SYNERGISTICS ENVIRONMENTAL SERVICES

NEW LARGO COLLIERY

DRAFT INTEGRATED WATER USE LICENCE APPLICATION

Report No.: JW194/11/C184 - Rev 1

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Jones & Wagener
Consulting Civil Engineers
59 Bevan Road PO Box 1434 Rivonia 2128 South Africa
Tel: 00 27 (0)11 519 0200 Fax: 00 27 (0)11 519 0201 email: post@jaws.co.za

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SYNOPSIS

Anglo American Inyosi Coal (Pty) Ltd (hereafter AAIC) proposes to develop an opencast coal mine, the New Largo Colliery, to supply coal to Eskom's new Kusile Power Station that is currently under construction between Bronkhorstspruit and eMalahleni in the Mpumalanga Province.

The New Largo coal reserve lies within AAIC's current prospecting right area / proposed mining right area. The total mining right area is 12 773 hectares (ha), of which the opencast mining area (mine pits) will occupy an area of approximately 5 600 ha. The No. 4 and No. 2 coal seams will be mined in two main phases:

- Phase 1 entails general construction, the development of the first opencast box-cut in the northern section of the mining area and the commissioning of the first dragline. Construction will commence in the second quarter and operations are expected to commence in the first quarter of 2015. A small truck and shovel fleet will be in operation until 2023. This coal is of such a quality that it does not require beneficiation. The coal in this area will therefore be dispatched directly from the tertiary crushing plants to the Kusile Power Station;
- Phase 2 construction will commence in the first quarter of 2020 and operations in the first quarter of 2023. This phase entails the development of the second opencast box-cut in the southern section of the mining area, commissioning of the second dragline in this section, as well as the commissioning of a coal processing plant. The further phases of the water treatment plant (WTP) will also be commissioned during this phaseThe mine will be located in the B20F and B20G quaternary catchments of the Olifants River Water Management Area.

This document provides the detailed information for the following water uses associated with the proposed mine:

S21(a) Taking water from a water resource

Water for the construction phase, will be obtained from three boreholes drilled into the old New Largo Colliery underground workings. According to GN R399 dated March 2004 (as extended in GN 837 dated 23 September 2010) quaternary catchment B20F and B20G fall within Zone C. In this Zone, 75m^3 of groundwater may be abstracted per hectare per property per annum. The boreholes are locate on Portions 1 and 4 of the farm Klipfontein 566 JR, portions 1 (± 379 ha) and 4 (±159 ha). Therefore, 28 425 m^3/a and 11 925 m^3/a may be abstracted, respectively (total of 40 350 m^3/a).

Water will be pumped from the old underground working and the advancing pit to ensure that mining activities continue (refer to S21(j) below).

S21(b) Storing water

Treated water will be pumped to a 1 Mℓ potable water reservoir located at the WTP. From this reservoir, water will be pumped to a 250 kℓ elevated potable water tank provided as part of the Phola-Kusile Coal Conveyor System. Water for Phases 1 and 2 of the New Largo Colliery will be provided from this elevated tank. Potable water will gravitated to the reticulation system that supplies the buildings, workshops, offices, Tips 1 and 2 and the explosives magazine.

Potable water is required for dust suppression at the conveyor transfer points, as well as for dust suppression at Tips 1 and 2. This will be sourced from the elevated water tanks and stored in Jo-Jo tanks at the transfers and Tips.

An additional 1 Mℓ storage tank will be established close to the abovementioned reservoir during Phase 2 when the coal beneficiation plant is developed.

Fire water will be sourced from two fire water tanks (420 kℓ each) next to the potable water reservoir. This was also provided as part of the Phola-Kusile Coal Conveyor System.

S21(c) Impeding or diverting the flow of water in a watercourse and/or S21(i) altering the bed, banks, course or characteristics of a watercourse

A number of wetlands and other watercourses are present in the proposed mining area. These watercourses will be mined partially or completely, and/or will be altered due to the development of infrastructure in the vicinity, or within, the watercourses. Borrow pits will also be developed in the vicinity, or within, watercourses. This will result in the alteration of the characteristics of these watercourses.

S21(g) Disposing of waste in a manner which may detrimentally impact on a water resource

Activities which-h may impact on the quality of the water resources are:

- An overburden dump that will be established in the north west for the placement of spoils from the initial boxcut. This dump will be outside of the mining footprint;
- During the initial years, coal from the northern pit will be dispatched directly from the crushing plants to the Kusile Power Station and therefore no discard will be generated. From 2023, when Dragline 2 is commissioned and mining operations move to poorer quality coal in the southern pit areas, a coal beneficiation plant will be commissioned. Discard from the plant will be disposed of in-pit;
- A surface discard dump will also be developed on a backfilled area to allow for the management of discard when spontaneous combustion or mine sequencing hampers in-pit discarding;
- ROM stockpile in the plant area from where coal will be dispatched to the Kusile Power Station;
- Emergency ROM stockpiles at Tip 1 and 2;
- A number of pollution control facilities will be developed as part of the water management system. This includes the 36 Mℓ Plant Area PCD, the 15 Mℓ Admin Area PCD, the 1 200 Mℓ PCD and 100 Mℓ balancing Mℓ at the WTP; as well as the eight pit ramp transfer dams and the polluted water dam at Tip 2;
- A 10 Mℓ bulk water supply storage dam will supply raw water for use as process water to the coal washing plant, washbays, dust suppression at the coal stockpile and for dust suppression on the haul roads;
- The Final Void dam will be used for the storage of dirty water during extreme events.

A number of potential decant points have been identified. Water will however be pumped from the workings to the WTP to prevent decant.

Due to the rate of development in the field of water treatment, a decision has not been made regarding the technology that will be used in the full-scale WTP. The waste streams associated with the WTP has therefore also not been identified. Although the generation of brine is expected to be unlikely, provision has been made for a brine disposal facility, in line with the precautionary approach, should it be required. The generation of a gypsum waste stream is expected. Provision has been made for a gypsum handling facility, where gypsum will be temporarily stored and dried before it is removed.

Product water (treated water) from the WTP will be re-used to meet the water demands of the mine (potable water, dust suppression and fire water) and the remainder will be discharged back into the receiving catchment. On average, over the life of mine, it is expected that clean water will be discharged to the system at an average rate of approximately 13 300 m^3/day (J&W, 2011).

Water for the operational phase will be sourced from the mobile WTP established as part of the Phola-Kusile Coal Conveyor system. This WTP will initially have a treatment capacity of 4 Mℓ and will treat water pumped from the old underground workings. The capacity of the mobile WTP will be increased to 8 Mℓ by 2016 as part of the New Largo Colliery project and will be ramped-up to a final treatment capacity of 24 Mℓ.

