ANGLO OPERATIONS (PTY) LTD: KLEINKOPJE COLLIERY

PIT 2A EXTENSION

EIAR AND EMPR FOR PUBLIC REVIEW

DMR REF. NUMBER: (MP) 30/1/2/3/2/1(307) EM

September 2016

SHANGONI
Management Services (Pty) Ltd

mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT: ANGLO OPERATIONS (PTY) LTD: KLEINKOPJE COLLIERY
PROJECT: PIT 2A EXTENSION
DOCUMENT: EIAR AND EMPR FOR PUBLIC REVIEW
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DMR REF. NUMBER: (MP) 30/1/2/3/2/1(307) EM

IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

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

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PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1. Details and expertise of the EAP

1.1 Details of the EAP

Name of The Practitioner: Shangoni Management Services: Wilda Meyer
Tel No.: (012) 807 7036
Fax No.: (012) 807 1014
e-mail address: wilda@shangoni.co.za

1.2 Expertise of the EAP.

Table 1: The qualifications of the EAP

NAME	QUALIFICATIONS
Brian Hayes	Professional Engineer. M.Sc.: Environmental Engineering.
Wilda Meyer	B.Sc. (Hons): Geography and Environmental Management

Table 2: Summary of the EAP's past experience

NAME	SUMMARY OF EXPERIENCE
Brian Hayes	Brian is a registered professional engineer (Chemical) with a master degree in Environmental Engineering from the University of Nottingham. Brian has 23 years' experience in environmental management and environmental engineering.
Wilda Meyer	Wilda obtained a B.Sc. Hons degree in Geography and Environmental Management through the University of Johannesburg. She has experience in conducting Environmental Management Programmes (EMPs), Basic Assessment Reports, Scoping Reports, Environmental Impact Assessments (EIAs), Waste Licence Applications, Integrated Water and Waste Management Plans (IWWMPs) and Integrated Water Use License Applications (IWULAs). Wilda also focusses on conducting environmental audits, such as EMP Performance Assessments and ISO14001 Internal Audits. She also has valuable experience in

NAME	SUMMARY OF EXPERIENCE
	ISO14001 Environmental Management System (EMS) Implementation and has successfully implemented and obtained ISO14001 certification at various gold- and diamond mine sites.

Detailed CV's of the EAP are attached in Annexure B.

2. Description of the property.

Table 3: Description of the property

Farm Name:	• Portion 18 of the farm Klippan 332 JS; and • Portion 0 of the farm Landau 349 JS. • Portion 208 of the farm Klipfontein 322 JS. • Portion 1 of the farm Kleinkopje 15 JS
Application area (Ha)	• Pit 2A Extension area = 101 ha • Proposed Pollution Control Dam = 21 ha • Haul road length = 3 968 m • Dewatering pipeline length = 6 363 m
Magisterial district:	Witbank (Emalahleni) Magisterial District
Distance and direction from nearest town	The mine is situated approximately 15km south of Emalahleni in Mpumalanga Province.
21-digit Surveyor General Code for each farm portion	• T0JS00000000034900000 • T0JS00000000033200018 • T0IS00000000001500001 • T0JS00000000032200208

Refer also to Figure 2 below for a map showing the farm portions.

3. Locality map

The localities of the Kleinkopje Colliery Pit 2A Extension application area(s) are presented in Figure 1 below.

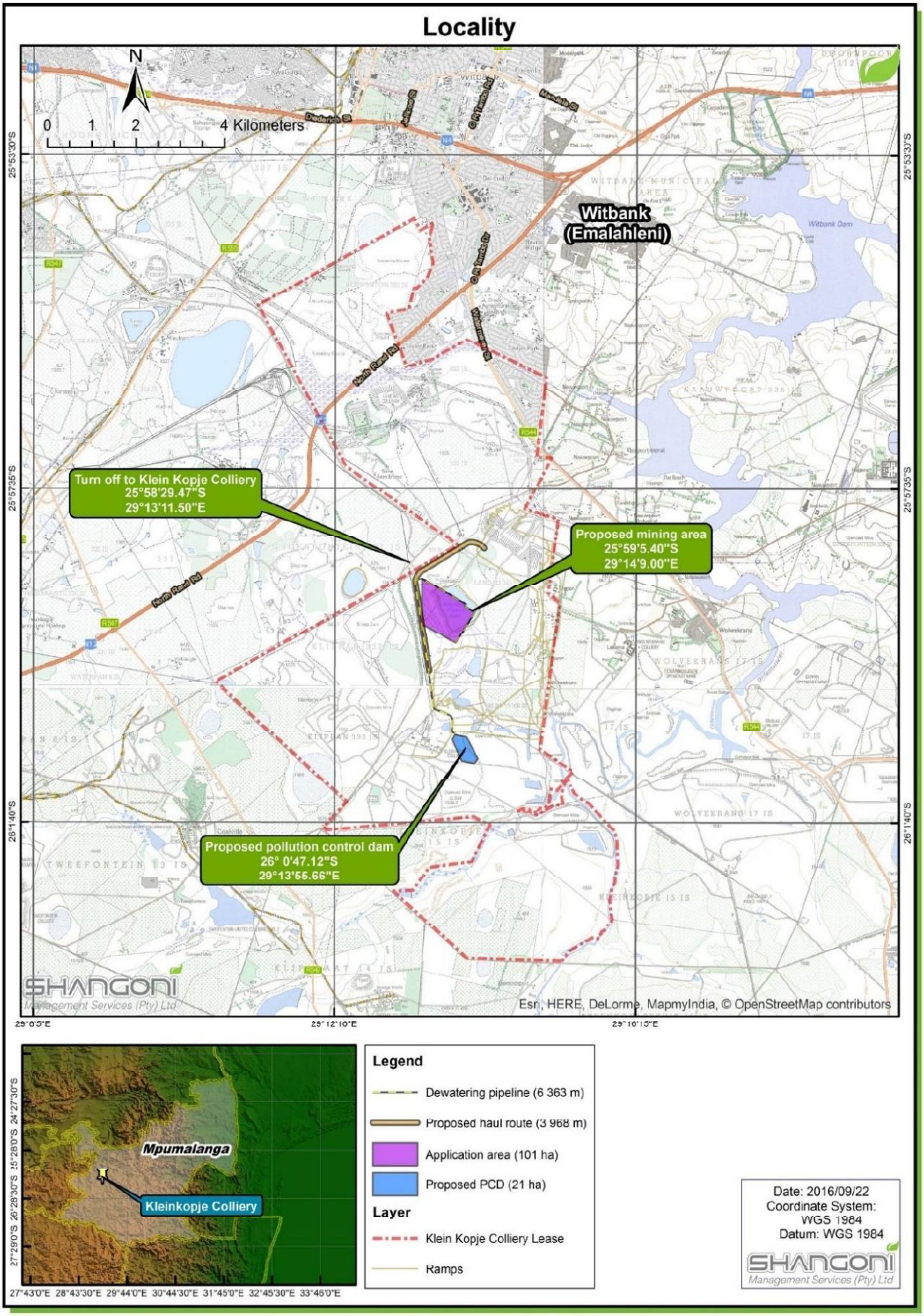


Figure 1: Locality map

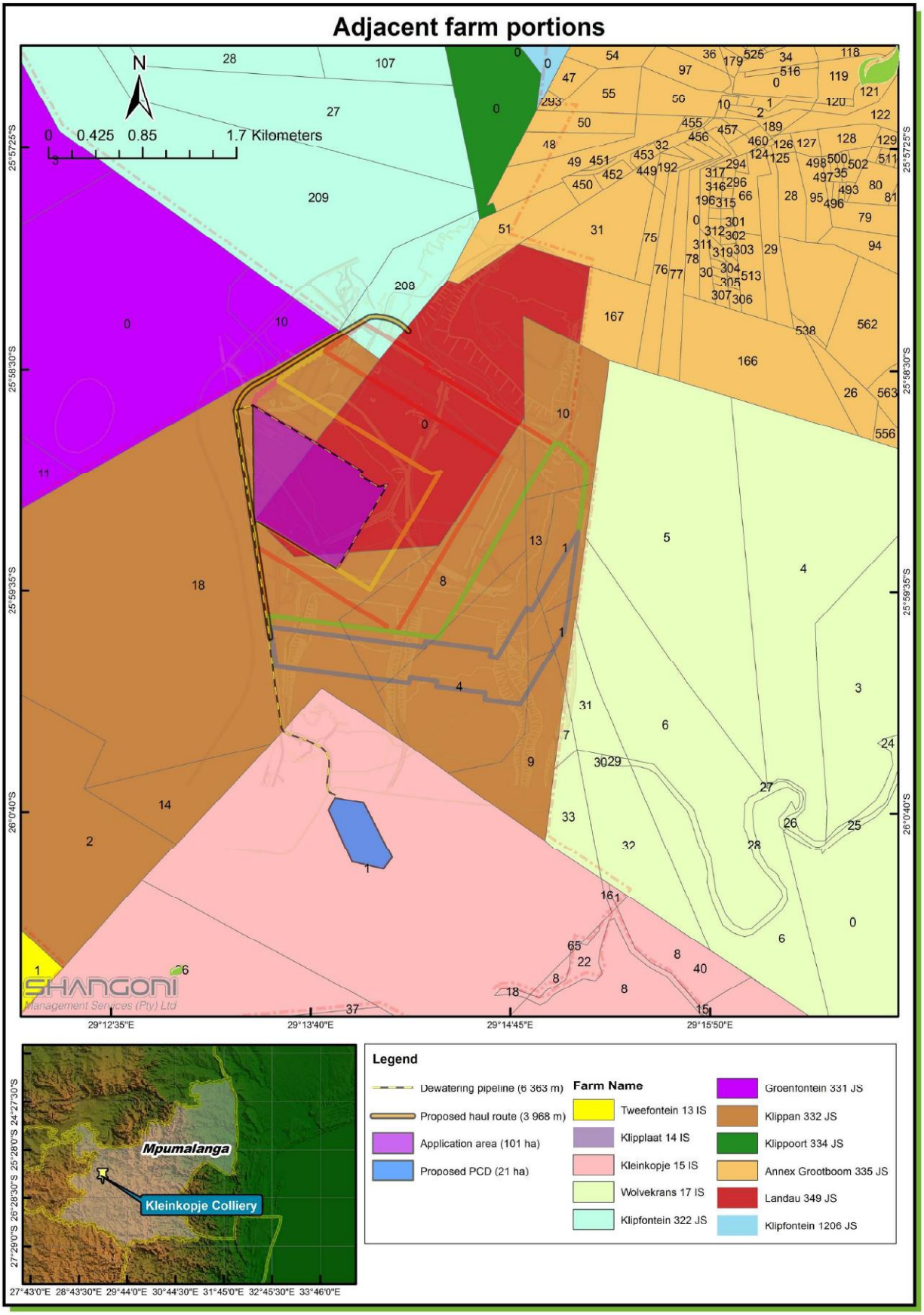


Figure 2: Map showing the farm portions associated with the Pit 2A Extension area(s)

4. Description of the scope of the proposed overall activity.

Anglo Operations (Pty) Ltd: Kleinkopje Colliery is an existing opencast coal mining operation located 15km south of Emalahleni in the Mpumalanga Province. The mine boundary area of the Kleinkopje Colliery is approximately 4000 ha in size. Approximately 7.6 million Run of Mine tons of coal is extracted from the opencast pits annually. Kleinkopje Colliery consists of a number of mining sections, a coal beneficiation plant, the Klippan co-disposal site and the 2A Dam. The 2A Dam was constructed as the main pollution control dam (PCD).

The Colliery has an approved Mining Right (MP30/5/1/1/2/307MR) and an aligned and consolidated Environmental Management Programme Report (EMPr) in terms of Section 39(6) of the Mineral and Petroleum Resources Development Act (MPRDA), 2002. The EMPr was approved by the Department of Mineral Resources (DMR) in September 2012. Refer to Figure 1 below for the mine authorisation map. Kleinkopje Colliery also holds an approved Water Use License 04/B11J/AFGJ/1416 dated 20 December 2011 from the Department of Water and Sanitation (DWS).

