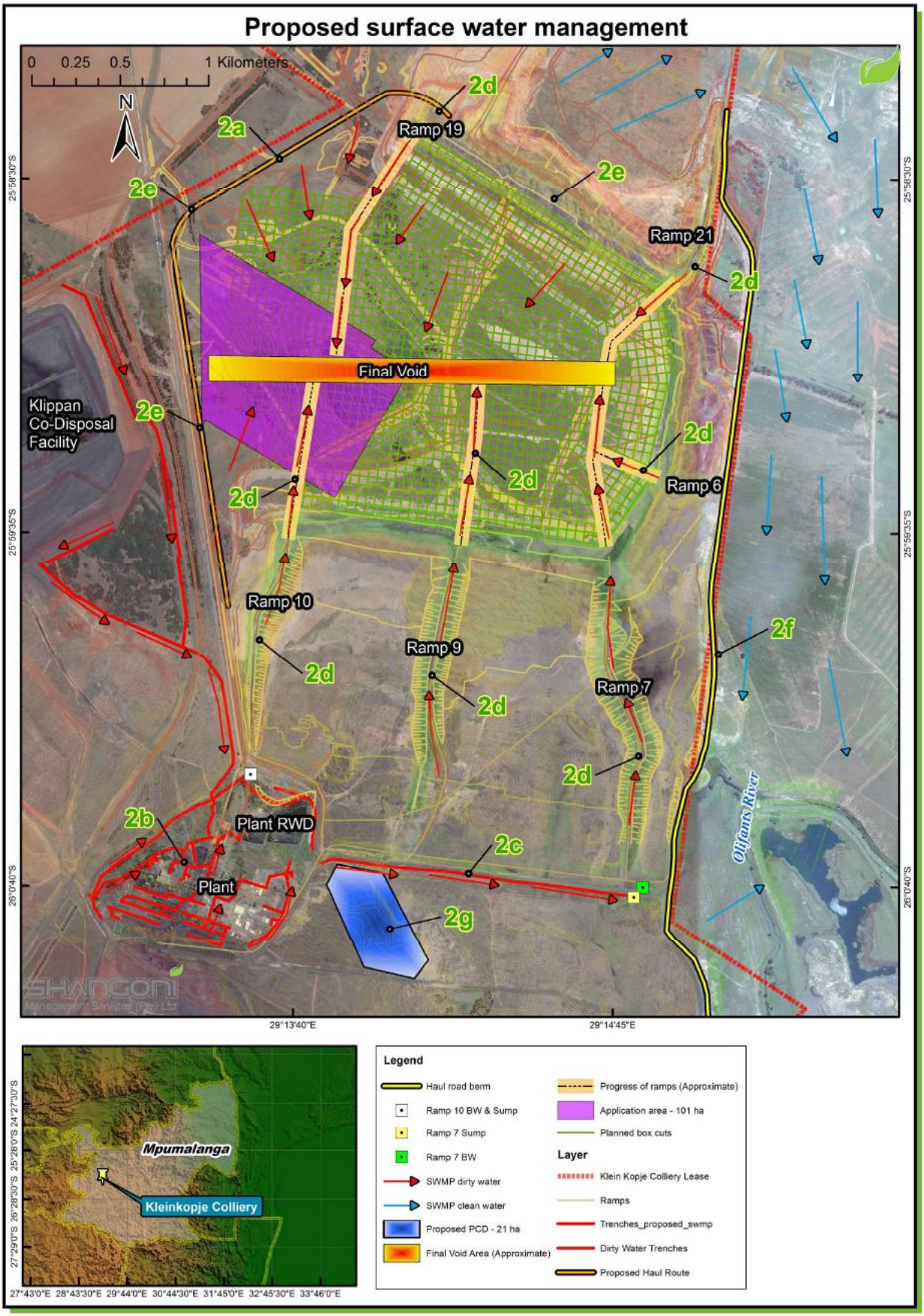

Figure 21: Proposed surface water management at the study area

Table 6: Proposed storm water management measures at the 2A Dam Extension Area

Reference number corresponding to Figure 21	Description, problem statement and recommendation
2a	A new haul road is proposed in order to haul coal from Ramp 19 to the tip located on the southern edge of the Kleinkopje plant area. Problem statement: The surface of the haul road will be compacted to ensure that it is suitable to carry heavy trucks transporting coal from Ramp 19 to the tip. The compacted surface of the haul road will cause an increase in surface water runoff velocity during heavy rainfall events. The latter might cause erosion of the haul road in areas of surface water concentration. The proposed haul road crosses a wetland area (although as part of the rehabilitation strategy, a comprehensive wetland rehabilitation strategy will be implemented by the mine). Recommendation: Areas were surface water might concentrate during heavy rainfall events should be identified during the operational phase and suitable energy dissipaters should be installed at such areas.
2b	A network of channels and trenches convey affected water and affected water runoff from the plant area towards the plant return water dams. The plant area is divided into an A-side and B-side section. Water conveyed from the B-side section of the plant enters the plant return water dams via silt trap 3 and silt trap 4. Water conveyed from the A-side section of the plant enters the plant return water dams via the eastern silt trap. Problem statement: Silt accumulation within the conveyance channels is a continual problem at coal mining operations and thereby, as a result, reducing channel capacities, blocking silt traps and compromising the capacities containment facilities such as the plant return water dams. Recommendation: It is proposed that the mine implement a maintenance schedule on all affected water conveyance channels, silt traps and containment facilities to ensure regular service in order to maintain the integrity of the infrastructure.

Reference number corresponding to Figure 21	Description, problem statement and recommendation
2c	Ramp 7 trench and Ramp 7 sump should be used as an additional measure to convey any possible spillage from the current plant return water dams and the proposed pollution control dam. Problem statement: Recent maintenance has not been conducted on the trench and sump. Vegetation growth has established thereby compromising the integrity of the trench and the sump. Overflow from the sump might reach the Olifants River located approximately 700 meters downstream. Recommendation: A maintenance schedule should be implemented on the trench and sump to ensure capacity. This strategy aims to prevent any overflow of the trench and sump should there be any accidental spillages from the proposed pollution control dam and/or the current plant return water dams.
2d	Rainfall directly onto the Pit 2A extension area will infiltrate into the high permeable areas between the ramps where mining took place. The compacted surfaces of the respective ramps will generate higher volumes of surface runoff into the voids. Problem statement: During the operational phase of the 2A extension area and the nature of the mining methods, it will be difficult to divert clean rainfall away from the area into adjacent downstream clean water areas. Therefore, as a result, there will be a reduction in the catchment yield towards the downstream clean water areas. Recommendation: It is recommended that surface water will be diverted away from mining operations within the 2A extension area as far as practicable in an attempt to lower dewatering requirements from the voids. There are areas were the diversion of surface water runoff will be difficult to achieve, especially within the ramps leading towards the voids were mining takes place. Surface runoff that accumulates in these areas as a result of rainfall, and groundwater ingress will then need to be dewatered from the voids to ensure the safe continuation of mining activities.

Reference number corresponding to Figure 21	Description, problem statement and recommendation
2e	Currently there is a small catchment area in the upper north-western section of the 2A extension area which generates clean runoff towards 2A Dam. Problem statement: The proposed 2A extension area will encroach the small catchment area and therefore it is important to divert and prevent the ingress of any clean surface runoff that will be generated from the remaining catchment into the mine workings. Recommendation: The proposed construction of a new haul road along the western and northern perimeter of the 2A extension area will act as a barrier to prevent any ingress of clean surface runoff into the mine workings. It is important to conduct regular inspections on the haul road's berms to ensure the integrity of the berms.
2f	A haul road safety berm is constructed along the eastern perimeter of Kleinkopje Colliery and will prevent dirty surface runoff from entering the adjacent clean water area consisting of agricultural areas and the Olifants River. Problem statement: The berm is damaged in some areas where potential affected runoff may enter the adjacent clean water areas. Recommendation: It is proposed that the mine implement a system to conduct regular checks on the berms to ensure that no affected water runoff exit the mine area. Regular reporting from mine personnel as they visit areas on the mine will help to detect problems efficiently.
2g	The proposed mining activities will remove the current 2A Dam from the mining operations. Problem statement: Considering the volume of affected water currently received by 2A Dam from the different facilities on Kleinkopje Colliery, and with further consideration to flood events (1:100 year), it was determined (refer Section 5 of report) that additional storage capacity will be needed in a scenario where the 2A Dam is removed from the current water management system of the mine. Recommendation: It is recommended that the mine construct an additional pollution control dam to contain the mine affected water as currently reporting to 2A Dam.

4.2.2.7.4 Flood simulation and water balance for plant return water dam(s)

The assessment provides an examination of the changing situation of the Kleinkopje Colliery and an investigation of different rainfall scenarios, such as flood and drought conditions, process changes and new developments, which are critical to the planning process. A dynamic water balance and flood simulation is an important operational and regulatory tool for water and pollution control, as well as an essential part of the life cycle analysis for all future activities on site.

The primary purpose of the flood simulation and water balance is to assess the buffer capacity of the current plant return water dams should the 2A Dam be removed as per the proposed project known as the 2A Dam Extension Project. The objectives in terms of this study are reflected as follow:

- Determine the inflows and outflows of the current plant return water dams;
- Quantify and understand the proposed surface water usage in and around the operation; and
- Determine if sufficient buffer capacity is available at the current plant return water dams should the 2A Dam be removed by using during different flood scenarios from the delineated catchment of the plant area and the 3 A North catchment that also flows into the plant return water dams.

The following scenarios were used to determine if the current plant return water dams have sufficient buffer capacity should the 2A Dam be removed and during different flood scenarios:

- Scenario 1: 1:100-year flood scenario including the 3 A North catchment[7] contribution and the plant catchment contribution to the Plant RWDs assuming the dams are empty with full design capacity of 48 000 m^3;
- Scenario 2: 1:100-year flood scenario excluding the 3 A North catchment contribution to the plant return water dams assuming the dams are empty with full design capacity of 48 000 m^3;
- Scenario 3: 1:100-year flood scenario including only the catchment contribution of the plant area to the plant return water dams assuming the dam is 30% silted with only 70% capacity remaining;
- Scenario 4: 1:100-year flood scenario including only the catchment contribution of the plant area to the plant return water dams assuming the dam is 50% silted with only 50% capacity remaining;
- Scenario 5: 1:100-year flood scenario including only the catchment contribution of the plant area to the plant return water dams assuming the dam is 70% silted with only 30% capacity remaining.

4.2.2.7.4.1 Flood simulation

The following section provides information on the catchment characteristics identified for the 3 A North Area catchment and the Plant Area catchment that will contribute runoff into the current plant return water dams. Surveyed contours of 1-meter intervals were used to delineate the catchment areas. Expected flood peaks were determined for a 1:100-year flood scenario as shown in Table 7 below.

[7] 3A North catchment constitutes clean water runoff from rehabilitated areas. This scenario was however included as there may be a risk of such clean water runoff not being effectively diverted and reporting to the plant return water dams.

Table 7: Catchment characteristics of the two contributing catchments

Catchment No.	MAP	Catchment Type	Catchment Size (km^2)	Flow length within catchment (m)	Height difference within catchment (m)
3 A North Area	702.7	Clean	7.333	3600	20
Plant Area	702.7	Dirty	0.841	1300	20

Table 8: Peak runoff reporting to a combination of channels for different return periods

Peak runoff (m^3/s)	Return period (year)											
	1:5			1:10			1:50			1:100		
	RM	ARM	SDF	RM	ARM	SDF	RM	ARM	SDF	RM	ARM	SDF
3 A North Area	14.48	14.92	16.89	19.45	20.74	28.93	34.77	35.85	63.24	44.94	43.48	80.62
Plant Area	6.14	6.27	4.16	7.95	8.39	7.14	13.31	13.55	15.60	16.73	15.95	19.89

The expected runoff volumes were determined using the simplified triangular hydrograph for the Rational Method. The 3A North catchment area was identified that will report via artificial sloped areas (on the rehabilitated area itself) underneath the bridge into a trench leading to the Plant RWDs. The entire plant area catchment was delineated to include all channels and trenches that contributes runoff into the current Plant RWDs.

The expected runoff volumes listed in Table 9 below calculated for the 1:100-year flood event can be included in Kleinkopje Colliery's water balance to verify if sufficient holding capacity is available.

Table 9: Expected runoff volumes 1:100-year flood

	Time of concentration (hours)	Point rainfall (mm)	ARF (%)	Average intensity (mm/h)	Factor (Ft)	Runoff Coefficient (%)	Peak flow (m^3/s)	Runoff Volume ($m^{3)}$
3 A North Area	2.41	139.1	98.9	57.1	1.00	38.8	44.94	584 849.16
Plant Area	1.03	113.9	99.8	110.2	1.00	68.3	16.73	93 052.26

4.2.2.7.4.2 Results

Flood scenarios for plant return water dams

Scenario 1: 1:100-year flood scenario including the 3 A North catchment contribution and the plant catchment contribution to the Plant RWDs assuming the dams are empty with full design capacity of 48 000 m³.

The model predicts that 642 897 m³ water is expected to overflow from the plant return water dams during a 1:100-year flood event.

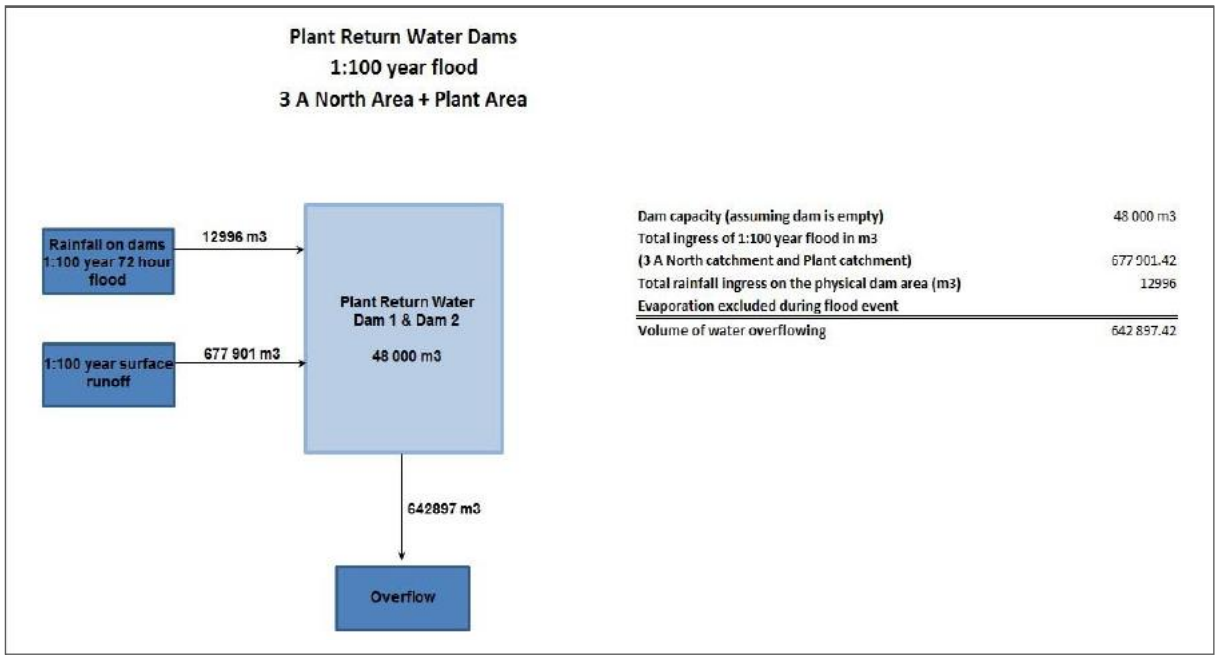

Figure 22: 1:100-year flood (3 A North Catchment and Plant Catchment)

Scenario 2: 1:100-year flood scenario excluding the 3 A North catchment contribution and the plant catchment contribution to the Plant RWDs assuming the dams are empty with full design capacity of 48 000 m³.

The model predicts that 58 048 m³ water is expected to overflow from the dams during a 1:100-year flood event.

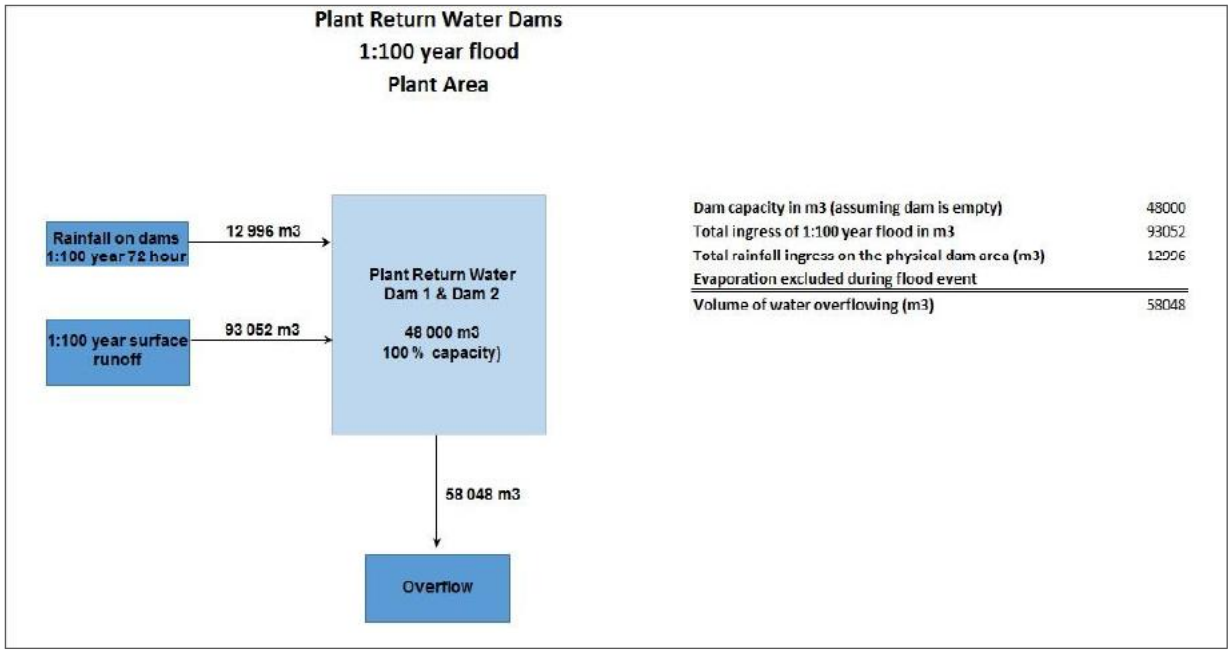

Figure 23: 1:100-year flood (Plant Catchment)

Scenario 3: 1:100-year flood scenario including only the catchment contribution of the plant area to the plant return water dams assuming the dam is 30% silted with only 70% capacity remaining;

The model predicts that 72 448 m^3 water is expected to overflow from the dams during a 1:100-year flood event.

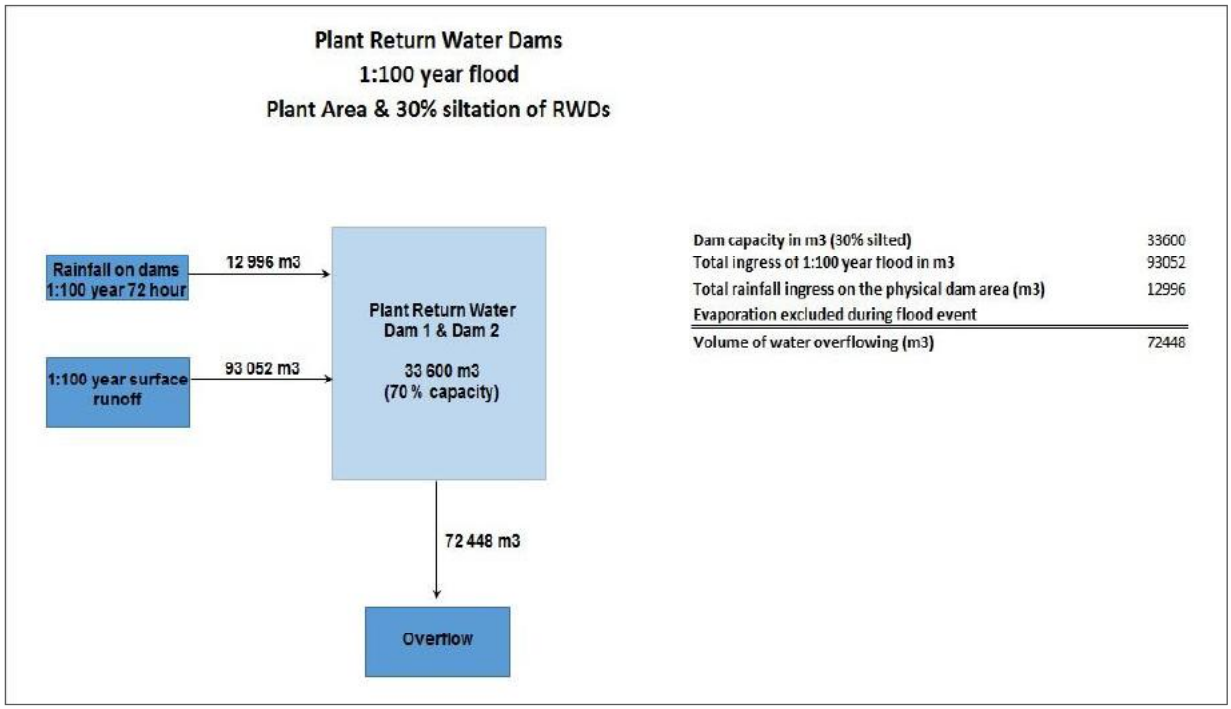

Figure 24: 1:100-year flood (Plant Catchment with 30 % siltation of the RWDs)

Scenario 4: 1:100-year flood scenario including only the catchment contribution of the plant area to the plant return water dams assuming the dam is 50% silted with only 50% capacity remaining;

The model predicts that 82 048 m^3 water is expected to overflow from the dams during a 1:100-year flood event.

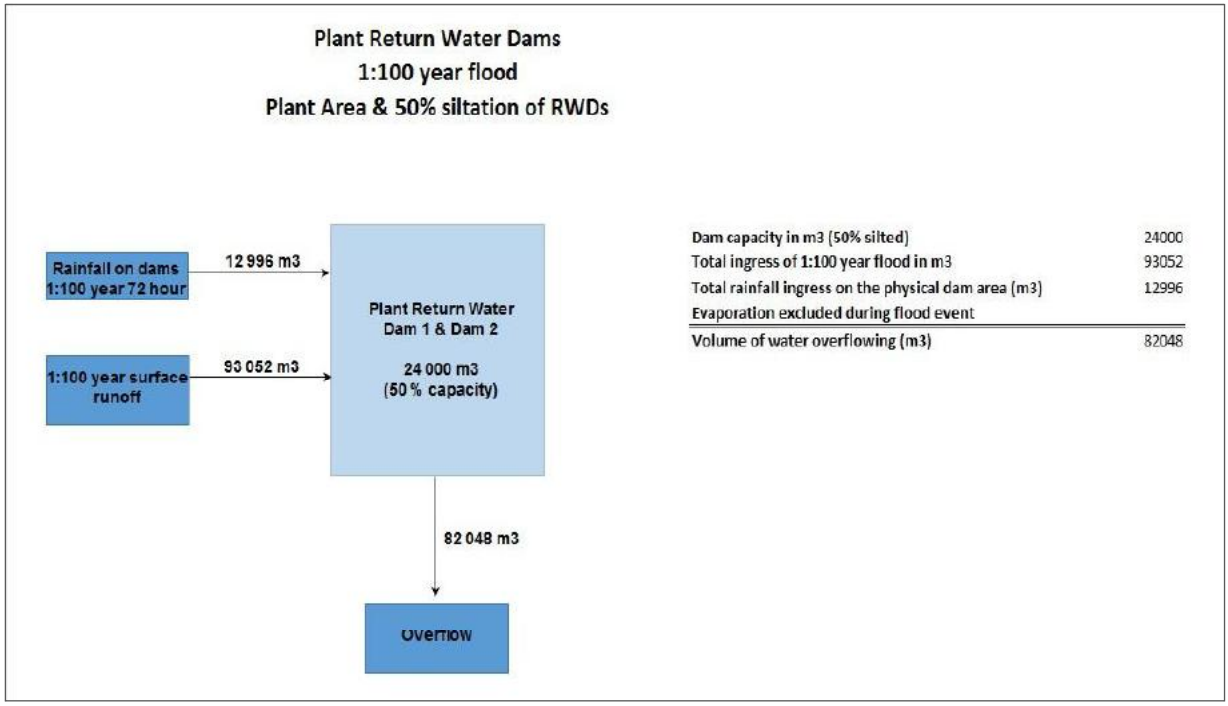

Figure 25: 1:100-year flood (Plant Catchment with 50 % siltation of the RWDs)

Scenario 5: 1:100-year flood scenario including only the catchment contribution of the plant area to the plant return water dams assuming the dam is 70% silted with only 30% capacity remaining.