Water will therefore be sourced from the underground workings, as well as from in-pit and on-site water make. Product water from the WTP (i.e. treated water) will be used as follows:

- The portion of the treated water that will be used as potable water, therefore chlorinated, will be stored in a 1 Mℓ water reservoir from where water will be pumped to a 250 kl elevated water tank. From this tank it will be gravitated via a pipeline to a reticulation system to provide potable water to the buildings, offices, workshops, operations at Tips 1 and 2, green rooms and the explosives magazine;
- Potable water from the WTP will also be used for dust and fire suppression along the conveyor systems;
- Treated water, not chlorinated (i.e. not potable standards), will be used for wash-down water in the plant, conveyors and tips, as well as for dust suppression on the haul roads. The latter will be sourced from a bulk water storage dam, which will be supplied from a balancing dam at the WTP.

S21(f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit

Treated water that is not used to supply in the water demand of the mine, will be discharged to the receiving watercourses according to the recommendations (discharge volume and position(s)) of the Reserve Determination study.

S21(j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people

Dewatering of the underground workings of the old New Largo Mine will take place to allow for continued mining. Initial dewatering is scheduled to commence in 2018, three (3) years prior to intersecting the underground workings by opencast mining activities. Dewatering will initially be done from a number of strategically placed boreholes and later from the opencast face. In pit dewatering will also be required.

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Definitions used in this report:

Clean water:	Clean water is any water that has not been in contact with carbonaceous material or other potential contaminants and includes run-off from areas unaffected by mining activities, as well as areas that have been rehabilitated.
Dirty water:	Dirty water is any water that has been in contact with carbonaceous material or other contaminants (i.e. water containing waste), and of which the water quality has been affected and therefore has the potential to cause pollution of a water resource.
Dirty water system:	Any dam, or other form of impoundment, canal, works, pipeline, residue deposit and any other structure or facility constructed for the retention or conveyance of water containing waste (BPG A4).
Mine water:	Mine water is water that accumulates in the underground workings or open pit and which may be of poor or good quality.
Groundwater	Water that occurs in the voids of saturated rock and soil material beneath the ground surface is referred to as groundwater and the body within which the groundwater is found is referred to as an aquifer (DWAF, 2007). Once groundwater enters the various pits and mining areas, it is considered to be dirty water.
Process water:	Water that is used in the process of mining coal and includes plant water, water used for dust suppression and water used in slurry to allow the pumping of waste.
Product water:	Permeate resulting from treatment at the water treatment plant.
Runoff:	Surface runoff is water that finds its way into a surface water body without infiltration into the soil and may include overland flow, return flow, interflow and base flow (BPG G1).
Surface water:	All water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, impoundments, seas, estuaries, etc.); also refers to springs, wells, or other collectors that are directly influenced by surface water (DWAF, 2007).
Storm water:	Water that accumulates on land as a result of precipitation events, and includes runoff from areas such as roads and roofs.
Watercourse:	A river or spring; natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows; and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks (NWA, 1998).
Water resources:	A watercourse, surface water, estuary, or aquifer (NWA, 1998).

Abbreviations used in the report:

AAIC	Anglo American Inyosi Coal
BPG	Best Practise Guidelines
DMR	Department of Minerals and Resources
DNWRP	Directorate National Water Resources Planning
DOC	Dissolved Organic Carbon
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWF	Dry Weather Flow
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EIS	Environmental Importance and Sensitivity
EMP	Environmental Management Program
EMPR	Environmental Management Program Report
ESWL	Environmental Safe Water Level
FRAI	Fish Response Assessment Index
GA	General Authorisations
GN	Government Notice
GN R	Government Notice Regulation
ha	hectares
IHAS	Invertebrate Habitat Assessment System
IHI	Index of Habitat Integrity
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
J&W	Jones & Wagener
JMA	Jasper Muller and Associates
kg	kilogram
km	kilometre
kV	kilovolt
ℓ/s	litre per second
LM	Local Municipality
LOM	Life of Mine
m	metre
m^2	square metre
m^3	cubic metre
m^3/s	cubic metre per second
mg/ℓ	milligram per litre
mm	millimetre
Mm^3	million cubic metres

mamsl	metres above mean sea level
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
Mℓ	Megalitre
MoU	Memorandum of Understanding
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
mS/m	milli Siemens per metre
Mt	million tonnes
MU	Management Unit
MW	Megawatt
NEMA	National Environmental Management Act (Act 107 of 1998)
NEM:WA	National Environmental Management: Waste Act (Act 59 of 2008)
No.	number
NQF	National Qualifications Framework
NWA	National Water Act (Act 36 of 1998)
PCD	Pollution Control Dam
PES	Present Ecological State
ROM	Run Of Mine
RWQO	Resource Water Quality Objectives
SAR	Sodium Absorption Ratio
SASS5	South African Scoring System Version 5
SAWS	South African Weather Station
SO_4	Sulphate
SP	Significance Points
SS	Suspended Solids
t	tonnes
TDS	Total Dissolved Solids
WCS	Wetland Consulting Services
WTP	Water Treatment Plant

Jones & Wagener
Consulting Civil Engineers
59 Bevan Road PO Box 1434 Rivonia 2128 South Africa
Tel: 00 27 (0)11 519 0200 Fax: 00 27 (0)11 519 0201 email: post@jaws.co.za

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1. INTRODUCTION

1.1 Background

Anglo American Inyosi Coal (Pty) Ltd (hereafter AAIC) propose to develop an opencast coal mine, the New Largo Colliery, to supply coal to Eskom's new Kusile Power Station that is currently under construction between Bronkhorstspruit and eMalahleni in the Mpumalanga Province.

The Kusile Power Station will consist of six 800 megawatt (MW) units and a total capacity of 4800 MW. At full production, the Kusile Power Station will require approximately 17 million tons (Mt) of coal per annum, depending on the quality of the coal. AAIC has committed, in a letter of intent, to supply the bulk of the coal demand over a period of 47 years to Kusile. The intention is to source this coal from the New Largo Colliery, with supporting production from AAIC's Zibulu 2 seam and Zondagsfontein 4 seam operations.

The New Largo coal reserve lies within AAIC's current prospecting right area / proposed mining right area. The total mining right area is 12 773 hectares (ha), of which the opencast mining area (mine pits) will occupy an area of approximately 5 600 ha. The majority of the coal reserve lies between the N4 highway in the north and the N12 highway in the south, with a small portion found to the south of the N12 highway. The intention is not to mine through the N12 highway but to leave a buffer zone for the highway and other linear infrastructure running parallel thereto, such as the Transnet National Multi Product Pipeline (NMPP) pipeline. The No. 4 and No. 2 coal seams will be mined (Synergistics, 2011).