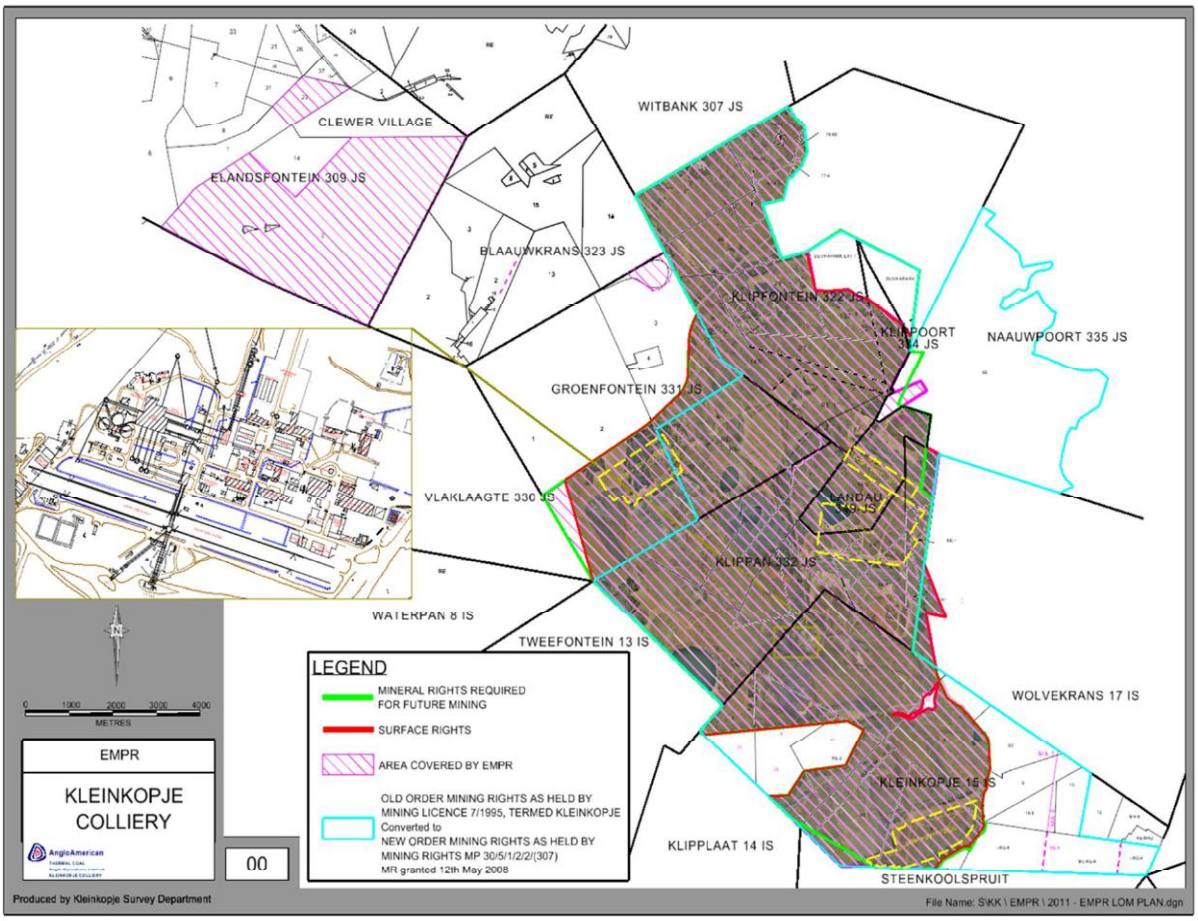


Figure 3: Mine authorisation map

Kleinkopje Colliery is in the process of revising its mine plan to include the mining of the coal situated in the area beneath its 2A Pollution Control Dam (here after referred to as the 2A Dam) (also referred to in some documentation as the Vleishaft dam) (refer to Figure 4 below). 2A Dam was constructed in 1998 within a tributary of the Olifants River as authorised by permits to construct and impound water in a dam with a safety risk.

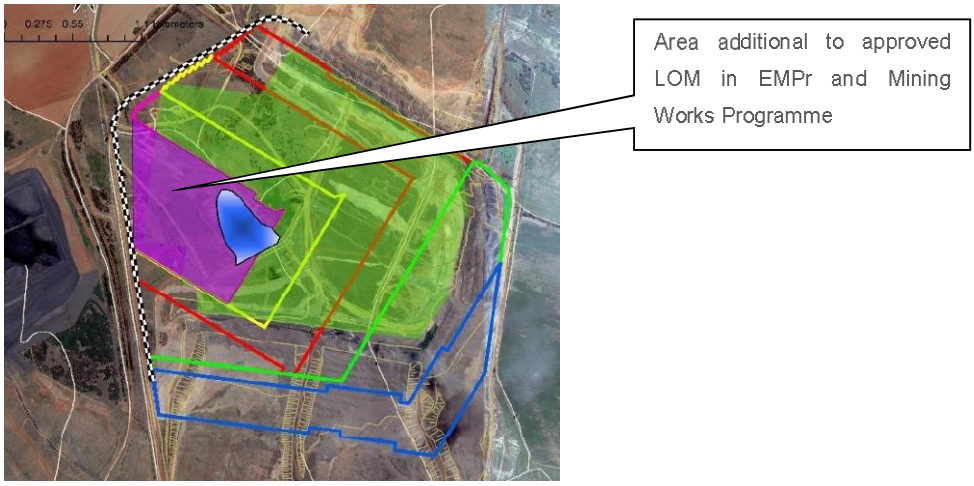


Figure 4: Approved Life of Mine plan (coloured area) vs proposed Pit 2A Extension area plan

Since the existing 2A Dam is located within the area where mining will be extended to, the pollution control dam (2A Dam) will need to be relocated (newly constructed) and operated in another location. Refer to the site plan below in Figure 5 for the proposed location of the PCD, as well as Table 4 below for the description of the triggered listed activities.

An application for Environmental Authorisation in terms of the National Environmental Management Act (NEMA), 1998, and the Environmental Impact Assessment (EIA) Regulations, dated December 2014 was submitted to the Mpumalanga Department of Mineral Resources (DMR) on 14 June 2016 for this Pit 2A Extension project.[1] A pre-application meeting was held with the DMR on 14 June 2016 during which the DMR agreed that a stand-alone Scoping Report and EIA report (EIAR) / Environmental Management Programme Report (EMPr) for the project be compiled and submitted, and that the amendment of the approved Kleinkopje Colliery EMPr (dated 2012) to incorporate the proposed project, be done as a separate process at a later stage. Refer to the minutes of the meeting held with DMR (attached in Annexure C). The DMR acknowledged receipt of the application form in a letter dated 06 July 2016 (refer to Annexure C4). The final Scoping Report was submitted to the DMR on 27 July 2016 and receipt thereof was acknowledged by the DMR on 16 August 2016. The Scoping Report was subsequently accepted by the DMR on 19 September 2016 (refer to Annexure C7).

[1] Note: The proposed Pit 2A Extension area forms part of the Mining Right for Kleinkopje Colliery, and therefore this EIAR / EMPr is compiled only in support of an application for Environmental Authorisation in terms of NEMA, 1998 and the EIA Regulations, 2014.

The farm portions relevant to the project changed subsequent to the submission of the original application form. Furthermore, the DMR requested that subsections (where relevant) of listed activities be included in the relevant tables of the application form. The amended application form is attached hereto in Annexure C5. The amended application form was submitted along with the Final Scoping Report based on discussions held with Ms Nditsheni Ramuhulu from the DMR: Mpumalanga office during a telephone conversation on 25 July 2016. The amended pages relevant to the listed activities sub-sections were also provided to the DMR on 13 July 2016. No further changes to the farm portions have been made since the submission and acceptance of the Scoping Report.

Furthermore, a Water Use Licence Application (WULA) will be lodged with DWS in terms of the National Water Act (NWA), 1998 for water use activities that will be triggered by the proposed project. Refer to Annexure C6 for the minutes of the meetings held with DWS, as well as the Notice of Intent to submit a WULA that was provided to DWS.

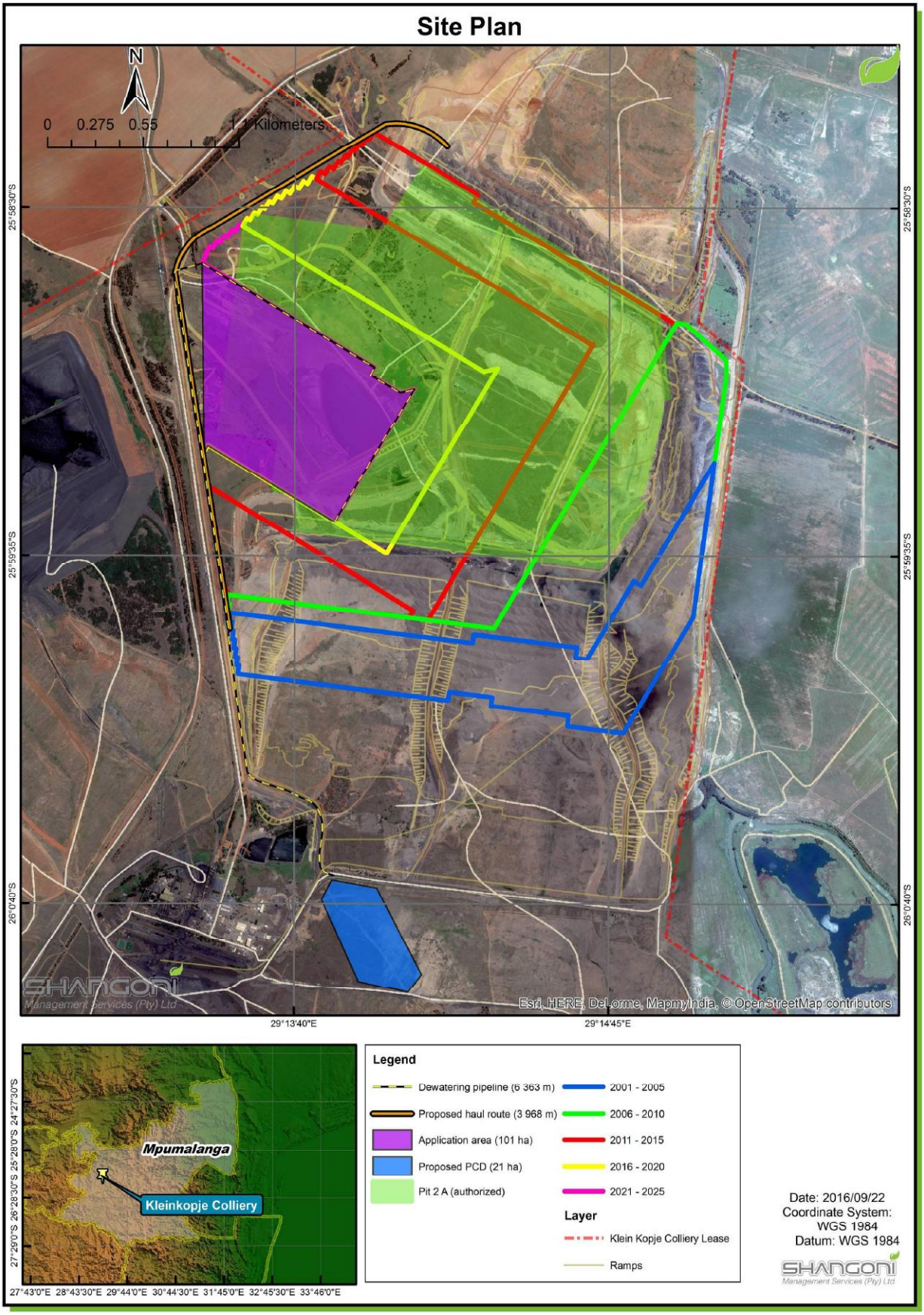


Figure 5: Site layout plan

4.1 Listed and specified activities

Table 4: Activities and listed activities associated with the proposed development

NAME OF ACTIVITY	ARIAL EXTENT OF ACTIVITY Ha or m²	LISTED ACTIVITY (mark with X)	APPLICABLE LISTING NOTICE (GNR 983, GNR 984 or GNR 985)/NOT LISTED
Clearance of vegetation[2]	Pit 2A Extension area: 101 ha. Proposed PCD: 21 ha	X	• Listed activity No 19(i) of GNR 983 • Listed activity No.15 of GNR 984
Removal and stockpiling[3] of topsoil and overburden for use during concurrent rehabilitation			
Mining of the ore reserve and subsequent (concurrent) rehabilitation of the open pit extension area(s)[4]		X	
Construction and use of haul roads within and around the open pit extension area(s)	The current haul road and ramp structure will be modified and extended to provide access to the open pit extension areas. The length of the proposed haul road 3 968 m.	X	• Listed activity No 24(ii) of GNR 983 • Listed activity No 56(ii) of GNR 983[5]
Continuation of the disposal of mine residue within the existing footprint on the current Klippan Co-disposal site, located at Kleinkopje Colliery.	Continuation of the use of the existing Klippan Co-disposal facility (133 ha – as per IWWMP, dated 2015).		The mentioned existing facility was included in the approved EMPR dated 2012 which EMPR is deemed to be approved in terms of

[2] Note: Although the northern corner (4 467m²) of the Pit 2A Extension area falls within a Critical Biodiversity Area (CBA) Optimal area, Listed Activity No 12 of GNR 985 is not triggered, as the area associated with the location of the Pit 2A Extension area is not considered indigenous vegetation and has been heavily impacted on by existing mining activities, extensive agricultural activities (i.e. maize cultivation), impacts associated with linear infrastructure (e.g. roads, powerlines etc.), the existence of the 2A Dam, and alien vegetation, including stands of *Populus x canescens* and Eucalyptus trees within the area. All of these activities have resulted in the extensive transformation of the natural habitats within the general area (Wetland Consulting Services, 2016).