The model predicts that 91 648 m^3 water is expected to overflow from the dams during a 1:100-year flood event.

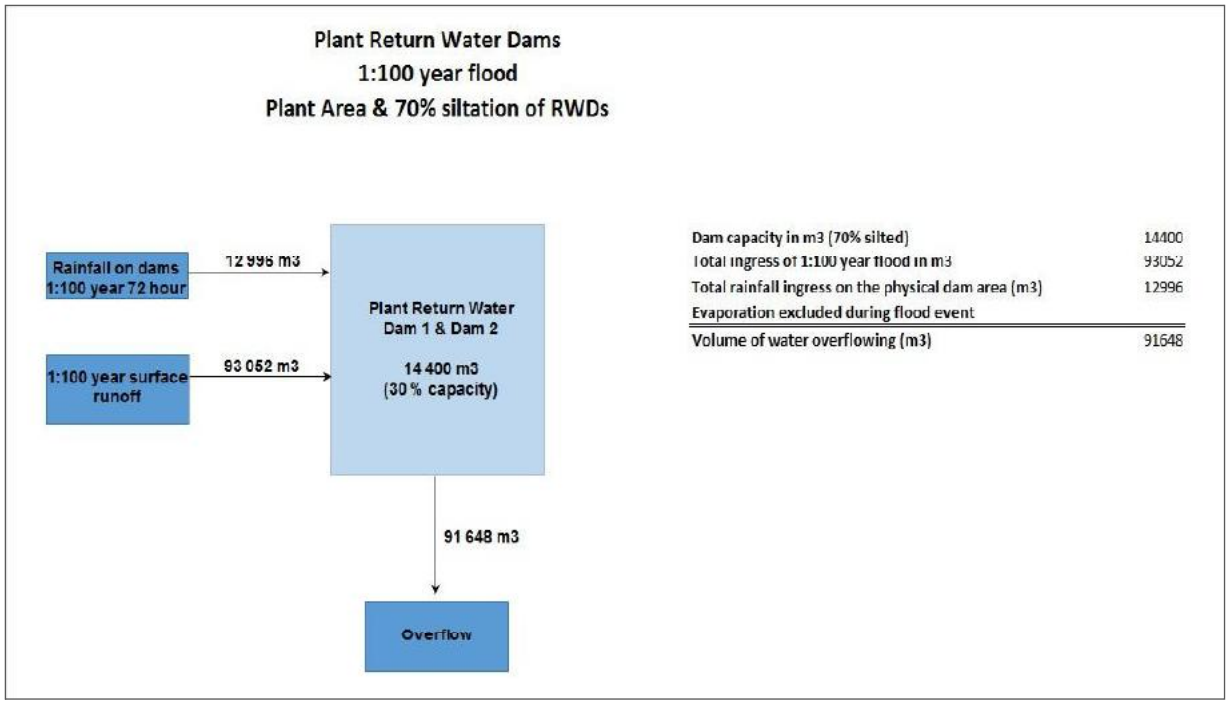

Figure 26: 1:100-year flood (Plant Catchment with 70 % siltation of the RWDs)

Wet and dry season scenarios applying historical data

The figures below represent the water balance for the plant return water dams in a scenario where the 2A Dam is removed from the operation in both a wet season and dry season scenario, and to determine the excess water as would currently report to 2A Dam. All sources of water that currently report to 2A Dam are rerouted (in the balance) to the current plant return water dams. As per the scenarios presented below, for both wet and dry season scenario, a significant volume of excess water has been calculated. It is however believed that significant seepage from 2A Dam occurs that is reflected in the high dewatering volume and subsequently also in the excess water. Should 2A Dam in future be replaced with a facility designed to minimise seepage (e.g. membrane or clay of high plasticity), it is the author's opinion that the dewatering requirements will substantially reduce. The management requirements for dewatering operations would also be simplified and the associated costs associated with dewatering will substantially reduce.

It is for this reason that the water balance scenarios as presented below cannot be applied in determining the capacity requirements for the proposed alternative pollution control dam. Upgrading of the current plant return water dams is not considered a feasible option as there is not sufficient area available to expand the current plant return water dams to accommodate for the additional capacity requirements (for as a minimum the 1:100-year flood event).

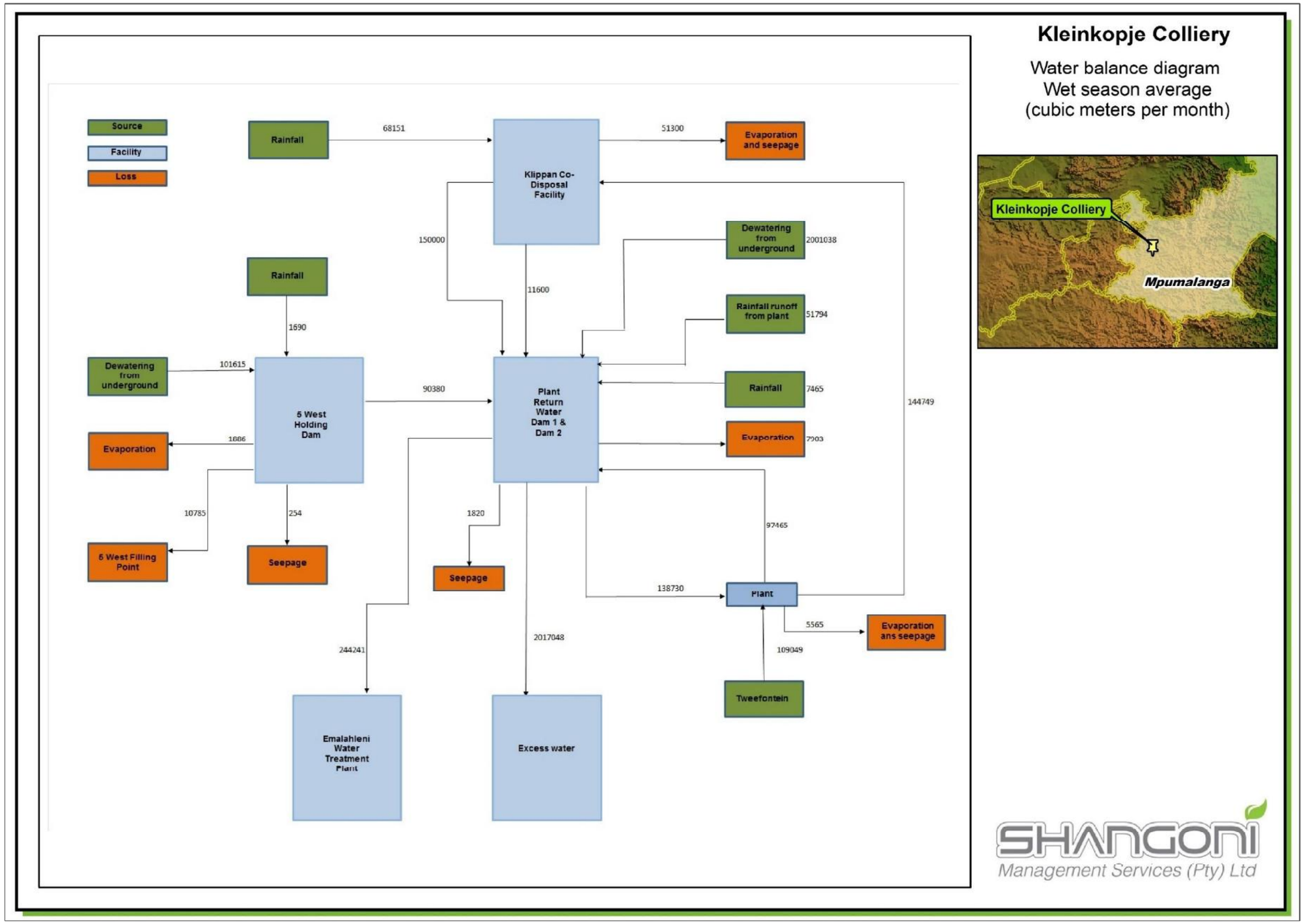

Figure 27: Wet season average water balance for the plant return water dams (Shangoni, 2016)

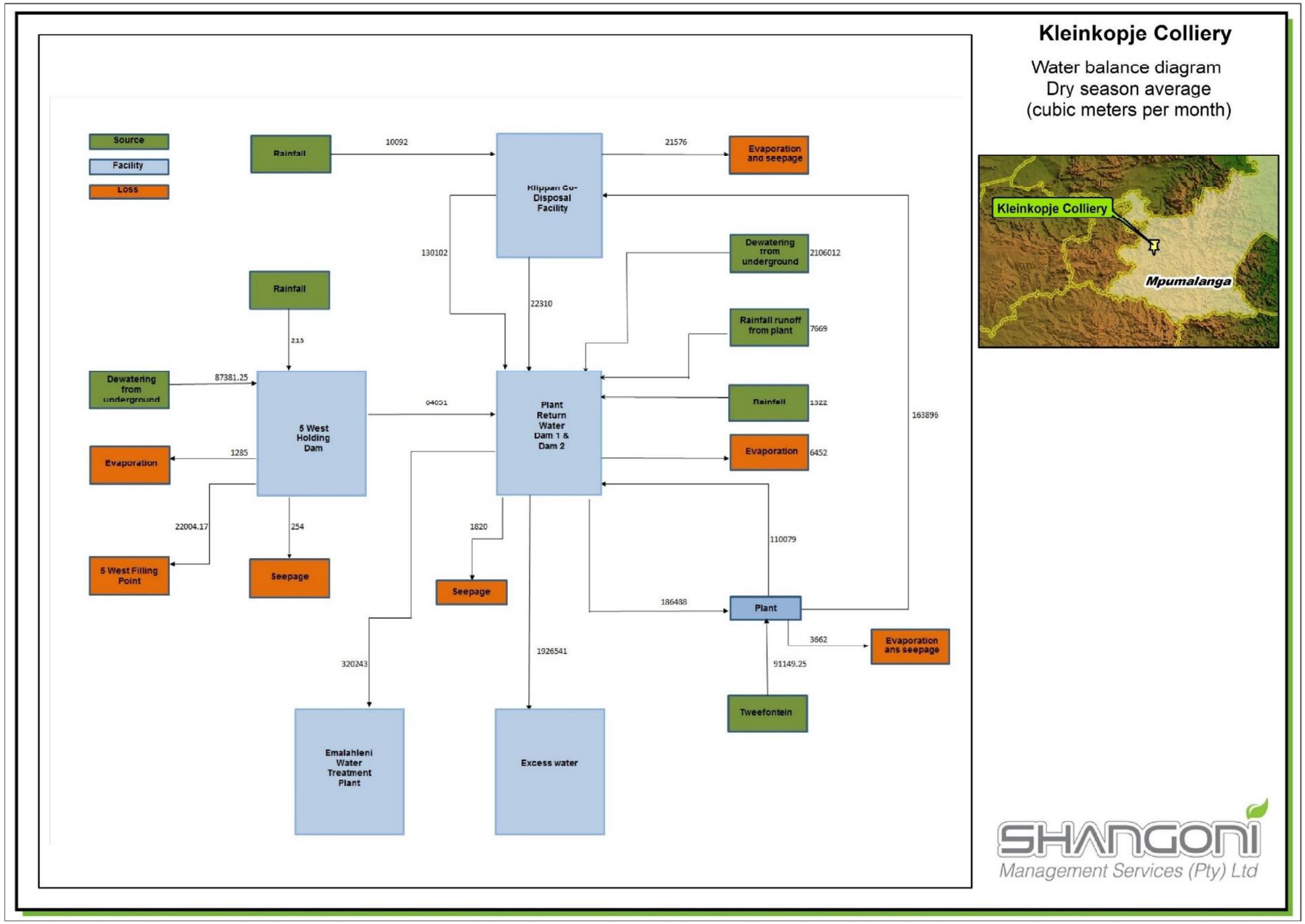

Figure 28: Dry season average water balance for the plant return water dams (Shangoni, 2016)

The following table lists the results of the two water balance models indicating the amount of surplus water to be contained.

Table 10: Surplus water expected during dry- and wet season

Season	Excess water to be contained (m3 / month)[8]
Wet	2 017 048
Dry	1 926 541

In a scenario where the mine pumps the maximum amount of water (600 000m^3 per/month) to the Emalahleni Water Treatment Plant, the following amount of surplus water is expected.

Table 11: Surplus water expected with maximum amount pumped to EWTP

Season	Excess water to be contained (m3 / month)
Wet	1 661 289
Dry	1 646 784

The following main concerns in terms of storm water management in accordance with the Best Practise Guidelines G1 for Storm Water Management (DWAF, 2006), the National Water Act (Act No. 36 of 1998) and Regulation 704 of the National Water Act (Act 36 of 1998) were identified. Mitigation measures were discussed in Section 4 and Section 5 and Section 6 of the report:

- The removal of the 2A Dam from the Kleinkopje water management system will require all existing affected water sources to the 2A Dam to be rerouted towards the existing plant return water dams. Different flood scenarios and a water balance model determined that the plant return water dams will not have sufficient buffer capacity to contain runoff generated from flood events (1:100 year). Therefore, it is recommended that the mine construct an additional pollution control dam to function as replacement facility for 2A Dam and to contain all excess water that is expected to arise from the current plant return water dams.
- As per the scenarios presented in the water balances in Section 5 of the report, for both wet and dry season scenario, a significant volume of excess water has been calculated. It is however believed that significant seepage from 2A Dam occurs that is reflected in the high dewatering volume and subsequently also in the excess water reporting back to 2A Dam. All seepage is contained in the underground affected water system and pumped back to surface for safe continuation of mining activities. Should 2A Dam in future be replaced with a facility designed to

[8] It is however believed that significant seepage from 2A Dam occurs that is reflected in the high dewatering volume and subsequently also in the excess water. Should 2A Dam in future be replaced by a lined facility (e.g. membrane or clay of high plasticity), seepage would substantially reduce, thereby also reducing the dewatering volumes. It is for this reason that the water balance scenarios as presented cannot be applied in determining the capacity requirements for the proposed alternative pollution control dam.

minimise seepage (e.g. membrane or clay of high plasticity), the dewatering requirements could substantially reduce. The management requirements for dewatering operations could also be simplified and the associated costs associated with dewatering can substantially reduce. Replacing of 2A Dam with a containment facility with limited seepage would have an overall positive impact on the current water management of Kleinkopje Colliery, that also provides an overall positive component to the 2A Dam Extension Project.

- Silt accumulation within affected water conveyance channels, trenches and containment facilities is a continual concern at coal mining operations, especially within the plant areas. Increased siltation compromises the integrity of these structures resulting in overflow and a reduction in the reuse of process water. Excess ponding of affected water compromises effective plant operations.
- Regular maintenance is proposed on the Ramp 7 trench and Ramp 7 sump to limit possible overflow towards the Olifants River located approximately 700 m downstream. Level control is also proposed within the Ramp 7 sump to ensure effective management of the facility. The aforementioned facilities should also be used as an additional measure to contain any possible spillages from the proposed pollution control dam.

4.2.2.8 Non-mineral Waste management

4.2.2.8.1 Industrial and hazardous waste disposal

Industrial waste from the mining areas at the Pit 2A Extension area will be collected from within the mining area on a routine basis and sent to the Central Salvage Yard, where it will be sorted and sold to different outside companies. Used oils are collected and recycled by a contractor. Hazardous waste will be removed off-site by a licenced hazardous waste contractor to an appropriate hazardous waste disposal site (i.e. Holfontein landfill site). The management of industrial and hazardous waste will be undertaken in accordance with the relevant existing Kleinkopje Mine SHE procedure.

4.2.2.8.2 Domestic waste disposal

Domestic waste will include amongst other general paper waste, food residue, class and plastic bags and bottles (if any). Domestic waste from the various areas on the mine is collected and disposed of at the Witbank (Emalahelni) Municipality disposal facility. The management of domestic waste will be undertaken in accordance with the relevant existing Kleinkopje Mine SHE procedure.

4.2.2.9 Sewage management

Chemical toilets will be made available at the Pit 2A Extension areas. Such toilets will be serviced regularly by a suitably qualified contractor and sewage will be removed off-site to an appropriate facility dealing with such waste.

4.2.3 Estimated reserves

The estimated reserves information for Block (Pit) 2A is provided in Annexure H. It is anticipated that coal reserves, based on current economic viability will last until at least 2025. Refer to Figure 5 for an indication of the mining schedule and planned box cuts. Figure 5 and Annexure H shows the planned years (phases) of mining at Pit 2A (including the proposed Pit 2A Extension) up until 2025.

4.2.4 Production rate and Life of Mine

The estimated production rate is 45Mt (5.1Mt/a on average). As mentioned above the Life of Mine for the Pit 2A operations is up until 2025. Refer to Annexure H for information with regards to the production rate and Life of Mine related to the Pit 2A operations. Refer also to Figure 5.

5. Policy and Legislative Context

Table 12: Policy and legislative context

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	**REFERENCE WHERE APPLIED** (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** (E.g. In terms of the National Water Act:-Water Use Licence has/has not been applied for).
The Constitution of the Republic of South Africa, 1996.	Throughout this EIAR / EMPr	Kleinkopje Colliery is in possession of a Mining Right and associated environmental authorisation as per its approved EMPr, 2012. This project specific EIAR / EMPr is compiled in accordance with the NEMA, 1998 and the EIA Regulations GN. R.982, dated December 2014.
The Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)		
The Mineral and Petroleum Resources Development Regulations, 2004, Regulations R.562 dated April 2004).		
The National Environmental Management Act, 1998 (Act No. 107 of 1998).		
The Environmental Impact Assessment Regulations, R. 982 dated December 2014.		

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	REFERENCE WHERE APPLIED (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g. In terms of the National Water Act - Water Use Licence has/has not been applied for).
The Environmental Impact Assessment Regulations, R. 983 dated December 2014. The Environmental Impact Assessment Regulations, R. 984 dated December 2014.	Table 4.	The triggered listed activities applied for are included in Table 4.
Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010. Government Notice 891 of 2014.	Section 6 (Part A) of this EIAR/ EMPr.	The need and desirability of the mine has been discussed in Section 6 below in terms of the required format contained in the Guideline on Need and Desirability (GN 891 of 2014). It should however be noted that Kleinkopje Colliery is an existing mine, and the Need and Desirability section (below) has been described in this context, as well as taking the extension of the mining area consideration (i.e. continuation of mining).
Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector.	Chapters E, F and M of Section 7.4.1 (Part A) of this EIAR / EMPr and Annexure I.	In terms of the requirement regarding the management of biodiversity, the Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector was consulted in terms of the following principles and sections, as contained in the Guideline, and have been

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	REFERENCE WHERE APPLIED (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g. In terms of the National Water Act:-Water Use Licence has/has not been applied for).
		incorporated throughout this EIAR / EMPr: • Biodiversity information used in Section 7.4.1 include the relevant GIS maps and documents to plot the location of the mining site onto maps depicting critical biodiversity areas, flora, sensitive areas etc. Information was also sourced from SANBI; • The use of existing specialist studies and monitoring information in order to determine the impacts on the ecological sphere of the environment; and • Biodiversity related impacts as well as impacts with regards to conservation planning and protected areas were assessed and are included in Section 9 (Part A) and Annexure I.
The National Water Act, 1998 (Act No. 36 of 1998).	Section 4.2.2.7 and Chapters G and I of Section 7.4.1 (Part A) of this EIAR / EMPr and Annexures E3, E4, E5 and E6.	A notice of intent to submit a Water Use Licence Application (WULA) for the project has been submitted to DWS. Refer to Annexure C6.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	REFERENCE WHERE APPLIED (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g. In terms of the National Water Act - Water Use Licence has/has not been applied for).
Government Notice (GN) 704, dated 1999 under the NWA, 1998.	Section 4.2.2.5; Section 12 and Chapter G of Section 7.4.1 (Part A) of this EIAR / EMPr and Annexures I and H3.	
The National Environmental Management: Biodiversity Act (NEM:BA), 2004 (Act No. 10 of 2004) and regulations thereunder.	Chapter E, F and M of Section 7.4.1 (Part A) of this EIAR / EMPr as well as Annexures E1 and E3.	Impacts and mitigation / management measures relevant to biodiversity and conservation are provided in Sections 9; 10; 11; 12 of Part A and Sections 1.4; 1.5 and 1.6 of Part B of this EIAR / EMPr.
Environmental Conservation Act, 1989 (Act No 73 of 1989).		
National Forests Act, 1998 (Act No 84 of 1998)		
National Veld and Forest Fire Act, 1998 (Act No 101 of 1998)		
Alien and Invasive Species Regulations published in the Government Gazette No. 37886, dated 01 August 2014	Chapter E, F and M of Section 7.4.1 (Part A) of this EIAR / EMPr as well as Annexures E1 and E3.	Impacts and mitigation / management measures relevant to biodiversity and conservation are provided in Sections 9; 10; 11; 12 of Part A and Sections 1.4; 1.5 and 1.6 of Part B of this EIAR / EMPr.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	REFERENCE WHERE APPLIED (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g. In terms of the National Water Act - Water Use Licence has/has not been applied for).
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)		
National Environmental Management: Protected Areas Act (NEM: PAA) (Act No 57 of 2003).		
NEM:BA National Threatened Terrestrial Ecosystems list, December 2011.		
Mpumalanga Biodiversity Sector Plan, 2014.	Chapter E, F and M of Section 7.4.1 (Part A) of this EIAR / EMPr as well as Annexures E1, E3 and E9.	Impacts and mitigation / management measures relevant to biodiversity and conservation are provided in Sections 9; 10; 11; 12 of Part A and Sections 1.4; 1.5 and 1.6 of Part B of this EIAR / EMPr.
Mpumalanga Nature Conservation Act, 1998 (Act 10 of 1998)	Chapters E, F and M of Part 7.4.1 (Part A) of this EIAR / EMPr and Annexure E1.	

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	REFERENCE WHERE APPLIED (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g. In terms of the National Water Act:-Water Use Licence has/has not been applied for).
The National Environmental Management: Air Quality Act (Act No 39 of 2004).	Chapter J of Section 7.4.1 (Part A), Section 9 (Part A) and Section 1.4.9 (Part B) of this EIAR / EMPr.	Air quality monitoring is performed at Kleinkopje Colliery. Refer also to Annexure E7.
Government Gazette, 32816, General Notice 1210, National Ambient Air Quality Standards, in terms of the National Environmental Management: Air Quality Act, 2003 (Act No. 39 of 2004), Department of Environmental Affairs, 24 December 2009.		
Government Gazette, 35463, General Notice 486, National Ambient Air Quality Standard for Particulate Matter with Aerodynamic Diameter less than 2.5 Micron Meters (PM2.5), in terms of the National Environmental Management: Air Quality Act, 2003 (Act No. 39 of 2004), Department of Environmental Affairs, 29 June 20012.	Chapter J of Section 7.4.1 (Part A), Section 9 (Part A) and Section 1.4.9 (Part B) of this EIAR / EMPr.	