Implementation is planned in two main phases:

- Phase 1 entails general construction, the development of the first opencast box-cut in the northern section of the mining area and the commissioning of the first dragline. Construction will commence in the second quarter and operations are expected to commence in the first quarter of 2015. A small truck and shovel fleet will be in operation until 2023. This coal is of such a quality that it does not require beneficiation. The coal in this area will therefore be dispatched directly from the tertiary crushing plants to the Kusile Power Station;
- Phase 2 construction will commence in the first quarter of 2020 and operations in the first quarter of 2023. This phase entails the development of the second opencast box-cut in the southern section of the mining area, commissioning of the second dragline in this section, as well as the commissioning of a coal processing plant. The further phases of the water treatment plant (WTP) will also be commissioned during this phase..

1.2 Regulatory framework

Water uses are defined in the National Water Act, 1998 (Act 36 of 1998) and includes the following activities as described in Section 21 of the Act:

21 (a) taking water from a water resource;

(b) storing water;

(c) impeding or diverting the flow of water in a watercourse;

(d) engaging in a stream flow reduction activity contemplated in section 36;

(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);

(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;

(g) disposing of waste in a manner which may detrimentally impact on a water resource;

(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

(i) altering the bed, banks, course or characteristics of a watercourse;

(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and

(k) using water for recreational purposes.

In terms of Section 22(1) a person may only undertake the abovementioned water uses if it is appropriately authorised:

22(1) A person may only use water

(a) without a licence

(i) if that water use is permissible under Schedule 1;

(ii) if that water use is permissible as a continuation of an existing lawful use; or

(iii) if that water use is permissible in terms of a general authorisation issued under section 39;

(b) if the water use is authorised by a licence under this Act; or

(c) if the responsible authority has dispensed with a licence requirement under subsection (3).

The authorisations required for the New Largo Colliery is discussed in detail in section 6.1.

1.3 Purpose of document

This document serves as an Integrated Water Use License Application (IWULA) for the Section 21 water uses associated with the proposed New Largo Colliery, as defined in the NWA. It therefore:

- Provides detail on all the water uses which requires registration or licensing;

- Provides a summary description of the proposed activities, the present environmental situation, the potential pollution sources, the expected impacts and proposed mitigation measures;
- Includes a copy of the Integrated Water and Waste Management Plan (IWWMP) in which the proposed water and waste management at the mine is outlined in detail;
- Includes copies of the relevant specialist reports compiled as part of the Environmental Impact Assessment (EIA) process, which also provides specialist input into the IWULA;
- Includes a copy of the Environmental Management Program (EMP) for the construction and operation of proposed mine;
- Includes proof of payment of the application fee to the DWA;
- Includes the completed application forms for the licensing of new water uses.

2. PROJECT DESCRIPTION

2.1 Project description

2.1.1 Project location

The New Largo coal resource is located in the Mpumalanga province, situated approximately 30 kilometres west of eMalahleni and 100 kilometres east of Johannesburg. The proposed colliery will be located in the eMalahleni and Victor Khanye Local Municipalities, which forms part of the Nkangala District Municipality. It is bounded by the N12 highway to the south and the N4 highway to the north, with a portion of the resource lying to the south of the N12 highway. The regional setting is indicated in **Figure 2.1.1(a)** and the locality map is provided in **Figure 2.1.1(b)**.

Portions of the No. 2 and No. 4 Seams have been previously mined by underground methods to supply the now defunct Wilge Power Station (refer to **Figure 2.1.1(c)**). The largest and most extensive underground mine is the now defunct New Largo Coal Mine. It is estimated that these defunct collieries extend over an area of approximately 1 300 ha and an estimated 45 million tonnes have been mined. Reserves are contained both in pillars and roof and/or floor of the workings.

2.1.2 Description of activity

Coal from the No. 2 and No. 4 seam will be mined at the proposed New Largo Colliery through opencast mining as indicated on **Figure 2.1.2(a)**. The Run of Mine (ROM) coal reserves are approximately 626 million tons and a yield of 85% is anticipated.

The opencast mining method was selected due to the low strip ratio, the ability to maximise the coal extraction and use of the coal resource, and to recover the coal reserves remaining in the areas that were previously mined by underground methods.

Draglines will be used for the removal of primary overburden due to the lower operating costs and the safer exposure of coal in previously mined underground areas. Two draglines will be utilised over the life of mine. Small truck and shovel operations will however also be used to meet the coal supply requirements.

Large 190 ton payload trucks will be used for the hauling of coal to one of two primary crushing plants.

Coal from certain areas within the New Largo coalfield is of such quality that it does not require beneficiation. This is directed straight to the primary screening and tertiary crushing plant and then onto the Kusile feed conveyor system.

Coal from areas where the contamination is higher, will be dispatched from the ROM stockpile to the primary and secondary screening plants and then onto the coal processing plant and tertiary crusher. From here, it will be dispatched to the Kusile Power Station via the feed conveyor.

The R545 provincial tar road between Kendal and Balmoral provides a north-south link between the N4 highway to the north and the N12 highway to the south of the mining area. A section of this road (approximately 17 km) is located in the centre of the proposed mining area and therefore needs to be demolished to allow mining operations to proceed. The affected section is from approximately 2 kilometres south of the Kendal-Balmoral road intersection on the N4, up to the intersection of the Kendal-Balmoral Road with the N12. A small section of the R545 splits and runs east towards Voltargo Village (previously Wilge Village) and will also have to be demolished where it is affected by the mining area

The demolition and re-alignment of the road will be done during the initial stages of the project. The replacement road will be a tarred road, 7.4 metres wide and the road servitude will be 40 metres wide. The proposed realignment is indicated in **Figure 2.1.2(b)**.

2.1.3 Extent of activity

The total AAIC prospecting right area / proposed mining right area is currently 12 773 ha. Approximately 5 600 ha will be mined by opencast mining.