[3] Soil stockpiling – not listed. Removal of topsoil included as part of the overall clearance and mining activity.

[4] Rehabilitation activities will include the re-instatement of the water course on the rehabilitated opencast area and the rehabilitation and protection of suitable remaining wetlands on-site (Refer to Annexure E3 – Wetland Baseline and Mitigation Report)

[5] Note: Although a section of the haul road footprint will fall within a Critical Biodiversity Area (CBA) Optimal area, the haul road will not consist of a reserve, and therefore, Activity No 4 of GNR 985 is not triggered.

NAME OF ACTIVITY	ARIAL EXTENT OF ACTIVITY Ha or m²	LISTED ACTIVITY (mark with X)	APPLICABLE LISTING NOTICE (GNR 983, GNR 984 or GNR 985)/NOT LISTED
			the National Environmental Management: Waste Act (NEMWA), 2008. Therefore, this activity is not applied for as a waste management activity.
Dewatering activity: Pumping of water collecting in the open pit extension area	The length of pipeline expansion will be more than 1km (6 363m) and the internal diameter more than the 0.36m threshold. Therefore, the applicable listed activities are applied for. The pipeline will run from the Pit 2A opencast area towards the proposed PCD. Refer to Figure 3.	X	• Listed activity No 10(i) and (ii) of GNR 983 • Listed activity No 34 of GNR 983 • Listed activity No 46(i) and (ii) of GNR 983 • Listed activity No 6 of GNR 984
Storm- and process water management measures for the purpose of clean- and dirty water separation.	Refer to Figure 17 for a description and illustration of the recommended storm water management plan as per the Annexure E4. These include: • Measures to ensure the diversion of clean water from affected areas; and • Measures to convey dirty / process water within the mining area to the dirty water management facilities and keep such in a closed circuit.	X	• Listed activity No 9(i) and (ii) of GNR 983 • Listed activity No 12(i)(vi)(xii)(a) of GNR 983 • Listed activity No 45(i) and (ii)(a) of GNR 983 • Listed activity No 48(i) and (vi)(a) of GNR 983 • Listed activity No 49(v)(a) of GNR 983
Use and maintenance of chemical / portable toilets at open pit extension area(s).	Will be portable and placed where needed at the open pit area.		• Not listed

NAME OF ACTIVITY	ARIAL EXTENT OF ACTIVITY Ha or m²	LISTED ACTIVITY (mark with X)	APPLICABLE LISTING NOTICE (GNR 983, GNR 984 or GNR 985)/NOT LISTED
Potential in-pit emergency maintenance on equipment or machinery.	Will be undertaken (if necessary) within the open pit/ extension area(s). Aerial extent of activity unknown as this depends on breakdown location of equipment or machinery.		• Not listed
As the existing 2A Dam footprint area falls within the planned Pit 2A Extension mining area, construction and operation of a new pollution control dam will be required.	Proposed PCD: 21 ha	X	• Listed activity No 34 of GNR 983 • Listed activity No 66(I) and (ii) of GNR 983 • Listed activity No 6 of GNR 984 • Listed activity No 16 of GNR 984

Refer to Figure 5 above for the site layout plan.

4.2 Description of the activities to be undertaken

4.2.1 Mineral to be mined

The mineral deposit mined at Kleinkopje Colliery is that of bituminous coal. Only the lower portions of the Vryheid Formation are preserved within the Kleinkopje mining area. The economical seams that can be exploited is that of the No. 1, No. 2, No. 4 and No. 5 seams. The Kleinkopje coal reserves are predominantly contained within the No. 1 and No. 2 seams, however, the No. 4 and No. 5 seams are present at deeper elevations that are exploited through open cast mining at the current Pit 2A mining area.

4.2.2 Description of the main mining activities and processes

The proposed Pit 2A extension will entail the following main activities:

- Clearance of vegetation;
- Mining activities by means of dragline production units (removal and stockpiling of topsoil and overburden and the subsequent removal and stockpiling of the ore reserve) (note: truck and shovel methods used for waste movement) (mining activities include blasting);
- Concurrent rehabilitation (including the re-instatement of the watercourse on the rehabilitated opencast area and the rehabilitation and protection of suitable remaining wetlands on-site (as mitigation measure to compensate for the loss of wetlands);
- Hauling activities;
- The continuation of the disposal of mine residue on Kleinkopje Colliery's existing mine residue facility (co-disposal facility);
- Concurrent rehabilitation of the open pit area (which includes spoils reshaping, topsoil placement and re-vegetation);
- Rehabilitation and offset strategy implementation for the wetland system associated with the 2A Dam and Pit 2A Extension area (as part of the mitigation / management measures);
- Dewatering of the open pit area; and
- Reticulation and storage of mine affected water that include the construction of a new Pollution Control Dam (PCD) (i.e. relocation of the 2A Dam).

Refer also to Table 4 above for a list of activities associated with the proposed project.

4.2.2.1 Mining and rehabilitation methods

A number of mining methods are proposed for the mining of the 2A Pit in the redefined layout. In the north of the pit a second dragline is required to allow for the necessary productivity improvement to sustain economic viability. In addition, the 5 seam has been included in the mining plan and could see additional mining activities such as a third dragline and intensified truck and shovel means being implemented. The Pit 2A mining methods are described in Figure 6 below.

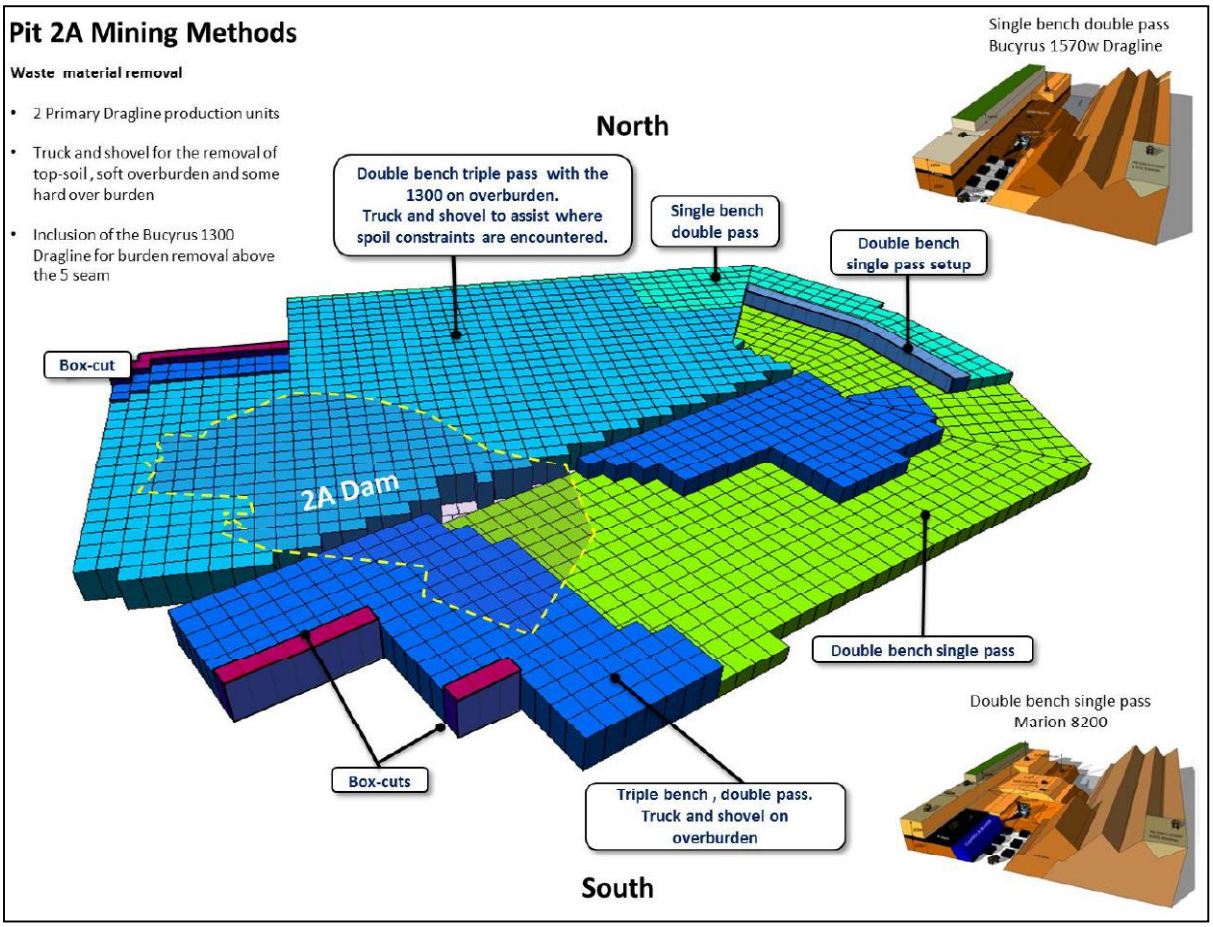


Figure 6: Pit 2A mining methods (Source: Extract from Life of Mine Report, 2016)

Mining in the south of Pit 2A is planned to be continued with the Marion 8200 Dragline by means of the current double bench single pass mining method. In this scenario the dragline operates on a lower bench just above the 4 seam horizon. This position allows the operating dragline to expose both the 4 and 2 seam coal resources in a single pass. Dozer push over in advance of the dragline assists in the process by allowing the dragline the opportunity to focus on coal exposure on both benches. In Figure 7 below one can see that cladding between the 2 to 4 seam inter-burden and 2 seam old workings is identified as part of the mining process with regards to spontaneous combustion control measures.