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	REFERENCE WHERE APPLIED (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g. In terms of the National Water Act - Water Use Licence has/has not been applied for).
Government Gazette 36974, General Notice 827, National Dust Control Regulations, in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004), Department of Environmental Affairs, 01 November 2013.		
Government Notice No. 144. Highveld Priority Area Air Quality Management Plan. March 2012.		
SABS Code of Practice 0103 of 2008: The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication.	Chapter K of Section 7.4.1 (Part A) of this EIAR / EMPr.	Impacts and mitigation / management measures relevant to noise are provided in Sections 9; 10; 11; 12 of Part A and Sections 1.4; 1.5 and 1.6 of Part B of this EIAR / EMPr.
SABS Code of Practice 0328 of 2008: Environmental Noise Impact Assessments		

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	REFERENCE WHERE APPLIED (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g. In terms of the National Water Act - Water Use Licence has/has not been applied for).
National Environmental Management: Waste Act (Act No 59 of 2008), as amended.	Sections 4.2.2.4 and 4.2.2.8 (Part A) of this EIAR / EMPr.	Impacts and mitigation / management measures relevant to waste management are provided in Sections 9; 10; 11; 12 of Part A and Sections 1.4; 1.5 and 1.6 of Part B of this EIAR / EMPr.
National Heritage Resources Act (Act No. 25 of 1999), as amended.	Chapter N of Section 7.4.1 (Part A) of this EIAR / EMPr and Annexure E2.	Impacts and mitigation / management measures are provided in Sections 9; 10; 11; 12 of Part A and Sections 1.4; 1.5 and 1.6 of Part B of this EIAR / EMPr. Refer also to Annexure J. Refer also to Annexure C8 for correspondence with SAHRA.
DMR Guideline for Consultation with communities and Interested and Affected Parties. As required in terms of Sections 16(4)(b) or 27(5)(b) of the Mineral and Petroleum Resources Development Act (Act 28 of 2002), and in accordance with the standard directive for the compilation thereof as published on the official website of the DMR.	Sections 7.3 and 11 of Part A this EIAR / EMPr and Annexure G.	Public Participation relevant to this EIAR / EMPr has been undertaken in accordance with the relevant Guideline(s) and EIA Regulations, dated December 2014. Refer to the Public Participation Report in Annexure G.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT (A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)	**REFERENCE WHERE APPLIED** (i.e. Where in this document has it been explained how the development complies with and responds to the legislation and policy context)	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** (E.g. In terms of the National Water Act - Water Use Licence has/has not been applied for).
Integrated Environmental Management Information Series. Criteria for determining alternatives in EIA.	Sections 7.1, 7.4, 7.7 and 7.9 of this EIAR / EMPr and Annexure D.	Alternatives have been assessed as part of the Scoping and EIA phases. Refer to Annexure D.
Government Gazette 39425. Government Notice R.1147 dated 2015, "*Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations*"	Section 19 (Part A) and Sections 1.4.1 and 1.7 (Part B) of this EIAR / EMPr, as well as Annexure J.	The Closure Cost Assessment (financial provision) report, as well as the Rehabilitation Plan and Schedule and Closure- and Decommissioning Plan have been compiled for the Pit 2A Extension in terms of the mentioned Regulations. Refer to Annexure J.
Emalahleni Local Municipality Integrated Development Plan. 2016/17.	Chapter O of Part 4.4.1 (Part A) of this EIAR / EMPr and Annexure F.	Impacts and mitigation / management measures are provided in Sections 9; 10; 11; 12 of Part A and Sections 1.4; 1.5 and 1.6 of Part B of this EIAR / EMPr. Refer also to Annexure J. The Social and Labour Plan Progress Report is included in Annexure F.
Emalahleni Local Municipality Spatial Development Framework. 2015.		

6. Need and desirability of the proposed activities

6.1 Need and Desirability in terms of the Guideline on Need and Desirability, dated 20 October 2014.

On the 20th of October 2014, the Department of Environmental Affairs published a Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010, in Government Notice 891 of 2014. The following table indicates on how the guideline requirements were considered in this EIR/EMPr.

Table 13: Need and Desirability of the Proposed Project

Requirement		Part where requirement is addressed/response
1.	**How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?[9]**	Kleinkopje Colliery is situated within an area vegetated by the Moist Sandy Highveld Grassland vegetation type according to Low & Rebelo (1998) with the most recent vegetation classification, classifying it as Eastern Highveld Grassland (Mucina & Rutherford 2006). The vegetation type is considered to be endangered nationally with none conserved and 55% altered, primarily by cultivation. The conservation status of this vegetation type is very poor, with large parts that are either currently cultivated or have been previously ploughed, and the remaining untransformed vegetation that occurs as patchy remnants that are often heavily grazed. The mine boundary area is situated in an endangered ecosystem. This means that the ecosystem has undergone degradation of ecological structure, function or composition as a result of human intervention, although it is not critically endangered.
1.1	How were the following ecological integrity considerations taken into account?	
1.1.1	*Threatened Ecosystems.[10]*	
1.1.2	*Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.[11]*	

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

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

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

Requirement	Part where requirement is addressed/response
	Vegetation and fauna sensitivity, wetlands and protected areas and conservation planning are described in Chapters E; F; H and M of Part 7.4.1 (Part A). Refer also to Annexures E1 and E3 for copies of the relevant specialist studies conducted.
1.1.3 Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs").	Refer to Chapter M of Part 7.4.1 (Part A). The natural vegetation of the study area as well as the surrounding areas has been heavily impacted by existing mining activities on site, extensive agricultural activities (i.e. maize cultivation) as well as impacts associated with linear infrastructures (e.g. roads, powerlines and railways). All of these activities have resulted in the transformation of the natural habitats within the general area, as portrayed in the Mpumalanga Biodiversity Sector Plan terrestrial biodiversity assessment which classifies large parts of the study area as having no natural habitat remaining. An area classified as CBA Optimal (Critical Biodiversity Area Optimal) is indicated as occurring within the northern reaches of the proposed opencast pit. Large sections of the hillslope seepage wetland (associated with the proposed location of the Pit 2A Extension area) are permanently or near-permanently wet. This is however related to both seepage derived from the upslope discard dump as well as overflow and discharge from reservoirs associated with pumping stations pumping water to the eMalahleni Water Reclamation Plant. Stands of the alien tree *Populus x canescens* are present on-site. A handheld pH and EC (electrical conductivity) meter was used to test the water within the hillslope seepage wetland downslope of the discard dump. EC readings of over 3999 µS/cm confirm elevated salinity levels due to coal discard contamination.
1.1.4 Conservation targets.	
1.1.5 Ecological drivers of the ecosystem.	
1.1.6 Environmental Management Framework.	
1.1.7 Spatial Development Framework.	

Requirement		Part where requirement is addressed/response
1.1.8	*Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).*[12]	On 4 May 2007 the Minister of Environmental Affairs and Tourism formally declared the eastern part of Gauteng and western part of Mpumalanga an air pollution hotspot, to be known as the "The Highveld Priority Area", a National air pollution hotspot in terms of Section 18(1) of the NEM:AQA. By declaring a priority area, authorities recognise that air quality within these areas are generally regarded as being poor, and frequently meet or exceed ambient air quality standards. Kleinkopje Colliery is located in the Highveld Priority Area. This implies that authorities may impose measures on the Kleinkopje Colliery and other mines and industries within this area in order to allow for improvements in the air quality of the region.
1.2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[13]	The potential impacts that have been identified and may occur as a result of the proposed activity has been discussed in Section 9 (Part A) and Section 1.4.9 (Part B) of this document.
1.3	How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[14]	
1.4	What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether,	Discards and slimes resulting from beneficiation of the ROM feed from the Pit 2A Extension area will be deposited on the above-mentioned

[12] Section 2(4)(n) of NEMA refers.

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

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

	Requirement	Part where requirement is addressed/response
	what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?[15]	existing Klippan Co-Disposal Facility located to the west of the proposed Pit 2A Extension area. Refer also to Section 4.2.2 of this report.
1.5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[16]	The Phase I HIA study for the proposed Pit 2A Extension Project revealed the following types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) in and near the Project Area, namely (Figure 84): • One graveyard in the Project Area (GY01). • Two graveyards directly outside the Project Area (GY02, GY03). GY01 will be affected by the Pit 2A Extension Project. GY02 and GY03 fall outside the footprint of the Pit 2A Extension Project and will not be affected by the proposed Pit 2A Extension Project. All graveyards and graves can be considered to be of high significance and are protected by various laws. According to the specialist, all the graveyards hold graves which are older than sixty years.
1.6	How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[17]	The mining and removal of minerals (non-renewable resources) at Kleinkopje Colliery's proposed Pit 2A Extension area will result in the localised destruction of the geological strata, which is a consequence of mining. Water collected within the Pit 2A Extension areas will continue to be dewatered and pumped to the dirty water management system and finally to the Emalahleni Water Reclamation Plant.
1.7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the	Kleinkopje Colliery holds an approved Water Use License 04/B11J/AFGJ/1416 dated 20 December 2011 from the Department of Water and

[15] Section 24 of the Constitution and Sections 2(4)(a)(iv) and 2(4)(b) of NEMA refer.
[16] Section 24 of the Constitution and Sections 2(4)(a)(iii) and 2(4)(b) of NEMA refer.
[17] Section 24 of the Constitution and Sections 2(4)(a)(v) and 2(4)(b) of NEMA refer.

Requirement		Part where requirement is addressed/response
	integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?[18]	Sanitation (DWS) for a number of water uses undertaken on-site. The potential impacts that may occur as a result of the proposed activity have been assessed in Section 9 (Part A) and Section 1.4.9 (Part B). Refer also to Annexure I.
1.7.1	*Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)*	Since the proposed Pit 2A Extension will be a continuation of the mining operation at Kleinkopje Colliery, the dependency on the use of the resources will continue.
1.7.2	*Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)*	
1.7.3	*Do the proposed location, type and scale of development promote a reduced dependency on resources?*	
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts?[19]	A risk-averse and cautious approach was applied by the undertaking of specialist studies (i.e. Wetland assessment and Biodiversity Action Plan).
1.8.1	*What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*	Refer also to Section 15 (Part A).
1.8.2	*What is the level of risk associated with the limits of current knowledge?*	Based on the fact that a number of specialists were commissioned to conduct assessments on

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

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

Requirement	Part where requirement is addressed/response
1.8.3 Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	their specialist fields for the project, and such assessments having been used in the assessment of impacts, the level of risk associated with the limits of current knowledge can be considered low.
1.9 How will the ecological impacts resulting from this development impact on people's environmental right in terms following:[20]	
1.9.1 Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	All potential negative and positive impacts associated with the proposed activity have been discussed in Section 9 (Part A) and Section 1.4.9 (Part B). Refer also to Annexure I.
1.9.2 Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	
1.10 Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	
1.11 Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	
1.12 Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?[21]	Refer to Part 8.1 and Annexure D.
1.13 Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the	All potential negative and positive impacts associated with the proposed activity have been

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

[21] Section 2(4)(b) of NEMA refer.

Requirement	Part where requirement is addressed/response
size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?[22]	discussed in Section 9 (Part A) and Section 1.4.9 (Part B). Refer also to Annexure I.
2.1 What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
2.1.1 The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,	Refer to Chapter O of Section 7.4.1 (Part A) of this document. All potential negative and positive impacts associated with the proposed activity have been discussed in Section 9 (Part A) and Section 1.4.9 (Part B). Refer also to Annexure I.
2.1.2 Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	
2.1.3 Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	
2.1.4 Municipal Economic Development Strategy ("LED Strategy").	
2.2 Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	
2.2.1 Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	
2.3 How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?[23]	Refer to Chapter O of Section 7.4.1 (Part A) and Labour Plan Progress Report (2015) attached hereto as Annexure F. Note: The proposed 2A Extension will be a continuation of the current mining activities.
2.4 Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term?[24] Will the impact be socially and economically sustainable in the short- and long-term?	All potential negative and positive impacts associated with the proposed activity have been discussed in Section 9 (Part A) and Section 1.4.9 (Part B). Refer also to Annexure I.

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

[23] Section 2(2) of NEMA refers.

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

Requirement	Part where requirement is addressed/response
	The development will be socially- and economically sustainable as the Life of Mine (at the Pit 2A mining area) will be extended up to 2025. During this period social and economical structures within the local communities will be supported by the mine in terms of job security and social responsibility.
2.5 In terms of location, describe how the placement of the proposed development will:[25]	-
2.5.1 result in the creation of residential and employment opportunities in close proximity to or integrated with each other,	As the proposed activity is the extension of the current mining activities, residential opportunities will not be created. The mine will continue to provide work for employees during the operational phase. The proposed activity will not impact on the transportation of people.
2.5.2 reduce the need for transport of people and goods,	
2.5.3 result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	
2.5.4 compliment other uses in the area,	The current land use at Kleinkopje Colliery is that of 'mining'. Local businesses and the existence of settlements and town in close proximity to Kleinkopje Colliery (and its neighbouring mines) are dependent on the operation of the mines in the area.
2.5.5 be in line with the planning for the area,	The Emalahleni Local Municipality SDF states the following: "*Mining activity and electricity generation are major contributors to the local economy. These southern parts of the municipality form part of the Energy Mecca of South Africa, due to its rich deposits of coal reserves and power stations such as Kendal, Matla, Duvha and Kriel. The mining belt also extends northward towards Emalahleni City. This area is thus characterised by conflicting demand between mining, electricity generation and agriculture. The primary objective should be to prevent mining activity from encroaching onto*

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

Requirement	Part where requirement is addressed/response
	high potential agricultural land and areas of high biodiversity; and to ensure that the areas of mining activity are properly rehabilitated and that the agricultural value of the land be restored once the mineral resources are depleted. *The vast majority of land in the Emalahleni Local Municipality is classified as medium and high potential soil. Thus, apart from the mining priority areas the remainder of the municipal area is earmarked to retain the current dominant agricultural use, including stock farming (sheep and cattle) and maize farming with some irrigated farming along the river drainage basins.*"
2.5.6 for urban related development, make use of underutilised land available with the urban edge,	Not applicable.
2.5.7 optimise the use of existing resources and infrastructure,	Kleinkopje Colliery is an existing mine. A processing plant is also currently operated within the existing mining boundary area. As the proposed Pit 2A Extension will be a continuation of the current activities, existing infrastructure and resources will be used as far as possible.
2.5.8 opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	
2.5.9 discourage "urban sprawl" and contribute to compaction/densification,	As mentioned above, Kleinkopje Colliery is an existing mine. A processing plant is also currently operated within the existing mining boundary area. As the proposed Pit 2A Extension will be a continuation of the current activities, it is not anticipated that the urban sprawl, the compaction / densification or impacts on spatial patterns will occur as a result of the proposed Pit 2A Extension. Existing resources and infrastructure will continue to be used as part of the proposed pit extension as far as possible.
2.5.10 contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	
2.5.11 encourage environmentally sustainable land development practices and processes,	Effective environmental management and mitigation of environmental impacts. Refer to Annexure I.

Requirement	Part where requirement is addressed/response
2.5.12 *take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),*	The proposed Pit 2A Extension location was determined based on the location of the ore reserve and in relation to the existing pit area. Alternatives have been identified in terms of the location of the proposed PCD. Refer to Annexure D.
2.5.13 *the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),*	The current mining operation results in high socio-economic returns. Refer also to the SLP Progress Report attached hereto as Annexure F.
2.5.14 *impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and*	It is not anticipated that the proposed activity will impact on any socio-cultural. The "sense of place" of the area has also already been impacted on as a result of current mining activities conducted within the area. Therefore, regular passers-by of the area as well as local residents within the area are likely to be desensitised to the mining activities.
2.5.15 *in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?*	It is not anticipated that the proposed activity will result in a more integrated settlement or in additional negative socio-economic impacts. Settlement patterns will most likely remain unchanged as the proposed Pit 2A Extension will be a continuation of the current mining activities.
2.6 How were a risk-averse and cautious approach applied in terms of socio-economic impacts?[26]	
2.6.1 *What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*[27]	It is believed that no socio-economic related knowledge gaps exist in terms of the proposed project. Also, no uncertainties have been identified. The following assumptions are made:
2.6.2 *What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?*	

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

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

Requirement	Part where requirement is addressed/response
2.6.3 *Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?*	• That all socio-economic information provided by the applicant regarding the proposed project is correct. • That the mitigation measures proposed in this report and the EMPr are implemented correctly and are effective. • All research/reference sources are accurate. • That there will be no significant changes to the proposed project that could affect the findings and recommendations of this report and the EMPr. Based on the above descriptions, it is our opinion that the level of risk associated with the limits of current knowledge (in terms of socio-economic aspects) is low.
2.7 How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	-
2.7.1 *Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?*	Kleinkopje Colliery is an existing mine operating approximately 15km from Emalahleni in the Mpumalanga Province. The socio-economic impacts which have been identified is that of impacts on the adjacent communities and positively the continuation of job security.
2.7.2 *Positive impacts. What measures were taken to enhance positive impacts?*	
2.8 Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	All potential negative and positive impacts associated with the proposed activity have been discussed in Section 9 (Part A) and Section 1.4.9 (Part B). Refer also to Annexure I
2.9 What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?[28]	Refer to Annexure D for the Alternatives Assessment Report.

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

Requirement	Part where requirement is addressed/response
2.10 What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?[29] Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	
2.11 What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?[30]	Refer to point 2.6 (of this table) above.
2.12 What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?[31]	All potential negative and positive impacts associated with the proposed activity have been discussed in Section 9 (Part A) and Section 1.4.9 (Part B). Refer also to Annexure I
2.13 What measures were taken to:	-
2.13.1 ensure the participation of all interested and affected parties,	Refer to the Public Participation report attached hereto as Annexure G.
2.13.2 provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,[32]	
2.13.3 ensure participation by vulnerable and disadvantaged persons,[33]	
2.13.4 promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,[34]	

[29] Section 2(4)(c) of NEMA refers.
[30] Section 2(4)(d) of NEMA refers.
[31] Section 2(4)(e) of NEMA refers.
[32] Section 2(4)(f) of NEMA refers.
[33] Section 2(4)(f) of NEMA refers.
[34] Section 2(4)(h) of NEMA refers.

Requirement	Part where requirement is addressed/response
2.13.5 ensure openness and transparency, and access to information in terms of the process,[35]	
2.13.6 ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge[36]*, and*	
2.13.7 ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?[37]	Refer to the Public Participation report attached hereto as Annexure G. The Public Participation report presents the details of all I&APs that were identified, how the I&APs were notified and involved in the process, any issues and concerns raised by the I&APs and the final results of the Public Participation Process.
2.14 Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?[38]	As mentioned previously, the proposed Pit 2A Extension is a continuation of an existing mining activity at Kleinkopje Colliery. It is not anticipated that additional opportunities will occur as a result of the proposed pit extension. However, the proposed activity will contribute to the continued success of the mining activity and continued job security and socio-economic well-being of the area.
2.15 What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?[39]	All contractors, sub-contractors and workers will attend compulsory environmental awareness training and inductions. This training will highlight the dangers associated with the workplace. Procedures relating to environmental risks will also be put in place and will be regularly updated.
2.16 Describe how the development will impact on job creation in terms of, amongst other aspects:	-
2.16.1 the number of temporary versus permanent jobs that will be created,	Kleinkopje Colliery currently employs 639 permanent employees and 79 core contractors.

[35] Section 2(4)(k) of NEMA refers.
[36] Section 2(4)(g) of NEMA refers.
[37] Section 2(4)(q) of NEMA refers.
[38] Section 2(4)(g) of NEMA refers.
[39] Section 2(4)(j) of NEMA refers.

Requirement	Part where requirement is addressed/response
2.16.2 whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	Therefore, should the environmental authorisation be approved and granted, it would result in the increased job security of the current employees.
2.16.3 the distance from where labourers will have to travel,	
2.16.4 the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and	
2.16.5 the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.17 What measures were taken to ensure:	-
2.17.1 that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and	Refer to the Public Participation report attached hereto as Annexure G. Other government departments are included on the list of I&APs and stakeholders and received the notifications of the proposed activity as well as notifications on the availability of the report for review.
2.17.2 that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	
2.18 What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?[40]	During the initial Public Participation Process, all issues and concerns raised by the I&APs, stakeholders and the Organs of State are taken into account and responses provided.
2.19 Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?[41]	Mitigation measures for each of the identified impacts will be described in detail in Annexure I and Part B of this report. The proposed mitigation measures are considered realistic to protect both the bio-physical and socio-economic environment in both the short- and long-term.
2.20 What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?[42]	The applicant will be responsible for the costs of any remediation of pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects.

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

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

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

Requirement		Part where requirement is addressed/response
		The Financial Provisioning Report for the proposed project is included in Annexure J..
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?[43]	The alternatives for the proposed project are described in Annexure D.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?[44]	All potential negative and positive impacts associated with the proposed activity have been discussed in Section 9 (Part A) and Section 1.4.9 (Part B). Refer also to Annexure I

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

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

7. Motivation for the preferred development footprint within the approved site including a full description of the process followed to reach the proposed development footprint within the approved site.

7.1 Details of the development footprint alternatives considered

7.1.1 Proposed activity

The proposed activity is that of opencast coal mining and related activities at the proposed Pit 2A Extension area of Kleinkopje Colliery. The proposed project also includes the construction and use of a haul road and a new pollution control dam (relocation of the 2A Dam).

7.1.2 Activity alternative

7.1.2.1 Mining method

Three alternatives in terms of mining method have been identified. These include:

- Alternative MM1: Dragline operation (preferred alternative)
- Alternative MM2: Truck-and-Shovel
- Alternative MM3: Production dozing

The current preferred alternative is that of dragline operation (MM1). This is due to dragline operation being cost effective in bulk waste material. It provides for high production rates and increased coal exposure and has a smaller carbon footprint when compared to the alternative mining methods. Dragline operation is also suitable for multi-seam operations at increased depth. Refer also to Table 69 for more detail on the advantages and disadvantages identified for each alternative.

Table 14: Comparative review – Activity (mining method) alternatives

	Alternative MM1: Dragline operation	Alternative MM2: Truck-and-Shovel	Alternative MM3: Production dozing
Environmental	64.20%	59.26%	55.56%
Social	66.67%	66.67%	66.67%
Technical	78.43%	66.67%	54.90%
Economic	76.67%	56.67%	66.67%
FINAL SCORE	71.49%	62.31%	60.95%

7.1.2.2 Scheduling alternatives

Three alternatives in terms of scheduling have been identified and include the following:

- Alternative SCH1: Dual dragline schedule (preferred alternative);
- Alternative SCH2: Single dragline schedule; and
- Alternative SCH3: Underground schedule.

The current preferred alternative is that of Duel dragline schedule (SCH1). Mining can be schedule for simultaneous end of duel dragline work and it provides for a high coal exposure rate. Refer also to Table 69 for more detail on the advantages and disadvantages identified for each alternative.

Table 15: Comparative review – Scheduling alternatives

	Alternative SCH1: Dual dragline schedule	Alternative SCH2: Single dragline schedule	Alternative SCH3: Underground schedule
Environmental	56.79%	56.79%	70.37%
Social	85.71%	85.71%	85.71%
Technical	96.08%	52.94%	41.18%
Economic	43.33%	76.67%	56.67%
FINAL SCORE	70.48%	68.03%	63.48%

7.1.3 Design / layout alternatives

Three alternatives in terms of design and layout at the Pit 2A mining area have been identified and include the following:

- Alternative DL1: Dual dragline layout (preferred alternative);
- Alternative DL2: Single dragline layout; and
- Alternative DL3: Underground layout.

The current preferred alternative is that of Duel dragline layout (DL1). The preferred layout allows for dual dragline production (increased coal recovery) and the mining of both high and low margin areas. It is also suited for multi-seam operations. Refer also to Table 69 for more detail on the advantages and disadvantages identified for each alternative.

Table 16: Comparative review – Design / layout alternatives

	Alternative DL1: Dual dragline layout	Alternative DL2: Single dragline layout	Alternative DL3: Underground layout
Environmental	56.79%	56.79%	70.37%
Social	85.71%	85.71%	85.71%
Technical	96.08%	56.86%	41.18%
Economic	56.67%	86.67%	70.00%
FINAL SCORE	73.81%	71.51%	66.82%

7.1.4 Location alternatives (proposed PCD)

7.1.4.1 Pit 2A Extension

Kleinkopje Colliery is an existing mining operation and the Pit 2A Extension will be a continuation of the already authorised mining rights open-pit area. Therefore, no alternative site locations could be considered due to the locality of the mineral deposit.

7.1.4.2 Haul road

Alternatives for the location of the haul road have not been assessed, as there are no other alternatives currently identified, and since the target space is bound by the pit border and the Kleinkopje Colliery main access road. Furthermore, the proposed haul road will connect to already existing haul roads within the vicinity of the current Pit 2A.

7.1.4.3 Proposed PCD

Six alternatives in terms of the proposed location of the new pollution control dam have been assessed:

- Alternative L1: Site 1 – Located north of the Tweefontein Road, approximately 1.5 km northwest of the existing 2A Dam.
- Alternative L2: Site 2 – Located approximately 500m north of the 2A Dam.
- Alternative L3: Site 3 – Located within a 200m ambit of the 2A Dam.
- Alternative L4: Site 4 – Located within the eastern section of the mine boundary area, approximately 3.8km southwest of the 2A Dam.
- Alternative L5: Site 5 – Located approximately 250m east of the Kleinkopje Colliery Main Complex and 1.5km south of the 2A Dam (preferred alternative).
- Alternative L6: Site 6 – The existing Plant Return Water Dam (RWD) located within the Kleinkopje Colliery Complex.

Refer to Figures 29 and 84 for a visual representation of the location of each of the above-mentioned alternatives.