Figure 2.1.1(a): Regional location

Figure 2.1.1(b): Locality map

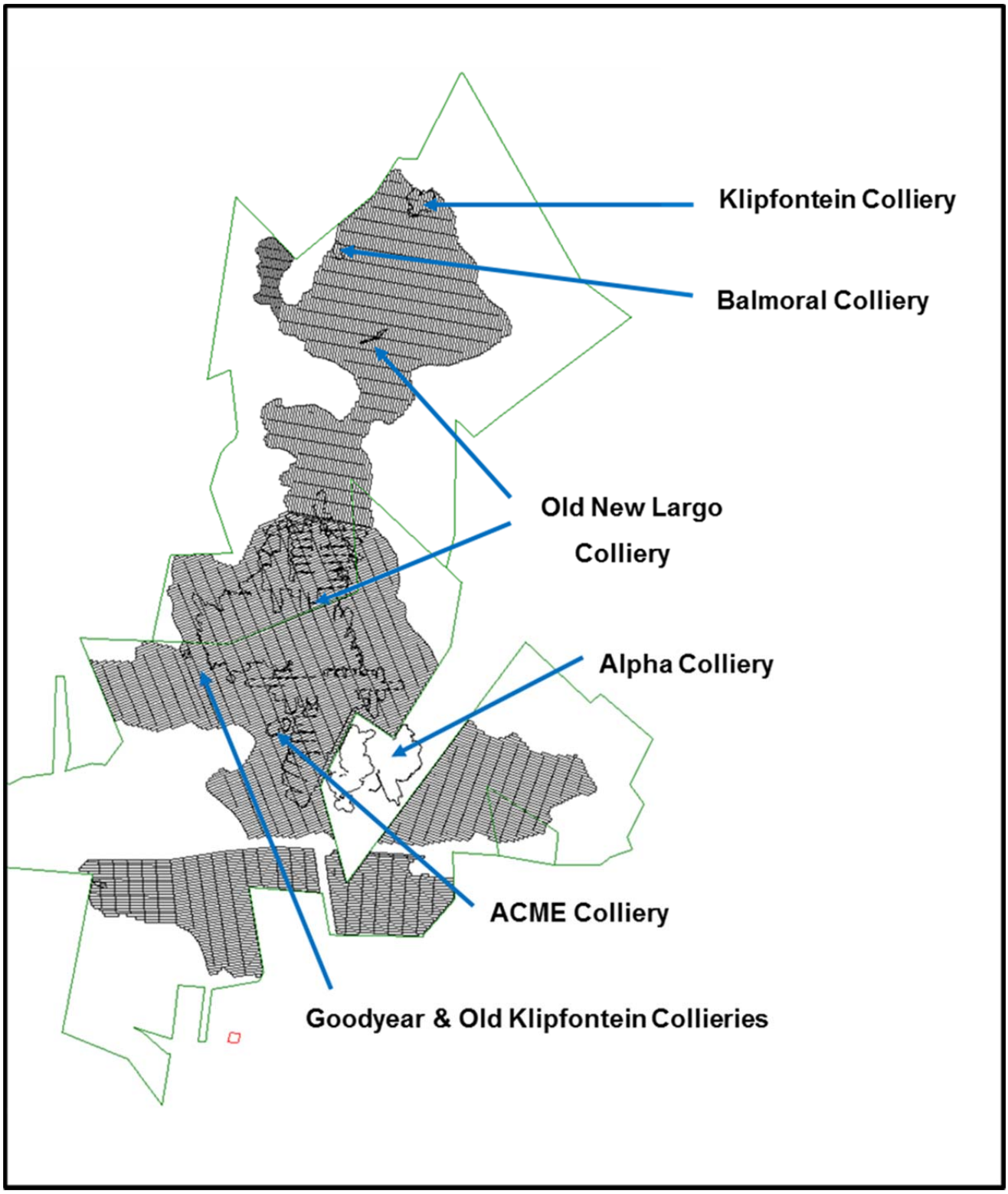

Figure 2.1.1(c): Previously undermined areas

Figure 2.1.2(a): Mine Plan

Figure 2.1.2(b): Proposed re-alignment of R545

2.1.4 Key processes and products

A number of mining methods were evaluated as part of the New Largo project and opencast mining with draglines were selected as the most suitable method. In the early years of the mine (up to 2022), a small truck and shovel fleet will however also be used to ensure that the demand at the Kusile Power Station is met. This will be decommissioned once the second dragline is commissioned in 2023.

Dragline strips will on average be in excess of 3 km long and 60 m wide in single seam areas and 130 m wide in double seam areas. The proposed mining process is illustrated in **Figure 2.1.4(a)** and can be described as follows:

- Vegetation and topsoil is stripped ahead of mining. At least one cut (60 m) should already be stripped and available for drilling between the active topsoil stripping operation and the open void;
- The topsoil is loaded onto 100 ton trucks by hydraulic excavators and is hauled to the back of the advancing pit for live placement on top of the levelled spoils;
- Overburden and interburden drilling operations commence in the front of the advancing pit after the topsoil has been removed;
- Overburden/interburden (spoils) is drilled, charged with explosives and blasted;
- After blasting the dragline and dozers move the spoils into the open void created previously in order to expose the coal seams at the bottom;
- Once the coal is exposed, the drilling, blasting, loading and hauling of coal and intra seam partings commence;
- The levelling of spoils will follow within three strips behind the open void;
- Topsoil is placed on top of the levelled spoils, after which it is levelled, seeded and fertilized.

Coal of consistent quality should be supplied to the Kusile Power Station to ensure that optimum combustion efficiencies are achieved. A coal processing plant will be required when mining proceeds to the southern areas where poorer quality coal is located. Higher quality coal (from the northern areas) will have to be blended with lower quality coal to ensure a constant supply, at the correct specifications, to Eskom.

Figure 2.1.4(a): Illustration of proposed mining process

2.1.5 Infrastructure description

The infrastructure of the New Largo Colliery is indicated on Drawing number C184-04-001 attached as Appendix A**,** as compiled from the block plan (Revision Q) received from Semane Consulting Engineers (Semane). Key components are the following:

- Administration area (office and workshop area):
  - EMV and LDV workshops and washbays, plant workshop, tyre bay, cable repair etc.;
  - Offices, canteen, community hall, security offices, training centre, clinic, change houses, stores and laboratories;
  - 15 Mℓ administration area pollution control dam and associated silt trap (receiving contaminated run off from the washbays and workshops);
  - Sewage treatment plant;
- Plant area:
  - Coal beneficiation plant;
  - ROM stockpiles;
  - The footprint for product stockpile has been indicated on the block plan, but will only be developed at a later stage if required by the client (Eskom*)*;
  - 36 Mℓ plant area pollution control dam and associated silt trap (receiving contaminated run off from the DMS plant, drainage from the ROM stockpiles, as well as effluent from the sewage treatment plan);
- Potable water tanks;

- Bulk water supply storage dam (10 Mℓ);
- Topsoil stockpile;
- Two tips;
- Two crushing plants;
- An emergency ROM stockpile at each of the Tips;
- Overburden stockpile;
- Pollution control dam at Tip 2, with associated silt trap;
- An explosive magazine area;
- Water treatment plant (WTP) to be phased as follows:

Year	Treatment Rate
2013	4 Mℓ/day
2017	8 Mℓ/day
2026	12 Mℓ/day
2033	16 Mℓ/day
2043	20 Mℓ/day
2051	24 Mℓ/day

- Waste management facilities at the WTP (provision has been made for a brine pond, as well as a gypsum handling facility);
- Electrical reticulation;
- Haul roads;
- Conveyor system from Tip 1 and Tip 2 to ROM stockpile;
- Conveyor to the Kusile Power Station;
- Eight pit ramp water dams (5 Mℓ each);
- 1200 Mℓ dewatering reservoir and 100 Mℓ balancing dam from where water will be pumped to the WTP for treatment;
- Boreholes for the dewatering of the underground workings;
- Moveable pumps for dewatering of advancing pits;
- Discard dump (on backfilled area);
- Fire fighting infrastructure; and
- Infrastructure associated with dust suppression (reticulation, goosenecks, cannons at stockpiles etc.).

