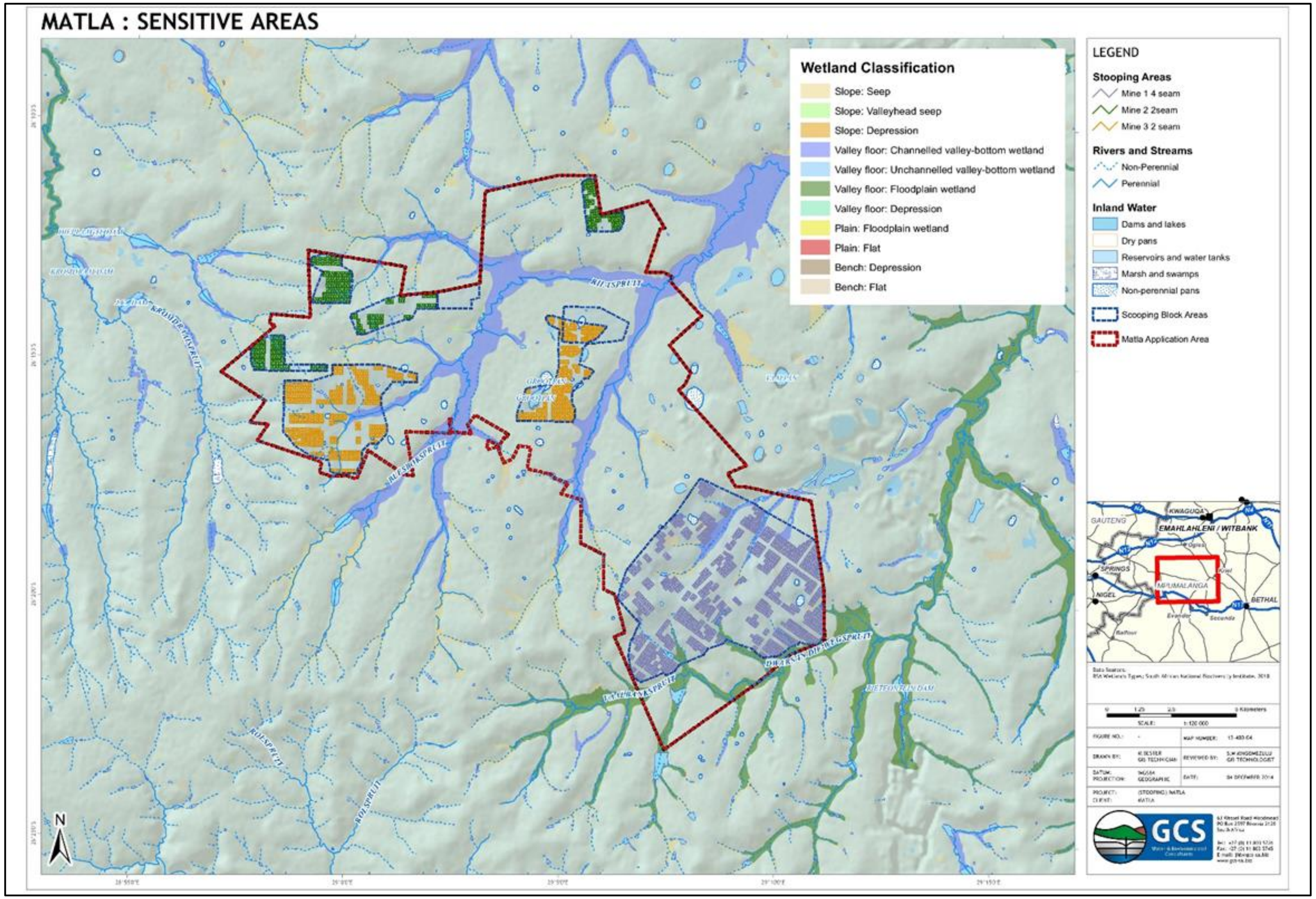
Wetland Type	Area (ha)	% of wetland area	% of study area
Channelled valley bottom	75.0	2.8%	1.0%
Unchannelled valley bottom	46.2	1.8%	0.6%
Hillslope seepage	2350.7	89.2%	32.5%
Pan	72.0	2.7%	1.0%
Dam	71.3	2.7%	1.0%
River diversion	3.8	0.1%	0.1%
Quarry	8.1	0.3%	0.1%
Subsidence wetland	8.0	0.3%	0.1%
TOTAL	**2635.1**	**100.0%**	**36.5%**

Table 4.14: Extent of wetlands delineated across the proposed Stooping Areas within the Matla Mining Right Area

Proposed Site	Size of site (ha)	Extent of wetlands on site (ha)	% of wetlands on site
Uitvlugt Stooping area (A)	237.6	39.2	16.5%
Block B & C	405.6	21.2	5.2%
Block D	173	36.9	21.3%
Block E	192.3	29.4	15.3%
3 Mine Stooping area (F, G & H)	2111.2	763.6	36.2%
LOMP Stooping area (I)	4103.3	1744.7	42.5%
TOTAL	**7222.6**	**2635.1**	**36.5%**

Figure 4.41 presents the sensitive areas of the identified stooping blocks.

The proposed stooping activities will directly affect a total area of 251 hectares of wetland, of which 49 hectares (19.5 %) will take place underneath wetlands. Refer to Section 5.5 for the impact assessment conducted for the stooping activities.



(Map not to scale, please refer to Annexure Q for A3 Maps)

Figure 4.41: Wetlands Associated with proposed Stooping Activities

4.3.3.1 Functional Assessment

Due to the activities that are taking place on site (mining, agriculture and other activities relating to the Matla Power Station), the wetlands represent the virtually the only remaining areas of indigenous vegetation within the Matla Mining Right Area constitute. Most of the areas on site that were once characterised by terrestrial grassland have been cultivated and now provided limited habitat for faunal species. Mining and the Matla Power Station further add to disturbances and habitat transformation within the area.

Only the wetland areas are still characterised by extensive areas of indigenous vegetation, even if many of the hillslope seepage wetlands have also been substantially impacted by cultivation in the past and are now characterised by secondary vegetation. Despite these disturbances, the wetlands play an important role at the local and regional scale in supporting biodiversity, not only wetland dependant and adapted species, but also terrestrial grassland species given the near complete transformation of terrestrial grassland habitat. Certain wetlands on site are also considered important at a national scale in biodiversity support as they support threatened species such as the African Grass Owl as well as Greater Flamingo.

Some of the functions that are typically attributed to wetlands include:

- Biodiversity support;
- Nutrient removal (and more specifically nitrate removal);
- Sediment trapping (and associated with this is the trapping of phosphates bound to iron as a component of the sediment);
- Stream flow augmentation;
- Flood attenuation;
- Trapping of pollutants; and
- Erosion control.

Most of these functions can be described as indirect use functions – beneficial services which the wetlands provide through ecological process and functions. Many of these functions attributed to wetlands are wetland type specific and can be linked to the position of wetlands in the landscape as well as to the way in which water enters and flows through the wetland. Thus not all wetlands can be expected to perform all functions, or to perform these functions with the same efficiency.

However, based on the hydro-geomorphic wetland type which classifies wetlands on the way that water moves through the wetland as well as the position of the wetland within the landscape, certain assumptions on the functions supported by wetlands can be made.

Hillslope seepage wetlands

Hillslope seepage wetlands make up 82 % of the wetlands on site and over 33 % of the land area. Hillslope seeps support conditions that facilitate both sulphate and nitrate reduction as interflow emerges through the organically rich wetland soil profile, and are thus thought to contribute to water quality improvement and/or the provision of high quality water. The greatest importance of the hillslope seepage wetlands on site is thus taken to be the movement of clean water through the hillslope seepage wetlands and into the adjacent valley bottom wetlands. Given the serious water quality concerns experienced in the upper Olifants River catchment, this provision of clean water assumes even greater importance. However, the seepage wetlands merely reflect the movement of this clean water through the landscape (in the sub-surface) and do not themselves produce the clean water.

As hillslope seepage wetlands, for the most part, are dependent on the presence of an aquiclude, either a hard or soft plinthic horizon, they are not generally regarded as significant sites for groundwater recharge (Parsons, 2004). However, by retaining water in the landscape and then slowly releasing this water into adjacent valley bottom or floodplain wetlands, hillslope seepage wetlands contribute to stream flow augmentation, especially during the rainy season and early dry season. From an overall water yield perspective there is evidence that they contribute to water loss. The longer the water is retained on or near the surface the more likely it is to be lost through evapo-transpiration (McCartney, 2000). Hillslope seepage wetlands are not generally considered to play an important role in flood attenuation, though early in the season, when still dry, the seeps have some capacity to retain water and thus reduce surface run-off. Later in the rainy season when the wetland soils are typically saturated, infiltration will decrease and surface run-off increase. Further flood attenuation can be provided by the roughness of the wetland vegetation; the greater the surface roughness of a wetland, the greater is the frictional resistance offered to the flow of water and the more effective the wetland will be in attenuating floods (Reppert et al., 1979). In terms of the hillslope seepage wetlands on site, the surface roughness is taken to be moderately low, given that the seepage wetlands are characterised by typical grassland vegetation offering only slight resistance to flow.

From a biodiversity perspective, hillslope seepage wetlands support plants in particular, and associated insects, birds and small mammals adapted to the seasonal moisture regime. The mosaic of moisture regimes within the hillslope seepage wetlands, ranging from temporary wetness in the rainy season to near permanent wetness in some areas results in a wide range of microhabitats within the hillslope seepage wetlands on site. Of all the wetland types on site, seepage wetlands displayed the highest species richness.

Valley Bottom Wetlands:

Valley bottom wetlands make up roughly 10.4 % of the wetland area on site, with channelled valley bottom wetlands, unchannelled valley bottom wetlands and a portion of the Rietspruit floodplain occurring on site.

Channelled valley bottom wetlands receive water typically from surface run-off in the upslope catchment and convey it via the channel to the downslope catchment. Under normal flow conditions water is confined to the channel, though flood flows can overtop the channel banks and spread across the wetland. Under these conditions the valley bottom wetlands can contribute to flood attenuation and sediment trapping as flows overtopping the channel banks are spread out and slowed down through the surface roughness provided by the vegetation, leading to sediment deposition. In instances where flow is confined to the channel, for example under normal flow conditions or in instances where a deeply incised channel prevents overtopping, sediment transport rather than sediment deposition is the dominant process, which is evidence by the erosion of a channel through the wetland. Channel erosion may be both vertical and/or lateral. Given the limited contact time between the water and the wetland soils as well as the limited deposition of sediments, the channelled valley bottom wetlands on site are not expected to perform important water quality functions.

By providing a habitat differing from the surrounding terrestrial grasslands and hillslope seepage wetlands, the channelled valley bottom wetlands play a role in maintaining biodiversity within the landscape.

Un-channelled valley bottom wetlands reflect conditions where surface flow velocities are such that they do not, under existing flow conditions, have sufficient energy to transport sediment to the extent that a channel is formed. In addition to the biodiversity associated with these systems it is expected that they play an important role in retaining water in the landscape as well as in contributing to influencing water quality through for example mineralisation of rain water. In general, these wetlands could be seen to play an important role in nutrient removal, including ammonia, through adsorption onto clay particles.

Pan Wetlands

Pans account for around 3.7 % of the wetland area in the study site. Given the position of many pans within the landscape, which is usually isolated from any stream channels, the opportunity for pans to attenuate floods is fairly limited, though some run-off is stored in pans. In the cases where pans are linked to the drainage network via seep zones, the function of flood attenuation is somewhat elevated. Pans are also not considered important for sediment trapping, as many pans are formed through the removal of sediment by wind when the pan basins are dry. Some precipitation of minerals and de-nitrification is expected to take place within pans, which contributes to improving water quality. Some of the accumulated salts and nutrients can however be exported out of the system and deposited on the surrounding slopes by wind during dry periods.

Direct Use Benefits

Direct uses of the wetlands on site include the use of water for livestock watering purposes (through the building of small dams within the wetlands), grazing and crop production (through cultivation within the wetland areas on site). As all of the wetlands are located on private land, access to the wetlands is limited and little use is made of the wetlands in terms of recreational activities such as fishing or bird watching, even though opportunities for such activities exist, most notably in the various large pans (in terms of bird watching) and the numerous farm dams (fishing).

No information regarding potential cultural value of the wetlands on site was available or could be found. However, given that all of the study has been privately owned for numerous years and that access to the land is thus limited, it is considered unlikely that the wetlands hold any significant cultural value.

4.3.3.2 Present Ecological Status

The PES was undertaken using the Level 1 WET-Health methodology (Mcfarlane et al., 2009) for all wetlands excluding pans, for which the PES was assessed using the 1999 RDM methods (DWAF, 1999).

The study area was subdivided in small sub-catchments so as to identify individual wetland units for assessment. Each wetland unit was classified into the various hydro-geomorphic wetland types represented within the unit and each hydro-geomorphic wetland type was then assessed in terms of hydrology, geomorphology and vegetation. The wetland units of the stooping areas is presented in Figure 4.41. Table 4.15 presents the rating scale that was implemented for the PES.

Table 4.15: Rating scale used for the PES assessment

Description	Combined impact score	PES Category
Unmodified, natural.	0-0.9	A
Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9	B
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has	2-3.9	C

taken place but the natural habitat remains predominantly intact		
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	D
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9	E
Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8 - 10	F

The description of the PES provided in Table 4.16 and is a general description of the complete stooping area, please refer to Section 6.4 of the wetland report (attached as part of Annexure H) for a detailed description of the PES for each stooping area. The overall PES in the study area is C/D, moderately to largely modified, except the pans on stooping area G and H. In total 45 wetland units have been identified.

Table 4.16: PES rating per wetland identified in stooping areas

Unit	Type	PES Score (combined)
Uitvlugt mining/study area		
Wetland unit 1	Valley Bottom	C
	Hillslope Seepage	C
Wetland unit 2	Valley Bottom	C
	Hillslope Seepage	C
Block F, G & H mining/study area		
Wetland unit 3	Floodplain	C
	Hillslope Seepage	C
	Pan	B
Wetland unit 4	Pan	B
	Hillslope Seepage	C
Wetland unit 5	Valley Bottom	C
	Hillslope Seepage	D
Wetland unit 6	Pan	C
	Hillslope Seepage	D
Wetland unit 7	Pan	B
	Hillslope Seepage	C
Wetland unit 8	Pan	D
	Hillslope Seepage	D
Wetland unit 9	Floodplain	E
	Hillslope Seepage	D
Wetland unit 10	Pan	C
	Hillslope Seepage	C
Wetland unit 11	Hillslope Seepage	C
	Valley Bottom	C
Wetland unit 12	Valley Bottom	C
Wetland unit 13	Hillslope Seepage	C
Wetland unit 14	Pan	C
	Hillslope Seepage	C

Unit	Type	PES Score (combined)
Wetland unit 15	Hillslope Seepage	D
	Pan	C
Wetland unit 16	Hillslope Seepage	D
Wetland unit 17	Hillslope Seepage	D
	Pan	C
	Valley Bottom	D
Wetland unit 18	Pan	C
	Hillslope Seepage	C
LOMP mining/study area		
Wetland unit 19	Valley Bottom	C
Wetland unit 20	Valley Bottom	C
	Hillslope Seepage	C
Wetland unit 21	Valley Bottom	C
	Hillslope Seepage	D
Wetland unit 22	Valley Bottom	D
	Hillslope Seepage	C
Wetland unit 23	Valley Bottom	D
	Hillslope Seepage	C
Wetland unit 24	Valley Bottom	D
	Hillslope Seepage	C
Wetland unit 25	Pan	B
	Valley Bottom	C
	Hillslope Seepage	C
Wetland unit 26	Pan	B
	Hillslope Seepage	C
Wetland unit 27	Pan	B
	Hillslope Seepage	C
Wetland unit 28	Hillslope Seepage	D
Wetland unit 29	Hillslope Seepage	D
	Valley Bottom	C
Wetland unit 30	Hillslope Seepage	C
	Valley Bottom	B
Wetland unit 31	Hillslope Seepage	C
	Valley Bottom	D
Wetland unit 32	Valley Bottom	C
	Hillslope Seepage	C
Wetland unit 33	Hillslope Seepage	D
	Valley Bottom	D
Wetland unit 34	Hillslope Seepage	C
	Valley Bottom	D
Wetland unit 35	Hillslope Seepage	D
	Pan	D
Wetland unit 36	Valley Bottom	C
	Hillslope Seepage	C
Wetland unit 37	Valley Bottom	C
	Hillslope Seepage	C
Block E mining/study area		
Wetland unit 38	Valley Bottom (above dam)	C
	Valley Bottom (below dam)	D
	Hillslope Seepage	C
Wetland unit 39	Hillslope Seepage	D

Unit	Type	PES Score (combined)
Block D mining/study area		
Wetland unit 41	Pan	C
	Hillslope Seepage	D
Block B & C mining/study area		
Wetland unit 40	Unchannelled Valley Bottom (west)	B
	Unchannelled Valley Bottom (far west)	D
	Unchannelled Valley Bottom (east)	D
	Channelled Valley Bottom	E
Wetland unit 42	Hillslope Seepage (west)	C
	Hillslope Seepage (east)	D
Wetland unit 43	Hillslope Seepage	D
	Pan	C
Wetland unit 44	Hillslope Seepage	D
Wetland unit 45	Unchannelled Valley Bottom	C

Each of the various delineated wetlands per stooping area (as numbered in Table 4.5), is presented in Figure 4.42 – Figure 4.44.

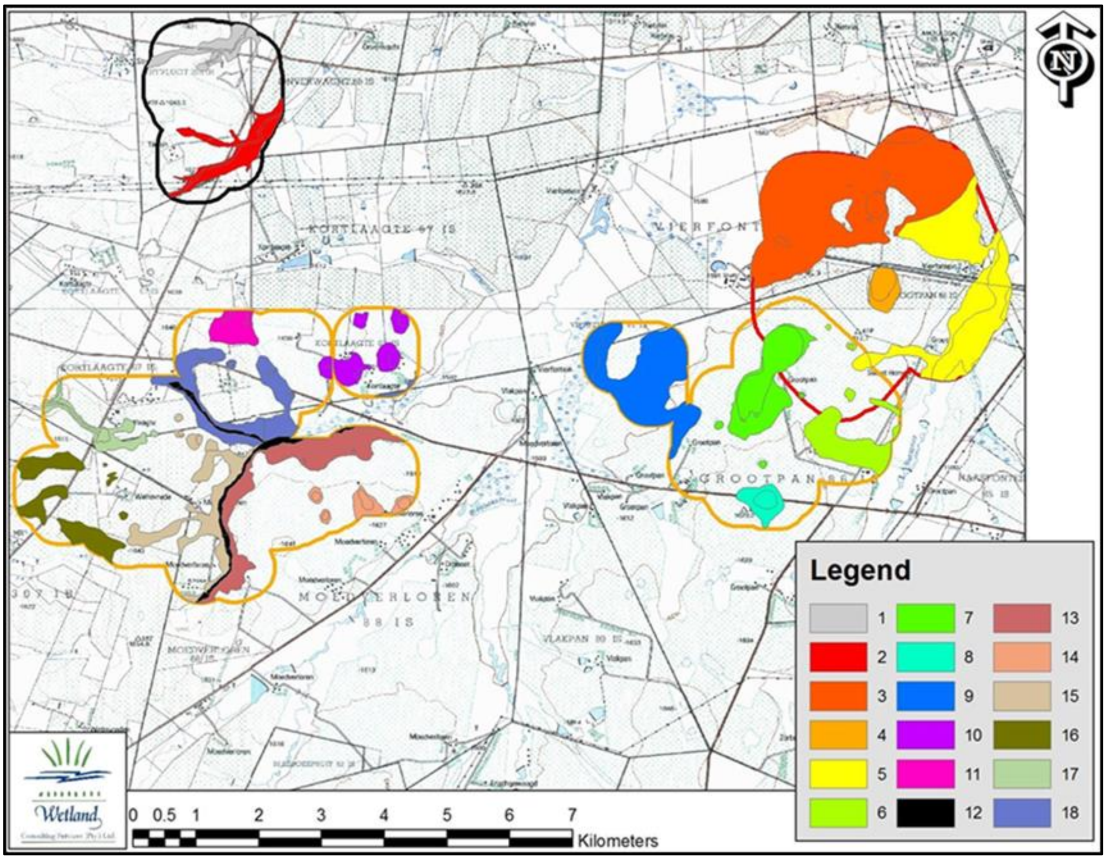


Figure 4.42: Map of delineated wetland units 1 to 18

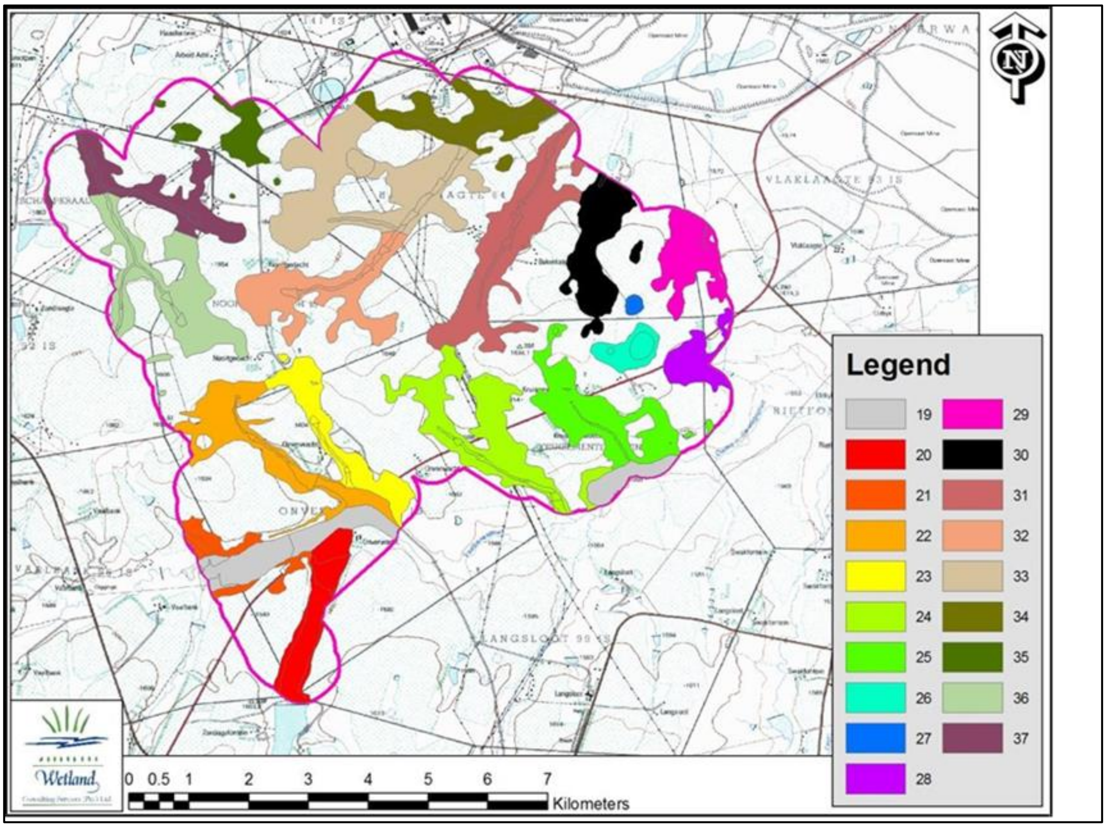


Figure 4.43: Map of delineated wetland units 19 to 37

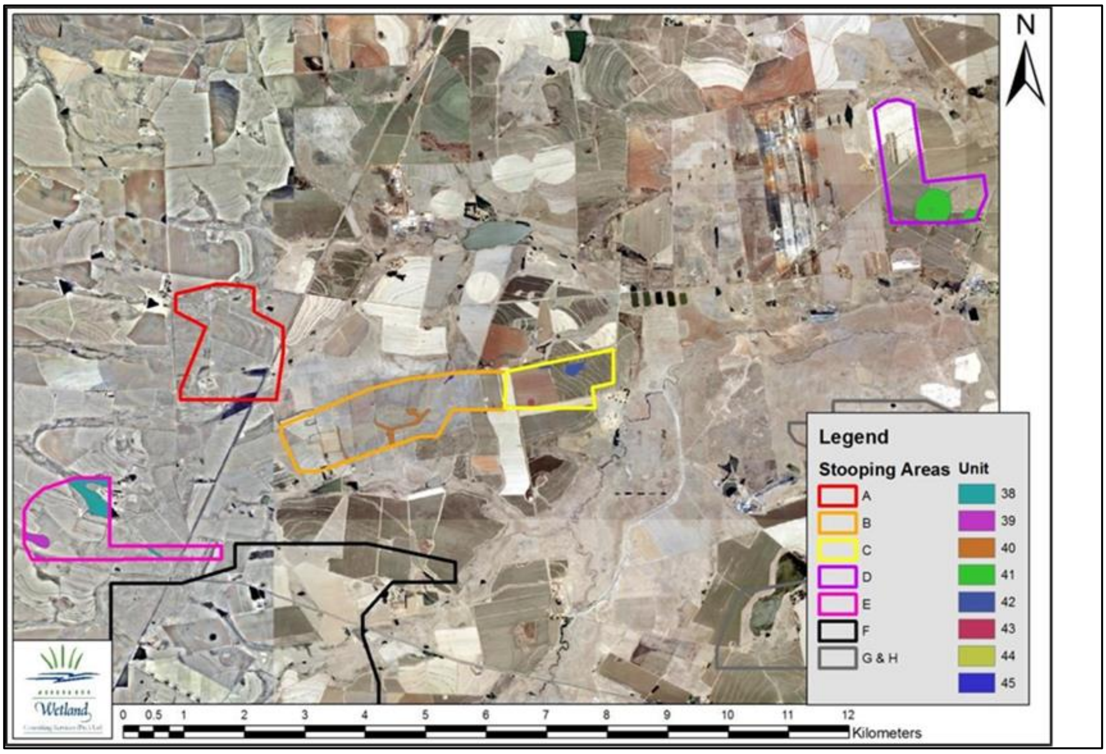


Figure 4.44: Map of delineated wetland units 38 to 45

The PES for each proposed stooping area is presented in Figure 4.45- Figure 4.50. As detailed above the overall PES of the study area was determined to be a C/D (moderately - largely modified).

The modifications to the wetlands are mostly as a result of agricultural activities that have resulted in significant impacts on the wetlands systems (in terms of vegetation, hydrology and geomorphology). Certain wetlands are still intact and considered largely natural, while some wetlands are now categorised with secondary vegetation while others are still undergoing cultivation activities. Cultivation surrounding the wetlands provides considerable sediment sources to the wetlands that get transported by surface flow following heavy rain as well as wind deposition thus altering the hydrology of those wetlands.

The Blesbokspruit floodplain wetland has been seriously modified through the construction of the river diversion and the surface subsidence due to underground mining that has completely altered the topography and water retention of the floodplain.

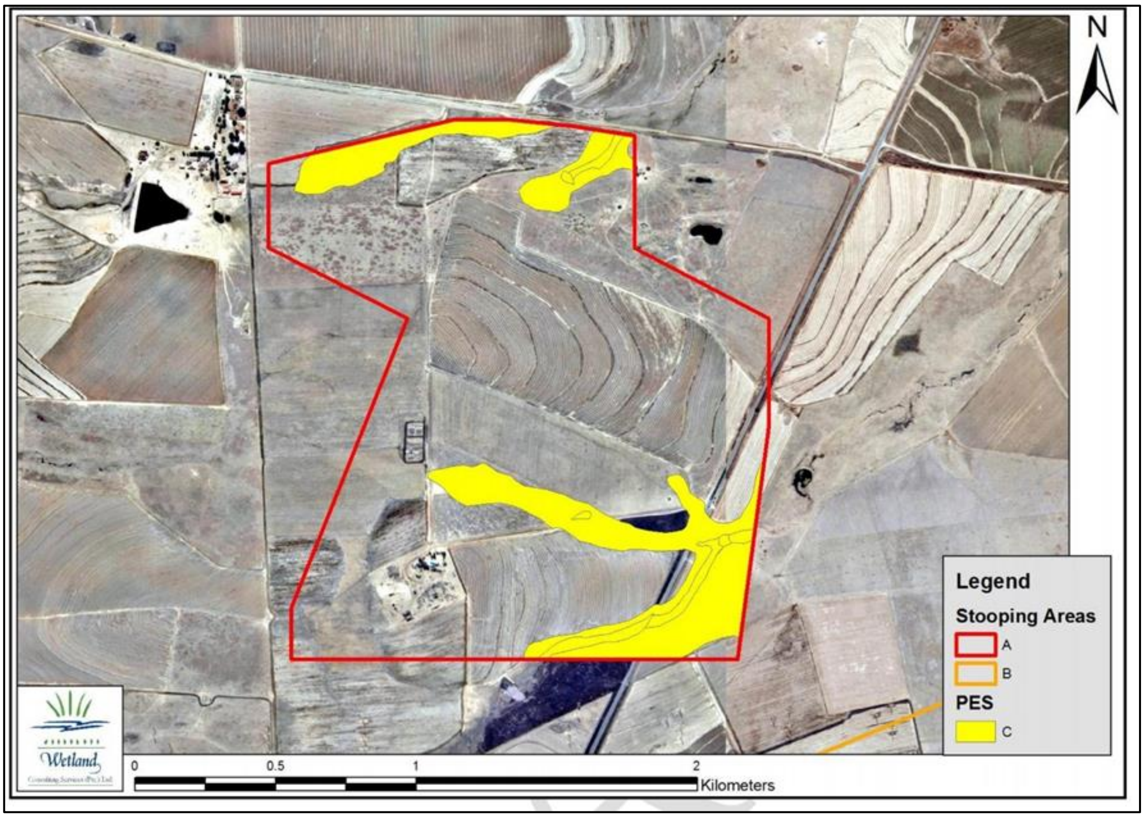


Figure 4.45: PES assessment for wetlands in the Uitvlugt study area

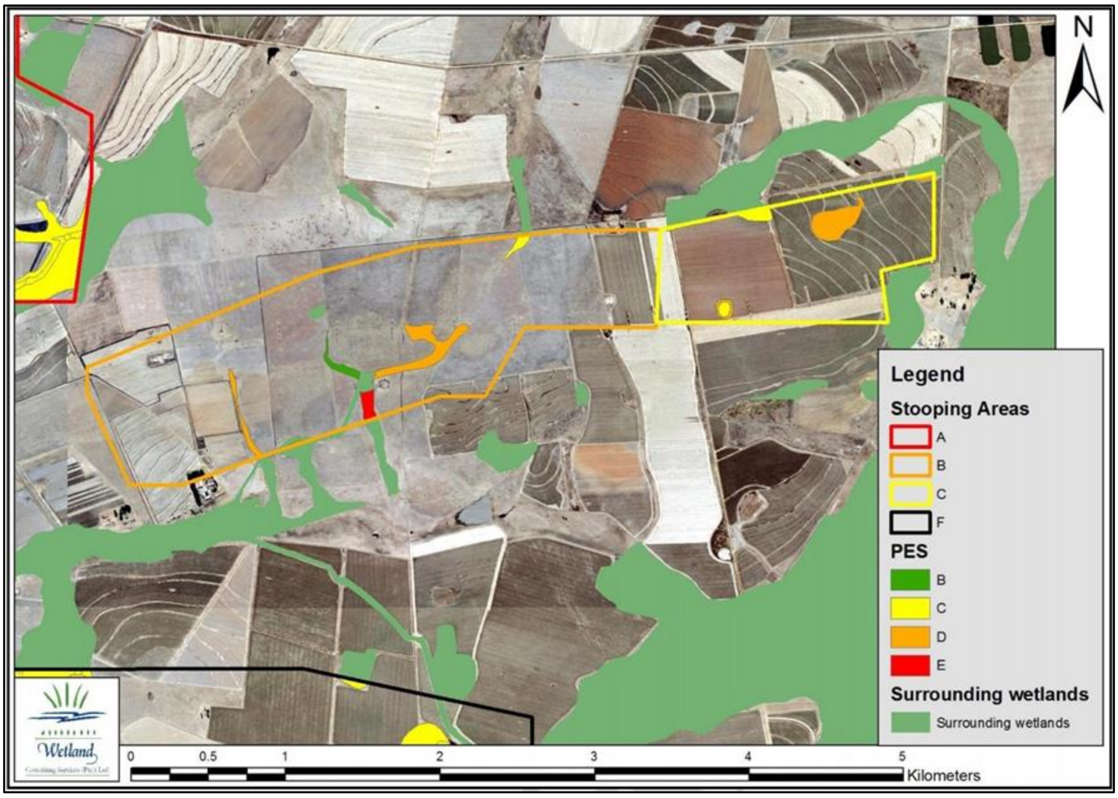


Figure 4.46: PES assessment for wetlands in Block B and C area

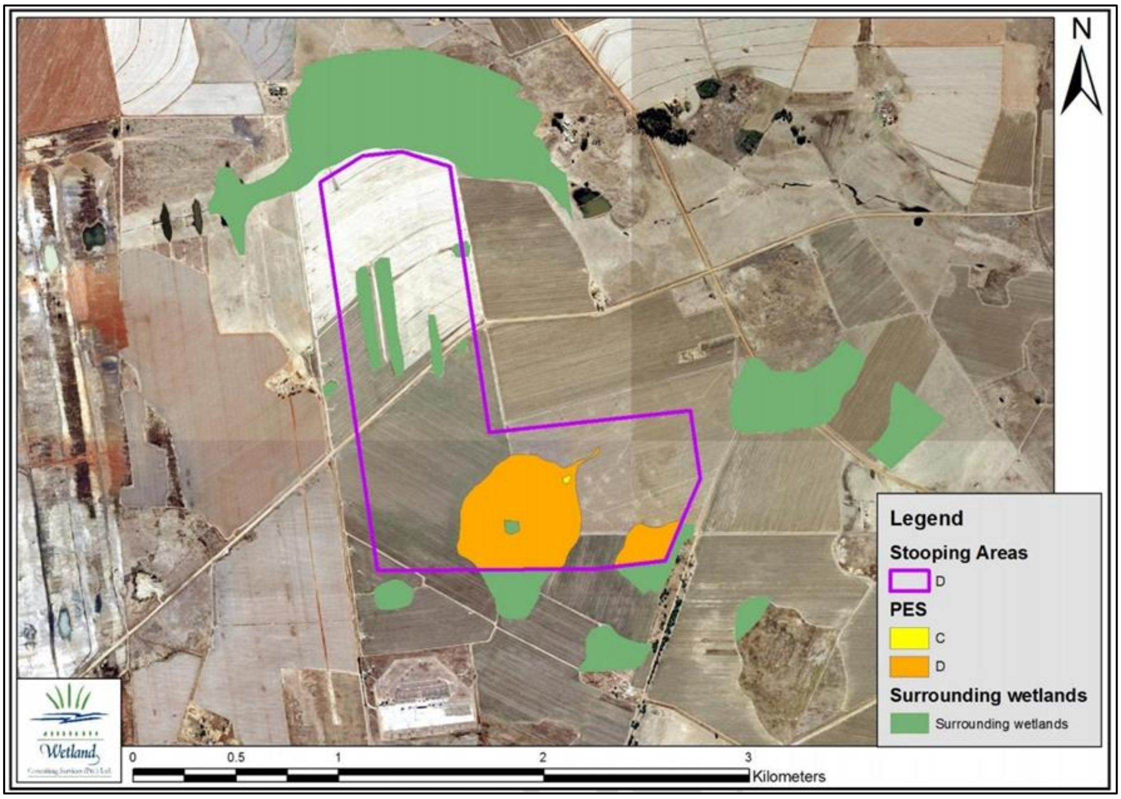


Figure 4.47: PES assessment for wetlands in Block D area

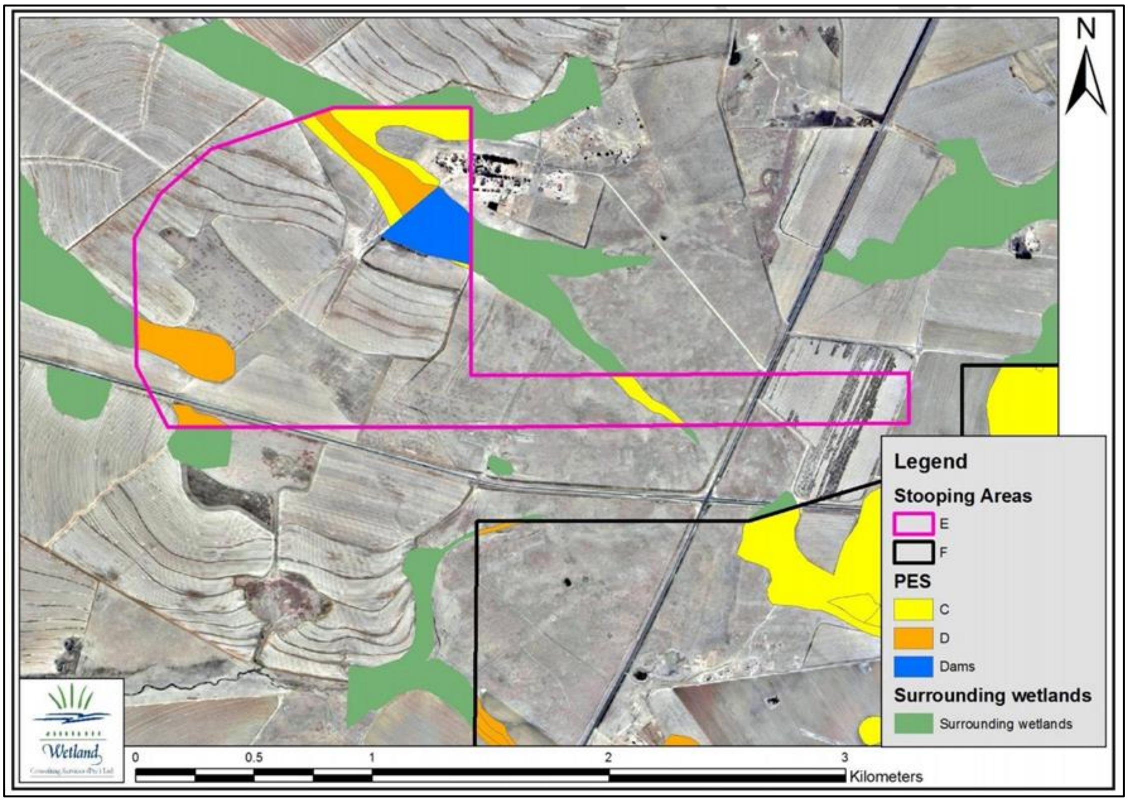


Figure 4.48: PES assessment for wetlands in Block E area

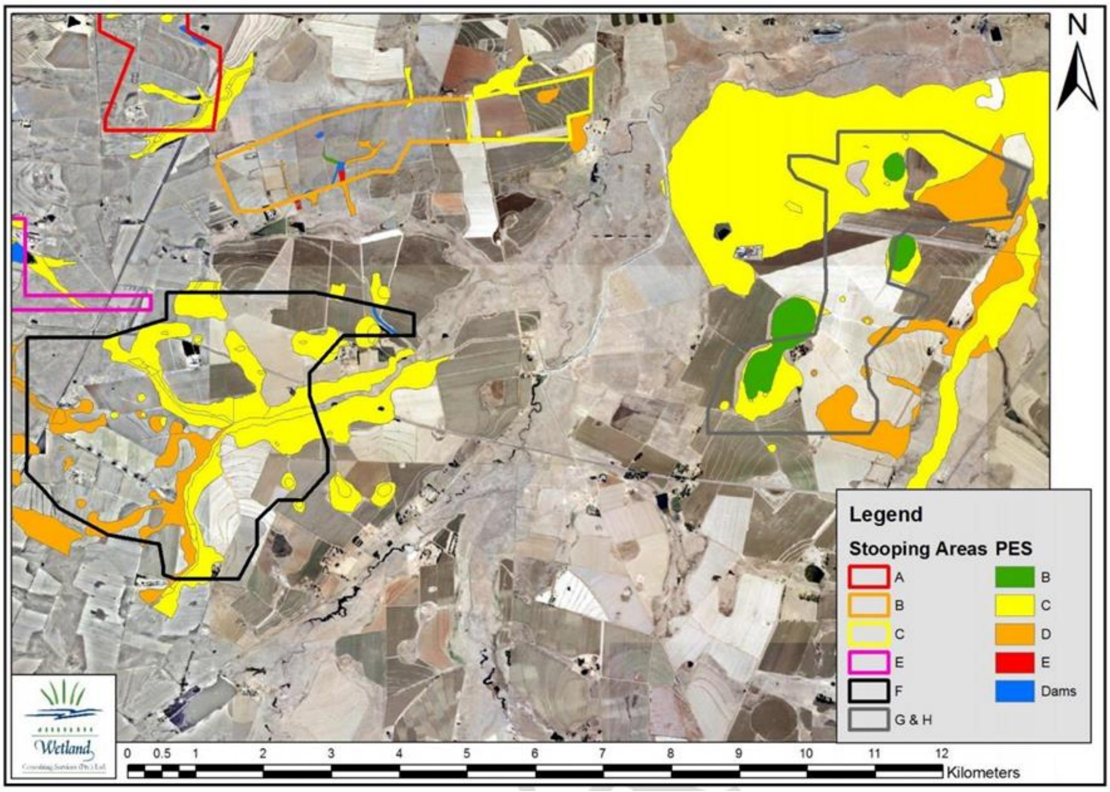


Figure 4.49: PES assessment for wetlands in Mine 3 study area

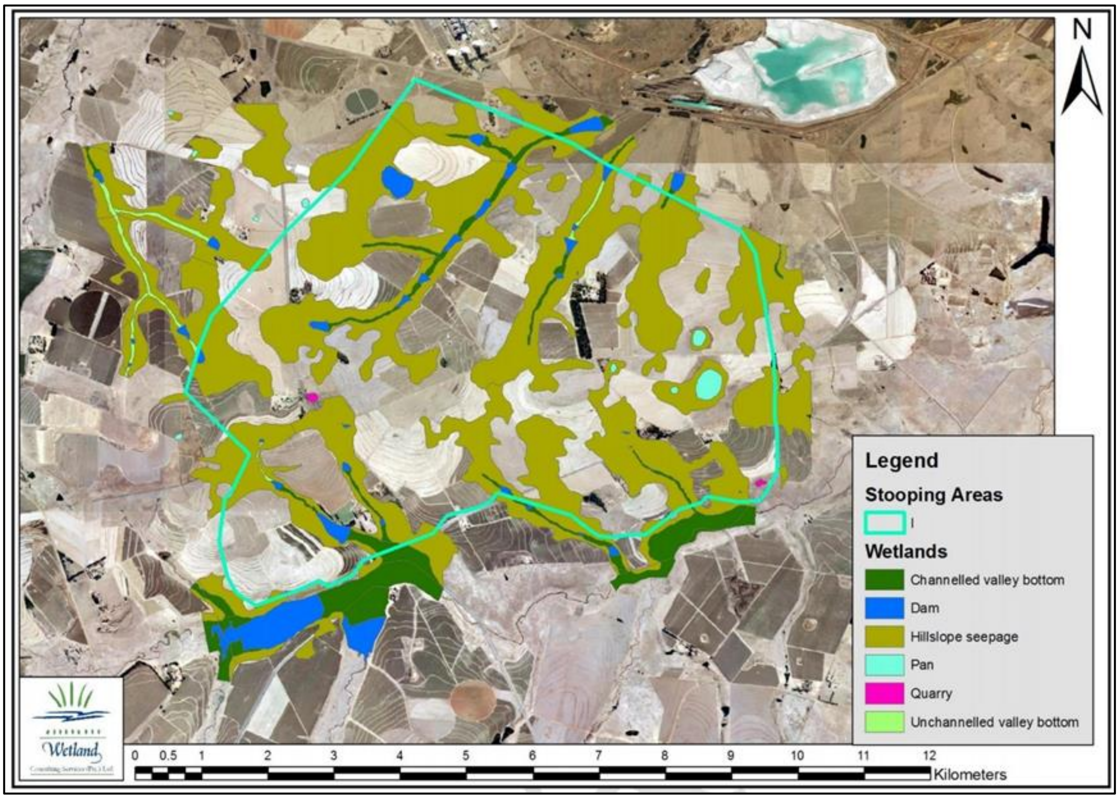


Figure 4.50: PES assessment in LOMP study area (Block I)

4.3.3.3 Ecological Importance and Sensitivity

EIS is a concept introduced in the reserve methodology to evaluate a wetland in terms of:

- Ecological Importance;
- Hydrological Functions; and
- Direct Human Benefits.

The scoring assessments for these three aspects of wetland importance and sensitivity have been based on the requirements of the NWA, the original Ecological Importance and Sensitivity assessments developed for riverine assessments (DWAF, 1999), and the work conducted by Kotze et al (2008) on the assessment of wetland ecological goods and services (the WETEcoServices tool). Based on this methodology, an EIS assessment was undertaken for all the delineated wetlands on site.

The wetlands within the study area all form part of the Olifants River Primary catchment which 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 concerns and also water quantity concerns have been raised within the sub-catchment, also specifically within the

Steenkoolspruit sub-catchment, which is feed by the Steenkoolspruit River. 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 EIS assessment was conducted for every hydro-geomorphic wetland unit identified within the study area. Further considerations that informed the EIS assessment include:

- The location of the study area within a vegetation type (Eastern Highveld Grassland) considered to be extensively transformed and threatened, and classed as Vulnerable;
- The wetland ecosystem type of the area, Mesic Highveld Grassland Group 4 wetlands, is considered to be Critically Endangered;
- The classification of the Blesbokspruit and Rietspruit wetland systems as FEPA wetlands;
- The extensive transformation of habitat that has occurred on site, as reflected in the Mpumalanga Biodiversity Sector Plan 2013 which classified only a very small area of the study area as a Critical Biodiversity Area – Irreplaceable, and some additional areas as Critical Biodiversity Area – Optimal, but most of the site as heavily modified;
- The results of the PES assessment of the wetlands on site which revealed most wetlands as being moderately modified, though a significant percentage also as heavily modified; and
- The presence of Red Data species such as Greater Flamingo and African Grass Owl in some of the wetlands on site.

It is these considerations that have informed the scoring of the systems in terms of their ecological importance and sensitivity. The results of the assessment and rankings based on our current understanding of the wetlands is illustrated in Figure 4.51 and Figure 4.52, and summarised in Table 4.17.

Just over 70% of the wetlands on site are considered of Moderate ecological importance and sensitivity, with only 3.7 % considered as High ecological importance and sensitivity. The wetlands that rated High consisted mostly of pan wetlands, but included the Blesbokspruit valley bottom upstream of the river diversion and one or two seepage wetlands known to support African Grass Owls.

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Table 4.17: Results of EIS assessment

Wetland Type	B	C	D	Total
Channelled valley bottom	1.1	50.8	23.1	75.0
Unchannelled valley bottom	29.8	12.8	3.5	46.2
Hillslope seepage	1.6	1723.5	625.6	2350.7
Pan	61.1	10.6	0.2	72.0
TOTAL	**93.6**	**1797.8**	**652.4**	**2543.8**
% of wetland area	**3.7%**	**70.7%**	**25.6%**	**100.0%**

Mining Block	B	C	D	Total
Uitvlugt Stooping area (A)		36.1		36.1
Block B & C	1.6	7.7	8.7	17.9
Block D		0.1	28.5	28.6
Block E		15.6	7.2	22.8
3 Mine Stooping area (F, G & H)	72.9	464.9	210.4	748.2
LOMP Stooping area (I)	19.1	1273.5	397.6	1690.2
TOTAL	**93.6**	**1797.8**	**652.4**	**2543.8**

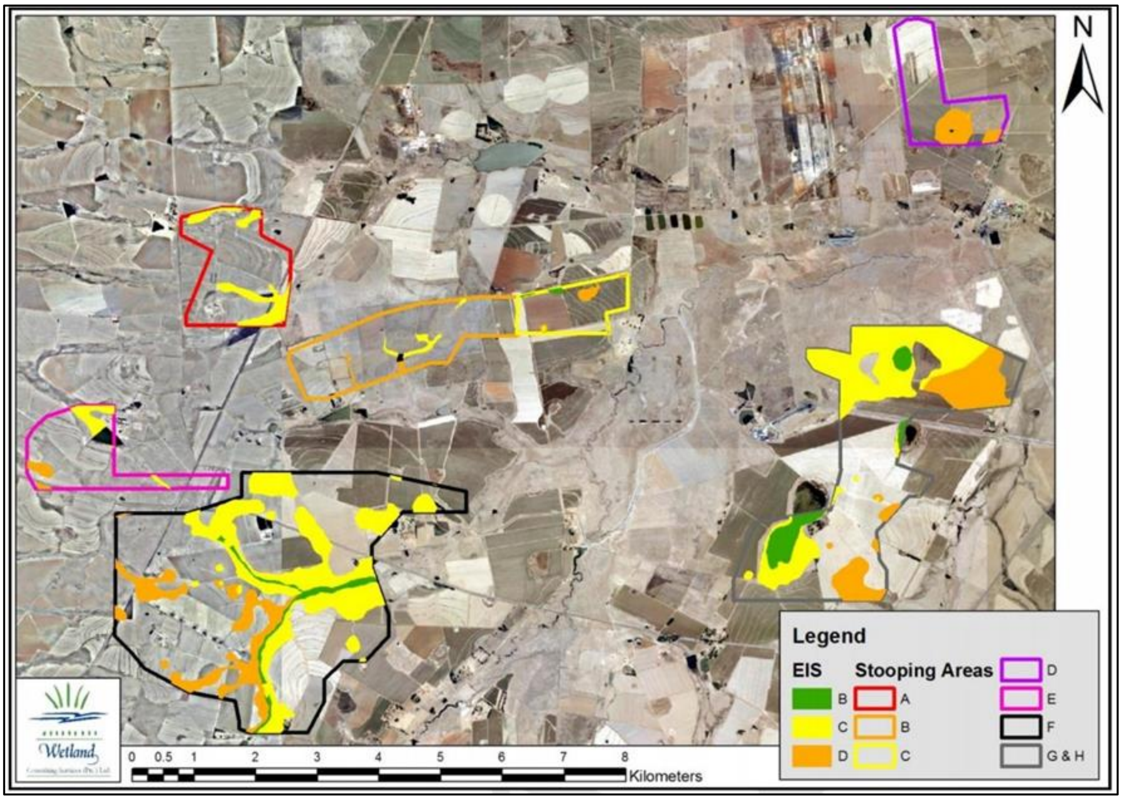


Figure 4.51: EIS assessment of wetlands in the Mine 3 study area and northern Blocks

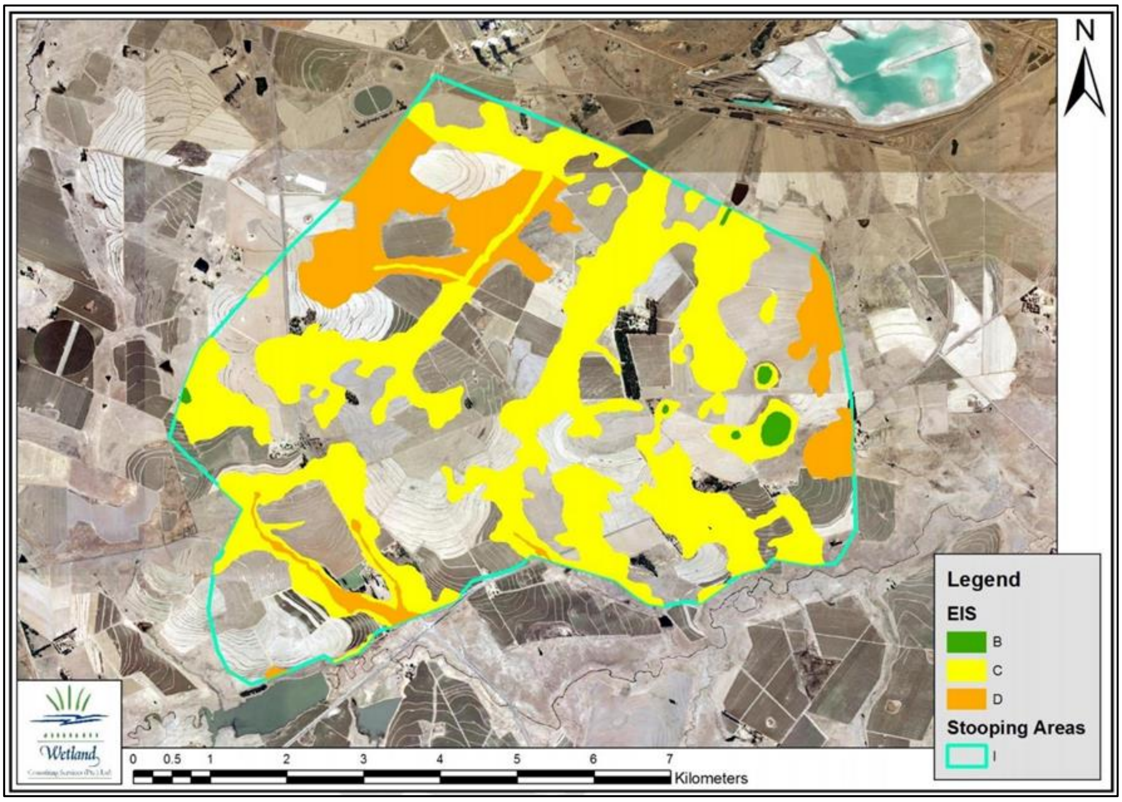


Figure 4.52: EIS assessment of wetlands within the LOMP study area

4.3.4 Wetland Flow

The maintenance of wetlands in their natural state is directly dependant on the maintenance of the drivers of the wetland – the water quantity, velocity and quality. Within the Matla study area, wetland systems are dominated by numerous and extensive hillslope seepage wetlands. These wetlands are maintained by shallow sub-surface interflow, derived from rainwater. Rainfall infiltrates the soil profile, percolates through the soil until it reaches an impermeable layer (e.g. a plinthic horizon or the underlying sandstone), and then flows laterally through the soil profile along the aquitard (resulting in the formation of a perched water table), or remains within the soil profile until it is eventually lost to evapo-transpiration.

Such perched water tables occur across large areas of the Mpumalanga Highveld, not only within hillslope seepage wetlands, but also within terrestrial areas, only at greater depth. In fact, given the deeper soils generally found within the terrestrial areas, these areas potentially store a far greater volume of water than is stored in the hillslope seepage wetlands themselves, and it is this water, temporarily stored within the landscape and slowly percolating through the soil, which supports the wetlands found on site. The hillslope seepage wetlands are merely the surface expression of this perched water table in those areas where a shallow soil profile results in the perched water table occurring within 50cm of the soil surface.

Key here is the interconnectedness of the water movement through the landscape; the hillslope seepage wetlands are directly dependant on sub-surface interflow derived from the terrestrial areas, while the discharge of water from the hillslope seepage wetlands plays a major role in supporting valley bottom wetlands or pan wetlands, whichever the case may be. It can be said that wetlands are dependent on catchment-scale processes, not only on wetland-scale processes.

4.4 Groundwater

As part of the Consolidation process, the previous groundwater reports that formed part of the previous Environmental Authorisations were assessed and one single master document (consolidated report) was compiled. This consolidated hydrogeological report is attached as Annexure G to this report.

The Matla Mine coal reserves form part of the Highveld Coal Field *(GCS, 2006)*. The coal seams are found within the Vryheid Formation of the Karoo Sequence (Figure 4.53). The Karoo Supergroup in the Matla area comprises the Ecca Group and the Dwyka Formation. The Ecca sediments consist predominantly of sandstone, siltstone, shale and coal. Combinations of these rock types are often found in the form of interbedded siltstone, mudstone and coarse-grained sandstone. The Ecca sediments overlie the Dwyka Formation (loosely referred to as the Dwyka tillite). The latter consists of a proper tillite, sandstone and sometimes a thin shale development. The upper portion of the Dwyka sediments may have been reworked, in which case carbonaceous shale and even inclusions of coal may be found. The Dwyka sediments are underlain by felsitic rocks of the Bushveld Complex.

The stratigraphic sequence within the Matla area includes five coal seams that are numbered from the bottom upwards from 1 to 5. Economic reserves are found in the 2 seam, 4 seam (lower) and the 5 seam. The seam depths vary, but are on average as follows:

- 5 Seam: - 35 to 50m below surface;
- 4 Seam: - 75 to 85m below surface; and
- 2 Seam: - 100 to 120m below surface.

The number 1, 3 and 4 upper seams only sporadically attain acceptable qualities and thickness.

Tectonically, the Karoo sediments are practically undisturbed. Faults are rare, however fractures are common in rocks such as sandstone and coal. Dolerite intrusions in the form of sills or dykes cause various mining problems, i.e. devolatised coal, weakened roof strata and/or displaced coal seams. The intrusion of a sill in the Mine 1 area caused extensive devolatisation of the overlying 2 Seam, resulting in the exclusion of the 2 seam from mineable reserves in Mine 1. Pressure on the overlying strata, due to the intrusion, resulted in two intersecting joint patterns, which generally have a NE to SW and NW to SE strike respectively. Dolerite from the underlying sill intruding the overlying strata through the joint patterns resulted in a high frequency of dykes in the Mine 1 area. In the Mine 2 total extraction area there are almost no intrusions, except for one small dyke, which affords Matla Mine the opportunity to utilise total extraction mining methods.

Key Issues:

- *The dolerite occurrences in the area have specific significance with regard to the geohydrology. Not only can groundwater compartments exist as a result of these features, but the possible groundwater interaction between mines will also be a function of the dolerite distribution;*
- *Geological structures also have the ability to act as preferred pathways for groundwater flow and any potential contamination; and*
- *The limit of weathering roughly averages in depth between 9 and 12 meters, deeper zones of weathering are however present. This weathered zone, wherever located below the local groundwater level, may also act as a preferred pathway.*

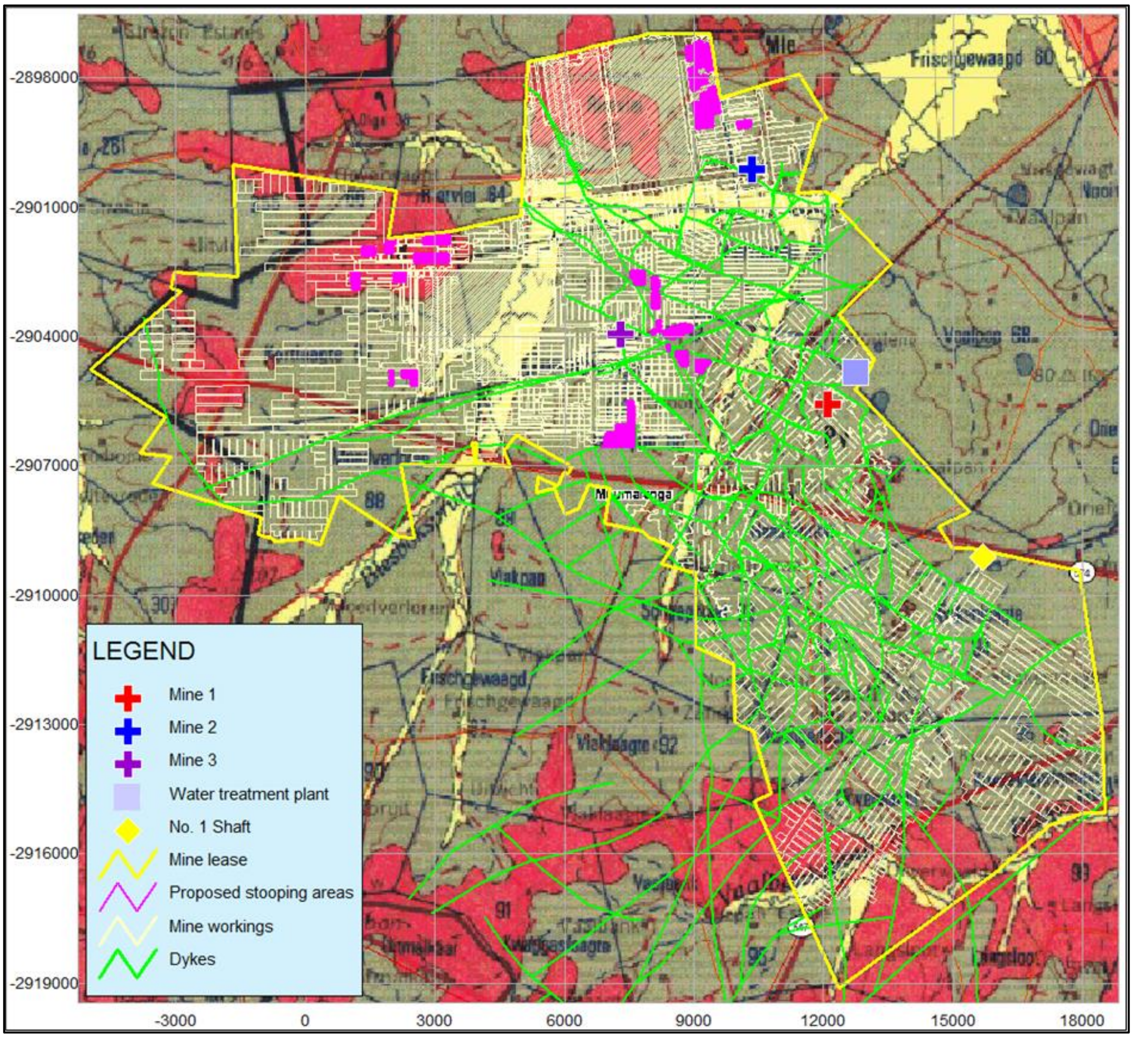


Figure 4.53: 1:250 000 scale geological map of the Mining Right Area

4.4.1 Aquifer Characterisation

Due to the fact that the main aquifer is a fractured rock type and fractures could assume any geometry and orientation, the physical boundary or 'end' of the aquifer is very difficult to specify or quantify. Aquifer boundary conditions that are generally considered during the delineation process are described as follows:

- **No-flow** boundaries are groundwater divides (topographic high or low areas/lines) or impermeable geological structures across which no groundwater flow is possible; and
- **Constant head** boundaries are positions or areas where the groundwater level is fixed at a certain elevation and does not change (perennial rivers/streams or dams/pans).

Topographic highs and lows were used to roughly delineate the aquifer system underlying the Matla mine lease area (Figure 4.54). The aquifer was estimated to cover an area of roughly 1 000km^2. Please note that geological structures such as dykes are known to occur within the area and have the ability to act as aquifer boundaries, thus subdividing the regional aquifer into various 'sub-aquifers' or compartments. The structural integrity of these potential boundaries remains an uncertainty, therefore aquifer boundaries as indicated in Figure 4.54 are considered to be conceptual and based on topographic controls only.