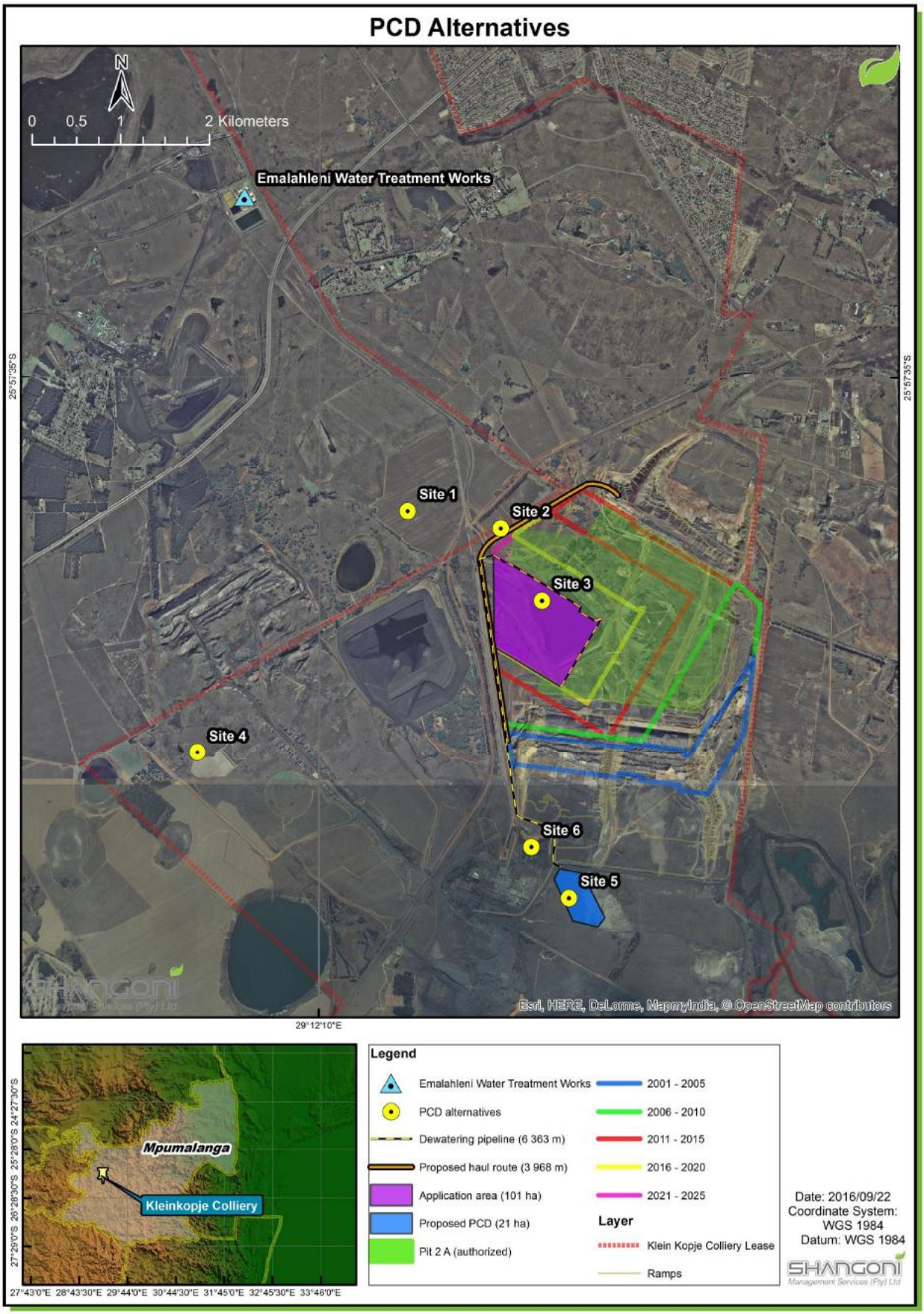

Figure 29: PCD location alternatives

The following advantages and disadvantages are relevant to the location alternatives for the PDC:

- Site L1's location is considered unsuitable due to the fact that area overlays the proposed Greenside Colliery planned 4 Seam underground workings. The site is also located a distance away from the Kleinkopje Colliery main complex and Klippan Co-Disposal Facility.
- Site L2's location falls within close proximity to a Critical Biodiversity Area (CBA) Optimal and there would no space available for the construction of the dam in that location due to existing infrastructure and the location of the proposed haul road next to the pit extension border. Furthermore, the site falls within the hillslope seepage wetland (refer to Figure 4).
- Site L3 is located within the proposed Pit 2A Extension area (application area). The site was identified as an alternative for the construction and operation of a small buffer dam during a previous 2A Dam relocation project undertaken for Kleinkopje Colliery. This site alternative also forms part of the No-go Option (i.e. should the Pit 2A Extension not take place, the existing 2A Dam will remain in place). Site L3 is also located in the mentioned wetland system.
- Site L4 is located too far from the current water reticulation system of the mine and also falls within in area characterised as an Ecological Support Area (ESA) Protected Area buffer as per the Mpumalanga Biodiversity Sector Plan.

Site L6 represents the current Plant Return Water Dam (RDW) located within Kleinkopje Colliery's mining rights area. This option entails the upgrading of the Plant RWD in order for it to be used as the main Pollution Control Dam at Kleinkopje Colliery. As per the storm water management plan and water balance results, the plant return water dams will not have sufficient buffer capacity to contain runoff generated from flood events (1:100 year). Therefore, the construction and operation of a new PCD is considered a preferred option. Furthermore, upgrading of the current plant return water dams is not considered a feasible option as there is not sufficient area available to expand the current plant return water dams to accommodate for the additional capacity requirements (for as a minimum the 1:100 flood event).

The preferred alternative is alternative L5 (Site 5). The site is ideally located in close proximity to the Kleinkopje Colliery Main Complex, within the mine's mining rights area and subsequently also in close proximity to the Plant return water dam and the existing reticulation system that runs to the Emalahleni Water Treatment Plant. Furthermore, the preferred dam will be close to the 5 West Pit and the Klippan Co-Disposal Facility. The site is also not situated on future reserves (the area has been previously mined). From an environmental perspective, the preferred site is not located within any wetland footprints, critical biodiversity areas or ecological support areas (refer to Figure 4). Refer also to Table 69 for more detail on the advantages and disadvantages identified for each alternative. The location alternatives will be further investigated as part of the EIA phase.

Table 17: Comparative review – Location alternatives (PCD)

	L1: Site 1	L2: Site 2	L3: Site 3	L4: Site 4	L5: Site 5	L6: Site 6
Environmental	82.76%	63.22%	73.56%	70.11%	88.51%	74.71%
Social	61.90%	66.67%	66.67%	61.90%	71.43%	71.43%
Technical	64.71%	52.94%	64.71%	64.71%	88.24%	84.31%
Economic	53.33%	53.33%	63.33%	53.33%	80.00%	90.00%
FINAL SCORE	65.68%	59.04%	67.07%	62.51%	82.04%	80.11%

7.1.5 Wetland mitigation and offset location alternatives

Three alternatives in terms of the wetland mitigation been identified and include the following:

- Alternative WT1: 2A Dam wetland re-establishment.
- Alternative WT2: Wetland Offset (wetland protection / rehabilitation / averted loss)
- Alternative WT3: Combination of wetland re-establishment and wetland off-set (preferred alternative).

Furthermore, three alternatives for wetland offset location include:

- Alternative OS1: Wetland offset on Kleinkopje Colliery site (preferred alternative).
- Alternative OS2: Wetland offset in another area (outside mine boundary area).
- Alternative OS3: A combination of wetland offset on-site and on another area outside the mine boundary area.

Refer also to Table 69 for more detail on the advantages and disadvantages identified for each alternative.

Wetland Consulting Services were commissioned to undertake a Wetland Baseline and Mitigation assessment and propose a conceptual strategy taking the above-mentioned alternatives into consideration. The resultant report is attached to the EIAR / EMPr in Annexure E3.

The preferred alternative is that of WT3 (a combination of WT 1 and WT2) (i.e. 2A Dam wetland t re-instatement/re-creation of water course on rehabilitated 2A Pit opencast area as well as the rehabilitation and protection of suitable wetlands on-site).

Table 18: Comparative review – Wetland mitigation alternatives

	Alternative WT1: 2A Dam wetland re-establishment	Wetland Offset (wetland protection / rehabilitation / averted loss)	Alternative WT3: Combination of WT1 and WT2
Environmental	68.69%	67.68%	81.82%

Social	95.24%	95.24%	95.24%
Technical	72.55%	68.63%	82.35%
Economic	46.67%	73.33%	80.00%
FINAL SCORE	**70.79%**	**76.22%**	**84.85%**

Table 19: Comparative review – Wetland off-set location alternatives

	Alternative OS1: Wetland offset on Kleinkopje Colliery site	Alternative OS2: Wetland offset in another area (outside mine boundary area)	Alernative OS3: A combination of OS 1 and OS2
Environmental	78.79%	64.65%	68.69%
Social	95.24%	85.71%	90.48%
Technical	96.08%	45.10%	66.67%
Economic	90.00%	70.00%	70.00%
FINAL SCORE	**90.03%**	**66.36%**	**73.96%**

Although it is unlikely that the functional hectare equivalent target will be met with the re-instatement of the wetland associated with the Pit 2A Extension area, the strategy will result in positive benefits in terms of re-instating flow to the Olifants River from the affected sub-catchment and restoring wetland processes to rehabilitated landscape. Re-instatement of wetland habitat on the rehabilitated area will increase habitat diversity and species diversity within the rehabilitated area. Appropriate design of the re-created system wll allow for tyical wetland functions such as flood attenuation and sediment trapping to be restored to the rehabilitated landscape.

The second aspect to the proposed (preferred) wetland mitigation strategy includes the rehabilitation of suitable remaining wetlands within the Kleinkopje mining rights area. From the map of wetland within the mining rights area (Figure 14), it is clear that extensive mining activities within the mining rights area and surroundings have limited the number and size of wetlands available for rehabilitation activities. A number of wetlands were found to be unsuitable targets for rehabilitation due to ongoing surface subsidence in some areas, as well as due to future proposed mining activities.

Three pans were however identified as possible targets for rehabilitation (numbered 1 to 3 in Figure 14) and were further investigated in the field. All three of these pans fall along the boundary of the Kleinkopje mining rights area and extend into the adjacent Tweefontein Mine (Glencore). However, what makes especially pans 1 and 2 ideal rehabilitation targets is that both these pans and their catchments have been excluded from future mining activities on the Tweefontein Mine side, and no future mining is planned on the Kleinkopje side either. It is therefore possible to protect both these pans and their

respective catchments. Pan 3 was unfortunately found to not represent a suitable target for rehabilitation under current circumstances.

7.1.6 No-go option

- *Physical and biophysical environment* – The proposed Pit 2A Extension project is expected to create a number of environmental impacts of which not all may necessarily be effectively mitigated and include impacts on water resources, soil, biodiversity, wetlands, air quality, and surrounding communities. However, from a wetland perspective, no flow currently exists between the affected wetland system and the Olifants River. The proposed wetland mitigation strategy will result in positive benefits in terms of re-instating flow to the Olifants River from the affected sub-catchment and restoring wetland processes to rehabilitated landscape.
- *Social* – A number of social impacts have been provisionally identified and include impacts on Interested and Affected Parties (I&APs) and surrounding communities. It is however important to note that the Kleinkopje Colliery is an existing mining operation. Therefore, the significance of negative social impacts that have been identified could be described as being low as regular visitors to the area and the local community are likely to be desensitised to the mining operations.
- *Economic* – Should the Environmental Authorisation not be granted, the Life of Mine will not be extended and several jobs may be lost. Skills development may cease and the ore body will remain *in situ* and unutilised.

7.1.7 Land use alternatives

The following land use alternatives have been identified, were investigated and are briefly compared in **Error! Reference source not found.**20 below:

- Alternative LU1: Opencast mining
- Alternative LU2: Grazing
- Alternative LU3: Crop production
- Alternative LU4: No-go (the existing wetland system would form part of the land use option associated with the No-go Option)

Major impacts associated with each land use alternative have been summarised for comparative purposes. Each proposed land use alternative may impact on the natural environment at the proposed site.

Table 20: Land use alternative assessment

Environmental component	Opencast Mining (LU1)	Grazing (LU2)	Crop production (LU3)	No-go (LU4) (Wetland land use forms part of the No-Go Option)
Geology	Drilling and blasting of the hard overburden to expose the underlying coal seams will permanently destroy or disrupt the geological sequence of the coal seams to be mined.	No impact.	No impact.	Some geological strata may be permanently altered by future mining activities (if not undertaken as part of the Pit 2A Extension mining activities).
Topography	Topography may be permanently altered by the mining within the area.	Overgrazing may result in soil erosion which in turn may alter the topography.	Topography will be levelled	Topography has already been altered by previous mining activities at Pit 2A located directly adjacent to the proposed Pit 2A Extension area.
Soil	Soil structure and functioning may be altered.	Overgrazing may result in the exposure of bare soils to the elements, which may lead to erosion.	Soils will be chemically and physically modified.	No impact.
Land use	Land use will be characterised as mining and related activities.	Land use will be characterised as agriculture.	Land use will be characterised as agriculture.	Land use will remain un-changed. It should be noted the Pit 2A Extension area is located directly adjacent to the current Pit 2A mining activities. Furthermore, 2A Dam is located where mining will occur. Therefore, the proposed

Environmental component	Opencast Mining (LU1)	Grazing (LU2)	Crop production (LU3)	No-go (LU4) (Wetland land use forms part of the No-Go Option)
				mining area forms part of the existing mining area.
Land capability	Land capability will be altered.	Land capability may be lowered if overgrazing occurs.	Land capability may be impacted on if poor farming techniques are employed.	Land capability has already been impacted on by previous mining and related activities.
Flora	As the activity includes the clearance of vegetation, flora associated with the wetland system will be impacted on within the area of proposed mining. A section of the proposed extension area is currently occupied by the 2A Dam (pollution control dam). Furthermore, the wetland specialist has indicated that the area associated with the proposed location of the Pit 2A Extension area has been heavily modified and impacted on and large stands of alien vegetation occurs on the site. Flora that has established at the proposed PCD location, may also	Natural vegetation may be impacted on if overgrazing occurs.	Any natural vegetation (if any) will be destroyed. However, it is unlikely that crop production will occur within the wetland area.	Natural vegetation has already been disturbed by mining and related activities.

Environmental component	Opencast Mining (LU1)	Grazing (LU2)	Crop production (LU3)	No-go (LU4) (Wetland land use forms part of the No-Go Option)
	be impacted on due to proposed clearance of vegetation for the construction of the PCD.			
Fauna	Fauna will be impacted on as habitats within the wetland system (as well as from the area proposed for the placement of the PCD) may be removed.	Natural vegetation may be impacted on should overgrazing occur. This in turn may lead to the destruction of habitats.	Fauna will be impacted on as habitats are destroyed.	Fauna has already been impacted on as habitats have been destroyed by past mining activities.
Surface water	Surface water quantity and quality may be compromised.	No impact.	Surface and groundwater may be used for irrigation.	Surface water has already been impacted on by previous mining, and will continue to be impacted on until such time as mining areas are rehabilitated.
Groundwater	Groundwater quantity and quality may be compromised.	No impact.	Groundwater may be used for irrigation.	Groundwater has already been impacted on by previous mining and related activities, and will continue to be impacted on until such time as the mining areas are closed and rehabilitated.
Air quality	Dust will be generated as a result of the proposed mining and related activities, as well as the construction activities of the proposed PCD.	Dust may be generated if overgrazing occurs and bare soil is exposed to the elements.	Dust may be generated if bare soil is exposed to the elements.	Dust from the surrounding mining activities will continue to be generated.

Environmental component	Opencast Mining (LU1)	Grazing (LU2)	Crop production (LU3)	No-go (LU4) (Wetland land use forms part of the No-Go Option)
Noise	Noise levels may increase as a result of the proposed mining and mining related activities, as well as the construction activities of the proposed PCD.	No impact.	Noise will be generated during planting and harvesting seasons.	Noise will continue to be generated by the surrounding mining and related activities.
Visual	The visual environment will be altered by changes in topography as a result of mining.	No impact.	The planting of crops will alter the visual environment.	No impact.
Sensitive landscapes	Sensitive landscapes will be altered. However, the wetland system(s) associated with the location of the proposed Pit 2A Extension area has previously been impacted on and by mining the area and re-instating the wetland system associated with the 2A Dam, is expected to result in an improvement to the overall system functionality and flow contribution to the Olifants River.	Sensitive landscapes may be altered or destroyed if overgrazing occurs.	Sensitive landscapes will be altered or destroyed. However, it is unlikely that crop production will occur within the wetland area.	The wetland systems associated with the Pit 2A Extension area has already been impacted on by previous mining and related activities, and will continue to be impacted on until such time as the areas are rehabilitated / re-instated.
Sites of archaeological and cultural interest	A graveyard is located within the area earmarked for mining to take place. These structures will be impacted on (relocation	The graveyard may be impacted on due to grazing activities.	The graveyard may be impacted on due to crop production.	No impact. However, access to the graves by family members will be difficult currently, since the graves are located within the

Environmental component	Opencast Mining (LU1)	Grazing (LU2)	Crop production (LU3)	No-go (LU4) (Wetland land use forms part of the No-Go Option)
	proposed) due to mining in the area. The graves are located within the fenced-off Kleinkopje Colliery area. The relocation of the graves may present an opportunity for these graves to be more easily accessible			fenced-off Kleinkopje Colliery area.
Socio-economic	Job security of the mine's current employees will continue, along with other benefits arising from the Social and Labour Plan.	Some jobs may be created.	Some jobs may be created.	Jobs associated with mining may be lost as the reserve will not continue to be mined.
Interested and affected parties	Surrounding landowners may be further impacted upon as a result of impacts listed above.	Surrounding landowners may be further impacted upon as a result of impacts listed above.	Surrounding landowners may be further impacted upon as a result of impacts listed above.	Surrounding landowners may be further impacted upon as a result of impacts listed above.
Cumulative impacts	Large mining complexes already exist in the vicinity of the Kleinkopje Colliery. Impacts of mining (as described above) may be slightly increased.	Destruction of the natural environment will be compounded if overgrazing takes place.	Destruction of the natural environment will be compounded if over- fertilisation occurs or poor farming techniques are employed.	Large mining complexes already exist in the vicinity of the Kleinkopje Colliery. Impacts of mining (as described above) will be compounded.

7.2 Details of the Public Participation Process Followed

A detailed public participation process was undertaken as part of the Scoping and EIA processes. As required by the NEMA (1998), EIA Regulations, dated December 2014, the following has been conducted as part of the Environmental Authorisation application (proof thereof is included in the Public Participation Report attached as Annexure G to this report):

- Advertisement.
  - Newspaper advertisements were placed in the Witbank News.
- Site notices.
  - Site notices were placed around the Kleinkopje Colliery site, Clewer and Emalahleni areas.
- Written notices.
  - Written notices (including BIDs) were distributed to I&APs and Stakeholders.
- Availability of Scoping Report for public review
  - The Scoping Report was made available for public and stakeholder review for a period of 30 days from 21 June 2016 to 21 July 2016.
- Public meeting
  - A public meeting was held on 20 September 2016. Refer to the minutes of the meeting in Annexure G.
- Availability of EIAR / EMPr for public review
  - This EIAR / EMPr is made available for public and stakeholder review for a period of 30 days from 28 September 2016 to 28 October 2016.

7.3 Summary of issues raised by I&APs

No issues were raised by adjacent land owners and registered I&APs during the Scoping Phase Public Participation Process. Refer also to the Public Participation Report attached as Annexure G. Issues and comments raised during the Public meeting have been included in Table 21 below. Furthermore, any further comments received from I&APs during the EIA Phase, will also be incorporated into the Public Participation Report and summarised in Table 23 below (subsequent to the EIAR / EMPr public review period having ended on 28 October 2016).

Two meetings were held with the Department of Water and Sanitation (DWS) on 11 July 2016 and 13 September 2016, regarding the water use licence requirements for the project. Refer to the minutes of the meetings in Annexure C6, and a summary thereof in Table 21 below.

Table 21: Summary of the issues raised by the I&APs

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s / I&APs	Mark with an X where consulted				
First meeting with DWS: 11 July 2016					
Betty Mnguni (DWS)	X	11 July 2016	Betty Mnguni (DWS) requested clarity on the need for a potential new Pollution Control Dam to be constructed or the potential upgrading of the Plant Return Water Dam to replace the 2A Dam water containing waste storage activity.	It was explained during the DWS meeting that the upgrading of the Plant Return Water Dam or construction of a new Pollution control dam were being considered and investigated. Furthermore, it was indicated that the SPRING Model the mine was developing at that stage, would have given an indication as to the dewatering requirements for the Pit 2A mining area.	Refer to Sections 4.2.2.7.3 and 4.2.2.7.4 (Part A) for the results obtained from the storm water management plan and water balance. Refer also to the alternatives assessment report in Annexure D.
Betty Mnguni (DWS)	X	11 July 2016	Betty Mnguni (DWS) enquired as to how many alternatives are considered for the PCD location, in relation to Section 21(c) and (i) water use/s.	Six (6) options (at that time 5) for the PCD location were identified and assessed. Refer to the alternatives assessment report in Annexure D.	Refer to Figure 29 as well as Annexure D.
Refer to the remainder of the minutes of the meeting held with the DWS (Annexure C6) regarding issues that are more relevant to the Water Use Licence Application process.					

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s / I&APs	Mark with an X where consulted				
Subsequent to availability of Scoping Report for public review					
No issues or concerns were received from other I&APs on the Scoping Report that was made available for public review.					
Second meeting with DWS: 13 September 2016					
Betty Mnguni (DWS)	X	13 Sep 2016	Betty Mnguni (DWS) requested confirmation as to whether the 2A Dam is the dam from where water is transferred to the Emalahleni Water Treatment Plant	This is confirmed.	Refer to Section 4.2.2.7.2 (Part A)
Pieter Ackerman (DWS)	X	13 Sep 2016	Pieter Ackerman (DWS) enquired as to the location of the decant point(s) at the mine and indicated that there may be a need for passive treatment at the decant point(s).	As per the draft geohydrological assessment, dated August 2016, decant is predicted to occur on the south-eastern perimeter of the opencast sections at a surface elevation of approximately 1520.	Refer to Annexure E6.
Pieter Ackerman (DWS)	X	13 Sep 2016	Subsequent to Wetland Consulting Services presenting proposed Wetland Mitigation Strategy to DWS, Pieter Ackerman (DWS) pointed out that he was in favour of such an approach as it would assist in reinstating some flow	This comment is acknowledged. Continued communication with DWS will be maintained during the Water Use Licence Application process.	N/A

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s / I&APs	Mark with an X where consulted				
			from the Pit 2A area back into the Olifants River.		
Wietsche Roets (DWS)	X	13 Sep 2016	Wietsche Roets (DWS) enquired as to whether the functional hectare equivalent requirement would be met by implementing the strategy.	The functional hectare equivalents would likely not be met, but the current functionality of the hillslope seepage wetland, particularly in respect of flow augmentation to downstream systems, is limited as it is isolated (Wetland Consulting Services, 2016).	Refer to Annexure E3.

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s / I&APs	Mark with an X where consulted				
Betty Mnguni (DWS)	X	13 Sep 2016	Betty Mnguni (DWS) enquired as to Slide 18 of Part 2 and asked how removing the alien trees at the pan areas would assist in terms of the strategy.	The alien invasive trees located between the two pan systems (pans and their associated hillslope seepage wetlands) are likely to be affecting the water supply to the systems and that by removing the trees (possibly leaving a few for small raptors) could assist in terms of improving water flow to the systems (Wetland Consulting Services).	Refer to the minutes of the meeting in Annexure C6.
Refer to the remainder of the minutes of the meeting held with the DWS (Annexure C6) regarding issues that are more relevant to the Water Use Licence Application process.					
Public Meeting (as part of Farmers Day): 20 September 2016					
J. Viljoen	X	20 Sep 2016	J. Viljoen mentioned that it seems that "Anglo/Shangoni" is concerned about wetlands and pollution to the Olifants river and that problems are buried underground but then his water comes from underground.	From the EAP's perspective, in terms of the Pit 2A extension project, groundwater impacts have been assessed and are included (along with the relevant management and mitigation measures) in this Environmental Impact Assessment	Refer to the minutes of the meeting in Annexure G. Refer also to the Risk Assessment Report in

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s / I&APs	Mark with an X where consulted				
			He stated that when Kleinkopje Colliery do blasting, veins that lead to his house are cut off and that groundwater is his survival means.	Report (EIAR) and Environmental Management Programme Report (EMPr). Groundwater impacts also formed part of presentation at the Public meeting (as per Annexure G). Shangoni encourages I&APs to review the EIAR / EMPr and specialist studies during the public review period and provide comments.	Annexure I and Part B of this report for the management and mitigation measures proposed by specialists.
J. Viljoen	X	20 Sep 2016	J. Viljoen asked what the mine will do, should groundwater be impacted on. He also mentioned that his one borehole packed up 3 weeks ago, and said that it is dry now. He indicated that he put in a new pump with electronic monitors and that 22 minutes later the borehole was dry. He stated that he cannot live and carry on with business with 20 minutes' supply of water.	The comments made are related to existing mining activities. Anglo representatives acknowledged the request and indicated that they will be in contact with J. Viljoen.	Refer to the minutes of the meeting in Annexure G.