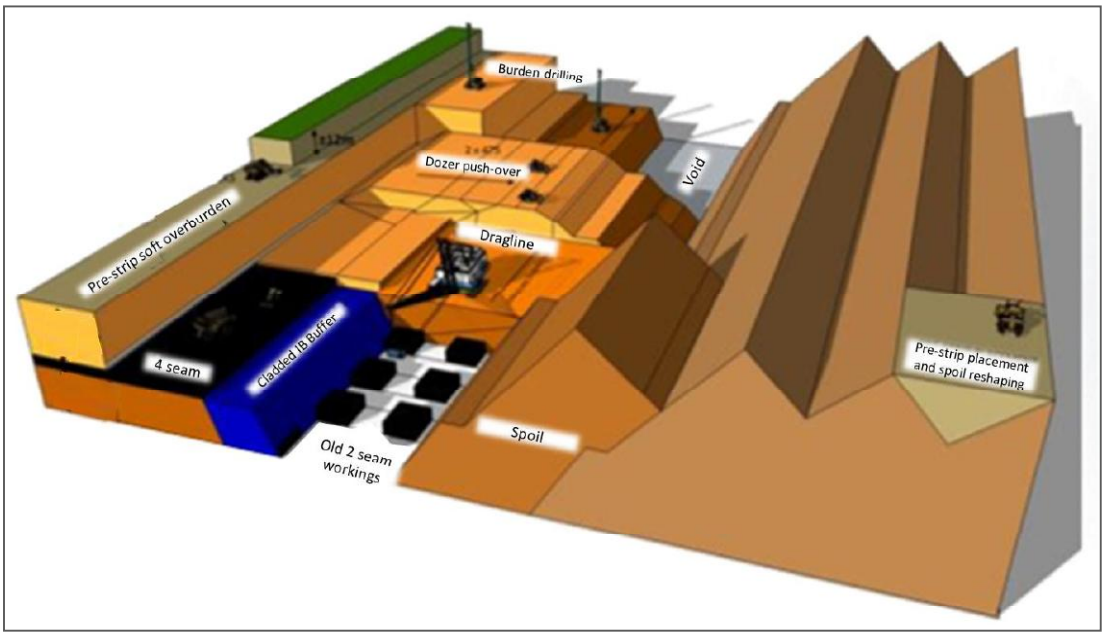


Figure 7: Mining in the south of Pit 2A (Source: Extract from Life of Mine Report, 2016)

The figure below indicates the single bench double pass method to be continued in the north of Pit 2A but this time by the current Bucyrus 1570 W dragline operating in Pit 5 West. This configuration is envisioned for the area starting at Ramp 21 to the proposed reestablishment of the Ramp 19 position in the extreme north of Pit 2A. This method is less productive when comparing it to the double bench single pass method in the south. A future proposal might be to extend the double bench single pass method throughout Pit 2A.

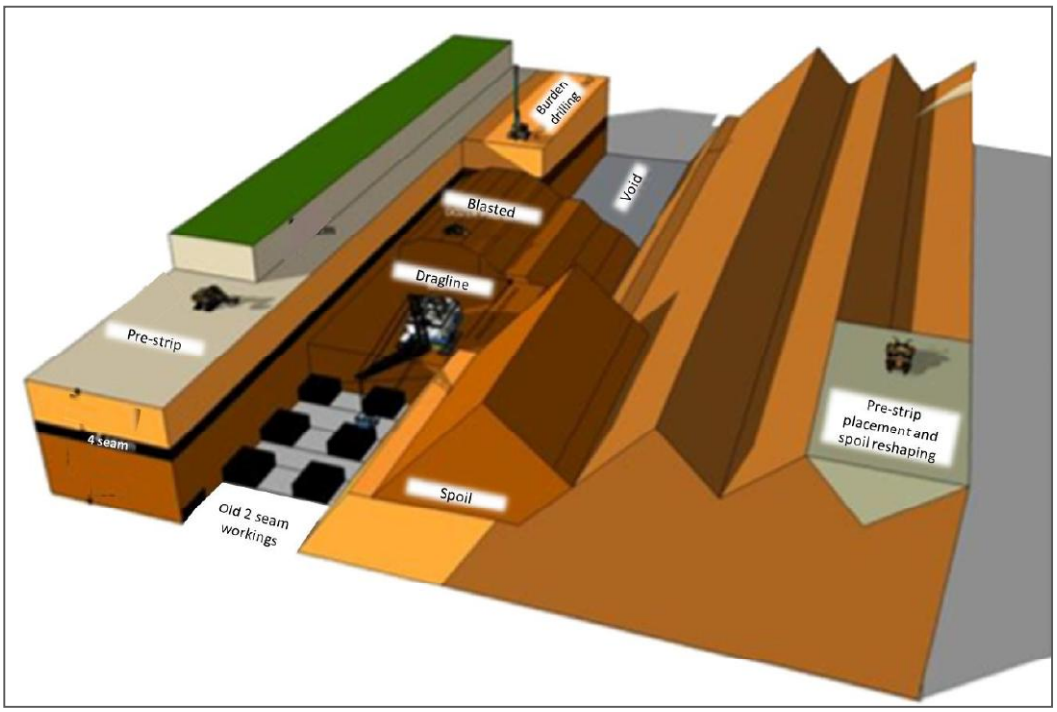


Figure 8: Mining in the north of Pit 2A (Source: Extract from Life of Mine Report, 2016)

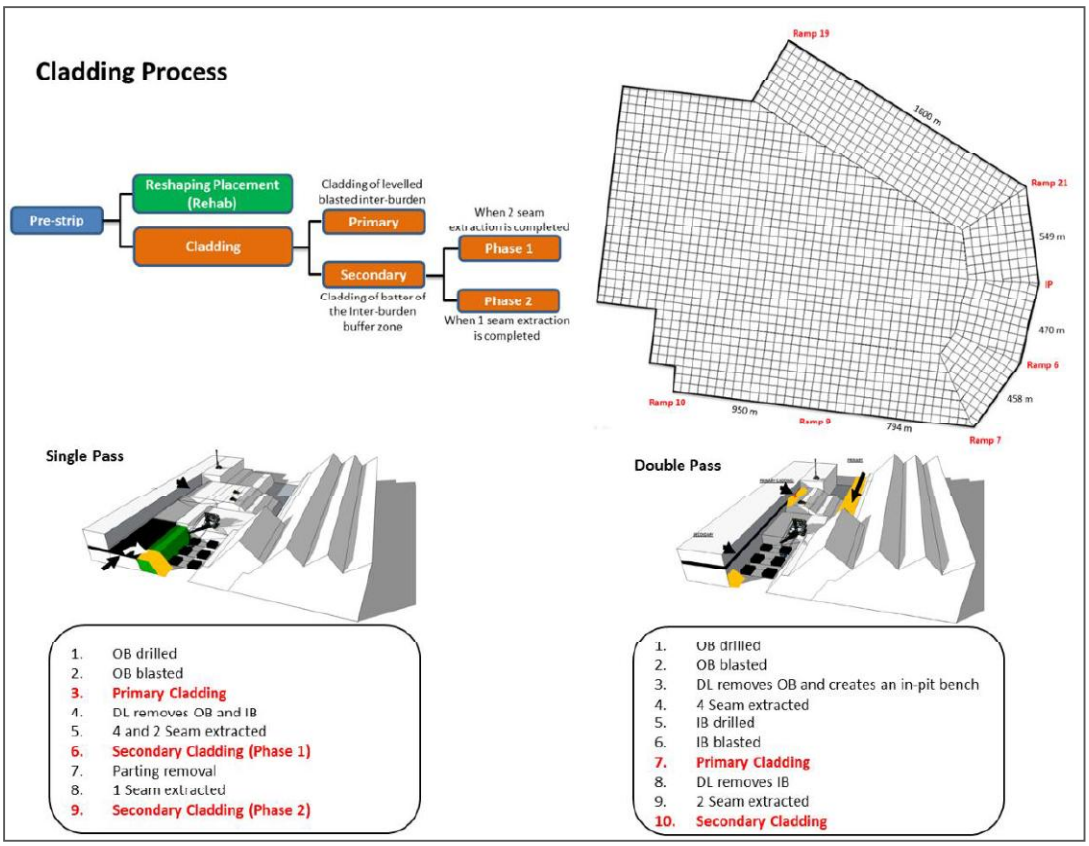


Figure 9: Cladding process (Source: Extract from Life of Mine Report, 2016)

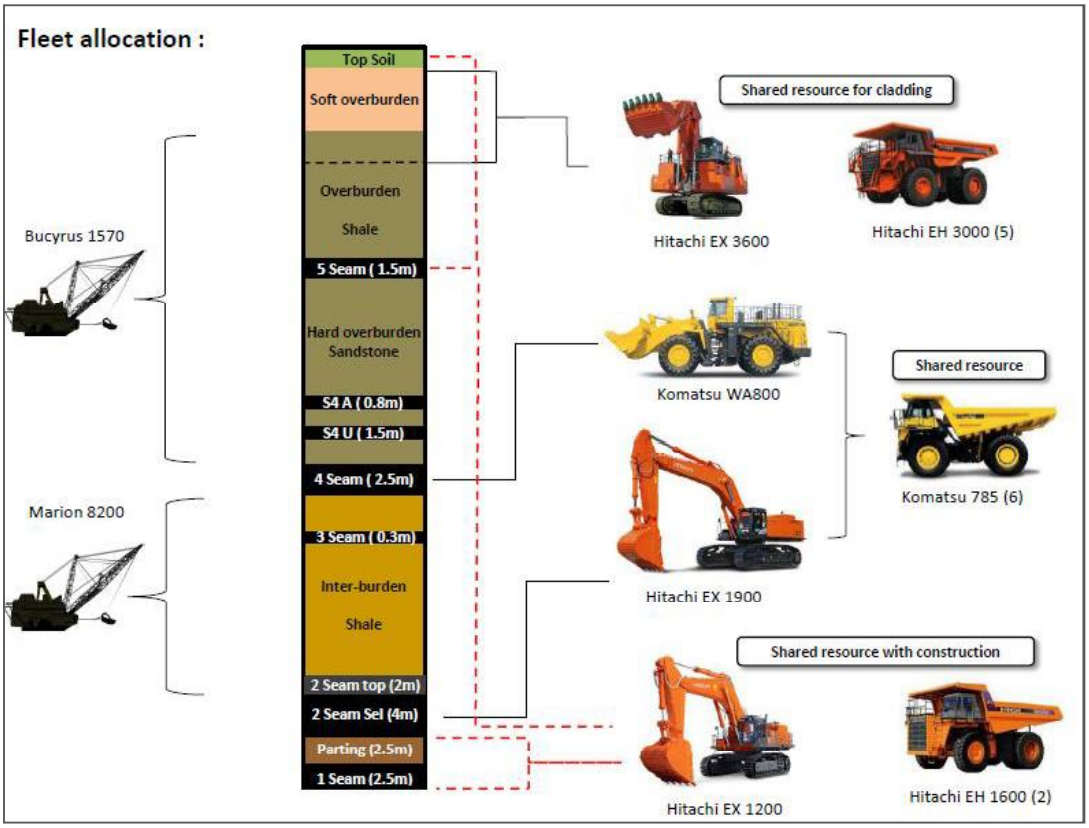


Figure 10: Fleet allocation (Source: Extract from Life of Mine Report, 2016)

Fleet size and use :

TYPE	NUMBER	USE
Dragline Fleet		
BE 1570W - 01	1	Overburden Removal
BE 1570W - 02	1	Overburden Removal
BE 1300W - 03	1	Rehabilitation
Marion 8200 - 04	1	Overburden Removal
BE 1570W - 05	1	Overburden Removal
Truck and Shovel Fleet		
Hitachi EX 1900	1	Pre- Strip, Topsoil and Parting removal
Hitachi EX 1900	1	Cladding
Komatsu PC 1250	1	Ramp construction
Hitachi EX 1200	1	
EH 1600	4	
EH 1700	2	
EH 3000	4	
Coaling Fleet		
Caterpillar 992 FEL	2	
Caterpillar 994	1	
P&H 2100 - 5	1	
EH 1600	2	Coal Loading and Hauling
EH 1700	2	
Caterpillar 777	2	
EH 3000	4	
Overburden Drilling		
Bucyrus Erie 61 - R	3	
Bucyrus Erie 49 - R	2	Overburden Drilling
Bucyrus Erie 39 - R	1	
Bucyrus Erie 33 - R	1	

Figure 11: Fleet size and use (Source: Extract from Life of Mine Report, 2016)

Kleinkopje Colliery is following a free drainage design for rehabilitation. Surface coal mining involves specialised equipment and mining techniques that allow the removal of large volumes of waste and coal from large areas. Rehabilitation is therefore an integral and important part of that process.