An existing 400 kV transmission line which runs from east to west across the resource area, numerous rural power lines and the R545 provincial road have to be relocated. This will be phased in with the mine plan over the life of the mine.

It should be noted that the list above depicts the full complement of infrastructure that will be developed over the life of mine, but that this will take place in phases as discussed in section 2.1.6). The required phasing and timing of water and waste

management infrastructure is indicated in **Table 2.1.5(a)**. Due to the phasing, final details of the infrastructure to be developed during Phase 2 are not available at this stage.

A brine pond and gypsum handling area will be constructed as part of the Phola-Kusile Coal Conveyor system for the mobile water treatment plant associated with that development. The location of these will be at the area earmarked for the final WTP of the New Largo Colliery. These facilities are addressed in a separate IWULA and IWWMP (JW117/11/C184 and C118/11/C184 respectively) and will therefore be authorised in terms of these applications. The facilities will however be used (and expanded as may be required) to be used for the disposal of waste from further phases of the WTP at the New Largo Colliery. The waste streams generated by further phases of the WTP will also depend on the technology selected.

Table 2.1.5(a): Phasing of water and waste management infrastructure

PHASE 1		PHASE 2	
Infrastructure	**Expected date**	**Infrastructure**	**Expected date**
Potable water tanks	2015	Three pit ramp transfer dams in southern area	As mining progresses
First ~ 600 Mℓ of 1200 Mℓ pollution control dam	2015	10 Mℓ polluted water dam at Tip 2 (pollution control dam)	2023
Second ~ 600 Mℓ of 1200 Mℓ pollution control dam	2017	Surface discard dump and associated pollution control dam	2023
100 Mℓ balancing dam (pollution control dam)	2015	Product stockpile	Only if required
Five pit ramp transfer dams in northern area	2015	Emergency ROM stockpile at Tip 2	2023
36 Mℓ Plant Area pollution control dam	2015	Second rotor added to second module of sewage treatment plant	2023
15 Mℓ Admin Area pollution control dam	2015	Dewatering boreholes (pumps 5-8)	When required
10 Mℓ bulk water supply storage dam	2015	Coal processing plant	2023
Overburden stockpile	2015	In-pit discarding	2023
ROM stockpile	2015	Ramp-up of WTP to 24 Mℓ	2024 onwards
Emergency ROM stockpile at Tip 1	When required		
First module of sewage treatment plant	2015		
Second module of sewage treatment plant	2018		
Dewatering boreholes (Pumps 1-4)	2018		
Additional 4 Mℓ unit at WTP*	2016		

* Initial 4 Mℓ mobile WTP and waste management facilities (brine pond and gypsum handling facility) established as part of Phola – Kusile Coal Conveyor system in 2013

Water for the construction phase, will be obtained from three boreholes drilled into the old New Largo Colliery underground workings.

Water for the operational phase will be sourced from the WTP, initially a mobile treatment plant that will be established as part of the Phola-Kusile Coal Conveyor

System. The mobile WTP will initially have a treatment capacity of 4 Mℓ and will treat water pumped from the old underground workings. The capacity of the mobile WTP will be increased to 8 Mℓ by 2016 as part of the New Largo Colliery project and will be ramped-up to a final treatment capacity of 24 Mℓ. Water will therefore be sourced from the underground workings, as well as from in-pit and on-site water make.

2.1.6 Activity life description

Based on official communication that AAIC has received from Eskom, the first coal at the Kusile Power Station is required in the October 2013 in order to lay down stockpile beds and commission the coal stockyard equipment. The first unit is scheduled to start commercial operations in 2014 and the last unit is expected to come online in 2018 (Synergistics, 2012). During the initial stages the coal demand will be supplied via the Phola-Kusile Coal Conveyor System from other mining operations.

The first dragline for the New Largo colliery will be assembled from January 2013 to September 2015. Construction and ramp-up of the New Largo Colliery will take place from 2013 to 2017.

The life of mine of the New Largo Colliery is approximately 50 years and the mine will be at full production between 2017 and 2059.

Implementation is planned in two main phases:

- Phase 1 entails general construction, the development of the first opencast box-cut in the northern section of the mining area and the commissioning of the first dragline. Construction will commence in the second quarter and operations is expected to commence in the first quarter of 2015. A small truck and shovel fleet will be in operation until 2023. This coal is of such a quality that it does not require beneficiation. The coal in this area will therefore be dispatched directly from the tertiary crushing plants to the Kusile Power Station;
- Phase 2 construction is expected to commence in the first quarter of 2020 and operations will commence in the first quarter of 2023. This phase entails the development of the second opencast box-cut in the southern section of the mining area, commissioning of the second dragline in this section, as well as the commissioning of a coal processing plant. The further phases of the water treatment plant (WTP) will also be commissioned during this phase.

2.2 Details of applicant

2.2.1 Applicant

Applicant:	Anglo American Inyosi Coal (Pty) Ltd
Company Registration:	2005/016701/07
Contact person:	Henri Nieuwoudt
Designation:	Head of Mining and Property Law: South Africa
Telephone number:	011 638 3781
Fax number:	011 638 4608
E-mail:	hnieuwoudt@angloamerican.co.za
Postal address:	PO Box 61587, Marshalltown, Johannesburg, 2017

2.2.2 Mineral rights holder

AAIC submitted a mining right application to the Department of Mineral Resources (DMR) over this area in April 2011. The application was accepted by the DMR in a letter issued to AAIC on 22 July 2011 and a scoping report was submitted on 22 August 2012. The EIA and EMP were submitted on 23 January 2012.

Applicant:	Anglo American Inyosi Coal (Pty) Ltd
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E-mail:	hnieuwoudt@angloamerican.co.za
Postal address:	PO Box 61587, Marshalltown, Johannesburg, 2017

2.2.3 Mine manager

Not appointed yet.