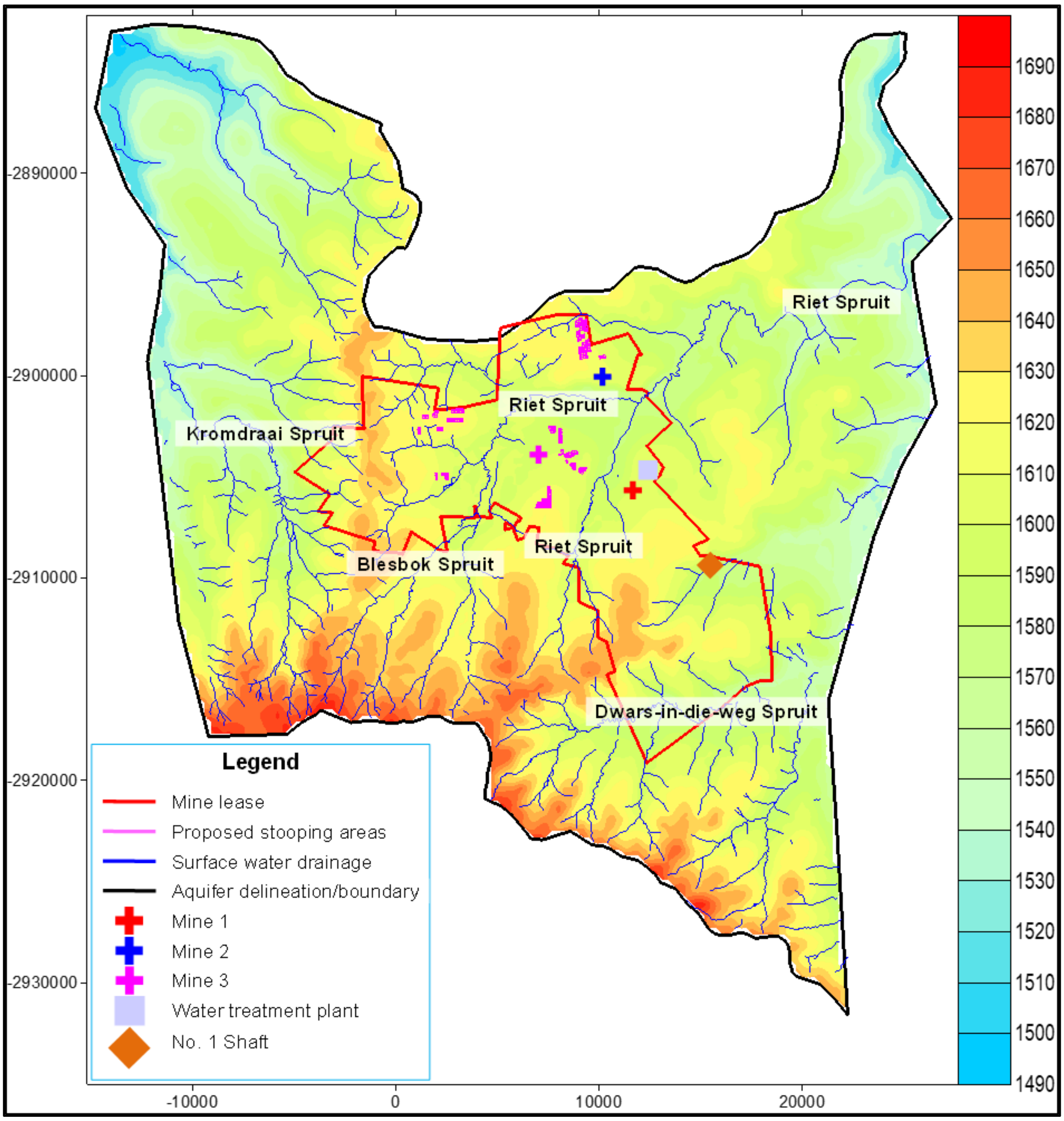


Figure 4.54: Aquifer Delineation for the Project Area

4.4.1.1 Aquifer Types

Two main types of aquifers are believed to be present in the mine lease area. For the purpose of this study an aquifer is defined as a geological formation or group of formations that can yield groundwater in economically useable quantities. Aquifer classification according to the Parsons Classification system is summarised in Table 4.18.

The **first aquifer** is a shallow, **semi-confined or unconfined aquifer** that occurs in the transitional soil and **weathered bedrock zone** or sub-outcrop horizon. Depending on the depth of the groundwater level and extent/depth of weathering, this aquifer may occur at depths of between 0 and 12 meters. Yields in this aquifer are generally low (less than 0.5 l/s) and the aquifer is usually not fit for supplying groundwater on a sustainable basis. Consideration of the shallow aquifer system becomes important during seepage estimations from pollution sources to receiving groundwater and surface water systems. The shallow weathered zone aquifer plays the most important role in mass transport simulations from process and mine induced contamination sources because the lateral seepage component in the shallow weathered aquifer often dominates the flow.

According to the Parsons Classification system, this aquifer is usually regarded as a minor- and in some cases a non-aquifer system.

Due to the mainly lateral flow and sometimes phreatic nature of the weathered zone aquifer, it is usually only affected by opencast mining or by high extraction or shallow underground mining where subsidence occurs and the entire roof strata above the mined area is destroyed. Where mining becomes deeper the weathered zone aquifer is usually affected to a very limited extent. The shallow aquifer system is undeveloped/absent in areas where the groundwater level is deeper than the contact between the weathered zone and fresh bedrock.

The **second aquifer** system is the deeper **secondary fractured rock aquifer** that is hosted within the sedimentary rocks of the Karoo Supergroup and occurs at depths generally exceeding 12 meters below surface. Groundwater yields, although more heterogeneous, can be higher. This aquifer system usually displays semi-confined or confined characteristics with piezometric heads often significantly higher than the water-bearing fracture position. Fractures may occur in any of the co-existing host rocks due to different tectonic, structural and genetic processes. Groundwater flow is fully restricted to open fractures and discontinuities, which become increasingly scarce at depths exceeding 30 meters below surface.

According to the Parsons Classification system, the aquifer could be regarded as a minor aquifer system, but also a sole aquifer system in some cases where groundwater is the only source of domestic water.

Table 4.18: Parsons Aquifer Classification (Parsons, 1995)

Sole Aquifer System	An aquifer that is used to supply 50% or more of domestic water for a given area, and for which there is no reasonably available alternative sources should the aquifer be impacted upon or depleted. Aquifer yields and natural water quality are immaterial.
Major Aquifer System	Highly permeable formation, usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good (less than 150 mS/m).
Minor Aquifer System	These can be fractured or potentially fractured rocks that do not have a primary permeability, or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large volumes of water, they are important both for local suppliers and in supplying base flow for rivers.
Non-Aquifer System	These are formations with negligible permeability that are generally regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer unusable. However, groundwater flow through such rocks, although impermeable, does take place, and needs to be considered when assessing the risk associated with persistent pollutants.
Special Aquifer System	An aquifer designated as such by the Minister of Water Affairs, after due process.

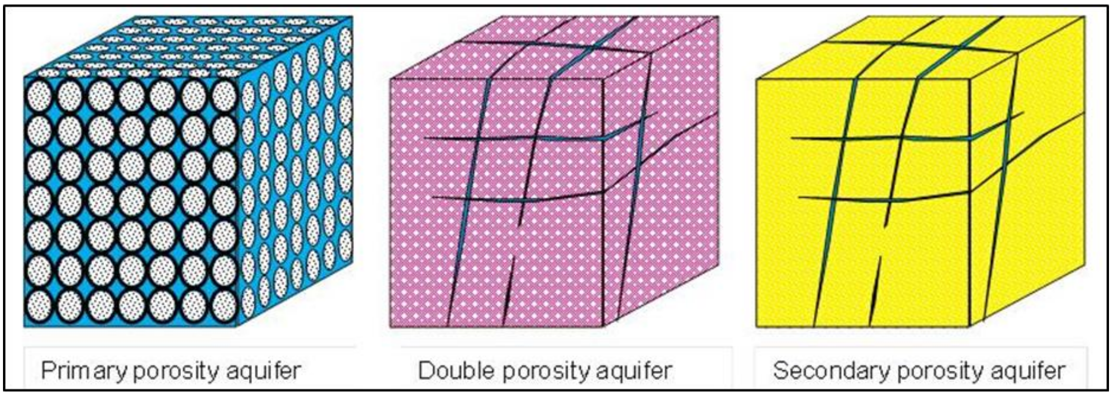


Figure 4.55: Types of aquifers based on porosity

4.4.1.2 Aquifer Transmissivity and Storativity

No aquifer testing was performed for the purpose of this investigation. All previously conducted groundwater related studies were consulted in order to obtain a better indication of the average hydraulic properties of the aquifer underlying the mining area.

Aquifer transmissivity is defined as a measure of the amount of water that could be transmitted horizontally through a unit width of aquifer by the full-saturated thickness of the aquifer under a hydraulic gradient of 1. Transmissivity is the product of the aquifer thickness and the hydraulic conductivity of the aquifer, usually expressed as m^2/day (Length^2/Time).

Storativity (or the storage coefficient) is the volume of water that a permeable unit will absorb or expel from storage per unit surface area per unit change in piezometric head.

Storativity (a dimensionless quantity) cannot be measured with a high degree of accuracy in slug tests or even in conventional pumping tests. It has been calculated by numerous different methods with the results published widely and a value of 0.002 to 0.01 is taken as representative for the proposed mining area. The storage coefficient values calculated from the pump tests proved to be in this order of magnitude.

The fractured rock aquifer underlying the mining area is known for being highly heterogeneous, which may result in significant variations in aquifer transmissivity/storativity over relatively short distances.

The average hydraulic conductivity (permeability) of the shallow weathered zone aquifer is 0.14m/d, which based on an average aquifer thickness of approximately 12 meters, translates to a transmissivity of around 1.7m^2/d (GCS, 1998).

Pumping tests that were performed on the deeper fractured rock aquifer revealed transmissivity values of between 0.1m^2/d and 7m^2/d (GCS, 1998), confirming the aquifer to be highly heterogeneous.

4.4.1.3 Aquifer Recharge and Discharge Rates

According to Figure 4.56, the mean annual recharge to the aquifer underlying the Matla mine lease area is in the region of 32mm, which based on an average rainfall of approximately 754mm/a translates to a recharge percentage of just over 4%. During the model calibration process, changes are made to the aquifer recharge (among other model input parameters) until an acceptable correlation is achieved between the model simulated and measured/actual groundwater elevations. During this calibration process for the Matla Stooping Project, a much lower recharge of between 0.6% and 1.2% was eventually assigned to the aquifer regime underlying the mine lease area.

Where outcrop occurs, the effective recharge percentage can be slightly higher while in low-lying topographies where discharge generally occurs and thicker sediment deposits, the effective recharge will be lower or even zero. Based on this estimate, the mean annual recharge to the aquifer regime as defined in Figure 4.54 should be ± 34.6Mm^3.

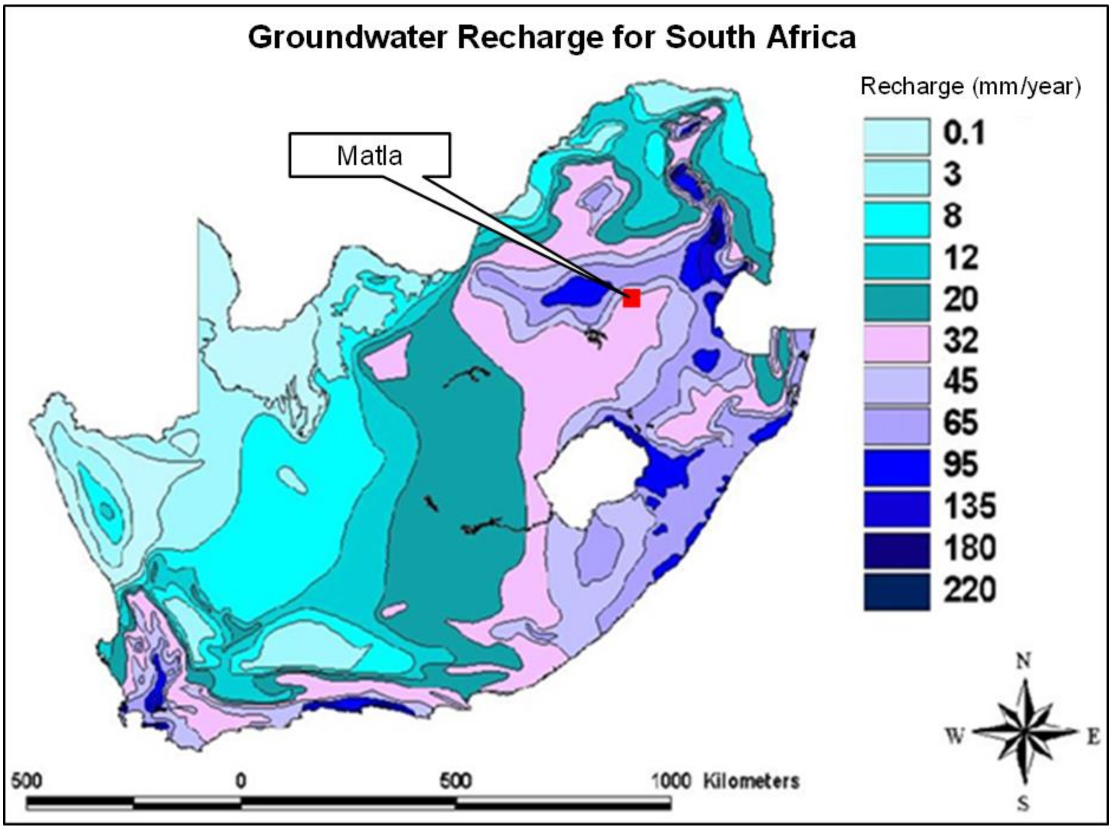


Figure 4.56: Mean annual aquifer recharge for South Africa (Vegter, 1995)

4.4.2 Groundwater Quality

A consolidated monitoring report was compiled by GCS. The purposes of this report was to consolidate the previous eight years of water quality data, for both surface and groundwater, and groundwater levels data into a consolidated water quality report. This monitoring report is attached as Annexure D to this report.

From the available data, 2008 to 2016, there are collectively 32 groundwater monitoring points which were used in the analyses of this report. The Matla groundwater monitoring programme requires that the boreholes are sampled on a quarterly basis for quality analysis and on a monthly basis for groundwater levels. Two master database were created, comprising all water quality analyses data in one and all the groundwater levels in another. From the water quality database a statistically analyses was done where the minimum, maximum, mean and geomean was calculated.

Line graphs were then constructed to visually identify annual trends. For many of the boreholes there was no continuous monitoring as either access to borehole were denied, boreholes were blocked or bees were in the boreholes. This caused a lack of cohesion in the line graphs and thus many gaps are present in the line graphs.

For the purpose of this report the following parameters were focused on: pH, electrical conductivity (EC) and nitrate, sulphate, iron and aluminium concentrations. For the groundwater levels column charts were created to see the annual trends.

All monitoring points, both surface and groundwater, were divided into zones. In total there are nine zones. All monitoring points, divided into zones, can be seen in Figure 4.5 (refer to Section 4.2.3). The monitoring points, both surface and groundwater monitoring localities, and the zones in which they have been designated into are presented in Table 4.1 of Section 4.2.3).

For each zone the pH, EC, iron and sodium concentration will be analysed to identify annual trends and whether or not the parameter exceeds the South African Water Quality Guidelines (SAWQG).

4.4.2.1 Zone 1 Groundwater Quality

Boreholes MGW 54, MGW 53, MGW 21 and MGW 22 are located in Zone 1. From Figure 4.57 it is clear that pH remained with the SAWQG target range for the duration of the monitoring period. The EC, Figure 4.58, varies for each borehole. MGW 53 does not exceed the limit whereas MGW 54 fluctuates slightly and at times exceeds the limit for EC. The EC in borehole MGW 21 has been increasing since 2010 with a brief period of decrease in 2016. MGW 22 has an inconsistent EC, fluctuating below and above the limit with a significant increase in EC during 2014.

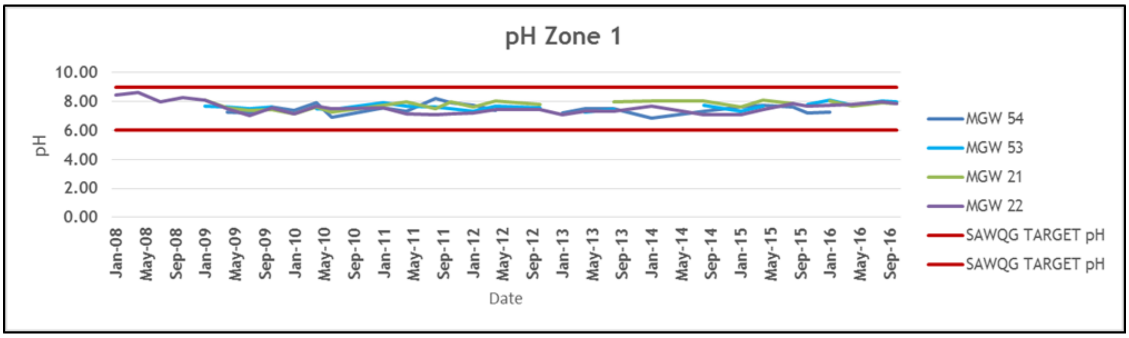


Figure 4.57: pH in boreholes MGW 54, MGW 53, MGW 21 and MGW 22

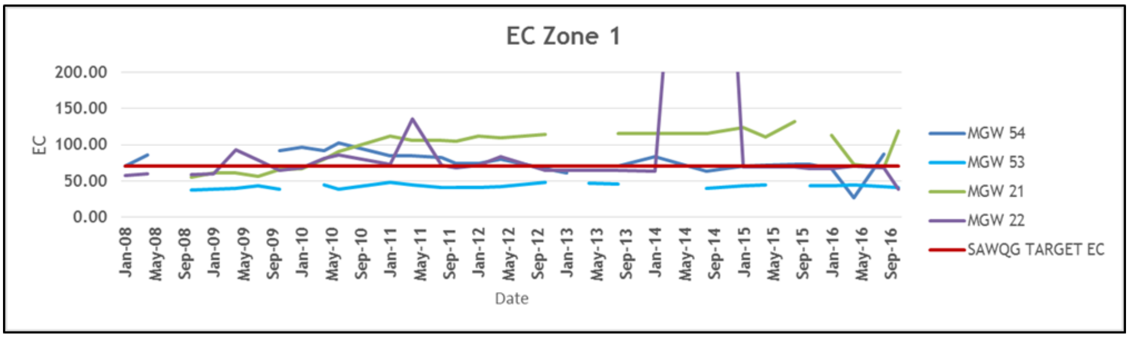


Figure 4.58: EC in boreholes MGW 54, MGW 53, MGW 21 and MGW 22

The iron and sodium concentrations for boreholes MGW 54, MGW 53, MGW 21 and MGW 22 can be seen in Figure 4.59 and Figure 4.60 respectively. The iron in MGW 54 consistently exceeded the limit whereas the iron concentration in MGW 53, MGW 21 and MGW 22 only exceeded the limit in 2011 and 2012 but has since decreased and are currently below the limit. The sodium in MGW 53, MGW 54 and MGW 22 has been decreasing over the monitoring period where MHW 21 has been increasing.

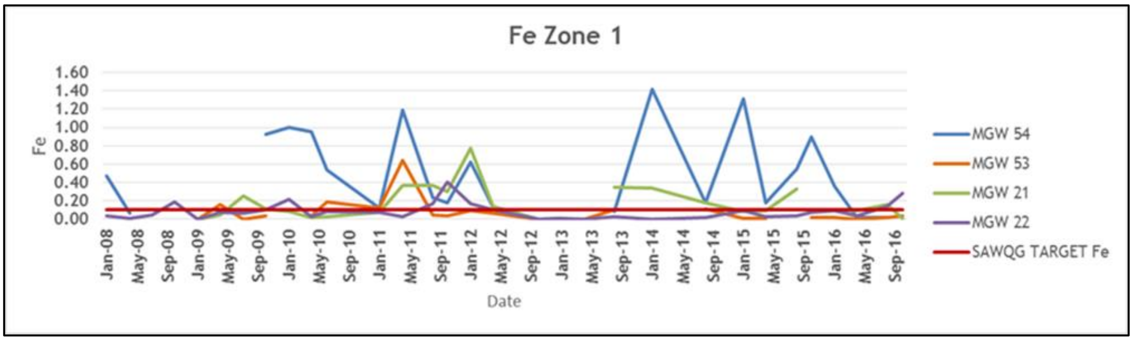


Figure 4.59: Fe in boreholes MGW 54, MGW 53, MGW 21 and MGW 22

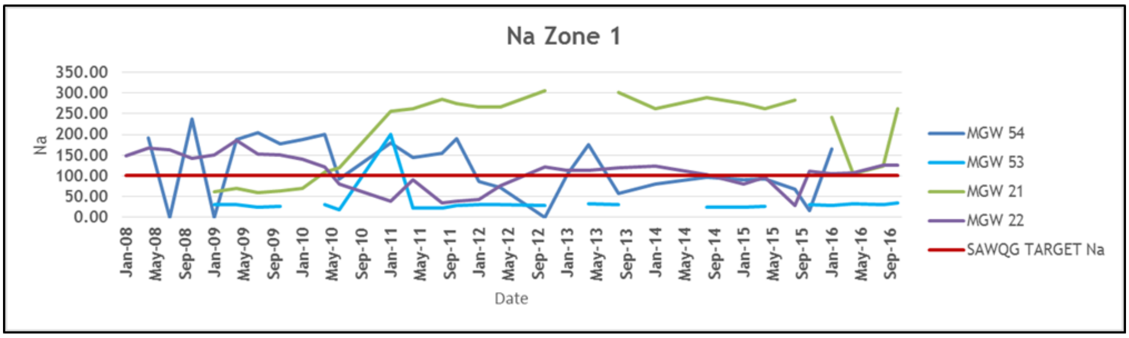


Figure 4.60: Na in boreholes MGW 54, MGW 53, MGW 21 and MGW 22

4.4.2.2 Zone 2 Groundwater Quality

The pH remained within the SAWQG Target range during the monitoring period. The EC, Figure 4.61, in borehole OCM 6, OCM 4 and OCM 5 consistently exceeded the SAWQG limit. The EC increased in OCM 6(s) remained below the limit until 2015 where it increased and currently exceeds the limit. OMC 4(s) started increasing 2015 but decreased later in 2016. The remaining boreholes (OCM 1, OCM 2, OCM 2(s), OCM 3, OCM 3(s), OCM 5(s) and OCM 7) are constant and don't exceed the EC limit.

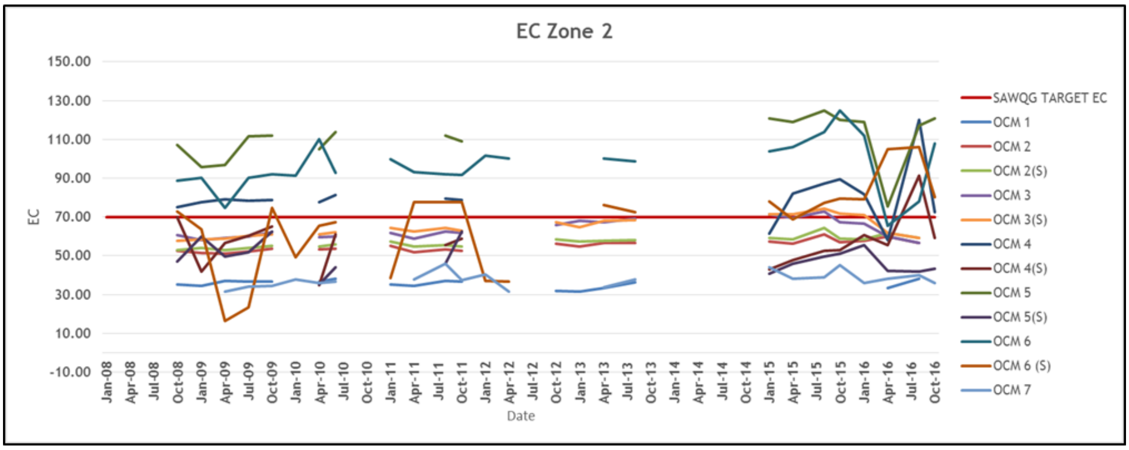


Figure 4.61: EC in boreholes located in Zone 2

Iron concentrations, Figure 4.62, show major variation in boreholes located in Zone 2 with the most dramatic variation occurring in OCM 7. OCM 4(s) and OCM 5(s) exceed the limit and are currently still increasing. Sodium concentration, Figure 4.63, also varies in all Zone 2 boreholes but all remain below the limit. Only OCM 5 exceeded the sodium limit in 2009 but has since decreased.

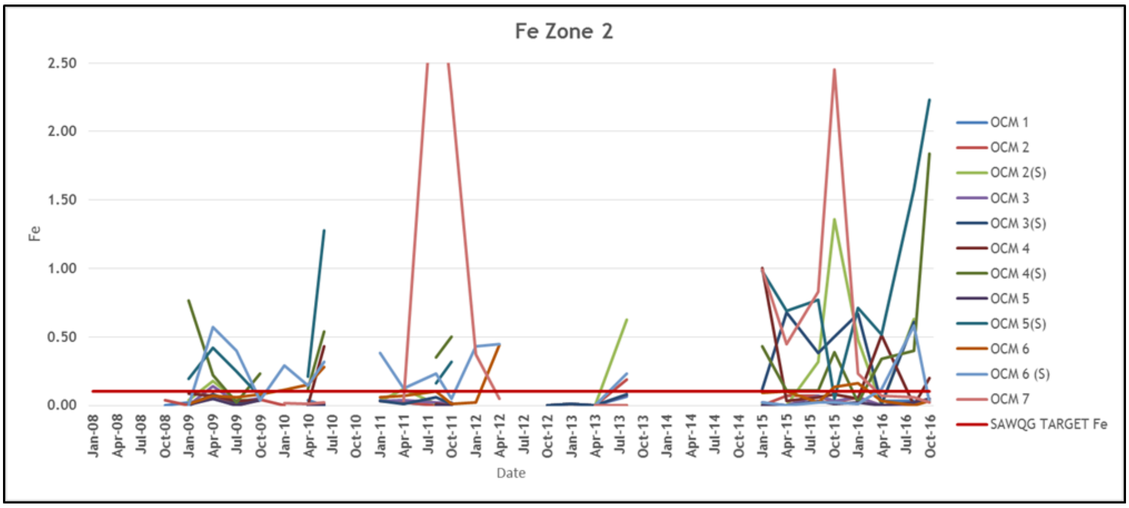


Figure 4.62: Fe in Zone 2 boreholes

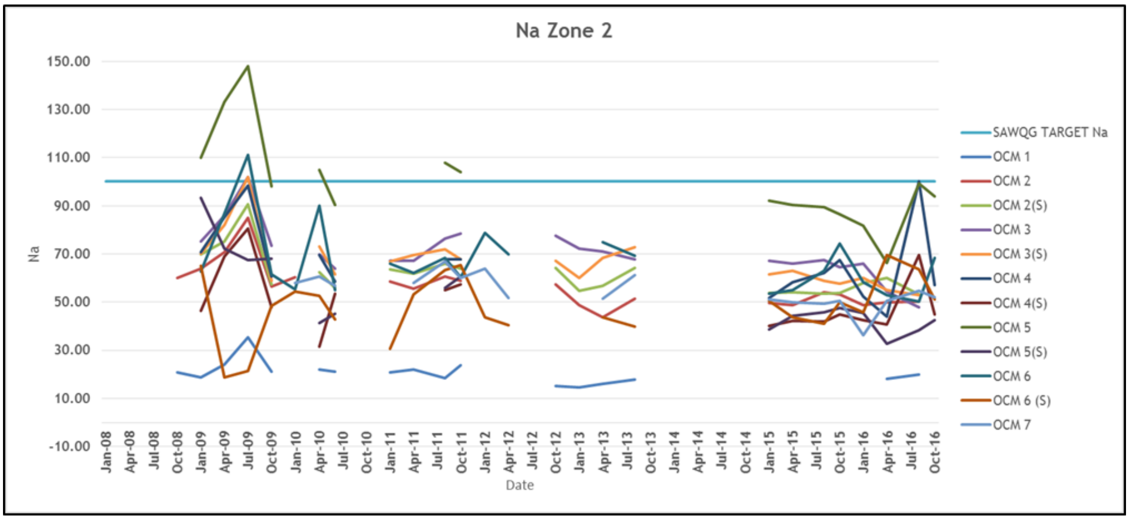


Figure 4.63: Na in Zone 2 boreholes

4.4.2.3 Zone 3 Groundwater Quality

Only one monitoring borehole is located in Zone 3 (MGW 43). The EC trend is depicted in Figure 4.64 and it is evident that EC has exceeded the target limit throughout the monitoring period. Iron concentrations, Figure 4.65, varies with major increase occurring in 2016. Sodium concentrations, Figure 4.66, decreased in 2011 but has since continued to increase, exceeding the SAWQG target limit.

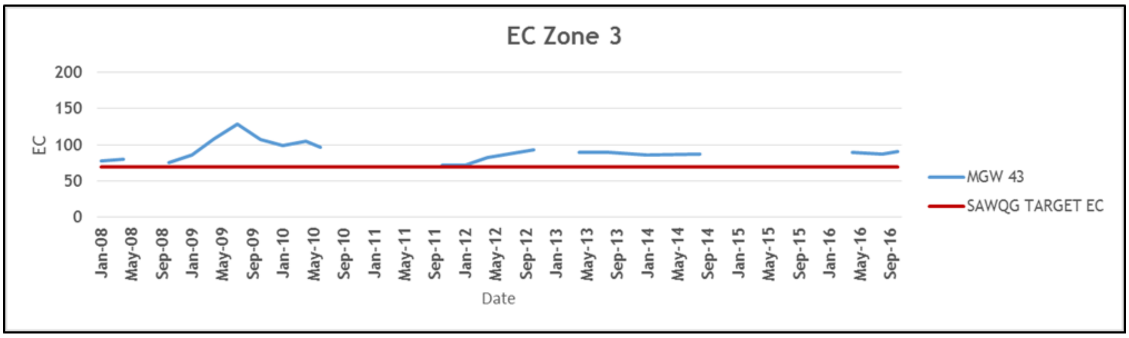


Figure 4.64: EC in MGW 43

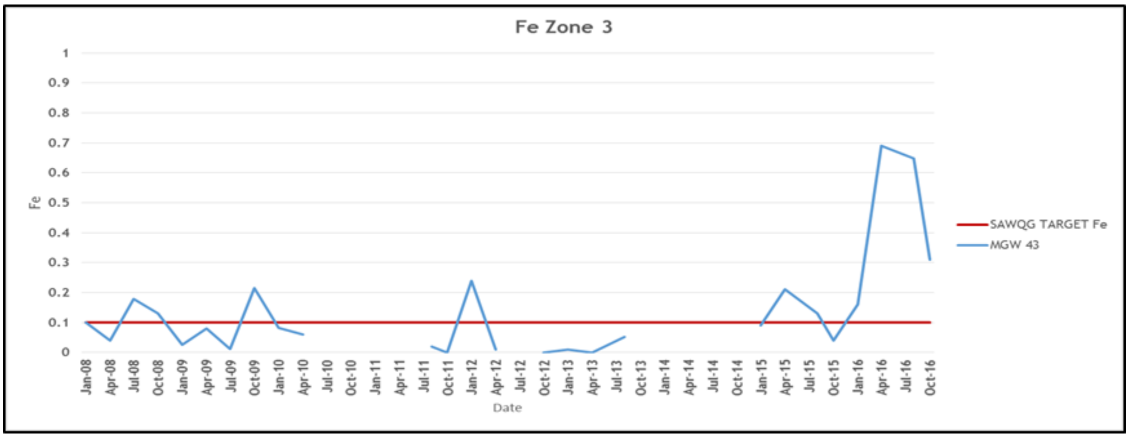


Figure 4.65: Iron concentration in MGW 43

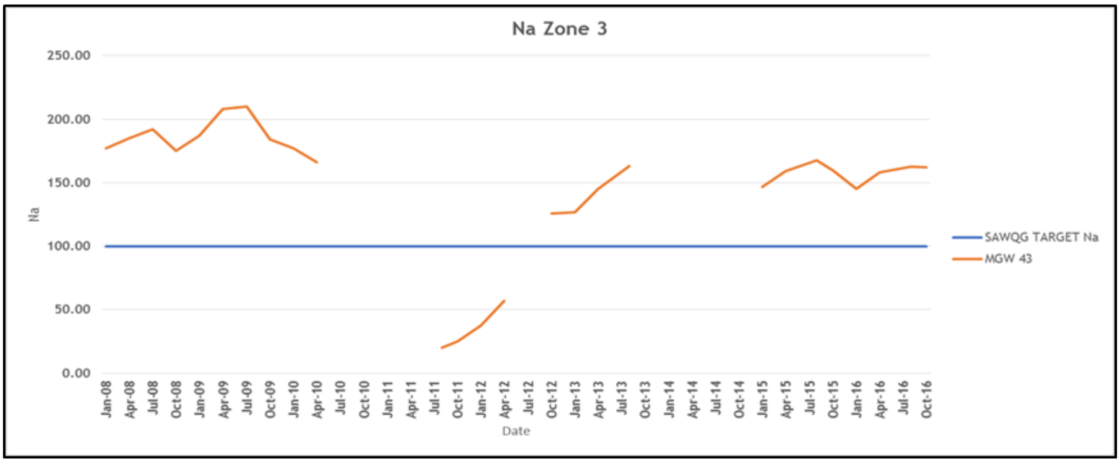


Figure 4.66: Sodium concentration in MGW 43

4.4.2.4 Zone 4 Groundwater Quality

No groundwater sampling points are located within zone 4.

4.4.2.5 Zone 5 Groundwater Quality

The pH and sodium concentration of borehole MGW 23 both fall within the target limits according to SAWQG. The iron concentration exceeds the SAWQG limit with a drastic spike in concentration occurring in 2015, as seen in Figure 4.68. EC, Figure 4.67, remains constant for the monitoring period with a brief increase occurring in 2015.

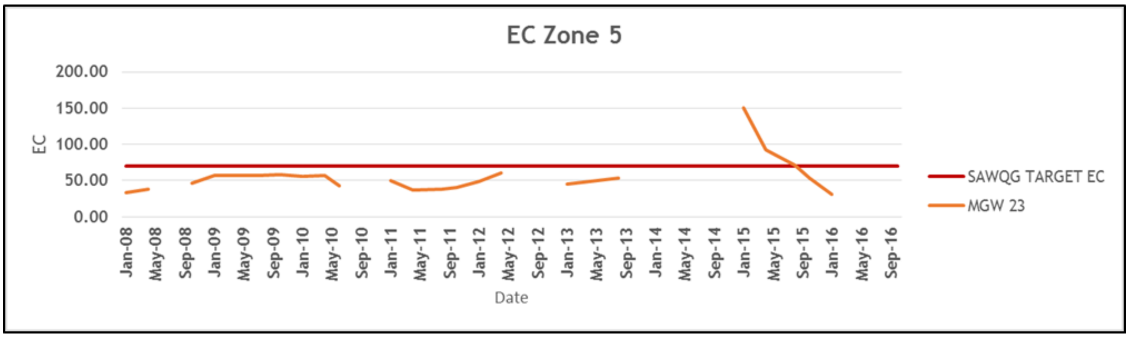


Figure 4.67: EC of borehole MGW 23

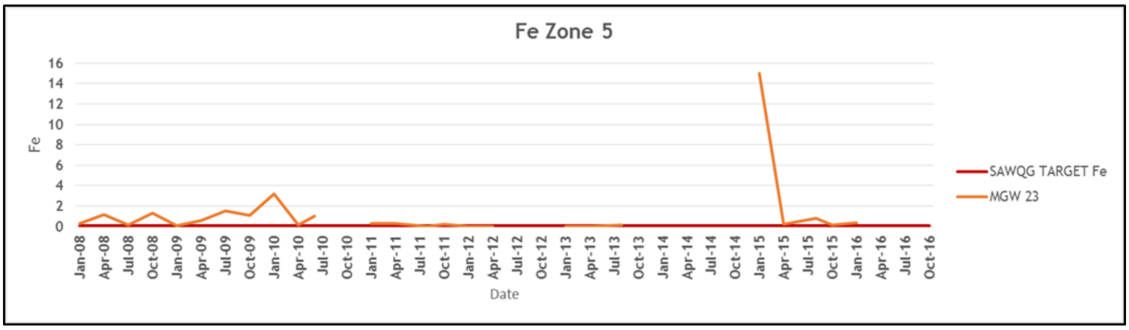


Figure 4.68: Iron concentration of borehole MGW 23

4.4.2.6 Zone 6 Groundwater Quality

The water quality in SPGW1 improved throughout the monitoring period. In 2008 borehole SPGW1 had elevated iron, EC (Figure 4.70), sulphate (Figure 4.71) and sodium concentrations (Figure 4.72) all of which decreased and are currently all within the SAWQG target limits. Borehole MGW 9(s) consistently had poor water quality throughout the monitoring period. In MGW 9(s) sulphate concentration was observed to have an increasing trend, EC also increased. Sodium remained constant and iron concentration decreased but remained above the SAWQG Target for MGW 9(s). In W.T.P 8 sodium and EC remain above the SAWQG Limit but the sodium concentration is decreasing. The pH, Figure 4.69, fluctuated but remains within the SAWQG Limit in all Zone 6 boreholes, with the exception of SPGW1 where a brief drop in pH occurred in 2012. All remaining boreholes in Zone 6 have good water quality with EC, sulphate and sodium remaining constant and below the SAWQG Limits.

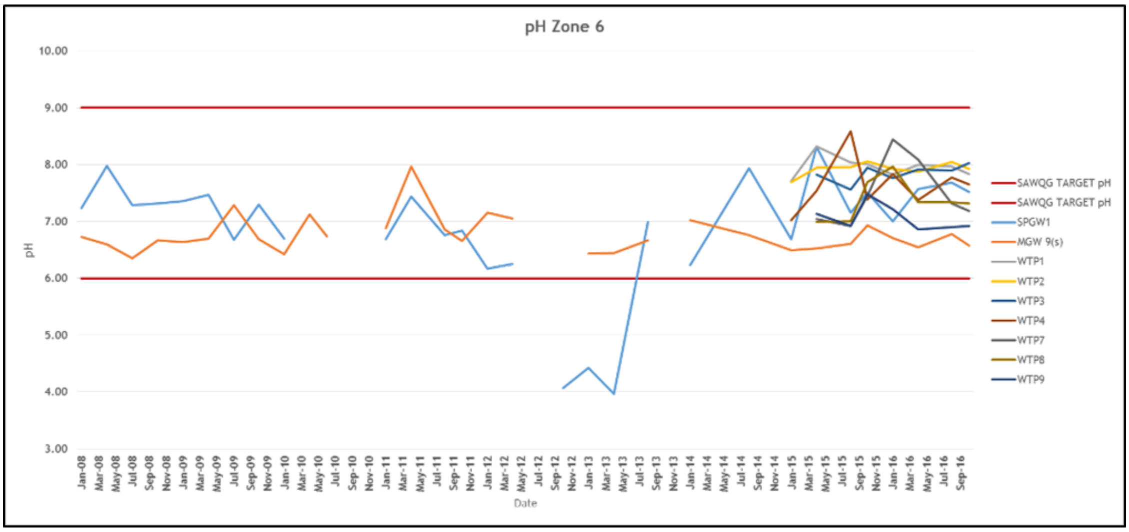


Figure 4.69: pH in Zone 6 boreholes

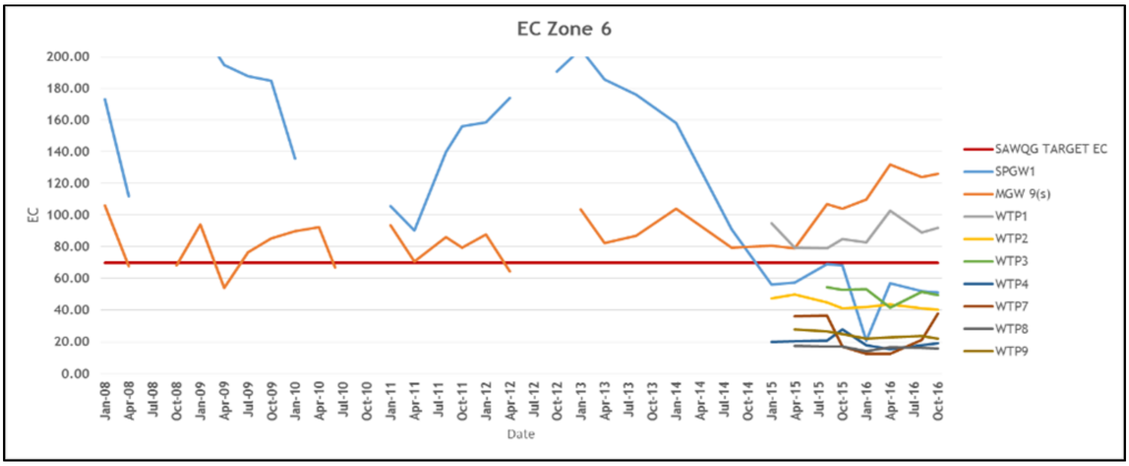


Figure 4.70: EC in Zone 6 boreholes

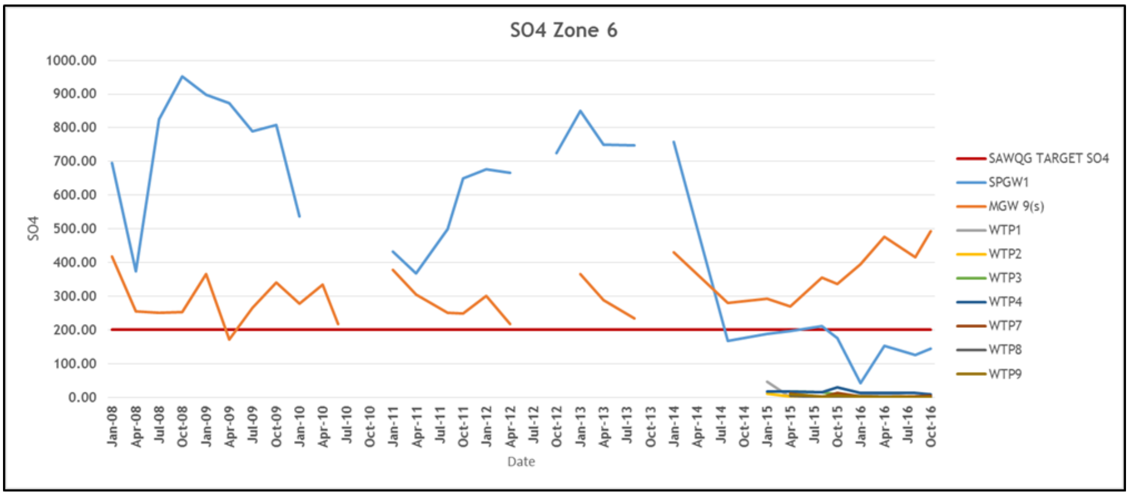


Figure 4.71: Sulphates in Zone 6 boreholes

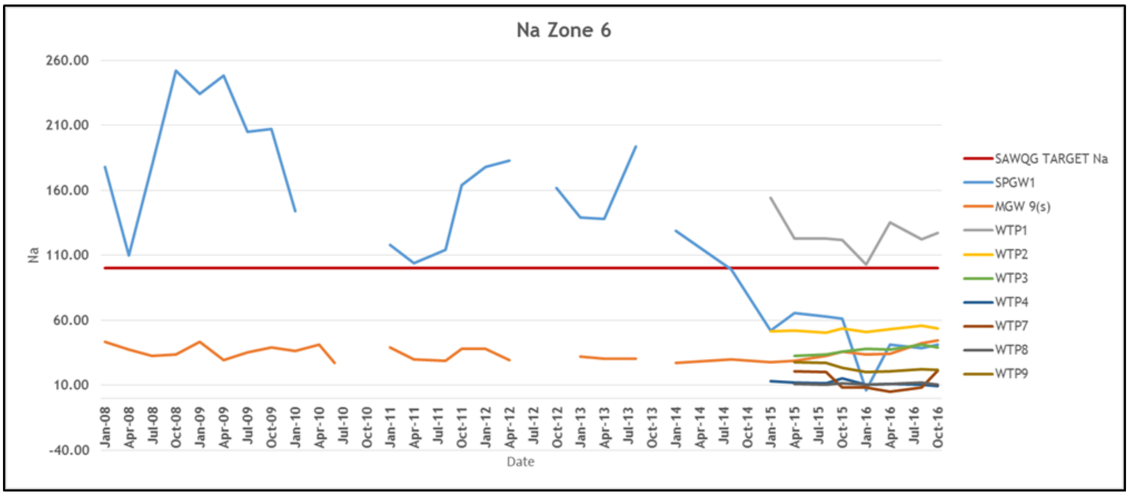


Figure 4.72: Sodium in Zone 6 boreholes

4.4.2.7 Zone 7 Groundwater Quality

The pH, sulphate concentration and EC for Zone 7 boreholes are mainly within the SAWQG Limit and as seen from Figure 4.73 and remain constant. Iron concentration, in MGW 45, varies and exceeds the SAWQG Limit over the monitoring period with spikes occurring in April of each year. The iron concentration, Figure 4.74, is however decreasing with the spikes in April getting smaller. The sodium concentration in MGW 45 is now constant following a triennial spike. Iron in MGW 4(s) also varies and exceeds the limit but sodium, Figure 4.75, remains constant.

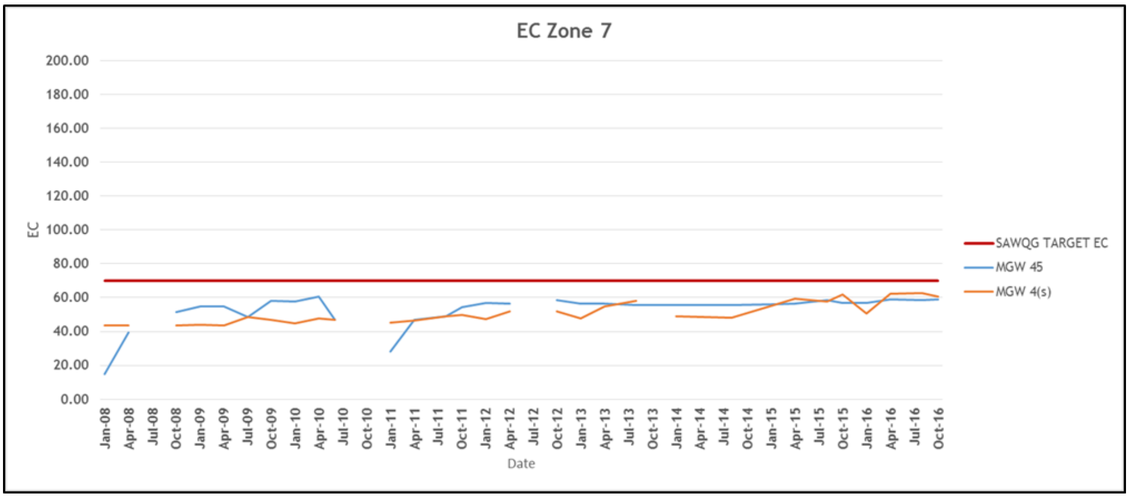


Figure 4.73: EC in MGW 45 and MGW 4(s)

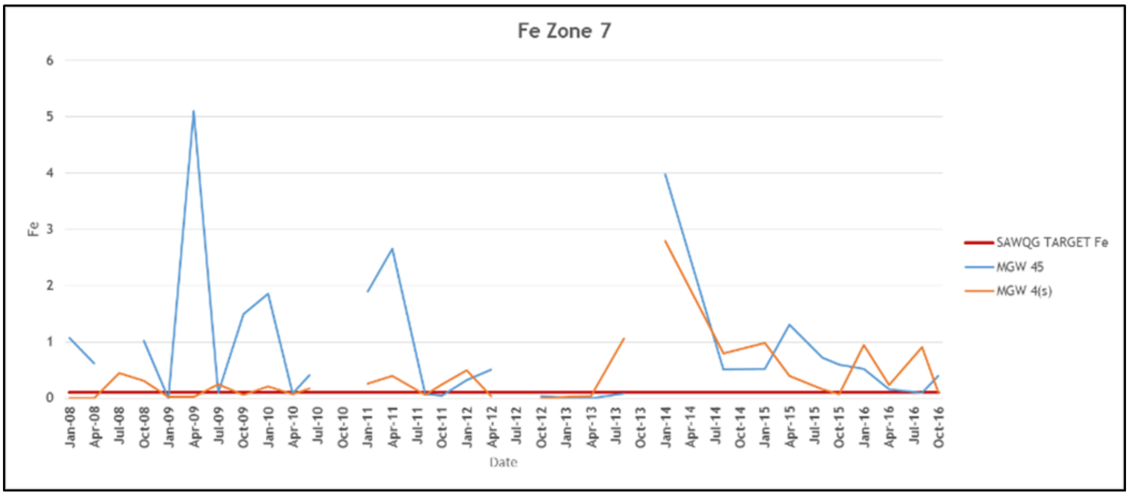


Figure 4.74: Iron concentration in MGW 45 and MGW 4(s)

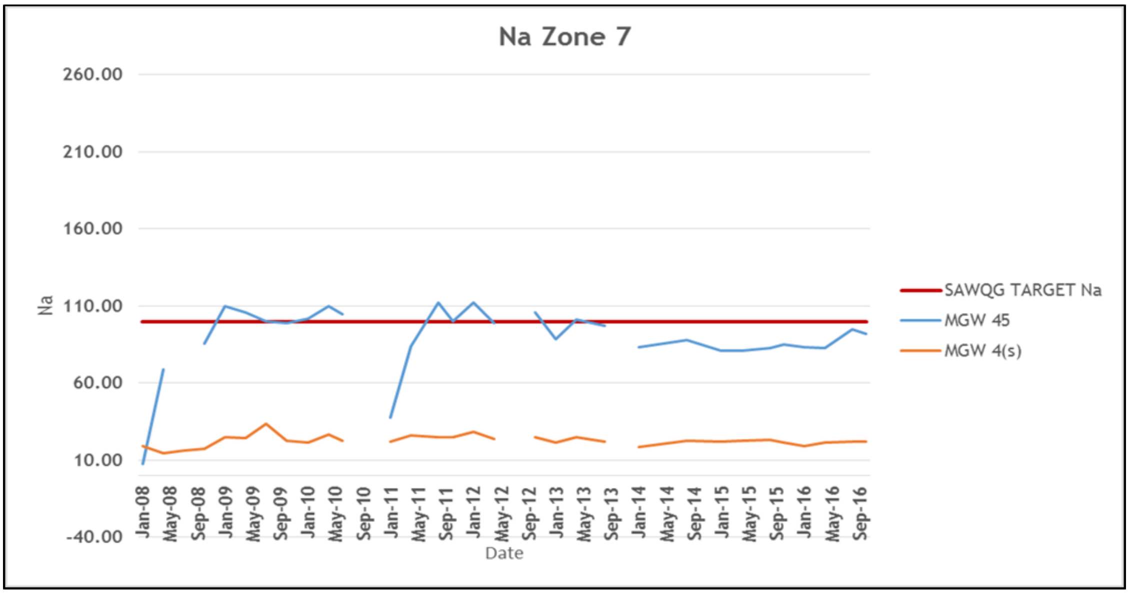


Figure 4.75: Sodium concentration in MGW 45 and MGW 4(s)

4.4.2.8 Zone 8 Groundwater Quality

Borehole MGW 24 has good water quality. From Figure 4.76 to Figure 4.78 it is evident that the parameters are constant except for a spike occurring in July 2016.

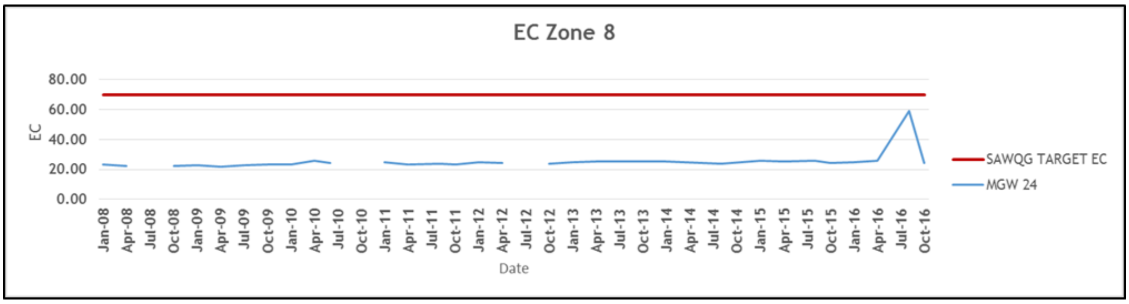


Figure 4.76: EC in MGW 24

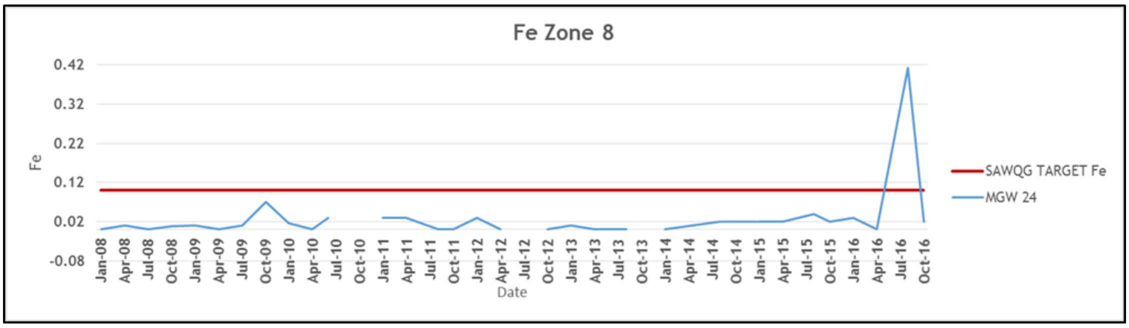


Figure 4.77: Iron concentration in MGW 24

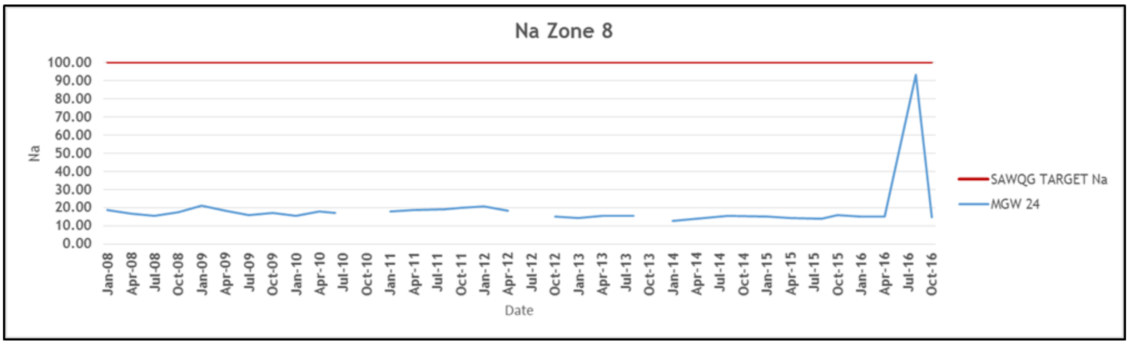


Figure 4.78: Sodium concentration in MGW 24

4.4.2.9 Zone 9 Groundwater Quality

Looking at Figure 4.79 to Figure 4.82 there is an abnormal spike in the concentrations of the various parameters in MGW 5(s) and a drop in the same parameters concentrations in MGW 46 occurring in January 2010. Besides the observed spike MGW 46 has a constant EC and sodium concentration which exceeds the SAWQG Limit. Iron in MGW 46 varies but has been decreasing since January 2014. Again, ignoring the spike, the EC and sodium in MGW 5(s) remains constant. The iron in MGW 5(s) varies and has a sudden increase that occurs roughly every three years.

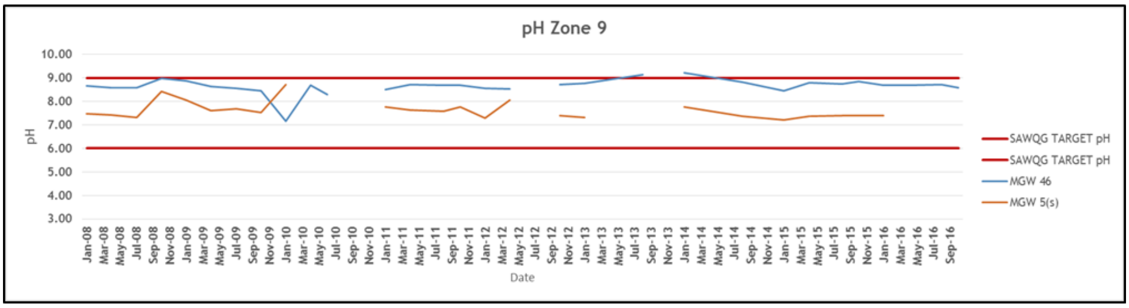


Figure 4.79: pH in Zone 9 boreholes

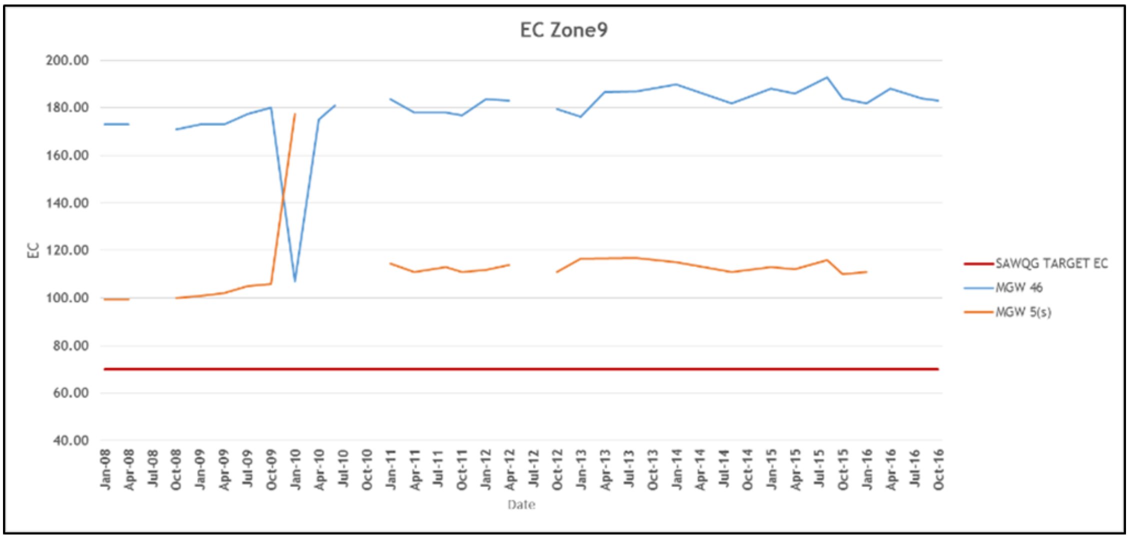


Figure 4.80: EC in Zone 9 boreholes

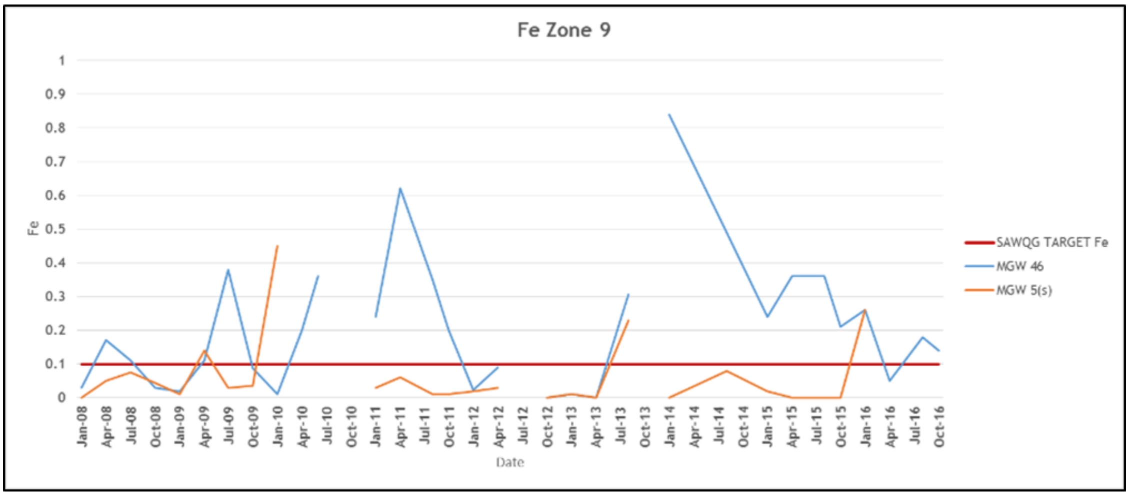


Figure 4.81: Iron concentration in Zone 9 boreholes

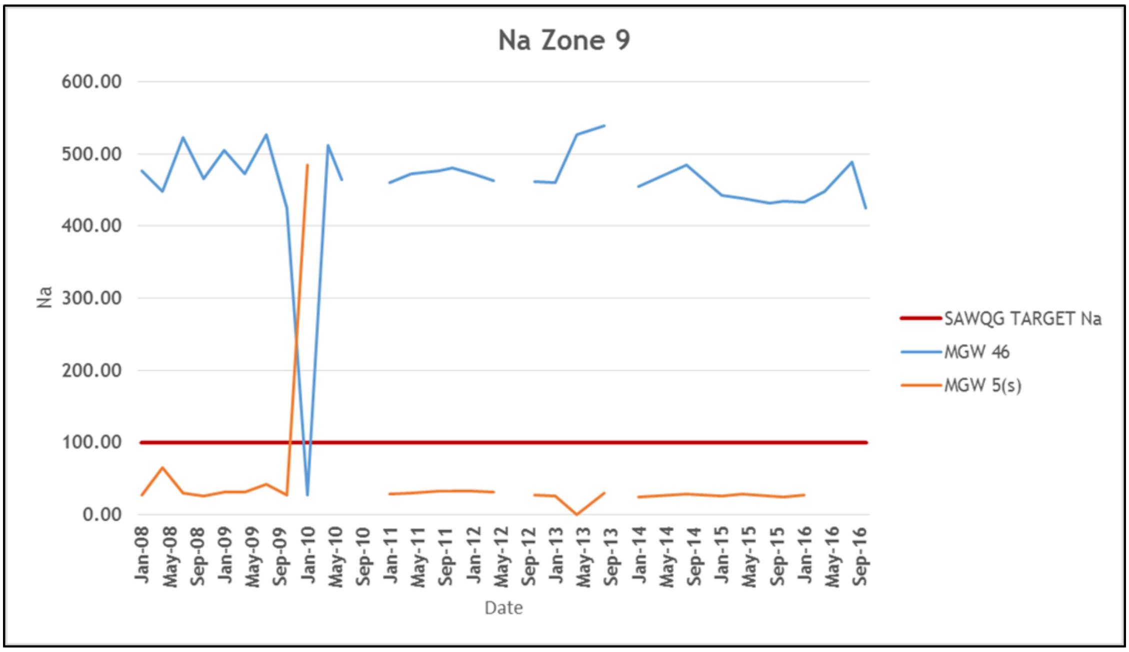


Figure 4.82: Sodium concentration in Zone 9 boreholes

4.4.2.10 Overall Conclusions

Table 4.19 summaries all trends see in each Zone. It is recommended that monitoring in all localities be conducted more consistently as it is difficult to identify trends when there are gaps in monitoring.