The rehabilitation process comprises three main phases, which include spoils reshaping, topsoil placement and re-vegetation. The objective of this process is to create a post mining landscape that is free draining, and achieve certain pre-described land capabilities of arable, grazing, wetland and wilderness that are stipulated in the approved EMPR, 2012. A fourth and increasingly more important component to the rehabilitation process is biodiversity management. The eventual outcome of any rehabilitation programme is to create a post mining environment that is ecologically diverse and functional, and can also strive to serve as a sustainable economic return. Ongoing management of existing rehabilitation pastures through correct burning and grazing regimes, as well as an alien vegetation control is essential to sustaining the health of the rehabilitated areas. This also increases the value of the rehabilitation through increased biomass production and prevention of soil erosion.

In order to ensure that the reshaping program at Pit 2A is effective in terms of achieving a free draining post mining topography, a rehabilitation design has been created. This design is based on the minimum requirements of a 1:5 slope and 1:500 for drainage paths for the reshaping process. These parameters ensure that in practice a minimal volume of material is moved for achieving the design. The design is

created through the integration of different software packages. Firstly, the specified LOM plan is modelled using 3D DIG. This creates a spoiling profile as created by the dragline. The positions of the final voids and the functional hauling ramps are simulated and identified. Additionally, the pre-strip activity is modelled for the backfilling of the spoil voids or for ramp shortening. This profile is then incorporated into Model Maker and the profile is simulated to the sloping requirements of 1:5 for out sloping and 1:500 for drainage paths. Any additional movement of material is also identified if a free draining topography cannot be achieved through the initial 1:5 modelling process.

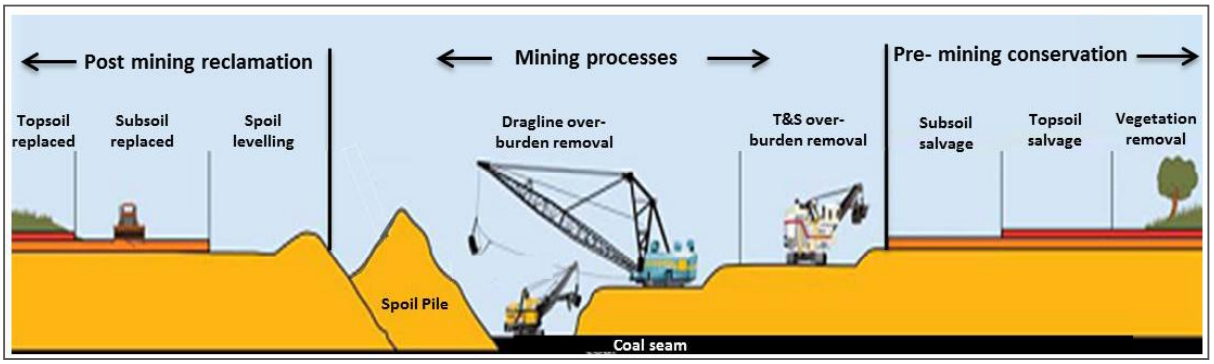


Figure 12: Typical strip cut operation (Source: Extract from Life of Mine Report, 2016)

The diagram above depicts a typical strip cut operation. Topsoil and soft material ahead of the mining operation is stripped by truck and shovel method. The soft overburden material is trucked to the post-mine area, where it is placed on the reshaped spoils.

In line with the Strategic Mine Planning view, Pit 2A was redefined to include the 2A Deep resource area. A new lay-out was created as a result and it was deemed necessary to relook at the rehabilitation model for this area. The free draining principle was followed and listed below are the assumptions that were built into the new rehabilitation model.

- 1 in 5 used as maximum gradient;
- 1 in 300 used as drainage gradient;
- Pre-strip material is to be used to backfill Ramp 9 up to the watershed point, due to insufficient local material available to achieve the required gradient;
- The model reflects a large, 1 in 300 gradient area where Ramp 19 and Ramp 10 enter the final void. This would imply a large volume to be moved into this area;
- Predicted topography between Ramp 10 and 9 and Ramp 9 and 7 indicate a number of peaks. In order to mitigate this, some of the pre-strip material from these areas could be relocated to areas where material shortages are noted. One such area is where backfilling is required at Ramp 9;
- Ramp 7 remains the critical drainage path outlet for Pit 2A;
- Recommend that a water specialist models the water quantities expected through and out Ramp 7 as flood and erosion control measures could be required[6];

[6] Refer to the Hydrology (storm water) Assessment in Annexure E4 and the mitigation measures in Part B of this EIAR / EMPr.

- The drainage paths are critical for free-draining, the spoil profiles and elevations are indicative only. Any ponding areas should be filled or trenched towards a drainage path during operations; and
- TOTAL volume to move at Planned Closure on final void and ramp scars (if ramp scars are left for planned closure) is 55M cubic metres, up from 41M which will increase the Planned Closure cost.

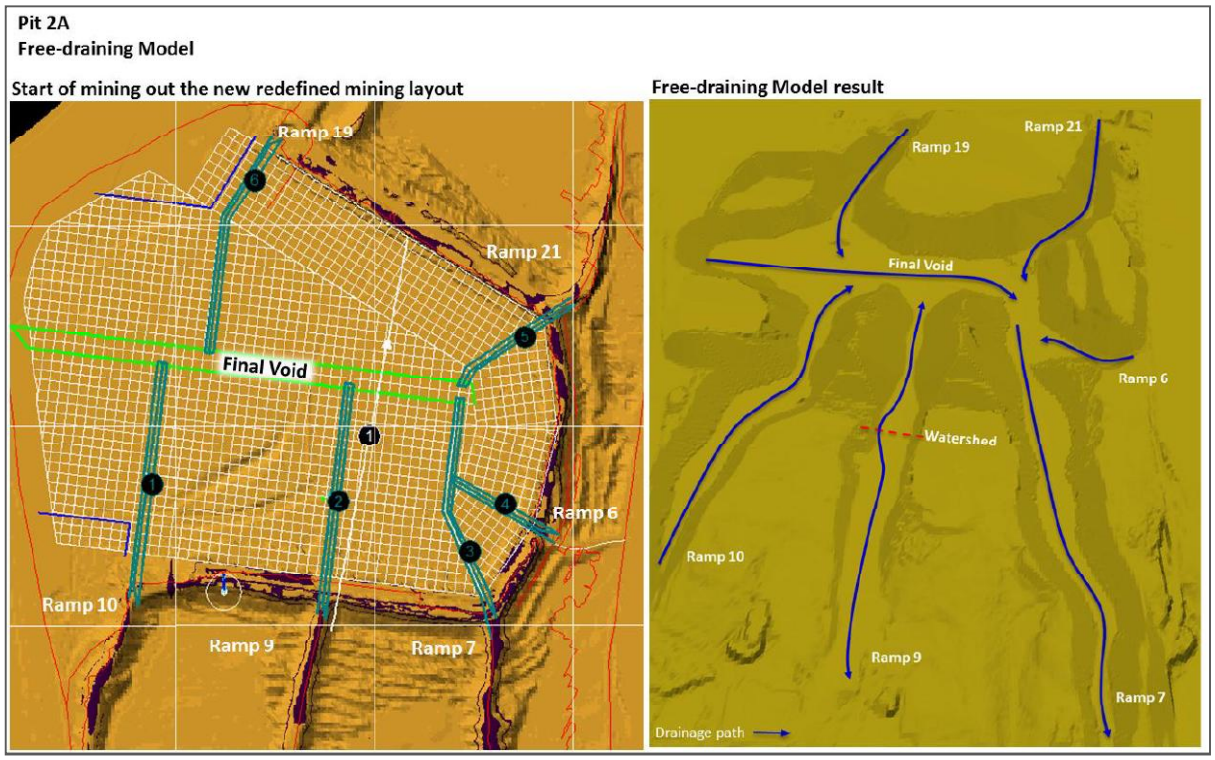


Figure 13: Pit 2A free-draining model (Source: Extract from Life of Mine Report, 2016)

4.2.2.2 Conceptual Wetland Mitigation Strategy

As part of the report titled: "*Wetland Baseline and Mitigation Report for the proposed Kleinkopje Colliery Opencast Extension Project*", dated August 2016 (Annexure E3), Wetland Consulting Services proposed the development and implementation of a wetland mitigation strategy to compensate for the wetland loss associated with the proposed project.

The mentioned wetland mitigation strategy that forms part of the above-mentioned baseline and mitigation report, which serves as a precursor to a rehabilitation plan, comprises a high-level description of the types of measures to be investigated once the authorities are satisfied that the approach has the potential to appropriately compensate for the wetland losses associated with the development. A subsequent rehabilitation plan entails detailed and complimentary input from a suitably qualified environmental engineer and a wetland ecologist. The wetland ecologist is responsible for identifying problems undermining the hydrological, geomorphological and vegetative integrity of the habitat on the site and deciding on appropriate measures to address these. The engineer is responsible for designing appropriate earthen, gabion and/or concrete interventions to achieve the objectives outlined by the wetland ecologist.

The wetland losses expected as a result of the proposed mining expansion and mining through of the 2A Dam and associated wetland was determined as 77 ha-eq. This would ordinarily form the target for the proposed wetland mitigation strategy. This target could also be referred to as the "Water Resources and Ecosystem Services Target" or functional offset target. However, placing the affected hillslope seepage wetland in context, and considering that the system is already isolated from the greater drainage network, it can be argued that the wetland system is currently not performing significant water resource maintenance functions in terms of the greater drainage network (Olifants River system). The relevance of the 77 ha-eq. as a suitable target is therefore debatable.

The SANBI and DWS (2014) offset guidelines also require the determination of an ecosystem conservation target. Applying the Wetland Offset Calculator (SANBI and DWS, 2014), this target was determined as 41.9 ha-eq. Although also measured in hectare equivalents, this is a separate target and needs to be achieved individually, though it can sometimes be possible to achieve functional and ecosystem conservation gains and targets within the same wetland system.

A two-pronged approach to the wetland mitigation strategy is proposed, which will include the following:

- Re-instatement/re-creation of water course on rehabilitated 2A Pit opencast area; and
- Rehabilitation and protection of suitable remaining wetlands on site.

1. Wetland Recreation

It has been proposed that a watercourse be recreated across the rehabilitated 2A opencast pit. Such an approach bears several benefits to the environment:

- Re-instatement of wetland habitat on the rehabilitated area will increase habitat diversity and species diversity within the rehabilitated area;
- Flows from the 2A Dam sub-catchment, including the portion of intact catchment and remaining hillslope seepage wetland upslope of the 2A Pit, will be allowed to drain back into the Olifants River, increasing flow to the river; and
- Appropriate design of the re-created system will allow for typical wetland functions such as flood attenuation and sediment trapping to be restored to the rehabilitated landscape.

It is proposed that the pit be rehabilitated to be free-draining as per the Free Draining Model provided in Figure 13 above, draining towards the Olifants River via Ramp 7 (see Figure 12 in Annexure E3). The biggest risk associated with the proposed approach is the increased ingress of water into the rehabilitated pit, increasing the volumes of water requiring treatment. In order to minimise this risk, it is vital that the re-created watercourse be clay-lined so as to minimise ingress. Further design considerations proposed include:

- The re-created watercourse should be characterised by gentle side-slopes, especially along the watercourse/wetland boundary to allow for vegetation zonation

- The proposed watercourse should include various interventions designed to control flow. The re-created system will be surface water driven (due to the free-draining landscape and lack of interflow) and likely characterised by significant flood flow following heavy rainfall events and the absence of base flow during extended dry periods. This will make the system susceptible to erosion, unless carefully designed. Interventions should include:
  - Ponds to attenuate flood flows, with gradual release over a number of days; and
  - Erosion control measures, e.g. gabion weirs. These will also assist with trapping sediments.
- It is proposed that re-creation of the watercourse includes focus on the creation of various micro-habitats, including for example:
  - Unchannelled sections;
  - Deeper water areas; and
  - Temporarily saturated areas.

2. On-site rehabilitation opportunities

The second aspect to the proposed wetland mitigation strategy includes the rehabilitation of suitable remaining wetlands within the Kleinkopje mining rights area (MRA). A map of wetlands within the MRA is provided in Figure 14. 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 MRA 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 Colliery side either. It is therefore possible to protect both these pans and their respective catchments.