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s / I&APs	Mark with an X where consulted				
			He also added that if he puts water in a glass for two days, black silt settles at the bottom of the glass. He stated that according to him, the black silt is coal.		
Arthur Lloyd	X	20 Sep 2016	Arthur Lloyd asked for the location of the aquifer that was mentioned during the presentation. Arthur Lloyd expressed their concern that the groundwater specialist is not present at the meeting since he / she would be the person with the specialist field knowledge. He said that his concern is knowing how the water will be affected when the mine does the blasting. He said that he is not concerned about the rivers and wetlands, but the groundwater. He further explained that he does doubts that there is communication to the mine	This comment is acknowledged. Refer to the geohydrological assessment report in Annexure E6 for information regarding the aquifers. Mitigation and management measures from specialist reports are incorporated into the EIAR / EMPr as commitments, against which the mine will be audited on a regular basis (should the environmental authorisation and water use licence for the project be issued).	Refer to Table 45 in Part A of this report and Annexure E6. Refer also to the Risk Assessment Report in Annexure I and Part B of this report for the management and mitigation measures proposed by specialists.

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s / I&APs	Mark with an X where consulted				
			and said that the mine just blasts anywhere. He said he understands that it is a public participation meeting and has to be held as required by the law but after the process, nobody controls what the mine is doing.		
Arthur Lloyd	X	20 Sep 2016	Arthur Lloyd asked how do they establish that the impact on groundwater. He asked if the specialists drill boreholes etc.	The methodologies on field work, hydrocensus, drilling, modelling etc. are included in the groundwater specialist report (Annexure E6). Kleinkopje representative Dolly Mthethwa mentioned that there are existing boreholes and also existing information and that the boreholes have been drilled as deep as 18 metres.	Refer to Annexure E6.

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s / I&APs	Mark with an X where consulted				
Willem du Plessis	X	20 Sep 2016	Willem du Plessis proposed that the mine and the farmers have a meeting regarding the ongoing groundwater aspects and discuss what the mine is prepared to do, should the farmers' boreholes be impacted on. He then asked that if the dam is moved to another location and the dam cracks resulting in seepage from the dam - how this will affect the groundwater	The Kleinkopje representatives acknowledged this request and indicated that they will be in contact with the I&APs in this regard. Note: Refer to the presentation of the meeting (Annexure G) which includes a description on the proposed groundwater impacts and mitigation / management measures. Refer to the minutes of the meeting (Annexure G) for more detailed discussions.	Refer to Annexure G as well as Annexure E6.
Refer to the remainder of the minutes of the meeting in Annexure G regarding issues that are more relevant to the existing mining operation at Kleinkopje Colliery.					

7.4 The Environmental attributes associated with the development footprint alternatives. A baseline environment.

7.4.1 Type of environment affected by the proposed activity

A baseline description or "*status quo*" of the present environmental situation is provided in this part of the document. Environmental aspects have been described in the following respective chapters:

- Chapter A: Geology.
- Chapter B: Climate.
- Chapter C: Topography.
- Chapter D: Soil.
- Chapter E: Vegetation.
- Chapter F: Fauna.
- Chapter G: Surface water.
- Chapter H: Sensitive landscapes (wetlands).
- Chapter I: Groundwater.
- Chapter J: Air Quality.
- Chapter K: Noise.
- Chapter L: Visual.
- Chapter M: Protected areas and conservation planning.
- Chapter N: Sites of archaeological, cultural and palaeontological importance.
- Chapter O: Regional socio-economic structures.

Note: Some information contained in this section of this EIAR / EMPr has been sourced from documents (i.e. existing specialist studies and ongoing monitoring reports) compiled for the whole of Kleinkopje Colliery. However, Pit 2A is currently being mined by Kleinkopje Colliery and forms part of the existing Kleinkopje Colliery mining operation. Furthermore, the proposed location of the pollution control dam is located within the existing Kleinkopje Colliery mine boundary area. Therefore, the information (sources) used for this section of this EIAR / EMPr is considered applicable to the proposed Pit 2A Extension area.

The following specialist studies were also conducted specifically for the Pit 2A Extension project:

- Wetland Baseline and Mitigation Assessment to inform a detailed Wetland Mitigation Strategy;
- Soil, Land Use and Land Capability Assessment;
- Geohydrological Risk Assessment;
- Hydrological Assessment (Storm Water Management Plan and Water Balance); and
- Archaeological- and Palaeontological Impact Assessments.

Chapter A: Geology

Information in this section of this report has been obtained from the following documents:

- The report titled:" Geohydrological *Assessment and Gap Analysis for Kleinkopje Colliery*", dated November 2011 and compiled by Groundwater Complete;
- The report titled: "*Anglo American – Kleinkopje Colliery; Integrated Waste Water Management Plan*", dated April 2015 with report no.: KK/IWULA/02/2154 (here after referred to as the IWWMP, dated April 2015); and
- The report titled: "*Geohydrological study and risk assessment for Anglo Operations (Pty) Ltd: Kleinkopje Colliery Pit 2A Extension*", dated August 2016 and compiled by Shangoni AquiScience (Annexure E6).

The Kleinkopje Colliery Pit 2A is underlain by rocks of the Karoo Supergroup. The Karoo Supergroup comprises a sedimentary succession of sandstones, siltstones, shales and coal measures. The coal measures are contained within the Vryheid Formation from the Middle Ecca Group. In the Kleinkopje area the economically extractable coal is contained mainly within the number 1 and 2 seams. The Karoo sediments are underlain by the Dwyka formation, comprising of diamictites and tillites that form the basement of the Karoo Supergroup. A regional geological map of the study area is provided in Figure 30 below.

Igneous intrusions of late Karoo Supergroup age in the form of dolerite dykes and sills also occur through the sedimentary succession. The sills usually precede the dykes, with the latter being emplaced during a later period of tensional forces within the earth's crust. Tectonically, the Karoo sediments are practically undisturbed. Faults are rare but fractures are common in competent rocks such as sandstone and coal.

The Ogies dyke is the only significant geological structure in the Kleinkopje area and it separates Block 4E and Block 5W. Some minor dolerite dykes, sills and normal faulting have been recorded in the Kleinkopje area but these do not have a measurable influence on groundwater flow and mass transport.

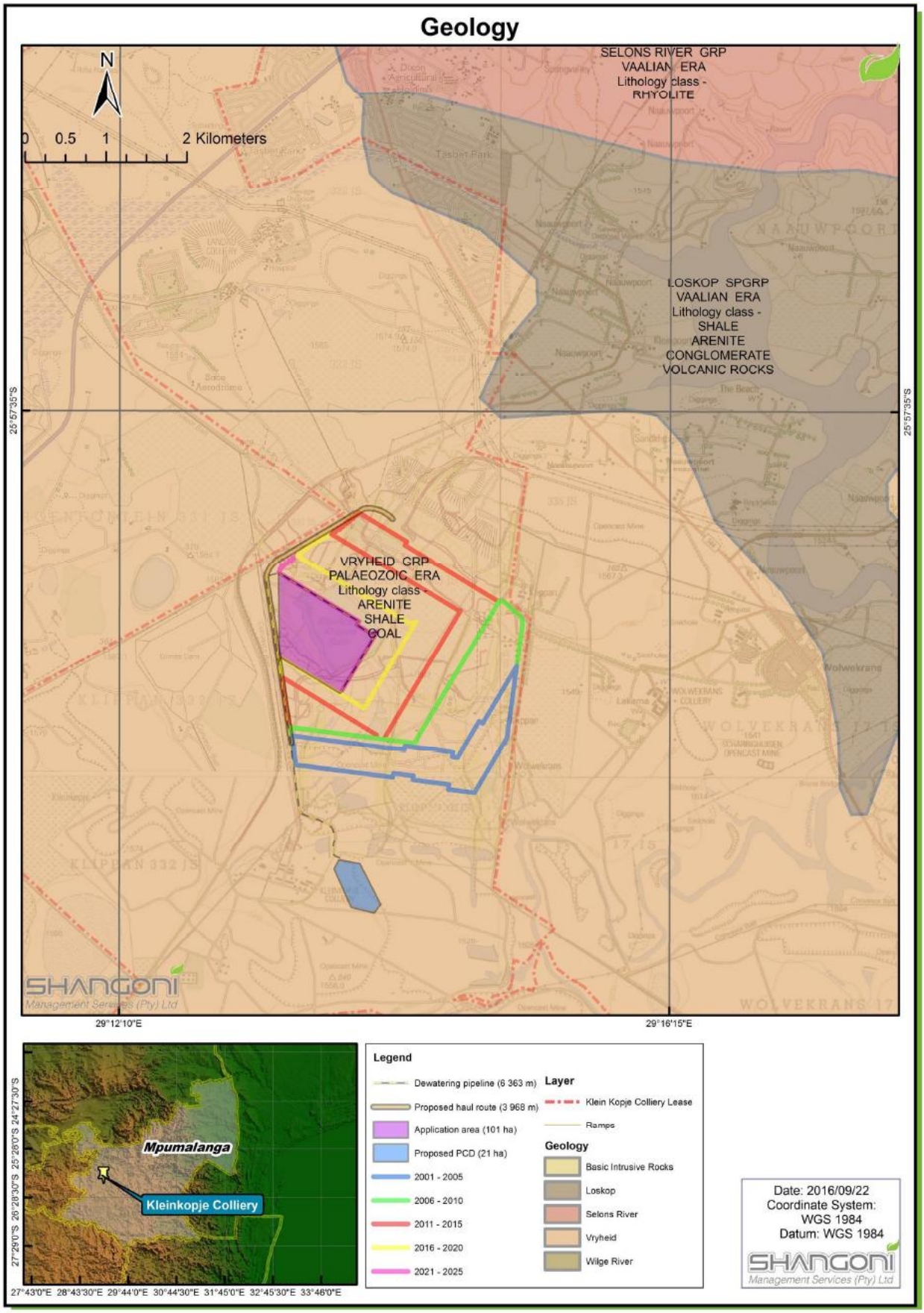

Figure 30: Regional Geology

Chapter B: Climate

The following sources were consulted for the inclusion of the information contained in this section of this report:

- The report titled: "*Anglo American – Kleinkopje Colliery; Integrated Waste Water Management Plan*", dated April 2015 with report no.: KK/IWULA/02/2154 (here after referred to as the IWWMP, dated April 2015);
- The report titled: "*Anglo Operations (Pty) Ltd., Kleinkopje Colliery: Pit 2A Extension. Storm Water Management Plan and Water Balance*; dated September 2016 (attached in Annexure E4).
- World Weather Online (www.worldweatheronline.com);
- AGIS (www.agis.agric.za/agismap);
- Climate-Data.Org (http://en.climate-data.org); and
- Wind data (www.windfinder.com/windstatistics).

The climate within the area associated with Kleinkopje Colliery's location (as well as the proposed Pit 2A Extension area and location of the proposed pollution control dam) is typically "Highveld", with warm summers (12 to 29 degrees Celsius (ºC) range) and cold winters (- 3 to 20 ºC range). Frost is usually experienced between May and August. Prevailing winds are northwest and southeast with an average speed of 5.4 km/hour.

1.1 Temperature

The closest officially recognised weather stations at which these data are recorded are Carolina and Bethal. Whilst these measurements are not believed to be representative of the Emalahleni area, and are therefore not included in this report, they can be made available on request. Data from the Kleinkopje weather station from 1976 to 1986 are included in Table 22 below. Figure 31 below provides the average maximum and minimum temperatures for Emalahleni.

Table 22: Mean monthly maximum and minimum temperatures from the Kleinkopje weather station (1976 to 1986)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Max.	25	26	27	27	27	26	24	22	18	18	21	24
Min.	11	13	14	15	15	11	8	4	3	2	4	7

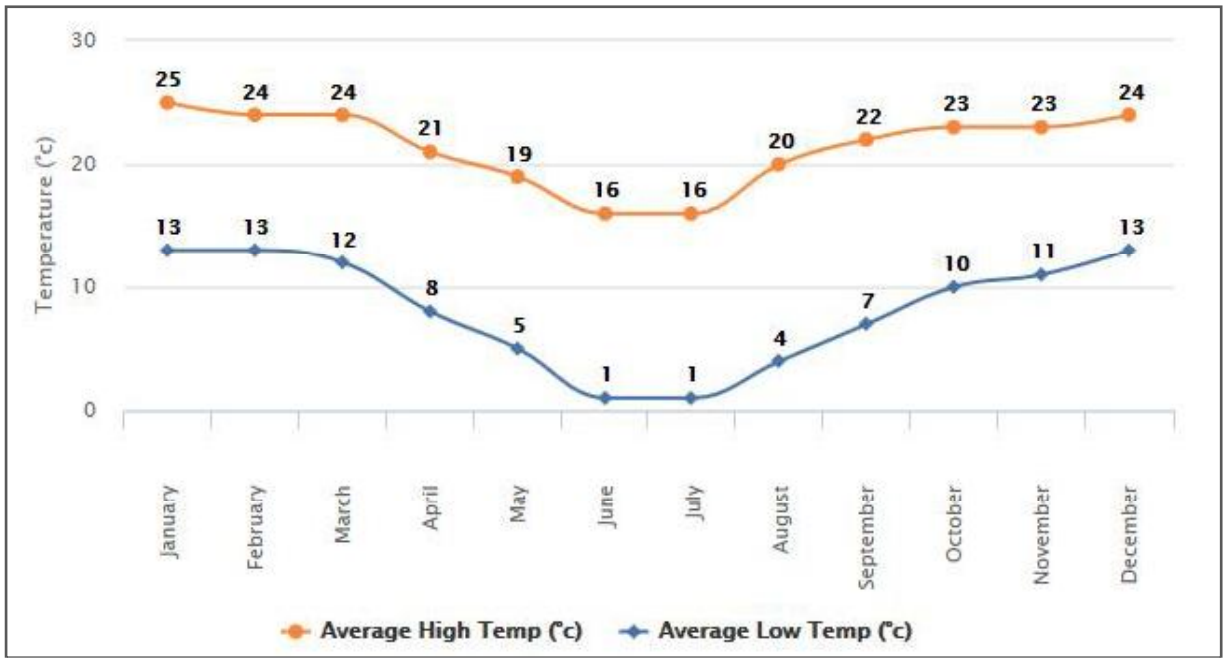

Figure 31: Average high and low temperatures for Emalahleni (source: www.worldweatheronline.com)

1.2 Rainfall

Rainfall has been recorded on a daily basis for the Emalahleni area. The rain falls predominantly between October and March. The average precipitation per annum is 702.7 according to the rainfall data from the DWS hydrological datasets collected at station B1E001. Most of the rainfall occurs during the summer months with the majority of rain events between October and April. The region receives the highest rainfall in January and the lowest in July.

Table 23: Average annual precipitation and evaporation

Date	Rainfall (mm)	Evaporation (mm)
January	131.5	164.5
February	91.8	138.4
March	73.8	129.6
April	39.3	97.4
May	13.4	79.8
June	7.0	65.3
July	2.9	72.5
August	7.9	98.8
September	20.7	137.3
October	78.3	163.7
November	123.8	158.5
December	116.7	163.6
Annual	**702.7**	**1476.2**

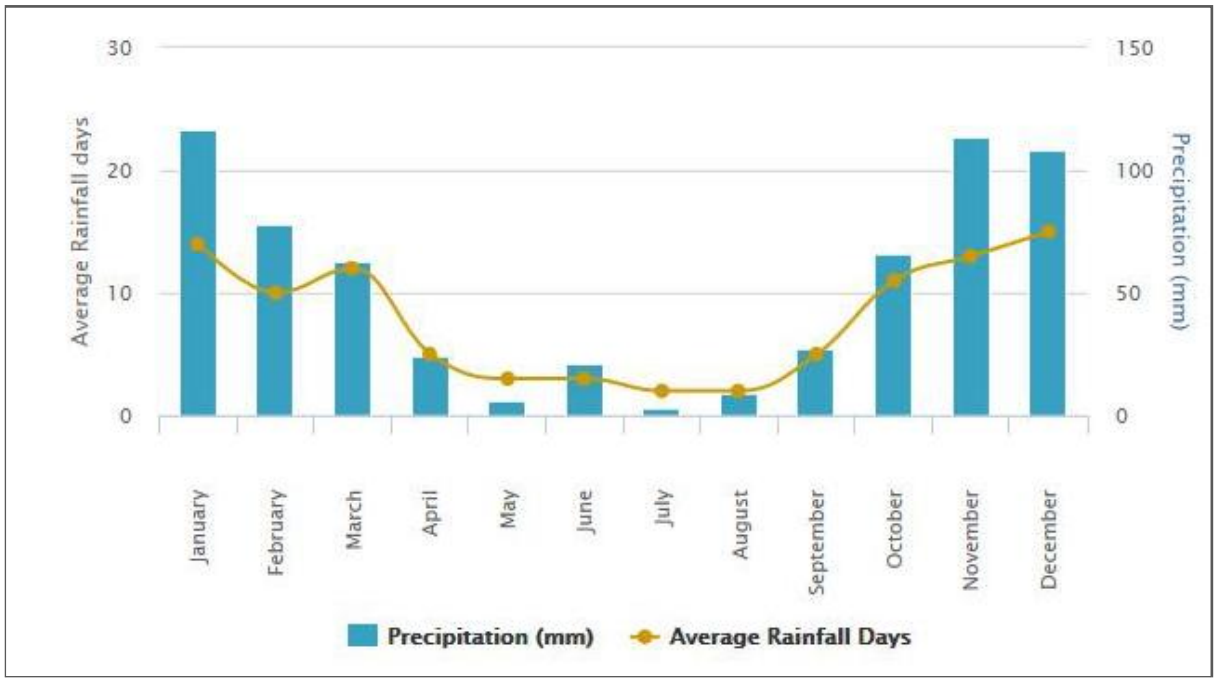

Figure 32: Average rainfall for Emalahleni (source: www.worldweatheronline.com)

1.3 Extreme weather conditions

Gusting winds are normally experienced during August and September months. Hailstorms are experienced occasionally at the start of the wet season between October and December. Frost is normally experienced in the winter months between May and August.

1.4 Evaporation

The mean monthly evaporation data from a Symons tank at the Ogies weather station for the period 1910 to 1989 and adjusted A-pan data are shown in Table 24.

Table 24: Mean monthly evaporation (mm) for Ogies weather station, based on the A-pan evaporation data (1910 – 1998)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Tot.
Symons	173	163	179	176	147	145	111	94	76	83	110	143	1600
Adjusted for A-pan	228	209	225	221	183	181	139	122	101	112	149	193	2096
A-pan adjusted for Open Water	141	132	142	150	124	130	95	81	67	65	86	113	1326
A-pan adjusted for Rehabilitated areas – Grassland	160	167	180	177	146	145	97	73	51	56	75	115	1442

1.5 Wind direction and speed

The closest officially recognised weather stations at which these data are recorded are Carolina and Bethal. Whilst these measurements are not believed to be representative of the Emalahleni area, and are therefore not included in this report, they can be made available on request. Data from the Kleinkopje weather station from 1976 to 1986 are included in Table 25..

Table 25: Mean monthly minimum and maximum wind direction and speed from Kleinkopje weather Station (1976 – 1986)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Wind direction	NW	NW	NW	NE	NE	NE	NE	NW	NW	NW	NW	NW
Speed (m/sec)	8.5	9.11	8.16	7.82	7.40	7.98	5.30	5.17	4.82	5.30	6.59	8.32

The prevailing wind direction throughout the year is from the northwest, although it has been noted that storm winds (high velocity winds) generally blow from the southeast, with the strongest winds occurring in later winter and early spring.

Chapter C: Topography

Kleinkopje Colliery is situated on gently undulating terrain with elevations ranging from 1498 to 1590 meters above mean sea level (mamsl) (1 560 mamsl within the vicinity of the proposed Pit 2A Extension application area). Surface runoff flows into marshy pans or tributaries, which in turn flow into either the Tweefonteinspruit or the Olifants River. Figure 33 below illustrates the topography of the area.

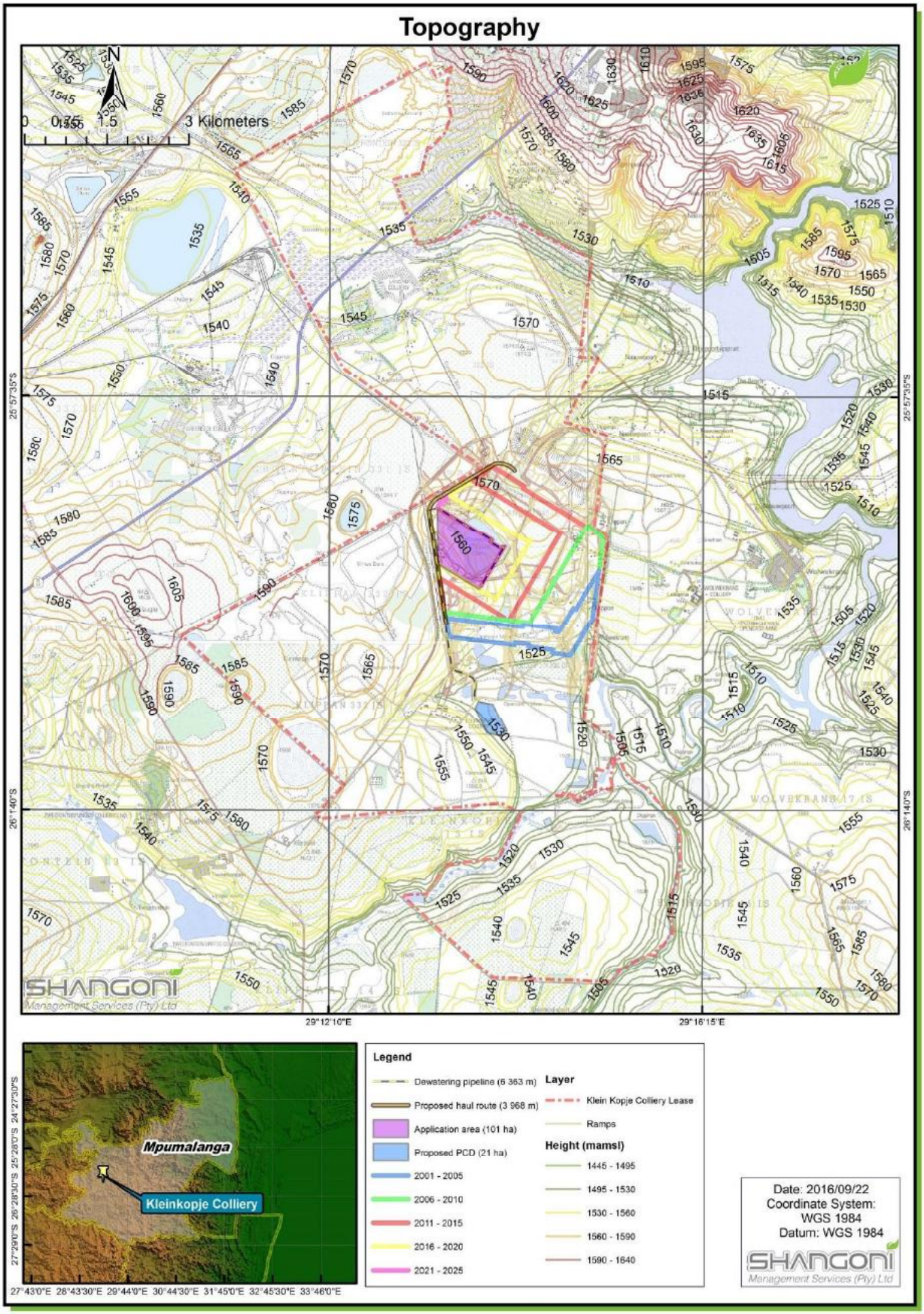

Figure 33: Topography of the area associated with the Pit 2A Extension project

Chapter D: Soil

1 General

The soils associated with the location of the proposed Pit 2A Extension application area are classified (on a high level) as freely drained, structureless soils that may have restricted soil depth, excessive drainage, high erodibility and low natural fertility (soil code S2) (refer to Figure 34 below).

2 Site specific

Scientific Aquatic Services (SAS) cc was appointed to conduct a soil and land capability assessment for the proposed Kleinkopje Colliery Pit 2A Extension. A soil survey was conducted on 12 August 2016, as part of the land capability impact assessment for the proposed development activities. The assessment entailed evaluating physical soil properties and current limitations to various land uses. Subsurface soil observations were made using a manual hand auger in order to assess individual soil profiles.

The resultant report titled: "*Soil, land use and land capability assessment for the proposed Kleinkopje Pit 2A Expansion and development of a new pollution control dam, near Emalahleni in the Mpumalanga Province*", dated September 2016 and compiled by Scientifc Aquatic Services, is attached to this EIAR / EMPr in Annexure E9. Information contained in the sections below were obtained from the above-mentioned report.