Table 4.19: Summary of Groundwater Levels and Quality Trends

Zone	Groundwater Levels	Groundwater Quality
Zone 1	Constant.	- pH was satisfactory and within SAWQG Limits. - MGW 54 elevated iron concentrations. - Sodium concentration increased in MGW 21. - Sodium concentration decreased in both MGW 54 and 53.
Zone 2	- Borehole OCM 1 and OCM 7 show seasonal fluctuations. - OCM 3, OCM 2, OCM 3(S) and OCM 2(S) remained constant. - Boreholes OCM 4, OCM 4(S), OCM 5 and OCM 5(S) experienced a decrease in groundwater levels. - Boreholes OMC 6 and OCM 6(S) experienced seasonal fluctuations until a decrease in groundwater level occurred in 2015.	- Elevated electrical conductivity observed in OCM 4, OCM 5 and OCM 6 and an increase in OMC 6(S). - Borehole OCM 7 showed great variation in iron concentration. - Sodium concentration remained satisfactory in all boreholes.

Zone	Groundwater Levels	Groundwater Quality
Zone 3	-In borehole, MGW 43, water levels remained constant.	- Borehole MGW 43 had elevated electrical conductivity, iron concentration increased and sodium concentration decreased.
Zone 4	N/A.	N/A.
Zone 5	-Groundwater level in MGW 23 increased during the monitoring period.	-Iron concentration decreased in MGW 23 and pH, EC and sodium remained satisfactory.
Zone 6	-Groundwater levels remained constant in MGW 9(S), W.T.P 3, W.T.P 4, W.T.P 7, W.T.P 8 and W.T.P 9. - A decreased in water level occurred in SPGW1 whereas a decreased in water level only started in July 2016 in borehole W.T.P 1. -W.T.P 2 showed an increase in water level in July 2016.	-Electrical conductivity decreased in SPGW1, increased in MGW 9(S) and remained constant in the remaining boreholes in Zone 6. - Sulphate and sodium concentration decreased in SPGW1 whereas sulphate concentration increased in MGW 9(S).
Zone 7	-Groundwater levels remained constant in MGW 45 and started decreasing in 2015 in MGW 4(S).	-Iron concentration decreased in both boreholes and remained constant in both boreholes.
Zone 8	- Water level in in MGW 24 showed seasonal fluctuations.	- Iron and sodium concentration were low in MGW 24 and electrical conductivity remained satisfactory.
Zone 9	-In borehole MGW 5(S) water level remained constant and too little data points are collected for MGW 46 to identify a trend.	- Electrical conductivity remained constant in both MGW 46 and MGW 5(S). - Sodium concentration remained elevated in MGW 46 and constant in 5(S). - Iron concentrations significantly increased in both boreholes.
Un-zoned localities	N/A	N/A

4.4.3 Hydrocensus

Comprehensive hydrocensus/users surveys were conducted for the Matla mine lease area and immediate surrounding during four individual groundwater related studies:

- Mining operations at Mine 1, Mine 2 and Mine 3 *(GCS, 2006)*;
- New access shaft and overland conveyor for Mine 1 *(Groundwater Square, 2008)*;
- Information review and gap analysis to support the EIA for stooping and opencast mining *(Golder 2011)*; and
- The stooping of existing underground mining areas located on Eskom and Exxaro owned land surface areas *(GCS, 2016)*.

The main aims and objectives of the hydrocensus field surveys were as follow:

- To locate all interested and affected persons (I&APs) with respect to groundwater – thus groundwater users;

- To collect all relevant information from the I&APs (i.e. name, telephone number, address, etc.);
- Accurately log representative boreholes on the I&APs properties; and
- To collect all relevant information regarding the logged boreholes (i.e. yield, age, depth, water level, use etc.) in order to establish a representative baseline of groundwater conditions.

The results of the hydrocensus surveys are summarised in Appendix A of the Hydrogeological report attached as Annexure G to this report, while borehole positions are indicated in Figure 4.83.

Key Issues: *Widespread pollution or depletion of the groundwater resource will impact negatively on:*

- *The groundwater resource itself and interrelations with other natural resources (e.g. rivers and streams); and*
- *The users that depend on groundwater as sole source of domestic water as well as for livestock and gardening.*

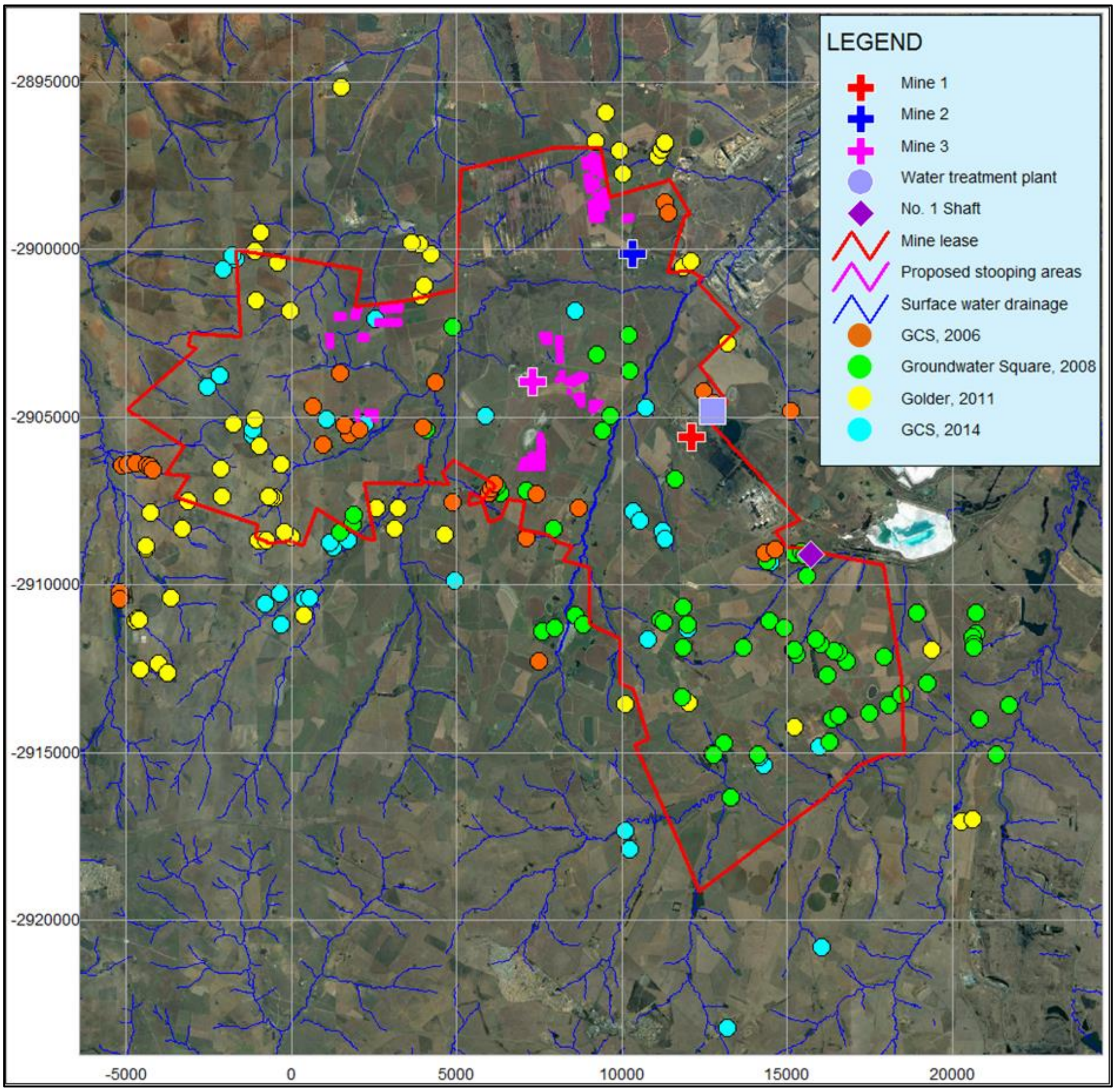


Figure 4.83: Positions of boreholes from previous hydrocensus and user surveys

4.4.3.1 Groundwater Level Depth

Groundwater level information was collected during a hydrocensus conducted by GCS in 2014 (Appendix A of the Hydrogeological report). A thematic groundwater level map of the entire mining area is provided in Figure 4.86. These water levels are essential as they were used in the generation of static groundwater level elevations with the use of the Bayesian interpolation method (Figure 4.87).

Regional static groundwater levels generally vary between ± 2 and 22 meters below surface (Figure 4.86). Due to the generally low aquifer transmissivity the pumping causes deep drawdown of the groundwater level/piezometric head and a depression cone forms that is deep, but very limited in lateral extent. This concept is explained in Figure 4.84.

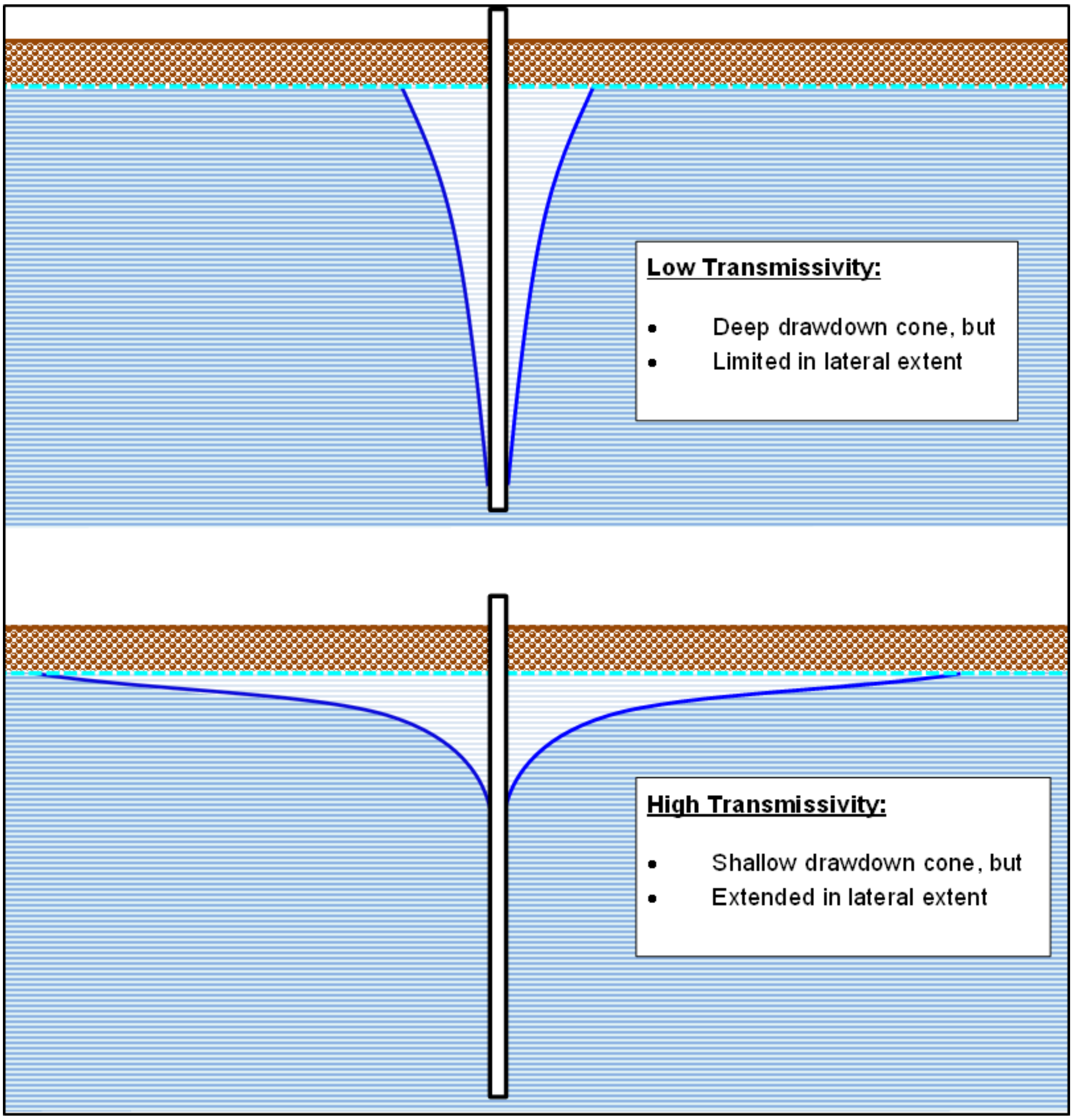


Figure 4.84: Effect of aquifer transmissivity on depression cone

The static groundwater elevation contour map provided in Figure 4.87 was constructed through the utilisation of the Bayesian interpolation technique. The Bayesian interpolation technique utilises the natural relationship that exists between the surface topography and the depth-to-groundwater level to estimate groundwater levels in areas where borehole data is scarce.

Because impacts on the natural groundwater level already exist due to mine dewatering and/or groundwater abstraction for domestic, irrigation and mining purposes, only boreholes where the linear correlation between borehole collar elevation and groundwater level elevation exists were used in the interpolation.

The static groundwater contours presented in Figure 4.87 therefore represent conditions without impacts from sources or actions other than natural conditions.

A graph of borehole collar elevation versus groundwater level elevation is presented in Figure 4.85 where the linear correlation of approximately 97% can be seen. It should be noted that groundwater levels from some boreholes (generally those in excess of ten meters deep) were discarded because impacts associated with groundwater abstraction affect the natural groundwater level/topography relationship.

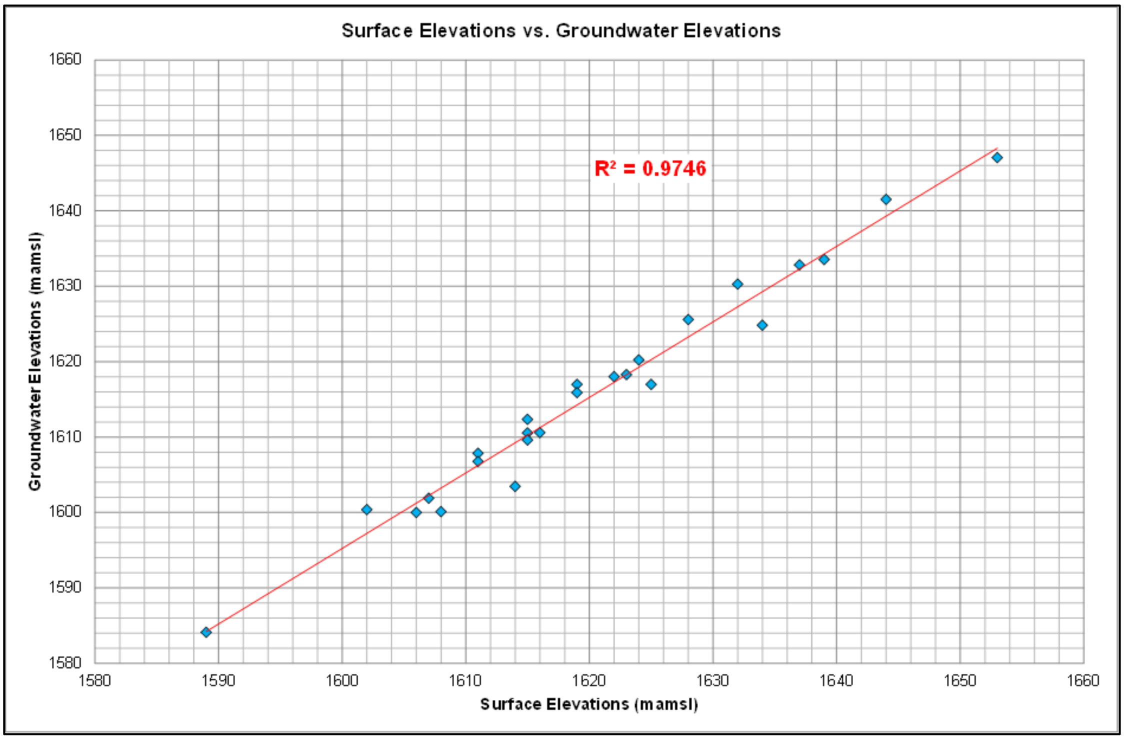


Figure 4.85: Relationship between surface- and groundwater elevations

The highest static water level elevation within the mine lease area is approximately 1 650 mamsl and occurs in the topographic higher regions. The lowest static water level elevation where no impact from abstraction occurs is at approximately 1 560 mamsl. Groundwater flow directions within the modelled area are also indicated in Figure 4.87 with the use of blue arrows.

Seen in the light of water level differences because of mining, pumping and recharge effects, filtering and processing of water levels are required to remove water levels considered anomalous high or low. The final interpolated potentiometric surface of the water levels is thus bound to contain local over- or under estimations of the actual water levels, but it will be representative of the general regional trend of the static groundwater level.

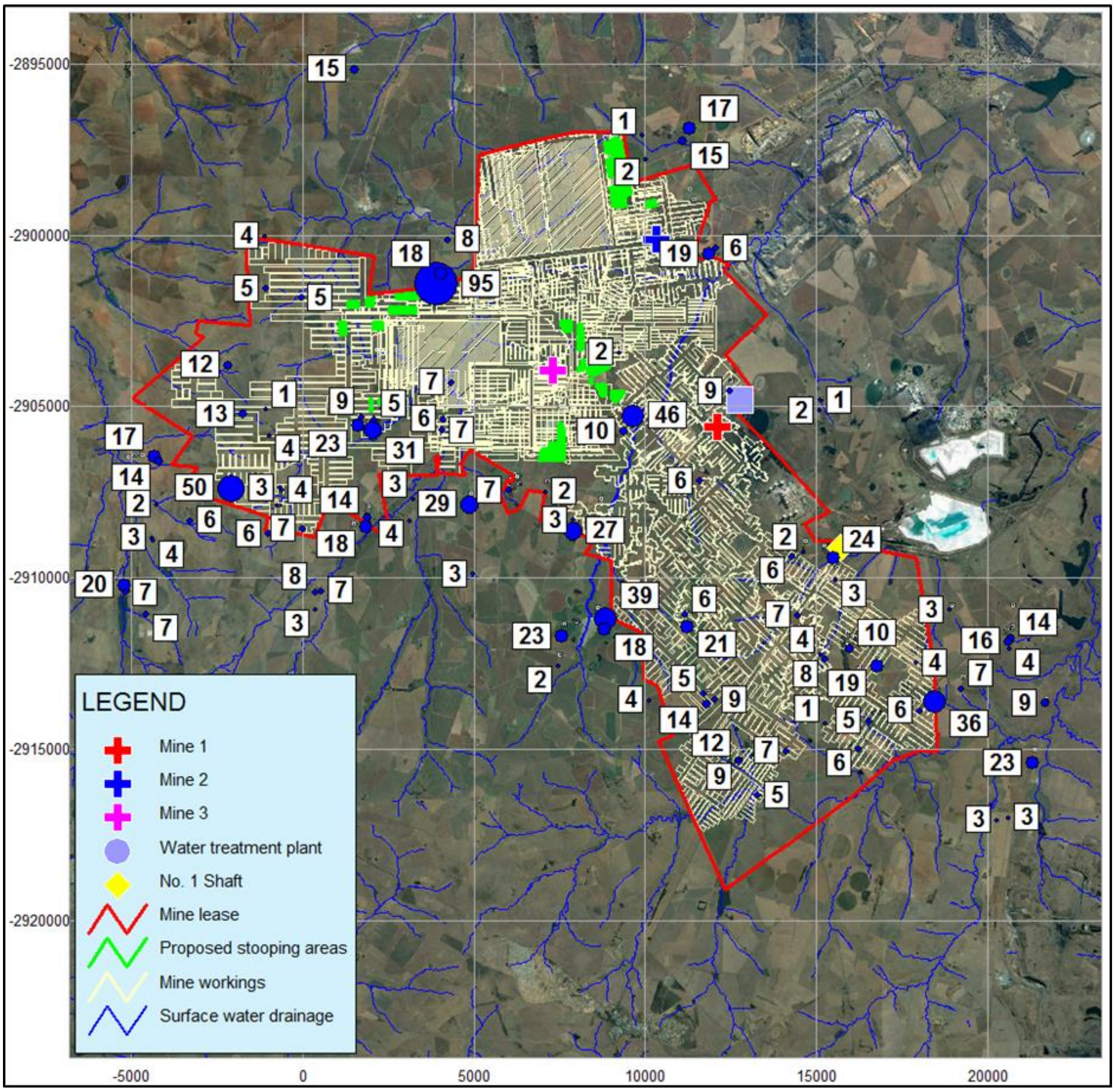


Figure 4.86: Thematic map of measured groundwater level depths (mbs)

Notes: *- The numbers in the above figure indicate the groundwater level depth below surface in meters,*

- The size of the blue circles is directly proportional to the groundwater level depth, hence the largest circle represents the deepest water level.

Key Issues: *On a regional scale, groundwater mimics the natural/unaffected flow patterns/directions of the surface topography. Impacts on groundwater levels and subsequent flow patterns do however occur (be it from groundwater abstraction for domestic/other purposes or mine dewatering), but are largely restricted due to the generally low hydraulic properties of the aquifer host rock.*

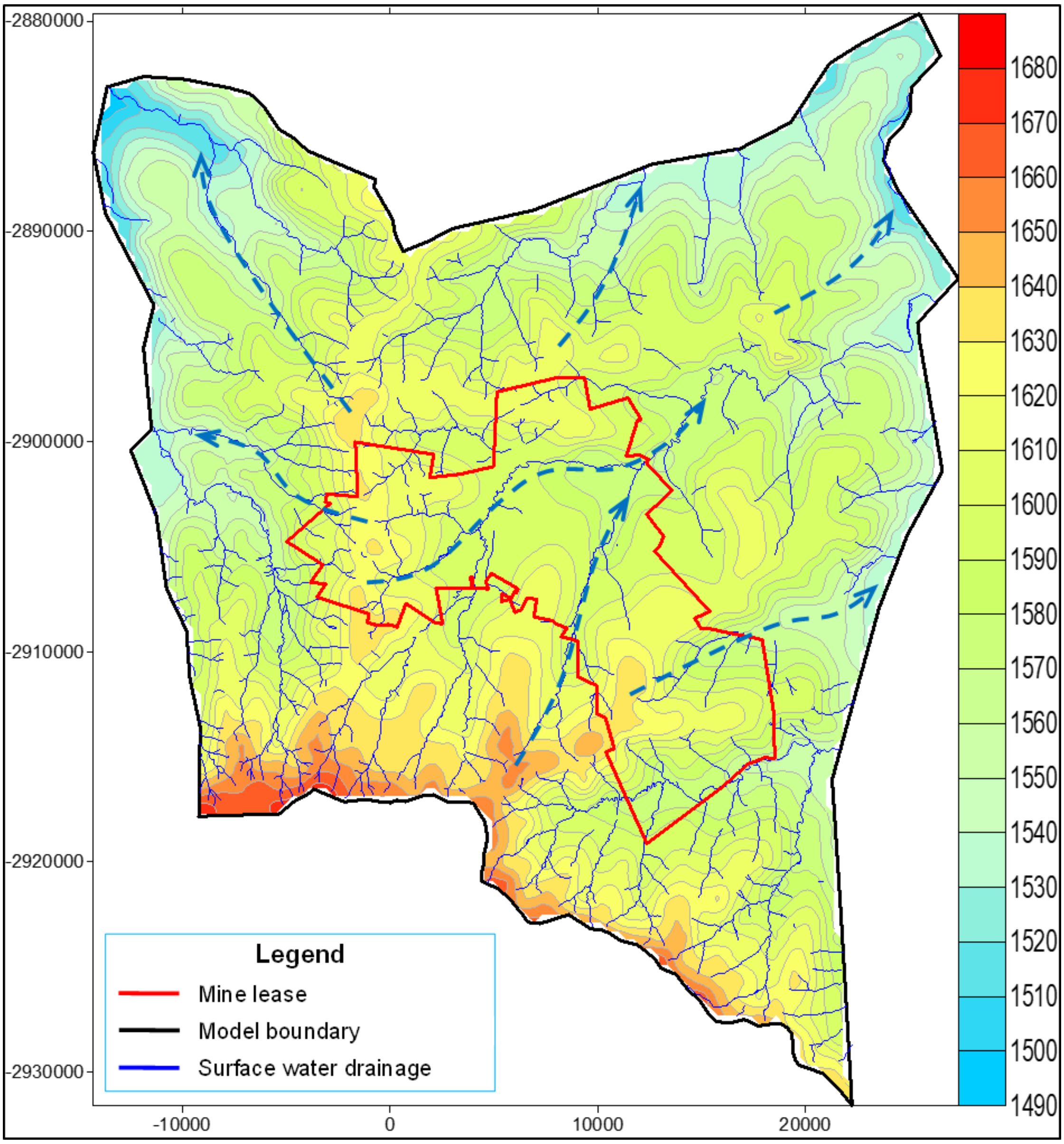


Figure 4.87: Bayesian interpolated groundwater elevation contour map of the modelled area (mamsl)

4.4.4 Potential Pollution Source Identification

A source area is defined as an area in which groundwater contamination is generated or released from as seepage or leachate. Source areas are subdivided into two main groups:

Point sources:

The contamination can easily be traced back to the source and typically includes mine infrastructure such as a processing plant, overburden/waste rock dump, pollution control dam, underground workings, ROM stockpile, etc.

Diffuse sources:

Diffuse sources of groundwater contamination are typically associated with poor quality leachate formation through numerous surface sources.

An evaluation of the mining area and related activities revealed numerous potential source areas, which are listed and briefly discussed below in Table 4.20. No acid base accounting was performed for the purpose of this investigation, however the surrounding mines are known to generate acid *(GCS, 1998)*. The weathered sandstone, shale, and the 5 seam roof and floor all have the potential for acidification. Groundwater flowing through these areas is likely to generate acid when exposed to oxygen and water. The coarse sandstone, on the other hand, has a very large neutralising potential and will give groundwater flowing through it an alkaline character *(GCS, 2006)*.

Table 4.20: Potential sources of groundwater contamination

Source	Contamination risk	Comments
1) Plant area	High	- Impact on the groundwater only occurs through leachate formation from surface. Impacts thus only occur as a result of rainfall recharge or when water is introduced in some form where leachate can form that seeps to the groundwater.
2) Waste rock dumps and stockpiles	High	- Effective recharge through waste rock dumps and stockpiles is much higher than the natural recharge of the area due to lower evaporation rates. - Surface water run-off originating from these source areas, toe-seeps and seepage through the base may potentially be of poor quality and could cause adverse groundwater quality impacts should it enter the aquifer. - Seepage from waste rock dumps and stockpiles is likely to be affected by acid mine/rock drainage and therefore high in iron and sulphate content.
3) Underground mining areas	High	- Contamination will only leave these areas after groundwater levels have recovered from the impacts of mine dewatering. - Water collecting in these areas is usually characterised by high concentrations of iron and sulphate and low pH due to acid mine drainage.
4) Dirty water retaining facilities (water treatment plant, pollution control dam, sewage, etc.)	Low/Medium	- These facilities are developed and constructed for the sole purpose of containing dirty/affected water and therefore minimising the risk of it contaminating the groundwater. Mismanagement of these facilities may however lead to spills and/or leakages that have the potential to contaminate the underlying groundwater.
5) Workshops and washing/cleaning bays	Low/Medium	- Impact on the groundwater only occurs through leachate formation from surface.

Source	Contamination risk	Comments
		Impacts thus only occur as a result of rainfall recharge or when water is introduced in some form where leachate can form that seeps to the groundwater. - Organic contaminants are usually the main pollutants of concern (e.g. oil, grease, diesel, petrol, hydraulic fluid, solvents, etc.).

Key Issues:

- *The coal and overburden material have the potential to generate an acidic leachate high in sulphate and iron content due to acid mine/rock drainage. This characteristic behaviour of material containing metal sulphide minerals (usually pyrite), significantly increases a source's potential to adversely affect the quality of groundwater;*
- *Water collecting in the mine workings will stratify with time, i.e. the "heavier" polluted water will sink to the bottom or floor of the mine leaving the "lighter" water of better quality to occupy the upper parts of the water column. The water that will eventually decant should therefore be of a better quality than that in the reactive coal horizon;*
- *This stratified system may however be disturbed in areas experiencing high water ingress and consequent mixing of the water columns, thus adversely affecting the quality of the decanting water; and*
- *High extraction mining has led to surface subsidence (especially above shortwall panels) in the Matla mine lease area. Wherever subsidence has occurred, recharge to the underground workings is expected to have increased significantly. If the Matla underground workings are to decant, the water is expected to be of poor quality.*

4.4.4.1 Potential Pathways for Contamination

In order for contamination to reach and eventually affect a receptor/s, it needs to travel along a preferred pathway. The effectiveness of a pathway to conduit contamination is determined by three main factors, namely:

- Hydraulic conductivity of pathway,
- Groundwater hydraulic gradient, and
- Area through which flow occurs.

All three abovementioned factors have a linear relationship with the flow of contamination through a preferred pathway, meaning an increase in any one of the three will lead to an increase in flow.

The following potential pathways were identified in the mine lease area:

Saturated weathered zone (weathered zone aquifer)

As discussed in Section 4.4.2 of the report, the weathered zone aquifer is composed of soil and weathered bedrock, which depending on the weathering depth and depth to groundwater level may be between 0 and 12 meters thick.

The rate of flow depends on the hydraulic conductivity of the aquifer and groundwater hydraulic gradient (presented din section 3.4 of the Hydrogeological Assessment). Groundwater/contaminant flux in this aquifer is expected to be in the order of 6 m/y, which is considered to be relatively slow. It should be noted that the weathered zone aquifer system is undeveloped in areas where the groundwater level is deeper than the contact between the weathered zone and fresh bedrock.

Geological structures

Dykes and faults are known to occur throughout the mine lease area, which may act as sufficient pathways for contamination. The crystalline nature of an igneous dyke is characteristic of an aquiclude, however rapid cooling during intrusion caused highly transmissive fracture zones to form along the contact between the intrusive and surrounding rock.

The flow rates may increase by several orders of magnitude should a transmissive geological structure be located in the down gradient groundwater flow direction and if it is also orientated parallel to the local flow direction.

4.4.4.2 Potential Receptors of Contamination

A receptor of groundwater contamination usually occurs in the form of a groundwater user that relies on groundwater for domestic, irrigation or livestock watering purposes. Surface water features (stream, river, dam, etc.) that rely on groundwater base flow for the sustainment of the aquatic environment are also considered to be important receptors.

Numerous groundwater users were located during the user surveys and their positions are indicated in Figure 4.83**. Numerous perennial surface water streams cut through the mine lease area, which are also considered to be potential receptors.**

Key Issues:

For a negative groundwater quality impact to be registered the following three components should be present:

- *A source to generate and release the contamination;*
- *A pathway along which the contamination may migrate; and*
- *A receptor to receive the contamination.*

All three these components are present within the Matla mine lease area, which stresses the importance of a comprehensive early detection groundwater monitoring program (source monitoring) and ongoing water management and containment of source effects.

4.4.5 Groundwater Model

4.4.5.1 Summary of Conceptual Model

A vertical cross section of the mine lease area is provided in Figure 4.88. Based on the assessment of all groundwater related aspects and previous groundwater studies, the hydrogeological system underlying the Matla mine lease area was conceptualised as follows:

- The mine lease area is underlain by sedimentary rocks (mainly sandstone, siltstone, shale and coal) of the Ecca Group, Karoo Supergroup;
- Two aquifer systems are present, namely a shallow aquifer composed of soil and weathered bedrock and a deeper fractured rock aquifer hosted within the solid/unweathered bedrock;
- The average transmissivity of the weathered zone aquifer is approximately 1.7 m^2/d, while the transmissivity of the more heterogeneous fractured rock aquifer generally varies between 0.1 m^2/d and 7 m^2/d;
- Approximately 4% of the mean annual rainfall reaches the groundwater table to recharge the aquifer;
- Natural groundwater drainage from the Matla mine lease area is towards the west/north-west and north-east;
- The average hydraulic gradient was calculated to be in the order of 0.7%, resulting in a groundwater seepage velocity/flux of approximately 5.8 m/y;
- Groundwater levels around the mining area generally vary between ± 2 and 22 meters below surface (mbs);
- Groundwater levels in excess of ten meters deep are considered to be affected (be it from groundwater abstraction for domestic/other purposes or mine dewatering), however impacts are largely restricted due to the generally low hydraulic properties of the aquifer host rock;
- Groundwater is considered to be of good quality according to the two sets of guidelines used in the assessment of the chemical and physical groundwater analyses;
- Numerous potential sources of groundwater contamination occur within the mine lease area. Studies have shown that the coal and waste material have the potential

to generate acidic leachate due to acid mine/rock drainage, significantly increasing the source's potential to adversely affect groundwater quality;

- The saturated weathered zone and geological structures (dykes and faults) within the mine lease area were identified as possible pathways along which groundwater and potential contamination may migrate at accelerated rates;
- Numerous groundwater users and perennial surface water streams occur throughout the mine lease area, which are considered to be important receptors of contamination that may potentially originate from the coal mining and related activities; and
- The planned stooping areas are either partially or completely flooded and would require dewatering before Matla can safely commence with their stooping activities.

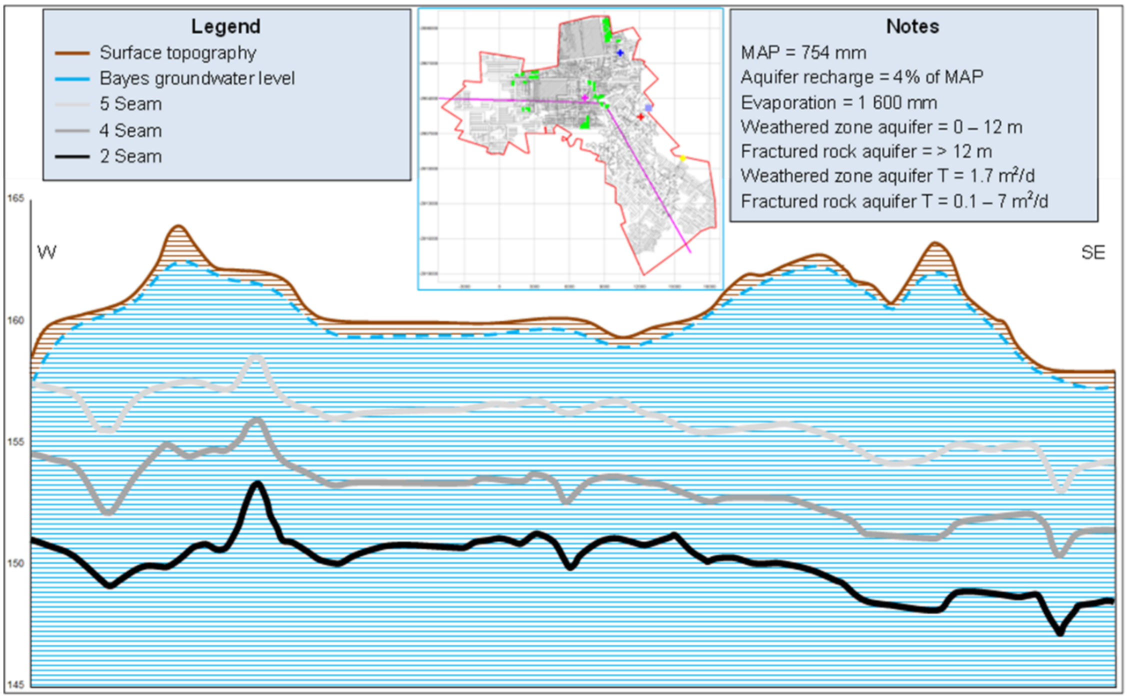


Figure 4.88: Vertical cross section through mine lease area

4.4.6 Numerical Groundwater Model

The following numerical groundwater modelling has been undertaken:

- New access shaft and overland conveyor for Mine 1 *(Groundwater Square, 2008)*;
- Water treatment plant *(Golder Associates Africa, 2012); and*
- The stooping of existing underground mining areas located on Eskom and Exxaro owned land surface areas *(GCS, 2016)*.

The main findings of the three individual modelling exercises are summarised in the following subsections. It should be noted that the model constructed for the Stooping Project (*GCS,* *2016)* was also used to simulate the combined impact of all potential surface source areas within the Matla mine lease area and is therefore discussed in more detail.

4.4.6.1 Modelling Results for the New Access Shaft at Mine 1 (Groundwater Square, 2008)

At the request of *Exxaro,* the MODFLOW and MT3D numerical flow and transport model codes were used. The maximum expected extent of the zones within which groundwater quality and water levels will be impacted at any time post-mining (10 years to 30 years after closure), as a result of the planned activities, are likely to be smaller than those depicted in Figure 4.89 (red and blue dotted lines respectively).

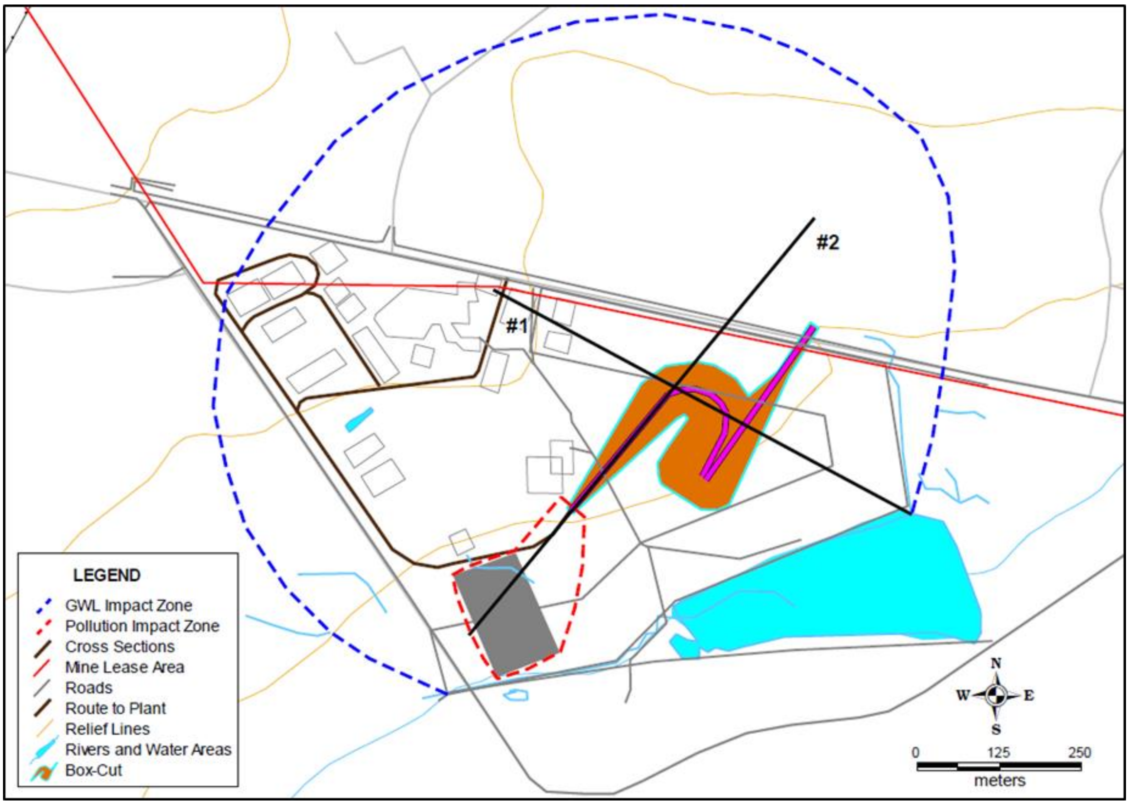


Figure 4.89: Maximum extent of 1) groundwater quality and 2) groundwater level impact zones

Due to the slope of the coal seam, excess water generated during the first years of mining will most likely have to be pumped to surface, or stored in well-planned underground shallow dams.

Whilst the mine might impact on groundwater levels in its immediate vicinity, the potential also exists that the mine will decant after closure. A deteriorating quality might also be observed in the local groundwater system and the Bakenlaagte Spruit.

Impacts were also simulated for the underground mining areas and the results of the model simulations are summarised below:

Operational phase:

Mine water balance:

Figure 4.90 depicts the volume of water expected to flow into the mine on an annual basis as mining progresses:

- The green solid line indicates the water-make on an annual basis; and
- The orange line indicates the cumulative volumes of all water over time (i.e. storage space required).

Assuming a mining height of 3.5m-4m, at 60%-70% extraction and recharge of between 1.5% and 2% of MAP to the underground mine:

- After mining, the available void space was estimated at 1.6x106m^3 to 2.1x106m^3, compared to the total volume of water generated of 1x106m^3;
- The total volume of water generated during mining would therefore only fill the available void space between 50% and 60%; and
- The above calculations do not provide for water usage during the operational phase.

It is therefore possible in principle (may not always be practical) that if a certain area/size of the deepest lying areas is mined first, enough void space will be available to store water for the remainder of the life of mine:

- The area required to be mined first, and made available for water storage, was conservatively estimated at between 25% and 30% of the total mine; and
- Such an area is the deepest lying 4 Seam, to be mined during the 5 years of 2025 to 2029.

Impact on groundwater levels:

During mining, groundwater levels in the immediate vicinity of the No.1 Shaft mine will be influenced. Groundwater levels in the shallow weathered zone aquifer and immediately above the 4 Seam workings will be affected (aquifer is <30m deep):

- All mining above 60m deep was identified. These are predominantly to the east and south;
- Given the depth to groundwater table in high lying areas, near the quaternary catchment divide, such areas bordering shallow 4 seam elevations were identified; and
- Water levels in the natural pans along the south-eastern mine lease boundary might be impacted.

Even in areas where the coal seam was found to be relatively deep, the groundwater levels immediately above (10m to 30m) the 4 Seam may potentially be impacted:

- As a result of the groundwater flow directions, dewatering should not extend beyond the surrounding rivers and streams or Pit-23.

Impact on groundwater quality:

- Groundwater flow into the underground workings is expected to be of similar quality to the background groundwater quality;
- The aquifers surrounding un-flooded mining sections are not expected to be impacted in terms of groundwater quality during the mining phase. This is due to groundwater flowing toward the dewatered mining area;
- However, flooded sections may potentially have a deteriorating groundwater quality impact on surrounding aquifers:
    - This is a very slow process as indicated for the "Post-Mining-Phase";
- No hydro-geochemical evaluation was performed on the water quality trends that will develop on the 4 seam during mining.

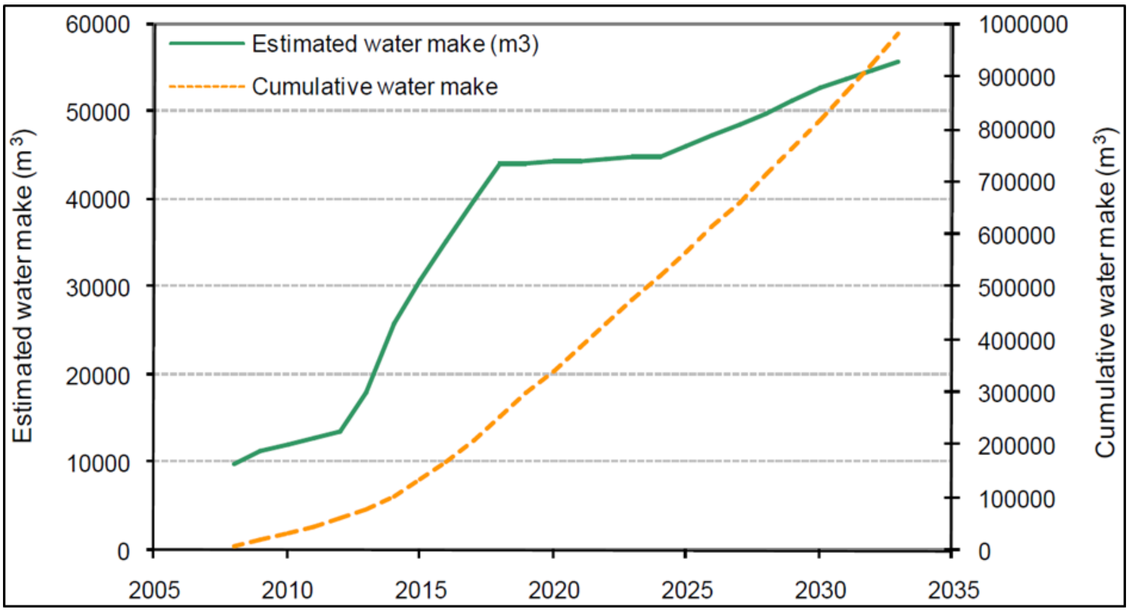


Figure 4.90: Expected Mine Water Balance

Post-mining phase

Mine water balance:

The post-mining water balance will depend on:

- The final mine plan, including provision for an additional mine Shaft; and
- Water management strategies for the Matla Coal mining complex.

Assuming the mine is 50% flooded after mining ceased, it is expected to take approximately 40 years to 50 years to completely flood.

Impact on groundwater levels:

- With reference to the steady state regional groundwater flow model for the post-mining situation, i.e. flooded underground workings in all *Matla Coal* mines:
    - None of the deeper model layers indicated the potential for groundwater and mine water to flow “across” the Riet Spruit; and
    - In future assessments, the Riet Spruit may therefore be interpreted as the northern aquifer boundary of 1-Mine and the No.1 Shaft mine.
- The groundwater level distribution in the shallow weathered zone aquifer is expected to be almost identical to the pre-mining situation; and
- After flooding, groundwater levels in the influenced areas of the weathered zone aquifer are expected to recover within a few years:
    - Groundwater levels around the natural pans to the southeast should not be impacted once the mine has flooded.

Impact on groundwater quality:

As no hydro-geochemical assessment was performed, no predictions could be made on the long-term mine water quality trends. However, the zone of impact was determined through numerical transport modelling at a constant “unit concentration” of 2000mg/L on the 4 Seam:

- The results depict the worst-case scenario where the whole mine is flooded; and
- It is evident that the impact is restricted to the immediate vicinity of mining at these depths.

A clear distinction can be seen between the water qualities on the coal seam horizon and the top-most shallow weathered zone aquifer, which interacts with the Bakenlaagte Spruit in the east as well as the Dwars-in-die-weg Spruit in the south.

4.4.6.2 Modelling Results for the Water Treatment Plant (Golder Associates Africa, 2012)

The numerical model for the project was constructed using Processing MODFLOW Pro, a pre- and post-processing package for MODFLOW and MT3D. A total of twelve different model scenarios were run, however only those concerning the “two brine ponds layout” are summarised shortly in the following paragraphs.

The four scenarios run with two brine ponds under anticipated seepage rates, the sulphate concentrations are expected to increase to around 1400 mg/l in the weathered aquifer in the immediate vicinity within the 6 years that the two ponds will be operational. Simulations indicate that sulphate concentrations will probably not increase to above 200 mg/l if the brine ponds are removed after 6 years and rehabilitated.

In the long term sulphate concentrations are not expected to increase above 200 mg/l in the weathered or fractured rock aquifers. Contamination will therefore be restricted to the immediate vicinity of the WTP and the brine ponds under anticipated seepage conditions.

If maximum seepage rates take place from the two brine ponds, sulphate concentrations may increase to around 4 000 mg/l in the 6 years that the ponds will be operational. Contamination is not expected to migrate from the brine ponds in this period. In the long-term, sulphate concentrations are not expected to exceed 200 mg/l in the weathered or fractured rock aquifers, due to the effect of dilution from rainfall with time.

If the two brine ponds are not removed and rehabilitated after 6 years, sulphate concentrations may increase to around 4 000 mg/l in the weathered aquifer and to 1 200 mg/l in the fractured rock aquifer. Contamination is expected to migrate in a northerly and easterly direction towards the pans. Under anticipated seepage conditions, the plume is not expected to reach the pans within 100 years, but will come very close.

Under maximum seepage rates, sulphate concentrations are expected to increase to around 6 200 mg/l in the weathered aquifer in the immediate vicinity of the brine ponds and to around 1 700 mg/l in the fractured rock aquifer. Sulphate concentrations exceeding 200 mg/l will reach the pans to the north of the WTP in both the weathered and fractured rock aquifers under these conditions.

No private boreholes are located within the affected zone.

4.4.6.3 Modelling Results for the Planned Stooping of Underground Mining Areas (GCS, 2016)

The numerical groundwater model, despite all efforts and advances in software and algorithms, remains a very simplified representation of the very complex and heterogeneous interacting aquifer systems underlying the site.

The integrity of a numerical model depends strongly on the formulation of a sound conceptual model and the quality and quantity (distribution, length of records etc.) of input data:

Garbage In = Garbage Out

Where accurate long term monitoring and test data over the entire project area is not available the model results should therefore be regarded as providing qualitative rather than quantitative results and also needs to be verified and updated regularly by means of a comprehensive groundwater monitoring program. Nonetheless, a numerical model can be used quite successfully to assess the effectiveness of various management and remediation options/techniques, especially if the shortcomings in information and assumptions made in the construction and calibration of the model are clearly listed and kept in mind during modelling.

All available information regarding the geological makeup (especially geological structures) of the mining area was considered in the construction of the numerical model. Geological structures such as dykes and faults, because the aquifer is of a secondary fractured nature, usually have higher transmissivities in comparison to the host rock and serve as preferred flow paths or conduits for groundwater movement. These structures therefore have the ability to significantly affect the outcome of a model. Areas still exist where such structural geological information is not available, therefore modelling (i.e. updating of the model) should be an ongoing process as new information becomes available with time.

No stooping schedules were available for the Phase 1 areas, therefore a worst case approach was followed whereby all the areas were simulated to be stooped during the same period.

Model domain and boundary conditions

The Processing Modflow 8 modelling package was used for the model simulations. The finite difference model grid constructed to include the entire Matla mine lease area is indicated in Figure 4.91Model dimensions and aquifer parameters used in the construction and calibration of the model are provided in Table 4.21.

The following model boundaries were used to define the model area and are also indicated in Figure 4.91.

No-flow boundaries in a model, as in nature, are groundwater divides (topographic high or low areas/lines) and geological structures (dykes) across which no groundwater flow is possible.

General head boundaries are boundaries through which groundwater movement is possible. The rate at which the groundwater moves through the boundary depends on the groundwater gradients as well as the hydraulic conductivities on opposite sides of the boundary position.

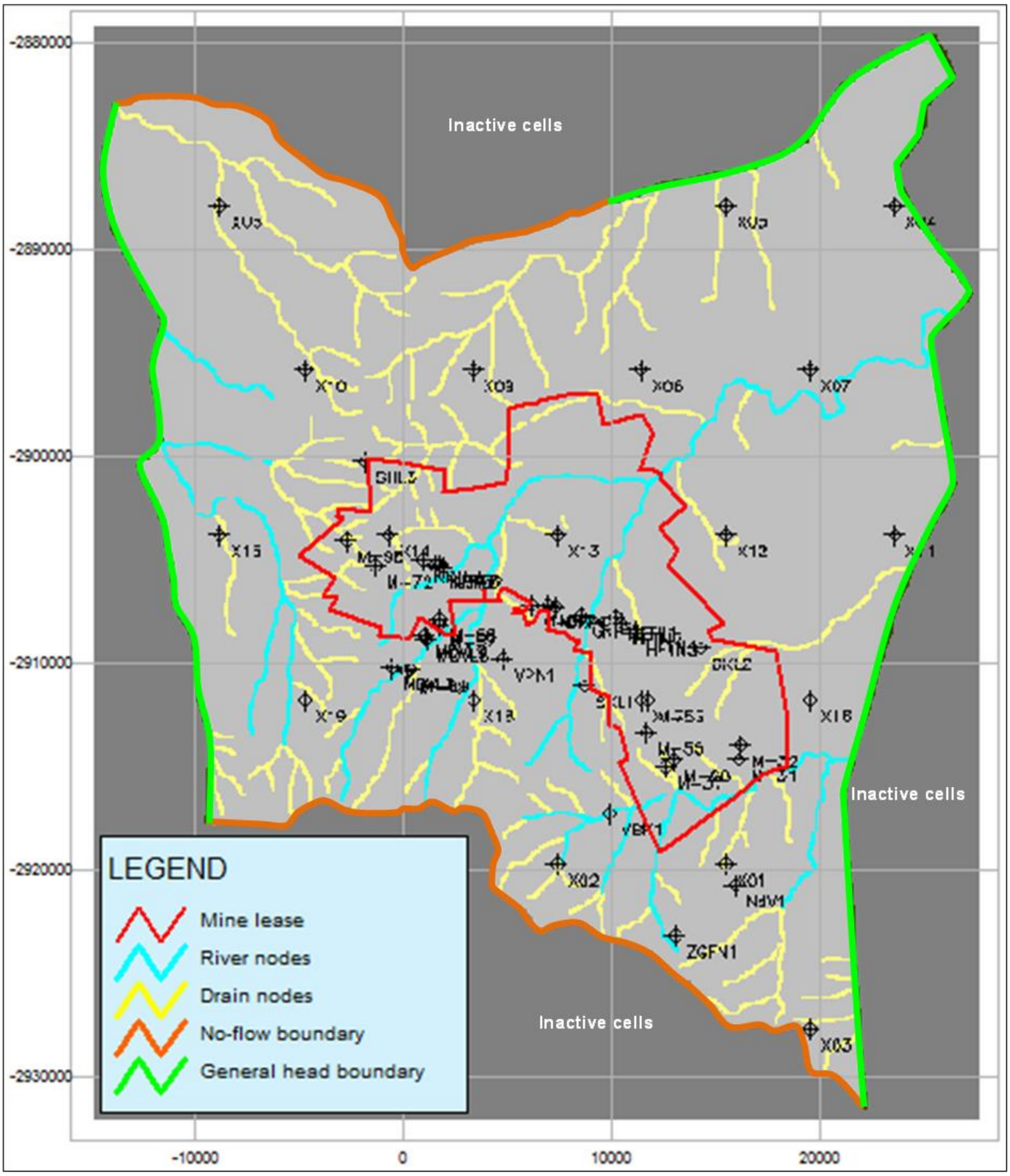


Figure 4.91: Numerical model grid

Table 4.21: Model dimensions and aquifer parameters

Grid size	Easting = 42 210m Northing = 52 640m
Rows and Columns	Rows = 752, Columns = 603
Cell size	70m by 70m
Transmissivity: Shallow aquifer	1.8 m^2/day
Transmissivity: Deeper aquifer	0.35 m^2/day
Specific yield: Shallow aquifer	0.06
Storage coefficient: Deeper aquifer	0.001
Effective porosity: Shallow aquifer	6%
Effective porosity: Deeper aquifer	2%
Recharge	0.6% - 1.2 % of MAP

Model calibration results

During the steady state calibration of the flow model changes were made to mainly the hydraulic properties (transmissivity) of the aquifer host rock and effective recharge (Table 4.21) until an acceptable correlation was achieved between the measured/observed groundwater elevations and those simulated by the model. Groundwater level information from user boreholes was used in the calibration process. A correlation of ± 97% was achieved with the calibration of the flow model and the results are provided in Figure 4.92.

The calibrated groundwater elevations were exported from the flow model and used to construct a contour map of the steady state groundwater elevations (Figure 4.93). The lowest groundwater elevations were simulated to occur in the north-western and north-eastern down gradient directions. Groundwater elevations follow the surface topography and increase towards the south.

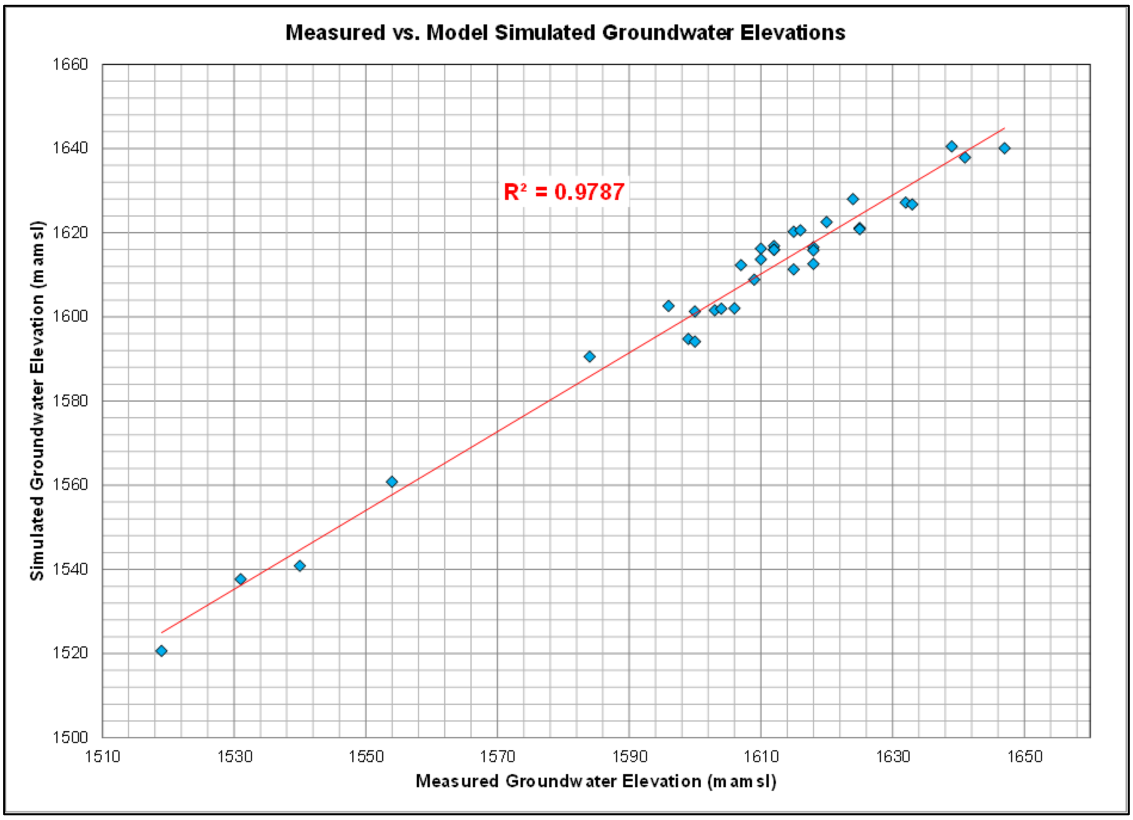


Figure 4.92: Numerical flow model calibration results

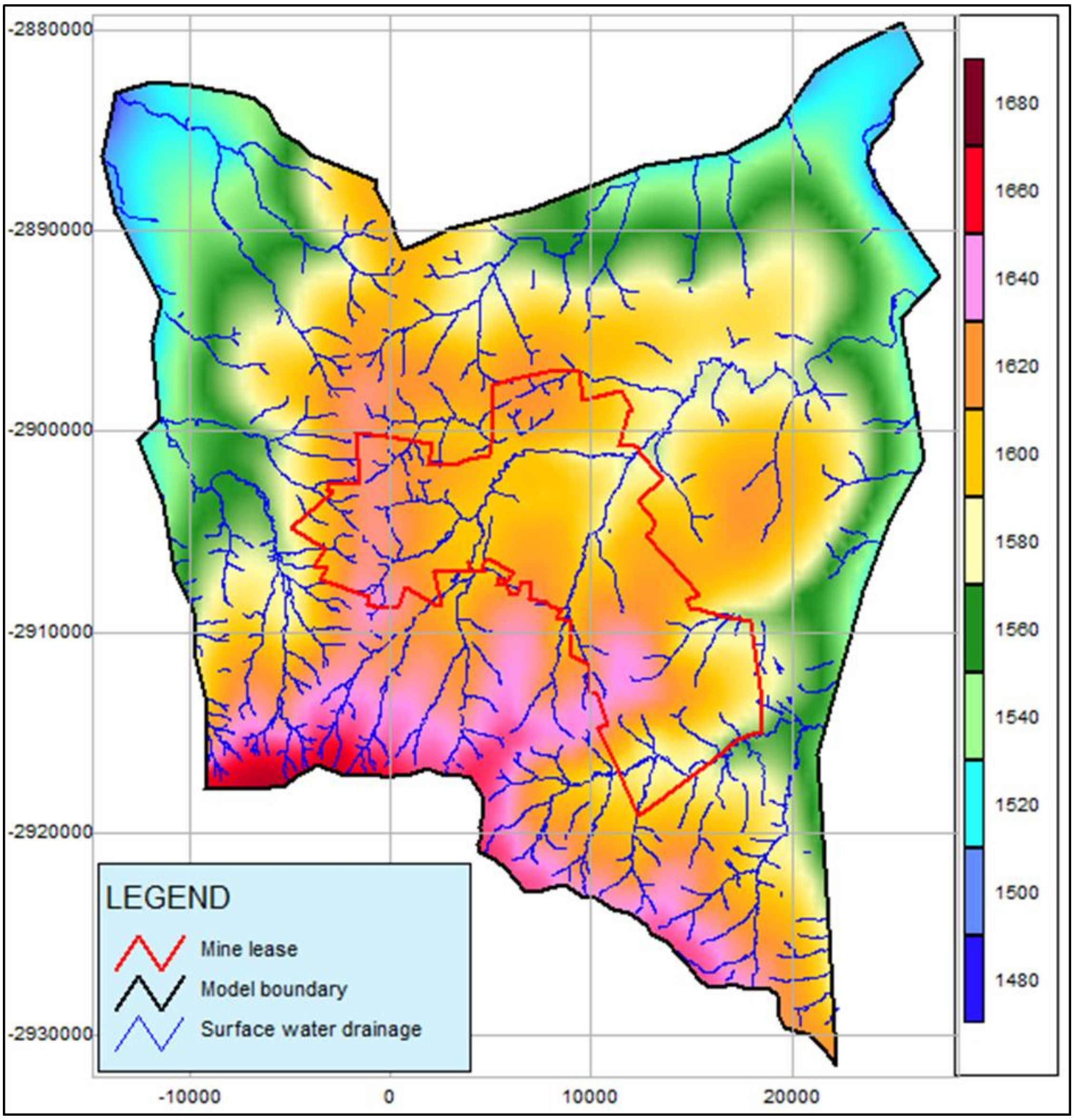


Figure 4.93: Model simulated steady state groundwater elevations (mamsl)

Flow model

Impacts on groundwater levels are expected to occur as a result of roof collapse followed by surface subsidence. The flow model was therefore used to simulate this potential impact. A mine plan and schedule are yet to be finalised for the planned stooping areas, which is considered to be a serious shortcoming in the model simulations.