A site visit by the specialist to these pans revealed a number of opportunities for improving the ecological integrity of pans 1 and 2 through rehabilitation interventions:

- Removal of alien trees – removal of alien trees from within the hillslope seepage wetlands surrounding the pans and their direct catchments will serve to improve water flow to the pans;
- Withdrawing cultivation from the hillslope seepage wetlands around the pan;
- Instating a vegetated buffer zone between cultivated fields and the delineated wetland habitat. Such a buffer will serve to mitigate against impacts associated with diffuse agricultural runoff from the cultivated fields;
- Closing of trenches – a number of trenches were observed within the hillslope seepage wetlands that intercept and potentially divert flows; and

- Grazing management plan – it is recommended that a grazing management plan be developed for the pans to ensure overutilization of the pans is avoided.

Pan 3 was unfortunately found to not represent a suitable target for rehabilitation under current circumstances. Although this very large pan was found to support exceptional numbers of Lesser Flamingo during August 2016 (in excess of 1 000 individuals were observed), the active sand mining along the western shoreline of the pan, together with impacts of high salinity water into the pan, result in limited opportunity to improve the ecological integrity of the pan.

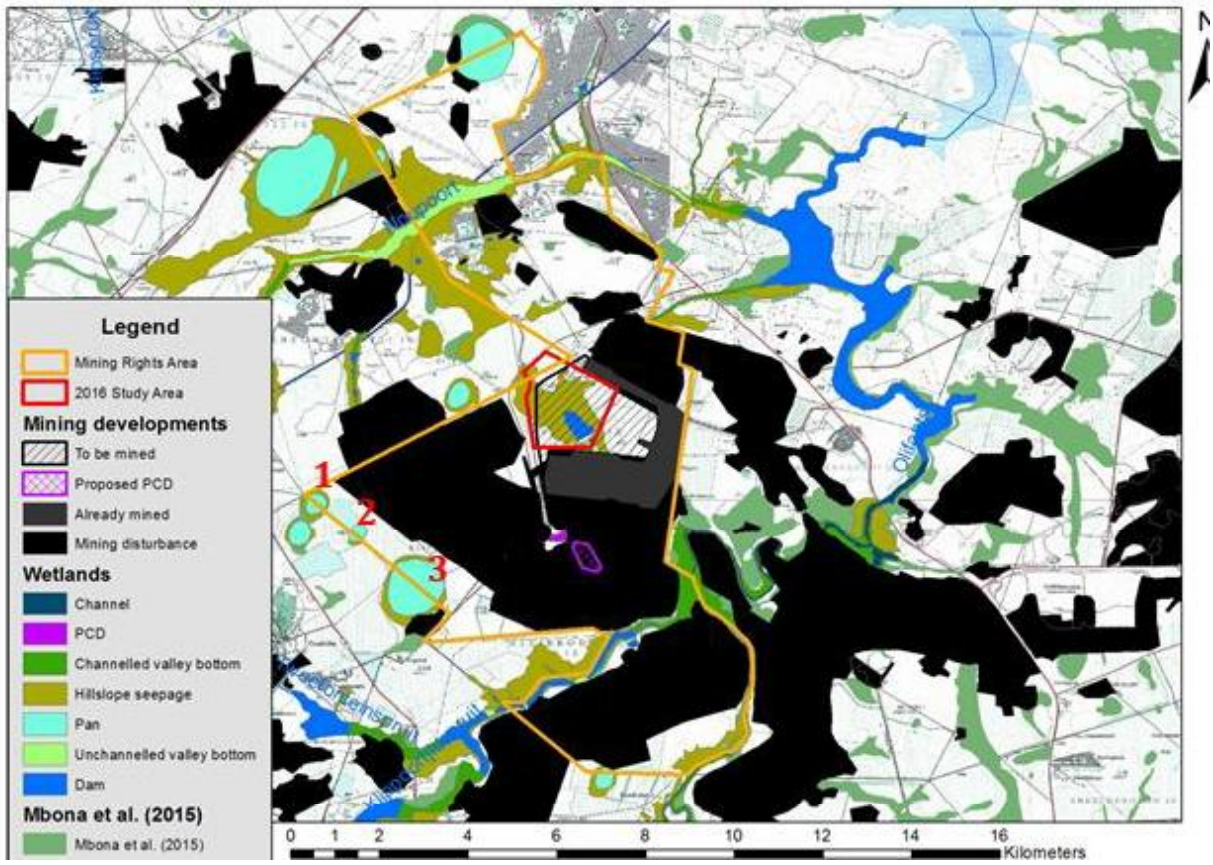


Figure 14: Kleinkopje mining rights area showing remaining wetland habitat and wetlands targeted for rehabilitation as part of the proposed wetland mitigation strategy (Wetland Consulting Services, 2016).

4.2.2.3 Ore Processing

Coal mined at the Pit 2A Extension area will be processed at the existing Kleinkopje Colliery beneficiation plant (refer to Figure 15 for the Master Layout Plan showing the existing facilities on-site along with the proposed Pit 2A Extension infrastructure).

The plant at Kleinkopje Colliery is designed to process two streams of coal; namely the select coal, which generates a low ash coal product and a steam coal product, and the non-select coal, which generates a steam coal product only.

The Run of Mine (ROM) coal, select and non-select, is fed into two separate tip bins from the opencast sections. The coal is then crushed in two Bradford breakers at a rate of 1 300 tons per hour per coal stream and the crushed product (nominal minus 75mm select/ minus 150mm non-select) is diverted to blending stockpiles by means of automatic stackers.

The raw coal is reclaimed from the stockpiles by means of bucket wheel reclaimers at a rate of 800 tons per hour and fed to two banana screens where a sizing operation at 12mm select and 15mm non-select takes place. The select and non-select top size material reports to silos 2 and 1 respectively. These four silos provide the head feed for the Dense Media Separation (DMS) plant and represent a total buffer storage capacity of 3 300 tons.

The select raw coal is processed at a rate of 750 to 800 tons per hour through a double stage wash process, with the large coal going through two high gravity Wemco Drum modules, and then two low gravity DMS cyclone modules and then two low gravity DMS cyclone modules. There is a buffer storage capacity between the high gravity and the low gravity plants of 1 650 tons.

The non-select raw coal is processed at a rate of 650 to 700 tons per hour through a single stage wash process, with the large coal using a Wemco drum module and small coal using a DMS cyclone module. The nominal minus 0.5 mm plus 150 micron fines arising from the de-sliming operation are beneficiated in a 150 ton per hour spiral plant and dewatered using three Wemco H900 centrifuges. This product is then recombined with the plus 0,5mm Low Volatile steam coal. The low ash coal produced is crushed to minus 32mm and then stored in a 2 200 tons silo (Silo 5) prior to conveying to the Rapid Loading Terminal (RLT). The steam coal is produced in a number of combinations, depending on sales requirements.

4.2.2.4 Mine residue

The Klippan Co-Disposal Facility was designed and constructed to accommodate the simultaneous disposal of slimes and discards from the Kleinkopje coal processing plant for the anticipated life of mine. The Klippan Co-Disposal Facility was constructed during 1985 and covers a total surface area of approximately 118 ha. The annual rate of slimes and discard production will be approximately 750 000 tonnes and 2 300 000 tonnes respectively for the life of the mine (Integrated Water and Waste Management Plan (IWWMP), 2015).

Discards and slimes resulting from beneficiation of the ROM feed from the Pit 2A Extension area will be deposited on the existing Klippan Co-Disposal Facility located to the west of the proposed Pit 2A Extension area. As per information provided by Anglo Operations (Pty) Ltd., the Klippan Co-Disposal Facility will have sufficient capacity (within its current and approved footprint) for the disposal of discards and slimes resulting from the beneficiation of coal from the Pit 2A Extension area.

As mentioned in Table 4 above, the Klippan Co-Disposal Facility was included in the approved EMPr dated 2012, which EMPr is deemed to be approved in terms of the National Environmental Management: Waste Act (NEMWA), 2008. Due to the facility being deemed authorised as well as no changes to the footprint of the facility being necessary, this activity is not applied for as a waste management activity (refer to Table 4) in terms of GN. R 921 of 29 November 2013 and GN. R 633 of 24 July 2015. Further the current footprint of the facility as authorised is sufficient in catering for the Pit 2 extension. No expansion of the facility is required.

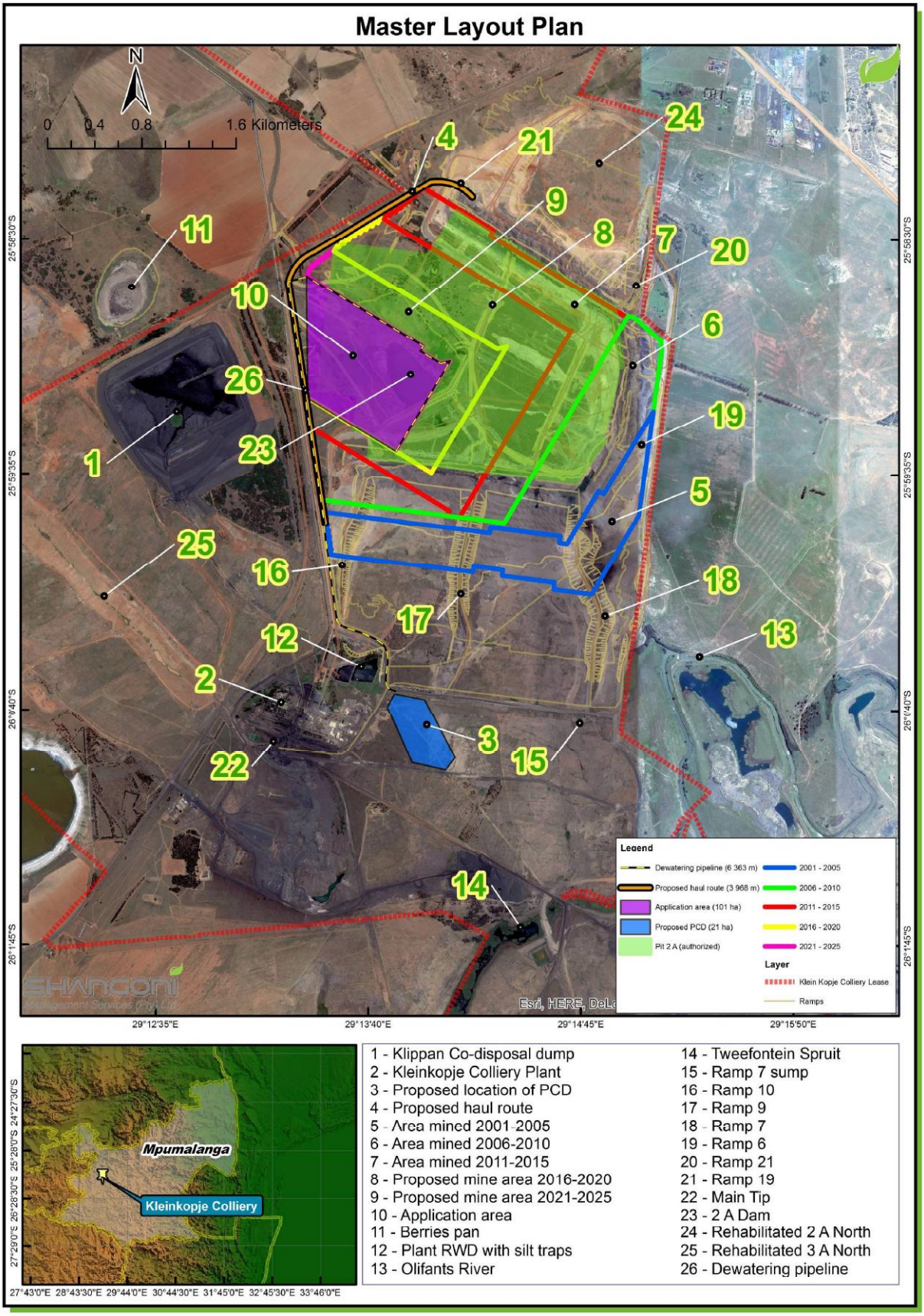


Figure 15: Kleinkopje mining rights area showing remaining wetland habitat and wetlands targeted for rehabilitation as part of the proposed wetland mitigation strategy (Wetland Consulting Services, 2016).