2.1 Dominant soil types

The proposed development area is dominated by the Clovelly/Hutton (Cv/Hu) soil forms, collectively constituting approximately 27% (49.69 ha) of the surveyed area. Other identified soil types include the plinthic Westleigh (We), Glencoe (Gc), Katspruit (Ka), and Longlands/Fernwood (Lo/Fw) soil forms, constituting approximately 22.34%, 3.10%, and 11.16% of the application area, respectively. The remainder 12% of the application is occupied by the 2A Dam, with underlying soil intuitively classified as Katspruit as this portion is permanently inundated.

The proposed Pollution Control Dam (PCD) area is largely dominated by extensively disturbed shallow soils classified as Mispah/Glencoe/Dresden (Ms/Gs/Dr) soil forms at best, based on observed relic properties, with severely disturbed Witbank (Wb) soil forms identified along the north-western portion, as presented in Figure 37 below. The severely disturbed Wb soils identified within the proposed PCD and Haul Road areas displayed no recognisable diagnostic soil morphological characteristics due to mining excavation activities in the vicinity of the proposed Haul Road, and haphazard soil replacement on old rehabilitated lands within the proposed PCD area. As such, these soils correspond with anthrosols in international soil classification terminology. All identified soil forms are presented in a soil map in Figures 36 and 37 for the northern and southern sections, respectively.

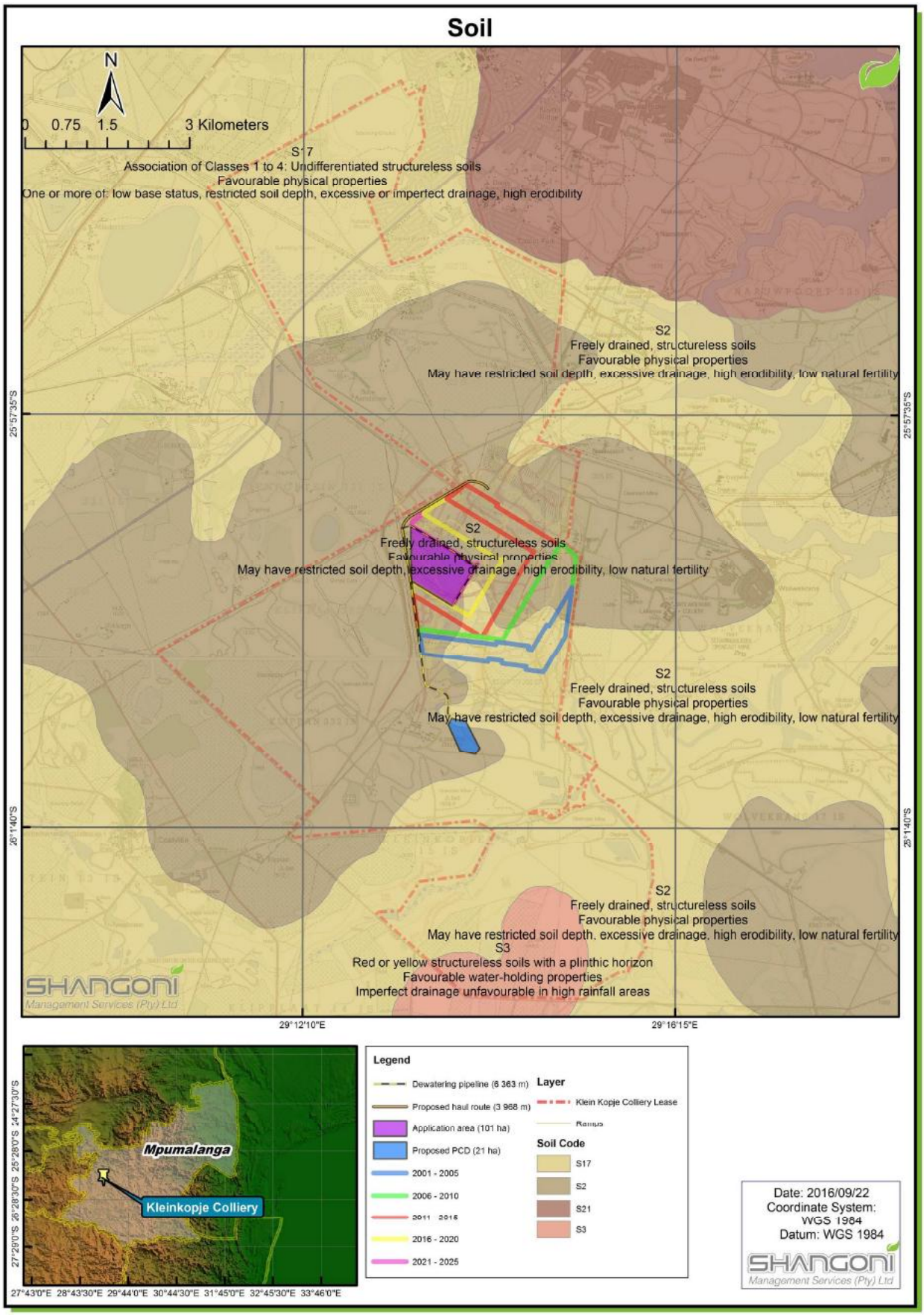

Figure 34: General soil map

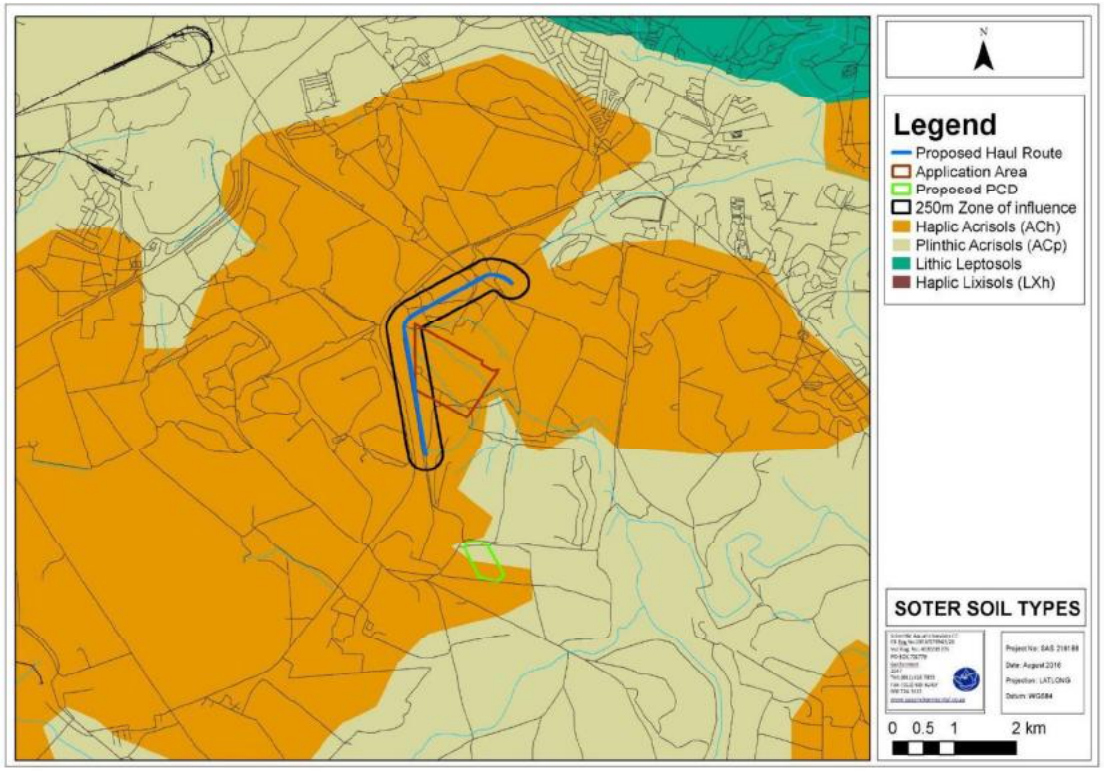

Figure 35: Dominant soil types in the vicinity of the proposed development areas according to the SOTER database (SAS, 2016)

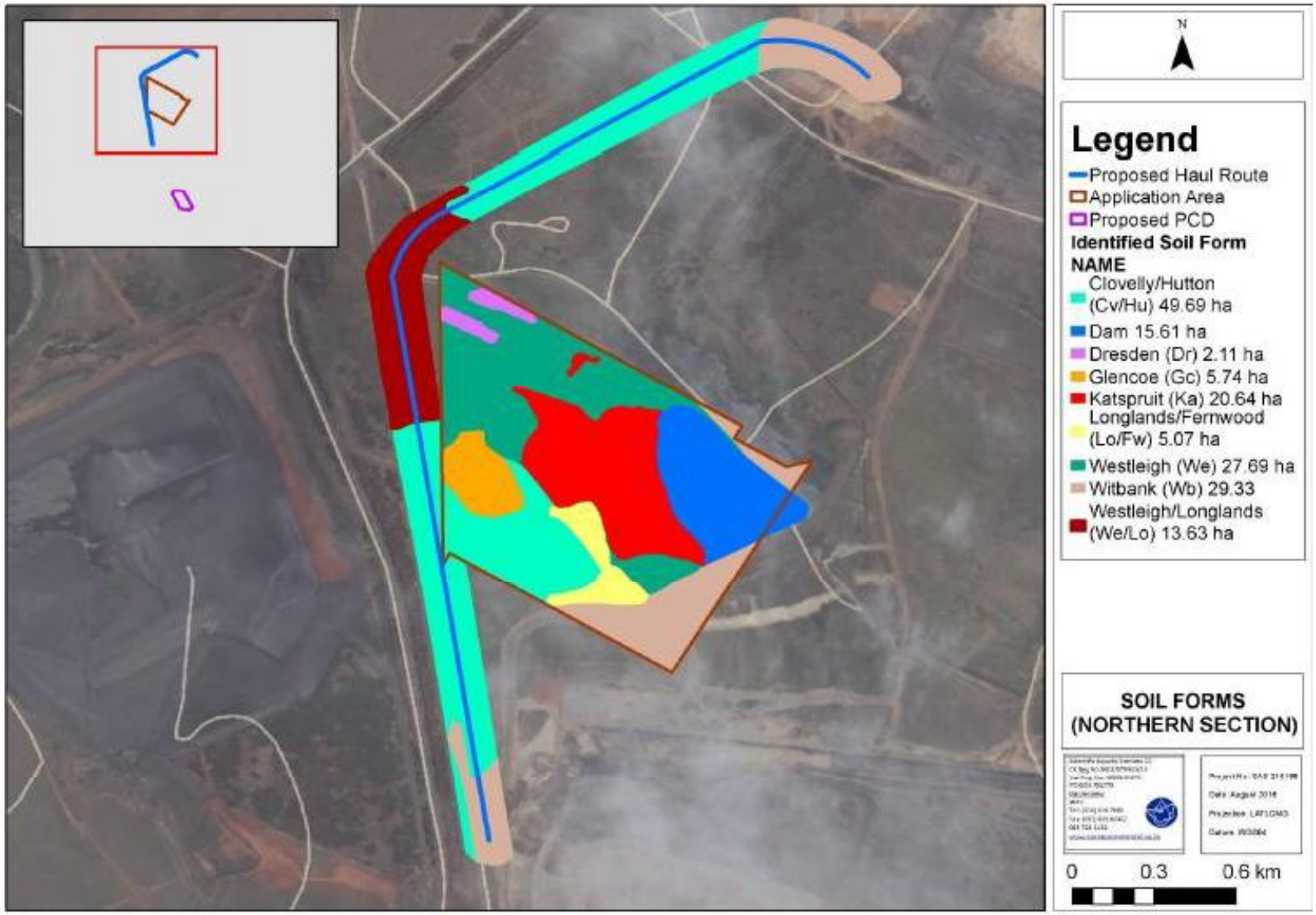

Figure 36: Soil map depicting identified soil forms on the northern section of the proposed development areas (SAS, 2016)

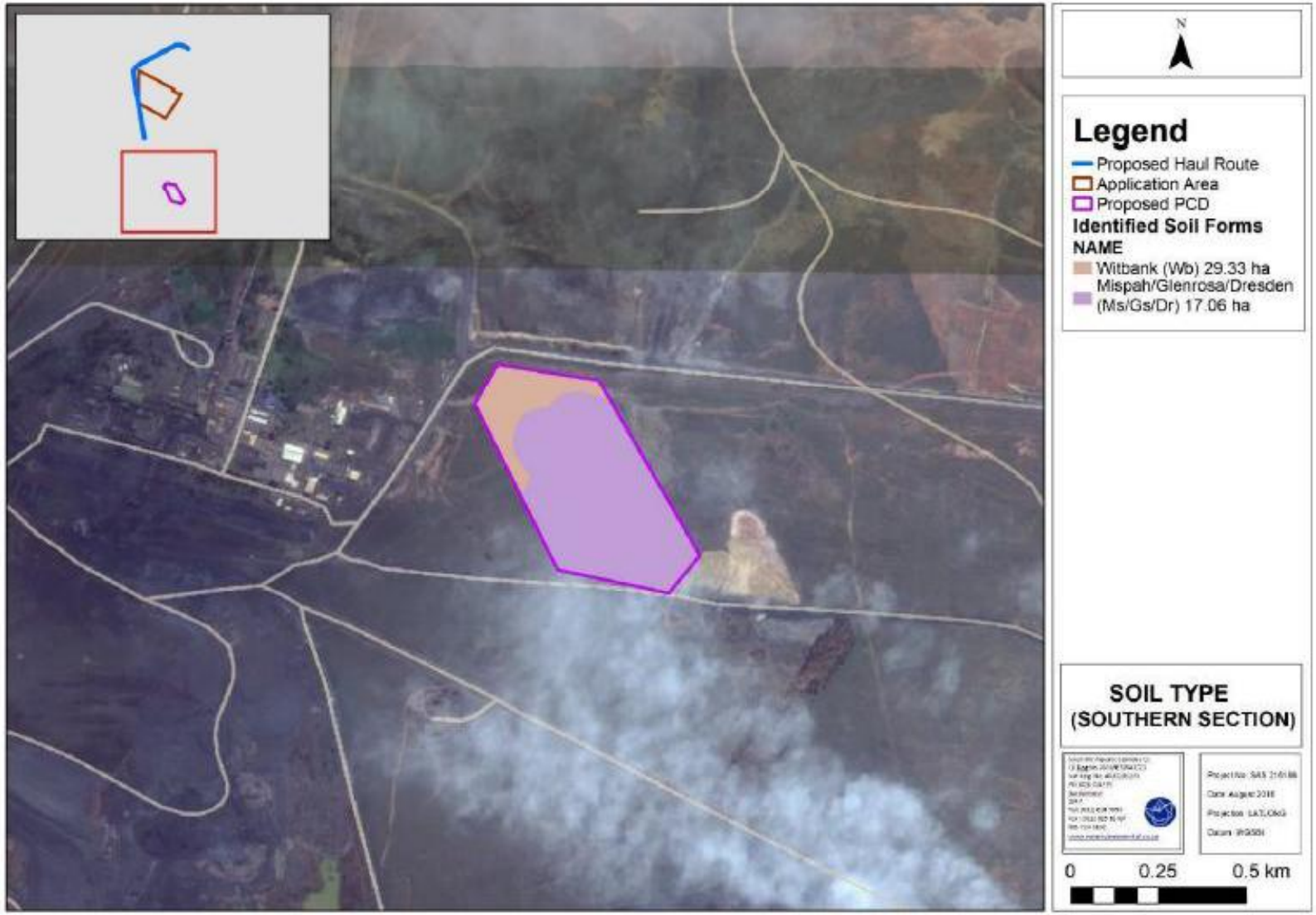

Figure 37: Soil map depicting identified soil forms within the proposed PCD area (SAS, 2016)

Chapter E: Vegetation

Information on vegetation as contained under this section has been obtained from the "*Biodiversity Action Plan for Kleinkopje Colliery*", dated February 2014, compiled by Digby Wells (refer to Annexure E1).

1 Biome and vegetation types

The study area is situated within the Grassland Biome of South Africa (Rutherford & Westfall, 1986, Mucina & Rutherford 2006). The Grassland Biome is found on the high central plateau of South Africa, and the inland areas of Kwazulu-Natal and the Eastern Cape. The topography is mainly flat and rolling, but includes the escarpment itself.

The vegetation type consists of a simple, single-layered herbaceous community of mainly tussocked grasses, herbs and forbs. High rainfall on the cold, frosty, Mpumalanga highveld, together with sandy soils, controls the distribution of this vegetation type.

Grasslands are dominated by a single layer of grasses (Rutherford & Westfall, 1986). The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localized habitats. Geophytes are often abundant. Frost, fire and grazing maintain the grass dominance and prevent the establishment of trees (Rutherford & Westfall, 1986).

The study area is situated within an area vegetated by the Moist Sandy Highveld Grassland vegetation type according to Low & Rebelo (1998) with the most recent vegetation classification, classifying it as Eastern Highveld Grassland (Mucina & Rutherford 2006) (Figure 26). The vegetation type is considered to be endangered nationally with none conserved and 55% altered, primarily by cultivation. The conservation status of this vegetation type is very poor, with large parts that are either currently cultivated or have been previously ploughed, and the remaining untransformed vegetation that occurs as patchy remnants that are often heavily grazed.

Moist Sandy Highveld Grassland is dominated by the grasses *Eragrostis plana*, *Eragrostis curvula*, *Heteropogon contortus*, *Trachypogon spicatus* and *Themeda triandra*. Acocks (1988) describes the same area as Bankenveld and considers it to be a sour vegetation type in which forbs play an important part. He described three variations of which the eastern variation occurs in the study area. This variation occurs on flattish sandy country in which the dominant species include *Tristachya leucothrix*, *Eragrostis racemosa*, *Heteropogon contortus*, *Trachypogon spicatus*, Digitaria tricholaenoides, *Themeda triandra* and others. *Tristachya biseriata* may be abundant on ridges.

The mine boundary area is situated in an endangered ecosystem. This means that the ecosystem has undergone degradation of ecological structure, function or composition as a result of human intervention, although it is not critically endangered.

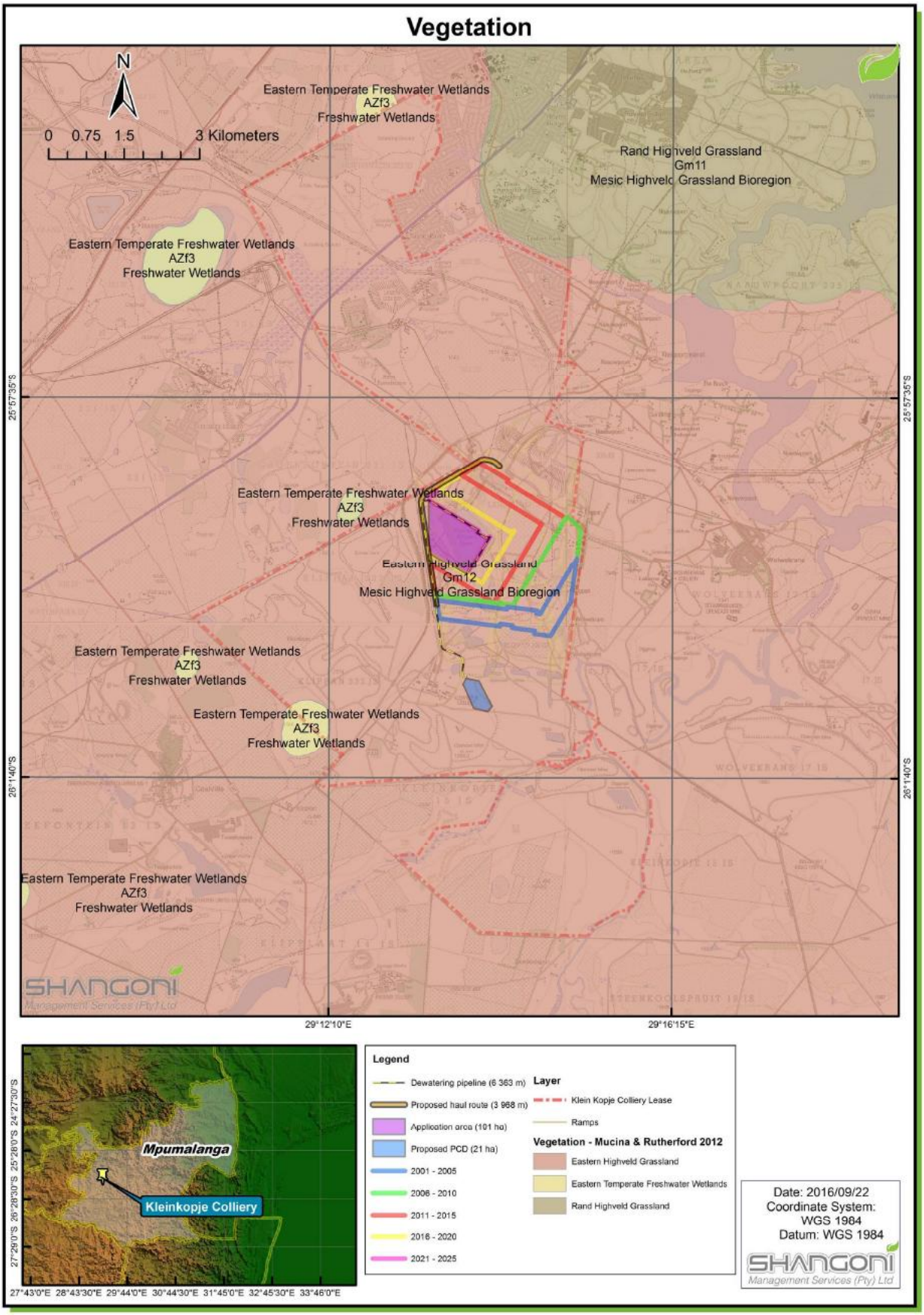

Figure 38: General vegetation of the area

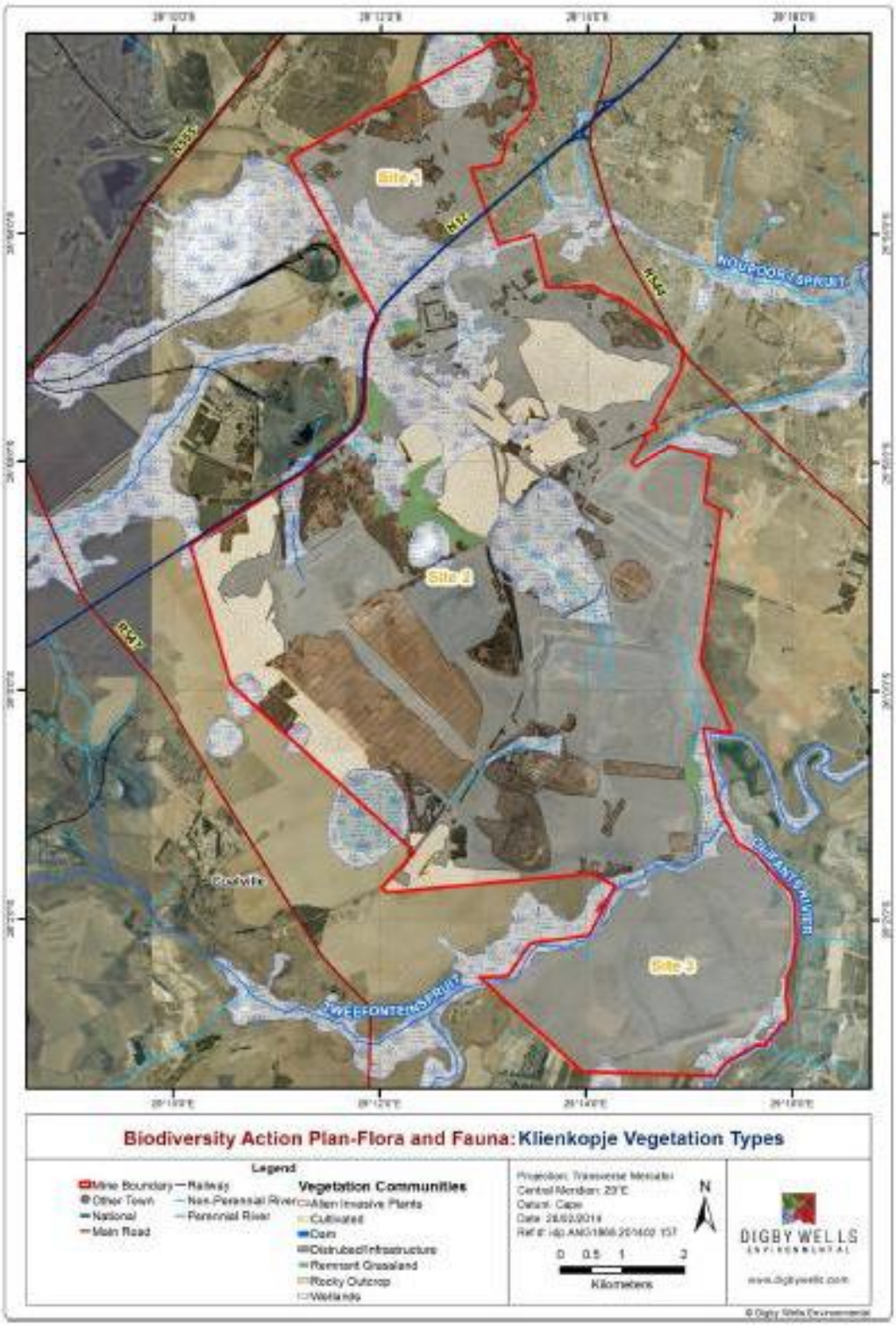

Figure 39: Kleinkopje Colliery vegetation types (as per the Biodiversity Action Plan, 2014) (Digby Wells, 2014)

2 Dominant species

Important taxa that may be present in the project area include:

Graminoids: *Aristida aequiglumis; A.congesta; A.junciformis subsp galpinii; Brachiaria serrate; Digitaria monodactyla; D.tricholaenoides; Elionurus muticus; Eragrostis chloromelas; E.curvula;*

E.plana; E.racemosa; E.sclerantha; Heteropogon contortus; Loudetia simplex; Monocymbium ceresiiforme; Setaria sphacelata; Sporobolus africanus; S.pectinatus; Themeda triandra; Trachypogon spicatus; Tristachya leucothrix; T.rehmannii; Alloteropsis semialata; Andropogon appendiculatus; A.schirensis; Bewsia biflora; Ctenium concinnum; Diheteropogon amplectens; Eragrostis capensis; E.gummiflua; E.patentissima; Harpochloa falx; Panicum natalensis; Rendlia altera; Schizachyrium sanguineum; Setaria nigrirostris; Urelytrum agropyroides.