The extent of the groundwater level impacts is governed by the hydraulic properties of the aquifer host rock and time. The influence of time on the radius/extent of the cone of depression (water level impact) is explained by means of the following equation *(Bear, 1979)*:

$$R(t) = 1.5(Tt/S)^{1/2}$$

Where R = *Radius (m),*

T = *Aquifer transmissivity* (m^2/d)*,*

t = *Time (days),*

S = *Storativity.*

The equation shows that an increase in time will lead to an increase in the radius of influence (extent of depression cone), which is why the mine plan/schedule plays such an important role in the model simulations. The same holds true for aquifer transmissivity, i.e. impacts on groundwater levels are expected to extend along transmissive geological structures. Such structures may also greatly increase groundwater discharge into the active mine workings.

The planned stooping was simulated to occur over an assumed time period of five years. We strongly recommend an update of the model simulations once the mine plan/schedule has been finalised.

In order to better indicate the impact of the planned stooping activities on the surrounding groundwater levels, initial groundwater elevations were subtracted from the simulated groundwater elevations at the end of year five. The difference between these two data sets therefore represents the total decrease in water level experienced over the simulation time. This data was used to construct a contour map of the model simulated groundwater depression cones, which are indicated in Figure 4.94. Groundwater user boreholes located within the mine lease area are indicated in the abovementioned figure with the use of blue place marks.

Summary of simulations:

A maximum groundwater level drawdown/decrease of 11 meters was simulated to occur in an area bordered by low transmissivity dykes (green lines in Figure 4.94). On average, drawdown was simulated to vary between approximately four and nine meters. A total area of ± 25km^2 was simulated to experience decreases in water levels. Ten groundwater user boreholes are located within this affected area (Table 4.22).

Table 4.22: Potentially affected groundwater user boreholes

BH	Model simulated drawdown (m)
HJFV2	5
HJFV5	3
KRTL1	3
KRTL6	5
KRTL8	6
KRTL9	6
KRTL10	6

BH	Model simulated drawdown (m)
KRTL11	6
M-19	3
VFN1	2

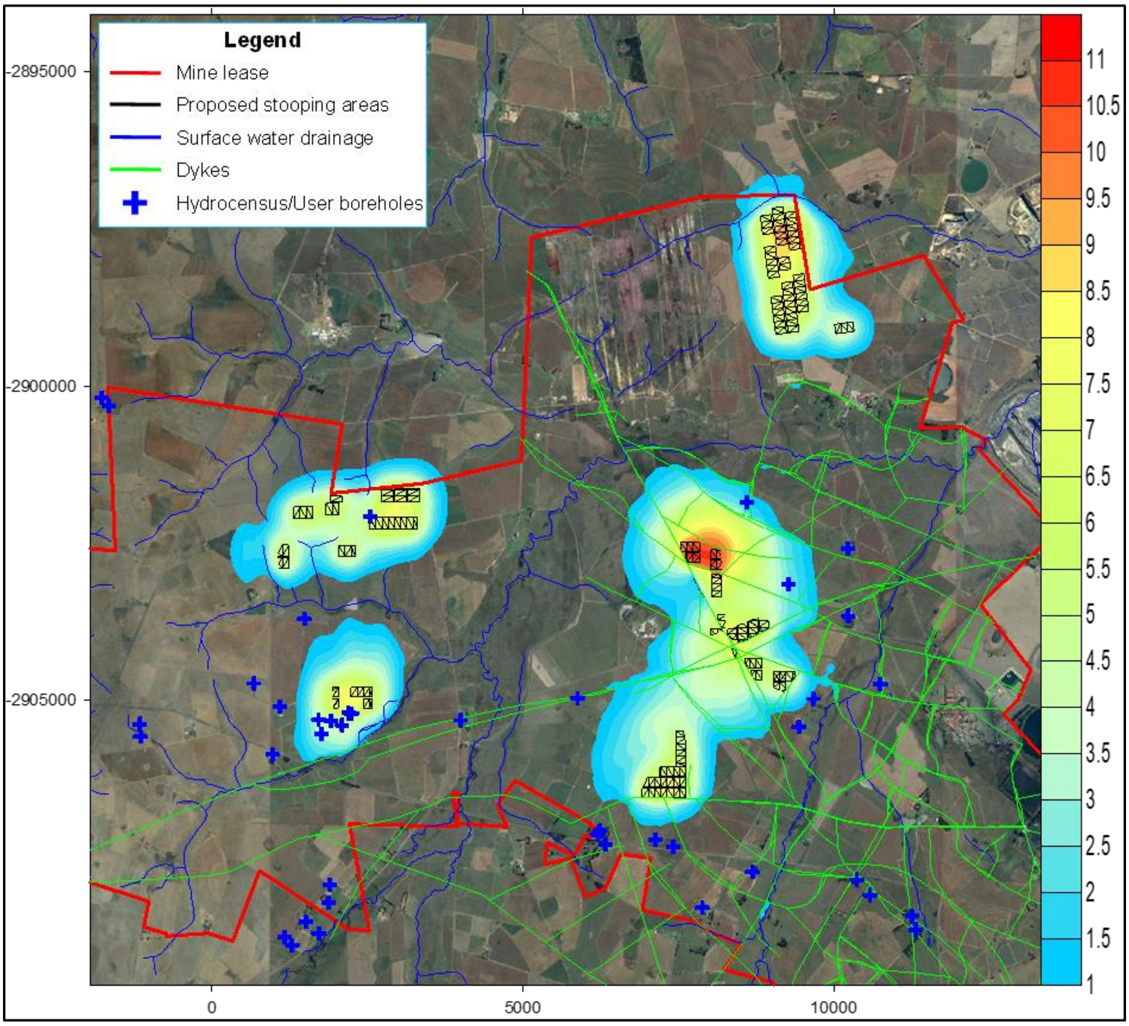


Figure 4.94: Model simulated groundwater depression cones (meters)

Key Issues:

- Ten groundwater user boreholes were simulated to be affected by the planned stooping activities;
- These boreholes were simulated to experience water level decreases of between two and six meters;
- It is therefore recommend that quarterly monitoring (at least) of groundwater levels in the model simulated affected areas be undertaken;
- Monitoring data should be assessed on a regular basis to determine/quantify the impact (if any) on groundwater levels; and

- Should the monitoring program indicate adverse groundwater level impacts, discussions should be held between ground water users and the Mine to find a solution.

4.4.6.4 Results of Mass Transport Model Simulation to include all Major Potential Surface Source Areas

The mass transport model was constructed to simulate pollution migration in the aquifer system underlying the mine lease area. Five main source areas were identified and included in the model simulations:

- Pollution control dams at No 1 Shaft, Mine 1, Mine 2 and Mine 3; and
- Water treatment plant and associated brine ponds.

In order to better indicate the impact of the potential sources on the surrounding groundwater quality conditions, contamination contours were exported from the mass transport model after a 25 and 50 years simulation runtime and used to construct the simulated contamination plumes, which are provided in Figure 4.95 and Figure 4.96 respectively.

The contamination was simulated by applying contaminated recharge to the entire surface areas of the potential sources listed above. The source areas were assigned a theoretical concentrations of 100%, therefore the results of the model simulations should be regarded as qualitative rather than quantitative.

<u>Summary of simulations:</u>

Impacts on groundwater levels are restricted and groundwater migration on a regional scale still follows the natural/pre-mining flow patterns/directions. Plumes were consequently simulated to follow the groundwater flow directions.

Plume migration is however quite slow as a result of the relatively low hydraulic properties of the aquifer host rock and low groundwater hydraulic gradients. Plumes were simulated to have migrated an average distance of ± 400 meters after a model runtime of 50 years, which translates to 8 meters per year. This is slightly higher than the 6 meters per year calculated in Section 3.4 of the Hydrogeological report.

User boreholes located during the *GCS 2014* hydrocensus/user survey are indicated in Figure 4.95 and Figure 4.96 with the use of yellow place marks. It should be noted that none of these boreholes are located within the areas simulated to be affected by the contamination plumes.

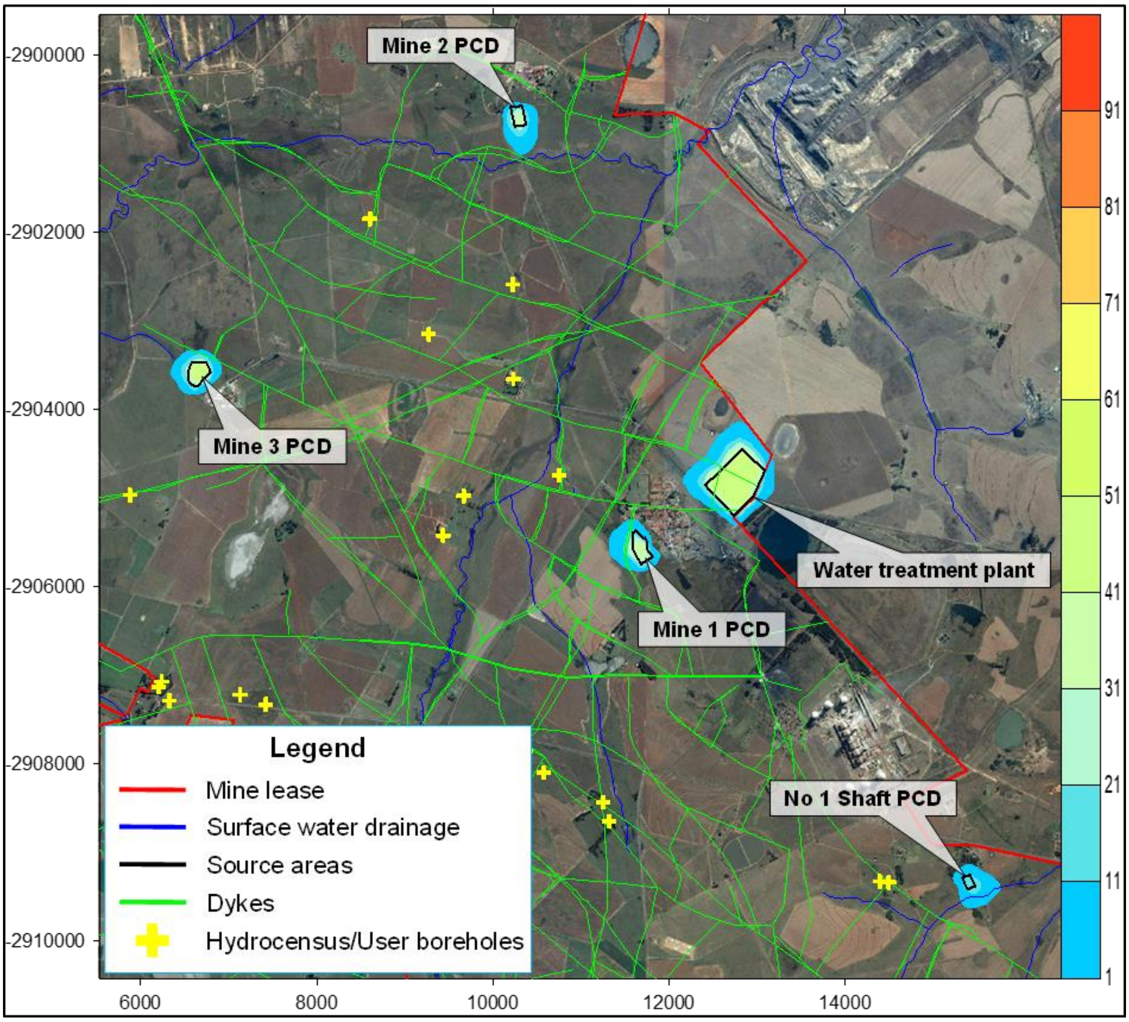


Figure 4.95: Simulated plume migration after 25 years (%)

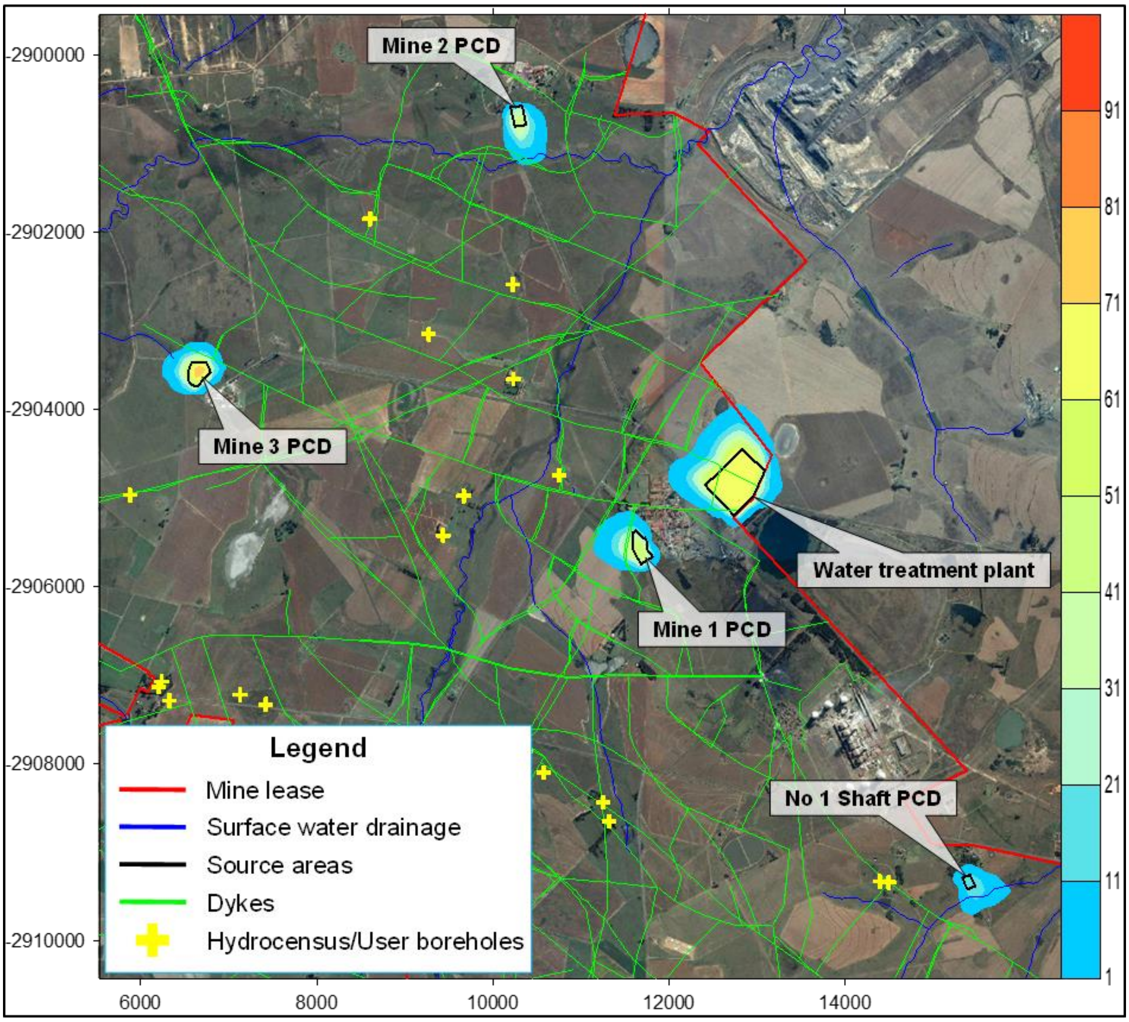


Figure 4.96: Simulated plume migration after 50 years (%)

4.5 Socio-Economic Environment

4.5.1 Regional Context

The Matla study area is located in the Mpumalanga Province of South Africa. Mpumalanga literally means "the place where the sun rises". Mpumalanga lies in eastern South Africa, north of KwaZulu-Natal and bordering Swaziland and Mozambique. It constitutes 6.5% of South Africa's land area. In the north it borders on Limpopo, to the west Gauteng, to the southwest the Free State and to the south KwaZulu-Natal. The capital is Nelspruit (recently renamed to Mbombela). Mpumalanga Province is divided into three municipal districts, which are further subdivided into 17 local municipalities.

Nkangala District Municipality (NDM) is one of the three districts of the Mpumalanga Province. The seat of NDM is Middelburg. The NDM consists of 160 towns and villages. NDM is located to the North-West of the province and is approximately 16 758km^2 in area, is classified as a

Class C municipality. NDM is at the economic hub of Mpumalanga, and is rich in minerals and natural resources. NDM is made up of six local municipalities, namely:

- Emakhazeni Local Municipality;
- Steve Tshwete (previously known as Middleburg) Local Municipality;
- Thembisile Hani Local Municipality;
- Dr JS Moroka Local Municipality;
- Emalahleni Local Municipality; and
- Victor Khanye (previously known as Delmas) Local Municipality.

4.5.2 Local Context

Emalahleni Local Municipality (ELM) is located within jurisdictional area of the Nkangala District Municipality (NDM). It covers an area of about 2677.67 km^2 in extent. The ELM, which means the “place of coal”, consists inter alia of the towns of eMalahleni, Kwa-Guqa, Ga-Nala and Ogies. The town of eMalahleni was established in 1903. It was named after a ridge of white rock located near the present railway station. In the early years, this ridge was a halting place for transport wagons and a trading post. ELM is probably the most industrialised municipal area in Nkangala and its landscape features mainly underground and opencast coalmines. This area has the largest concentration of power stations in the country (IDP, 2016).

The road infrastructure connecting ELM to the rest of the country is also very well maintained and serviced by logistics freight activities to such that the significance of the municipality in the Industrial Development and Transportation strategies of the country are recognised. Connecting the municipality to the rest of the country as mentioned above is the significant road infrastructure consisting of the N4 and N12 freeways. The N4 and the N12 converge at eMalahleni town and then the N4 proceeds from there to Nelspruit and Maputo (IDP, 2016).

Running parallel to the N4 is a rail line that connects Gauteng through ELM to Maputo. This significant rail and road infrastructure has been identified as part a Southern African initiative to connect Walvis Bay (on the west coast of Africa) and Maputo (on the east coast of Africa) called the Maputo Corridor (IDP, 2016).

The ELM area of jurisdiction consists of the main following towns/ settlements, ranked according to population:

- eMalahleni complex;
- Ogies and Phola;
- Ga-Nala and Thubelihle;
- Rietspruit;

- Van Dyksdrift; and
- Wilge.

4.5.2.1 Demographic Analysis

ELM is ranked second in the whole province in terms of population size as currently approximately 35% of the province's population reside here (IDP 2016/2017). According to Census 2011, ELM has a total population of 395 466 and has experienced a population growth of 43.1%. Of the total population, 81.3% are black African, 15.7% are white, with the other population groups making up the remaining 3.0% (Stats SA, 2017). The population growth and the percentage contribution to the Province and the NDM is indicated in Table 4.23. Table 4.24 depicts the gender composition within the ELM.

Table 4.23: Population Size

Demographic Indicators	Stats SA Census 1996	Stats SA Census 2001	Stats SA Census 2011	Share of Nkangala's figure 2011	Share of Mpumalanga's figure 2011
Population number	236 040	276 413	395 466	30.2%	9.8%
Annual Growth Rate		1.58	3.58		

Table 4.24: Gender Composition in ELM

Sex	Percentage (%)
Male	52.8
Female	47.2

Of those aged 20 years and older, 4,0% have completed primary school, 35,7% have some secondary education, 31,5% have completed matric, 14,0% have some form of higher education, while 5, 8% have no form of schooling (Stats SA, 2017). Table 4.25 represents the education levels for all ages within the ELM. Data for 2011 indicates that the education levels in the ELM are higher than those of the overall NDM (IDP 2016/17). In terms of the languages spoken, Zulu and Afrikaans are the most common within the ELM. The languages spoken and their respective percentages is shown in Table 4.26.

Table 4.25: Highest Education (all age groups)

Group	Percentage (%)
No Schooling	2.9
Some Primary	38.4
Completed Primary	5.9
Some Secondary	32.7
Completed Secondary	16.9
Higher Education	2.5
Not Applicable	0.7

Table 4.26: Languages in the ELM

Language	Percentage (%)
Afrikaans	14.9
English	5.6
IsiNdebele	8.9
IsiXhosa	3.1
IsiZulu	38.6
Sepedi	11.3
Sesotho	3.2
Setswana	1.2
Sign Language	0.3
SiSwati	5.8
Tshivenda	0.5
Xitsonga	3.5
Other	1.7
Not Applicable	1.5

There are119 874 households in the municipality, with an average household size of 3.2 persons per household. More than 90% of the dwellings are classified as urban (Stats SA, 2017).

4.5.2.2 Service Provision

The energy sources used and their associated percentage are shown in Figure 4.97. As is illustrated, the main source of energy in the ELM is electricity.

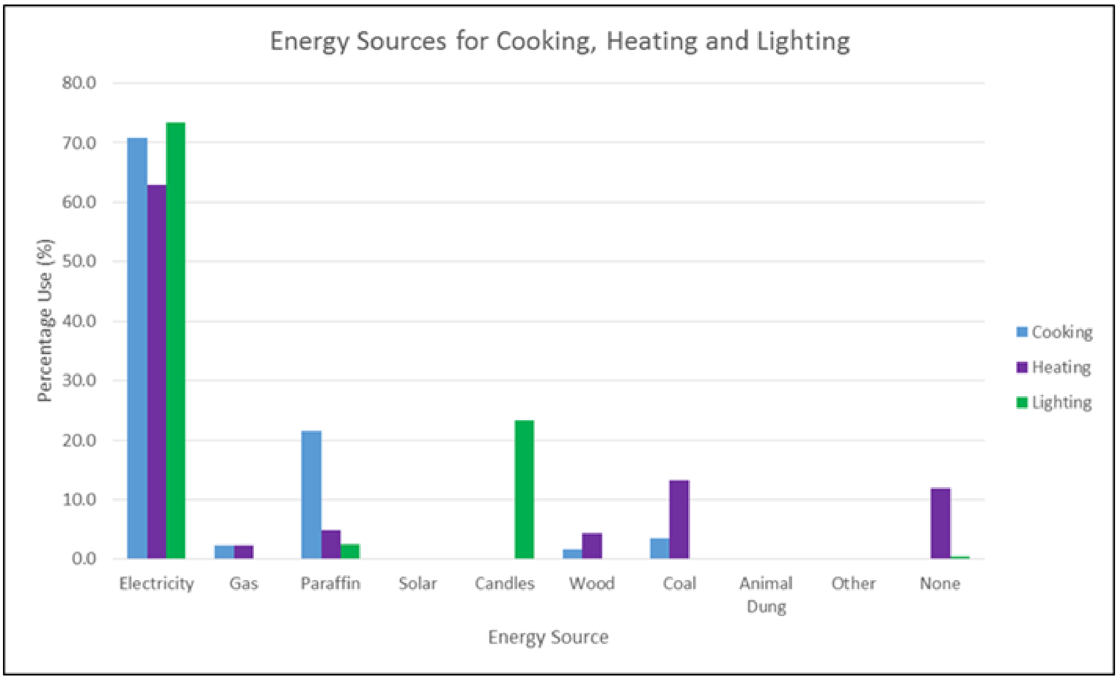


Figure 4.97: Energy Use in the ELM

The main sources of water in the ELM is indicated in Figure 4.98. From the figure, it is determined that the main source of water within the ELM is the Regional/Local water scheme (operated by municipality or other water services provider). In terms of the access to toilet facilities (Table 4.27), almost 70% of the population have access to flush toilets (connected to the sewer system). Approximately 20% of the population have access to pit toilets without ventilation.

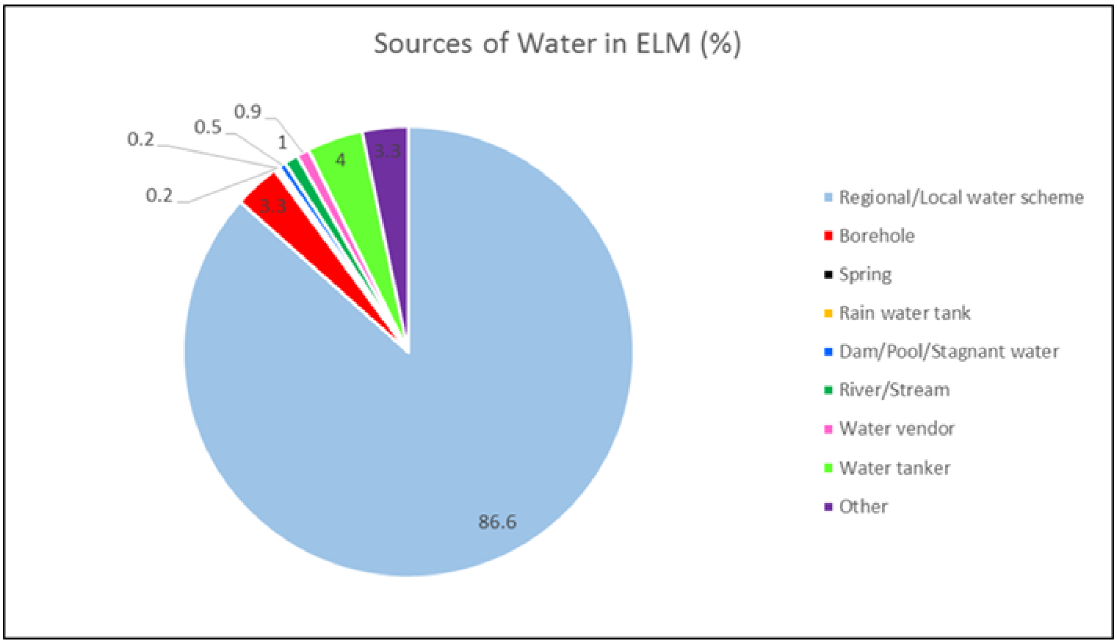


Figure 4.98: Sources of Water in the ELM

Table 4.27: Access to Toilet Facilities

Toilet Facility	Percentage (%)
Flush Toilet (connected to sewage system)	68.8
None	2.5
Flush Toilet (with septic tank)	2
Chemical Toilet	.7
Pit Toilet (with ventilation)	3.2
Pit Toilet (without ventilation)	20.2
Bucket Toilet	0.6
Other	2

The percentage of the population that has access to various waste/refuse disposal is illustrated in Figure 4.99. As can be seen, the majority of the population have their refuse removed at least once a week by the local municipality or private company, while almost 7% have no refuse removal at all.

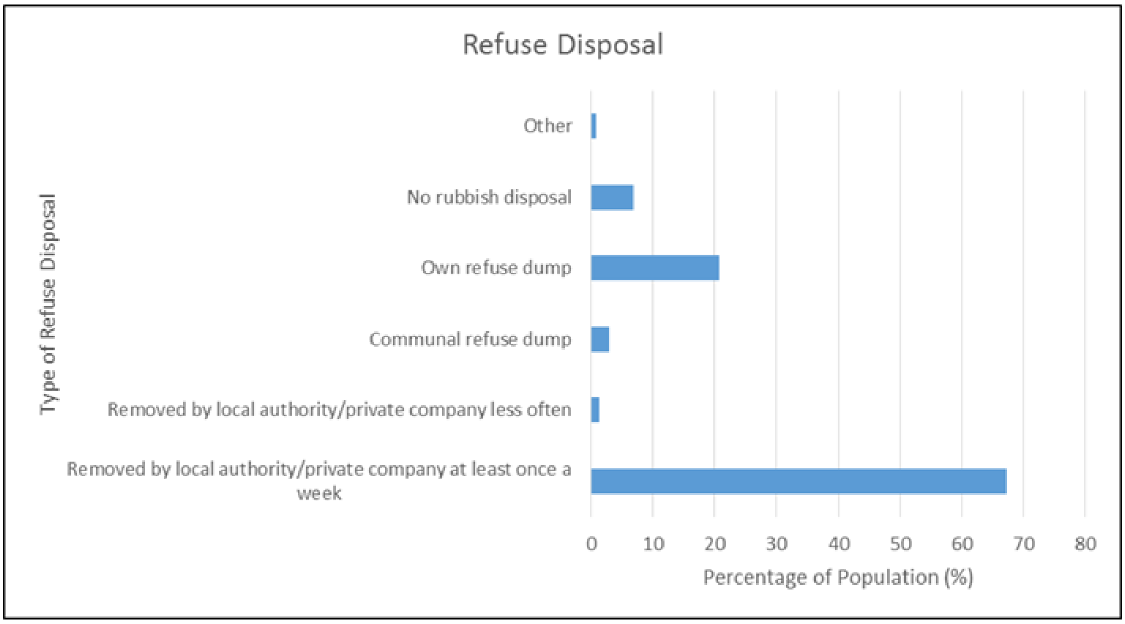


Figure 4.99: Access to Refuse Disposal in ELM

4.5.2.3 Economic Profile

Within the ELM, 190 662 people are economically active (employed or unemployed but looking for work). Of the 101 062 economically active youth (15 – 34 years) in the area, 36.0% are unemployed. The income per household is depicted in Table 4.28. The 2011 Census showed that the ELM unemployment rate decreased by 11.1% from 2001 to 2011.

The leading industry in terms of employment is Trade with 21.1%, followed by Mining 20.6% and Manufacturing 14.2%. Since 2001 there has been an increasing role/share of Mining, Construction, Community Services & Finance as employer and a decrease in the role/share of Trade, Manufacturing, Transport, Agriculture, Private Households and Utility (IDP 2016/17). The unemployment rate of ELM was 27.3% in 2011 (compared to 26.6% in 1996 and 38.4% in 2001).

Table 4.28: Income Brackets per Household in ELM

Income	Percentage (%)
No Income	13.5
R1 - R4,800	3.2
R4,801 - R9,600	5
R9,601 - R19,600	11.1
R19,601 - R38,200	16.8
R38,201 - R76,4000	17.5
R76,401 - R153,800	13.5
R153,801 - R307,600	10.5
R307,601 - R614,400	6.1
R614,001 - R1,228,800	2
R1,228,801 - R2,457,600	0.5

Income	Percentage (%)
R2,457,601+	0.3

One of the services that the South African government provides for the population is in the form of income grants. These grants are designed to alleviate poverty among vulnerable persons for which the grant is intended for. Each grant has its own eligibility criteria that can be accessed from the Department of Social Development. The ELM has 34,849 people who depend on grants. The grant with the largest recipients is the child support grant followed by old age grant and the lowest recipients are war veterans.

ELM contributed 17.9% to the provincial economy in 2011. Gross Value Add (GVA) in 2011 was R40.5 billion at current prices and R19.9 billion at constant 2005 prices, which is third largest economy in the province (IDP 2016/17). The dominant economic sector in ELM is Trade, Mining and Manufacturing which combined contributes to more than 50% of the employment. The type of mining done in ELM is also relatively labour intensive.

4.5.2.4 Healthcare

HIV/AIDS in South Africa has increased rapidly over the past decade. The social and economic consequences of the disease are far reaching and affect every facet of life in South Africa. Despite South Africa creating a progressive and far-sighted policy and legislative environment for dealing with HIV/AIDS, the prevalence of HIV/AIDS continues to increase. This indicates that policies and laws have not been adequately implemented and have not impacted significantly on the ground.

In Figure 4.100 the top ten leading causes of death are depicted with Influenza and pneumonia and Tuberculosis being the main cause of death in the ELM. Inflammatory diseases of the central nervous system were the lowest cause of death in the municipality.

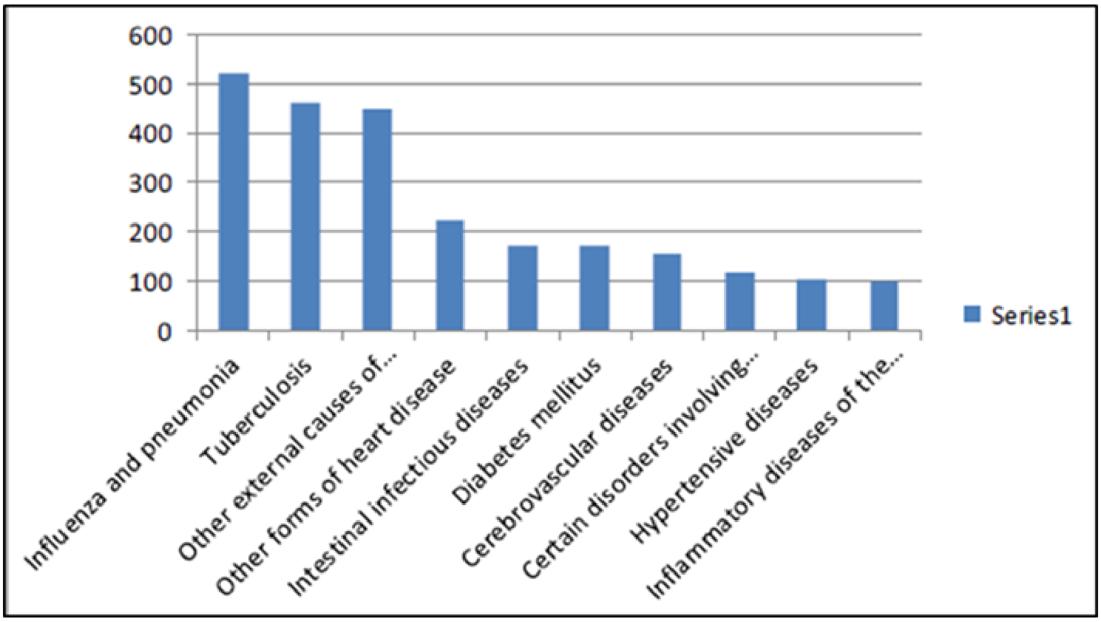


Figure 4.100: Top Ten Leading Causes of Death in ELM (2011)

5 ANALYSES AND CHARACTERISATION OF ACTIVITY

5.1 Site Delineation for Characterisation

Figure 1.1 and Figure 1.2 refers to the locality and property boundaries of the approved mining area. As previously stated, the Matla Mining operations and the associated infrastructure with the three mining complexes all take place within the already approved footprint. No mining or mining related activities currently takes place or is proposed to take place outside of this area.

5.2 Water and Waste Management

5.2.1 Water Balance

GCS updated the water balance as an addendum to the hydrological assessment report. The water balance report serves as input into the consolidated IWULA/IWWMP for the Matla Mine. It was requested that the water balance should consider two different scenarios, namely:

- Current situation – The water balance for the current situation does not take into consideration all future planned new infrastructure areas or water management plans, which includes:
  - The new Mine 1 Area including dewatering of the new Mine 1 underground workings;
  - A new Mine 1 Pollution Control Dam (PCD);
  - Brine Pond 3;
  - Sewage treatment plant at New Mine 1; and

- Construction of the proposed Megalitre Tanks at Mine 2;
- 10-year mine operation – The 10 year mine operation for which the water balance is developed takes into consideration all the above mentioned proposed infrastructure and increased dewatering requirement from the underground workings.

The development of the water balance was based on an agreed Process Flow Diagram (PFD). The PFD serves as a basis on how the mine water circuit is represented. To setup an average water balance model, a PFD was created for each mine and scenario (current and 10-year future) to create insight into all water-linked flows within the Matla Mine operations.

All PFDs have been confirmed and approved by Exxaro. The PFDs for the current mine water balances are shown in Figure 5.1 to Figure 5.3 while the future mine water balance scenarios are shown in Figure 5.4 to Figure 5.6.

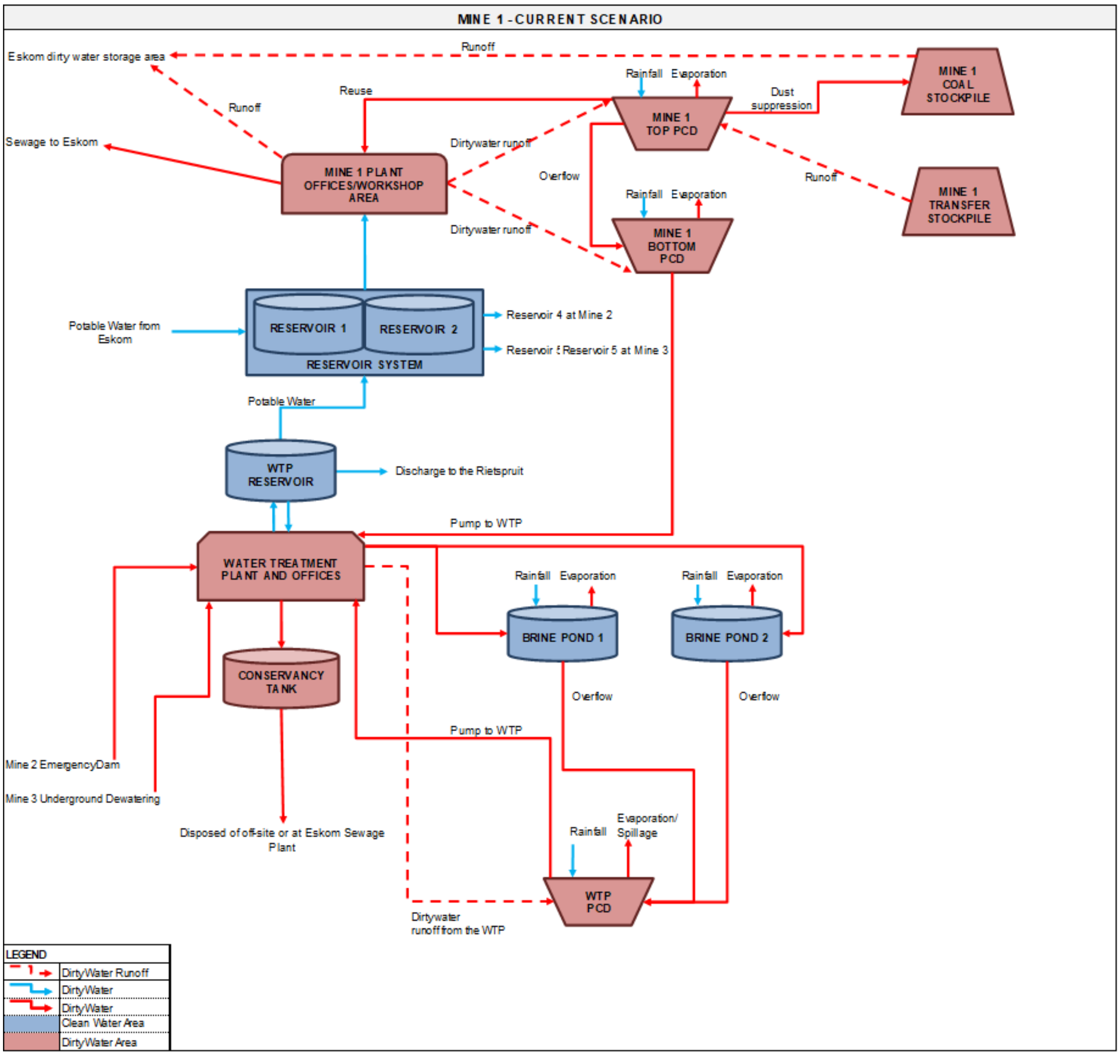


Figure 5.1: PFD for the current Mine 1 water balance

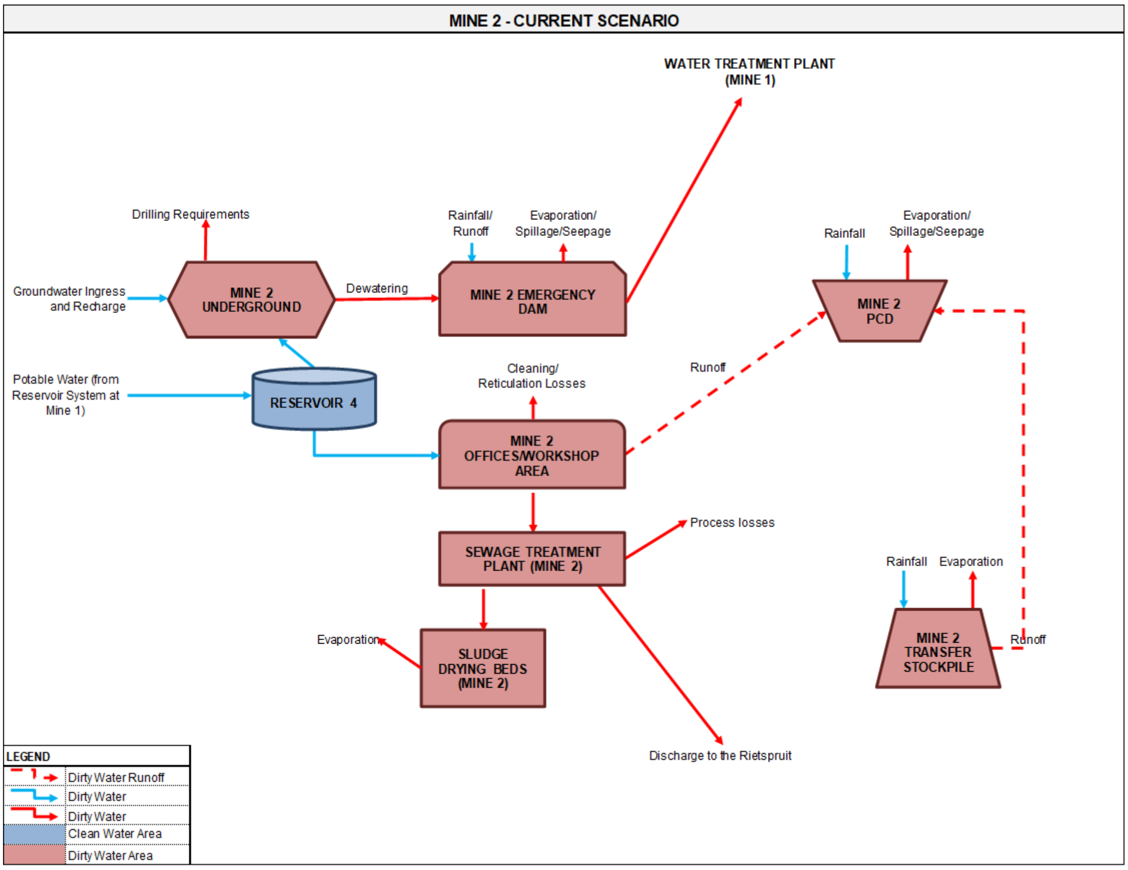


Figure 5.2: PFD for the current Mine 2 water balance

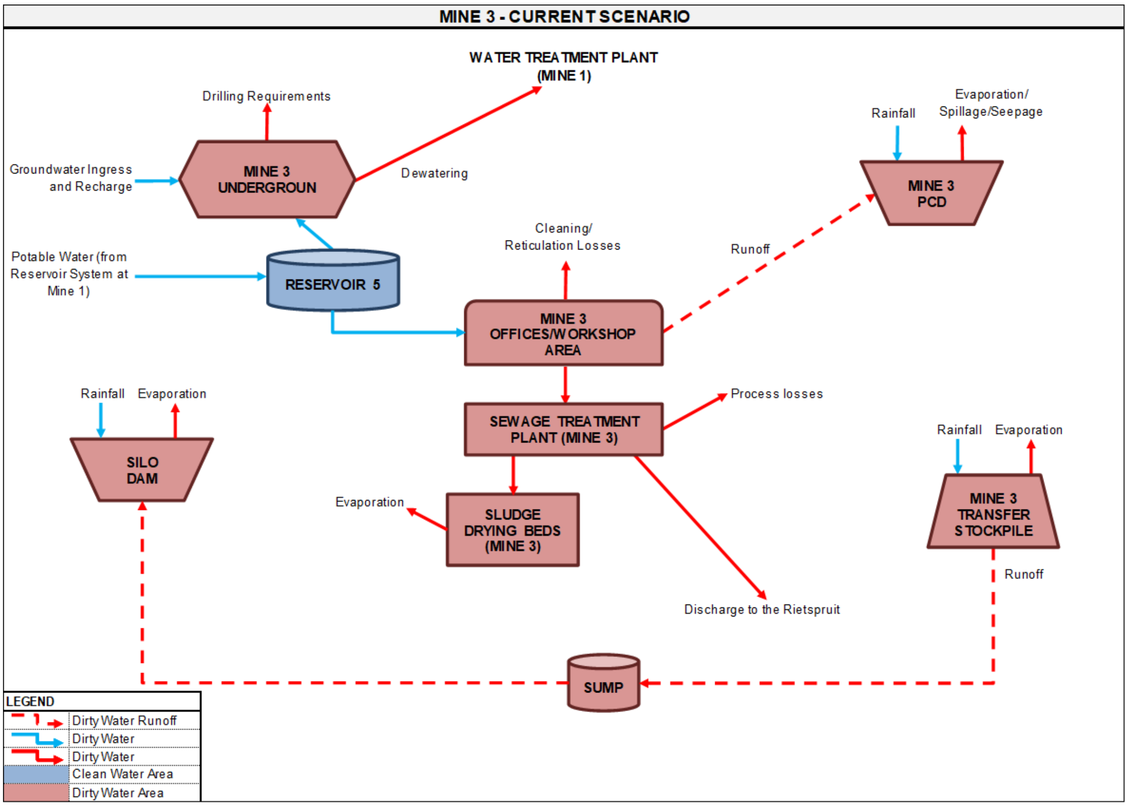


Figure 5.3: PFD for the current Mine 3 water balance

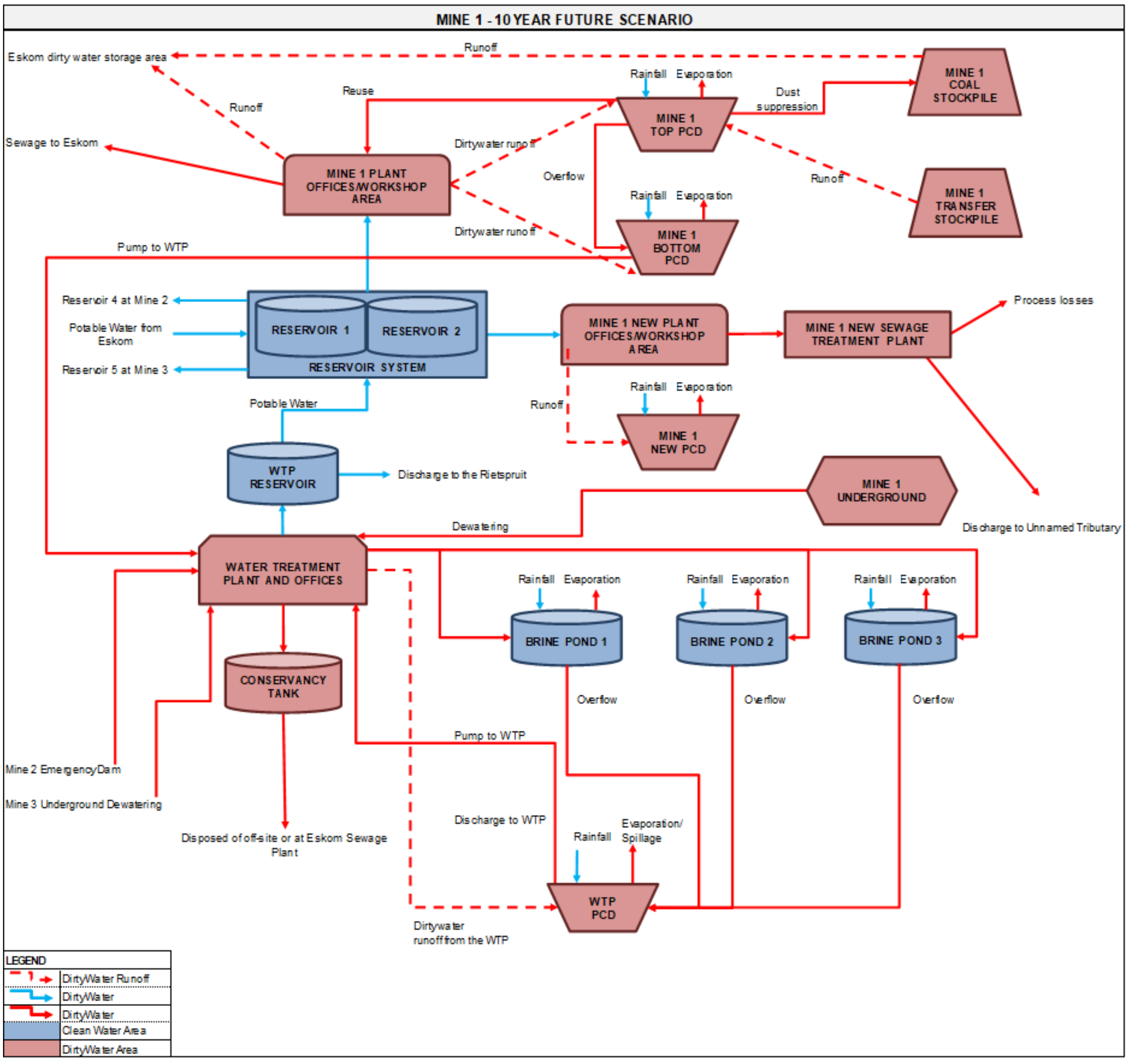


Figure 5.4: PFD for the future Mine 1 water balance

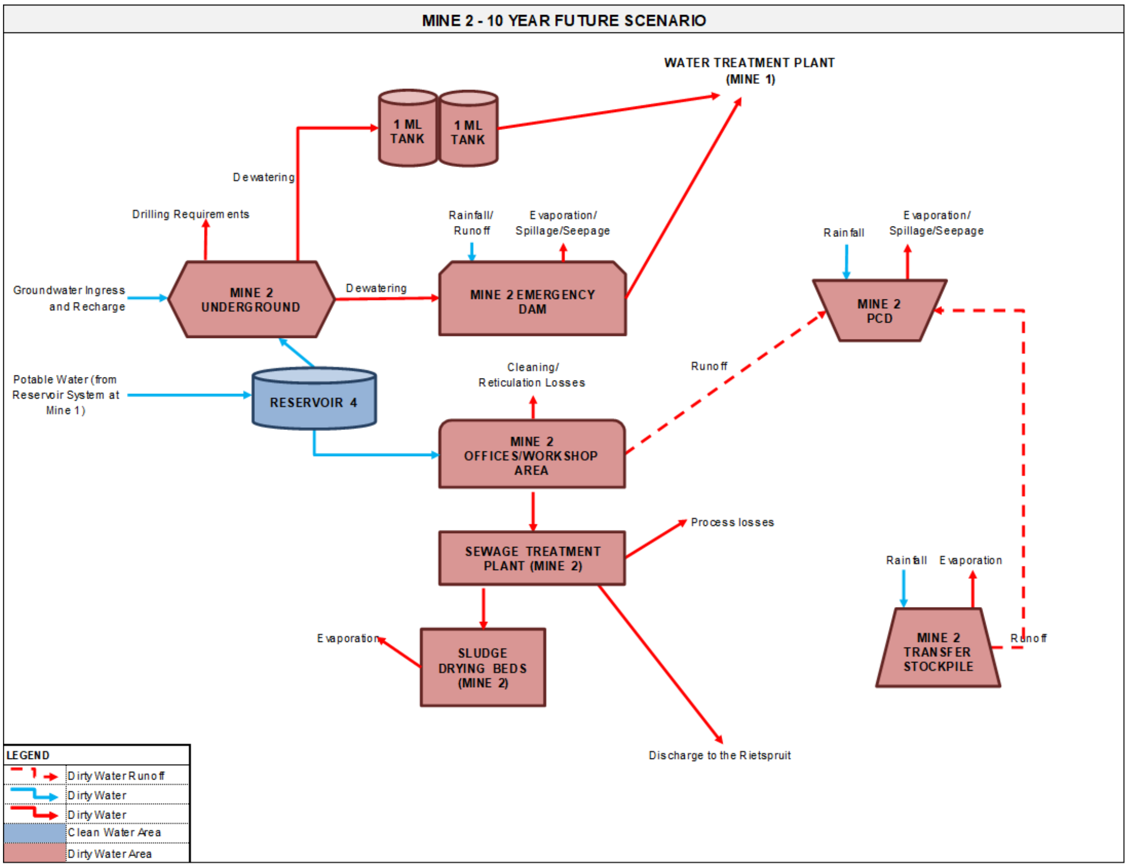


Figure 5.5: PFD for the future Mine 2 water balance

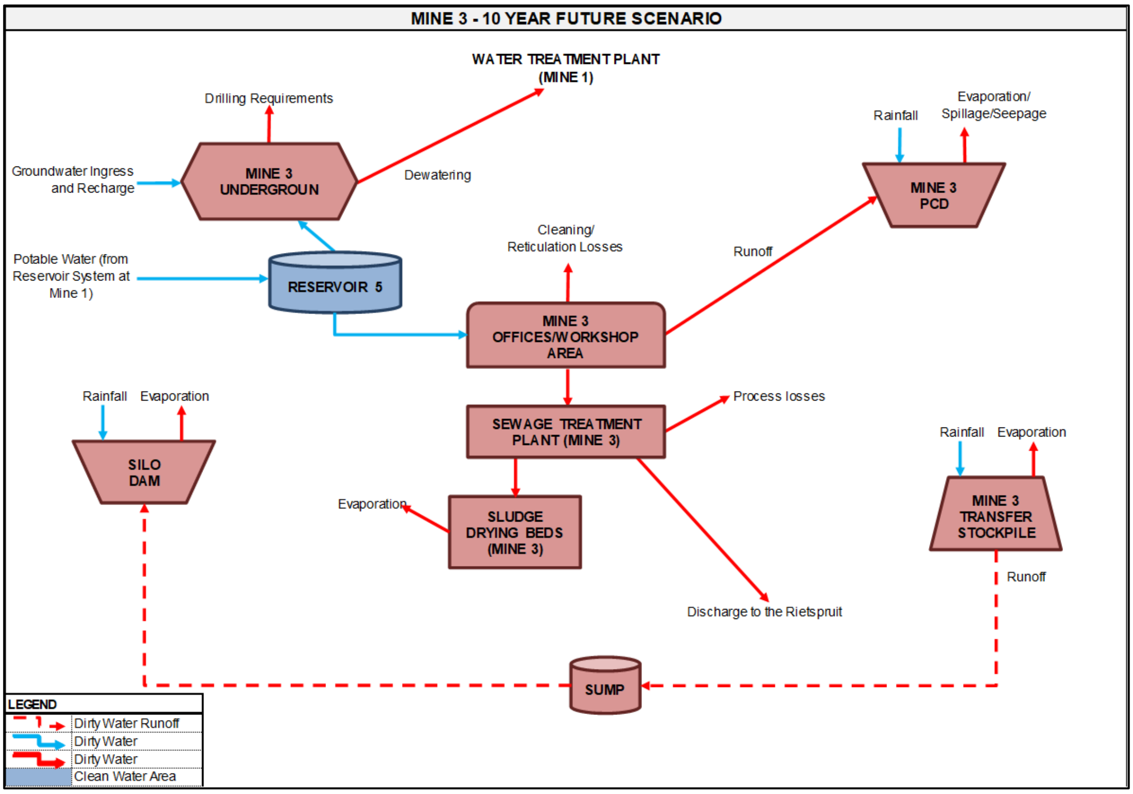


Figure 5.6: PFD for the future Mine 3 water balance

The water balance was developed using an Excel spreadsheet model, taking into consideration average monthly periods during the year. A water balance discussion between GCS and Mr Charles Lindstrom of Exxaro took place on the 27th of March 2018. In this meeting all assumptions and input parameters were discussed and agreed on.

A summary of the information used in the water balance includes climate data such as rainfall and evaporation (SD, 2018), other data used to develop the PFD and compile the water balance where extracted from the following sources listed below:

- Matla Mines Stormwater Design, Technical Design Report, WSP, 2017 (WSP, 2017);
- Matla: Update of the Groundwater Balance, Eelco Lukas and Danie Vermeulen, 2015 (MWC, 2015);
- Exxaro Matla Coal, Integrated Water and Waste Management Plan, Golder Associates, December, 2013 (Golder, 2013); and
- New Mine 1 Integrated Water Use License (IWUL), 2015: License number: 04/B11E/ACFGIJ/3734.

The following water sources (inflows) were included in the water balance calculations:

- Recharge/Groundwater ingress into the underground working;
- Runoff generated from surface infrastructure areas;

- Direct rainfall over PCDs and any other containment infrastructures; and
- Potable water supply.

The following losses/outflows were included in the water balance calculations:

- Evaporation from an open water surface area (PCD)(natural);
- System losses from sewage treatment plant;
- Losses from the water treatment plant;
- Dust suppression; and
- Discharges unto the receiving watercourse/environment.

5.2.1.1 Assumptions and Input Parameters

The water balance assumes the following:

- The water balance was developed for the current and 10 year mine situation and will be dictated by their respective PFDs;
- Potable water users were confirmed by Exxaro and are presented in Table 5.1;
- Rainfall/runoff related inflows and evaporation losses were determined for an average year. Hydrological information was obtained from SD (2018) and relevant surface and footprint areas that were assumed for mining infrastructure are presented in Table 5.2;
- Runoff coefficients for each surface were fixed and not influenced by antecedent moisture conditions. Average runoff coefficients from the mine area were assumed at 30% of rainfall and for the stockpile areas at 20%;
- The underground workings receive water from recharge (groundwater ingress). The expected groundwater ingress volumes will vary over time and was determined in the groundwater specialist study (MWC, 2015). Assumed groundwater inflow volumes are presented in Table 5.3;
- Catchment and surface areas for the current and 10 year future scenario were taken from WSP (2017) and are presented in Table 5.4; and
- Information obtained for the New Mine 1 stormwater management plan (SWMP) (WSP, 2017) was incorporated into the new mine 1 water balance and includes dirty water catchment areas, proposed PCD volumes and surface areas.

All input parameters used for the water balance are presented in Table 5.1 to Table 5.4.

Table 5.1: Assumed potable water users (from Exxaro)

Potable Water User	Volume (m^3/year)
Mine 1 Potable Water Use	488 481
Mine 2 Potable Water Use	520 269
Mine 3 Potable Water Use	206 007

New Mine 1 Potable Water Use	206 007
Water Treatment Plant Offices	22 104

Table 5.2: Assumed surface areas for current and future mining infrastructure

Location	Surface Area (m^2)
Mine 1	
Mine 1 Transfer Coal Stockpile	9 000
Mine 1 Coal Stockpile	302 000
Mine 1 WTP PCD	2 640
Mine 1 Bottom PCD	60 000
Mine 1 Top PCD	24 000
Mine 1 WPT/Office Catchment	62 000
Mine 1 Brine Pond 1	33 667
Mine 1 Brine Pond 2	33 667
Mine 1 Brine Pond 3 (Future)	33 667
New Mine 1 PCD (Future)	7 000
Mine 2	
Mine 2 Emergency Dam	175 000
Mine 2 PCD	27 000
Mine 2 Sludge Beds (4x)	25
Mine 2 Transfer Stockpile	11 650
Mine 2 Emergency Dam Catchment	626 000
Mine 3	
Mine 3 PCD	42 700
Mine 3 Sludge Beds (4x)	15
Mine 3 Transfer Stockpile	3 800
Mine 3 Silo Dam	7 500

Table 5.3: Assumed recharge (groundwater ingress) figures into the underground workings as taken from MWC (2015)

Location	Average Recharge (m^3/d)
Current UG Workings	
Mine 1 (4 Seam)	0
Mine 2 (2 and 5 Seam)	3 500
Mine 3 (2 and 4 Seam)	3 500
Total	*7 000*
10-year future	
Mine 1 (4 Seam)	2 500
Mine 2 (2 and 5 Seam)	4 000
Mine 3 (2 and 4 Seam)	4 000
Total	*10 500*

Table 5.4: Current and future catchment surface areas delineated from WSP (2017)

Location	Catchment Surface Area (m^2)
Current and 10-year future	
Processing Plant	93 970
Mine 1	148 717
Mine 2	232 890
Mine 3	92 510
10-year future	
New Mine 1	43 570

5.2.1.2 Current Water Balance

The current mine water balance for the Matla Mine is presented in Table 5.5 to Table 5.7. The following summarises key results of the current water balance:

- Approximately 2 369 721 m^3/year (6 492 m^3/d) is required to send to the Water Treatment Plant (WTP). Treated discharges from the WTP into the Rietspruit were calculated at 1 149 965 m^3/year (3 150 m^3/day) and 1 214 756 m^3/year (3 328 m^3/day) is pumped for potable use on the Matla Coal Mine;
- A total of 2 555 000 m^3/year (7 000 m^3/day) is dewatered from the underground workings at Mine 2 and Mine 3;
- A total of 26 106 m^3/year (71.5 m^3/day) can be reused for dust suppression on the Mine 1 Coal Stockpile from the Top PCD. If more dust suppression is required, the pumping to the WTP from the Bottom PCD can be reduced; and
- Approximately 50 000 m^3/year (137 m^3/day) from Mine 2 Sewage Treatment Plant and 35 000 m^3/year (96 m^3/day) from Mine 3 Sewage Treatment Plant are potentially discharged into the Rietspruit.