4.2.2.5 Linear activities: Mineral transport on site (haul roads) and dewatering pipeline for pumping of water from the open pit to the dirty water management system

The current haul road and ramp structure will be modified and extended to provide access to the Pit 2A Extension areas. The length of the proposed haul road is approximately 3 968 m (refer to the yellow line in Figure 16 below as well as to the site plan (Figure 5).

Current status of haul roads and ramps within and around Pit 2A:

- Ramp 10 to Tip: 2.7km (ramp incline 510m) (in-pit 450m). Total: 3.66km.
- Ramp 9 to Tip: 1.7km (ramp incline 1.9km) (in-pit 550m).
- Ramp 7 to Tip: 2.9km (ramp incline 1.9km) (in-pit 310m)
- Ramp 6 to Tip: 5.4km (ramp incline 366m) (in-pit 500m)
- Ramp 21 to Tip: 7.7km (ramp incline 1.1km) (in-pit 1.4km)

Ramp shortening plan:

- Proposed length to Ramp 9 = 2.0km (ramp incline 1.5km)
- Proposed length to Ramp 7 = 3.3km (ramp incline 609m)
- Proposed length to Ramp 6 = 4.7km (ramp incline 366m)
- Proposed length to Ramp 21 = 6.8km (ramp incline 1.1km)
- Backfill ramps to a 10% gradient
- Future proposed ramp = Re-establishment of Ramp 19, which would include the following:
  - Ramp gradient at 8%
  - Side slopes at angle of repose (37°)
  - Haul road length of ± 4km
  - Haul road design to serve a 4-year life cycle
  - DRA time estimation: 48 weeks to construct

A dewatering pipeline also forms part of the listed activities applied for as part of the Pit 2A Extension project. It is anticipated that the pipeline will have an internal diameter of approximately 400mm and will be placed within the same footprint as the above-mentioned haul road. The pipeline will run from the Pit 2A open pit extension area to the mine's dirty water storage system (i.e. pollution control dam). Refer to Figure 18 below for a photograph of a similar existing pipeline and Figure 19 indicating the pipeline's route and coordinates.

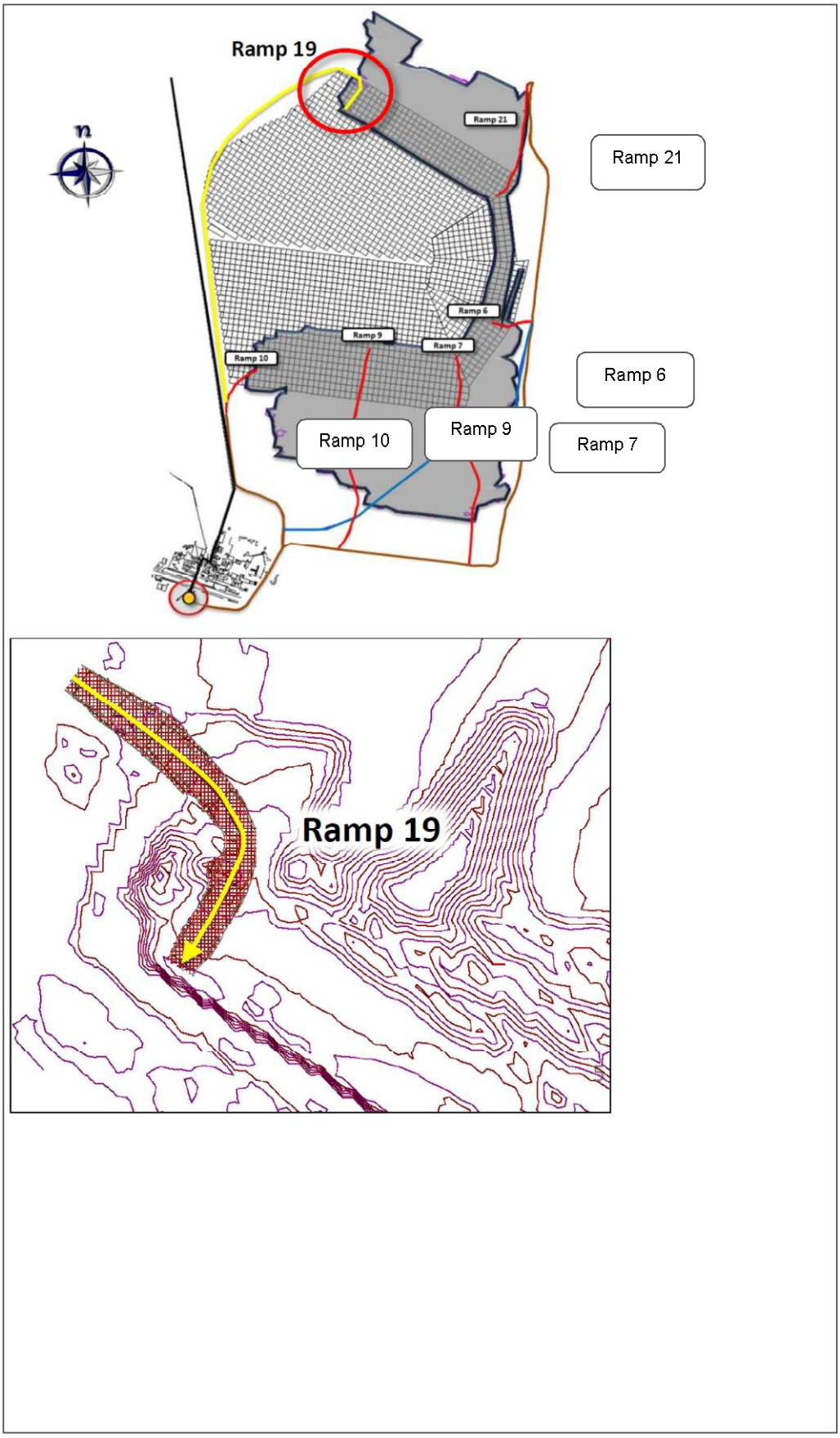


Figure 16: Pit 2A coal hauling routes and reinstatement of Ramp (Kleinkopje Life of Mine 2016 presentation)

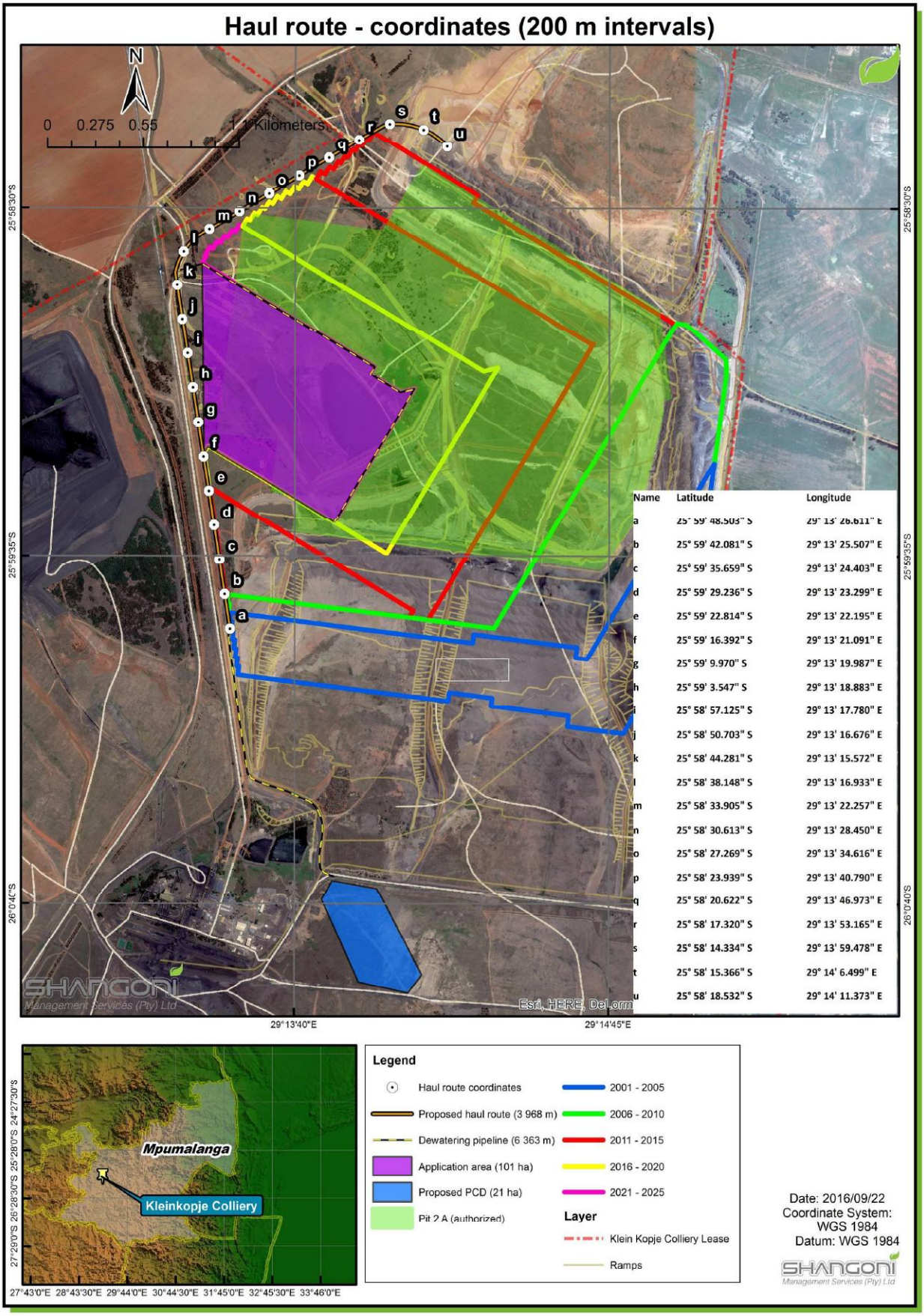


Figure 17: Figure showing coordinates and length of proposed haul road (including Ramp 19)

Figure 18: Photograph of existing pipelines (similar pipeline expected for dewatering line)

4.2.2.6 Linear activities: Mineral transport off-site

As per the approved EMPr, 2012, product coal at Kleinkopje Colliery is transported by overland conveyor to the Rapid Loading Terminal. Coal is then stacked automatically in designated beds. The coal is reclaimed from the beds using mechanical reclaimers and conveyed to one of the three load-out stations described below:

- Export 1 – two designated silos, one for low ash coal and one for stream coal;
- Export 2 – a single silo for steam coal; and
- Inland screening and load out station.

Transnet rails export coal to Richards Bay. Inland coal is both railed and transported by road to customers in South Africa.

The above-mentioned process will be continued during the Pit 2A Extension activities.