2.3 Details of land owner

The properties affected by the proposed mining operations and R545 re-alignment are indicated on **Figure 2.3(a)** and details are provided in **Table 2.3(a)**.

Figure 2.3(a): Property ownership

Table 2.3(a): List of properties affected by mining

Farm name	Portion	Property owner
PROPERTIES AFFECTED BY MINING		
Honingkrantz 536 JR	Remainder, 1	AAIC
Hartbeesfontein 537 JR	RE	AAIC
Roodepoortjie 326 JS	12, 23	AAIC
	24	JE Strick
	1 (RE/1)	H Roos
	5 (RE/5), 23 (23/1)	Anglo Operations Ltd
Klipfontein 566 JR	1 (RE/1), 4, 5, 17, 18, 20, 55, 60 (RE/60), 61, 63, 64,66	SR Anglo Ltd
	27, 28	Fairacres Products (Pty) Ltd
	62	GC Byrne (Pty) Ltd
Klipfontein 568 JR	1(RE/1), 2 (RE/2), 5, 6, 7, 11 (RE/11), 12, 13, 14, 15, 16, 17 (RE/17), 33, 34, 35, 36, 37 (2), Remainder	AAIC
	26, 32	Truter Boerdery Trust
	8, 9 (RE/9), 10, 18 (RE/18), 19, 38	A Cherry
	30, 31	Kendal Poultry Farm (Pty) Ltd
	29	Waterfontein Boerdery CC
	21	JJ Herbst Konstruksie CC
	22	DJ Meyer
	23	Bronlaw Prop (Pty) Ltd
	43, 44, 51, 52, 53 (53/1), 54 (54/16), 55 (55/15), 56, 57 (57/14), 58, 59 (59/14)	South African National Roads Agency Ltd
Heuvelfontein 215 JR	11, 13, 35, 36 (RE/36/1), 37, 38 (38/1), 52, 75	Truter Boerdery Trust
	85, 86, 88	Transnet Ltd
Van Dyksput 214 JR	4	Truter Boerdery Trust

Farm name	Portion	Property owner
Bankfontein 216 JR	7, 10, RE	Truter Boerdery Trust
	6	Feret Coal Kendal (Pty) Ltd
	12 (12/10), 13 (13/11)	South African National Roads Agency Ltd
	11	Ingwe Surface Holdings Ltd / Truter Boerdery Trust
Vlakfontein 569 JR	26	Eskom Holdings Ltd
	2, 5, 8 (RE/8/2), 9	AAIC
	16	Macphail Distributors (Pty) Ltd
	1, 4, 7 (7/4), 11	Truter Boerdery Trust
	22	South African National Roads Agency Ltd / Truter Boerdery Trust
	23	South African National Roads Agency Ltd
Eenzaamheid 534 JR	3, 40	Witbank Brickworks 1961 (Pty) Ltd
Prinshof 2 IS	5, 6, R (RE)	Truter Boerdery Trust
	21	eMalahleni Local Municipality
Smaldeel 1 IS	2	Ingwe Surface Holdings Ltd
	R (RE)	Truter Boerdery Trust
PROPERTIES AFFECTED BY RE-ALIGNEMENT OF R545		
Honingkrantz 536 JR	RE	AAIC
Roodepoortjie 326 JS	23	AAIC
	24	JE Strick
	1 (RE)	JH Roos
	26	Truter Boerdery Trust
Eenzaamheid 534 JR	5	CA van Niekerk
	68	To be confirmed

Farm name	Portion	Property owner
Prinshof 2 IS	4	eMalahleni Local Municipality
	5, 6, Remainder	Truter Boerdery Trust
	10	Ingwe Surface Holdings Ltd
	20	Largo Technical Engineering CC
Smaldeel 1 IS	Remainder	Truter Boerdery Trust
Vlakfontein 569 JR	4	Truter Boerdery Trust
	15, 18, 19	JC van den Heever

3. PRESENT ENVIRONMENTAL STATUS

3.1 Topography and drainage

The topography comprise of moderately flat to gently undulating plains. The proposed pit areas are located within the higher lying areas and the topography gently drops to the east and west along the watershed. The western side of the mining area drains into the Wilge River system, and the eastern side of the mining area drains into the Saalboomspruit system. Due to the generally flat topography, several isolated surface water pans are present.

3.2 Land use

Current land use includes sand mining and agriculture (crop irrigation and livestock farming). Chicken farming and brickmaking activities are also practiced. Coal mining activities exist to the south of the proposed New Largo Colliery. The Voltargo Village and Phola Township are to the east.

It is estimated that approximately 20% of the coal reserve area comprises defunct collieries. The largest and most extensive is the now defunct underground New Largo Coal Mine where bord and pillar mining was undertaken until 1989. Approximately 1 150 ha was mined on the No. 4 Seam horizon and 280 ha on the No. 2 Seam. The depth of mining is 10 – 50 m below surface level. Water levels in the underground workings are controlled by pumping the excess water to a pan on the farm Klipfontein 566 JR. These workings have filled with water and are currently decanting at an average rate of 1 500 m^3/day.

Extensive sand mining operations exist within the coal reserve area.

The Kusile Power Station is being constructed adjacent to the proposed mining area and the Phola-Kusile Coal Conveyor System is planned between the Phola Washing Plant and the Kusile Power Station.

3.3 Climate

3.3.1 Temperature

The Eskom Kendal 2 monitoring station is located to the south of the proposed New Largo Colliery. The annual average maximum, minimum and mean temperatures for this station are given as 26°C, 10°C and 16°C respectively, based on the records for 2005 to 2009. The average daily maximum temperatures range from 30°C in December, January and February to 20°C in June, with daily minima ranging from 15°C in January and December to 3°C in July (Synergistics, 2011).

3.3.2 Rainfall

The average monthly rainfall for Ogies South African Weather Station (SAWS) (station number 0478093) based on the period 1908 to 2000, is indicated in **Table 3.3.2(a)**.

Table 3.3.2(a): Average monthly rainfall depths for SAWS station 0478093 (1908 – 2000)

Month	Average rainfall (mm)
October	75
November	120
December	123
January	132
February	100
March	80
April	43
May	18
June	8
July	7
August	9
September	24
Mean Annual Precipitation	**739.3**

3.4 Geology

The regional geology is described by Jasper Muller and Associates (JMA, 2011b) as follows:

The geology of the greater study is highly diverse and ranges from sedimentary lithologies of the Karroo Supergroup, through to intrusives of the Bushveld Igneous Complex. The surface geology consists predominantly of the sedimentary lithologies of the Ecca Group, denoted Pe or Pv on **Figure 3.4(a)**. These lithological units consist of shale, shaly sandstone, grit, sandstone, conglomerate and coal, and cover the majority of the southern and south-eastern extent of the study area. The extents of the open cast mining operations at New Largo are confined to these sedimentary lithologies of the Ecca Group.