Table 5.5: Average annual water balance for Mine 1 (current)

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	Quantity (m3/a)	Water Circuit/stream	Quantity (m3/a)	
Water Treatment Plant (10ML)	Mine 2 Emergency Dam	1 161 317	Brine Pond 1	75 629	
	Mine 3 Underground Dewatering	1 277 500	Brine Pond 2	75 629	
	WTP PCD Spillage	-	WTP Reservoir	2 369 721	
	Mine 1 Bottom PCD Spillage	82 163			
	Total	**2 520 980**		**2 520 980**	**-**
Water Treatment Plant Offices (conservancy tank)	WTP Reservoir (Potable Water) / Potable water from Eskom	5 000	Disposed of off-site/at Eskom Sewage Plant	2 550	
			Consumption (potable)	2 450	
	Total	**5 000**		**5 000**	**-**
WTP Reservoir	Water Treatment Plant and offices	2 369 721	Reservoir System (Reservoir 1 & 2)	1 214 756	
			Water Treatment Plant Offices	5 000	
			Discharges to Rietspruit	1 149 965	
	Total	**2 369 721**		**2 369 721**	**-**
Reservoir System (Reservoir 1 & 2)	WTP Reservoir (Potable Water) / Potable water from Eskom	1 214 756	Mine 1 Plant, Offices & Workshop area	488 481	
			Reservoir 4 at Mine 2	520 269	
			Reservoir 5 at Mine 3	206 007	
	Total	**1 214 756**		**1 214 756**	**-**
Mine 1 Plant, Offices & Workshop area	Reservoir System	488 481	Disposed of off-site/at Eskom Sewage Plant	341 936	
			Consumption (potable)	146 544	
	Total	**488 481**		**488 481**	**-**
Mine 1 Top PCD	Dirty water runoff (Mine 1 plant, offices &workshops)	16 407	Dust suppression (Mine 1 Coal Stockpile)	26 106	
	Rainfall	13 968	Mine 1 Bottom PCD (overflow)	17 404	
	Runoff (Mine 1 Transfer Stockpile)	1 571	Evaporation	32 400	

	Consumptive Return (9%)	43 963	Reuse (Mine 1)	-	
	Total	**75 910**		**75 910**	**-**
Mine 1 Bottom PCD	Rainfall	34 920	Evaporation	81 000	
	Mine 1 Top PCD (overflow)	17 404	Pump to WTP	82 163	
	Dirty water runoff (Mine 1 plant, offices &workshops)	8 259			
	Consumptive Return (21%)	102 581			
	Total	**163 163**		**163 163**	**-**
Mine 1 Transfer Stockpile	Rainfall	5 238	Evaporation/Seepage/Entrainment	3 667	
			Runoff (Mine 1 Top PCD)	1 571	
	Total	**5 238**		**5 238**	**-**
Mine 1 Coal Stockpile	Dust suppression (Mine 1 Top PCD)	26 106	Evaporation/Seepage/Entrainment	149 141	
	Rainfall	175 764	Runoff (Eskom dirty water storage area)	52 729	
	Total	**201 870**		**201 870**	**-**
Brine Pond 1	Water Treatment Plant and offices	75 629	Evaporation	40 500	
	Rainfall	19 594	Overflow to WTP PCD (emergency)	-	
			Storage	54 724	
	Total	**95 224**		**95 224**	**-**
Brine Pond 2	Water Treatment Plant and offices	75 629	Evaporation	40 500	
	Rainfall	19 594	Overflow to WTP PCD (emergency)	-	
			Storage	54 724	
	Total	**95 224**		**95 224**	**-**
WTP PCD	Runoff (Water Treatment Plant & Offices)	1 804	Evaporation	3 341	
	Rainfall	1 536	Spillage to WTP	-	
	Overflow from Brine Pond 1 (emergency)	-			

	Overflow from Brine Pond 2 (emergency)	-			
	Total	**3 341**		**3 341**	**-**
Total Water Balance		**7 238 907**		**7 238 907**	**-**

Table 5.6: Average annual water balance for Mine 2 (current)

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	**Quantity (m3/a)**	**Water Circuit/stream**	**Quantity (m3/a)**	
Mine 2 Underground	Groundwater Ingress & Recharge	1 277 500	Dewatering (Mine 2 Emergency Dam)	1 277 500	
	Total	**1 277 500**		**1 277 500**	**-**
Reservoir 4	Potable water from Reservoir System at Mine 1	520 269	Mine 2 Offices & Workshop Area	156 081	
			Potable Underground Users	364 188	
	Total	**520 269**		**520 269**	**-**
Mine 2 Emergency Dam	Mine 2 Underground Dewatering	1 277 500	Evaporation/Seepage/Spillage	236 250	
	Rainfall	101 850	Water Treatment Plant Mine 1	1 161 317	
	Runoff	18 217			
	Total	**1 397 567**		**1 397 567**	**-**
Mine 2 Offices & Workshop Area	Reservoir 4 (Potable water supply)	156 081	Sewage Treatment Plant Mine 2	52 027	
			Consumption (Potable)	104 054	
	Total	**156 081**		**156 081**	**-**
Mine 2 PCD	Dirty water runoff (Mine 2 offices & workshop area)	10 705	Evaporation	27 775	
	Rainfall	15 714			
	Mine 2 Transfer stockpile runoff	1 356			
	Total	**27 775**		**27 775**	**-**

Sewage Treatment Plant Mine 2	Mine 2 Offices & Workshop Area Sewage	52 027	Process losses	1 951	
			Discharge to Rietspruit	**50 000**	
			Sludge beds 2a - 2d at Mine 2	76	
	Total	**52 027**		**52 027**	**-**
Sludge Drying beds 2a - 2d	Sewage Treatment Plant Mine 2	76	Evaporation	134	
	Rainfall	58			
	Total	**134**		**134**	**-**
Mine 2 Transfer Stockpile	Rainfall	6 780	Evaporation/Seepage/Spillage	5 424	
			Runoff to Mine 2 PCD	1 356	
	Total	**6 780**		**6 780**	**-**
Total Water Balance		**3 438 132**		**3 438 132**	**-**

Table 5.7: Average annual water balance for Mine 3 (current)

Facility Name	**Water In**		**Water Out**		**Balance**
	Water Circuit/stream	**Quantity (m3/a)**	**Water Circuit/stream**	**Quantity (m3/a)**	
Mine 3 Underground	Groundwater Ingress & Recharge	1 277 500	Dewatering (Water Treatment Plant Mine 1)	1 277 500	
	Total	**1 277 500**		**1 277 500**	**-**
Reservoir 5	Potable water from Reservoir System at Mine 1	206 007	Mine 3 Offices & Workshop Area	123 604	
			Potable Underground Users	82 403	
	Total	**206 007**		**206 007**	**-**
Mine 3 Offices & Workshop Area	Reservoir 5 (Potable water supply)	123 604	Sewage Treatment Plant Mine 3	36 051	
			Consumption (Potable)	87 553	
	Total	**123 604**		**123 604**	**-**
Mine 3 PCD	Dirty water runoff (Mine 3 offices & workshop area)	9 095	Evaporation/Seepage/Spillage	33 946	

	Rainfall	24 851			
	Total	**33 946**		**33 946**	**-**
Sewage Treatment Plant Mine 3	Mine 3 Offices & Workshop Area Sewage	36 051	Process losses	1 028	
			Discharge to Rietspruit	35 000	
			Sludge beds 3a - 3d at Mine 3	23	
	Total	**36 051**		**36 051**	**-**
Sludge Drying beds 3a - 3d	Sewage Treatment Plant Mine 3	23	Evaporation	81	
	Rainfall	58			
	Total	**81**		**81**	**-**
Mine 3 Transfer Stockpile	Rainfall	2 212	Evaporation/Seepage/Spillage	1 548	
			Runoff to to Sump	663	
	Total	**2 212**		**2 212**	**-**
Sump	Mine 3 Transfer Stockpile	663	Silo Dam	663	
	Total	**663**		**663**	**-**
Silo Dam	Sump	663	Evaporation	5 028	
	Rainfall	4 365			
	Total	**5 028**		**5 028**	**-**
Total Water Balance		**1 685 093**		**1 685 093**	**-**

5.2.1.3 Future Water Balance (10 year)

The future water balance for the Matla Mine is presented in Table 5.8 to Table 5.10. The following summarises key results of the future water balance:

- Approximately 3 681 868 m^3/year (10 0087 m^3/d) would have to be treated at the WTP. Treated discharges from the WTP into the Rietspruit were calculated at 2 256 105 m^3/year (6 181 m^3/day) and 1 420 763 m^3/year (3 892 m^3/day) is pumped for potable use on the Matla Coal Mine;
- The calculated dewatering rate from the underground workings at the New Mine 1, Mine 2 and Mine 3 could be 3 832 500 m^3/year (10 500 m^3/day);
- A total of 26 106 m^3/year (71.5 m^3/day) could be reused for dust suppression on the Mine 1 Coal Stockpile from the Top PCD. If more dust suppression is required, the pumping to the WTP from the Bottom PCD can be reduced; and
- Approximately 50 000 m^3/year (137 m^3/day) from Mine 2 Sewage Treatment Plant and 35 000 m^3/year (96 m^3/day) from Mine 3 Sewage Treatment Plant could be discharged into the Rietspruit.

Table 5.8: Average annual water balance for future Mine 1 water balance (future - 10 year)

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	Quantity (m³/a)	Water Circuit/stream	Quantity (m³/a)	
New Mine 1 Underground	Groundwater Ingress & Recharge	912 500	Dewatering (Water Treatment Plant)	912 500	
	Total	**912 500**		**912 500**	**-**
Water Treatment Plant (10ML)	Mine 2 Emergency Dam	730 000	Brine Pond 1	78 338	
	Megalitre Tank 1	365 000	Brine Pond 2	78 338	
	Megalitre Tank 2	365 000	Brine Pond 3	78 338	
	Mine 3 Underground Dewatering	1 460 000	WTP Reservoir	3 681 868	
	New Mine 1 Underground Dewatering	912 500			
	WTP PCD	-			
	Mine Bottom PCD	84 381			
	Total	**3 916 881**		**3 916 881**	**-**
Water Treatment Plant Offices (conservancy tank)	WTP Reservoir (Potable Water) / Potable water from Eskom	5 000	Disposed of off-site/at Eskom Sewage Plant	2 550	
			Consumption (potable)	2 450	
	Total	**5 000**		**5 000**	**-**
WTP Reservoir	Water Treatment Plant and offices	3 681 868	Reservoir System (Reservoir 1 & 2)	1 420 763	
			Discharge to Rietspruit	2 256 105	
			Water Treatment Plant Offices	5 000	
	Total	**3 681 868**		**3 681 868**	**-**
Reservoir System (Reservoir 1 & 2)	WTP Reservoir (Potable Water) / Potable water from Eskom	1 420 763	Mine 1 Plant, Offices & Workshop area	488 481	
			Reservoir 4 at Mine 2	520 269	
			Reservoir 5 at Mine 3	206 007	
			New Mine 1 Plant, Offices & Workshop area	206 007	
	Total	**1 420 763**		**1 420 763**	**-**
Mine 1 New Plant, Offices & Workshop Area	Reservoir System	206 007	Disposed of off-site/at Eskom Sewage Plant	30 901	
			Consumption (potable)	175 106	
	Total	**206 007**		**206 007**	**-**

Mine 1 New Sewage Treatment Plant	Mine 1 New Plant, Offices & Workshop Area	30 901	Process Losses	1 236	
			Discharge to Unnamed Tributary	29 665	
	Total	**30 901**		**30 901**	**-**
Mine 1 New PCD	Runoff (Mine 1 New Plant, Offices & Workshop Area)	7 607	Evaporation	9 450	
	Rainfall	4 074	Dust Suppression (Conveyor Belt)	2 231	
	Total	**11 681**		**11 681**	**-**
Mine 1 Plant, Offices & Workshop area	Reservoir System	488 481	Disposed of off-site/at Eskom Sewage Plant	341 936	
			Consumption (potable)	146 544	
	Total	**488 481**		**488 481**	**-**
Mine 1 Top PCD	Dirty water runoff (Mine 1 plant, offices &workshops)	16 407	Dust suppression (Mine 1 Coal Stockpile)	26 106	
	Rainfall	13 968	Mine 1 Bottom PCD (overflow)	17 404	
	Runoff (Mine 1 Transfer Stockpile)	1 571	Evaporation	32 400	
	Consumptive Return (9%)	43 963	Reuse (Mine 1)	-	
	Total	**75 910**		**75 910**	**-**
Mine 1 Bottom PCD	Rainfall	34 920	Evaporation	81 000	
	Mine 1 Top PCD (overflow)	17 404	Pump to WTP	84 381	
	Dirty water runoff (Mine 1 plant, offices &workshops)	10 476			
	Consumptive Return (21%)	102 581			
	.	**165 381**		**165 381**	**-**
Mine 1 Transfer Stockpile	Rainfall	5 238	Evaporation/Seepage/Entrainment	3 667	
			Runoff (Mine 1 Top PCD)	1 571	
	Total	**5 238**		**5 238**	**-**
Mine 1 Coal Stockpile	Dust supression (Mine 1 Top PCD)	26 106	Evaporation/Seepage/Entrainment	29 598	
	Rainfall	4 365	Runoff (Eskom dirty water storage area)	873	
				-	
	Total	**30 471**		**30 471**	**-**
Brine Pond 1	Water Treatment Plant and offices	78 338	Evaporation	45 450	

	Rainfall	19 594	Overflow to WTP PCD (emergency)	-	
			Storage	52 481	
	Total	**97 932**		**97 932**	**-**
Brine Pond 2	Water Treatment Plant and offices	78 338	Evaporation	45 450	
	Rainfall	19 594	Overflow to WTP PCD (emergency)	-	
			Storage	52 481	
	Total	**97 932**		**97 932**	**-**
Brine Pond 3	Water Treatment Plant and offices	78 338	Evaporation	45 450	
	Rainfall	19 594	Overflow to WTP PCD (emergency)	-	
			Storage	52 481	
	Total	**97 932**		**97 932**	**-**
WTP PCD	Runoff (Water Treatment Plant & Offices)	1 804	Evaporation	3 341	
	Rainfall	1 536	Spillage to WTP	-	
	Overflow from Brine Pond 1 (emergency)	-			
	Overflow from Brine Pond 2 (emergency)	-			
	Overflow from Brine Pond 3 (emergency)	-			
	Total	**3 341**		**3 341**	**-**
Total Water Balance		**11 243 217**		**11 243 217**	**-**

Table 5.9: Average annual water balance for future Mine 2 water balance (future - 10 year)

Facility Name	**Water In**		**Water Out**		**Balance**
	Water Circuit/stream	**Quantity (m3/a)**	**Water Circuit/stream**	**Quantity (m3/a)**	
Mine 2 Underground	Groundwater Ingress & Recharge	1 460 000	Dewatering (Mine 2 Emergency Dam)	730 000	
			Dewatering (2 Megalitre Tanks)	730 000	
	Total	**1 460 000**		**1 460 000**	**-**

Reservoir 4	Potable water from Reservoir System at Mine 1	520 269	Mine 2 Offices & Workshop Area	156 081	
			Potable Underground Users	364 188	
	Total	**520 269**		**520 269**	**-**
Megalitre Tanks 1 & 2	Dewatering of Mine 2 underground	730 000	Water Treatment Plant mine 1	730 000	
	Total	**730 000**		**730 000**	**-**
Mine 2 Emergency Dam	Mine 2 Underground Dewatering	730 000	Evaporation/Seepage/Spillage	155 925	
	Rainfall	101 850	Water Treatment Plant Mine 1	694 142	
	Catchment Runoff	18 217			
	Total	**850 067**		**850 067**	**-**
Mine 2 Offices & Workshop Area	Reservoir 4 (Potable water supply)	156 081	Sewage Treatment Plant Mine 2	52 027	
			Consumption (Potable)	104 054	
	Total	**156 081**		**156 081**	**-**
Mine 2 PCD	Dirty water runoff (Mine 2 offices & workshop area)	10 705	Evaporation	27 775	
	Rainfall	15 714			
	Mine 2 Transfer stockpile runoff	1 356			
	Total	**27 775**		**27 775**	**-**
Sewage Treatment Plant Mine 2	Mine 2 Offices & Workshop Area Sewage	52 027	Process losses	1 951	
			Discharge to Rietspruit	50 000	
			Sludge beds 2a - 2d at Mine 2	76	
	Total	**52 027**		**52 027**	**-**
Sludge Drying beds 2a - 2d	Sewage Treatment Plant Mine 2	76	Evaporation	134	
	Rainfall	58			
	Total	**134**		**134**	**-**
Mine 2 Transfer Stockpile	Rainfall	6 780	Evaporation/Seepage/Spillage	5 424	
		-	Runoff to Mine 2 PCD	1 356	
	Total	**6 780**		**6 780**	**-**
Total Water Balance		**3 073 132**		**3 073 132**	**-**

Table 5.10: Average annual water balance for future Mine 3 water balance (future - 10 year)

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	Quantity (m3/a)	Water Circuit/stream	Quantity (m3/a)	
Mine 3 Underground	Groundwater Ingress & Recharge	1 460 000	Dewatering (Water Treatment Plant Mine 1)	1 460 000	
	Total	1 460 000.00		1 460 000.00	-
Reservoir 5	Potable water from Reservoir System at Mine 1	206 007	Mine 3 Offices & Workshop Area	133 904	
			Potable Underground Users	72 102	
	Total	206 006.72		206 006.72	-
Mine 3 Offices & Workshop Area	Reservoir 5 (Potable water supply)	133 904	Sewage Treatment Plant Mine 3	41 201	
			Consumption (Potable)	92 703	
	Total	133 904.37		133 904.37	-
Mine 3 PCD	Dirty water runoff (Mine 3 offices & workshop area)	9 095	Evaporation/Seepage/Spillage	33 946	
	Rainfall	24 851			
	Total	33 946.31		33 946.31	-
Sewage Treatment Plant Mine 3	Mine 3 Offices & Workshop Area Sewage	41 201	Process losses	6 125	
			Discharge to Rietspruit	35 000	
			Sludge beds 3a - 3d at Mine 3	77	
	Total	41 201.34		41 201.34	-
Sludge Drying beds 3a - 3d	Sewage Treatment Plant Mine 3	77	Evaporation	135	
	Rainfall	58			
	Total	135.00		135.00	-
Mine 3 Transfer Stockpile	Rainfall	2 212	Evaporation/Seepage/Spillage	1 548	
			Runoff to Sump	663	
	Total	2 211.60		2 211.60	-
Silo Dam	Sump	663	Evaporation	5 028	
	Rainfall	4 365			

	Total	**5 028.48**		**5 028.48**	**-**
Total Water Balance		**1 882 433.83**		**1 882 433.83**	**-**

5.2.1.4 Conclusion and Recommendations

The following recommendations have been made based on the outcomes of this water balance study:

- To monitor dewatering volumes from the underground workings. The capacity of the WTP is 10ML/day (10 000 m^3/day) and this may be insufficient if recharge exceeds this volume;
- To monitor all inflows into the PCDs. This will contribute to better insight in potential reuse of water for dust suppression;
- To comply with Water Use License (WUL) conditions, the mine water balance should be updated on an annual basis during operations, preferably at the end of the rainfall period in March. This will enable the mine of make a decision on whether additional water treatment is required in the future.

5.2.2 Process Water

Process water is sourced from the WTP which receives water from the underground workings at the mine complexes. The water from the WTP goes into the reservoir system at Mine 1 which also receives potable water from Eskom. The water from the reservoir system goes to the underground workings as well as the various workshops and the plant.

5.2.3 Storm Water

Initially WSP had undertaken a study (Stormwater Assessment and Management Plan for the Matla Operations, WSP, 2012), however all findings been updated in the 2017 study (Malta Mines Stormwater Design, Technical Design Report, WSP, 2017). This report has been attached as Annexure F to this report.

It should be noted at the time of the study, Mine 1 was operational, however currently it isn’t, and a separate stormwater management plan for the New Mine 1 area was undertaken. The approach adopted for the above mentioned study included:

- Desktop review of existing information and site walkover;
- GN 704 audit;
- Development of a conceptual stormwater management plan; and
- Design of infrastructure (to allow for the construction tender stage to commence).

A Storm Water Management Plan (SWMP) is a statutory requirement for mining and related activities in South Africa and is defined by General Notice 704 and Regulation 77 of the NWA. No water use licences in terms of this act will be granted without an approved SWMP. The purpose of a SWMP is to prevent the pollution of water resources in and around mining areas, or areas where mining related activity occurs. Regulations define a methodological approach to preventing and/or containing pollution on mining sites, set design standards and specify measures that must be taken to monitor and evaluate the efficacy of pollution control measures that are implemented.

The basic principles of a SWMP include:

- Separation of clean and dirty water - clean water should, as far as possible, be kept separate from dirty water. Water from clean water areas should be diverted away from dirty water areas and should be allowed to pass through to downstream users. Dirty water must be contained and captured on site. Spillage of dirty water is not allowed except during extreme flood events that are, on average, exceeded no more than once in 50 years;
- Containment of dirty water - reasonable measures must be taken to ensure that dirty water is contained. All dirty water must be captured and transported in lined channels (capable of containing 1:50-year design floods) to prevent the seepage of contaminated water into groundwater resources. Dirty water runoff must be stored in a Pollution Control Dam (PCD), where reasonable precautions are taken to prevent leaks or seepage. PCDs may not spill more often than (on average) once in 50 years. The design standard is not that a 1 in 50-year flood should be captured, but that the dam may not spill. Design storage volumes are a function of peak storage requirements that often correspond to abnormally wet conditions that continue for an extended period of time, and not to a specific flood event;
- Reuse and recycling of dirty water - regulations stipulate a clear hierarchy of water use. First reuse any captured dirty water. Recycle as much water as possible. Minimise the import and use of clean water resources. Excess water released from a dirty water area must be treated to a standard agreed to by the regulator (DWS) and any plan to treat and release excess water must be approved and licensed.;
- Preventing the pollution of water resources - exposure between water and potential pollutants should be reduced to a minimum. Special precautions may be required to prevent the transport of pollutants in water. Oil traps should be specified below workshops, fuel depots and vehicle wash-bays to prevent the flow of hydrocarbons into PCDs. Silt traps may be constructed where surface runoff is likely to lead to the transport of suspended sediments and the like. Showers in a change-room at a coal mine may yield heavy concentrations of coal dust that would reduce the efficiency of a sewage treatment plant. Under similar circumstances, wash-water should be separated from conventional water-borne sewage, and treated separately; and
- Reducing dirty water areas - special attention should be paid to early rehabilitation of mining and other dirty water areas to reduce the dirty water footprint area to an absolute minimum. This will reduce the total volumes of dirty water and simplify the

final measures to be taken at mine closure. Part of any SWMP will include processes that identify and implement opportunities to reduce the dirty water footprint areas. A benefit of smaller dirty water footprint areas is that polluted runoff is reduced, fewer drains are required and pollution control dams can often be smaller. (Smaller surface area equates to cheaper and more effective storm water management).

The stormwater management plan for Mine 1, Mine 2 and Mine 3 are describe in the sections that follow.

5.2.3.1 Stormwater Management for Mine Summary

The stormwater management plan for Mine 1, Mine 2, Mine 3 and the Plant area is summarised in Figure 5.7- Figure 5.10. All peak flow calculations used to size the stormwater controls are based on the Rational method (SANRAL, 2013).

All channels are either trapezoidal or triangular, with the exception of the rectangular grid channel, L1 on Mine 2, since it requires vehicles to be able to pass over it. Channels were designed to have a freeboard of 10% of the channel depth to act as a safety factor. Conventionally, collector channels are designed for 10-year storm events (where any excess is captured further downstream in the catchment) but due to the clean and dirty nature of the sites, it cannot be allowed for water to overflow into other catchments. Therefore, the channels were designed for a 50-year storm event (WSP, 2017).

Similarly, to pipes, Uniform Flow Analysis method with Manning's equation was used to analyse stormwater channels. Manning's *n* coefficient for concrete channels was estimated to be 0.015 (Chadwick, Morfett, & Borthwick, 2013) and 0.025 for grass-blocks (Technicrete, 2017). The design of channels targeted a self-cleansing velocity of 1.0m/s to prevent siltation, while being designed to avoid backwater conditions (WSP, 2017).

Berms are specified in Mine 1 and Mine 2 to divert clean water away from dirty areas. The berms will require erosion protection in the form of dump rock. The dump rock will protect the toe of the berm by slowing down the flow, while allowing the water to infiltrate into the ground (WSP, 2017).

The new sediment traps are based on a 'settling channel' concept which attenuates stormwater flow through the channel. The channel is designed to be large enough to give particles enough time to fall out of suspension (WSP, 2017).

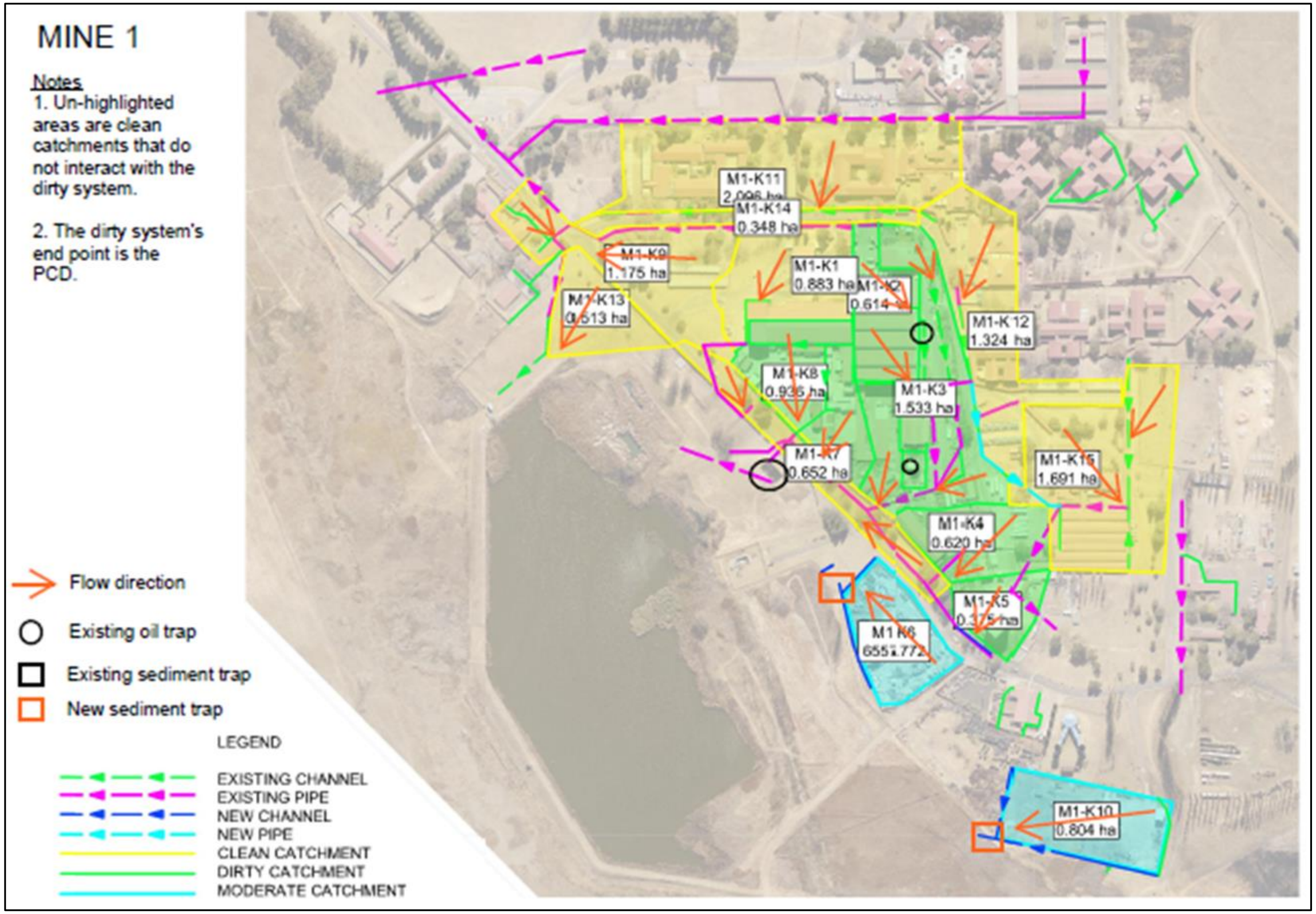


Figure 5.7: Proposed Stormwater Management (Mine 1) (WSP, 2017)

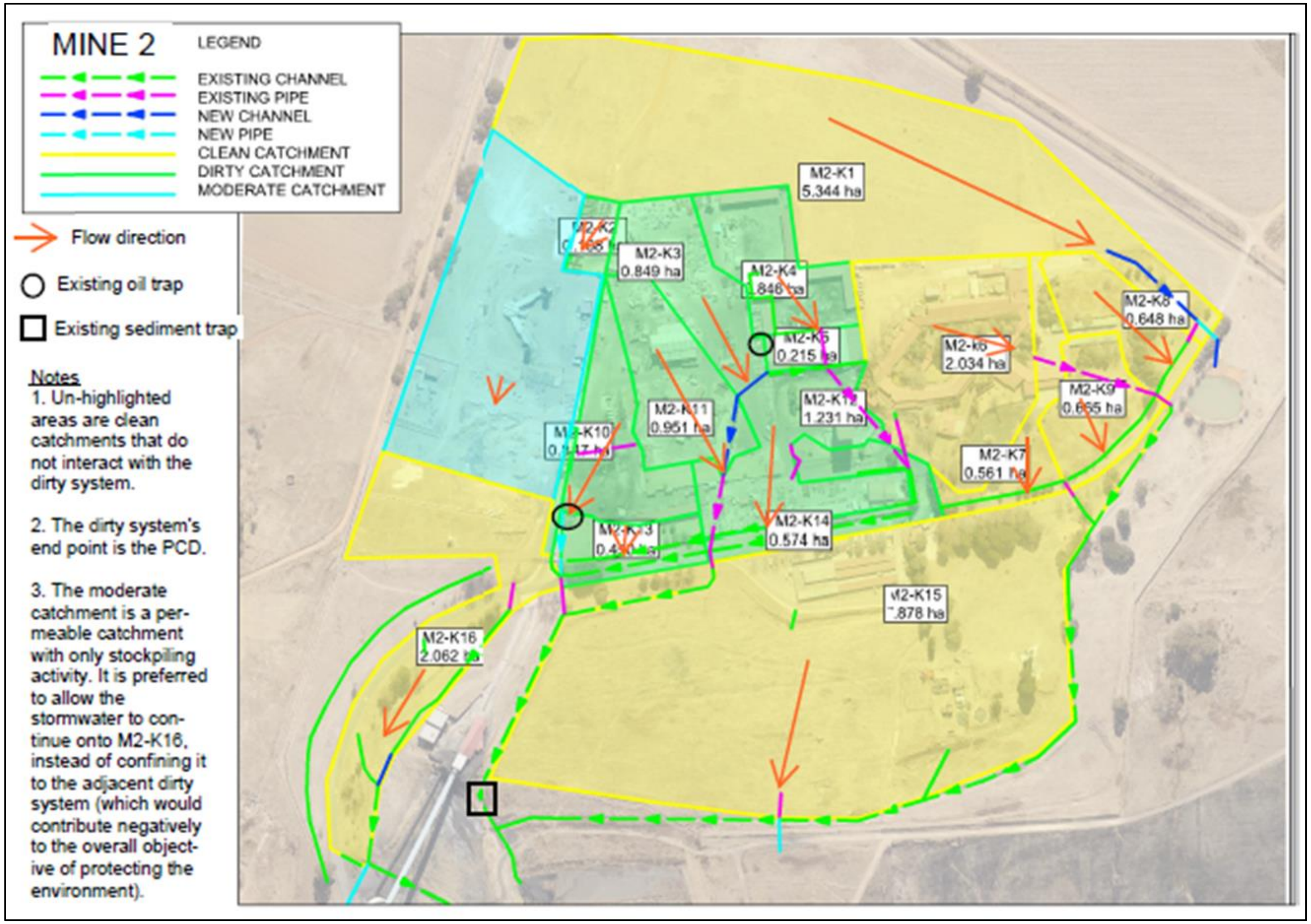


Figure 5.8: Proposed Stormwater Management (Mine 2) (WSP, 2017)

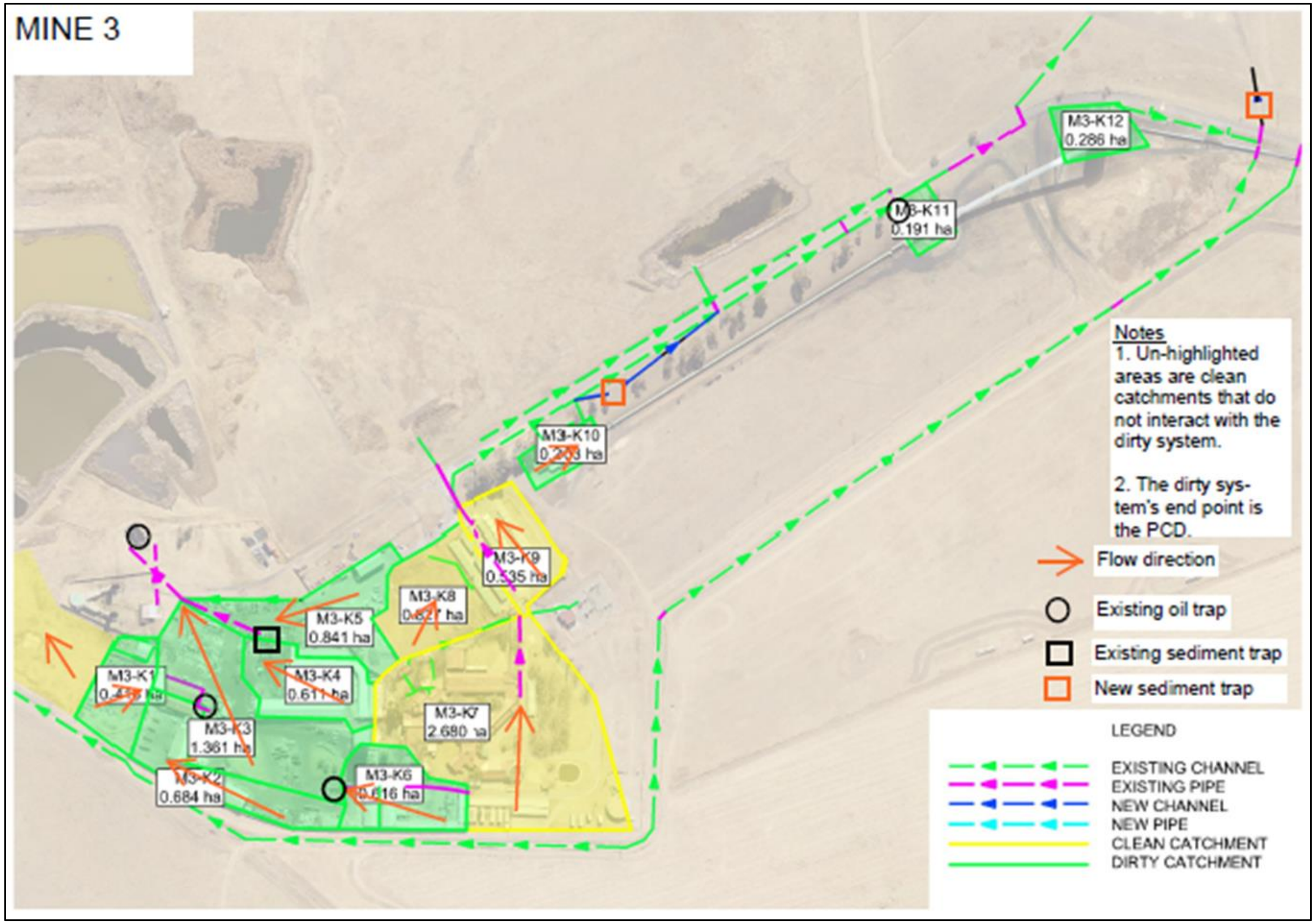


Figure 5.9: Proposed Stormwater Management (Mine 3) (WSP, 2017)

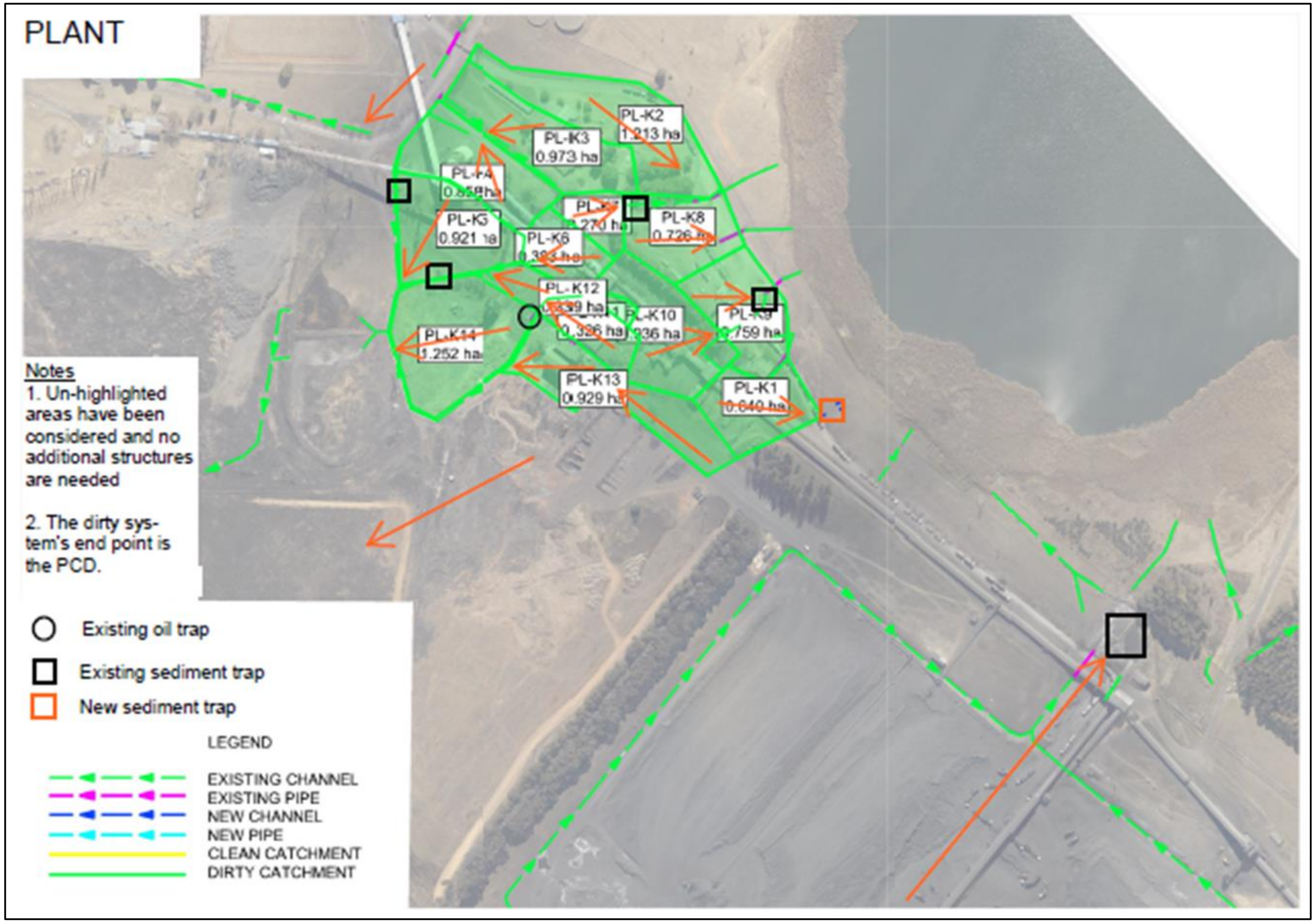


Figure 5.10: Proposed Stormwater Management (Plant Area) (WSP, 2017)

5.2.3.2 Stormwater management plan at the proposed stooping areas

All information regarding the stormwater management plan for the proposed stooping areas was obtained from the surface water study conducted by GCS, (Hydrological Assessment for the Proposed Stooping of Pillars of the Underground Works at Matla, GCS, 2015).

The Matla Stooping Project (Phase 1) will have no surface-related activities as the mining will be underground. There will be no dirty water generating areas as a result of this. The impacts to the surface will be in the form of subsidence of approximately 1.53m, therefore the site-wide framework is to allow the subsided areas to be free-draining while at the same time limiting the amount of surface water runoff infiltrating into the underground workings. The clean water runoff being generated from the upslope clean water catchments will be diverted away from the subsided areas

The water runoff generated from the subsided areas will be diverted to flow out of these areas via channels. This conceptual stormwater management plan methodology was developed in accordance with GN704 of the South African National Water Act (NWA) (Act 36 of 1998) (South Africa, 1998). This guideline was adopted when sizing all storm water infrastructure as these guidelines are relevant to mining activities. Further to this, dirty water channels and storm water infrastructure were sized such that they will only spill once, on average, in a 50-year period (GCS, 2015).

Summary of catchment hydrology

Discretisation into sub-catchments is based on the topography of the study area, as shown in Figure 5.11 to Figure 5.14. This was undertaken in order to determine the clean water and dirty water catchment areas. No designation of the clean and dirty water catchments was carried out as there are no dirty water generating activities taking place on the surface. The parameters used to model the overland flow are listed in Table 5.11.

Manning's 'n' coefficient used in the model for the impervious areas and pervious areas were 0.013 (float finish, concrete) and 0.15 (veld type vegetation), respectively (McCuen, 1996). The soils were identified as being in the sandy loam group (WR2012). The model uses these criteria to incorporate infiltration into the analysis using the Green-Ampt infiltration method. The sandy loam group resulted in a Suction Head of 110.1mm, a Hydraulic Conductivity of 21.8 mm/hr and an Initial Deficit of 0.36 being used in the modelling. Simulated runoff volumes are summarised in for the 50-year recurrence interval storm event (GCS, 2015).

Table 5.11: Summary of catchment hydrology (GCS, 2015)

Name	Area (ha)	Flow Length (m)	Slope (%)	Runoff Volume (m^3)	Peak Runoff (m^3/s)
S1.	21.7	1093	1.7	3350	0.92
S2.	1.6	55	1.7	660	0.52
S3.	0.3	30	1.7	120	0.12
S4.	1.5	50	1.7	650	0.54
S5.	9.8	230	1.5	3040	1.37
S6.	5.2	100	3.3	2140	1.52
S7.	0.6	35	3.3	290	0.31
S8.	2.2	55	3.2	960	0.87
S9.	4.6	105	1.8	1790	1.15
S10.	2.9	105	0.3	880	0.39
S11.	0.4	25	0.3	160	0.12
S12.	3.1	70	0.5	1150	0.68
S13.	4.9	250	1.5	1480	0.64
S14.	13.2	380	3	3890	1.64
S15.	5.6	110	2.8	2230	1.51
S16.	0.8	95	0.5	260	0.14
S17.	0.6	60	0.4	210	0.12
S18.	3.7	90	1.4	1450	0.94
S19.	0.3	35	1.5	130	0.12
S20.	0.8	55	1.4	350	0.26
S21.	1.8	60	1.4	730	0.53
S22.	4.0	120	1.1	1420	0.79
S23.	4.4	140	0.8	1430	0.70
S24.	4.0	110	1.3	1480	0.88
S25.	16.4	220	1.5	5160	2.37
S26.	14.3	180	1.7	4860	2.50
S27.	4.5	125	2.2	1730	1.08
S28.	4.1	90	1.5	1610	1.05
S29.	5.8	140	1.3	2020	1.09
S30.	5.0	155	0.9	1620	0.78
S31.	13.0	300	2.2	3920	1.71
S32.	5.3	210	3.8	1930	1.10
S33.	15.3	200	3.7	5560	3.22
S34.	2.0	90	5.1	870	0.70
S35.	1.8	105	3	730	0.51
S36.	1.4	80	1.8	560	0.39
S37.	2.8	135	3.2	1090	0.71
S38.	2.6	80	6.7	1160	1.05
S39.	4.4	120	2.9	1730	1.15
S40.	4.6	150	2.6	1710	1.03
S41.	2.7	105	3.9	1100	0.79
S42.	19.3	200	2.3	6620	3.48
S43.	0.7	65	1.2	300	0.21

S44.	2.1	95	1.2	790	0.49
S45.	12.4	300	2.5	3830	1.71
S46.	4.5	115	2.5	1770	1.17
S47.	2.4	105	2	930	0.60
S48.	16.0	625	2	3520	1.17
S49.	5.5	90	3.3	2290	1.67
S50.	2.3	97	2.9	930	0.65
S51.	0.8	64	2	340	0.26
S52.	31.7	616	2.3	7270	2.48
S53.	37.8	620	4.6	10030	3.84
S54.	2.8	115	5.2	1160	0.84
S55.	4.5	110	1.6	1710	1.06
S56.	12.1	200	1.5	3910	1.87
S57.	15.8	175	0.8	4840	2.14
S58.	10.5	115	0.8	3640	1.93
S59.	28.2	255	1.9	8790	3.98
S60.	6.8	150	0.3	1830	0.72
S61.	9.6	190	1.3	3090	1.47
S62.	3.5	155	2.1	1260	0.72
S63.	4.1	170	2	1440	0.79
S64.	6.1	200	0.5	1630	0.63
S65.	8.3	115	1.2	3030	1.74
S66.	14.0	200	2.2	4790	2.49
S67.	5.7	135	2.1	2140	1.29

The key for Figure 5.11to Figure 5.14 is described within the brackets (Green outlined area = Stooping area, Red outlined area = Sub catchment area/berm, Yellow arrow symbol = Flow direction).

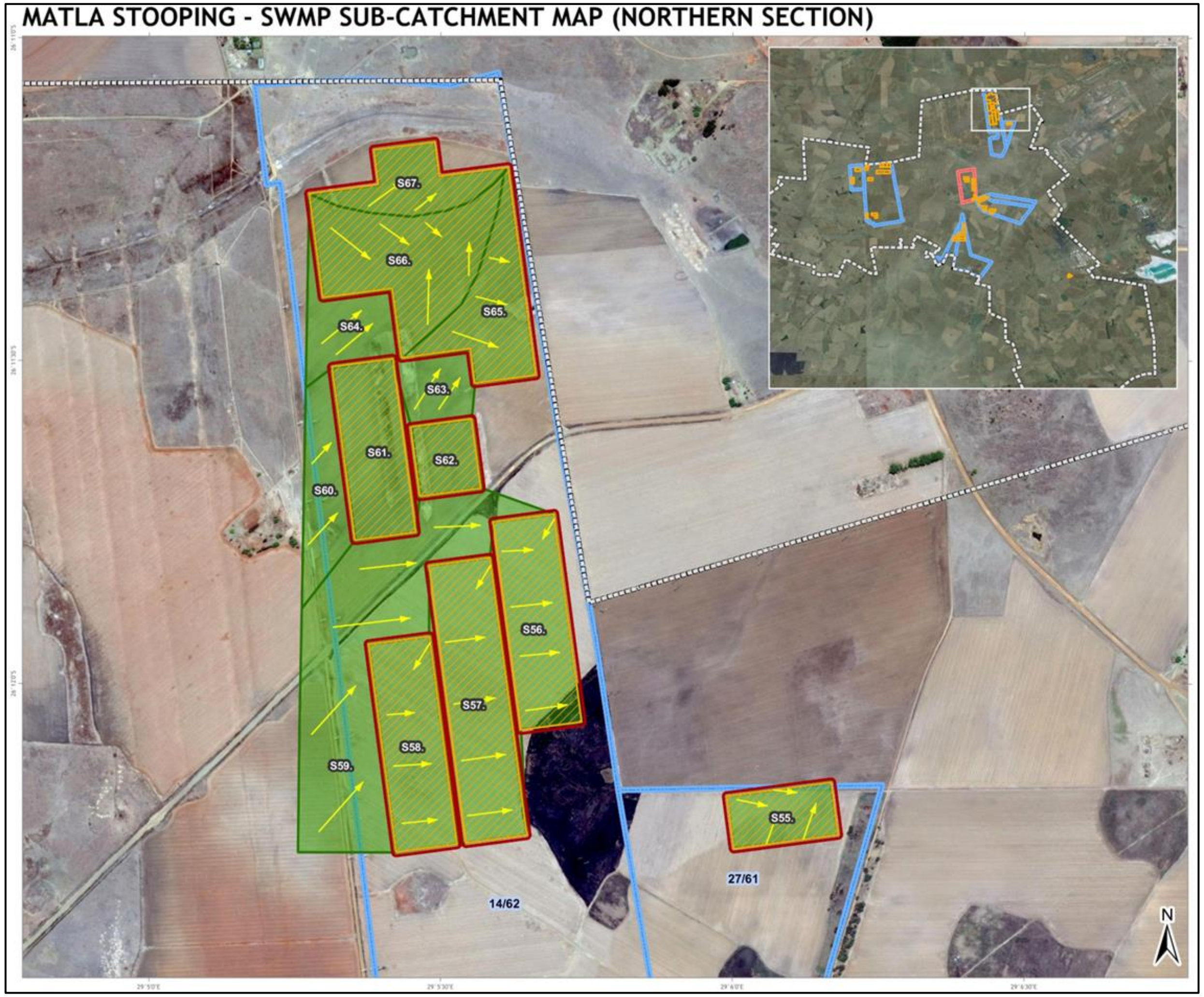


Figure 5.11: Summary of delineated catchment areas (Northern Section), (GCS, 2015)

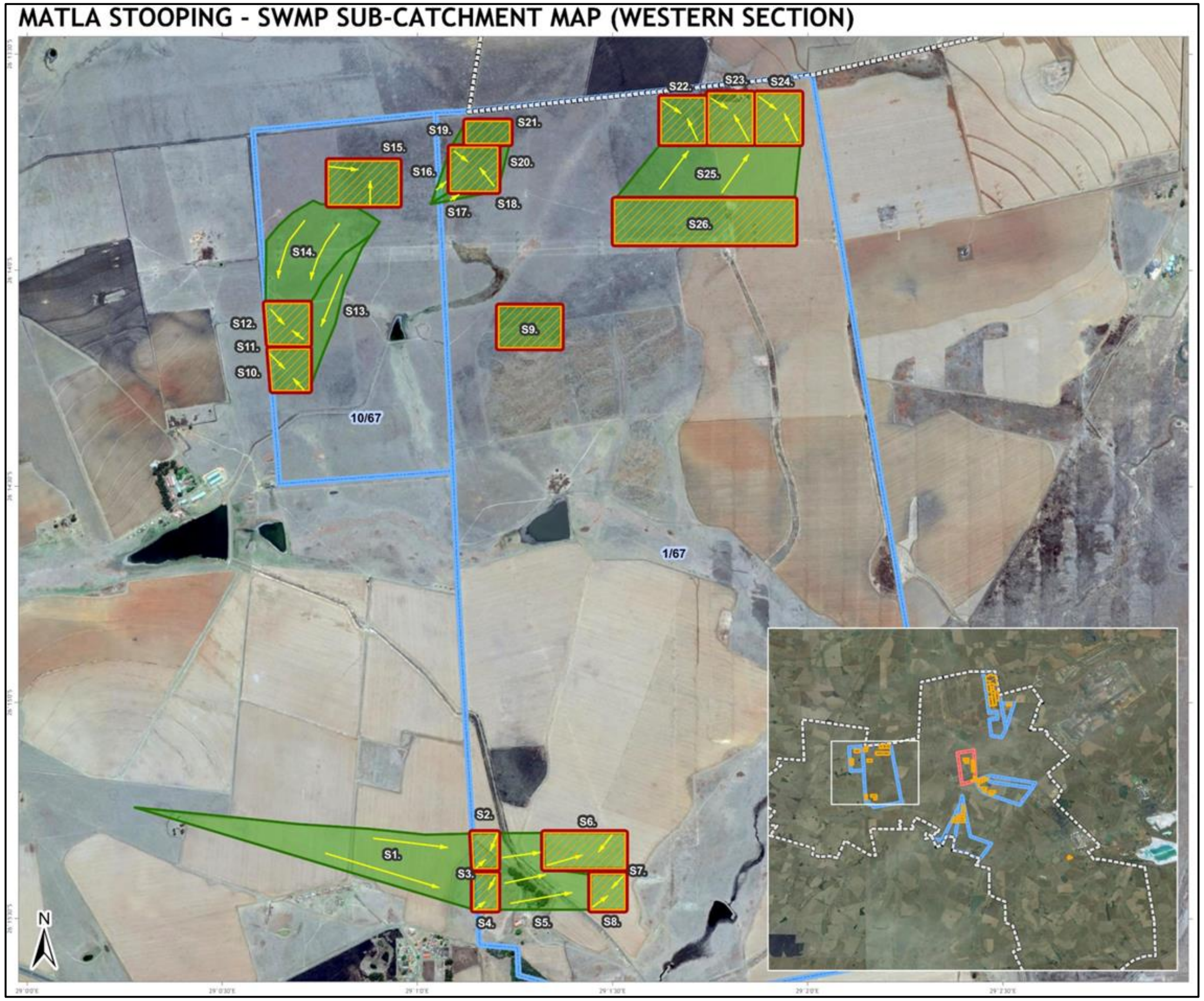


Figure 5.12: Summary of delineated catchment areas (Western Section), (GCS, 2015)

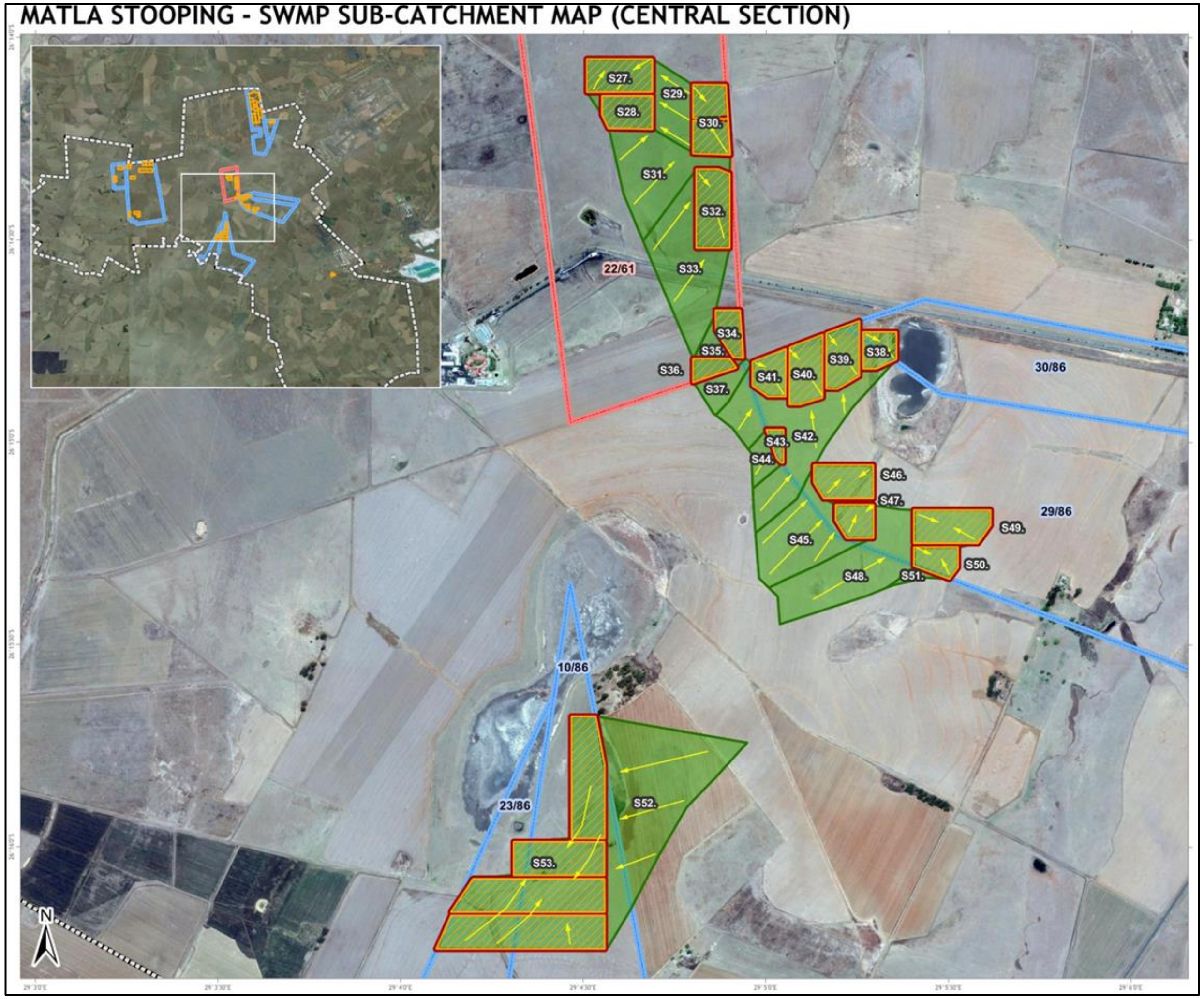


Figure 5.13: Summary of delineated catchment areas (Central Section), (GCS, 2015)

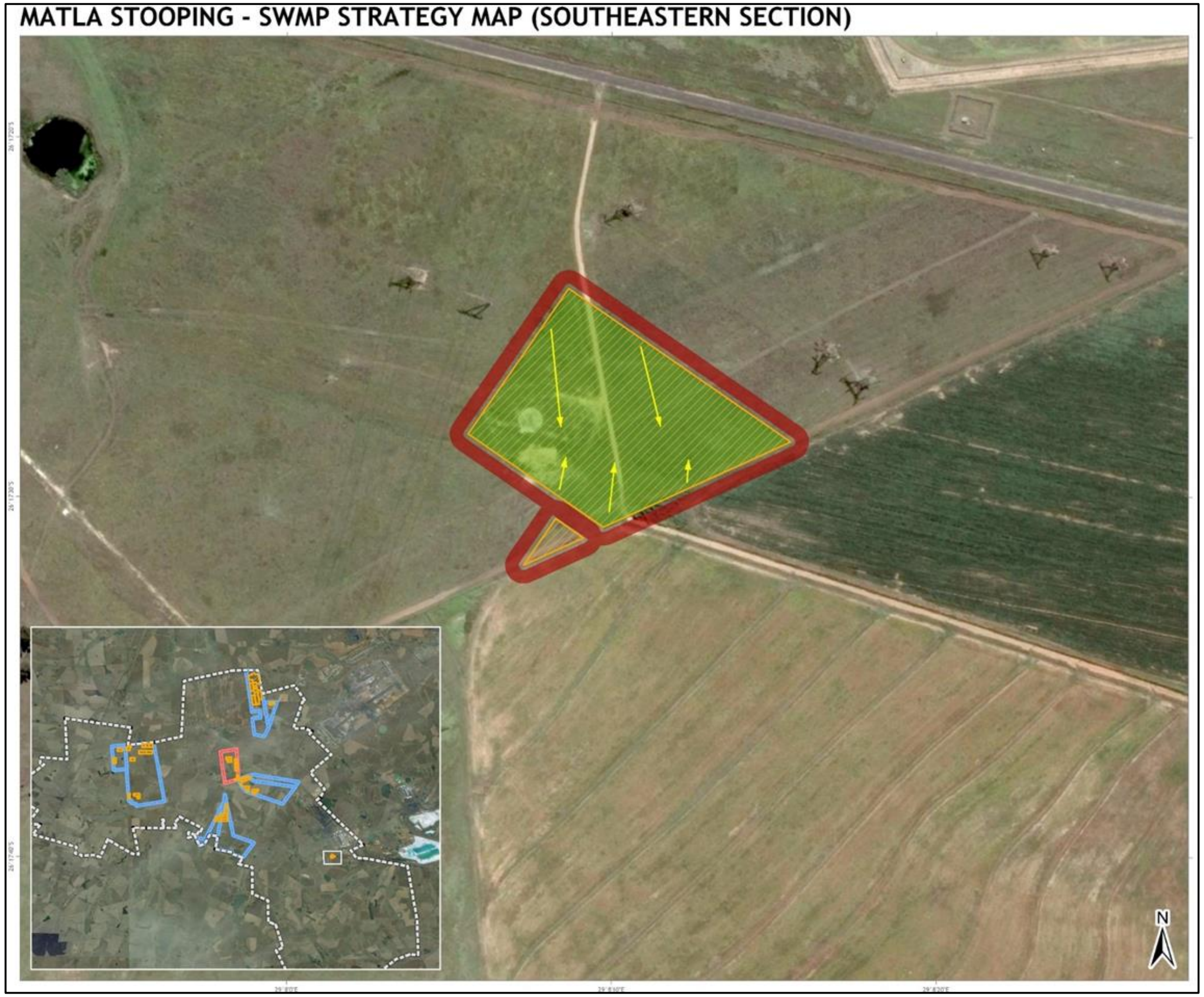


Figure 5.14: Summary of delineated catchment areas (South Eastern Section), (GCS, 2015)

Summary of channel sizing

The diversion channel has been sized to divert the runoff for the 50-year return period flood peak, as per GN704 (shown in Table 5.12). The proposed conceptual diversion channel layout can be seen in Figure 5.15 to Figure 5.18. The Manning's roughness assumed for the channels was 0.035 (vegetation-lined channels) (Hicks et al., 1998).

The results show that one of the channels (C42 and C53, (as shown Figure 5.15 to Figure 5.18) is at risk of eroding, due to the maximum velocity being 3m/s. The high velocities are due to the steep catchment gradients present on the site. Therefore, additional lining may be required for the channels, such as riprap. This channel lining, when implemented, will greatly reduce the risk of erosion. Another option would be to implement energy dissipation devices. Energy dissipaters are devices designed to protect downstream areas from erosion by reducing the velocity of flow to acceptable limits (GCS, 2015).

The key for Figure 5.15 to Figure 5.18 is described within the brackets (Light blue outlined area = Stooping area, Red outlined area = Sub catchment area/berm, Blue line with yellow arrow symbol = proposed channel showing flow direction, Red point = Junction, Green point = Outflow).