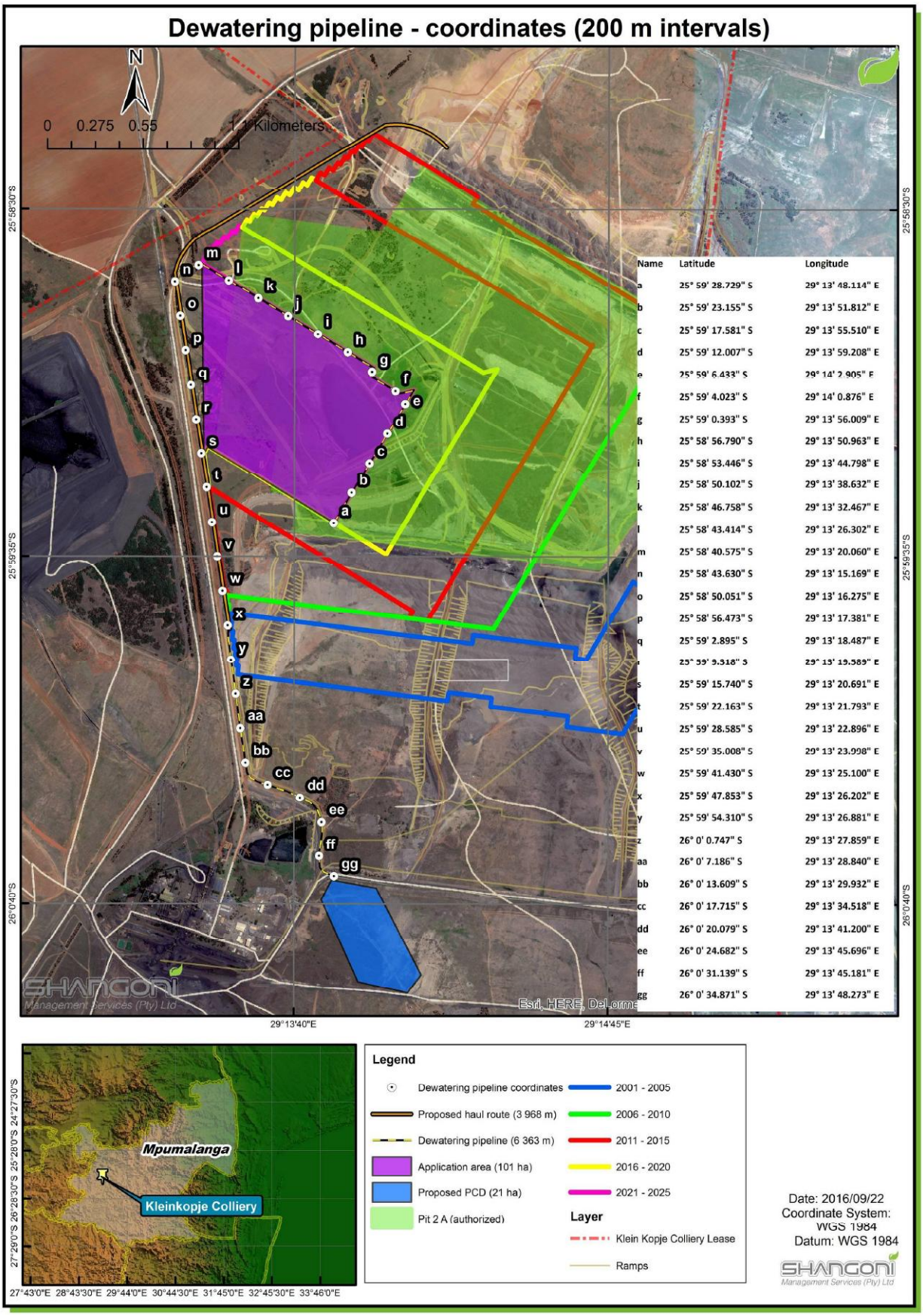


Figure 19: Figure showing coordinates and length of proposed dewatering pipeline

4.2.2.7 Water management

4.2.2.7.1 History related to 2A Dam

4.2.2.7.1.1 Watercourse alteration at Block 2A Stander Spruit

The original watercourse alteration in the Pit 2A mining area was constructed before mining commenced at Kleinkopje Colliery as per permit 16/2/7/B100/C85/E2. This channel diverted 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, was situated north of the original watercourse alteration.

4.2.2.7.1.2 2A Dam

Due to the extension of the open pit mining area into the underground workings of the No. 2 seam, water in the underground workings had to be removed. In order for the surface infrastructure to cater for the additional volume of abstracted underground water, Kleinkopje Colliery obtained permission by means of Permit No. 12/2/B102/75, dated August 1998 to alter and enlarge a dam as well as to impound water in this Category II dam, with a storage capacity of 3 880 000 cubic meters at full supply level and a vertical wall height of 19.0 meters. The mentioned permit includes the construction of 2A Dam in an unnamed tributary of the Olifants River. The 2A Dam was constructed by Fraser Alexander Construction during January – July 1998 and is currently the primary PCD used for the storage of dirty water on the mine.

2A Dam is further licensed as a section 21(g) water use under license 04/B11J/AFGJ/1416. A wetland assessment informing the approved EMPR and WUL was undertaken in 2001.

4.2.2.7.1.3 Further watercourse alteration at Block 2A Stander Spruit

The construction of the 2A Dam (mentioned above) necessitated some modifications to the watercourse alteration. Further modifications were thus done in the latter half of 1999. These modifications entail the re-routing a section of the diversion around the advancing mining operation.

4.2.2.7.2 Current water management system network

A storm water management plan and water balance for the Pit 2A Extension Project was developed, with the resultant report titled: "*Anglo Operations (Pty) Ltd: Kleinkopje Colliery: 2A Dam Extension Project – Storm water management plan and water balance*", dated September 2016 and compiled by Shangoni Management Services attached in Annexure E4. The information contained in this section was sourced from the mentioned report.

The Kleinkopje Colliery plant area is divided into A-side and B-side section with constructed storm water channels. All channels draining from the B-side of the plant goes through silt traps 3 and 4 before entering the current plant pollution control dams. The channels draining from the A-side of the plant

area (EMV workshop, plant and sewage plant) goes through a silt and oil trap before being pumped to the current plant pollution control dams. Seepage from the Klippan Co-Disposal Facility is conveyed via a trench towards the plant pollution control dams.

Two pumps service the current plant pollution control dams and pump water to the Fire Hydrant Dam for re-use in the plant and to Ramp 10 Sump. Overflow from the plant pollution control dams enter a trench towards Ramp 7 sump that also receives water dewatered from Ramp 7. Water contained in Ramp 7 is pumped to Ramp 10 Sump. Ramp 10 Sump also receives water from 5 West Holding Dam and water from dewatering activities at Ramp 9. Water from Ramp 10 Sump is pumped to 2A Dam.
2A Dam receives water from the following sources:

- Ramp 10;
- Klippan Co-Disposal Facility;
- Pit dewatering from Ramp 6, Ramp 19 and Ramp 21;
- Seepage through the 2A Dam wall pumped back to 2A Dam;
- Overflow from Ericson Dam 1, Ericson Dam 2 and Army Tank Dam; and
- Rainfall ingress.

Water exits 2A Dam by means of the following:

- Seepage to underground compartments;
- Seepage through the 2A Dam wall;
- Evaporation;
- Pumping of water to the Emalahleni Water Treatment Plant; and
- Pumping of water to the plant.

Underground water contained in the underground Jacuzzi dams is pumped above ground to the two Ericson Dams and Army Tank Dam. Water is then pumped from the three aforementioned dams to the Emalahleni Water Treatment Works for treatment and supply to the Emalahleni municipality.

Two main underground compartments exist in Pit 2A. Water from these compartments is pumped via a series of borehole pumps into the Ericson dams and Army Tank Dam. The following figure and table illustrate the current water management situation at the study area.

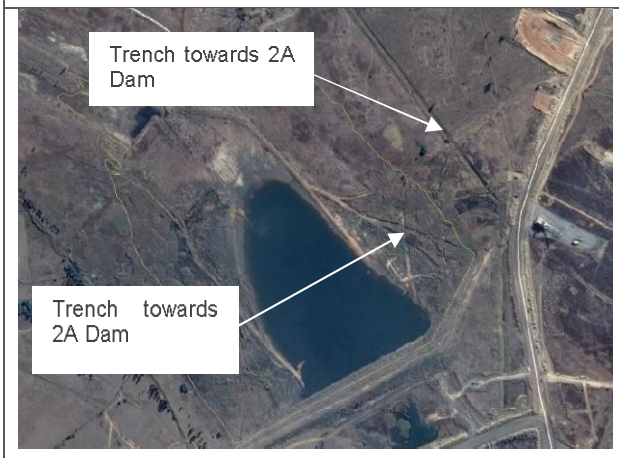
Figure 20: Current surface water management (Shangoni, 2016)

Table 5: Current surface water management at the 2A Dam Extension Area

Number and picture corresponding to Figure 20	Description of the area
	1a – Seepage trenches convey affected seepage water from the Klippan Co-disposal facility to the plant return water dams. The affected water flows through silt trap 3 and silt trap 4 before entering the plant return water dams.
	1b – Seepage trench from the Klippan co-disposal facility at the culvert towards silt trap 3 and silt trap 4 before reaching the plant return water dams.
	1c – Affected water trench located on the north-western side of the plant conveying runoff and water utilised within the plant B-side towards silt trap 3 and silt trap 4.

Number and picture corresponding to Figure 20	Description of the area
	1d – Network of dirty water channels within the B-side of the Kleinkopje plant area reporting to silt trap 3 and silt trap 4.
	1e - Network of dirty water channels within the A-side of the Kleinkopje plant area reporting to the eastern silt trap before entering the plant return water dams.
	1f – Affected water trench located adjacent to the haul road towards Ramp 7 sump.

Number and picture corresponding to Figure 20	Description of the area
	1g – Ramp 7 sump collecting runoff from the affected water trench and dewatering from Ramp 7. Overflow from the Ramp 7 break wash also enters Ramp 7 sump. Water contained in the sump is re-used within the process (pumped to Ramp 10 dewatering station).
	1h – Ramp 10 dewatering station receiving water from 5 West Holding Dam, Ramp 7 sump, dewatering from Ramp 9 and the plant return water dams.
	1i – Area of affected water discharge from the Ramp 10 pipeline into a trench conveying the water into 2A Dam.

Number and picture corresponding to Figure 20	Description of the area
	1j – Underground water from the 2A area is pumped into Ericson Dam 1, Ericson Dam 2 and Army Tank Dam. Overflow from these containment facilities goes into a trench conveying the water into 2A Dam.
	1k – Dewatering from Ramp 19, Ramp 21 and Ramp 6 in channelled via a trench into 2A Dam.
	1l – Area were the trenches from the Ericson Dams and the discharge trench from Ramp 10 flow into 2A Dam.

Number and picture corresponding to Figure 20	Description of the area
	1 m – Water that seeps through the 2A Dam wall accumulates within this area and is pumped back into 2A Dam.
	1 n – Overflow channel of the plant return water dams. Any overflow from the dams will flow over the adjacent haul road into the trench towards Ramp 7 sump.

4.2.2.7.3 Storm water management plan

The storm water management plan for the Pit 2A Extension Project aims to address concerns that have been identified in terms of existing infrastructure as well as proposed changes. The plan attempts to provide management measures that should be in place to prevent flood damage proactively and contribute to the effective channelling and containment of surface water. The report (Annexure E4) was compiled in line with the Best Practise Guidelines G1 for Storm Water Management (DWAF, 2006), the National Water Act (Act No. 36 of 1998) and Regulation 704 (No. 704 of 4 June 1999) in terms of the National Water Act (Act No. 36 of 1998).

The management areas are determined using the geographic location of infrastructure and distinct catchment boundaries (either natural or altered). Surveyed contours (1 m) were provided by the client and used to define the drainage regime associated with each focus area. Each focus area is described by indicating the general runoff directions towards the natural watercourses or towards areas were surface water accumulation takes place as a result of modifications caused by mining activities.

Each management area at the Pit 2A Extension Project is discussed by indicating the main drainage philosophy anticipated using contour data and the current / proposed runoff control strategies. Blue

and red arrows indicate the location of clean and affected runoff respectively as well as direction. A more detailed description of the storm water environment as well as the measures to control clean runoff and retain affected runoff is also provided in the discussion tables using the maps as reference.

Flood peaks for storm water conveyance infrastructures and volumes for containment facilities are essential for storm water management to ensure that infrastructure has sufficient capacity to withstand a design flood (1:50 year and 1:100-year flood) during peak runoff flow. Flood peaks provide insight specifically to sizing of diversion and conveying infrastructure, as well as capacity requirements for retention facilities designed to reduce flood peaks.

Efficiency and practicality is a key aspect to a successful storm water management plan. Good management is based on separating clean and dirty water and therefore incorporates the fundamental principle of pollution prevention. All proposed measures prioritise the use of gravity and natural drainage lines to provide cost-effective solutions with minimum maintenance requirements. Where such measures are not possible and the use of mechanical equipment is required (e.g. pumping infrastructure in sumps and containment dams), it is the responsibility of the operation to do a risk assessment with regards to control, maintenance and standby equipment in case of down time.

Refer to Figure 21 and Table 6 below illustrating the proposed storm water management plan.