Herbs: *Berkheya setifera; Haplocarpha scaposa; Justicia anagalloides; Pelargonium luridum; Acalypha angustata; Chamaecrista mimosoides; Dicoma anomala; Euryops gilfillanii; E.transvaalensis; Helichrysum aureonitens; H.caespititium; H.callicomum; H.oreophilum; H.rugulosum; Ipomoea crassipes; Pentanisia prunelloides; Selago densiflora; Senecio coronatus; Vernonia oligocephala; Wahlenbergia undulata*.

Geophytic Herbs: *Gladiolus crassifolius; Haemanthus humilis; Hypoxis rigidula; Ledebouria ovatifolia*.

Succulent Herbs: *Aloe ecklonis*

Low Shrubs: *Anthospermum rigidum subsp. pumilum; Stoeboe plumosa (Mucina and Rutherford, 2006)*

3 Threatened Flora

A list of threatened species that are likely to occur within the Pit 2A Extension area as well as the location of the proposed PCD is shown in Table 226. Only one species *Gladiolus macneilii*, which is include here even though it does not occur on the National Herbarium of Pretoria (PRE) Computerised Information system (PRECIS) list for the area, is endangered, and may require special measures to protect any populations that are positively identified. The remainder of the threatened species are in the vulnerable and near threatened categories indicating that conservation efforts aimed at the level of habitat conservation are adequate in the surface rights area.

Table 26: Threatened species that are likely to occur on the Kleinkopje Colliery surface rights area (Source: Digby Wells, 2014)

Scientific name	Common name
Gladiolus macneilii	Gladiolus
Gladiolus rufomarginatus	
Gladiolus varius	
Satyrium microrrhynchum	Orchid
Ledebouria appresifolia	Ledebouria
Eulophia leachii	Orchid
Gladiolus vernus	Gladiolus
Kniphofia triangularis	Red hot poker
Nerine gracilis	Nerine

4 Medicinal plants

According to the PRECIS list one medicinal plant may occur on the Kleinkopje Colliery surface rights area. However, this species was not found during the field visit. Refer to Table 27 below.

Table 27: Medicinal plants found on the Kleinkopje Colliery surface rights area (source: Digby Wells, 2014)

Scientific name	Common name	Uses	Habitat	Observed
Hypoxis hemerocallidea	Gifbol	Medicinal	Grassland	No, related species Hypoxis interjecta was observed.

5 Invader or exotic species

The Kleinkopje surface rights have been extensively invaded by alien plants in places particularly wattles as indicated in Table 28. In 1995 PPRI issued a report entitled '*Management Plan for the Control of Alien Plants at Kleinkopje*' by P Campbell and D Naude. The study found that the main alien species within the area include: Black and silver wattle; Eucalyptus species; Wild tomato; Bugweed; Bitter apple; Pluisbossie; Prickly Pear; Sesbania; Pampas grass; Pine species; Weeping willow; Peach trees; Blackwood trees; and Poplar trees. Species noted during the Biodversity study conducted in 2013 are listed in Table 30.

Table 28: Alien plants found on the Kleinkopje Colliery Surface rights area (source: Digby Wells, 2014)

Scientific name	Common name	Status	Habitat
Acacia mearnsii	Black Wattle	Transformer and declared weed (category 2)	Invades most habitats, particularly watercourses, roadsides, disturbed grassland.
Acacia dealbata	Silverwattle	Category 2	Invades most habitats, particularly watercourses, roadsides, disturbed grassland.
Acacia decurrens	Greenwattle	Category 2	Invades most habitats, particularly watercourses, roadsides, disturbed grassland.
Solanum sisymbriifolium	Wild tomato	Declared.	Invades disturbed landscapes such as road sides, cultivated fields, disturbed grassland.

Scientific name	Common name	Status	Habitat
Tagetes minuta	Kakiebos	Declared weed	Invades disturbed grassland, cultivated land, roadsides.
Eucalyptus camaldulensis	Red river gum	Transformer and declared invader (category 2)	Invades forest gaps, plantations, watercourses and roadsides.
Bidens pilosa	Blackjack	Cosmopolitan weed	Invades cultivated land, disturbed watercourses and grasslands
Cirsium vulgare	Scottish thistle	Declared weed	Invades grasslands, roadsides, old lands, vleis, wetland margins
Argemone mexicana	Mexican Poppy	Declared weed	Invades roadsides, wastelands, river margins, cultivated lands.
Solanum mauritanum	Bugweed	Category 1 invader, agricultural weed.	Invades disturbed grassland, cultivated land, roadsides, plantations.
Solanum elaeagnifolium	Bitter apple	Category 1 invader, agricultural weed.	Invades disturbed grassland, cultivated land, roadsides, plantations.
Opuntia ficus-indica	Prickley Pear	Category 1, invader	-
Lopholaena coriifolia	Pluisbossie	Not listed	-
Sesbania punicea	Sesbania	Category 1, invader	-
Cortadaria selloana	Pampas grass	Category 1, invader	-
Pinus patula	Patula Pine	Category 2, invader	Grassland, Forest margins, road cuttings
Salix Babylonica	Weeping Willow	Category 2, invader	Waterways
Prunus persica	Peach	Not listed	Roadsides, riverbanks, waste places, urban areas.
Acacia melanoxylon	Blackwood	Category 2, invader	Roadsides, riverbanks, waste places, urban areas
Populus canescens, P. deltoids, P. nigra	Poplar	Declared invader category 2)	Invades riverbanks and marshes

Chapter F: Fauna

1 Commonly occurring species

The Kleinkopje Colliery provides varied habitats for a number of species, despite the terrestrial ecology of the area being largely modified. The species present are however lower than would be expected of a pristine area which is reflective of a history of anthropogenic activity which has negatively impacted biodiversity within the area.

The natural areas which exist within the area provide habitat for these species, while the transformed areas may provide a source of food. Natural areas are priorities for conservation of species and should be maintained in order that biodiversity is enhanced. Wetlands are particularly high priority natural areas as a result of the significant role they play in provision of habitat and support of Biodiversity furthermore, they provide potential habitat for the Red Data listed amphibian, the Giant Bullfrog. Furthermore, the wetland areas provide habitat for the owl species that are planned to be reintroduced to the area.

Mining and agriculture have transformed much of the natural vegetation, which has resulted in alteration of the natural ecology however positive outcomes have been that different species have colonised in these areas which formerly did not provide suitable habitat, such as the Giant Kingfisher and Black Sparrow-hawk. These species are comfortably sustained in these locations; however their habitat could be vastly improved in a number of situations through various means. Habitat improvement could be initiated through various activities such as increased 'natural' areas, corridor creation, decreased disturbances to habitat, water quality improvement and rehabilitation. Furthermore mechanisms such as bat boxes and owl boxes could be implemented in order to attract species to the area.

Faunal surveys revealed that black-backed jackal, yellow mongoose, and scrub hare inhabit the natural areas. Evidence in the form of spoor, quills, droppings, soil mounds and grass clippings indicated the presence of porcupine, Cape clawless otter, common duiker, Hottentot golden mole, Highveld gerbil, and vlei rat.

2 Protected faunal species

Protected faunal species that could occur in the area are outlined in Table 29 below. The vegetation type determines which animals can be supported on the land area, Figure 39 details the vegetation types (as referred to in the Biodiversity Action Plan, dated 2014) present on Kleinkopje Colliery.

Table 29:Protected fauna species that could possible occur in the area associated with the proposed Pit 2A Extension and proposed location of the PCD (Source: Digby Wells, 2014)

Scientific name	Common name	Observed	Habitat on site
Mammal species			
Chrysospalax villosus	Rough-haired Golden Mole	No	All natural sites
Orycteropus afer	ardvark	No	All natural sites
Proteles cristatus	Aardwolf	No	All natural sites
Poecilogale albinucha	African Striped Weasel	No	All natural sites
Atelerix frontalis	Southern African Hedgehog	No	All natural sites
Felis serval	Serval	Yes	All natural sites
Mystromys albicaudatus	Whitetailed Mouse	No	All natural sites
Reptile species			
Python sebae	African Rock Python	No	All natural sites
Tetradactylus africanus	Beyer's Longtailed Seps	No	All natural sites
Homoroselaps dorsalis	Striped Harlequin Snake	No	All natural sites
Bird species			
Podica senegalensis	African Finfoot	No	Pans/Wetlands/River
Circus ranivorus	African Marsh Harrier	No	Pans/Wetlands/River/Grassland
Geronticus calvus	Bald Ibis	Yes	Grasslands and agriculture for feeding, requires cliffs for breeding.
Circus maurus	Black Harrier	No	Pans/Wetlands/River/Grassland.
Ciconia nigra	Black Stork	No	Pans/Wetlands/River/Grassland. Requires cliffs and gorges for breeding.

Scientific name	Common name	Observed	Habitat on site
Glareola nordmanni	Blackwinged Pranticole	No	Pans/Wetlands/River/Grassland.
Anthropoides paradiseus	Blue Crane	Yes	Pans/Wetlands/River/Grassland. Feeding and breeding.
Eupodotis caerulescens	Blue Korhaan	No	Pans/Wetlands/River/Grassland. Feeding and breeding.
Spizocorys fringillaris	Botha's Lark	No	Pans/Wetlands/River/Grassland. Feeding and breeding
Balearica regulorum	Crowned Crane	No	Pans/Wetlands/River/Grassland. Feeding and breeding.
Tyto capensis	Grass owl	No	Pans/Wetlands/River/Grassland. Feeding and breeding
Phoenicopterus ruber	Greater Flamingo	No	Wetland/Pan areas
Alcedo semitorquata	Halfcollared Kingfisher	No	Pans/Wetlands/River/Grassland. Feeding and breeding
Phoenicopterus minor	Lesser Flamingo	No	Wetland/Pan areas
Phoenicopterus ruber	Greater Flamingo	Yes	Wetland/Pan areas, 2A dam, Klippan discard dump
Falco naumanni	Lesser Kestrel	No	Pans/Wetlands/River/Grassland. Feeding and breeding
Pelecanus rufenscens	Pinkbacked Pelican	No	Wetland/Pan areas
Sagittarius serpentarius	Secretary Bird	Yes	Pans/Wetlands/River/Grassland. Feeding and breeding
Neotis denhami	Stanley's Bustard	No	Pans/Wetlands/River/Grassland. Feeding and breeding
Grus carunculata	Wattled Crane	No	Pans/Wetlands/River/Grassland. Feeding and breeding
Eupodotid cafra	Whitebellied Korhaan	No	Pans/Wetlands/River/Grassland. Feeding and breeding
Mycteria ibis	Yellowbilled Stork	No	Pans/Wetlands/River/Grassland. Feeding and breeding

Chapter G: Surface Water

Information on surface water was sourced from the following documents:

- The report titled: "*Anglo American – Kleinkopje Colliery; Integrated Waste Water Management Plan*", dated April 2015 with report no.: KK/IWULA/02/2154 (here after referred to as the IWWMP, dated April 2015);
- The report titled: "*Kleinkopje Colliery revised and consolidated EIA and EMP, report prepared for Anglo American Operations Limited – Thermal Coal*", with report No 414908, compiled by SRK Consulting and dated April 2012 (here after referred to as the revised EMPr, dated April 2012);
- The report titled: "*Anglo Coal Kleinkopje Colliery - Annual Water Quality Assessment Report*", dated December 2015 (for the period January – November 2015), compiled by Aquatico Scientific (attached in Annexure E4); and
- The report titled: "*Anglo Operations (Pty) Ltd., Kleinkopje Colliery: Pit 2A Extension. Storm Water Management Plan and Water Balance*; dated September 2016 (attached in Annexure E4).

1 Catchment area and watercourses

The locations associated with the proposed Pit 2A Extension and the proposed pollution control dam are situated in quaternary catchment B11F with a section of the project extending into B11G (refer to Figure 40 below), which forms part of the Olifants River catchment area. The Olifants River, which is part of the regional drainage network of the province, leaves the Colliery boundaries at the Wolverkrans weir (1,503masl).

The Standerspruit previously traversed the area that is now referred to as the Pit (Block) 2A mining area. A watercourse alteration was originally constructed in the Standerspruit in 1998 before mining commenced at Kleinkopje Colliery. The channel diverts clean surface runoff from the plant area and catchments upslope of its position. Due to commencement of opencast mining operations in Pit 2A, a subsequent watercourse alteration was constructed. This subsequent watercourse alteration, which was completed early in 1994, is situated north of the original watercourse alteration. The construction of the Block 2A dam necessitated some modifications to this watercourse alteration. Further modifications were done in 1999. These modifications entailed the re-routing of a section of the diversion around the advancing mining operation.

2 Mean annual runoff

Mean annual runoff (MAR) is based on the relevant quaternary catchment runoff as obtained from the WR2005. The MAR values are presented in the Table 30 below. The mean annual runoff (MAR) for the afore-mentioned watercourse alteration is indicated in Table 31 below.

Table 30: Mean Annual Runoff for quaternary catchment based on the WR2005

Catchment	Total Area km^2	Nett Area km^2	MAR 10^6m^3/a	Unit MAR 10^6/m^3/a/km^2
B11F	368	337	15.7	0.046

Table 31: Watercourse alteration flow volumes calculated with the WRSM90

Criteria (volumes in million m^3)	Catchments
	1, 2, 3, 4a, 4b, 5, 6
Area (km^2)	16.15
MAR	0.79
Wettest year (1917 – 1918)	3.37
Driest year (1932 – 1933)	0.08

3 Average dry weather flow

The average dry weather flows for the catchment was again derived from the monthly quaternary flow data set derived in the WR2005 Report. Refer to Table 32 below.

Table 32: Computed dry weather flows of the relevant catchment

Catchment	Flow 103m3/m	Flow l/s
Quaternary B11F	130.3	50.3

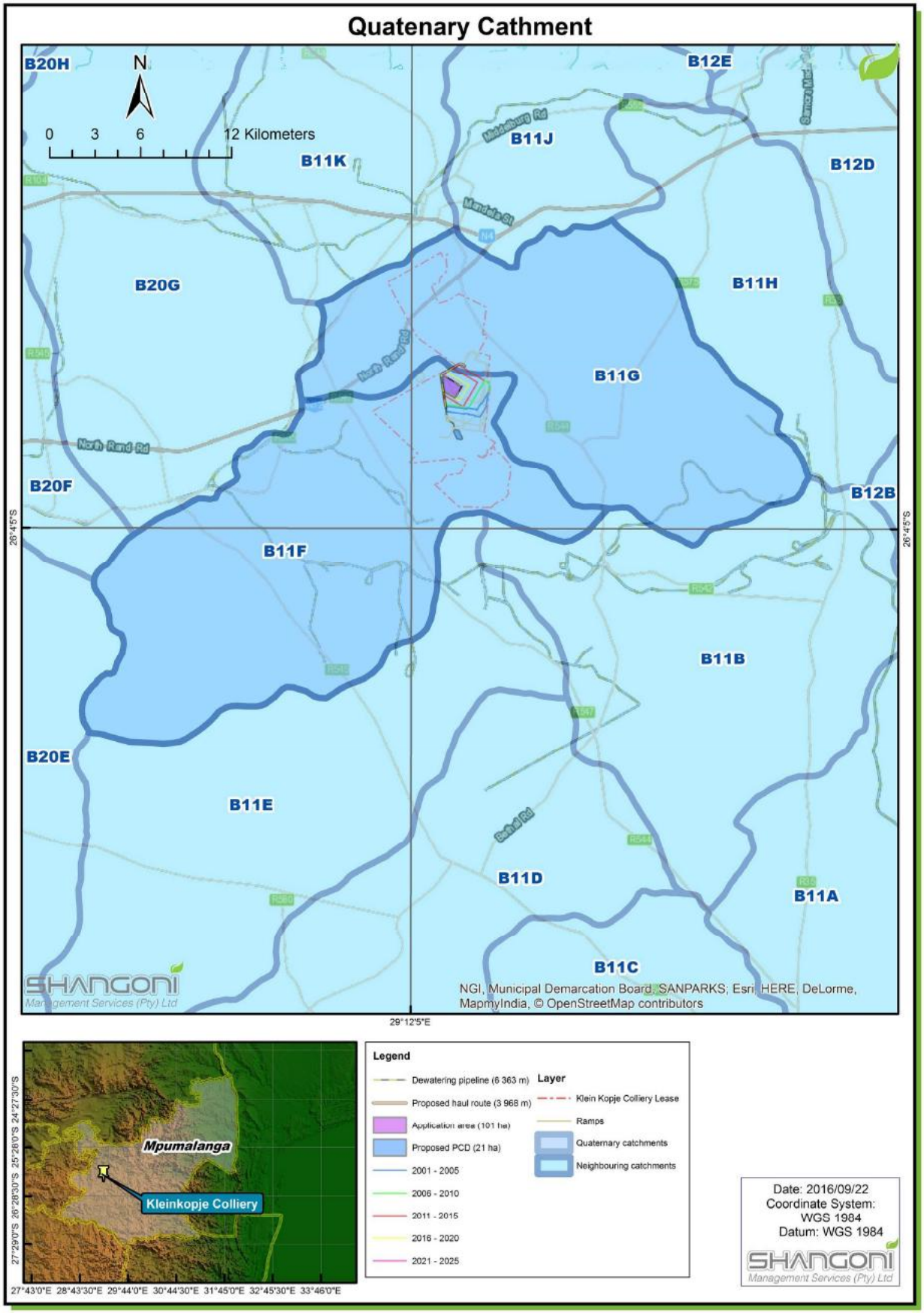

Figure 40: Quaternary catchment relevant to the Pit 2A Extension project area

Figure 41: General runoff directions (Shangoni, 2016)

4 Surface water use

The main categories of water use within the surrounding area are:

- Industrial,
- Potable,
- Agricultural,
- Aquatic, and
- Recreational

The Witbank Dam, being the receiving water body, starts directly below the Wolwekrans weir, which is regarded as the position that the Olifants River leaves the property. The main water users extracting or utilising water from the Witbank Dam are:

- Highveld Steel and Vanadium Corporation,
- Eskom,
- Emalahleni Municipality, and
- Recreational and aquatic life.

5 Surface water quality

5.1 Surface water quality monitoring programme

Anglo Coal Kleinkopje Colliery has contracted Aquatico Scientific (Pty) Ltd. to conduct drinking water and surface water monitoring. The Annual Water Quality Report (AWQR) dated December 2015 describes the results of the water monitoring programme from January to November 2015. As indicated in the AWQR, the water monitoring localities of various variables were compared to that of the limits as set in SANS 241 – 1:2015 (Drinking Water Limits) and the Kleinkopje Colliery Integrated Water Use Licence (IWUL), dated December 2011 (Licence No. 04/B11J/AFGJ/1416).

Table 33 below provides a description of the surface water and process water monitoring localities. Furthermore, the surface water monitoring localities are indicated in Figure 42, and the process water monitoring localities are indicated in Figure 43 below.

Table 33: Description of the surface and process water monitoring localities at Kleinkopje Colliery

Monitoring locality	Description
Surface water monitoring localities	
WP042	Olifants River In
RW004	Olifants River Out
WP037 Upstream	Upstream of WP037
WP037	Tweefontein Spruit In
WP039	Tweefontein Spruit above 5 West HD
WP040	Tweefontein Spruit Out

Monitoring locality	Description
WP074	Stander Spruit
WP033	North East Spruit Out
WP012	Naauwpoort Spruit where entering KK
WP008	Naauwpoort Spruit at Klipfontein Dump
WP011	Landau Under Highway Culvert
WP029	Naauwpoort Spruit Out
WP098	Roofcoal Dump Seepage Dam
Process water monitoring localities	
WP083	Klippan Return Water at Penstock
WP093	Clarified Tanks – Thickener Dam
WP095	Klippan Toe Seep
WP009	2A Dam
RW011	Surface Water
RW011B	Arms Tank
RW011C	Erickson Dam 2
RW003	Plant Return Water Dam
WP096	Oil Separator
WP097	Oil Separator
WP036	Klipfontein Toe Trench

Figure 42: Surface water monitoring localities at Kleinkopje Colliery (modified from Aquatico AWQR; December 2015)

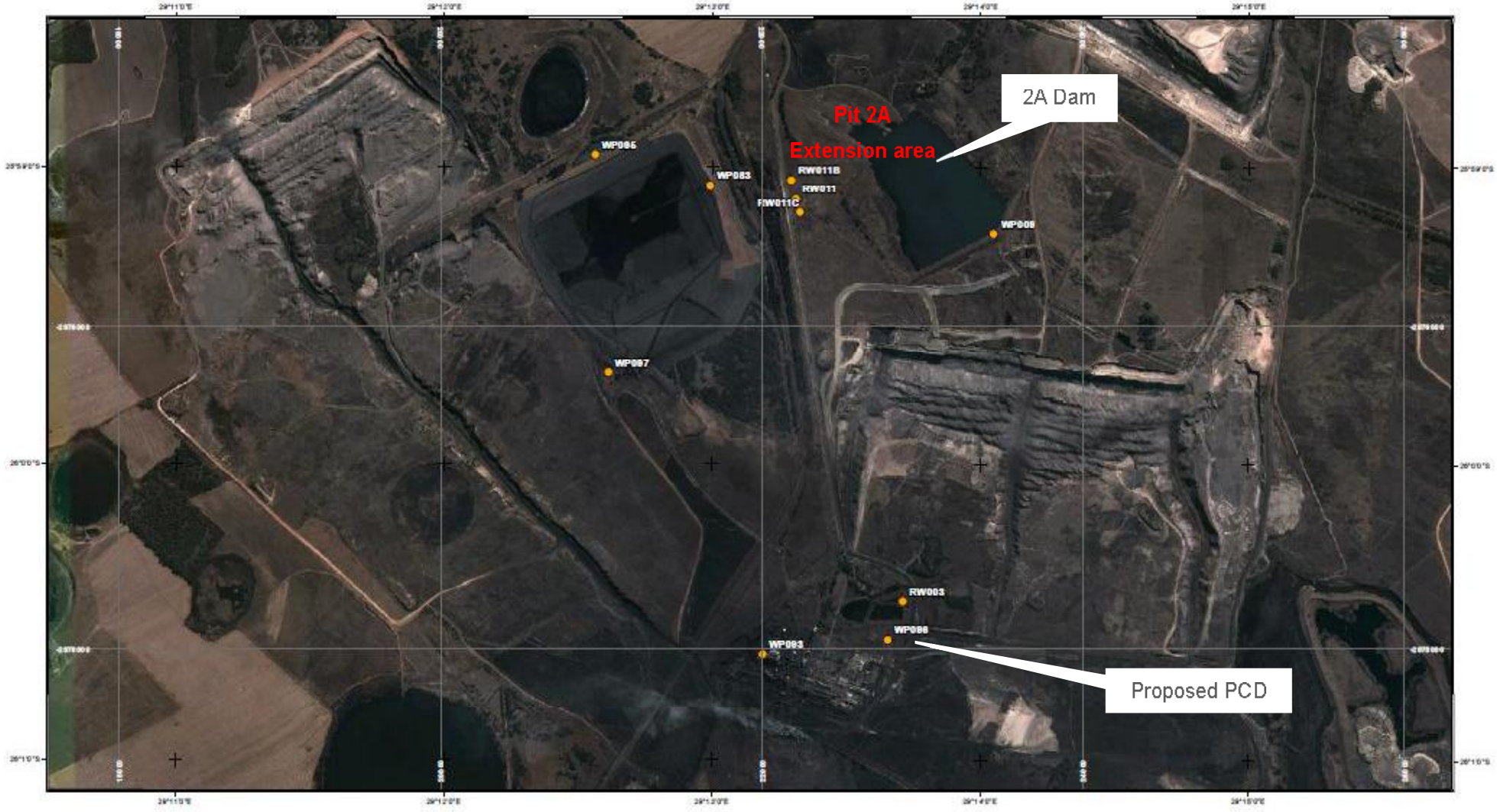

Figure 43: Process water monitoring localities at Kleinkopje Colliery (modified from Aquatico AWQR; December 2015)

5.2 Surface water quality monitoring results

5.2.1 Surface water quality

Physical water quality:

The majority of surface water localities can be described as neutral in terms of pH values obtained during the annual sampling period of 2015 (refer to Table 3 in Water Quality Report in Annexure E4). The only exception was locality WP008 which could be described as acidic. Similarly, the majority of localities could also be described as very saline except for locality WP029 (non-saline) as well as localities WP042 and RW004 (saline). Classification based on total hardness showed that water from the surface water localities ranged from hard to extremely hard.