Table 5.12: Summary of channel characteristics and results (GCS, 2015)

Name	Length (m)	Roughness	Cross-Section	Height (m)	Bottom Width (m)	Left Slope (1:H)	Right Slope (1:H)	Slope (m/m)	Max. Flow (m³/s)	Max. Velocity (m/s)
C1.	345	0.035	Trapezoidal	1	1	2	2	0.032	0.92	1.81
C2.	194	0.035	Trapezoidal	0.8	0.5	2	2	0.017	0.52	1.33
C3.	111	0.035	Trapezoidal	1	1	2	2	0.017	0.12	0.83
C4.	174	0.035	Trapezoidal	0.8	0.5	2	2	0.017	0.51	1.32
C5.	518	0.035	Trapezoidal	1	1	2	2	0.026	1.34	1.87
C6.	199	0.035	Trapezoidal	0.8	0.5	2	2	0.032	0.85	1.83
C7.	171	0.035	Trapezoidal	1	1	2	2	0.033	0.30	1.32
C8.	378	0.035	Trapezoidal	0.8	0.5	2	2	0.033	1.51	2.14
C9.	318	0.035	Trapezoidal	0.5	0.5	2	2	0.018	1.12	1.62
C10.	383	0.035	Trapezoidal	1	1	2	2	0.024	0.64	1.48
C11.	225	0.035	Trapezoidal	0.5	0.5	2	2	0.020	0.39	1.28
C12.	182	0.035	Trapezoidal	1	1	2	2	0.020	0.12	0.86
C13.	253	0.035	Trapezoidal	0.5	0.5	2	2	0.018	0.66	1.43
C14.	200	0.035	Trapezoidal	1	1	2	2	0.022	1.64	1.85
C15.	348	0.035	Trapezoidal	1	0.5	2	2	0.028	1.49	2.01
C16.	209	0.035	Trapezoidal	1	1	2	2	0.015	0.12	0.81
C17.	199	0.035	Trapezoidal	1	1	2	2	0.039	0.13	1.09
C18.	283	0.035	Trapezoidal	0.5	0.5	2	2	0.015	0.92	1.47
C19.	201	0.035	Trapezoidal	1	1	2	2	0.020	0.26	1.09
C20.	103	0.035	Trapezoidal	1	1	2	2	0.020	0.12	0.87
C21.	220	0.035	Trapezoidal	0.5	0.5	2	2	0.014	0.53	1.26
C22.	273	0.035	Trapezoidal	0.5	0.5	2	2	0.025	0.78	1.63
C23.	291	0.035	Trapezoidal	0.5	0.5	2	2	0.025	0.68	1.58
C24.	293	0.035	Trapezoidal	0.5	0.5	2	2	0.025	0.86	1.68
C25.	649	0.035	Trapezoidal	1	1	2	2	0.028	2.32	2.22

C26.	834	0.035	Trapezoidal	1	1	2	2	0.028	2.39	2.24
C27.	381	0.035	Trapezoidal	0.5	0.5	2	2	0.022	1.05	1.68
C28.	374	0.035	Trapezoidal	0.5	0.5	2	2	0.015	1.02	1.51
C29.	343	0.035	Trapezoidal	1	1	2	2	0.036	1.07	1.97
C30.	389	0.035	Trapezoidal	0.5	0.5	2	2	0.015	0.76	1.40
C31.	659	0.035	Trapezoidal	1	1	2	2	0.031	1.69	2.12
C32.	417	0.035	Trapezoidal	0.5	0.5	2	2	0.038	1.07	2.07
C33.	552	0.035	Trapezoidal	1	1	2	2	0.048	3.14	2.93
C34.	230	0.035	Trapezoidal	0.5	0.5	2	2	0.051	0.69	2.06
C35.	285	0.035	Trapezoidal	1	1	2	2	0.041	0.50	1.67
C36.	214	0.035	Trapezoidal	1	1	2	2	0.018	0.38	1.19
C37.	328	0.035	Trapezoidal	1	1	2	2	0.019	0.69	1.41
C38.	205	0.035	Trapezoidal	0.5	0.5	2	2	0.067	1.03	2.53
C39.	340	0.035	Trapezoidal	0.5	0.5	2	2	0.029	1.13	1.90
C40.	363	0.035	Trapezoidal	0.5	0.5	2	2	0.026	1.01	1.77
C41.	261	0.035	Trapezoidal	0.5	0.5	2	2	0.039	0.79	1.93
C42.	803	0.035	Trapezoidal	1	1	2	2	0.051	3.37	3.05
C43.	158	0.035	Trapezoidal	1	1	2	2	0.012	0.21	0.89
C44.	213	0.035	Trapezoidal	1	1	2	2	0.013	0.48	1.16
C45.	492	0.035	Trapezoidal	1	1	2	2	0.018	1.69	1.75
C46.	343	0.035	Trapezoidal	0.5	0.5	2	2	0.025	1.14	1.80
C47.	271	0.035	Trapezoidal	0.5	0.5	2	2	0.020	0.59	1.42
C48.	323	0.035	Trapezoidal	1	1	2	2	0.036	1.16	2.02
C49.	407	0.035	Trapezoidal	1	1	2	2	0.033	1.66	2.16
C50.	260	0.035	Trapezoidal	0.5	0.5	2	2	0.029	0.65	1.65
C51.	201	0.035	Trapezoidal	1	1	2	2	0.020	0.25	1.09
C52.	1104	0.035	Trapezoidal	1	1	2	2	0.016	2.38	1.86

C53.	365	0.035	Trapezoidal	1	1	2	2	0.047	3.83	3.06
C54.	286	0.035	Trapezoidal	1	1	2	2	0.052	0.84	2.11
C55.	361	0.035	Trapezoidal	0.5	0.5	2	2	0.016	1.03	1.54
C56.	697	0.035	Trapezoidal	1	1	2	2	0.022	1.80	1.90
C57.	865	0.035	Trapezoidal	1	1	2	2	0.022	2.07	1.97
C58.	673	0.035	Trapezoidal	1	1	2	2	0.022	1.84	1.91
C59.	1464	0.035	Trapezoidal	1	1	2	2	0.033	3.77	2.68
C60.	693	0.035	Trapezoidal	1	1	2	2	0.032	0.70	1.31
C61.	575	0.035	Trapezoidal	0.5	0.5	2	2	0.013	0.95	1.42
C62.	300	0.035	Trapezoidal	0.5	0.5	2	2	0.021	0.70	1.50
C63.	394	0.035	Trapezoidal	1	1	2	2	0.032	1.85	2.19
C64.	670	0.035	Trapezoidal	1	1	2	2	0.033	0.61	1.20
C65.	630	0.035	Trapezoidal	1	1	2	2	0.012	1.64	1.40
C66.	622	0.035	Trapezoidal	1	1	2	2	0.019	2.41	2.01
C67.	387	0.035	Trapezoidal	1	1	2	2	0.016	1.25	1.54
C68.	170	0.035	Trapezoidal	1	1	2	2	0.012	4.48	2.02

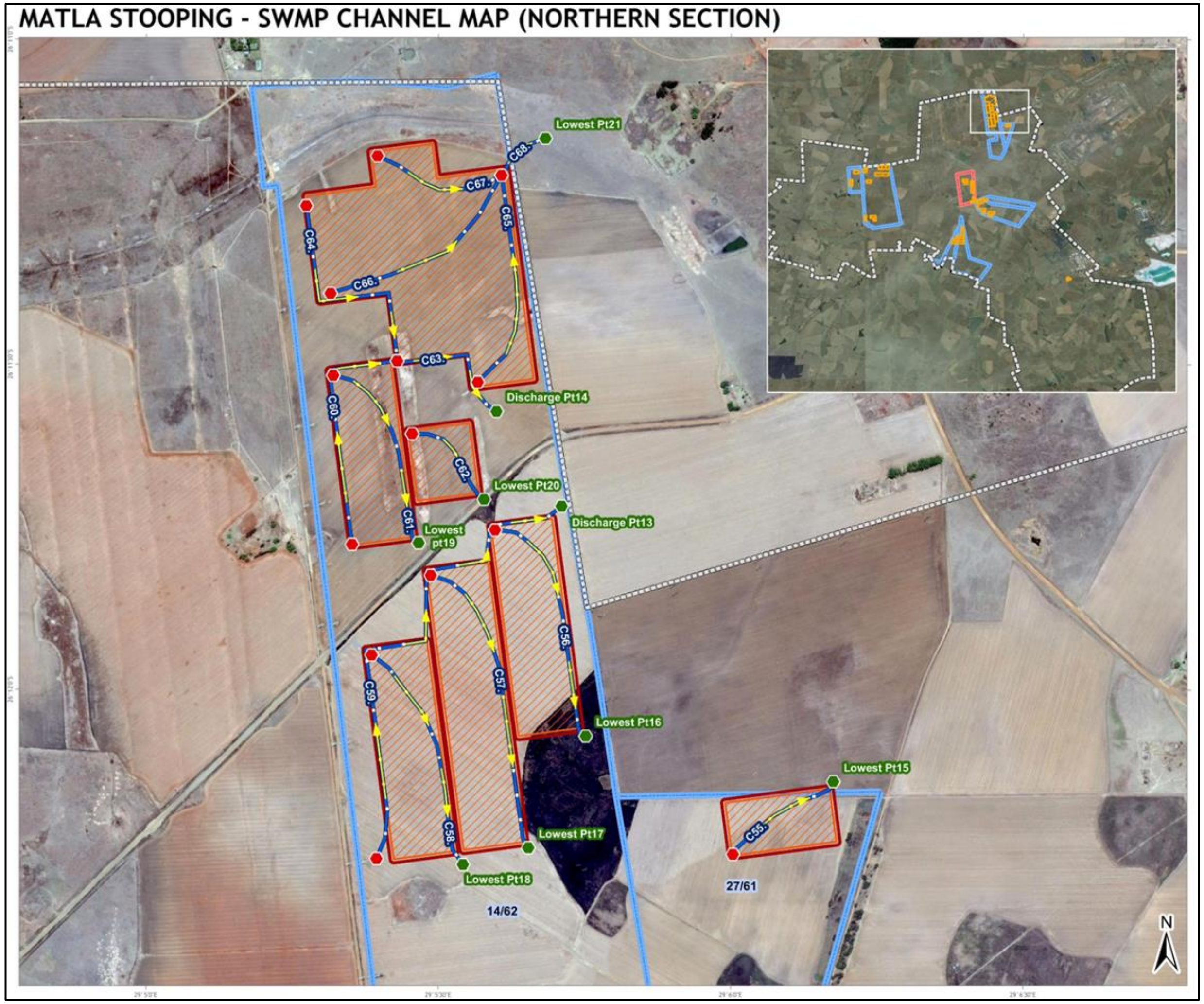


Figure 5.15: The proposed channel layout – Northern Section (GCS, 2015)

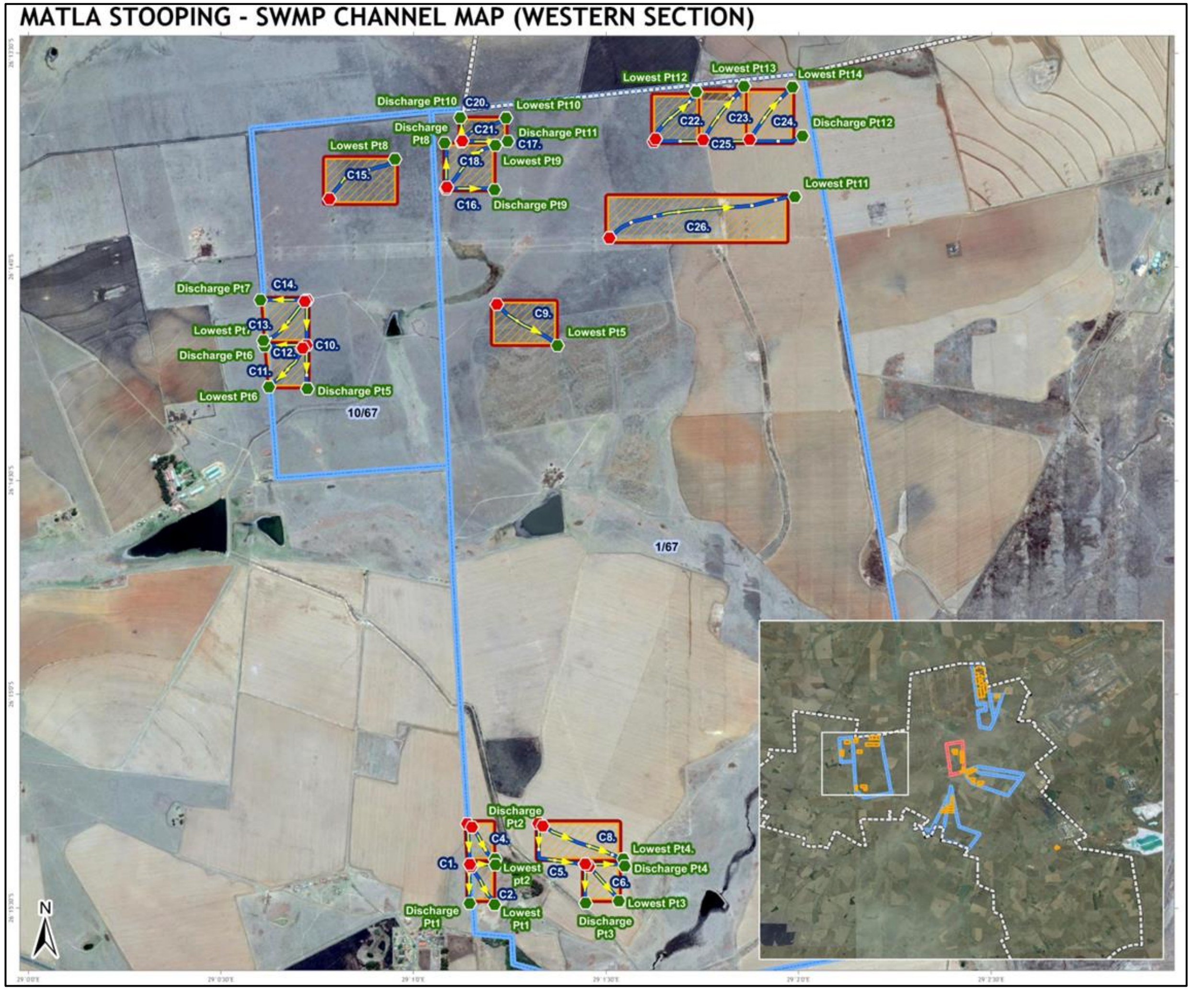


Figure 5.16: The proposed channel layout – Western Section (GCS, 2015)

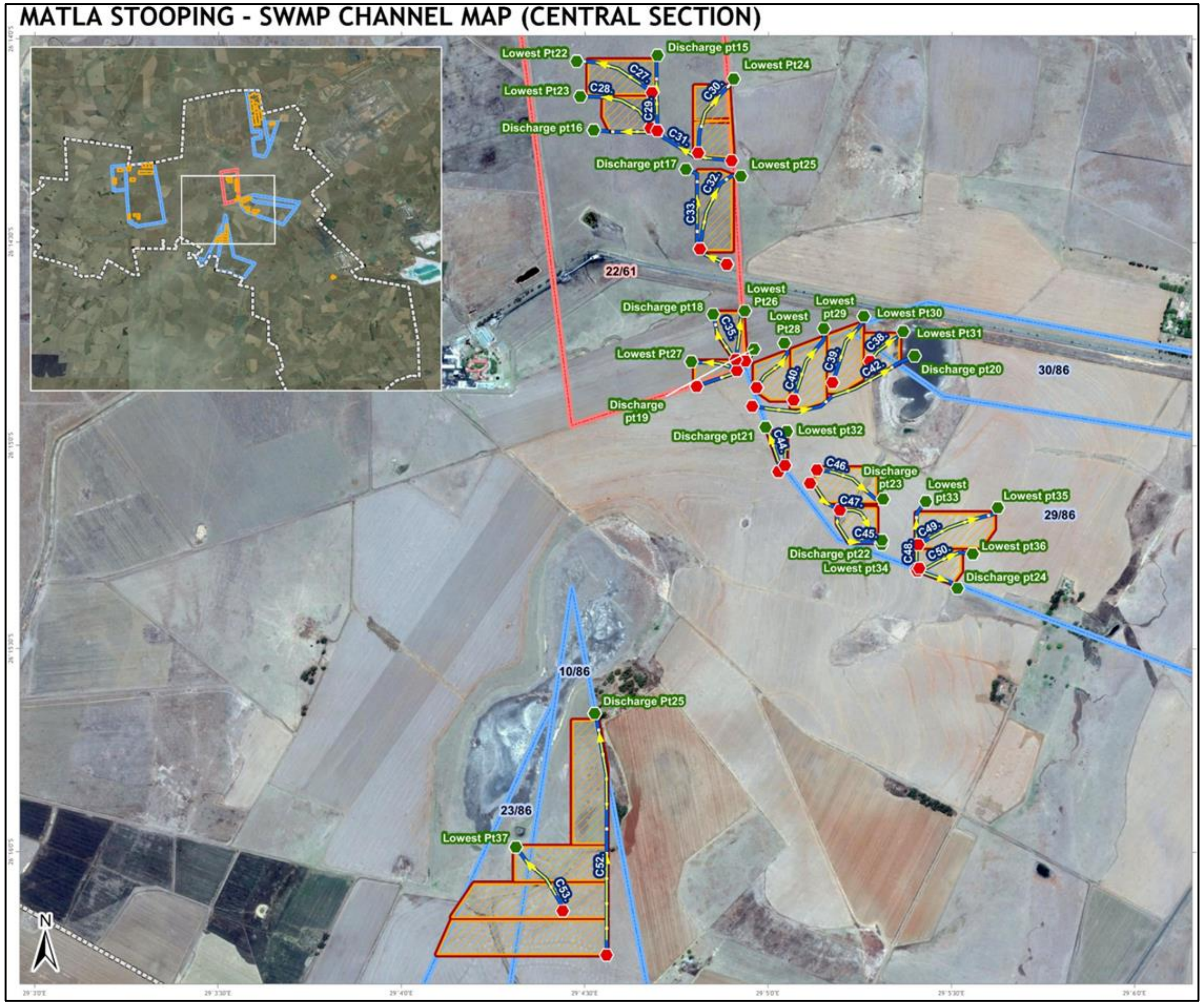


Figure 5.17: The proposed channel layout – Central Section (GCS, 2015)

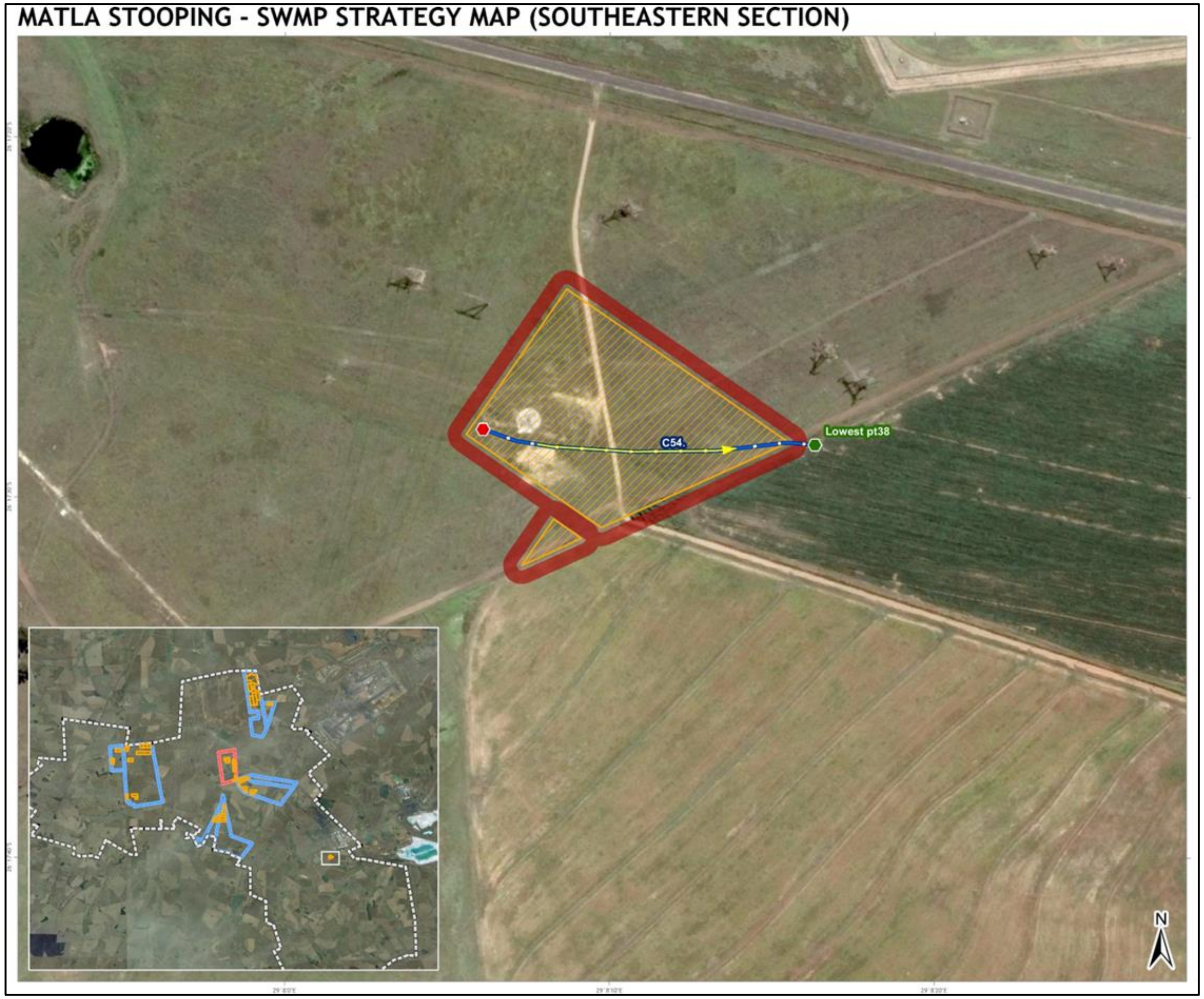


Figure 5.18: The proposed channel layout - South Eastern Section (GCS, 2015)

5.2.3.3 Stormwater Management for the New Mine 1 Area

The section below details the proposed stormwater management for the New Mine 1 Shaft Area.

Conceptual sizing of clean and dirty water channels

Based on the project layout placement, the drainage direction within close proximity the New Mine 1 infrastructure areas occurs in a north west to south east direction. Therefore, all clean water runoff emanating from the upstream catchment boundary is to be diverted around the proposed infrastructure area to the nearest watercourse or clean water environment.

It is proposed that all clean water channels be unlined vegetated trapezoidal channels of which an example is shown below in Figure 5.19.

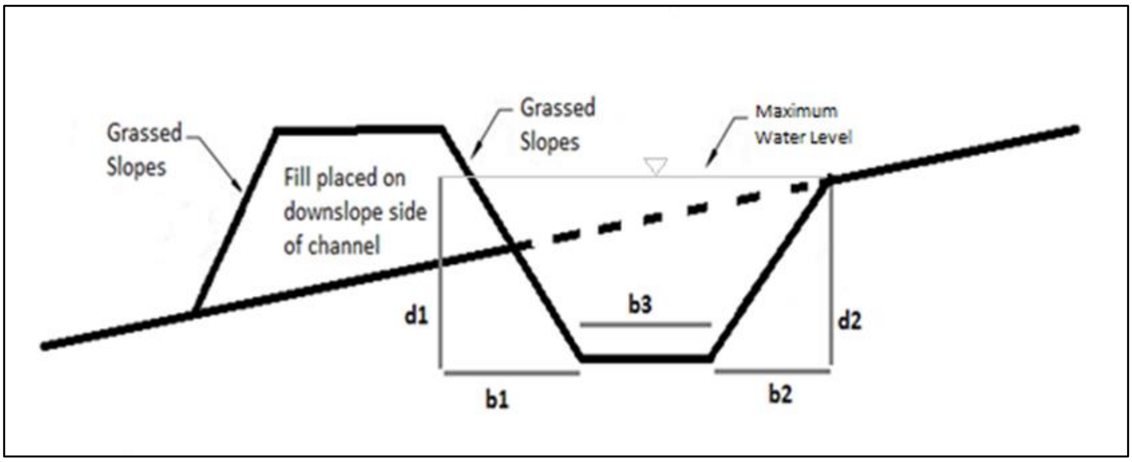


Figure 5.19: Clean water diversion channel conceptual design

All dirty water channels are based on a concrete lined trapezoidal channel, and will serve to capture all runoff from within the New Mine 1 area.

Summary of the catchment hydrology, peak flow estimations and conceptual sizing of the proposed channels are shown below in Table 5.13, Table 5.14, and Table 5.15 respectively.

Table 5.13: Summary of catchment hydrology

Name	Area (km^2)	Length of longest watercourse (m)	Height Difference (m)	Rainfall Intensity (Q_{50})	Tc (hours)	C-Factor
Catch A-B	0.0293	432	9.8	137	0.25	0.24
Catch C-D, E-F, F-D	0.0424	383	12.4	137	0.25	0.51
Catch G-H, I-H, I-J	0.0245	378	11.48	137	0.25	0.51

Catch K-L	0.0305	445	15.01	137	0.25	0.51
Catch M-L	0.0557	438	7.89	137	0.25	0.51

Table 5.14: Summary of peak flows for various recurrence intervals

Name	Summary of peak flows (m^3/s) for various recurrence intervals (years)					
	2 year	5 year	10 year	20 year	50 year	100 year
Catch A-B	0.06	0.09	0.12	0.15	0.22	0.30
Catch C-D, E-F, F-D	0.35	0.49	0.59	0.71	0.91	1.10
Catch G-H, I-H, I-J	0.20	0.28	0.34	0.41	0.53	0.64
Catch K-L	0.25	0.35	0.43	0.51	0.65	0.79
Catch M-L	0.46	0.64	0.78	0.93	1.19	1.45

Table 5.15: Summary of conceptual sizing of proposed channels

Channel Section	Length (m)	Q (m3/s)	left and right slope (m/m)	Bottom width (m)	Calculated Top width (m)	Calculated depth (m)	Velocity (m/s)	Design depth (m)	Type
A-B	351	0.22	0.3	1.0	1.14	0.24	0.85	1.0	Grassed Trapezoidal
C-D	413	0.91	N/A	1.0	1.00	0.40	2.26	1.0	Lined Rectangular
E-F	72	0.91	N/A	1.0	1.00	0.40	2.26	1.0	Lined Rectangular
G-H	105	0.53	N/A	1.0	1.00	0.27	1.93	1.0	Lined Rectangular
I-J	122	0.53	N/A	1.0	1.00	0.27	1.93	1.0	Lined Rectangular
K-L	379	0.65	N/A	1.0	1.00	0.31	2.07	1.0	Lined Rectangular
M-L	548	1.19	N/A	1.0	1.00	0.49	2.45	1.0	Lined Rectangular

5.2.3.4 Conceptual sizing of New Mine 1 PCD

To calculate the amount of dirty water runoff captured via the infrastructure areas of New Mine 1, the Soil Conversation Services (SCS) method, described fully in Schmidt and Schulze (1987) is used. The SCS method is particularly suited to small catchments (less than $30km^2$) and takes into account most of the factors that affect runoff, such as quantity, time distribution and duration of rainfall, land use, soil type and size and characteristics of the generating catchment. It is based on the principle that runoff is caused by the rainfall that exceeds the cumulative infiltration of the soil. Soil types are divided into four hydrological groups, ranging from soils with low runoff potential (well-drained with high infiltration ability and permeability such as sand and gravel) to soils with high runoff potential (very low infiltration rates and permeability such as shallow soils with clay, peat or rock).

The method used a curve number (CN) which can be determined from observation of the characteristics of the catchment. The curve number expresses a catchments stormflow response to a rainfall event (Schulze et al. 1992). This response is dependent on the catchment characteristics such as hydrological soil properties, catchment slope and land use.

For the project area, the adopted CN for all surface areas is estimated to be 70. The SCS storm flow depth equation is given below:

$$Q = \frac{(P - I_a)^2}{P - I_a + S} \quad \text{for } \boldsymbol{P > I_a}$$

where

Q = stormflow depth (mm),
P = daily rainfall depth (mm), usually input as a one-day design rainfall for a given return period,
S = potential maximum soil water retention (mm),
= index of the wetness of the catchment's soil prior to a rainfall event,
I_a = initial losses (abstractions) prior to the commencement of stormflow, comprising of depression storage, interception and initial infiltration (mm)
= 0.1 S

Table 5.16 provides the sizing of the New Mine 1 PCD.

Table 5.16: Summary of PCD sizing (m3) for New Mine 1

Name	Summary of PCD volume (m^3) for various recurrence intervals (years)					
	2 year	5 year	10 year	20 year	50 year	100 year
New Mine 1 PCD	2411	4284	5783	7435	**9876**	11928

All runoff collected at the mid to lower catchment will be collected in a sump and pumped to the New Mine 1 PCD.

As indicated above the proposed PCD required to contain all the dirty water emanating from the New Mine 1 infrastructure area, should be sized so as to contain the 24 hour 1:50 year storm event. Based on the calculations, the total volume of the PCD is estimated at 9876 m^3.

The overall infrastructure and summary of the stormwater management plan for the New Mine 1 area is shown in Figure 2.7 and Figure 5.20 respectively.

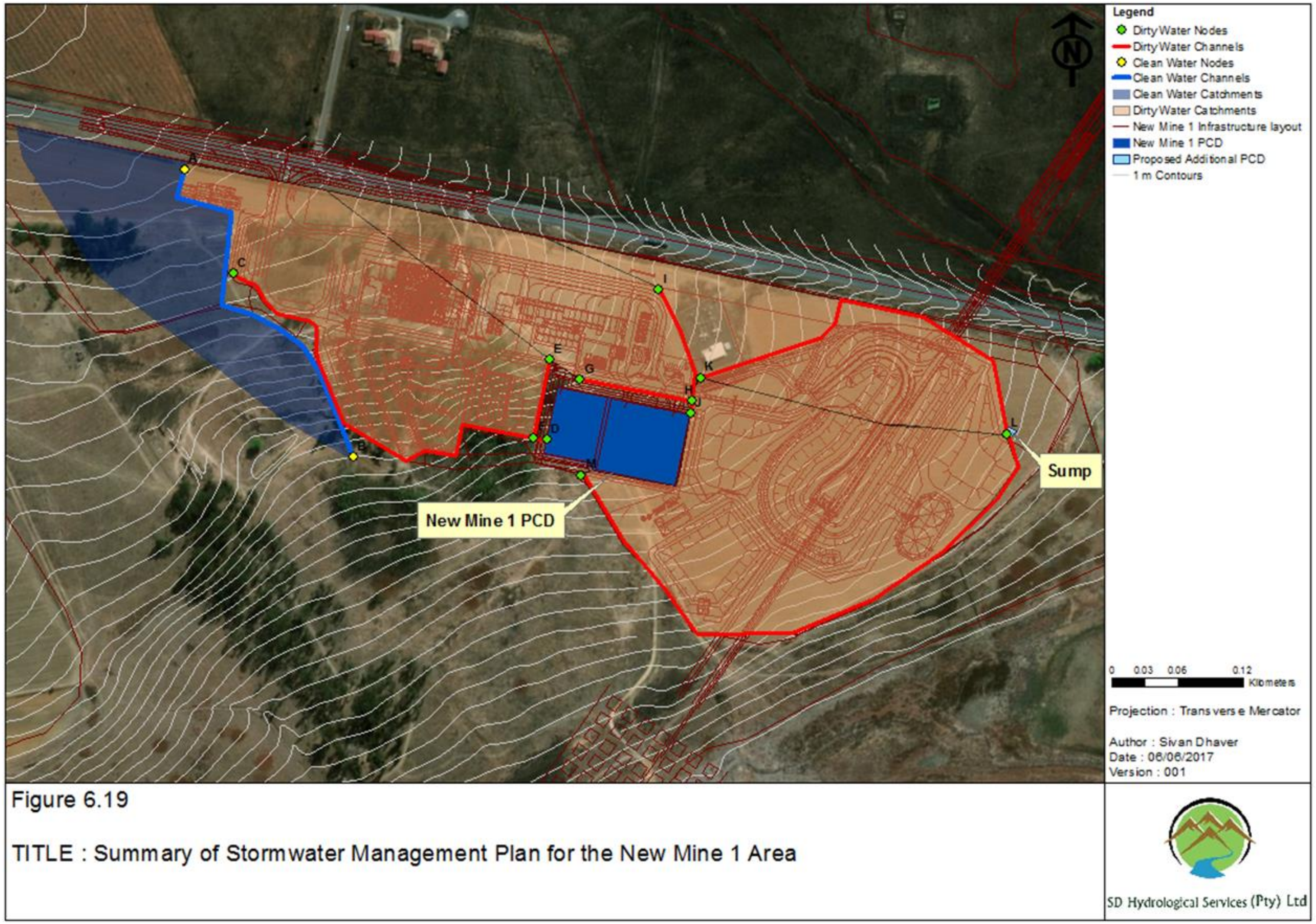


Figure 5.20: Summary of SWMP for New Mine 1 Area

5.2.4 Groundwater

Groundwater is abstracted from the existing underground workings at Mine 2 and 3 only. Abstraction is authorised from the existing Mine 1 underground workings, however Mine 1 is currently on stop due to an unsafe primary development nearby the shaft and is awaiting the New Mine 1 box cut to be completed. Groundwater will be abstracted from the underground workings of the New Mine 1 Shaft once operational. All abstraction from the underground workings is authorised in terms of the issued IWULs however, amendments to the abstraction volumes have been applied for in this application (refer to Section 3.5 for further details).

5.2.5 Waste

Waste management on the Matla Coal subscribes to the principles of sustainable waste management including:

- Waste prevention - the prevention and avoidance of the production of waste at source;
- Waste reduction - the reduction of the volume or hazardous nature of the waste during production;
- Resource recovery - recycling or re-use of the waste;
- Waste treatment - the treatment of waste to reduce volume or risk to human and environmental safety and health to reduce the degree of hazard when waste is disposed of in a landfill or discharged into a water source; and
- Waste disposal/ discharge/ emission - the environmentally acceptable and safe disposal or discharge of waste, (e.g. encapsulation, incineration, landfill or discharge to a water source).

The mine's Waste Management Procedure (ENVP16) is applicable at all Matla shafts, complexes and associated areas and is attached as Annexure N to this report. The scope of the document is to provide a procedure that specifies a waste management program to handle, contain, control and dispose of waste generated from activities, products, services and facilities at Matla Mine to prevent pollution of the workplace and the environment.

To ensure the effectiveness of waste management, it is essential that waste is separated at source according to Matla coal waste stream classification (Annexure N):

- Hazardous waste – BLACK;
- General waste – GREEN/WHITE;
- General Waste – BLUE;
- Medical – RED;
- Expired Medical Waste – Green; and

- Used Needles – Yellow.

After separation, waste is stored in designated areas where pollution from waste is minimised. Where possible, waste products are re-used or recycled. A contractor removes all waste from site for safe disposal.

5.2.5.1 Domestic waste

Solid waste will be removed by a contractor and will be disposed of at off-site waste management facilities as is currently done by the 3 other shafts.

Whale Rock Industries collects domestic waste for disposal at the Witbank Domestic Waste Disposal Site.

5.2.5.2 Industrial waste

Whale Rock Industries is the contracted company that Matla Coal utilises to remove and dispose of industrial waste to the Rietfontein disposal site.

5.2.5.3 Hazardous waste

Hazardous/toxic waste will be disposed of to the Holfontein Disposal Site and hazardous non-toxic waste will be disposed of to the Rietfontein Disposal Site.

5.3 Operational Management

5.3.1 Organisational Structure

Refer to Figure 2.8 for the diagrams illustrating the organisational structure of the Matla Mining operation.

5.3.2 Resources and Competence

The SHE Manager oversees all of the environmental related aspects regarding the Matla mining operation

All employees and managers are expected to have a detailed understanding of Company policies and standards that directly relate to their job. It is every employee's responsibility to comply with the policies and standards relating to their work and to seek assistance from a manager or supervisor.

5.3.3 Education and Training

The Exxaro board has overall responsibility for Safety Health and Environmental (SHE) monitoring and performance, exercised through the SHE committee and consulting forums at corporate level and each commodity business. Policies and standards cover all operational aspects and activities that could affect the safety and health of people and the environment: a duty of care that covers the life cycle of each commodity business, from exploration and planning to operation, closure, decommissioning, remediation and rehabilitation and post-closure care that focuses mainly on ensuring that environmental sustainability is achieved.

Developed in consultation with relevant stakeholders and mandatory for all Exxaro operations, SHE policy and management standards aim to:

- Provide a risk-based SHE management system, consistent with national legislation, group SHE policy, ISO 14001, OHSAS 18001 and other internationally recognised standards that support the implementation of SHE best practice across all Exxaro operations;
- Provide a group-wide framework to effect SHE legal compliance;
- Ensure the progressive development and implementation of more specific and detailed SHE management systems at all levels of Exxaro operations;
- Provide performance criteria against which SHE management systems across Exxaro can be measured;
- Provide a basis from which to drive SHE continuous improvement; and
- Integrate SHE elements into all relevant existing and new policies and practices.

All employees of Matla Coal have to undergo environmental awareness and training on the aspects set above and in terms of the Safety, Health, Environment and quality Policy and the Emergency Preparedness Response protocol attached as Annexure N.

5.3.4 Internal and External Communication

Exxaro initiates numerous activities to engage stakeholders at a local and national level, including the following:

- Quarterly National Exxaro stakeholder engagement forum chaired by senior manager, covering sustainability focus areas;
- Quarterly Stakeholder forum reports which are summarised reports of topics and discussions from stakeholder engagement forum;
- Web-site (www.Exxaro.com);
- One-on-one meetings with specific stakeholders on pertinent issues; and

- Annual report that covers progress in all areas of sustainability for the preceding year.

5.3.5 Awareness Raising

Matla Coal holds key stakeholder workshops to raise awareness as necessary as has been undertaken for the previous authorisations as well as the consolidation project. A copy of the Issues and Response Register for the stakeholder engagement undertaken during this environmental authorisation process is attached in Annexure N as part of the Public Participation Reporting. Further public consultation is underway and will be finalised in during 2018.

On-site, ongoing health, safety, and environmental awareness campaigns occur in line with the mines strategic focus areas:

- Ensure Exxaro's sustainability;
- Protect and build Exxaro's reputation;
- Develop Exxaro's leadership and people;
- Improve Exxaro's portfolio; and
- Achieve operational excellence.

While management will ultimately be responsible and accountable, personnel should also be given responsibility and accountability to report to management on certain aspects. Basic water knowledge and water conservation training during induction is implemented. A water awareness campaign to educate employees on the importance of water conservation should also be initiated via monthly discussion topics (toolbox talks).

A policy has been compiled for the waste management on site. Safe operating procedures for surface and underground waste handling and removal have been compiled and are in effect. An integrated Water Management Plan has also been compiled for the mine.

5.4 Monitoring and Control

The key to the success of environmental management lies in the effective implementation of the proposed mitigation and management measures. Monitoring provides qualitative and quantitative information pertaining to the possible impacts of the development on the environment, and enables the measurement of the effectiveness of environmental management measures.

This monitoring programme will allow Matla to monitor its compliance in terms of the NWA for its entire operations. The monitoring programme will incorporate monitoring of the following components:

- Hydrological (Surface water);
- Hydrogeological (Groundwater); and
- Biomonitoring and wetland surveys.

Record keeping and the disclosure of information to the relevant personnel is key to the success of the monitoring programme. The following are key to the successful implementation of monitoring for Matla:

- The water user must ensure that the establishment of monitoring programmes to monitor the quantity and quality of the wastewater prior to storage or disposal, as follows:
  - For the storage of wastewater, the quantity must be recorded monthly; or
  - For the disposal of wastewater, the quantity must be gauged or metered and recorded monthly.
- Upon the written request of the responsible authority, the water user must:
  - Ensure the establishment of any additional monitoring programmes; and
  - Appoint a competent person to assess the water use measurements made in terms of this authorisation, and to submit the findings to the responsible authority for evaluation.
- The water user must keep a written record of the following wastewater storage or wastewater disposal and related activities:
  - The quantity of wastewater stored or disposed of or re-used;
  - The quality of wastewater stored or disposed of;
  - Details of the monitoring programme; and
  - Details of failures and malfunctions of any wastewater disposal system or wastewater storage dam that the registered user is responsible for, and such information must be made available upon written request to the responsible authority.
- Any information on the occurrence of any incident that has or is likely to have a detrimental impact on the water resource quality must be reported to the responsible authority.

The water monitoring that is conducted on site undergoes analysis at a SANAS accredited laboratory. The laboratory analysis results are compared to the following guidelines:

- SANS 241:2011 Standard limit (operational);
- Class II (Max Allowance for Limited Duration) *2006;

- Class II: Water Consumption Period, a max *2006;
- Sewage Limit General Limit;
- Sewage Limit Special Limit; and
- Target Water Quality Guidelines.

It is recommended, that the Licensee make reference to the consolidated IWUL, provided the IWUL is authorised; and the limits that will be provided therein. Currently limits have been specified in the IWULs issued to Matla, however these have not been made reference to in the various reports for the water monitoring.

The issuing of a consolidated IWUL, will aid in the prevention of duplicating limit requirements and also streamline these requirements to provide for a more precise and easily understandable assessment process going forward.

According to the Wetland Monitoring and Management Plan compile by Golder in 2010, the monitoring in Table 5.17 is recommended to be undertaken for Matla.

Table 5.17: Monitoring frequencies for the Matla Mine

Monitoring Type	Monitoring Activity	Monitoring Frequency	Report to be submitted to	Submission frequency
In-stream monitoring	Aquatic biomonitoring (includes *in situ* water quality, WET-Testing); SASS5; FRAI and Diatoms	Bi-annually	Matla & Exxaro	Bi-annually
			Eskom	
			DWS – Regional Director (Wetland forum)	Annually
Out of stream monitoring	Remote sensing, Ground trothing surveys for vegetation, birds, mammals. Arthropods, amphibians and reptiles	Annually	Matla & Exxaro	Annually
	Monitoring of subsistence due to mining activities.		DWS – Regional Director (Wetland forum)	
Surface Water Monitoring	Surface water quality analysis	Monthly	Matla & Exxaro	Quarterly
			DWS	
			DMR	
	Surface water flow analysis	Monthly	Matla & Exxaro	Quarterly
			DWS	
	Monitoring of water release through the controlled inlet structures	Monthly	Matla & Exxaro	Quarterly
			DWS	
Groundwater Monitoring	Groundwater quality analysis	Monthly	Matla & Exxaro	Quarterly
			DWS	
			DMR	
Ground and surface water	Ground and surface water quality monitoring audit report.	Annually	Matla & Exxaro	Annually
			DWS	
			DMR	

*DME = Department of Minerals and Energy

5.4.1 Surface Water Monitoring

Monitoring of surface water quality should be done in accordance with the commitments and guidelines as stated in the EMP and the relevant IWULs issued to Matla. A surface water monitoring programme is currently being implemented by the mine. This programme provides for the required monitoring points as directed by each IWUL previously issued to the Mine. Further to this, the monitoring programme has additional points that are sampled for various parameters. The parameters which should be analysed on a monthly basis, for the surface water monitoring points are indicated in Table 5.18.

Table 5.18: Surface Water Monitoring Parameters

Parameters to be Analysed	
Acidity (mg $CaCO_3$/L)	Magnesium (mg Mg/L)
Total Alkalinity (mg $CaCO_3$/L)	Nitrate and Nitrite (TON) (mg N/L)
Bicarbonate Alkalinity (mg $CaCO_3$/L)	Ortho Phosphate (mg P/L)
Carbonate Alkalinity (mg $CaCO_3$/L)	Potassium (mg K/L)
M Alkalinity (mg $CaCO_3$/L)	Sodium (mg Na/L)
P Alkalinity (mg $CaCO_3$/L)	Silicon (mg Si/L)
Colour (mg/l as Pt)	Sulphate (mg SO_4/L)
Conductivity (Laboratory) (mS/m)	Aluminium (mg Al/L)
pH (Laboratory) (pH Units)	Boron (mg B/L)
Total Hardness (mg $CaCO_3$/L)	Fluoride (mg F/L)
Calcium Hardness (mg $CaCO_3$/L)	Iron (mg Fe/L)
Magnesium Hardness (mg $CaCO_3$/L)	Manganese (mg Mn/L)
Total Dissolved Solids (TDS) (mg/L)	Langelier Index (indicative, not SANS) (Calculation)
Suspended Solids (TSS) (mg/L)	pHs (indicative, not SANS) (Calculation)
Temperature (°C)	Sodium Absorption Ratio (indicative) (Calculation)
Turbidity (NTU)	TDS to EC Ratio (indicative, not SANS) (Calculation)
Ammonia (mg N/L)	Corrosion Ratio (indicative, not SANS) (Calculation)
Calcium mg (Ca/L)	Ryznar Index indicative, not SANS) (Calculation)
Total Chlorine (Laboratory) (mg Cl_2/L)	Standard Plate Count (count/mL) – certain sample points only;
Soluble Chlorine (Laboratory) (mg Cl_2/L)	Total coliforms (CFU/100mL) – certain sample points only;
Chloride (mg Cl/L)	Faecal Coliforms (CFU/100mL) – certain sample points only

The surface water monitoring points that are monitored at Matla, are provided in Table 5.19. As previously discussed in Section 3.5, the limits for the discharge of the treated effluent from the sewage works at Mine 2 and Mine 3 have been requested to be amended. The localities of the monitoring points are presented in Figure 4.5. The localities presented in the table are a combination of the various monitoring points as provided in the four IWULs issued to Matla. These monitoring points already form part of the monitoring programme for Matla.

Table 5.19: Surface Water Monitoring Points of Matla

SITE ID	SAMPLE DESCRIPTION	SITE TYPE	Location_type_code	CO-ORDINATES
MSW01	1 Mine settling pond 1	PCD	PCD	S26°15.838' E029°07.254'
MSW02	1 Mine settling pond 2	PCD	PCD	S26°15.616' E029°06.948'
MSW03	Rietspruit dam	Dam	RIVER	S26°10.168' E029°13.726'

MSW04	2 Mine dam	PCD	PCD	S26°13.141' E029°06.171'
MSW05	2 Mine U/S	Stream	RIVER	S26°13.354' E029°06.181'
MSW06	2 Mine effl. into river	Effluent	STP	S26°13.315' E029°06.272'
MSW07	2 Mine D/S	Stream	RIVER	S26°13.409' E029°07.221'
MSW08	Box cut dam	Mining pit	MINE	S26°13.117' E029°04.673'
MSW09	Kriel Ogies Road	Stream	RIVER	S26°11.514' E029°10.947'
MSW10	2 Mine pan	Pan	WETLAND	S26°12.480' E029°06.990'
MSW11	3 Mine settling pond	PCD	PCD	S26°14.665' E029°04.039'
MSW12	3 Mine final dam @ shaft	PCD	PCD	S26°14.631' E029°04.059'
MSW13	3 Mine silo dam	PCD	PCD	S26°14.523' E029°04.589'
MSW14	3 Mine U/S	Stream	RIVER	S26°16.371' E029°02.408'
MSW15	1 Mine drinking water	Potable water	TAP	S26°15.500' E029°07.025'
MSW16	2 Mine drinking water	Potable water	TAP	S26°12.804' E029°06.322'
MSW17	3 Mine drinking water	Potable water	TAP	S26°14.816' E029°04.212'
MSW18	Pan 1	Pan	WETLAND	S26°15.113' E029°07.846'
MSW19	Pan 2	Pan	WETLAND	S26°14.913' E029°07.632'
MSW20	Rietspruit 6	Stream	RIVER	S26°13.326' E029°05.738'
MSW21	Discharge 8 - RO release	Stream	RO	S26°13.345' E029°06.181'
MSW22	Pan 3	Pan	WETLAND	S26°15.814' E029°08.107'
MSW23	Rietspruit 7	Stream	RIVER	S26°13.378' E029°06.785'
MSW24	Tributary 4 Up Stream	Stream	RIVER	S26°14.582' E029°06.532'
MSW25	Tributary 5 Down Stream	Stream	RIVER	S26°14.005' E029°06.903'
MSW26	Matla Product Water	Potable water	TAP	S26°15.366' E029°07.531'
MSW27	Matla Feed Sample	RO feed water	MINE	S26°15.366' E029°07.531'
MSW28	Brine pond 1	PCD	PCD	S26°15.231' E029°07.667'
MSW29	Brine pond 2	PCD	PCD	S26°15.303' E029°07.740'
MSW30	OS1 - tributary	Stream	RIVER	S26°18'2,92" E029°08'57,25"
MSW31	OS2 - farm dam	Dam	RIVER	S26°17'45,97" E029°09'36,66"
MSW32	OS3 - tributary	Stream	RIVER	S26°17'38,46" E029°09'53,12"
MSW33	OS4 - tributary	Stream	RIVER	S26°17'35,19" E029°09'35,84"
MSW34	Mine 1 new shaft PCD	PCD	PCD	TBC

MSW35	Mine 1 new shaft Effluent release	Effluent	STP	TBC
MSW36	Mine 3 Effluent release	Effluent	STP	S26° 13.444' E029° 3.660'
MSW37	WTP PCD	PCD	PCD	S 26°15'16.56" E 29° 7'31.66"
MSW38	Central Mine Potable	Potable water	TAP	S26°15.500' E029°07.025'
Code	2010 Licence	Main		
	2015 Licence	New Mine 1 shaft		
	2014 Licence	RO Plant		

Water samples taken should continue to be tested by an accredited laboratory and results compared with water quality standards promulgated by the DWS and the DEA.

An annual report on water quality monitoring activities and the results of water quality tests shall be submitted to the Olifants River Catchment Management Agency (once operational) or the DWS, as outlined by the IWUL once authorised.

According to condition 3.3.1 of the River Diversion IWUL (issued 2017), water quality parameters at upstream and downstream monitoring points should be monitored as presented in Table 5.20. It is recommended that all upstream and downstream monitoring locations of the monitoring programme be assessed according to the criteria set out in Table 5.20.

Table 5.20: River Diversion Instream Water Quality Parameters and Limits (River Diversion IWUL, 2017)

Variable	Limit
Temperature (°C)	<10% variation
pH	6.0-8.5
Electrical Conductivity (mS/m)	<50
Suspended Solids (mg/l)	<25
Dissolved Oxygen (mg/l)	≥6
Turbidity (NTU)	<50

The requested parameter limits for the discharge of the treated effluent from the WWTWs at Mine 2 and Mine 3 are provided in Table 3.17. It is important to note that the limits provided refer to sewage (i.e. domestic wastewater) only and it must therefore be remembered that the limits are not referring to the mine process wastewater, instream water quality or discharge from the WTP.

5.4.2 Groundwater Monitoring

Monitoring of groundwater quality should be done in accordance with the commitments and guidelines as stated in the EMP and the relevant IWULs issued to Matla. The main purpose of a monitoring system concerned with the control of pollution and the groundwater resource, are to:

- Provide reliable and irrefutable data on the quality and chemical composition of the groundwater;
- Detect and quantify the presence and seriousness of any polluting substances in the groundwater at the very earliest stage possible; and
- Detect any severe decrease in water levels in aquifers being exploited.

As with the surface water monitoring, a groundwater monitoring programme is currently being implemented by the mine. This programme provides for the required monitoring points as directed by each IWUL previously issued to the Mine. Further to this, the monitoring programme provides for additional points that are sampled for various parameters. The parameters which should be analysed on a quarterly basis, for the groundwater monitoring points are indicated in Table 5.21.

Table 5.21: Groundwater Monitoring Parameters

Parameters to be Analysed	
Acidity (mg $CaCO_3$/L)	Magnesium (mg Mg/L)
Total Alkalinity (mg $CaCO_3$/L)	Nitrate and Nitrite (TON) (mg N/L)
Bicarbonate Alkalinity (mg $CaCO_3$/L)	Ortho Phosphate (mg P/L)
Carbonate Alkalinity (mg $CaCO_3$/L)	Potassium (mg K/L)
M Alkalinity (mg $CaCO_3$/L)	Sodium (mg Na/L)
P Alkalinity (mg $CaCO_3$/L)	Silicon (mg Si/L)
Colour (mg/l as Pt)	Sulphate (mg SO_4/L)
Conductivity (Laboratory) (mS/m)	Total Aluminium (mg Al/L)
Conductivity (Field) (mS/m)	Aluminium (mg Al/L)
pH (Laboratory) (pH Units)	Boron (mg B/L)
Total Hardness (mg $CaCO_3$/L)	Fluoride (mg F/L)
Calcium Hardness (mg $CaCO_3$/L)	Iron (mg Fe/L)
Magnesium Hardness (mg $CaCO_3$/L)	Manganese (mg Mn/L)
Total Dissolved Solids (TDS) (mg/L)	Langelier Index (indicative, not SANS) (Calculation)
Suspended Solids (TSS) (mg/L)	pHs (indicative, not SANS) (Calculation)
Temperature (°C)	Sodium Absorption Ratio (indicative) (Calculation)
Ammonia (mg N/L)	TDS to EC Ratio (indicative, not SANS) (Calculation)
Calcium (mg Ca/L)	Corrosion Ratio (indicative, not SANS) (Calculation)
Chloride (mg Cl/L)	Ryznar Index (indicative, not SANS) (Calculation)

Groundwater levels are monitored on a monthly basis. The monitoring points for the groundwater monitoring programme (as presented in Section 4) are provided in Table 5.22. The localities of the monitoring points are presented in Figure 4.5. The localities presented in the table are a combination of the various monitoring points as provided in the four IWULs issued to Matla. These monitoring points already form part of the monitoring programme for Matla.

Table 5.22: Matla Groundwater Monitoring Points

Monitoring Point	Coordinates	Frequency of Monitoring
MGW01 / OCM 1	S26°12.994' E29°05.383'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW02 / OCM 2	S26°13.194' E29°05.288	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW03 / OCM 2 (S)	S26°13.194' E29°05.288'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW04 / OCM 3	S26°13.240' E29°05.088'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW05 / OCM 3 (S)	S26°13.240' E29°05.088'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW06 / OCM 4	S26°13.314' E29°04.750.	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW07 / OCM 4 (S)	S26°13.314' E29°04.750'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW08 / OCM 5	S26°13.354' E29°04.541'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW09 / OCM 5 (S)	S26°13.354' E29°04.541'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW10 / OCM 6	S26°13.581' E29°03.419'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW11 / OCM 6 (S)	S26°13.581' E29°03.419'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW12 / OCM 7	S26°13.124' E29°03.239'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW13 / MGW 46	S26°20.887' E29°10.986'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW14 / MGW 5 (S)	S26°20.889' E29°10.987'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW15 / MGW 45	S26°17.653' E29°09.902'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW16 / MGW 4 (S)	S26°17.653' E29°09.903'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW17 / MGW 44	S26°16.259' E29°02.756'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW18 / MGW 3 (S)	S26°16.254' E29°02.756'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW19 / MGW 24	S26°16.099' E29°01.178'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW20 / MGW (S)	S26°12.758' E28°58.985'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW 55 / MGW 55	S26°12.759' E28°58.985'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW21 / MGW 54	S26°13.024' E29°00.672'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW 7(S)	S26°13.023' E29°00.673'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW22 / MGW 6 (S)	S26°11.903' E29°03.050'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW 53	S26°11.903' E29°03.050'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW 21(S) / MGW 21	S26°11.145' E29°04.504'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW GF	S26°11.417' E29°04.816'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW RHB	S26°11.416' E29°05.599'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW23 / MGW 43	S26°13.080' E29°07.085'	Chemical analysis: Quarterly Groundwater levels: Monthly

Monitoring Point	Coordinates	Frequency of Monitoring
MGW 22(S) / MGW 22	S26°13.080' E29°07.085	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW 23(S) / MGW 23	S26°14.254' E29°06.567'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW25 / SPGW 1	S26°16.036' E29°08.016'	Chemical analysis: Quarterly Groundwater levels: Monthly
MGW26 / MGW 9 (S)	S26°15.826' E29°07.329'	Chemical analysis: Quarterly Groundwater levels: Monthly
W.T.P 1	S26°15.520' E29°07.626'	Chemical analysis: Quarterly Groundwater levels: Monthly
W.T.P 2	S26°15.521' E29°07.631'	Chemical analysis: Quarterly Groundwater levels: Monthly
W.T.P 3	S26°15.450' E29°07.717'	Chemical analysis: Quarterly Groundwater levels: Monthly
W.T.P 4	S26°15.324' E29°07.805'	Chemical analysis: Quarterly Groundwater levels: Monthly
W.T.P 5	S26°15.182' E29°07.684'	Chemical analysis: Quarterly Groundwater levels: Monthly
W.T.P 6	S26°15.193' E29°07.687'	Chemical analysis: Quarterly Groundwater levels: Monthly
W.T.P 7	S26°15.223' E29°07.545'	Chemical analysis: Quarterly Groundwater levels: Monthly
W.T.P 8	S26°15.106' E29°07.677'	Chemical analysis: Quarterly Groundwater levels: Monthly
W.T.P 9	S26°15.200' E29°07.794'	Chemical analysis: Quarterly Groundwater levels: Monthly

5.4.3 Biomonitoring and Wetland Monitoring

The following factors should be assessed during biomonitoring and wetland monitoring surveys.

- Stressor indicators with the in-stream and permanent wetland areas:
  - *In situ* water quality;
  - Ex-situ water quality analysis; and
  - Sediment composition analysis
- Habitat indicators:
  - General habitat assessment (i.e. Integrated Habitat Assessment System, Version 2.2);
  - Integrated Habitat Assessment (i.e. Index for Habitat Integrity, Version 2); and
  - Wetland IHI/Wet-Health, as applicable.
- Response indicators:
  - Aquatic macroinvertebrate assessment, including the determination of ecological condition through Version 5 of the South African Scoring System (SASS5) and the Macro-Invertebrate Response Assessment Index (MIRAI);
  - Ichthyological assessment, including the evaluation of reference conditions and determination ecological condition through the Fish Response Assessment Index (FRAI);

- Diatom assessment, including the determination of ecological condition through the Specific Pollution-sensitivity Index (SPI);
- Screening-level ecotoxicological assessment (Water & Sediment), using three levels of biological hierarchy;
- Wetland flora; and
- Wetland fauna.

- Wetland Socio-economic assessment:
  - Wetland EcoServices; and
  - Wetland Ecological Importance and Sensitivity.

Biomonitoring is currently being undertaken on a quarterly basis for the Matla Mine. A full aquatic biomonitoring assessment was conducted by Digby in 2016/2017 for the Matla Operations (Annexure J). Two surveys were completed during the course of the aquatic assessment, these included surveys during the low flow period (October 2016), and the high flow period (March 2017).

The selection of sites was based on the approved IWUL conditions which stipulate the location of various sites. In addition, sites were selected based on the previous studies which have taken place in the project area (e.g. No 3 Mine River diversion sampling sites). It is further noted that sites were selected around certain infrastructures and activities such as discharge points and conveyor crossings. The site surveyed are presented in Figure 5.21. Based on the layout of the applicable IWULs the waterbodies were divided into relevant sections namely:

- The Conveyor Tributary;
- The New Shaft Tributary;
- The Rietspruit; and
- The Pans and Impoundments.

Standard River Health Programme (RHP) and ecotoxicological techniques were applied to determine the Present Ecological Status (PES) of the various waterbodies Based on the overall results of the 2016/2017 assessments the following conclusions can be drawn:

5.4.3.1 The Conveyor Tributary

Based on the results of the assessment, no water quality impacts could be associated with the licensed infrastructure. With regards to habitat quality, limited impacts can be attributed to the infrastructure as no erosion or physical alterations can be observed in the downstream areas. The modified status recorded for the habitat can mainly be attributed to farming activities along the tributary as well as poor rainfall.

5.4.3.2 The New Shaft Tributary

The PES for the New Shaft Tributary has remained the same as the baseline PES determined by Digby Wells (2015/2016). Overall, no impacts to local aquatic ecology could be identified as a result of the licenced activities for the 2016/2017 survey period.

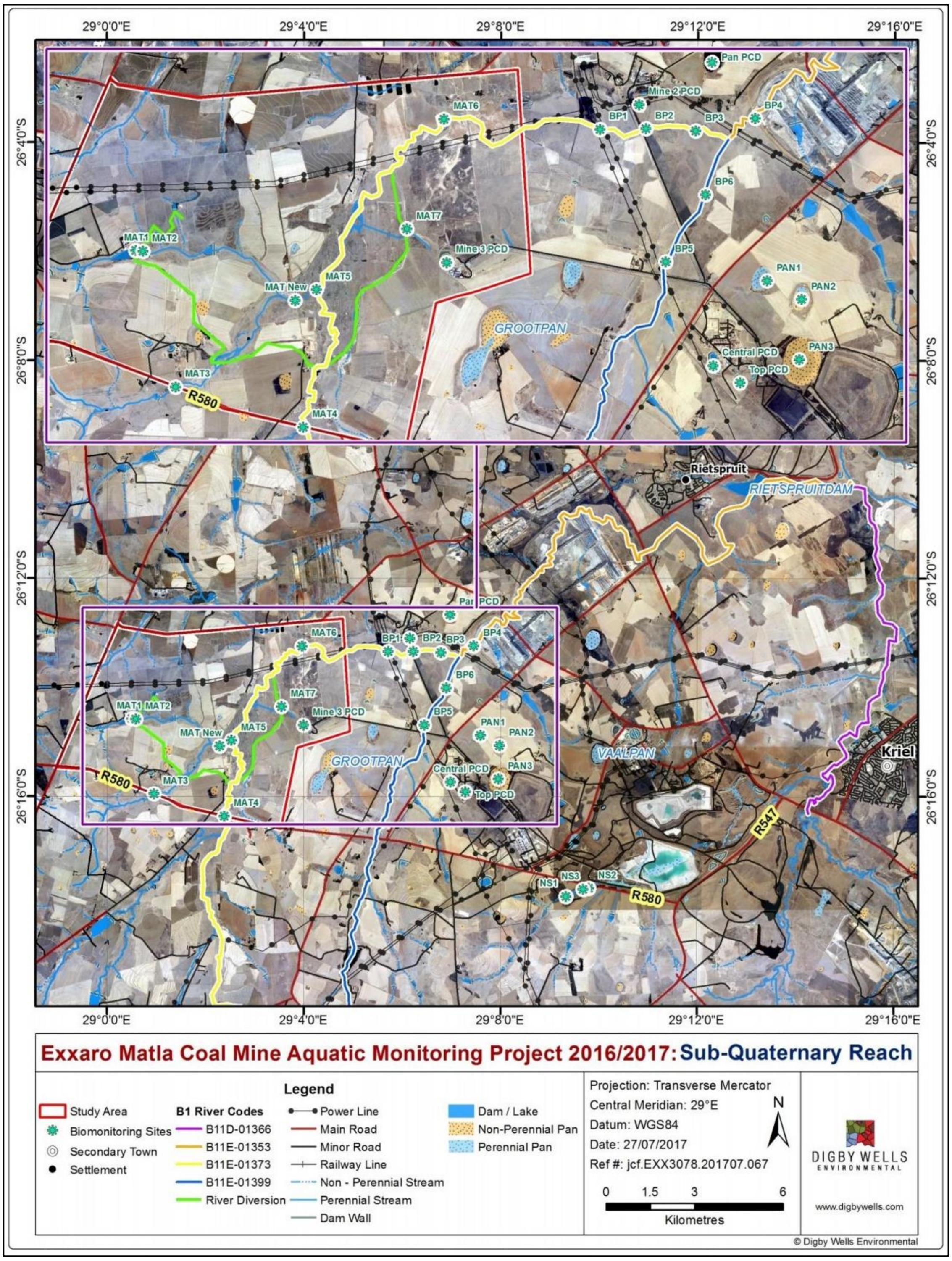


Figure 5.21: Points surveyed during Aquatic Biomonitoring Survey (Digby, 2017)

5.4.3.3 The Rietspruit

River Diversion Sites

The activities within the Rietspruit catchment have resulted in the largely modified PES classification of the system. The river diversion has altered the instream habitat and subsequently modified the ecological status of the downstream conditions. Based on the previous studies, the biological responses indicate a negative trend which appears to be on the rise. This trend can be attributed to below normal rainfall and subsequent loss of aquatic habitats.