The Ecca Group form part of the Permian Age Karroo Supergroup, and have been extensively mined for coal within the Witbank Coal Fields of South Africa. The New Largo study area lies along the north-western extent of the Witbank Coal Fields.

The Ecca Group lithological units lie unconformably on top of the tillites of the late Carboniferous to early Permian Dwyka Group (Pd/C-Pd), which forms the base of the Karroo Supergroup. The dwyka tillites outcrop extensively at the surface to the east and west of the proposed pits at New Largo.

The surface geology to the north and far west of the study area is dominated by fine to medium-grained diabase (di) intrusives ranging in age from Vaalian to post-Mogolian. These diabases intruded into and above the Pretoria Group Sediments as well as the Wilgerivier Formation (Mw) of the Waterberg Group. The Mogolian Age sedimentary litholigical units of the Wilgerivier Formation consist predominantly of sandstones and conglomerates and outcrop extensively to the north of the study area.

Nebo granite (Mn) is indicated to occur to the north of the proposed New Largo mining activities as well. The Nebo granite forms part of the Raashoop Granophyre Suite of

the Rustenburg Layered Suite of the Bushveld Complex and consists of coarse grained granites.

The surface geology across the northern and far western extent of the study area consists of sedimentary lithologies of the Pretoria Group. These include quartzites of the Magaliesberg Formation (Vm), shales of the Silverton Formation (Vsi), quartzites of the Dasspoort Formation (Vd) as well as quartzites and shales of the Strubenkop Formation (Vst). The Pretoria Group sediments are the oldest within the study area and have intermittently been intruded by diabase.

Based on the information obtained from the 1:250 000 Geological Map Series of South Africa sheets, there is no evidence of large scale faulting within the study area. No dykes are indicated on the sheets either and the extent of the intrusive lithologies is confined to that of the diabase as well as the intrusives of the Bushveld Igneous Complex.

The 1:250 000 Geological Map Series of South Africa sheets indicate that coal has historically and is currently still being mined within the extent of the study area.

Figure 3.4(a): Regional geology

3.5 Surface water

3.5.1 Water Management Area

The proposed New Largo Colliery is situated in the Wilge River catchment, which forms part of the Loskop Dam catchment of the Olifants Water Management Area. It is situated on a watershed, with the western side of the mining area draining into the Wilge River and its tributaries, and the eastern side of the mining area draining into the Saalklapspruit and its tributaries (quaternary sub-catchments B20F and B20G respectively as indicated on **Figure 3.5.1(a)**. The Saalklapspruit joins the Wilge River, which in turn drains into the Olifants River. The Olifants River flows to the Loskop dam and then through the central part of the Kruger National Park and into Mozambique. It eventually joins the Limpopo River and discharges to the Indian Ocean on the east African coastline.

3.5.2 Mean Annual Runoff

The Mean Annual Runoff (MAR) for various sub-catchments was computed using the WRSM2000 synthetic streamflow generation model. The results of the modelling are shown in **Table 3.5.2(a)** and the catchments and nodes are shown in **Figure 3.5.2(a)**.

Table 3.5.2(a): Mean Annual Runoff (MAR) for the New Largo mining area

Node	Catchment area (km^2)	MAR ($x\ 10^6 m^3$)	% of MAR at Loskop Dam
NL1	2.6	0.09	0.02
NL2	3.0	0.11	0.03
NL3	3.9	0.14	0.04
NL4	43	1.54	0.06
NL5	6.1	0.22	0.32
NL7	4.2	0.15	0.04
NL8	27	0.97	0.25
NL9	3.3	0.12	0.03
NL10	23	0.81	0.21
NL13	67	2.38	0.62
NL16	40	1.44	0.38
NL17	53	1.89	0.49
NL18	31	1.11	0.29
NL20	27.9	1.00	0.26
NL23	15	0.53	0.14
NL27	5.4	0.19	0.05
NL32	5.4	0.19	0.05
NL33	15.3	0.55	0.14

Note: MAR for Loskop Dam estimated at 384 x $10^6 m^3$

Figure 3.5.1(a): Quaternary catchments

Figure 3.5.2(a) Catchments and nodes

3.5.3 Floodlines

The 1:100 year floodlines are indicated in **Figure 3.5.3(a).** The methodology used to determine this is described in detail in report number JW120/11/C184.

3.5.4 Resource Class, Receiving Water Quality Objectives and Reserve

Water quality objectives

The Directorate National Water Resource Planning (DNWRP) of the (then) Department of Water Affairs and Forestry (DWAF) developed a water quality management strategy for the Upper and Middle Olifants River catchment, which was published in 2009 (DNWRP, 2009). One of the key elements of this strategy was the development of Resource Water Quality Objectives (RWQO).

Interim RWQO were determined based on the current set of objectives in the Witbank, Klipspruit and Middelburg Dam catchments, which was modified to account for the water quality component of the Ecological Reserve. Where previous objectives were not available, the South African Water Quality Guidelines together with the present water quality status were used to determine RWQO. The set of RWQO determined are interim objectives that will be reviewed once the water quality component of the Ecological Reserve has been updated (DNWRP, 2009).

The proposed development is located within Management Unit (MU) 21 for the Saalklapspruit, and MU 20 and 22 for the Wilge River catchment respectively, as indicated in **Figure 3.5.4(a).** The Interim RWQO developed by the DNWRP for these management units are indicated in **Table 3.5.4(a).**

Resource class

The establishment of resource classes for the Olifants River WMA is still in process.

In terms of the river component of the National Spatial Biodiversity Assessment, quaternary catchment B20F is considered to have rehabilitation potential, while B20G is considered transformed (EcoInfo, 2011). The Wilge River is classed as a third order river, and under natural conditions is considered a perennial river. The Saalboomspruit is classed as a first order river, and under natural conditions is considered a non-perennial river. The assigned river signature[1] for the Wilge River is Highveld, which is an endangered signature and the Saalboomspruit has a critically endangered river type (EcoInfo, 2011).