Chemical water quality:

Localities WP042 and RW004 were the only surface water localities which could be classified as Good water quality in terms of the chemical variables analysed (refer to Table 3 in Annexure E4 in Water Quality Report in Annexure E4). The majority of the localities could be classified as either Poor or Unacceptable water quality due to elevated sulphate, calcium and manganese concentrations.

Bacteriological water quality:

All of the surface water localities could be classified as either Poor or Unacceptable water quality during the 2015 monitoring period.

Summary:

None of the surface water localities complied fully with the limits set in the IWUL. The dominating exceeding variables included electrical conductivity, total dissolved solids, total alkalinity, sulphate and manganese. Although the limits set in the Integrated Water Use Licence are stringent, when the water quality of 2015 is compared to the qualities of the region and qualities of the historic data, the water quality limits set in the IWUL will not be easily attainable.[45]

The most concerning localities were WP098 and WP008 which recorded excessively high concentrations of total dissolved solids, sulphate and manganese while locality WP074 (Stander Spruit) had high metals concentrations.

Microbiologically, all of the surface water localities could be classified as either Poor or Unacceptable water quality due to high faecal coliform numbers in multiple months during the 2015 annual sampling period.

[45] A draft water use licence document was received in April 2016 from the DWS where in an amendment was made to some of the water quality limits.

Refer to Annexure E4 for more detail with regards to the surface water monitoring quality at each locality.

5.2.2 Process water quality

Physical water quality:

The majority of water from the process water localities could be classified as neutral, extremely saline and extremely hard (refer to Table 4 in Annexure E4 in Water Quality Report in Annexure E4). The only exception was water from locality RW011B which could be classified as acidic in addition to being extremely saline and extremely hard.

Chemical water quality:

In terms of the analysed chemical variables, all of the process water localities could be classified as Unacceptable water quality (refer to Table 4 in Annexure E4 in Water Quality Report in Annexure E4). This was due to high concentrations of sulphate, calcium and magnesium.

Bacteriological water quality:

None of the process water localities could be classified as Ideal water quality as faecal coliforms were detected at each sampling point (refer to Table 8 in Annexure E4 in Water Quality Report in Annexure E4). Locality RW003 was the only locality which could be classified as Marginal water quality while localities RW011, RW011B, RW011C, WP083, WP097 and WP009 could be classified as Poor water quality. The most problematic localities (WP093, WP095 and WP096) could be classified as Unacceptable water quality as numerous faecal coliforms were present on multiple occasions.

Summary:

All of the sampled process water localities exceeded the limits set in the IWUL for process/waste water. Additionally, the limits that are set in the IWUL are similar to the Good water quality (DWA Domestic Use) guidelines. Variables where limits were exceeded at all localities included electrical conductivity, total dissolved solids, calcium, magnesium and sulphate.

Refer to Annexure E4 for more detail with regards to the process water monitoring quality at each locality.

6 Resource class and river health

In South Africa, a river health classification scheme is used to standardise the output of different river systems. The document titled “Resource Directed Measures for Protection of Water Resources: River Ecosystems Version 1.0.24”, dated September 1999, compiled by the Department of Water and Sanitation (DWS), provides the indexes of Attainable Ecological Management Classes as shown in Table 34 below. Each index is calibrated so that its results can be expressed in terms of ecological and management perspectives.

Table 34: Resource classes as set out by the Department of Water and Sanitation

River Health Class	Ecological perspective	Management perspective
Natural / Excellent (Class A)	No or negligible modification of in-stream and riparian habitats and biota.	Protected rivers; relatively untouched by human hands; no discharges or impoundments allowed.
Good (Class B)	Ecosystems essentially in good state; biodiversity largely intact.	Some human-related disturbance but mostly of low impact potential.
Fair (Class C)	A few sensitive species may be lost; lower abundances of biological populations are likely to occur, or sometimes, higher abundances of tolerant or opportunistic species occur.	Multiple disturbances associated with need for socio-economic development, e.g. impoundment, habitat modification and water quality degradation.
Poor (Class D)	Habitat diversity and availability have declined; mostly only tolerant species present; species present are often diseased; population dynamics have been disrupted (e.g. biota can no longer reproduce or alien species have invaded the ecosystem).	Often characterised by high human densities or extensive resource exploitation. Management intervention is needed to improve river health – e.g. to restore flow patterns, river habitats or water quality.

The Upper reach of this section of the Olifants River Catchment falls into the Ecological Management Class D as defined in Table 36 above.

7 Aquatic environment

The information contained in this section of this report was sourced from the following document:

- The report titled: Specialist report: "*Biomonitoring and toxicity assessment of the Tweefonteinspruit, Naauwpoortspruit and Olifants River*", dated December 2015 and compiled by Nepid Consultants (refer to Annexure E5).

Biomonitoring is conducted at Kleinkopje Colliery on a bi-annual basis (during the winter and summer months). Biomonitoring was undertaken at six sites (Table 35). Photographs of the biomonitoring sites are shown in Appendix B of Annexure E5, and locations are shown in Figure 44 below.

Table 35: Details of monitoring sites in the vicinity of Kleinkopje Colliery

Code	Name	Wetland Type
WP012	Naauwpoortspruit IN	Non channelled Valley Bottom
WP029	Naauwpoortspruit OUT	Non channelled Valley Bottom
WP037	Tweefonteinspruit IN	Non channelled Valley Bottom

Code	Name	Wetland Type
WP040	Tweefonteinspruit OUT	Non channelled Valley Bottom
WP042	Olifants River IN	Lowland River
RW004	Olifants River OUT	Lowland River

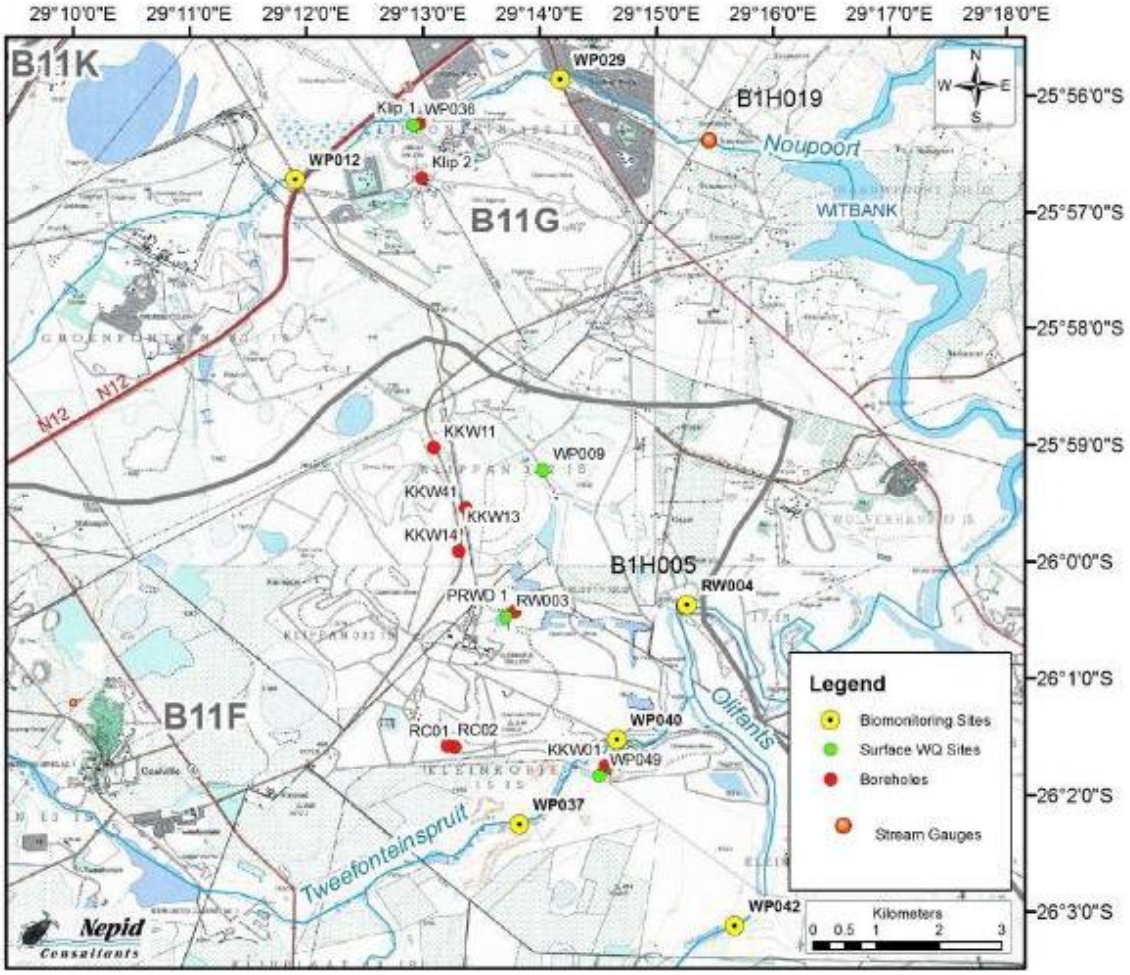

Figure 44: Biomonitoring sampling locations (Source: Nepid Consultants; December 2015)

7.1 Results

Surface water quality:

Surface water quality in December 2015 showed a general improvement compared to the previous survey, conducted in June 2015. The improvement is attributed to a single and localised rainfall event that took place 42 days before the field survey. However, stormwater runoff that is likely to have been associated with this rainfall event contributed to elevated turbidity in the Tweefonteinspruit and Olifants River.

Benthic Diatoms:

Summary results of diatoms recorded in December 2015 are shown in Table 36, and detailed data are presented in Annexure E5.

Table 36: Summary results - Diatoms

Site	No. species	SPI score	Class	Category	PTV (%)	Valve deformities (%)
WP042	28	10.9	Moderate quality	C/D	32.3	1
RW004	45	9.4	Poor quality	D	28.5	0.75
WP037		13	Moderate quality	C	20.8	0
WP040		8.2	Poor quality	D	39.9	0
WP012	18	6	Bad quality	E	80.3	1.25
WP029	14	4.6=8	Bad quality	E/F	79.3	1

Aquatic Macro Invertabrates:

The diversity of aquatic macroinvertebrates in Olifants River in December 2015 was similar at the two sites, with 8 taxa recorded upstream, and 10 taxa recorded downstream. Similar results were recorded during the previous survey. This was despite cessation of flow in the Olifants River for a period of 30 days in October/November 2015. The most sensitive taxon at both sites was freshwater shrimp (Atyidae), which has a moderate sensitivity score of 8/15.

These shrimps were moderately abundant at both sites. The proportion of air-breathing taxa was the same at the two sites (50%). The results show that there was no measurable difference in the composition or abundance of aquatic macroinvertebrates at the two monitoring sites.

Toxicity:

Toxicity tests conducted in December 2015 indicated an increase in overall toxicity throughout the area, with all sites having some degree of toxicity, and seven sites (50%) classified as Highly Toxic (Table 4-2). By contrast, the previous survey recorded no toxicity at eight sites, and two sites (14%) were classified as Highly Toxic (Table 4-2 in Annexure E5).

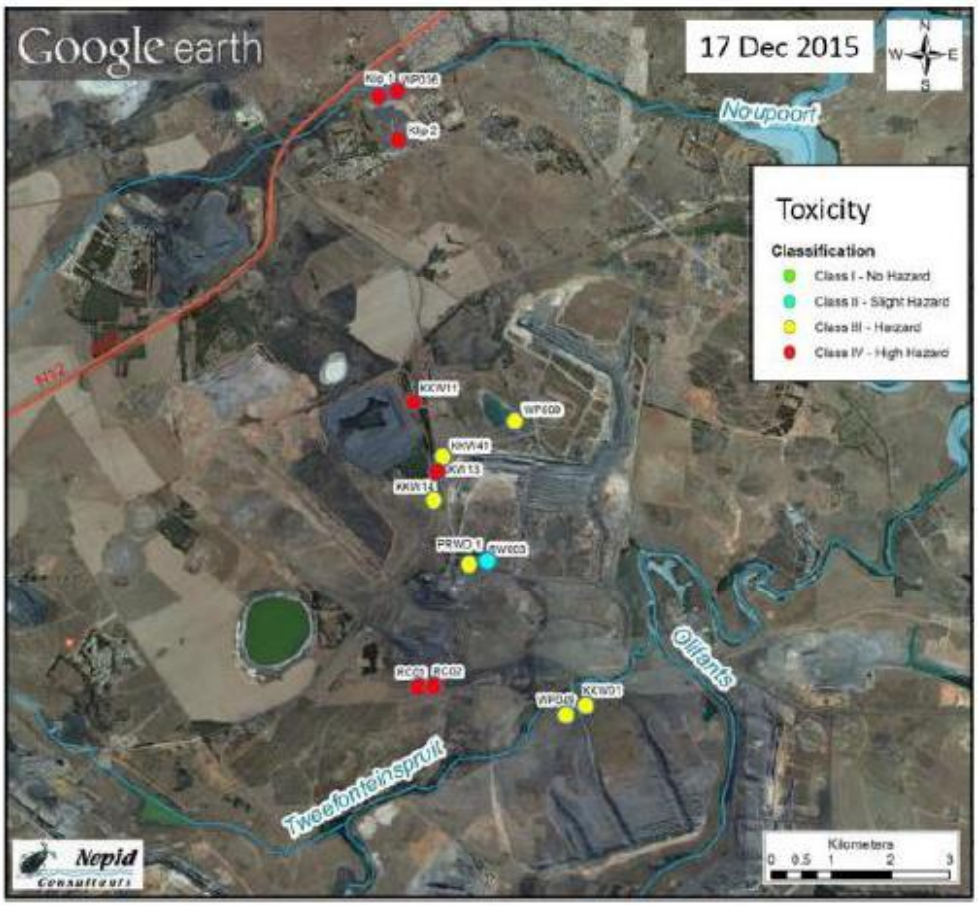

Figure 45: Toxicity results (Source: Nepid Consultants; December 2015)

Chapter H: Sensitive landscapes (Wetlands)

Information on wetlands as contained under this section has been obtained from the report titled: "*Wetland baseline and mitigation report for the proposed Kleinkopje Colliery opencast extension project*", dated August 2016 and compiled by Wetland Consulting Services (Annexure E3).

1 National Freshwater Ecosystem Priority Areas

The Atlas of Freshwater Ecosystem Priority Areas (FEPA) in South Africa (Nel et al, 2011) (The Atlas) which represents the culmination of the National Freshwater Ecosystem Priority Areas project (NFEPA), a partnership between SANBI, CSIR, WRC, DEA, DWA, WWF, SAIAB and SANParks, provides a series of maps detailing strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. FEPA's were identified through a systematic biodiversity planning approach that incorporated a range of biodiversity aspects such as ecoregion, current condition of habitat, presence of threatened vegetation, fish, frogs and birds, and importance in terms of maintaining downstream habitat.

A recently completed WRC funded project (Mbona et al., 2015) updated the NFEPA wetland mapping for the Mpumalanga Highveld. This has resulted in improved wetland coverage in the database and also in additional FEPA's being identified. An extract of this wetland database (Mbona et al., 2015) is shown in Figure 46 below.

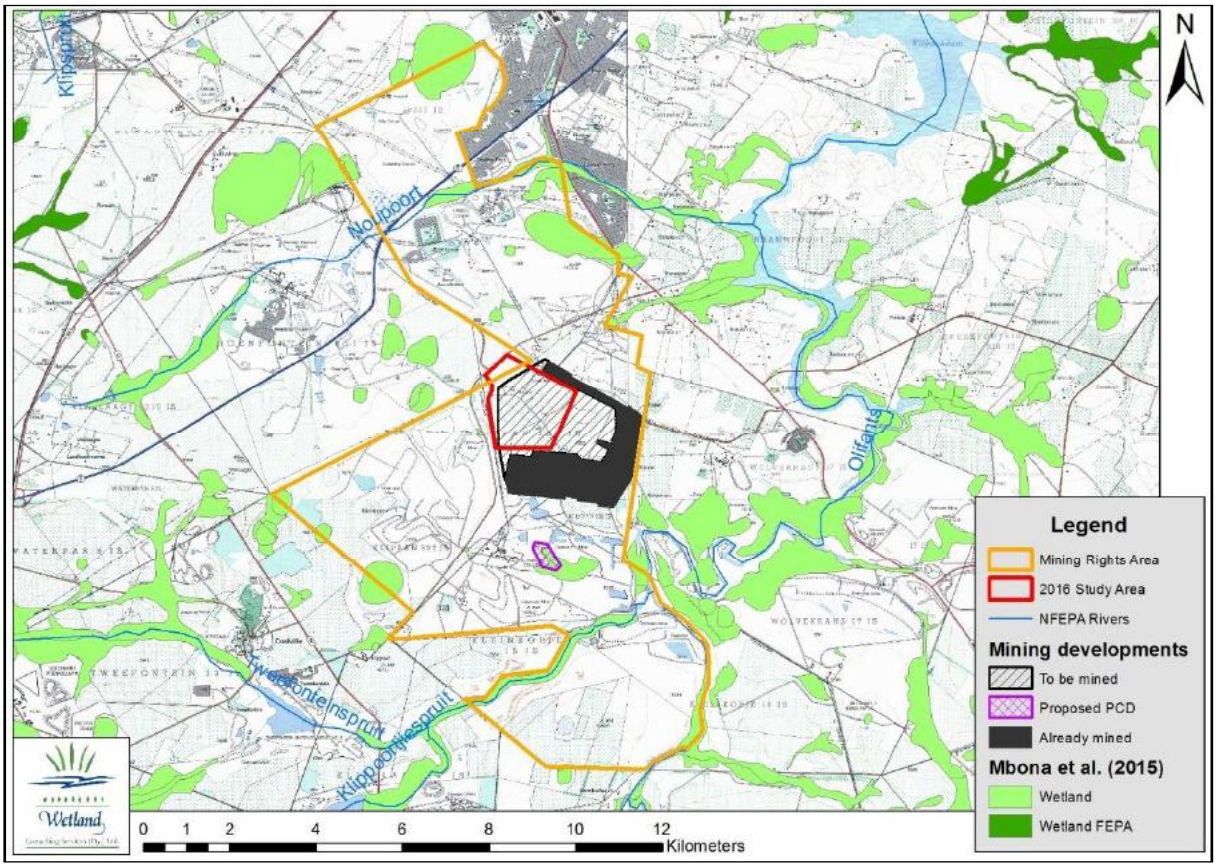

Figure 46: Map showing wetlands and FEPA's within the Kleinkopje mining rights area, as per Mbona et al. (2015).

It is clear from the map above that there are no FEPA wetlands within the study area, nor in the Kleinkopje mining rights area.

2 Wetland delineation and classification

The wetland system impacted by the proposed mining activities covers a total of 177 hectares. In addition to the delineated wetland area, two dams (including 2A Dam) were identified covering a combined area of 22.7 ha. It is important to note that these are dirty water dams and that water from 2A Dam is pumped to the eMalahleni Water Reclamation Plant for treatment. The delineated hillslope seepage wetland drains into the 2A Dam. 2A Dam is not permitted to overflow and no surface water link exists from the 2A Dam to the downslope Tweefonteinspruit and Olifants River. The 2A Dam and associated hillslope seepage wetland thus represent an isolated, dirty water system.

The delineated and classified wetlands within the study area and surrounds are illustrated in the figure below, with more detail regarding the different wetland types also provided in Tables 37 and 38.

Table 37: Areas of the different wetland types recorded on site.

Wetland Type	Area (ha)	% Wetland area
Hillslope seepage	172.3	97.1
Unchannelled valley bottom	5.1	2.9
TOTAL	177.4	100.0%

Table 38: Hydro-geomorphic classification system (adapted from Brinson, 1993; Kotze, 1999; and Marneweck and Batchelor, 2002).

Hydro-geomorphic Type	Description
Hillslope Seepage	Slopes on hillsides which are characterised by the colluvial (transported by gravity) movement of materials. Water inputs are mainly from subsurface flow and outflow can be via a well-defined stream channel connecting the area directly to a stream channel or outflow can be through diffuse subsurface and/or surface flow but with no direct surface water connection to a stream channel.
Unchannelled Valley Bottom	Valley bottom areas with no clearly defined stream channel, usually gently sloped and characterised by alluvial sediment deposition, generally leading to a net accumulation of sediment. Water inputs mainly from channel entering the wetland and also from adjacent slopes.

It is clear from the table above that the wetland area on site is dominated by hillslope seepage wetlands, which make up 97 % of the wetland area on site (refer to Figure 47). This is no surprise given the location of the study area at the head of a small watercourse and the fact that the entire study area is underline by sandstone and shale of the Vryheid ECCA group Formation (Karoo Supergroup). Sandstone typically weathers to form apedal soils which are sandy soils with weak structure.

These soils allow easy infiltration of rainfall and as a result are characterised by reduced surface run-off and increased throughflow and interflow (sub-surface seepage of water through the soil profile). Water infiltrates through the soil profile until an aquitard is reached (e.g. a soil horizon of low permeability, unweathered sandstone, hard or soft plinthic layers etc.) The water then moves laterally through the soil profile along the aquitard, forming a perched water table, and expressing itself as hillslope seepage wetlands in areas where the perched water table approaches the soil surface. The fluctuation of the water table causes accumulation and localization of iron and manganese oxides in the soil. This appearance is known as mottling and concretions. Gleying is common is these wet soils which are expressed as grey colours within the soil horizon.

The northern and eastern portions of the hillslope seepage wetlands within the study area are typically temporary to seasonal wetland habitat and seldom have areas of surface water, with flows taking place within the soil profile (interflow) or as diffuse sheet flow following large storm events. As such, these

wetlands are often classed as moist grasslands. Within the study area these wetlands are characterised by a typical Highveld assemblage of grass species with occasional sedges. Key wetland indicator species observed included *Imperata cylindrica, Eragrostis gummiflua, Cynodon dactylon, Agrostis lachnantha,* and *Kyllinga erecta*. The small shrub *Seriphium plumosum* typically occurred along and just outside the wetland edge.

In contrast, large sections of the western portions of the hillslope seepage wetland are permanently or near-permanently wet. This is however related to both seepage derived from the upslope discard dump as well as overflow and discharge from reservoirs associated with pumping stations pumping water to the eMalahleni Water Reclamation Plant. Large stands of *Phragmites australis* and *Typha capensis* occur in these areas, as well as stands of the alien tree *Populus* x *canescens*. A handheld pH and EC (electrical conductivity) meter was used to test the water within the hillslope seepage wetland downslope of the discard dump. EC readings of over 3999 µS/cm confirm elevated salinity levels due to coal discard contamination.

Downstream of the 2A Dam in the southern portions of the study area the remnants of an unchannelled valley bottom wetland remain. Historically this valley bottom wetland would have formed the link to downstream water resources. However, the lower reaches of the valley bottom wetland have been destroyed by opencast coal mining and currently no link to downstream water resources exists.

A shallow excavation area was identified along the upper parts of the hillslope seepage wetland in the northern portion of the study area. It appears that this area was sand mined/borrowed in the past. This area is characterized by the presence of numerous plant species indicating seasonal saturation of the soil.