Water Treatment Plant Discharge Sites:

The impact of the discharge of treated water in the lower Rietspruit appears to be beneficial for biological responses. It has allowed for the presence of sensitive aquatic biota such as *Barbus neefi* and several invertebrate taxa to be present even in poor rainfall conditions. However, an overall increase in Total Dissolved Solids (TDS) was observed at the sites when comparing results to the previous high flow survey (Digby Wells, February 2016). Therefore, attention needs to be given to this overall increase.

5.4.3.4 The Impoundments and Pans

The limnological assessment of the various partitions of the PCD's at the Matla Mine show that conductivity levels are higher in the water bodies when compared to the river systems. The elevated concentrations of dissolved solids have also led to toxicity assessments showing signs of toxicity at Mine 2 and Mine 3 PCD's with effects to two of the three taxonomic groups of aquatic organisms. Metal content in sediments of the PCD's indicated an overall decrease in the number of enriched elements. This is to be expected in PCD and the water is contained. However, the enrichment of chromium and manganese is still of concern, at all sites not just the impoundments, where future monitoring will develop further temporal trends and confirm the contamination status of the sediments in the PCD's.

5.4.3.5 Recommendations

Based on the outcomes of the 2016/2017 study the following recommendations can be made:

- Additional sites, at least one, should be selected immediately downstream of the various PCD's at the Exxaro Matla Coal Mine. The selection of these sites would allow for the determination of potential seepage emanating from the polluted water bodies;

- A change was made in the two upper river diversion sites (MAT1 and MAT2) where the newly selected sites monitor the water entering the river diversion. These sites should be monitored in future studies instead of the previously selected sites which were dry during both the high and low flow surveys;
- Based on the assessment of the river diversion and illustrated in the remote sensing monitoring of vegetation study, the banks of the river diversion should be vegetated and erosion issues must be addressed to ensure long-term stability. In addition, connectivity between the upper and lower Rietspruit requires confirmation and should be further surveyed; and
- The presence of livestock agriculture within the Rietspruit channel should be limited, by increasing the numbers of “no-go areas”, as per the approved Wetland Management Plan. In addition, cracks/fractures on the banks of the upper Rietspruit, caused as a result of subsidence should be rehabilitated.

Based on the outcomes of the previous study (Digby Wells 2015/2016) and the 2016/2017 study the following monitoring programme will be completed for the duration of the remaining study periods of the Matla Biomonitoring Project

Table 5.23: Monitoring Program

Key Performance Indicator	Threshold of Concern	Target
SASS5	-20%	No significant deterioration of SASS5 scores.
ASPT	-10%	No significant differences between upstream, and downstream regions
Beatidae	None present	All sites
Pseudocrenilabrus philander or *Tilapia sparmanni*	Absence	Presence

5.4.4 Waste Monitoring

The run of mine product is beneficiated in a crushing and screening plant only. Rocks removed from the run of mine product are put onto a rock dump and the product is sent directly to Eskom. The residue is comprised of sandstone and shale.

The waste management policy has been attached as Annexure N to this report.

5.5 Risk Assessment/Best Practice Assessment

5.5.1 Impact Assessment Methodology

The following methodology was used to rank these impacts. Clearly defined rating and rankings scales (Table 5.24 to Table 5.30) were used to assess the impacts associated with the proposed activities. The impacts identified by each specialist study and through public participation were combined into a single impact rating table for ease of assessment.

Each impact identified was rated according the expected magnitude, duration, scale and probability of the impact (Table 5.31).

To ensure uniformity, the assessment of potential impacts will be addressed in a standard manner so that a wide range of impacts is comparable. For this reason a clearly defined rating scale will be provided to the specialist to assess the impacts associated with their investigation.

Each impact identified will be assessed in terms of scale (spatial scale), magnitude (severity) and duration (temporal scale). Consequence is then determined as follows:

Consequence = Severity + Spatial Scale + Duration

The Risk of the activity is then calculated based on frequency of the activity and impact, how easily it can be detected and whether the activity is governed by legislation. Thus:

Likelihood = Frequency of activity + frequency of impact + legal issues + detection

The risk is then based on the consequence and likelihood.

Risk = Consequence x likelihood

In order to assess each of these factors for each impact, the ranking scales in Table 5.24–Table 5.30 were used.

Table 5.24: Severity

Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful / within a regulated sensitive area	5

Table 5.25: Spatial Scale - How big is the area that the aspect is impacting on?

Area specific (at impact site)	1
Whole site (entire surface right)	2
Local (within 5km)	3
Regional / neighboring areas (5km to 50km)	4
National	5

Table 5.26: Duration

One day to one month (immediate)	1
One month to one year (Short term)	2
One year to 10 years (medium term)	3
Life of the activity (long term)	4

Beyond life of the activity (permanent)	5

Table 5.27: Frequency of the activity - How often do you do the specific activity?

Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

Table 5.28: Frequency of the incident/impact - How often does the activity impact on the environment?

Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

Table 5.29: Legal Issues - How is the activity governed by legislation?

No legislation	1
Fully covered by legislation	5

Table 5.30: Detection - How quickly/easily can the impacts/risks of the activity be detected on the environment, people and property?

Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

Environmental effects will be rated as either of high, moderate or low significance on the basis provided in Table 5.31.

Table 5.31: Impact Rating

RATING	CLASS
1 - 55	(L) Low Risk
56 - 169	M) Moderate Risk
170 - 600	(H) High Risk

5.5.2 Impacts Identified

The identified impacts of the various mining complexes, WTP, River Diversion and New Mine 1 are presented in Table 5.32 to Table 5.34. These impacts presented were sourced from the previous application and reports compiled for these areas and are based on the existing (or potential impacts as is the case for New Mine 1) and relevant impacts of these areas.

The impacts associated with the new Section 21(g) water uses for the consolidation are presented in Table 5.35. The stooping and goafing impacts are presented in Table 5.36.

The detailed impact tables are attached as Annexure O to this report.

Table 5.32: Matla Mine 1, 2 & 3 and River Diversion Impacts

Impact description					Significance before mitigation		Significance after mitigation		Mitigation measures	Action plan	Responsible person
No.	Phases	Activity	Aspect	Impact							
1	Operation	Mining Operations (Mine 1, 2 and 3)	Surface water quality in the water resources within the mining area and downstream may deteriorate due to careless handling of contaminated run-off from the active mining areas. The potential for pollution of surface water exists and especially in the vicinity of the box cut. Improper management of the mining activities and dirty water containment systems can lead to pollution of the water resources.	Contamination of surface water resources	-	M	-	M	Sufficient storm water control measures must be put in place and maintained so that clean and dirty water are kept separate. Dirty water from operational activities will be contained in containment dams and re-used on site where possible.	Inspection and Maintenance Schedule. Upgrading of the Storm Water Management on site (WSP, 2017)	Engineering Department & SHE Manager
2	Operation	Mining Operations (Mine 1, 2 and 3)	Soils may become contaminated with hydrocarbons (e.g. diesel, grease and oil) spilling from construction vehicles. This in turn could lead to impacts on surface water and groundwater quality.	Impacts on water quality and soil contamination	-	M	-	M	Soil that is contaminated by fuel or oil spills, for example from construction vehicles, should be collected and treated at a pre-determined and dedicated location, or treated in situ, using bioremediation.	Monitoring programme. Biomonitoring programme. Inspection Schedule.	SHE Manager
3	Operation	Mining Operations (Mine 1, 2 and 3)	Catchment reduction - Rainfall falling within the enclosed access shaft area will be unavailable to the catchment, resulting in loss of catchment yield.	catchment reduction	-	M	-	M	Effective diversion of clean storm water, by implementation of the proposed storm water management plan should reduce the impacts of reduced catchment runoff. Adhere to Storm Water Management Plan. The extent of dirty water management areas must be minimised as far as possible.	Surface water monitoring programme. Biomonitoring programme	SHE Manager
4	Operation	River Diversion	Catchment reduction - The location of the box cut approximately 2km's west of Mine 2 has necessitated the	catchment reduction	-	H	-	H	The river diversion has been put in place in order to divert drainage away from the box cut approximately 2km's west of Mine 2.	Surface water monitoring programme.	SHE Manager

			construction of a river diversion. This has altered the drainage pattern and affected the flood peak attenuation.						Ongoing maintenance of the river diversion must take place	Biomonitoring programme	
5	Operation	Mining Operations (Mine 1, 2 and 3)	Increased erosion, resulting in increased sediment load in surface runoff.	Increased erosion	-	M	-	M	Erosion controls will be included in the design of changes to slope conformation, linear infrastructure ad points of water discharge. The use of natural erosion controls such as vetiver grass will be considered in all instances where a stand-alone situation is required (i.e. at closure)	Monitoring programme. Inspection schedule	SHE Manager
6	Operation	Mining Operations (Mine 1, 2 and 3)	Siltation of the watercourses due to increased erosion on site which adversely affects the water quality as well as the habitat of living organisms.	watercourse siltation	-	M	-	M	Erosion controls will be included in the design of changes to slope conformation, linear infrastructure ad points of water discharge. The use of natural erosion controls such as vetiver grass will be considered in all instances where a stand-alone situation is required (i.e. at closure)	Surface water monitoring programme. Biomonitoring programme	SHE Manager
7	Operation	Mining Operations (Mine 1, 2 and 3)	Surface water quality in the water resources within the mining area and downstream may deteriorate due to careless handling of contaminated run-off from the active mining areas. The potential for pollution of surface water exists and especially in the vicinity of the box cut. Improper management of the mining activities and dirty water containment systems can lead to pollution of the water resources.	Degradation of surface water quality	-	M	-	M	Sufficient storm water control measures will be put in place so that clean and dirty water are kept separate. Dirty water from activities will be contained in containment dams and re-used on site where possible.	Surface water monitoring programme. Biomonitoring programme. Inspection and Maintenance Schedule. Upgrading of the Storm Water Management on site (WSP, 2017).	SHE Manager
8	Operation	Mining Operations (Mine 1, 2 and 3)	Operation of the mine shafts and complexes may potentially impact on the groundwater system over the life of the	Impact on groundwater quality	-	M	-	M	Monitoring should be conducted in line with the requirements of the IWUL issued. Accidental contaminant spills should be immediately cleaned up by appropriated absorbent	Monitoring programme.	SHE Manager

			project in terms of the water quality						substances/materials. The disposal of used oils, greases and the like should take place in a responsible manner, preventing any contact with soil or the groundwater system. Off-site storage/disposal is advisable.		
9	Operation	Dewatering of groundwater resource	Groundwater seepage into box-cut will be pumped out to the surface causing the formation of a dewatering cone. The mining operations may potentially impact on the groundwater system over the life of the project in terms of the water volume (both by abstracting water from and introducing water to the groundwater system/resource).	Impact on groundwater resource availability	-	M	-	M	Groundwater monitoring should be conducted as per the IWUL conditions or as instructed by DWS. Groundwater levels will be monitored during operation and post closure.	Monitoring programme.	SHE Manager
10	Operation	Mining Operations (Mine 1, 2 and 3)	Deterioration of groundwater quality due to surface activities	Impacts on groundwater quality	-	M	-	M	Monitoring of groundwater should be conducted as per the IWUL conditions or instructed by DWS. If groundwater qualities are found to exceed the IWUL limits, action may be required to improve/replace the liner systems at the source of contamination.	Groundwater monitoring programme. Inspection and Maintenance schedule	SHE Manager
11	Operation	Mining Operations (Mine 1, 2 and 3)	Lowering of groundwater levels due to dewatering which may impact on groundwater users in the area (water supply). Infiltration rates and recharge may be altered. Development of a cone of depression resulting from dewatering of underground workings. Decreased water supply to farmers and adjacent landowners may occur.	Impact on groundwater resource availability	-	M	-	M	Groundwater monitoring should be conducted as per the IWUL conditions or as instructed by DWS. The mine will ensure water supply to farms on the Matla Coal.	Groundwater Monitoring programme. Complaints register.	SHE Manager
12	Operation	River Diversion	The wetlands have been impacted on by the river diversion and the construction of the box cut. Since wetlands are sensitive environments the	Degradation of aquatic ecosystems	-	H	-	H	The Blesbokspruit area south west of the river diversion will be conserved and monitored with the aim of forming a conservancy to maintain the	Surface water monitoring programme. Biomonitoring programme.	SHE Manager

			impact the impact on the floral and faunal communities is expected to be definite. Over time it is expected that the wetland will re-establish in some of the subsided, low lying areas caused by the mining operations, however it will take significant time to become a functioning unit.						functionality of the rest of the wetland in the area. The conservancy will consist of eleven farms and the project aims to enhance community involvement in local conservation. Biomonitoring along river diversion has shown the establishment of fauna and flora species.		
13	Construction	River Diversion	Degradation and loss of aquatic ecosystem and wetlands due to river diversion.	Degradation of aquatic ecosystems	-	H	-	H	A programme of regular bio-monitoring should be maintained. Restoration of disturbed land to its pre-mining land capability will require careful conservation of soil and erosion control during the operational phase. The box cut and river diversion will remain. Biomonitoring along river diversion has shown the establishment of fauna and flora species.	Monitoring programme which includes quarterly biomonitoring.	SHE Manager
14	Operation	0	Sewage works at Mine 2 and 3 may negatively impact on the water quality of surface water resources if spillage occurs or not maintained	Surface water contamination and spillage.	-	M	-	L	The sewage works should be maintained and monitored on a daily basis to ensure optimal operation to prevent overflow. Water from wash bays should not be pumped to the sewage works. This water should be pumped to the pollution control dams, dirty water areas.	Surface water monitoring programme. Maintenance and inspection schedule.	Engineering department and SHE Manager
15	Operation	0	Discharge of treated effluent from Mine 2 and 3 from the sewage works may negatively impact on the water quality of surface water resources.	Degradation of water quality	-	M	-	M	Check the sewage works daily to ensure that it is working optimally by taking process samples. Monitor effluent quality on a monthly basis and act on any concerns. Monitor flows daily. Investigate re-use options. Maintain the sewage works. Ensure adequately skilled personnel to operate the sewage works.	Surface water monitoring programme. Maintenance and inspection schedule.	Engineering department and SHE Manager
16	Operation	0	Negative impacts on surface water quality may also result due to: - Coal spills along the overland conveyor route;	Degradation of water quality	-	M	-	M	Hazardous chemicals and waste should be stored, transported and handled according to the relevant waste legislation. Storm water shall be diverted around areas that may	Surface water monitoring programme. Biomonitoring programme.	SHE Manager

			- Accidental leaks and/or discharges of coal, contaminated water from various facilities on site; - Any leaks and/or spills of contaminants such as diesel, grease and oil, as well as dust; and - Use of contaminated water for dust suppression purposes outside of dirty water management areas.						contaminate. Storage facilities (including any tanks) shall be surrounded by a bund wall, to ensure that accidental spillage does not pollute local soil or water resources. All contractors and sub-contractors should be informed of the procedures, requirements and restrictions of the mine. All servicing, maintenance and repairs done on machinery that makes use of hydrocarbons as fuels or lubricants shall be carried out on a concreted surface, and will make use of a drip tray placed strategically to avoid incidental spillage. Drip trays shall be inspected and emptied daily and serviced when necessary. In particular, drip trays shall be closely monitored during rain events to ensure that they do not overflow. Conditions of the EMP should be adhered to. The surface water monitoring programme should continue to be implemented as per the IWUL conditions.	Inspection and Maintenance Schedule. Upgrading of the Storm Water Management on site (WSP, 2017).	
17	Operation	PCD operation	Impacts on groundwater quality due to seepage from the Pollution Control Dams	Impacts on groundwater quality	-	H	-	M	The liner system for the pollution control dam must be maintained with care to ensure that it meets the design and IWUL specifications. Inspections of the liner should be undertaken regularly to ensure that the liner is still intact and effective. Monitoring of the identified monitoring boreholes must be conducted as per the IWUL conditions in order to determine the impact on groundwater resources.	Groundwater monitoring programme. Inspection and Maintenance schedule	Engineering department and SHE Manager

Table 5.33: Matla WTP Impacts

Impact description					Significance before mitigation		Significance after mitigation		Mitigation measures	Action plan	Responsible person
No.	**Phases**	**Activity**	**Aspect**	**Impact**							
1	Operation	Brine Pond Operation	Overtopping of brines dams due to heavy rainfall may impact on surface water resources.	Degradation of surface water quality	-	M	-	M	Regular monitoring of the brine pond levels should be implemented. If required an automated level metre should be put in place in order to warn of a potential overtopping event. Overflow water from the brine bonds should be sent to the WTP PCD in order to prevent overtopping.	Inspection and Maintenance Schedule. Upgrading of the Storm Water Management on site (WSP, 2017)	Engineering Department & SHE Manager
2	Operation	WTP Operations	Operations of the WTP may potentially impact on the surface water quality if not maintained or properly managed.	Degradation of surface water quality	-	M	-	L	Maintain separation of clean and dirty stormwater. No dirty water may be discharged. Daily monitoring of the brine ponds to determine leaks. Quarterly bio-monitoring and monthly water quality monitoring of surrounding pans (all pans within 500m radius) as per the monitoring protocol in the aquatic ecology specialist report. Handling of hazardous substances only in designated bunded areas on site.	Monitoring programme. Biomonitoring programme. Inspection Schedule.	SHE Manager
3	Operation	WTP Operations	Contamination of water resources due to dirty stormwater discharge	Degradation of surface water quality	-	M	-	M	Impermeable surfaces on site should be minimised to limit stormwater generation and maximise infiltration. Clean and dirty stormwater should be separated. No dirty stormwater should be discharged unless treated. Clean stormwater should be discharged into the environment at designated discharge points that are protected against erosion and encourage the dispersal of low velocity flows into vegetated areas so as to prevent erosion and to trap sediments transported in the stormwater. Stormwater should be conveyed in grassed swales rather than cement lined canals/trenches so as to maximise infiltration. Stormwater may not be discharged directly into any	Inspection and Maintenance Schedule. Storm water management plan.	SHE Manager

									adjacent wetland system with minimum buffer distance of 20m maintained between the wetland edge and the point of discharge.		
4	Operation	PCD operation	Leakage or seepage from Brine Ponds and WTP PCD. Failure or deterioration of lining system may potentially impact on groundwater resources	Deterioration in surface water quality due to leakage or seepage	-	H	-	M	Ensure the dirty water catchment area is as small as possible to avoid unnecessary losses to the stream flow. Dam levels will be kept at the required levels	Inspection schedule. Surface water Monitoring Programme,	SHE Manager
5	Operation	WTP Operations	A variety of toxic chemicals generated in the water treatment plant, including chemicals used in membrane cleaning and pre-treatment, may pose a potential risk for contamination of groundwater aquifers.	Degradation of groundwater quality	-	M	-	M	Matla will implement the ground and surface water monitoring plan as detailed in this EMP document.	Surface water monitoring programme. Biomonitoring programme. Inspection and Maintenance Schedule.	SHE Manager
6	Operation	WTP Operations	Altered hydrology - increased low flow periods and increased flood intensities. Water that is pumped to the WTP and then used by Eskom will effectively be removed from the catchment, causing altered hydrology in the previously receiving watercourses. Valley bottom wetlands, on the other hand, will have more pronounced seasonal variations in flow, with more intense storm flows and more prolonged low flow periods. This may affect the biotic composition.	Aquatic habitat alteration	-	M	-	M	Where possible, return clean water to natural aquatic ecosystems (without storage) to limit impact on natural hydrological regime of streams. Where clean water is returned into the landscape, discharge points should be protected against erosion and should aim to mimic the hydrology of the receiving water resource. No concentrated discharge should take place.	Surface water monitoring programme. Biomonitoring programme	SHE Manager
7	Operation	Storm water runoff	Increased stormwater runoff and erosion at stormwater outlets. Removal of vegetation and decreased infiltration will result in greater volumes and velocities of stormwater runoff, discharged at site specific stormwater outlets. This will result in	Erosion and catchment alteration	-	M	-	M	Stormwater discharge points should be protected against erosion and should aim to mimic the hydrology of the receiving water resource. No concentrated discharge should take place. Discharge points should also be regularly monitored and damage repaired.	Inspection and maintenance schedule.	Engineering Department & SHE Manager

			increased storm flows and erosion. If treated water is discharged back into the natural watercourses, this will have the same effect.								
8	Operation	WTP Operations	Altered seasonal hydrology of pans. Mine 2 Pan, if used for storage, will lose its seasonal pan-specific characteristics and become more dam-like. Pans 1 and 2 currently have a pronounced seasonality and are therefore most at risk to hydrological changes.	Altered seasonal hydrology of pans	-	M	-	M	Pans 1 and 2, in particular, should be protected from receiving additional artificial water inputs, either directly or via subsurface seepage. Abstraction should also not be allowed from these pans. The natural hydrology of these pans should be mimicked as far as possible and the role of groundwater seepage should be established.	Surface water monitoring programme. Biomonitoring programme	SHE Manager
9	Operation	WTP Operations	Loss of species due to decline in water quality. Species that are sensitive to salinisation or acidification of surface water, or other contaminants, are likely to be lost from the system, resulting in a decline in overall biodiversity.	loss of aquatic species	-	M	-	M	Spill prevention measures should be compiled and implemented with auditable follow-up actions in the event of an incident. Regular maintenance of machinery is essential to minimise the chance of leaks or spills. Regular inspections of the WTP operations should be conducted to detect potential problems that may later lead to leaks. Where leaks or spills occur, they should be immediately contained and addressed according to an Emergency Preparedness Plan and followed by effective remediation. Monthly monitoring of water quality within adjacent pans, as well as a long term quarterly biomonitoring programme, should be implemented. Recommendations and irregularities (e.g. sudden spikes in salinity) should be followed up in a clearly auditable way.	Monitoring programme.	SHE Manager
10	Operation	WTP Operations	Loss of species due to altered hydrology. Loss of pool habitats as a result of decreased flows, together with changes in the seasonal flow regime and associated physicochemical conditions (e.g. increased	loss of aquatic species	-	H	-	M	Pans 1 and 2, in particular, should be protected from receiving additional artificial water inputs, either directly or via subsurface seepage. Abstraction should also not be allowed from these pans. Where possible, return clean water to natural aquatic ecosystems	Monitoring programme (surface water, groundwater and biomonitoring).	SHE Manager

			temperatures, increased turbidity) may cause a loss of aquatic biota from streams. In addition, the change from a seasonal to permanent pan hydrology (Pans 1 and Mine 2 Pan are most at risk), will result in a loss of specialised pan-adapted invertebrates. Pan 1 is particularly sensitive to any changes in its hydrological regime and this impact will have the most significant consequences in this pan.						(without storage) to limit impact on natural hydrological regime of streams. Where clean water is returned into the landscape, discharge points should be protected against erosion and should aim to mimic the hydrology of the receiving water resource. No concentrated discharge should take place		
11	Operation	WTP Operations	The disturbance of the wetlands as a result of constructing the water treatment plant within 500m of the wetland. Since the wetland has already been disturbed as a result of on-going agricultural activity, the current status quo of the wetland is not considered as pristine.	Disturbance of wetlands	-	M	-	M	All infrastructure relating to the WTP & BP was done according to best practice with adequate clean and dirty water separation infrastructure. All infrastructure to be monitored on-going basis to ensure adequate functioning. High priority status for any repairs required.	Inspection schedule. Maintenance schedule	Engineering Department & SHE Manager
12	Operation	0	Discharge of water from the WTP may potentially cause pollution of the water resources if the treated water discharged is not of sufficient quality.	Degradation of surface water quality	-	M	-	M	Water Quality will be treated to meet DWS limits as specified by the IWUL.	Surface water monitoring programme.	SHE Manager

Table 5.34: Matla New Mine 1 Shaft Impacts

Impact description					Significance before mitigation		Significance after mitigation		Mitigation measures	Action plan	Responsible person
No.	Phases	Activity	Aspect	Impact							
1	Construction	Construction activities	Construction of the box-cut. he proposed Matla 1 new access shaft may potentially impact on the groundwater system over the life of the project in terms of the water quality	Impact on groundwater quality	-	M	-	M	Monitoring should be conducted in line with the requirements of the IWUL issued. Baseline conditions should be recorded by monitoring at specific positions prior to construction. Accidental contaminant spills should be immediately cleaned up by appropriated absorbent substances/materials. The disposal of used oils, greases and the like should take place in a responsible manner, preventing any contact with soil or the groundwater system. Off-site storage/disposal is advisable.	Monitoring programme.	SHE Manager
0	Operation	Dewatering of groundwater resource	Groundwater seepage into box-cut will be pumped out to the surface causing the formation of a dewatering cone. The proposed Matla 1 new access shaft may potentially impact on the groundwater system over the life of the project in terms of the water volume (both by abstracting water from and introducing water to the groundwater system/resource).	Impact on groundwater resource availability	-	M	-	M	Groundwater monitoring should be conducted as per the IWUL conditions or as instructed by DWS. In the Mine 1 new shaft all predicted impacts on groundwater levels and groundwater quality should be confirmed within 2 years of commencement of mining and the mine plane adapted if necessary. All prominent water-yielding bedding planes / fissures at the new Matla 1 shaft site should be cement-grouted to reduce inflows as soon as practically possible. Unless specified otherwise by the mining engineer or the geotechnical engineer, cement-grouting should done if groundwater inflow of >0.5ℓ/s continues for longer than five days in any seepage zone. These	Monitoring programme.	SHE Manager

									features might start seeping/flowing after high rainfall events. If the total inflow can be reduced to <1 ℓ /s, the cone of depression will most likely not extend more than 150 m from the box-cut and not reach the Bakenlaagtespruit. Water-yielding bedding planes/fissures at the three proposed off-site ventilation shafts should be cement-grouted to stop inflow immediately after being intercepted.		
0	Operation	Dewatering of groundwater resource	Lowering of groundwater levels due to dewatering which may impact on groundwater users in the area (water supply). Infiltration rates and recharge may be altered. Development of a cone of depression resulting from dewatering of underground workings	Impact on groundwater resource availability	-	M	-	M	Groundwater monitoring should be conducted as per the IWUL conditions or as instructed by DWS. In the Mine 1 new shaft all predicted impacts on groundwater levels and groundwater quality should be confirmed within 2 years of commencement of mining and the mine plane adapted if necessary. All prominent water-yielding bedding planes / fissures at the new Matla 1 shaft site should be cement-grouted to reduce inflows as soon as practically possible. Unless specified otherwise by the mining engineer or the geotechnical engineer, cement-grouting should done if groundwater inflow of >0.5ℓ/s continues for longer than five days in any seepage zone. These features might start seeping/flowing after high rainfall events. If the total inflow can be reduced to <1 ℓ /s, the cone of depression will most likely not extend more than 150 m from the box-cut and not reach the Bakenlaagtespruit. Water-yielding	Monitoring programme.	SHE Manager

									bedding planes/fissures at the three proposed off-site ventilation shafts should be cement-grouted to stop inflow immediately after being intercepted.		
0	Operation	New Mine 1 Construction and Operation	The aquatic systems are already critically modified and do not represent an adequate habitat in their present state. Degradation of aquatic ecosystems due to decreased water quality is expected to be of low impact.	Degradation of aquatic ecosystems	-	M	-	M	Construction lay down area should be placed away from wetland areas and the watercourses that feed them. A programme of regular bio-monitoring should be established prior to the commencement of construction.	Monitoring programme which includes quarterly biomonitoring	SHE Manager
0	Construction	New Mine 1 Construction and Operation	Degradation and loss of aquatic ecosystem due to modification of the flow regime.	Degradation of aquatic ecosystems	-	M	-	M	A programme of regular bio-monitoring should be established prior to the commencement of construction, to broaden the baseline information by recording seasonal data. The road immediately upstream of site OS1 acts as a barrier, preventing the free flow of water. Pipes should be installed under the road or, if the road is not needed, it should be removed.	Monitoring programme which includes quarterly biomonitoring	SHE Manager
0	Operation	New Mine 1 Construction and Operation	Loss of species of conservation significance: the significance of this potential impact is low with or without the implementation of the proposed mitigation measures	Loss of species	-	M	-	M	Where it will be routed under the road, the conveyor should not resurface within the area of 'high conservational importance'. It will therefore resurface on the opposite side of the 'stream' transecting the relevant property. The wetland specialist should identify/mark the position where the conveyor may resurface on site after it has been routed underneath the road. This will be on the opposite side of the 'high conservational value' wetland. Wetland areas should be declared "no-go" areas.	Monitoring programme which includes quarterly biomonitoring	SHE Manager
0	Construction	Construction activities	The study sites are relatively poor with regard to both faunal	Construction of New Mine 1	-	M	-	M	Construction lay down area should be placed away from wetland areas	Construction Monitoring	SHE Manager

			and floral species richness. The originally moderate biodiversity of the area has been reduced by anthropogenic activities that have caused destruction of habitat. Semi-natural areas are few and small in size, effectively negligible when the edge effects of surrounding perturbed areas are taken into account. The impacts of the construction phase will be high in the directly affected areas, but the loss of biodiversity will be considerably less than it would have been if the area had not already been disturbed. It is apparent that the infrastructure construction activities will not encroach on the areas of high conservation importance, although mining will take place under such areas. However, unless due care is exercised, the construction activities could have adverse effects of high significance on the existing condition of these wetland areas, by causing runoff containing sediments and contaminants, e.g. from spillages of fuels and lubricants						and the watercourses that feed them. Declare the wetland areas to be "no-go" areas for personnel and machinery and enforce the prohibition. Clean up any spills of fuel or other contaminants on open ground immediately. Disturbance of surface areas should be kept to a minimum where the conveyor is routed (overland) across areas of 'medium conservational value'. No driving or vehicle manoeuvring should be allowed within sensitive landscapes (or exclusion zones). The exclusion zone should be clearly demarcated. A programme of regular bio-monitoring should be established prior to the commencement of construction.	programme. Inspection schedule	
0	Construction	Construction activities	Construction on Sewage WWTW. Increased erosion, resulting in increased sediment load in surface runoff due to construction activities.	Increased erosion, & increased sedimentation	-	M	-	L	Soils should be stripped during the dry winter months, as far as possible. Soil should be stockpiled at a slope of no more than 25%, to prevent erosion by wind and rain. Soil stockpiles should not be more than 5 metres in height. All soil stockpiles must be protected by storm water berms to prevent erosion and loss of soil.	Construction Monitoring programme. Inspection schedule	SHE Manager

0	Operation	Discharge of treated effluent into watercourse	Sewage works may negatively impact on the water quality of surface water resources if spillage occirs or not maintained	Surface water contamination and spillage.	-	M	-	L	The sewage works should be maintained and monitored on a daily basis to ensure optimal operation to prevent overflow. Water from wash bays should not be pumped to the sewage works. This water should be pumped to the pollution control dams, dirty water areas.	Surface water monitoring programme. Maintenance and inspection schedule.	Engineering department and SHE Manager
0	Operation	New Mine 1 Construction and Operation	Discharge of treated effluent from the sewage works may negatively impact on the water quality of surface water resources.	Degradation of water quality	-	M	-	M	Check the sewage works daily to ensure that it is working optimally by taking process samples. Monitor effluent quality on a monthly basis and act on any concerns. Monitor flows daily. Investigate re-use options. Maintain the sewage works. Ensure adequately skilled personnel to operate the sewage works.	Surface water monitoring programme. Maintenance and inspection schedule.	Engineering department and SHE Manager
0	Construction	Construction activities	Increased erosion, resulting in increased sediment load in surface runoff.	Increased erosion	-	M	-	M	Soils should be stripped during the dry winter months, as far as possible. Soil should be stockpiled at a slope of no more than 25%, to prevent erosion by wind and rain. Soil stockpiles should not be more than 5 metres in height. All soil stockpiles must be protected by storm water berms to prevent erosion and loss of soil.	Construction Monitoring programme. Inspection schedule	SHE Manager
0	Construction	Site clearing / preparation	Vegetation removal and clearance due to construction activities.	Vegetation removal	-	M	-	M	The construction laydown area and the construction areas of the development should be clearly marked with the objective of minimising the area of indigenous vegetation that has to be cleared. Ensure that destruction of vegetation only occurs within these demarcated areas. Red data and protected trees must be labelled, and where possible, left undisturbed. Take active measures to prevent the destruction of the	Construction Monitoring programme. Inspection schedule	SHE Manager

									natural vegetation along the banks of the stream and the immediate area surrounding the dam		
0	Construction	Site clearing / preparation	Surface compaction due to construction activities may lead to altered surface runoff patterns.	Surface compaction	-	M	-	M	Establish the surface water management and pollution control features (diversion berms, pollution control dam, concreted pad for servicing of vehicles etc.) as approved in the IWUL early in the construction phase, before the rain season.	Surface water monitoring programme. Inspection schedule.	SHE Manager
0	Operation	New Mine 1 Construction and Operation	Catchment reduction - Rainfall falling within the enclosed access shaft area will be unavailable to the catchment, resulting in loss of catchment yield.	catchment reduction	-	M	-	M	Effective diversion of clean storm water, by implementation of the proposed storm water management plan should reduce the impacts of reduced catchment runoff. Adhere to Storm Water Management Plan. The extent of dirty water management areas must be minimised as far as possible.	Surface water monitoring programme. Biomonitoring programme	SHE Manager
0	Operation	New Mine 1 Construction and Operation	Siltation of the watercourses due to increased erosion on site which adversely affects the water quality as well as the habitat of living organisms.	watercourse siltation	-	M	-	M	Erosion controls, included in the designs submitted, should be implemented on site. . The use of natural erosion controls such as vetiver grass will be considered in all instances where a stand-alone situation is required (i.e. at closure). Regular inspection on site should be undertaken in order to assess effectiveness of erosion control measures.	Surface water monitoring programme. Biomonitoring programme	SHE Manager
0	Operation	New Mine 1 Construction and Operation	Alteration of drainage patterns: the location of the box cut approximately 2km's west of Mine 2 has necessitated the construction of a river diversion. This has altered the drainage pattern and affected the flood peak attenuation.	catchment alteration	-	M	-	M	The river diversion has been put in place in order to divert drainage away from the box cut approximately 2km's west of Mine 2. Ongoing maintenance of the river diversion must take place to prevent erosion.	Surface water monitoring programme. Biomonitoring programme	SHE Manager
0	Operation	New Mine 1 Construction	Surface water quality in the water resources within the	Degradation of water quality	-	M	-	M	Pump contaminated storm water from the shaft dirty water area and	Surface water monitoring	SHE Manager

		and Operation	mining area and downstream may deteriorate due to careless handling of contaminated run-off from the active mining areas. The potential for pollution of surface water exists and especially in the vicinity of the box cut. Improper management of the mining activities and dirty water containment systems can lead to pollution of the water resources.						groundwater for mine dewatering purposes to the pit dewatering dam and treat as dirty water. The storm water management plan as well as the designs and procedures relating to the dirty water dams should be adhered to. Waste water facilities and storm water management infrastructure should be well maintained and inspected regularly. Construct up-slope storm water diversion berms to facilitate natural drainage at the new shaft area and as necessary at the existing shaft areas. Implement the mine's Waste Management Procedure in all areas	programme. Biomonitoring programme. Inspection and Maintenance Schedule. Upgrading of the Storm Water Management on site (WSP, 2017).	
0	Operation	New Mine 1 Construction and Operation	Negative impacts on surface water quality may also result due to: - Coal spills along the overland conveyor route; - Accidental leaks and/or discharges of coal, contaminated water from various facilities on site; - Any leaks and/or spills of contaminants such as diesel, grease and oil, as well as dust; and - Use of contaminated water for dust suppression purposes outside of dirty water management areas.	Degradation of water quality	-	M	-	M	Hazardous chemicals and waste should be stored, transported and handled according to the relevant waste legislation. Storm water shall be diverted around areas that may contaminate. Storage facilities (including any tanks) shall be surrounded by a bund wall, to ensure that accidental spillage does not pollute local soil or water resources. All contractors and sub-contractors should be informed of the procedures, requirements and restrictions of the mine. All servicing, maintenance and repairs done on machinery that makes use of hydrocarbons as fuels or lubricants shall be carried out on a concreted surface, and will make use of a drip tray placed strategically to avoid incidental spillage. Drip trays shall be inspected and emptied daily and serviced when necessary. In particular, drip trays shall be closely monitored during rain events to	Surface water monitoring programme. Biomonitoring programme. Inspection and Maintenance Schedule. Upgrading of the Storm Water Management on site (WSP, 2017).	SHE Manager

									ensure that they do not overflow. Conditions of the EMP should be adhered to. The surface water monitoring programme should continue to be implemented as per the IWUL conditions.		
0	Operation	PCD operation	Impacts on groundwater quality due to seepage from the Pollution Control Dam	Impacts on groundwater quality	-	H	-	M	The liner system for the pollution control dam must be constructed with care to ensure that it meets the design and IWUL specifications. Inspections of the liner should be undertaken regularly to ensure that the liner is still intact and effective. Monitoring of the identified monitoring boreholes must be conducted as per the IWUL conditions in order to determine the impact on groundwater resources.	Groundwater monitoring programme. Inspection and Maintenance schedule	Engineering department and SHE Manager
0	Operation	New Mine 1 Construction and Operation	Deterioration of groundwater quality due to surface activities	Impacts on groundwater quality	-	M	-	M	Monitoring of groundwater should be conducted as per the IWUL conditions or instructed by DWS. The impact on groundwater levels at the surface water features to the southeast should be confirmed, as soon as the hydraulic nature of the aquifer is better understood. A comprehensive re-analysis and groundwater modelling of monitoring data should be carried out at least every 3 to 4 years. If groundwater qualities are found to exceed the IWUL limits, action may be required to improve/replace the liner systems at the source of contamination. ¡ In the event that the mine plan is altered or additional hydrogeological work indicates additional or altered impacts, all management measures should be reviewed and adapted.	Groundwater monitoring programme. Inspection and Maintenance schedule	SHE Manager

Table 5.35: New Section 21(g) Water Use Impacts

Impact description					Significance before mitigation		Significance after mitigation		Mitigation measures	Action plan	Responsible person
No.	Phases	Activity	Aspect	Impact							
1	Operation	Mega-litre tanks	Surface water quality in the water resources (Mine 2 emergency dam) within the mining area may deteriorate due to spills from the mega litre tanks. This pan is currently licensed to receive all the water from Mine 2 underground workings. Therefore this pan is already impacted and would it is foreseen that this pan would not further deteriorate should spillage occur.	Contamination of surface water resources	-	M	-	M	This pan is currently licensed to receive all the water from Mine 2 underground workings. Therefore this pan is already impacted and would it is foreseen that this pan would not further deteriorate should spillage occur. Measures should be put in place to prevent leakage and spillage. Regular inspection of the tanks and levels thereof should be undertaken.	Inspection and Maintenance Schedule.	Engineering Department & SHE Manager
2	Operation	Mega-litre tanks	Groundwater quality within the mining area may deteriorate due to leaks from the mega litre tanks.	Contamination of ground water resources	-	M	-	M	The mine 2 emergency dam (Pan at Mine 2) may have already impacted on groundwater quality in this area. Therefore is t is not foreseen that a further deterioration would take place. However, it is recommended that the tanks are securely sealed and that they are placed on a lined based (concrete or another type of lining system) with infrastructure around the base to ensure that any leakage from the tanks are contained and will not spill into the environment. Regular inspections should be undertaken.	Monitoring programme. Inspection schedule	Engineering Department & SHE Manager
3	Operation	Stockpiles	Runoff from stockpiles may potentially impact on surface water quality and surrounding soils if the runoff is not captured.	Impacts on water quality and soil contamination	-	M	-	M	Stormwater management infrastructure should be placed at the Main stockpile at Mine 1 and transfer stockpiles at Mine 1, 2 and 3. Runoff from the stockpiles should be directed to the dirty water containment facilities on site. Regular inspections of the storm water infrastructure should be undertaken.	Stormwater management plan (WSP, 2017). Inspection schedule.	Engineering Department & SHE Manager

4	Operation	Stockpiles	Increased sedimentation of water resources from stockpile run off	Increased sedimentation	-	M	-	M	Stormwater management infrastructure should be placed at the Main stockpile at Mine 1 and transfer stockpiles at Mine 1, 2 and 3. Runoff from the stockpiles should be directed to the dirty water containment facilities on site. Regular inspections of the storm water infrastructure should be undertaken.	Stormwater management plan (WSP, 2017). Inspection schedule.	Engineering Department & SHE Manager
5	Operation	Sludge beds operation	Operation of the sludge drying beds may impact on groundwater quality due to spills and leaks of these beds. Cracks in the structures of the sludge drying beds of Mine 2 and 3 may negatively impact on groundwater quality.	Impact on groundwater quality	-	M	-	M	Monitoring should be conducted in line with the requirements of the IWUL issued. Accidental contaminant spills should be immediately cleaned up by appropriated absorbent substances/materials. Regular inspections on the integrity of the sludge bed structures should be undertaken.	Monitoring programme. Inspection schedule	Engineering Department & SHE Manager
6	Operation	Sludge beds operation	Deterioration of surface water quality due to sludge bed operational activities.	0	-	M	-	M	Monitoring should be conducted in line with the requirements of the IWUL issued. Accidental contaminant spills should be immediately cleaned up by appropriated absorbent substances/materials. Regular inspections on the integrity of the sludge bed structures should be undertaken.	Monitoring programme. Inspection schedule	Engineering Department & SHE Manager

Table 5.36: New Section 21(c) & (i) Impacts - Stooping & Goafing

Impact description					Significance before mitigation		Significance after mitigation		Mitigation measures	Action plan	Responsible person
No.	Phases	Activity	Aspect	Impact							
1	Operation	Stooping	Subsidence within wetland areas due to stooping activities will alter the patterns of water retention and distribution within the wetlands, leading to habitat degradation (lowering of the wetland PES) and habitat alteration as the vegetation and fauna adapt to the new patterns of water movement.	Wetland degradation and Habitat alteration	-	H	-	H	Difficult to mitigate unless surface subsidence is prevented under wetlands. Consideration should be given to, as a minimum, exclude the pans within the Block G & H area (including Grootpan) and their catchments from stooping activities unless it can be shown that flow into the pans will not be negatively impacted by stooping. Ploughing over of cracks appearing on the earth's surface where such cracks appear in cultivated areas should be implemented. Should subsidence occur in wetland areas, the cracks should be closed by hand, as is the current practice for surface subsidence at Matla 3 mine. Where flow paths are disrupted by subsidence, these should be re-created in consultation with wetland and aquatic specialists. The rehabilitation plan compiled for the goaf areas (Golder, 2009) should be implemented for areas of subsidence.	Rehabilitation Plan (Golder, 2009). Quarterly biomonitoring. Wetland rehabilitation plan.	SHE Manager
2	Operation	Stooping	Depressions formed within wetlands due to subsidence will increase water storage within the wetlands, reducing flow to downstream wetlands. Additionally, surface subsidence and the associated subsurface fracturing of the rock strata can lead to increased ingress of surface water into the underground mine workings, reducing flow in downstream wetlands.	Decreased flow in downstream wetlands:	-	H	-	H	Difficult to mitigate unless surface subsidence is prevented under wetlands. Where flow paths are disrupted by subsidence, these should be re-created in consultation with wetland and aquatic specialists. Where impoundments are created by surface subsidence, the opportunities and desirability of reshaping such areas to again drain to downstream reaches should be investigated by suitable specialists, including specialists in the field of wetlands/aquatic ecology.	Matla monitoring programme (surface water, groundwater, biomonitoring). Rehabilitation Plan (Golder, 2009). Quarterly biomonitoring. Wetland rehabilitation plan.	SHE Manager

3	Operation	Stooping & Goaf areas	Increase in alien vegetation due to disturbance to wetland habitat and goaf areas where rehabilitation has taken place.	Alien vegetation increase.	-	M	-	M	An alien vegetation management plan must be drawn up for all surface areas under the control of Matla. This plan should provide clear management measures for the various alien invasive species on site. Regular alien vegetation surveys should be undertaken. Special attention should be paid to areas disturbed by surface subsidence.	Alien vegetation management plan. Inspection Schedule.	SHE Manager
4	Operation	Stooping & Goaf areas	Activities undertaken on subsided areas will require the movement of soil and the exposure of bare soil areas to erosion. Eroded sediments are likely to enter wetlands and watercourses leading to increased turbidity and increased sediment deposition.	Increased sediment movement into wetlands	-	M	-	M	All sediment moving activities within wetlands should be undertaken during low flow periods. Rapid revegetation of disturbed soils is vital and must be insured. Regular follow up checks are required to ensure successful revegetation and to repair any observed erosion damage. Sediment control measures such as bidim fences, hay bales etc. should be installed to limit movement of sediment away from the disturbed area.	Matla monitoring programme (surface water, groundwater, biomonitoring). Rehabilitation Plan (Golder, 2009). Quarterly biomonitoring. Wetland rehabilitation plan.	SHE Manager
5	Operation	Stooping & Goaf areas	Salinization as a result of ponding	Salinization of wetlands	-	H	-	M	Reshape topography to avoid topography. A surface rehabilitation plan should be compiled. This should be implemented during the operational, closure and rehabilitation phases.	Matla monitoring programme (surface water, groundwater, biomonitoring). Rehabilitation Plan (Golder, 2009). Quarterly biomonitoring. Wetland rehabilitation plan.	SHE Manager
6	Operation	Stooping & Goaf areas	Alteration of drainage patterns through reshaping of goaf areas as well as subsidence from stooping.	Catchment alteration	-	M	-	M	Effective diversion of clean storm water, by implementation of the proposed storm water management plan should reduce the impacts of reduced catchment runoff. Adhere to Storm Water Management Plan.	Matla monitoring programme (surface water, groundwater, biomonitoring). Rehabilitation Plan (Golder, 2009). Quarterly biomonitoring. Wetland rehabilitation plan.	SHE Manager

7	Operation	Goaf areas	Rehabilitation measures implemented which affect the wetland ecology of the Hydro-Geomorphic (HGM) units for goaf areas: • Re-profiling, re-shaping and re-sloping of the areas affected by subsidence; • The development of a series of small ponds along the wetland areas to serve as sediment traps, to reduce speed of run-off flow, and to allow the establishment of wetland vegetation, which will have a filtering and cleaning effect on water quality • Aggressive revegetation of the area as for side slopes; and • Evidence of redirection of the flow paths through barriers to reduce the speed of run-off flow through the wetland areas.	rehabilitation of goaf areas	+	M	+	M	Rehabilitation measures already implemented. Rehabilitation measures implemented which affect the wetland ecology of the Hydro-Geomorphic (HGM) units for goaf areas: • Re-profiling, re-shaping and re-sloping of the areas affected by subsidence; • The development of a series of small ponds along the wetland areas to serve as sediment traps, to reduce speed of run-off flow, and to allow the establishment of wetland vegetation, which will have a filtering and cleaning effect on water quality • Aggressive revegetation of the area as for side slopes; and • Evidence of redirection of the flow paths through barriers to reduce the speed of run-off flow through the wetland areas	Matla monitoring programme (surface water, groundwater, biomonitoring). Rehabilitation Plan (Golder, 2009). Quarterly biomonitoring. Wetland rehabilitation plan.	SHE Manager

5.6 Issues and Responses from Public Consultation Process

Public participation is an essential and legislative requirement for any environmental authorisation process. The principles that demand communication with society at large are best embodied in the principles of the National Environmental Management Act 1998 (Act No. 107 of 1998) (NEMA), South Africa's overarching environmental law.

Section 41 (4) of the NWA provides that the competent authority, the DWS, may, at any stage of the application process, require the applicant to place a suitable notice in newspapers and other media, and to take other reasonable steps as directed by the competent authority to bring the application to the attention of relevant organs of state, interested persons and the general public. The required Public Participation Process (PPP) is outlined in the Government Notice Regulation 267, Regulations Regarding the Procedural Requirements for Water Use Licence Applications and Appeals published in Government Gazette 40713 on 24 March 2017.

The Public Participation Process (PPP) for this consolidation application forms an integral part of the environmental authorisation application in terms of the following legislative processes:

- MPRDA: Section 48 (f) and 49(f) respectively of the MPRDA regulation R527, published in terms of Section 107(1) of the MPRDA Government Gazette No. 26275, dated 23 April 2004;
- NEMA: Chapter 6, GN R982, Government Gazette No. 38282 dated 4 December 2014; and
- NWA: Section 41 (4) of the NWA, GNR 267 Government Gazette 40713 dated 24 March 2017.

Due to the legislative requirements listed above, the PPP has been integrated as far as possible to present all environmental authorisation application processes to Interested and Affected Parties (I&APs). Due to the Environmental Authorisations required for this project the information presented herewith was attained from the PPP report, compiled for the Environmental Authorisation Process (refer to Annexure L).

5.6.1 Purpose of PPP

The PPP process ensures that all stakeholders have an opportunity to raise their comments as part of an open and transparent process, which in turn ensures for a complete comprehensive environmental study. The purpose of PPP and the engagement process is to:

- Introduce the proposed project;
- Explain the authorisation and PPP processes to be undertaken;

- Determine and record public issues and concerns;
- Provide opportunities for public input and gathering of local knowledge;
- Inform a broad range of stakeholders about the project and the environmental process to be followed;
- Establish lines of communication between stakeholders and the project team;
- Identify all the significant issues in the project; and
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent environmental impacts, associated with the project.

This section of the report documents the process that has been followed to date with respect to consultation of I&APs, stakeholders and the Government Authorities.

5.6.2 Identification of Interested and Affected Parties (I&APs)

The following stakeholder groups were identified and informed of the project:

- Landowners;
- Lawful occupiers of land;
- Relevant authorities;
- Utilities; and
- Members of the public within the Kriel area.

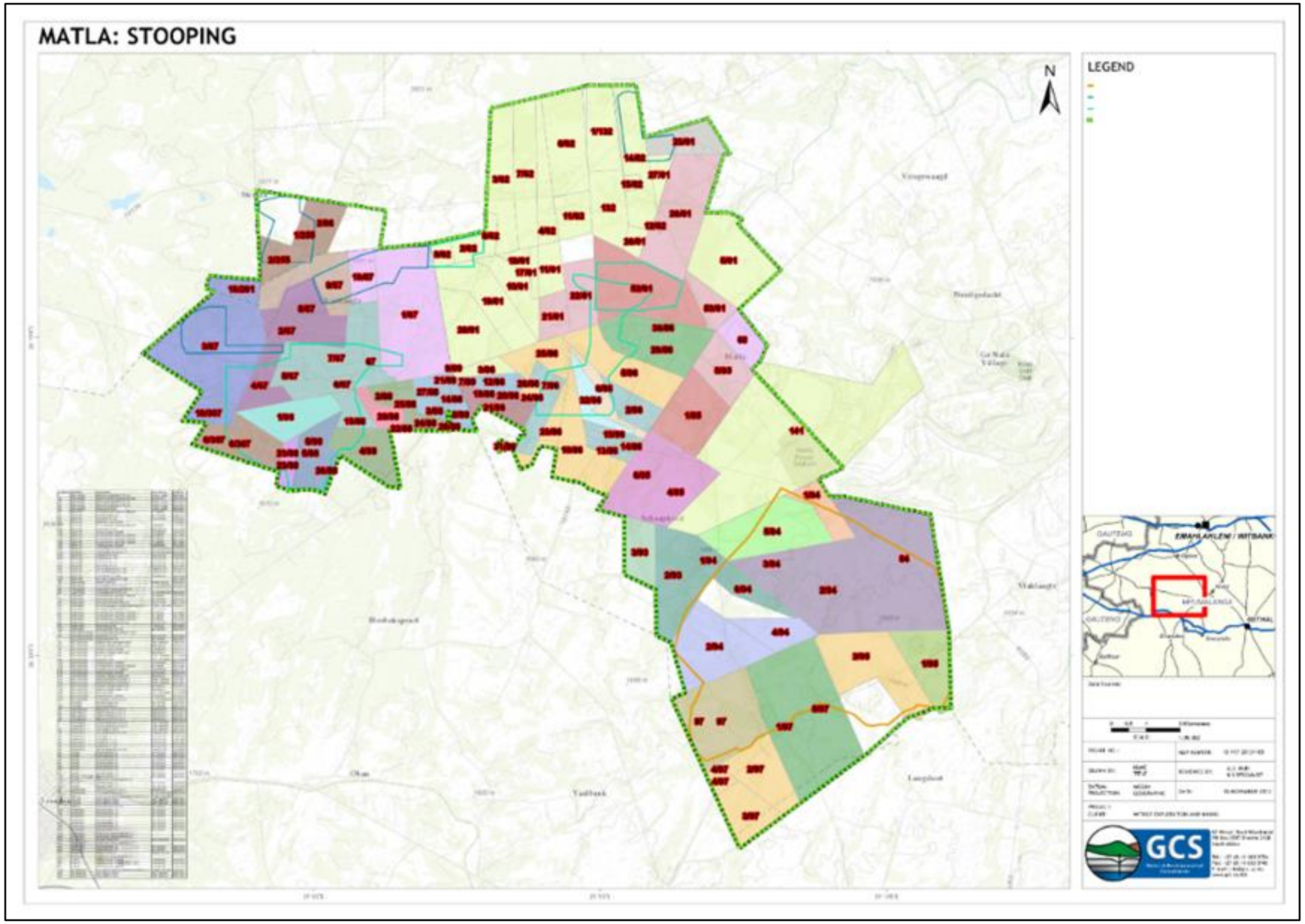
The existing Database for the Matla mine was updated for the proposed development. The database contains the contact details of the landowners, local, provincial and national authorities as well as all people who requested registration.

5.6.2.1 Landowner Consultation

Landowners were consulted in the following manner:

- Written communication (Background Information Document) sent via email, fax and registered mail;
- Public Open Day on Thursday, 9 November 2017 at the Kriel Golf club.

See Figure 5.22 for surrounding and neighbouring land owners



(Map not to scale – refer to Annexure Q for A3 Figures)

Figure 5.22: Surrounding Landowners

5.6.2.2 List of Authorities Consulted

The following authorities were informed, in writing, of the project application processes being undertaken:

- Department of Minerals and Resources (DMR);
- Department of Water and Sanitation (DWS);
- South African Heritage Resources Agency (SAHRA);
- Mpumalanga Tourism and Parks Agency (MTPA);
- Department of Agriculture, Forestry and Fisheries;
- Department of Roads, Transport and Public Works (DRTPW); and
- Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA).

These authorities were automatically registered as I&APs on the stakeholder database developed for the project.

5.6.3 Notification of Stakeholders

Various methods of written notification were utilised to inform the I&APs. These are discussed in the sections below. The process undertaken thus far is described in this section of the report and proof thereof is included in the Stakeholder Engagement Report attached herewith as Annexure L.

The notification letter, site notice, advertisement and the BID documents which were used to notify stakeholders and the public of the project contained the following information:

- The geographic location of the project;
- The name of the applicant;
- The reference numbers issues for the environmental authorization application which were issued by the DMR;
- The applications being undertaken in terms of the MPRDA, NEMA and NWA;
- The listed activities being applied for in terms of the NEMA regulations and listed activities in terms of the NWA;
- An invitation to register as an I&AP;
- The contact details and deadline for registration; and
- Notification that a public meeting will be held to present the project (as part of the NEMA and NWA).

5.6.4 Site Notices

Site notices were placed at six (6) locations around the proposed project area. The locations can be seen on Figure 5.23. A copy of the site notices is included in the proof of public participation document included as Annexure L.

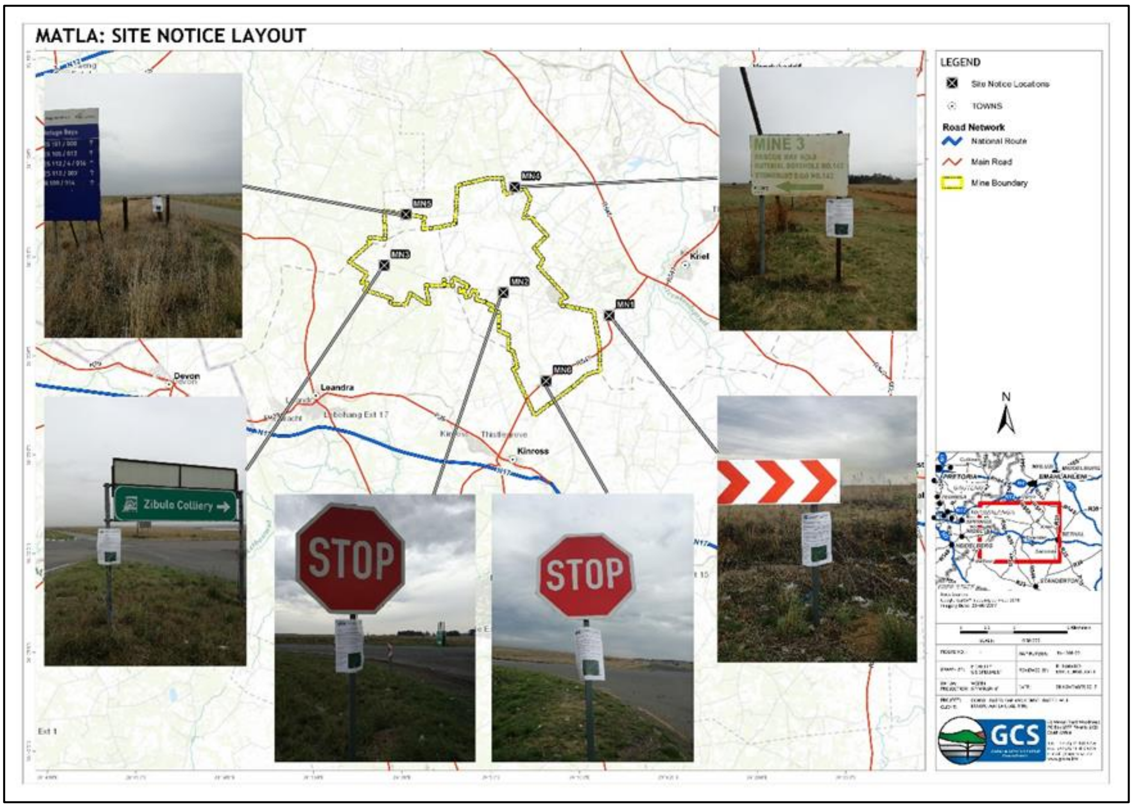


Figure 5.23: Site Notices Map

5.6.4.1 Media Advertisement

Advertisements, according to Regulation 41 of NEMA regarding the project background, the assessment process being followed, the availability of the draft Scoping Report (DSR) for public comment and a public meeting were placed on 27 October 2017 in both the Witbank News and the Ridge Times. Proof of Advertisements can be seen in Annexure L.

The draft EIA/EMP and IWULA reports will be advertised in the same papers and proof thereof included in the final EIA/EMP and IWULA.

5.6.4.2 Background Information Documents

Background Information Documents (BIDs) were distributed via email and fax to the following people listed on the Matla stakeholder database:

- Landowners of the properties within the proposed Project Area;
- Local, provincial and national authorities;

- All I&APs who contacted GCS following the placement of the advertisements, and
- BIDs (including registration forms) were placed on the table at the Public Meeting.

5.6.4.3 SMS and Email Notification

The existing database was notified via SMS an Email notifications prior to meetings. Further notifications was sent whenever documentation was placed on the GCS website for public review.

5.6.5 Public Meetings

5.6.5.1 Introductory and Scoping Phase Public Meeting

A public Meeting was held on Thursday, 9 November 2017 at the Kriel Golf Club, Kriel. Minutes and an attendance register were taken and are presented in Annexure L.

5.6.5.2 EIA/EMP phase

During the draft EIA/EMP phase, a Public Open Day and Meeting will be held on a date that is still to be confirmed. Minutes and an attendance register will be taken.

5.6.6 Authorities Consultation Meetings

Meetings were held with the competent Authorities (DWS – 23 November 2016 and DMR – 6 December 2016) prior to submission of the application form, in order to confirm the listed activities and process going forward with regards to the consolidation of the EMP's and the IWUL's. Another meeting will be scheduled by the time of submission of the final EIA/EMP.

5.6.7 Stakeholder Database

The existing Database for the Matla mine was updated for the proposed development. The database contains the contact details of the landowners, local, provincial and national authorities as well as all people who requested registration. This is included in Annexure L.

5.6.8 Issues and Response

5.6.8.1 Issues raised by the public

Issues and concerns raised to date have been recorded and included in the Issues and Response document. These issues can be seen in Table 5.37.

5.6.8.2 Issues raised by the commenting Authorities

Any issues received from Commenting Authorities will be recorded and presented as the process progresses.

Table 5.37: Issues and Response

No	Comment Raised	By Whom	Where and Date	Response by EAP
1	Would like to offer medical services to the mine	Sue Naidoo	telephomically 07/11/2017	Contact person at mine's details were sent.
2	Eskom is not a commenting authority rather an interested and affected party. Please change this on the front page of the scooping report. • On the second page the subject line states " Scooping report for listed activities associated with Mining Right and/or Bulk sampling activities including trenching in cases of Alluvial Diamond Prospecting" Is this not supposed to be for coal mining instead of diamond?	Shumani Mavhungu	Email, 14/11/2017	Comment noted, and the EAP also informed the IAP that the template was a standard template used, and therefore the title on the Page.
3	Questioned how the condition of the groundwater will change, and will there be any seepage of polluted water. He also stated that they have problems with boreholes drying up with the mining taking place.	Dirk Grobler	Scoping public meeitng, 09/11/2017	Explained that the groundwater study will look at what the current status of the groundwater is. She stated that after mining, the groundwater should return to normal levels and that the groundwater study will also look at how long it will take for the groundwater to return to the normal groundwater level. She stated further that the specialist will be able to tell how far the pollution plume will migrate, if any, and how long this will take to reach a steady state after mining. Also, she mentioned that Matla is undertaking groundwater monitoring which is usually done quarterly as a minimum. The data recorded from the monitoring will be included in the reports and made available to you so that you can see what the trends were for the past 4 years. Further she stated that with stooping there will not be an increased discharge or abstraction from the mine and that it is just a continuation of what is currently happening.
4	Queried the location of the new shaft.	A. Boshoff	Scoping public meeitng, 09/11/2017	Stated that it will be in the South-East area of the mine (pointing it out on the screen)
5	Wanted to know when the shaft will be built	A. Boshoff	Scoping public meeitng, 09/11/2017	They wanted to start building the shaft 5 years ago, but it will cost R 1.8 billion to establish the shaft and all other infrastructure. SB said that they are in a captive agreement with Eskom, so they are waiting for Eskom to provide the funding for the shaft's construction. He stated that Eskom has already approved it, but it is delayed because the Minister of Public Enterprises still has to approve it. He concluded that they will start with construction of

No	Comment Raised	By Whom	Where and Date	Response by EAP
				the shaft when the money is there, but they don't know when that will be.
6	Raised his concern about where the people are going to live during the construction of the shaft and how they will get to work, because he is worried that the construction workers will trespass or settle on his property during the construction phase of the shaft.	A. Boshoff	Scoping public meeitng, 09/11/2017	Explained that before construction starts, there will be a site establishment the area will be fenced and guarded by security. There will be strict access control.
7	Stated that she is concerned about where the workers, during the shaft's construction, will live, and that she is worried they will build houses nearby and then trespass on her property and also dump garbage on her property. She also wanted to know if there is going to be a noise impact study because they already have a problem with noise.	N. Boshoff	Scoping public meeitng, 09/11/2017	Explained that with regards to noise pollution, the application for the new shaft was already done and was completed, so we are just consolidating everything in one document. Thus, the noise impact was already assessed and we are just putting together all the studies into one document. She stated further that in terms of the stooping, we have not included noise studies because this activity takes place underground. RJvR: Responded by stating that Matla will have to appoint an ECO (whether internal or external) to manage construction. In terms of the original Environmental Management Plan (EMP) that was done there would be certain activities identified to be undertaken during construction phase. There would be demarcation of the area, then land clearance and after that the construction will start. So the ECO has a legal duty in terms of the National Environmental Management Act (NEMA) to make sure that all of those issues and the decisions made and agreed to within that construction plan is implemented on site. She explained that one of their responsibilities is exactly one of your concerns around where people are staying. It is up to the ECO to determine that people are not staying on the neighbouring farms without permission. The ECO has to do monthly audits through to the Department when they are doing the construction, and this is in terms of NEMA and the Mineral and Petroleum Resources Development Act (MPRDA), both being managed by the Department of Mineral Resources (DMR). It is important to understand who the ECO is at the time of construction, and that that person has to communicate with every person in the area that is affected. The ECO has to be on site every day during the time of

No	Comment Raised	By Whom	Where and Date	Response by EAP
				construction which is usually a 12 month to a 2 year process. You as the public would then report any issues to that person and he/she will then report on the issues to the department. Usually noise monitoring will be more from a health and safety perspective, but it also includes some of the environmental acoustic noise. She said that she hasn't seen that EMP, however she would assume there will be some noise monitoring that would take place.
8	Sated that she doesn't see any rehabilitation being undertaken. She complained about dust from the ash dumps when there are strong winds, which is so bad that she can't see where she is driving. She stated that she would like to know how the rehabilitation will take place.	N. Boshoff	Scoping public meeitng, 09/11/2017	Responded by stating that the consolidation report addresses all of the impacts currently on site in terms of all the activities. So it would look at the rehabilitation of the water treatment plant, it would look at the rehabilitation of the entire plant area. She explained further that the consolidation is trying to take all of the bits and pieces from the various authorisations and putting them into one document so that it makes it easier for the mine to manage their commitments. The mine has multiple rights, so to audit each one separately they easily start losing track of what's going on. The whole aim of what we are doing is to bring that into one process so that the mine has a better understanding of what the requirements are of them, and better controls can be put into place to be able to manage it. In terms of the rehabilitation, it is a long term process. Rehabilitation on average is up to 3 years depending on what you rehabilitate. The problem with the ash dumps are something that should be taken up with Eskom as it is on their properties. From Matla's perspective, through doing this consolidation, they will be able to put in a monitoring plan for the entire site. Matla does monitoring already, it's now just a matter of streamlining it and making sure that everything is addressed. Legally the new requirements under NEMA requires an annual or 2 year audit depending on what the department says of the entire mining right area, in terms of that EMP. Those audits now need to be released to the public. You will have the same information at hand as what Matla does. You will be able to see where the issues lie, and you have the opportunity to hold them accountable to

No	Comment Raised	By Whom	Where and Date	Response by EAP
				that. Changes in legislation in the last 2 years have empowered the I&AP's. The new EMP will fall under that process.
9	Stated that he is concerned about people walking over his land. He also queried how the shaft is going to be constructed? Will there be any blasting because his house is quite old.	A. Boshoff	Scoping public meeitng, 09/11/2017	Stated that it is an incline shaft that will be developed, so essentially you will dig until you find solid ground using normal excavators and then once you get to solid ground there will be blasting taking place but it will go underground. So with the blasting there will be the necessary monitoring equipment to monitor the blasting underground and the air blast. There are two things that might impact on infrastructure, the air blast and the vibration, and both those two things will be monitored.
10	Wanted to know if the land is currently vacant where the blasting is going to take place and are there any people residing nearby and is there a plan if the blasting will indeed affect those people?	Thozamile Ndaba	Scoping public meeitng, 09/11/2017	there aren't any people living in the vicinity of those areas to their knowledge. He also stated that it is Eskom property and they have a land manager that manages leases on all properties and they have given Matla the go-ahead to those areas. He concluded that if there are indeed relocation, it would be on Eskom's side, as they are the land-owner. Indicated on the screen that all the stooping areas will be underground, and that those pillars will be excavated and not blasted. She stated that there won't be blasting for mining and that blasting will only be for the new shaft. Explained that the stooping areas were chosen in areas where it will not affect surface infrastructure, or communities. It will also not be directly under rivers and streams.
11	Wanted to know about the remaining areas and if they will also be subject to stooping	Dirk Grobler	Scoping public meeitng, 09/11/2017	Explained that the mine is very old, and that it started in 1978. He stated that since stooping is a very technical mining method, you cannot go back to old areas. It is an extensive process where they would first assess the stability before certain pillars can be stooped. If you stoop old pillars, it may pose a safety risk to the workers.
12	Wanted to know how she can give her comments to be included in the document.		Scoping public meeitng, 09/11/2017	Answered that if she received the invitation via sms, then she can reply with her comments on the sms and we will receive it, and then include the comments in the comments register.
13	asked if the mine will appoint local people to construct the new shaft, and how will the local people know about it.	Thozamile Ndaba	Scoping public meeitng, 09/11/2017	answered that it does form part of the mine's Social and Labour Plan (SLP), to first look at employing local people and making use of local small business' to contract for work.

No	Comment Raised	By Whom	Where and Date	Response by EAP
				It is the mine's responsibility to identify all the possible candidates within the local community before appointing anyone. There will be some type of forum where people will be able to apply for jobs, and the mine will also have the database from this Public Participation Process to work from.
14	requested that GCS run through the presentation with her as she arrived late. stated that her property was Grootpan, Portion 86 and that she ran a guest house on the property called "Pa se Huis", and that she was concerned that any stooping operations would result in significant amounts of water referring to her property as she was at the lowest point in the area and she had previously been told by a consultant that any activities near her property would result in her property being flooded. ERW was concerned that any activities would result in a concentration of water at the low point of her property which would result in flooding. RJvR said that she would request the appointed specialists to consider this statement and address any such issues in their reports. Stated that a representative, Faith, from another mining company, Blue Nightingale, had approached her as the identified owner of Haasfontein, portion 6, stating that they had been awarded a Mining Right (MR) over the property. ERW stated that she was not the owner of Haasfontein portion 6, but in fact of Grootpan portion 86. ERW queried with the representative of the mining company how a MR had been approved if Matla had a MR over the area, and the representative replied that it was because they were going to be mining a different coal seam. ERW stated that the same representative indicated sometime thereafter that the process had been	E. Robertson-Walker	Scoping public meeitng, 09/11/2017	GCS thanked her for the information provided and said that GCS would investigate the situation further.

No	Comment Raised	By Whom	Where and Date	Response by EAP
	placed on hold until further notice. ERW provided RJvR with the contact details of the representative in order for GCS to request copies of the specialist assessments undertaken by them.			

5.6.9 Document Review

The Draft Reports of the ESR was made available for public review for the period 26 October 2017 to 27 November 2017, The EIA/EMP and IWULA/IWWMP will be placed in public domain for public review and comments from xxxxxxxxxx: The IWULA/IWWMP will be placed in public domain for public review for a period of 60 days as per the requirements of GNR 267.

All documents for public review was placed on the GCS website for download by stakeholders. SMS, fax and email notification was sent to the stakeholders to notify them of the documents available for review.

5.7 Matters Requiring Attention/Problem Statement

Not applicable to this application.

5.8 Assessment of Level and Confidence of Information

All information contained in this IWULA/IWWMP was sourced from the specialist studies conducted for the project area, the EMP compiled and information and policies sourced from the client directly as well as the issued IWULs.

The specialists appointed to undertake the various investigations are considered to be competent in their particular fields. In light of the above, the level of confidence with regards to the information and reports used to compile this document is high.

6 WATER AND WASTE MANAGEMENT

6.1 Water and Waste Management Philosophy

The following objectives/goals have been put into place to ensure the correct management of the water at Matla.

6.1.1 Potable Water

The following objectives/goals relate to potable water:

- To ensure the continued protection of the natural resources;
- To conduct all activities in such a manner that will not pose a threat to the quality of natural resources including the aquatic bio-diversity and habitat integrity;
- Meeting performance objectives of all the conditions related to the environmental authorisations;
- Working towards the catchment management strategy once that has been developed;

- Ensuring that management and mitigating measures implemented is at all times sufficient for the protection of the natural aquatic environment; and
- Ensuring that siltation risks are managed through erosion protection, concurrent rehabilitation, effective sloping and the maintenance of silt traps.

6.1.2 Process Water

The following objectives/goals relate to Process Water:

- Optimise the re-use of process water;
- Optimise the operation of the water circuit with the least possible losses;
- Manage water quality according to the performance objectives included in the conditions of all the environmental authorisations;
- Ensure that water quality remains within the requirements set by DWS;
- Ensure that the integrity of the system is of such a nature that it will allow for 0% discharge other than those discharges authorised in terms of Section 21(f) of the IWUL; and
- Management of the process water infrastructure in such a manner that risk will be avoided

6.1.3 Storm Water

The following objectives/goals relate to Storm Water

- To ensure at all times the effective separation of clean and dirty water and the protection of clean water;
- Ensure that dirty water footprints are reduced to the smallest possible catchment size;
- Implement a storm water management plan on site based on best practice principles;
- Effective maintenance of all storm water structures and infrastructure; and
- Containment and re-use of dirty water in the process.

6.1.4 Groundwater

The following objectives/goals relate to Groundwater:

- Conduct all activities in such a manner that it will not pose unnecessary threats to the groundwater resources in terms of quality and quantity;
- Ensure that the conditions and water quality objectives of the future IWUL conditions are met;
- To ensure that all liners remain intact to protect the groundwater environment;
- Conduct groundwater monitoring on a quarterly basis to assist in identifying risks early so that management measures can be implemented timeously;

- Inspect and monitor all aspects that lead to the protection of the groundwater regime on a regular basis; and
- To update the groundwater model at least every five years.

6.1.5 Wastewater Treatment Facility

The following objectives/goals relate to the Waste water Treatment Facility:

- Ensure that sewage and related facilities comply with Regulations and Guidelines;
- Ensure that the best operating and management measures are applied;
- Ensure that water quality of the treated effluent discharged into the respective water courses remains within the requirements set by DWS;
- Prevent any pollution to soil or water resources by ensuring and monitoring the integrity and effectiveness of the system; and
- Regular maintenance and inspections is conducted to prevent pollution.

6.1.6 Pollution Control Dams/Dirty Water Containment Facilities

The objectives set for the dirty water system, including settling ponds, are to:

- Ensure compliance to all best practices in terms of the construction and the operation of the dirty water systems;
- Maintain the integrity of the dirty water system, including the berms, bunds and drains;
- Ensure that all dirty water systems are cleaned and maintained on a regular basis;
- Rehabilitate disturbed areas as per the closure objectives in order to address all environmental impacts as far as possible and practical;
- Infrastructure was designed for 1:1 00 year peak flows;
- The clean water control outside the mine consists of cut-off berms and trenches that will direct the water around the mine, underneath access roads with culverts and back to the natural water courses and river. Concrete lined drains was constructed in areas with steep slopes;
- The mine dirty water control consists of infrastructure to direct water to drains throughout the mine complexes and plant areas. The drains channel the water into the pollution control dams;
- The clay lining of the pollution control dams remains intact and inspected regularly to assess integrity of the clay lining. Where possible and applicable, pollution control dams are HDPE lined to prevent leakages and ingress into ground water and possible contamination of the surface and ground water;
- All the pollution control dams are designed to have an 0.8m freeboard;

- The pollution control dam storm water return design philosophy consist of pumping the water back into the system and therefore not compromising the storage capacity of the dams, which could cause them to spill to the environment;
- The basis of the design for clean and dirty water control entails that no polluted water will spill or mix with clean water and contaminate it; and
- Where applicable, pollution control dams are supplied with a silt trap in order to minimise the loss of capacity due to siltation.

6.1.7 Waste

A risk assessment approach is adopted for the waste management philosophy on site. The normal sequence of controlling the source of waste management is followed and includes the following steps.

- Eliminate:
  - Remove the waste source;
  - Substitute for a less waste; and
  - Stop waste practices.
- Control at the source:
  - Restrict waste: Contain or attenuate the waste source; and
  - Proper maintenance and good housekeeping of plant, equipment and machinery.
- Minimize.
  - Restrict waste. (Admin. controls); and
  - Competent on-going supervision is needed to ensure compliance.

6.2 Strategies

6.2.1 Process Water

Additional process water management practices and strategies include:

- Capturing of all dirty water and "dirty water run-off "and diverting it to the process water dams / settling dams/pollution control dams for re-use;
- The clay/HDPE lining and regular inspection of the lining of all process water and pollution control dams;
- Maintenance teams from the mine are always available and conduct regular inspections of the sewage treatment works at the Mine complexes, including engineers and electricians. Water quality is monitored on a regular basis to ensure optimised functioning and to ensure that discharge into the watercourses falls within the authorised limits if the IWUL;
- Process water is reused in the process to decrease the demand on potable water;

- A monthly surface and groundwater monitoring programme is carried out at all process water dams;
- Maintenance is done to all process water channels through cleaning and the cutting of grass;
- Grass is cut at all process water dams;
- Where process water is piped, pipes are inspected at regular intervals, according to a maintenance and monitoring schedule;
- Dirty water from the workshop areas is captured in trenches which run to sumps and oil separators. Once the oil is separated from the dirty water, the dirty water is allowed to flow to the pollution control dams, while the dirty oils area collected and removed from site by an approved accredited company ;
- All wash bays areas have been be equipped with cut off trenches to ensure that spillages are contained.

6.2.2 Storm Water

Storm water management practices and strategies at the mine include:

- Clean and dirty separation;
- Channels and/or upstream cut-off trenches to divert clean water away from the surface infrastructure to the natural environment;
- Collection of dirty water in a network of trenches diverts water to the respective pollution control dams/dirty water containment facilities;
- Silt traps to trap all silts, thereby protecting the dirty water infrastructure against siltation;
- Regular maintenance of all storm water management infrastructures according to a monitoring and maintenance schedule;
- Cutting of grass in and adjacent to storm water infrastructure;
- Slopping and shaping of areas to ensure that storm water is drained via the storm water management channels;
- Concrete lining of channels where erosion may occur; and
- Stone pitched drainage channels throughout the surface infrastructure.

6.2.3 Groundwater

The risk of seepage of dirty water or potentially dirty water into groundwater resources are reduced through:

- Paving of large areas that can potentially contribute to groundwater pollution;
- The lining of dirty water infrastructure with clay/HDPE liners; and

- Confine activities that can lead to pollution, for example wash bays, to specially prepared areas.

Further groundwater management strategies include:

- A groundwater monitoring programme has been implemented for the mine;
- Trend analysis of the historic data is taking place to ensure that negative trends can be picked up and remediation done if required; and
- The groundwater model is updated on a regular basis to ensure that any plumes that may form are identified.

6.2.4 Waste

The mine's Waste Management Procedure (ENVP16) is applicable at all Matla shafts, complexes and associated areas and is attached as Annexure N to this report. The scope of the document is to provide a procedure that specifies a waste management program to handle, contain, control and dispose of waste generated from activities, products, services and facilities at Matla Mine to prevent pollution of the workplace and the environment.

To ensure the effectiveness of waste management, it is essential that waste is separated at source according to Matla coal waste stream classification (Annexure N):

- Hazardous waste – BLACK
- General waste – GREEN/WHITE
- Toxins – BLUE
- Medical – RED
- Expired Medical Waste – Green
- Used Needles - Yellow

After separation, waste is stored in designated areas where pollution from waste is minimised. Where possible, waste products are re-used or recycled. A contractor removes all waste from site for safe disposal

6.3 Performance Objectives/Goals

The following objectives and strategies are followed in order to achieve the Safety, Health, Environment and Quality Policy:

- Compliance:
    - Identify all applicable legislation and other applicable requirements to the identified environmental aspects and will ensure that the operations remain in compliance with such legislation and requirements.

- Pollution Prevention:
  - Identify the impacts that all operations, processes and products have on the environment and ensure that pollution on the environment is prevented or minimised.
- Improvement:
  - Set objectives and targets to improve environmental performance and the Environmental Management System and will continually strive to find even better sustainable solutions to problems.
- Competence:
  - Ensure that all people who perform work for or on behalf of Matla are competent and understand the impact of their activities on the environment, and their role in the prevention of pollution and the maintenance of the Environmental Management System.
- Communication:
  - Actively communicate this policy to persons working for and on behalf of Matla to ensure that they understand the content intent, and will make it available to the public.
- Review:
  - Review the continued sustainability and adequacy of this policy at least annually to ensure it remains valid at all times.

6.4 Measures to Achieve and Sustain Performance Objectives

The IWWMP must clearly demonstrate that they have incorporated all of the above objectives/principles or, alternatively, must clearly motivate why any of the above principles are not relevant.

The water resource can be protected in the following ways by applying water conservation, pollution prevention and minimisation of impacts principles:

- Reduction in the level of contamination of water through implementation of pollution prevention strategies thereby increasing the economic reuse of the water without treatment; and
- Minimisation of impacts through capture, containment, reuse & reclamation of contaminated water thereby preventing discharges/releases.

6.5 Option Analysis and Motivation for Implementation of Preferred Options

Several Alternatives with regards to the stooping activities were assessed are discussed in the sections that follow:

6.5.1 Mining Method alternative

6.5.1.1 Stope and fill

Where large bulk ore bodies are to be mined at great depth, or where leaving pillars of ore is uneconomical, the open stope is filled with backfill, which can be a cement and rock mixture, a cement and sand mixture or a cement and tailings mixture. This method is popular as the refilled stopes provide support for the adjacent stopes, allowing total extraction of economic resources.

This method is not preferred due to it being economically unviable due to the material required for filling.

6.5.1.2 Development op Open Cast Pits

Open-pit mining (as opposed to underground mining) has several advantages:-

- Low cost of recovery - large trucks can enter the mine, get filled up with rock from a large excavator and drive away to the processing plant;
- No need to leave stability pillars, necessary to hold up underground mine workings but which may contain valuable ore that is effectively lost to the mining company;
- Ease of beneficiation - surface mines are usually composed of materials (oxides in the case of metalliferous mines) that are easier to handle and easier to treat in order to recover their marketable product as a result of being so close to surface; and
- Safer environment - less problem of rock falls, hanging wall collapse resulting in a lower injury rate than in underground mine.

However the areas proposed to be stooped, are too vast for the development of opencast pits, and would prove economically non-viable. In addition, this method will have a greater impact on the biophysical environment. As with all forms of large-scale mineral extraction, opencast mining can have a negative impact on the surrounding environment and ecosystems.

The removal of the overburden destroys the pre-existing landscape and contributes to erosion. Even after final rehabilitation of the pits have been completed, the geology of the area is completely destroyed, which will cause ongoing issues, especially in terms of decant water.

6.5.2 No-Go Alternatives

If the mining operation were not to proceed, the potential environmental impacts associated with mining is not expected to occur, and the continued impacts associated with current agricultural and livestock grazing practices would continue.

If the mining operation were to proceed then the proposed stooping project would have the following anticipated positive social impacts:

- Increase the longevity of the mine, enabling long term employment opportunities;
- The continued contribution to the local municipal tax base;
- The continued involvement of Matla with regards to training and capacity building of its employees and subsequent improvement of the livelihoods of the employees' families; and
- The commitment of Matla Mine with regards to social development project and support.

If the proposed mining operation does not proceed, then all the potential positive benefits, as described, would not materialise.

6.6 IWWMP Action Plan

Refer to Table 6.1 for the IWWMP Action Plan for the Matla operations. This IWWMP Action Plan should be implemented for the entire mining right area and should be updated according to the consolidated EMP and IWUL once issued.

Table 6.1: Matla IWWMP Action Plan

Responsibility	Monitoring Actions
Daily Inspection, Observations and Monitoring Activities	
Mining Personnel	General housekeeping. All waste to be deposited in demarcated bins at the Mine Complexes.
	Daily inspection of surface areas.
	All maintenance / fitting activities to be conducted on concreted areas.
	Activate dust suppression system on non-rainy days immediately prior to the use of the roads by the haul truck. Activate dust suppression on the stockpiles as required.
Grade C and higher	Undertake workplace observations in all areas of the operation and document findings accordingly.
Selected representative	Any water leaks identified must be reported and leaks fixed immediately.
Environmental Officer	Daily monitoring of the brine ponds and various waste water facilities, for leakage should be undertaken.
All personnel	Notify environmental department of any hydrocarbon spills immediately (regardless of size). All hydrocarbon spills must be cleaned up immediately. Mine procedure should be followed.

Responsibility	Monitoring Actions
Weekly Inspection, Observations and Monitoring Activities	
Environmental Officer	Weekly inspection of the pipelines are required to ensure no leakage/blockage/theft occurs
Selected representative	Designated person to monitor amount of waste in waste receptacles. Should the receptacles be approaching full, measures must be implemented to empty receptacle and remove the waste from site.
Monthly Inspection, Observations and Monitoring Activities	
Environmental Officer	Monthly monitoring of water quality within adjacent pans.
	Surface water quality sampling undertaken on a monthly basis and groundwater quality sampling undertaken on a quarterly basis. Results analysed according to the monitoring programme and IWUL requirements.
	Quarterly surface and groundwater monitoring reports to be generated by the mine or through a water quality specialist
	Long term quarterly biomonitoring programme, should be implemented.
	Quarterly biomonitoring of surrounding pans (all pans within 500m radius) as per the monitoring protocol.
	Regular monitoring to ensure successful establishment of indigenous vegetation and removal of alien and weedy species should be undertaken for 2 full growing seasons.
	Review and update water balance diagram annually.
	Update waste itinerary spreadsheet.
	Compare monthly water pollution control dam rates with previous months.
	Investigate reasons for variations, if necessary, and take the appropriate action.
	Compare monthly power pollution control dam rates with previous months.
	Monitor the storm water control measures (trench and berm) along the perimeter of the plant area. If they are becoming eroded or not functioning correctly, the necessary maintenance work must be conducted.
Annual Inspection, Observations and Monitoring Activities	
Mine manager and environmental manager	Confirm the validity of all permits / registrations / licences which include, but are not limited to the renewal of all permits / registrations / licences that will expire within the coming year.
Contractors	Annual external audits of IWULs and other environmental authorisations
Environmental Officer	Annual internal audits of IWULs and other environmental authorisations
Environmental Officer	Check sewage systems.
Environmental Officer	Check waste management system and wear and tear on waste receptacles.
Post Closure Inspection, Observations and Monitoring Activities	
Mine manager and environmental manager	Regular monitoring of adjacent water resources post-closure as per the recommendations in the aquatic ecology specialist reports should be undertaken.
Mine manager and environmental manager	Water quality monitoring as well as biomonitoring should also continue well beyond closure to ensure that rehabilitation and remediation measures have been effective.
Employee Training	

Responsibility	Monitoring Actions
Environmental Officer/SHE manager	Training of all employees on water conservation and demand management. Training on the water and waste management policies of Matla

6.7 Control and Monitoring

6.7.1 Monitoring of Change in Baseline information

6.7.1.1 Surface Water Monitoring

Refer to Section 5.4.1 of this report for information pertaining to the bio-monitoring that is recommended/being implemented for Matla.

6.7.1.2 Groundwater Monitoring

Refer to Section 5.4.2 of this report for information pertaining to the bio-monitoring that is recommended/being implemented for Matla.

6.7.1.3 Biomonitoring

Refer to Section 5.4.3 of this report for information pertaining to the bio-monitoring that is recommended/being implemented for Matla.

6.7.2 Audit and Report on Performance Measures

Each component within the IWWMP has an associated audit and performance review component. Regular review and auditing is important to ensure systems are up-to-date and still relevant for current situations. Evaluation is required to verify its appropriateness and suitability by comparing performance to objectives set. Changes or adjustments to systems are required where review/auditing highlights shortcomings or gaps. Performance should be measured against:

- Internal audit (conducted annually);
- External audit (conducted annually); and
- DWS reporting (conducted bi-annually).

6.7.3 Audit and Report on Relevance of IWWMP Action Plan

All existing and new systems need to be reviewed and modified to ensure continual improvement. It is considered good practice to review or audit all systems at least annually and to update the IWWMP as will be required by the IWUL

7 CONCLUSION

7.1 Regulatory Status of Activity

The following IWULs have been issued to Matla for water uses taking place on site in terms of Section 21 of the NWA:

- Licence No: 24084303 dated 23 October 2017 (previously issued in 2007) in terms of the NWA for river diversion for Section 21 (c) and (i);
- Licence No: 24084303 dated 1 October 2010 in terms of the NWA for Integrated Water Uses for Section 21(a), (b), (f), (g), (j). Amendment issued in terms of Section 158 on the 22nd of November 2013;
- Licence No: 24084303 dated 1 April 2011 in terms of the NWA for controlled release - Section 21(f) EXPIRED;
- Licence No. 04/B11E/ABCFGIJ/2446 of 17 March 2014: Water Treatment Plant – Sections 21(a), (b), (c), (f), (g), (i) and (j); and
- Licence No. 04/B11E/ACFGIJ/3734 of 16 July 2015: New Mine 1 Shaft – Sections 21 (a), (c), (f), (g), (i) and (j).

In order to achieve a more streamlined management approach and decrease the duplication in terms of compliance with regards to the various authorisations and Licences, Matla has proposed to consolidate the various authorisation and licences.

In addition to the consolidation of all previous approved IWULs, several amendment are required to some of the existing authorised water uses. These amendment have been included in this report as part of this consolidation process and are detailed in Section 3.5.

This report serves as the technical motivation document for the consolidation of the existing IWULs, the identified amendments to existing licensed water uses and new uses in terms of Section 21 of the NWA.

7.2 Statement of Water Uses Requiring Authorisation

7.2.1 Section 21(g) Water Uses

Additional new water use activities, as defined in terms of Section 21(g) (disposing of waste in a manner which may detrimentally impact on a water resource) of the NWA have also been included into the consolidation process. The new water uses that have been included are as follows:

- Dust suppression on the stockpiles;
- Strategic main stockpile area at the plant located at Mine 1;

- The transfer stockpiles at Mine 1, 2 and 3;
- Two mega litre tanks at the Mine 2 Emergency Dam (Pan at Mine 2); and
- Sludge drying beds of the existing sewage treatment works at Mine 2 and 3.

7.2.2 Section 21(c) and (i) Water Uses

Rehabilitation is planned for panels 6, 7 and 8 of the goaf areas (surface depressions) at the Mine 2 complex. A basic framework for rehabilitation of standing water was determined and described in the feasibility design submitted to Matla. Due to the nature of the goaf areas and the rehabilitation that is planned, water uses are triggered and are required to be authorised.

Matla also proposes to stoop (or totally extract) pillars at the previously underground mined areas with the intent to reclaim the remaining coal reserves by using the conventional board and pillar mining method (drill and blast). Only phase 1 of the stooping project is being applied for. The stooping uses previously formed a separate application, however this application has not been submitted to DWS to date. As such, as per the request of DWS, the stooping uses will form part of this Consolidation process.

The water uses associated with the goaf areas as well as the stooping uses trigger water uses under Section 21 of the NWA in term of the following:

- Section 21(c) – Impeding or diverting the flow of water in a watercourse; and
- Section 21(i): Altering the bed, banks course or characteristics of a watercourse

Section 3.5 of this reports details all the amendments 9to conditions of IWULs as well as to the authorised water uses) and new uses required to be incorporated into the consolidated IWUL. Table 7.1, provides an overview of the all the water uses applicable to the consolidation. This table presents all the water uses (new, amended and existing water uses) that are required to be considered for authorisation in the consolidated IWUL.

Table 7.1: Summary of all Water Uses to be Licensed for the Matla Mine

Water Uses of Matla Coal Mine						
Section 21(a) - Taking water from a water resource.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Volume Applied for (m^3/a)**
1	Abstraction of excess underground water for storage in PCD prior treatment at the WTP	New Mine 1 dewatering	26° 17' 44.5"S 29° 09' 18.8" E		Bakenlaagte 84 IS Remaining Extent	912500 m^3/a
2	Taking of water containing waste from the underground	Mine 3	26° 14' 45.16" S 29° 04' 00.50" E		Vierfontein 61 IS ptn 21	1 460 000 m^3/a
Section 21(b) - Storing of water.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Capacity (m^3)**
3	Storage of Water in dams	Reservoir 1	26° 15.692' S 29° 07.616' E		Haasfontein 85 IS ptn 5	1000 m^3 (allowed to store 1000 m^3)
4	Storage of Water in dams	Reservoir 2	26° 15.692' S 29° 07.632' E		Haasfontein 85 IS ptn 5	2000 m^3 (allowed to store 2000 m^3)
5	Storage of Water in dams	Reservoir 4	26° 12.631' S 29° 06.155' E		Vierfontein 61 IS ptn 26	1000 m^3 (allowed to store 1000 m^3)
6	Storage of Water in dams	Reservoir 5	26° 14.847' S 29° 04.284' E		Vierfontein 61 IS ptn 21	2000 m^3 (allowed to store 2000 m^3)
7	Storage of treated water from the Reverse Osmosis Water Treatment Plant before use in the process and discharge into the Rietspruit River.	Reverse Osmosis Water Treatment Plant	26°15'21.93"S 29° 7'31.92"E		Vaalpan 68 IS Remaining Extent	10 000 m^3 (10 Ml)
Section 21(c) - Impeding or diverting the flow of water in a watercourse & Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Dimensions of diversion**
8	River diversion for continuation of mining	Rietspruit River Diversion	**Start:** 26° 13' 51.5" S 29° 03' 26.0" E	**End:** 26° 15' 21.2" S 29° 02' 59.6" E	Kortlaagte 67 IS Remaining Extent	Height: 4.6 m Width: 61 m Length: 300 m
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	
			Start	**End**		
9	Dirty water pipeline within 500 m from the wetland/pan	Dirty water pipeline	**Start Point:** 26° 15' 28.23" S 29° 07' 31.55" E	**End Point:** 26° 15' 29.27" S 29° 07' 30.43" E	Vaalpan 68 IS portion 0 (remaining extent)	
10	The construction of a Water Treatment Plant and Brine Ponds within 500m from the wetland/pan	Water Treatment Plant and Brine Ponds	**WTP Corner 1:** 26° 15' 07.47" S 29° 07' 40.73" E	**WTP Corner 2:** 26° 15' 15.29" S 29° 07' 49.42" E	Vaalpan 68 IS Remaining Extent	

			WTP Corner 3: 26° 15' 24.58" S 29° 07' 45.20" E	**WTP Corner 4:** 26° 15' 30.49" S 29° 07' 37.61" E	
			Brine Ponds: 26° 15' 20.09 S" 29° 07' 26.14" E		
11	Clean Water Pipeline crossing a tributary of Rietspruit River	Clean Water Pipeline crossing Tributary of Rietspruit	**Start Point:** 26° 14' 22.05" S 29° 06' 38.31" E	**End Point:** 26° 14' 19.32" S 29° 06' 37.06" E	Vierfontein 61 IS ptn 53
12	Clean Water Pipeline crossing various hillslope seepage wetland and unchannelled valley bottom wetlands	Clean Water Pipeline crossing various wetlands	**Start Point:** 26° 15' 28.23" S 29° 07' 31.55" E	**End Point:** 26° 15' 29.27" S 29° 07' 30.43" E	Haasfontein 85 IS portion 5
			26° 13' 41.44"S 29° 06' 19.57" E		Vierfontein 61 IS ptn 26
			26° 14' 16.04" S 29° 06' 35.57" E		Vierfontein 61 IS ptn 53
13	Gabions to act as energy dissipating structures	Gabions	26° 13' 21.18" S 29° 06' 10.44" E		Vierfontein 61 IS ptn 26
14	Construction of culverts	Culverts	26° 17' 35.4"S 29° 09' 35.3" E	26° 17' 31.8"S 29° 09' 32.9" E	Bakenlaagte 84 IS ptn 6
15	Construction of culverts	Culverts	26° 17' 35.4"S 29° 09' 29.8" E	26° 17' 31.8"S 29° 09' 32.9" E	Bakenlaagte 84 IS ptn 6
16	Artificial small ponds associated with the goaf areas within 100m of unnamed perennial drainage line. The small ponds associated with the goaf areas act as sediment traps and allow for the establishment of wetland vegetation. Establishment of artificial wetlands as a result.	Goaf areas/ponds	Top left corner: 26°12'45.34"S; 29° 3'5.24"E Bottom left corner: 26°13'1.27"S; 29° 3'6.80"E	Top right corner: 26°12'50.42"S; 29° 3'37.01"E Bottom right corner: 26°13'0.23"S; 29° 3'38.12"E	Rietvlei 62 IS ptns 3 and 7
17	Artificial small ponds associated with the goaf areas within 500m boundary of Hillslope Seepage wetland and floodplain wetland associated with the Blesbokspruit River. The small ponds associated with the goaf areas act as sediment traps and allow for the establishment of wetland vegetation. Establishment of artificial wetlands as a result.	Goaf areas/ponds	Top left corner: 26°12'45.34"S; 29° 3'5.24"E Bottom left corner: 26°13'1.27"S; 29° 3'6.80"E	Top right corner: 26°12'50.42"S; 29° 3'37.01"E Bottom right corner: 26°13'0.23"S; 29° 3'38.12"E	Rietvlei 62 IS ptns 3 and 7

Water Use No.	Stooping - Description	Activity - Stooping	Co-ordinates		Property	Affected Watercourse from Stooping
			Start	End		

18	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’14.65”S 29°05’16.55”E	26°11’30.87”S 29°05’39.42”E	Rietvlei 62 IS Portion 14	Wetlands on site; Hillslope seepage, unchannelled valley bottom and subsidence wetlands
19	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’30.13”S 29°05’21.74”E	26°11’46.07”S 29°05’23.99”E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence wetlands
20	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’35.74”S 29°05’29.85”E	26°11’42.25”S 29°05’30.17”E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence wetlands
21	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’56.05”S 29°05’25.41”E	26°12’15.46”S 29°05’28.11”E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence, hillslope seepage wetlands and pan
22	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’48.95”S 29°05’31.97”E	26°12’14.44”S 29°05’35.68”E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence, hillslope seepage wetlands and pan
23	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°11’44.98”S 29°05’38.60”E	26°12’03.91”S 29°05’41.49”E	Rietvlei 62 IS Portion 14	Wetlands on site; subsidence, hillslope seepage wetlands and pan
24	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°12’13.35”S 29°05’59.97”E	26°12’11.51”S 29°05’10.53”E	Vierfontein 61 IS Portion 27	Wetlands on site; subsidence, hillslope seepage wetlands and pan
25	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’05.40”S 29°04’30.59”E	26°14’05.84”S 29°04’41.27”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
26	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’10.67”S 29°04’33.00”E	26°14’10.90”S 29°04’41.25”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
27	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’09.46”S 29°04’47.90”E	26°14’09.42”S 29°04’53.58”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
28	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’14.61”S 29°04’47.98”E	26°14’14.61”S 29°04’47.98”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
29	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’19.63”S 29°04’50.72”E	26°14’31.11”S 29°04’51.14”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland and channelled valley bottom wetland.
30	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’40.39”S 29°04’51.69”E	26°14’47.12”S 29°04’56.32”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland
31	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’47.50”S 29°04’47.97”E	26°14’48.84”S 29°04’54.81”E	Vierfontein 61 IS Portion 22	Wetlands on site; hillslope seepage wetland
32	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’51.51”S 29°04’57.68”E	26°14’46.17”S 29°05’03.17”E	Grootpan 86 IS Portion 29	Wetlands on site; hillslope seepage wetlands
33	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14’44.96”S 29°05’06.37”E	26°14’54.24”S 29°05’06.39”E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland

34	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'42.96"S 29°05'12.26"E	26°14'52.00"S 29°05'11.80"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
35	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'43.61"S 29°05'18.70"E	26°14'49.08"S 29°05'18.05"E	Grootpan 86 IS Portion 29 & 30	Wetlands on site; pan and hillslope seepage wetland
36	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'58.21"S 29°05'00.06"E	26°15'02.91"S 29°05'02.95"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
37	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'05.85"S 29°05'07.87"E	26°15'05.88"S 29°05'17.60"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
38	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'11.54"S 29°05'11.35"E	26°15'11.98"S 29°05'17.73"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
39	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'12.54"S 29°05'24.27"E	26°15'12.10"S 29°05'36.88"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
40	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'17.03"S 29°05'24.39"E	26°15'17.98"S 29°05'31.46"E	Grootpan 86 IS Portion 29	Wetlands on site; pan and hillslope seepage wetland
41	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'40.68"S 29°04'29.72"E	26°15'58.63"S 29°04'30.67"E	Grootpan 86 IS Portion 10	Wetlands on site; pan and hillslope seepage wetland
42	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°16'01.57"S 29°04'18.59"E	26°16'01.71"S 29°04'33.47"E	Grootpan 86 IS Portions 10 & 23	Wetlands on site; pan and hillslope seepage wetland
43	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°16'09.45"S 29°04'08.31"E	26°16'07.29"S 29°04'33.50"E	Grootpan 86 IS Portions 10 & 23	Wetlands on site; pan and hillslope seepage wetland
44	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°16'15.13"S 29°04'05.93"E	26°16'12.77"S 29°04'33.50"E	Grootpan 86 IS Portions 10 & 23	Wetlands on site; pan and hillslope seepage wetland
45	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°17'25.94"S 29°08'11.50"E	26°17'31.72"S 29°08'07.18"E	Matla Power Station 141 IS	Wetlands on site; hillslope seepage wetland & channelled valley bottom wetland
46	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'40.69"S 29°01'07.32"E	26°13'41.02"S 29°01'14.03"E	Kortlaagte 67 IS Portion 1	Wetlands on site; unchannelled valley bottom wetland
47	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'46.22"S 29°01'05.05"E	26°13'46.04"S 29°01'12.21"E	Kortlaagte 67 IS Portion 1	Wetlands on site; unchannelled valley bottom wetland
48	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'39.22"S 29°01'37.46"E	26°13'38.89"S 29°01'58.84"E	Kortlaagte 67 IS Portion 1	Wetlands on site; hillslope seepage and unchannelled valley bottom wetland
49	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'53.23"S 29°01'30.29"E	26°13'53.39"S 29°01'57.78"E	Kortlaagte 67 IS Portion 1	Wetlands on site; hillslope seepage, Pan and unchannelled valley bottom wetland
50	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'08.20"S 29°01'12.38"E	26°14'07.91"S 29°01'21.97"E	Kortlaagte 67 IS Portion 1	Wetlands on site; channelled and unchannelled valley bottom wetland

51	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'18.02"S 29°01'10.03"E	26°15'22.93"S 29°01'10.50"E	Kortlaagte 67 IS Portion 1	Wetlands on site; pan and hillslope seepage wetland and River Diversion	
52	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'23.85"S 29°01'10.18"E	26°15'28.70"S 29°01'10.32"E	Kortlaagte 67 IS Portion 1	Wetlands on site; pan and hillslope seepage wetland	
53	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'20.95"S 29°01'19.18"E	26°15'20.63"S 29°01'31.85"E	Kortlaagte 67 IS Portion 1	Wetlands on site; hillslope seepage and unchannelled valley bottom wetland and Pan & River Diversion	
54	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°15'26.74"S 29°01'26.60"E	26°15'26.59"S 29°01'31.71"E	Kortlaagte 67 IS Portion 1	Wetlands on site; unchannelled and channelled valley bottom wetlands, pan, hillslope seepage and river diversion	
55	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°13'47.97"S 29°00'46.30"E	26°13'47.97"S 29°00'39.30"E	Kortlaagte 67 IS Portion 10	Wetlands on site; quarry and unchannelled valley bottom wetland	
56	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'04.54"S; 29°00'39.30"E	26°14'10.31"S 29°00'39.93"E	Kortlaagte 67 IS Portion 10	Wetlands on site; quarry, unchannelled valley bottom and hillslope seepage wetland, river diversion and dam	
57	Activities within a 500m radius of a wetland	Undermining of a wetland area	26°14'10.95"S 29°00'39.96"E	26°14'16.48"S 29°00'40.20"E	Kortlaagte 67 IS Portion 10	Wetlands on site; quarry, unchannelled valley bottom and hillslope seepage wetland, river diversion and dam	
Section 21(f) - Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.							
Water Use No.	**Description**	**Site Name**	**Co-ordinates**		**Property**	**Volume Applied for (m³/a)**	
58	Discharge of treated effluent from Mine 2 Sewage Treatment Works to the Rietspruit River.	Mine 2 WWTW discharge	26° 13.296' S 29° 06.298' E		Vierfontein 61 IS ptn 26	50 000 m³/a	
59	Discharge of treated effluent from Mine 3 Sewage Treatment Works to the Rietspruit River.	Mine 3 WWTW discharge	26° 13.429' S 29° 03.635' E		Vierfontein 61 IS ptn 21	35 000 m³/a	
60	Discharge of treated water into Rietspruit River.	Water Treatment Plant Discharge	26° 13' 21.18" S 29° 06' 10.44" E		Vierfontein 61 IS ptn 26	2580550 m³/a	
61	Discharge waste water from sewage works into unnamed tributary	New Mine 1 WWTW discharge	26° 17' 42.6"S 29° 09' 23.7" E		Bakenlaagte 84 IS Remaining Extent	66576 m³/a	
Section 21(g) - Disposing of waste in a manner which may detrimentally impact on a water resource.							
Water Use No.	**Section 21(g)**	**Site Name**		**Co-ordinates**	**Property**	**Capacity / Size / Area**	**Throughput as per IWUL (m³/month)**

62	Disposing of water containing waste into the Top PCD.	Top PDC	26° 15.829' S 29° 07.271' E	Haasfontein 85 IS ptn 5	47 353	30 000 m^3/month
63	Disposing of water containing waste into the Bottom PCD.	Bottom PCD	26° 15.597' S 29° 06.928' E	Haasfontein 85 IS ptn 5	130 756	72739 m^3/month
64	Disposing of water containing waste into the PCD on the farm Vierfontein 61 IS portion 26.	Pollution Control Dam	26° 13.142' S 29° 06.162' E	Vierfontein 61 IS ptn 26	70 000	70000 m^3/month
65	Disposing of water containing waste into the Surface Pan (emergency facility)	Mine 2 Emergency Dam	26° 12.481' S 29° 06.999' E	Vierfontein 61 IS ptn 26	500 000	50 0000 m^3/month
66	Disposing of water containing waste into the PCD with settling pond	PCD with Settling Pond	26° 14.647' S 29° 04.093' E	Vierfontein 61 IS ptn 26	80 100	80100 m^3/month
67	Disposing of water containing waste into the silo dam	Silo Dam	26° 14.429' S 29° 04.548' E	Vierfontein 61 IS ptn 22	24 000	24 000 m^3/month
68	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 1	Brine Storage Dam 1	26°15' 12.6" S 29° 07' 40.6" E	Vaalpan 68 IS portion 0 (remaining extent)	5.5 ha 280 000m^3 capacity	0.3 – 0.5 Ml/day
69	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 2	Brine Storage Dam 2	26° 15' 16.1"S 29° 07' 45.7" E	Vaalpan 68 IS portion 0 (remaining extent)	5.5 ha 280 000m^3 capacity	0.3 – 0.5 Ml/day
70	Disposal of brine water from the Reverse Osmosis Treatment Plant Brine Storage Dam 3	Brine Storage Dam 3	26°15' 24.5" S 29° 07' 40.6" E	Vaalpan 68 IS portion 0 (remaining extent)	5.5 ha 280 000m^3 capacity	0.3 – 0.5 Ml/day
71	Storage of underground water from the mines before treatment and stormwater from the dirty area	WTP PCD	26°15'17.12"S 29° 7'31.84"E E	Vaalpan 68 IS portion 0 (remaining extent)	5000m^3	
72	Excess water from the workings into the Conservancy Tank	Conservancy Tank	26°15' 23.4" S 29° 07' 30.8" E	Vaalpan 68 IS portion 0 (remaining extent)	10 Ml 10 000m^3	
73	Pollution Control Dam	New Mine 1 PCD	26° 17' 42.6"S 29° 09' 23.7" E	Bakenlaagte 84 IS Remaining Extent		729 708 m^3/a
74	Dust suppression (conveyor belt)	Dust suppression New Mine 1	N/A	Bakenlaagte 84 IS Remaining Extent	N/A	28 335 m^3/a
75	Strategic Main Stockpile at Mine 1	Mine 1 Coal Stockpile	26°16'10.85"S 29° 7'47.30"E	Matla Power Station 141 IS	31	30 471 m^3/a

76	Transfer point at the silo area at Mine 1	Transfer stockpile Mine 1	26°15'48.60"S; 29° 7'27.57"E	Haasfontein IS 85 ptn 5	1.5Ha footprint	5 238 m^3/a
77	Transfer point at the silo area at Mine 2	Transfer stockpile Mine 2	26°12'58.64"S 29° 6'5.76"E	Vierfontein 61 IS ptn 26	0.4 Ha	6 780 m^3/a
78	Transfer point at the silo area at Mine 3	Transfer stockpile Mine 3	26°14'30.01"S; 29° 4'31.95"E	Vierfontein 61 IS ptn 22	0.05Ha	2 211.3 m^3/a
79	Dust suppression at Main Mine 1 Main Stockpile	Dust Suppression Main Complex	N/A	Matla Power Station 141 IS & Haasfontein IS 85 ptn 5	N/A	26106 m^3/a
80	Sludge Drying Beds 2a, 2b, 2c, 2d at Mine 2 WWTW	Sludge Drying Beds Mine 2	26°12'56.7"S 29°06'18.0"E	Vierfontein 61 IS ptn 26	2a = 16m^3 2b = 15m^3 2c = 15m^3 2d = 14 m^3	134 m^3/a
81	4 Sludge Drying Beds at Mine 3 WWTW (3a, 3b, 3c, 3d)	Sludge Drying Beds Mine 3	26°14'43.4"S 29°04'06.0"E	Vierfontein 61 IS ptn 21	4 x 9m^3	135 m^3/a
82	2 Mega litre tanks at Mine 2 Emergency Dam	Mine 2 Emergency Dam Tanks	26°12'28.86"S 29° 6'59.94"E	Vierfontein 61 IS ptn 26	2 x 1000 m^3	730 000 m^3/a (365 000 m^3/a for each tank)
Section 21(j) - Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.						
Water Use No.	**Description**	**Site Name**	**Co-ordinates**	**Property**	**Volume Applied for (m^3/a)**	
83	Abstraction of excess underground water for storage in PCD prior treatment at the WTP	New Mine 1 dewatering	26° 17' 44.5"S 29° 09' 18.8" E	Bakenlaagte 84 IS Remaining Extent	912500 m^3/a	
84	dewatering of underground mine water from Exxaro Matla Mine 2	Mine 2	26° 12' 47.3"S 29° 06' 06.3" E	Vierfontein 61 IS ptn 26	1460 000 m^3/a	
85	dewatering of underground mine water from Exxaro Matla Mine 3	Mine 3	26° 14' 45.16"S 29° 04' 00.5" E	Vierfontein 61 IS ptn 21	1460 000 m^3/a	

7.3 Section 27 Motivation

7.3.1 Existing Lawful Water Uses

An existing lawful water use is defined in section 32 of the National Water Act, 1998, (Act No. 36 of 1998) (NWA) as any water use which has taken place at any time during a period of two years immediately before the date of commencement of the NWA or which has been declared an existing lawful water use under section 33 and which was authorised by or under any law which was in force immediately before the date of commencement of the NWA.

The ELWUs of the Matla Mine have been presented in Section 3.2 of this report.

7.3.2 The Need to Redress the Results of Past Racial and Gender Discrimination

Matla's Social and Labour Plan (SLP) 2015-2020 forms an integral part of its operational and business strategies. The SLP seeks to maximise the productive potential of its employees through:

- A Skills Development Plan;
- A Career Progression Plan;
- A Mentorship Plan;
- Internship and Bursary Plans; and
- An Employment Equity Plan.

The objectives of the HRD Programme are to ensure:

- Availability of specific mining skills;
- Competency of the workforce; and
- Training employees in skills that can be carried over and utilised outside the sphere of the mining industry.

In addition, the Employment Equity (EE) Plan addresses the processes to be embarked upon to ensure the achievement of 40% Historically Disadvantaged South Africans (HDSA) participation in management and 13% women in mining as stipulated in the Broad Based Socio-Economic Empowerment Charter for the South African Mining Industry.

Matla views the provision of workplace training as essential for productivity, growth and global competitiveness. The aim is to provide the required mechanisms and opportunities for identifying and developing the skills needed by the company and thereby ensuring that employees achieve their full growth potential. It is vital for Matla to successfully develop a workforce that is flexible and responsive to the challenges and opportunities posed by the demands of development of the industry as well as such forces as globalisation and the introduction of new working practices.

7.3.2.1 A Skills Development Plan

The workforce will comprise 1,587 permanent employees by the year 2020, primarily from the local municipality, Emalahleni area in Mpumalanga province with some from other parts of South Africa. The Skills development plan addresses improving the accessibility of Adult Basic Education & Training (ABET), and the development and implementation of a Career Progression Plan, a Mentorship Plan and an Internship and Bursary Plan. Broadly, the skills development plan details the respective training that is being provided in terms of the requirements of the operation's business plans and articulates the measures that are in force to ensure the continued career progression of HDSA and women.

7.3.2.2 A Career Progression Plan

In line with the EE target of achieving 40% HDSA in management, a Career Progression Plan has been developed to ensure talent management for all sectors of the mine. The exact goals and frameworks of these plans are provided in the SLP (attached as Annexure P to this report).

Individual Development Plans (IDP) exist for all employment categories from Paterson A/B-level upwards. These plans form part of the performance management system for D–levels upwards and illustrate the skills development requirements / needs within the workforce. Individual development / training plans linked to career development plans for organisational levels lower that the foreman level are also incorporated. These focus on four disciplines namely, mining, engineering, plant and services.

Matla's career progression policy is based on:

- Accelerated development of employees with potential, particularly Historically Disadvantaged South Africans (HDSA) employees.
- Rigorous use of formal succession planning and individual development.

7.3.2.3 Mentorship & Coaching Plan

The following is provided under the mentoring and coaching plan:

- A mentorship and coaching plan will be part of all employees' development.
- Line supervisors will form part of the mentorship programme for employees.

Matla is committed to ensuring that mentorship is an integrated part of organisational life. To this end, Matla will ensure the effective allocation of time and resources. Management at all levels is expected to continuously grow the organisation and to demonstrate effective commitment to mentorship. The aim of mentorship is to facilitate learning as part of their leadership role. Mentorship will be managed as a deliberate, structured, and focused process. The mentorship effort will be directed at the protégé for an assigned period, after which the candidate should be able to perform as required and exhibit competence in the objectives that were set for the mentorship period.

7.3.2.4 Internship and Bursary Plans

Matla forms part of the Exxaro group which has an integrated people development initiative including such elements as a professionals-in-training scheme to ensure a steady supply of professional skills needed for this company. The group also continues to fund bursaries primarily for engineering and geology studies.

After graduation, young professionals are taken through a structured development programme, which operates as an internship, for at least 24 months, ensuring proper training and development in the respective fields of study. During this period, the young professionals are properly mentored and coached. The number of students taken into the bursary and professionals-in-training scheme is dependent on the workforce pipeline plan for core and critical skills, the skills needed in a specific area and on the skills development plans for the individual.

Over the coming five years, the mine will make available two to three internships per annum to local community members who need work experience in the mining industry in order to complete their degrees. The mine can provide internships in the three core business areas of engineering, mining and geology.

Bursaries will be awarded based on an annual business needs analysis (Bursar plan for new intakes). The company will annually award bursaries to young South African talent for full time studies in the scarce skills categories. Bursary applicants will go through a selection process as determined by the Talent Management and Staffing Centre of Excellence (CoE). Only applicants who meet the minimum requirements as specified by the relevant procedural document will be considered for available bursaries. The minimum requirements for bursars will be a four-year BSc, BEng, BTech, BComm or other relevant degrees and three-year national diplomas in the scarce skills categories. Applicants must be declared medically fit by an Occupational Health Practitioner as stipulated by the Mine, Health and Safety Act.

7.3.2.5 An Employment Equity Plan.

The purpose of the Employment Equity (EE) plan is to ensure diversity as well as the participation of HDSAs at all decision-making positions and core occupational categories in the mining industry. The mine must achieve a minimum of 40% HDSA demographic representation. The plan reflects annual progress targets

Objective of the Plan:

- The objective of the Matla Coal EE plan is to work towards the establishment of a workforce profile that reflects the demographics of the national and regional economically active population across all levels; and
- Responsibility for implementing the EE plan and change management programmes for Matla Coal will rest with line managers and the assigned EE manager. Monitoring will be done by the Transformation Forum.

Matla Coal is committed to working towards employment equity and to adhering to the Mining Charter targets and objectives.

The goal of employing 13% women in core activities is intended to be achieved through the implementation of a policy of non-discrimination of potential and existing employees on grounds of gender or disability. All human resources policies have been reviewed and, where necessary, amended to ensure fairness and due process are adequately pursued.

7.3.3 Efficient and Beneficial Use of Water in the Public Interest

The approved consolidated IWUL will enable Matla to continue to [provide coal for power generation purposes to Eskom. This indirectly will allow for the continued operation of various business thereby contributing to the economy. Furthermore, the public indirectly benefits from coal through fuel and electricity usage. Coal contributes 90% to electricity and 30% to our liquid fuel requirements. In addition, the coal industry benefits the public through being the third largest employer, accounting for 15% of total mining industry employment. This highlights the economic contribution, and therefore summarises the economic context within which the industry operates.

Matla contributes to the efficient and beneficial use of water by adhering to the regulatory provisions as contained in the current IWULs and the provisions of the NWA. Water use activities may not commence without an approved water use authorisation. Thus, approval of the proposed water uses is imperative and will indirectly contribute to the beneficial use of water by illustrating that Matla is committed to adhere to the regulatory regime governing water use in South Africa.

Furthermore, Matla is committed to responsible management of its approved water uses and future water uses and strives to adhere to the principles of water conservation and demand management. Additionally, Matla ensures that the community in terms of employment, benefits. Monitoring of water resources has been implemented to detect any impacts during the early stages and to mitigate these as soon as practically possible.

Matla are committed to responsible discharge policies and will ensure that these are done in line with the consolidated IWUL. Dirty water is channelled to a PCD where it is re-used as process water.

7.3.4 The socio-economic impact

7.3.4.1 Of the water use or uses if authorised

The establishment of Matla has been a stimulant to the local, provincial and national economies. The creation of jobs and the purchase of goods and services has lead to increased economic activity in both the formal and informal sectors. Furthermore, with Matla being an underground coal mine, agricultural activities are still able to take place on the surface level. Therefore food production and provision is not impeded.

On a national level, the extension of the LoM due to the stooping to take place and New Mine 1 Shaft will enable to the continued procision of coal to the Eskom Matla Power Station. This will therefore allow the continued production of electricity for the South African population.

7.3.4.2 Of failure to authorise the water use or uses

It is critical that the mining operation continues in an environmentally, economically and socially sustainable manner. The failure to authorise the water uses applied for, will result in the mine ceasing their operation. This will cause negative impacts with greater economic impacts such as employment losses, economic growth reduction at the local, provincial and national level.

7.3.5 Any Catchment Management Strategy Applicable the Relevant Water Resource

Catchment Management Agencies (CMAs) are recognised in the NWA as operational institutions to actively support the implementation of integrated catchment (watershed) management policies and strategies at a local level. The agencies are tasked with ensuring that the nation's water resources are protected, used, developed, conserved, managed and controlled in an equitable manner. The CMA is responsible inter alia for: (a) developing and implementing a catchment management strategy that reflects the needs and concerns of all role-players, and (b) coordinating the activities of water users and water. The Olifants River Basin is one of 9 catchment-based water management areas in the country to be managed by a Catchment Management Agency (CMA).

The Olifants River Basin Catchment Management Agency (CMA) is in the process of being established. It will take over direct water resource management responsibilities in the basin currently being performed by DWS. The CMA co-ordinates water-related activities in the basin and provides an effective mechanism for stakeholder participation in water management.

7.3.6 The Likely Effect of the Water Use to be authorised on the Water Resource and on Other Water Users

Refer to Section 5.5 of this report for the impacts on ground and surface water resources as a result of mining activities and proposed new uses for the Matla Mine.

7.3.7 The Class and the Resource Quality Objectives of the Water Resource

The receiving water quality objective and river health of the Matla Mine have been presented in Section 4.2.5 and Section 4.2.6 respectively.

7.3.8 Investments Already made and to be made by the Water User in Respect to the Water Use in Question

The total wage bill at full production for 2017 was approximately R1 014 663 846 and the total operating cost for 2017 was approximately R2 697 278 703.71.

Additional investments that have been made for the project at hand include the various specialist and feasibility studies that have been conducted for this project in order to determine the operation schedules and associated impacts.

7.3.9 The Strategic Importance of the Water Uses to be authorised

In strict economic terms, the overall mining industry is paramount to South Africa's current and future prosperity. The primary value chain alone accounts for 500 000 jobs directly and indirectly creates another 500 000 jobs giving a total contribution of 1 000 000 jobs created for the economy. It produces almost a fifth of GDP and pays a similar percentage of corporate tax. It accounts for half of all traffic moved by Transnet and 94% of the power generated in this country. The value of mining companies listed on the JSE is R1.9 trillion, which represents 43% of the total market capitalization of the exchange and therefore helps create wealth for millions of South African pension fund holders and investors, while at the same time attracting significant foreign capital flows that help unlock our mineral potential. And, perhaps most critically, more than half of our export earnings are derived from mining and mineral products.

With specific reference to coal mining, just over two thirds (by mass) of domestic coal consumption is utilised for electricity generation by Eskom, the national power utility. Coal-to-liquid-fuel plants, operated by Sasol, account for another fifth of coal consumption. Small merchants, who supply mainly residential users and small businesses, account for about 2%, metallurgical industries about 3% and cement, chemical and other industries consume the remaining 5% (DMR, 2009). Coal therefore plays a vital role in South Africa's energy-economy: it accounts for 70% of primary energy consumption, 93% of electricity generation and 30% of petroleum liquid fuels.

7.3.10 The Quality of Water in the Water Resource which may be required for the Reserve and for meeting International Agreements

The water quality in the Olifants Catchment is adversely affected by point discharges from industries, wastewater treatment works, mine dewatering, irrigation return flows and diffuse sources such as runoff from mining and industrial complexes, agriculture and urban areas. The area is also subject to atmospheric deposition due to emissions from coal-fired power stations and industry in and around the basin.

Groundwater quality is generally good but high iron and fluoride concentrations are found in certain areas. Estimates suggest that close to 3% of the national mean annual runoff is intercepted by invasive alien vegetation and its removal and containment may contribute to improving the flow regime in the basin.

Land degradation due to overgrazing and poor agricultural practice gives rise to high sediment loads in the river.

Water monitoring on site is conducted and has been expanded upon in section 4 of this report. Through monitoring, impacts will be detected at an early stage. Where impacts are detected and mitigation measures are applied correctly and timeously, water use would not impact negatively on the quality of the water resource or international obligations.

7.3.11 The Probable Duration of any undertaking or which a Water use is to be authorised

With the addition of New Mine 1 and the stooping activities, the life of mine for Matla is anticipated as follows:

- Mine 3 (seam 4) and Mine 2 (seam 2) shortwall production will be depleted in 2018. This production method will be replaced with bord and pillar mining method (stooping);
- Mine 2 (seam 2) continuous miner sections will be depleted in 2026 while Mine 2 (seam 4) production will decrease and be depleted by 2034;

- Mine 1 (seam 4) production will slowly decrease due to traveling distances underground. Depletion of Mine 1 (seam 4) reserves will be in 2037; and
- Mine 3 (seam 4) will be depleted in 2022 and the 2 seam known as low seam mining will be depleted in 2040. The normal height seam 2 will be depleted in 2040.

Thus it is evident that the new proposed stooping, and already authorised New Mine 1 Operations will extend the Matla operational life spam quite considerably.

7.4 Proposed Licence Conditions

It is hereby requested that all the water uses presented here in (Table 7.1) be authorised under one new consolidated IWUL and that the previous IWULs be replaced with this new IWUL.

The proposed consolidated IWUL is requested to be authorised for a period of 40 years with a review period of 5 years. This authorisation period will enable the operational life span of the mine to be completed and will also provide for the associated closure and rehabilitation phases of the mine.

8 REFERENCES

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Emalahleni Local Municipality; (June 2016/17). 2016/17 Integrated Development Plan (IDP).

Statistics South Africa (Stats SA), 2017. http://www.statssa.gov.za/?page_id=993&id=emalahleni-municipality-2 Accessed 15 June 2017.

Various specialist studies conducted for the consolidation and stooping uses.

APPENDIX A

Details for Appendix A.

APPENDIX B

Details for Appendix B.