[1] Assigned river signature reflects the conservation significance of a drainage system as determined by the National Spatial Biodiversity Assessment

Figure 3.5.3(a): 1:100 year floodlines

Figure 3.5.4(a): Catchment Management Units

Table 3.5.4(a): Interim RWQO for Management Units 20, 21 and 22 of the Wilge River Catchment (DNWRP, 2009)

Constituent	Unit	MU 20 and MU 21	MU 22
Electrical conductivity (EC)	mS/m	70	40
Dissolved oxygen (DO)	% Sat	70	70
pH		6.5 – 8.4	6.5 – 8.4
Alkalinity	mg/ℓ $CaCO_3$	85	120
Boron (B)	mg/ℓ	0.5	0.5
Calcium (Ca)	mg/ℓ	80	25
Chloride (Cl)	mg/ℓ	20	20
Fluoride (F)	mg/ℓ	0.5	0.5
Magnesium (Mg)	mg/ℓ	20	20
Potassium (K)	mg/ℓ	10	10
Sodium (Na)	mg/ℓ	20	20
Sodium Absorption Ration (SAR)	$Meql^{0.5}$	1.0	1.0
Sulphate (SO_4)	mg/ℓ	120	60
Total Dissolved Solids (TDS)	mg/ℓ	450	280
Dissolved Organic Carbon (DOC)	mg/ℓ	10	10
Iron (Fe)	mg/ℓ	1.0	1.0
Manganese (Mn)	mg/ℓ	0.18	0.18
Aluminium (Al)	mg/ℓ	0.02	0.02
Chromium VI (Cr VI)	mg/ℓ	0.05	0.05
Ammonia* (NH_3)	mg/ℓ as N	0.007	0.007
Nitrate (NO_3)	mg/ℓ as N	6	6
Phosphate (PO_4)	mg/ℓ as P	0.05	0.05
Total phosphorus	mg/ℓ as P	0.25	0.25
Total Inorganic Nitrogen	mg/ℓ as N	2.5	2.5
E. coli	# per 100 mℓ	130	130
Chlorophyll a	mg/ℓ	0.02	0.02

* Free ammonia as NH_3

3.5.5 Surface water quality

The baseline water quality assessment is described in detail in the surface water report (JW120/11/C184). Water quality sampling and analyses was done according to the Surface Water Monitoring Protocol developed for the project (J&W, 2010).

The current water quality in the Wilge River catchment has not been impacted to a large extent and generally is within the interim RWQO's for MU22 as developed by the DNWRP. The only exception is the Klipfonteinspruit, where an impact associated with the decant of mine water from underground workings has been observed. The impact is noticeable in the macro and micro constituents of the water in the Klipfonteinspruit. The high dissolved aluminium values observed at this point is of particular concern. The poor quality water in the Klipfonteinspruit is however diluted with good quality water from reaches further upstream, resulting in water quality further downstream which generally is in the order of the interim RWQO for MU22. The exception is aluminium which exceeded the objective on most occasions. It should be noted that the interim RWQO for aluminium is based on the Aquatic Ecological Reserve determined in 2001 (DNWRP, 2009). When the levels are compared to the SA Water Quality Guidelines for irrigation and stock watering, the measured quality is below the target guideline of 5 mg/ℓ. The levels at most of the monitoring points are above the ideal domestic guideline of 0.15 mg/ℓ, but below the acceptable guideline for domestic use of 0.5 mg/ℓ.

Historical data for the DWA gauge B2H014 (at Onverwacht on the Wilge River) show a steady deterioration in the water quality in the Wilge River downstream of the proposed conveyor system, the proposed New Largo Mine and the Kusile Power Station. The levels of sulphate, chloride, calcium and magnesium are approaching the interim RWQO set for the MU. Any further contribution of salt load into the system can therefore not be tolerated.

The water quality in the Saalklapspruit catchment is of poorer quality and does not comply with the interim RWQO's for MU21. The mining and industrial activities in the upper reaches of the Grootspruit, a tributary of the Saalklapspruit, seem to have a high negative impact on the water quality. The Phola Sewage treatment plant also contributes to the poor water quality observed in the Saalklapspruit. This could have implications for the downstream water users as the water may not be fit for its intended use.

The DNWRP indicated that the system does not have any salinity assimilative capacity left and that the salinity load will have to be removed from the catchment in order to meet the RWQO's for the Loskop Dam. This will involve the management of pollution sources such as decants and seepages from defunct mines. In future, mines will have to treat water to acceptable levels (DNWRP, 2009).

3.5.6 Surface water use

A survey was done of the current surface water use within the area as part of the surface water specialist study. This was done through a questionnaire in which information was requested regarding the source of water use, the purpose (e.g. crop irrigation or livestock watering) and an estimate of the extent of the use (e.g. area irrigated or number of livestock units). Details of the outcome of this study are not provided here and can be referenced in the surface water specialist report.

Surface water in the study area is used primarily for agricultural irrigation and livestock watering purposes. Approximately 1 000 ha of maize, wheat, soya and planted pastures is irrigated from surface water resources, mainly through centre pivot

irrigation. On a smaller scale, crops such as potatoes, peanuts and cabbage are irrigated from surface water resources using spray irrigation methods.

Other commercial activities include chicken farming and brick making facility.

Domestic water use is mainly from groundwater resources. Rivers and dams are used for recreational activities such as swimming, fishing and canoeing (where water quality permits such activities).

Several mines (coal and sand mines) also make use of the surface water resources in the area.

Downstream water users include agricultural irrigation (Gouwsberg Irrigation Board area and the Loskop Dam Irrigation Board further downstream), as well as game farming.

3.5.7 Wetlands

A detailed wetland assessment was undertaken by Wetland Consulting Services as part of the EIA.

The types of wetlands and area occupied are indicated in **Table 3.5.7(a)**. Wetlands occupies a total of 1 600 ha represent 14% of the total study area of approximately 11 470 ha. The distribution of wetlands is indicated in **Figure 3.5.7(a).**

Table 3.5.7(a): Types and area of wetlands (WCS, 2011)

Wetland type	Area (ha)	Percentage (%)
Valley bottom wetlands	413	26
Hillslope seepage wetlands	978	61
Pans	164	10
Dams	45	3
TOTAL	**1 600**	**100**

The proposed mining area straddles a catchment divide with flows to the east feeding the Saalklapspruit and those to the west the Wilge River. Three large and three small pans are located on the crest of this drainage divide. The flows off the “ridge”’ emerge as seepage wetlands where the aquiclude intercepts the side slopes and where flows concentrate in the valley bottoms.

The valley bottom wetlands on the tributaries of the Saalklapspruit are largely channelled, indicating that the energy associated with the flows is high enough to result in sediment transport. The large *Phragmites* stands in the Saalklapspruit are a reflection of the deposition of sediments emerging from the upstream catchment. The valley bottom wetlands associated with the tributaries of the Wilge River are largely unchannelled within the study area. Some evidence of channel development was observed in the systems on the farm Klipfontein. The absence of any extensive reed beds in the Wilge River suggest that the energy associated with flows out of this section of the catchment is high, thus transporting sediments to beyond the study area. The relatively large surface area representing seeps suggests that a considerable portion of the rainfall falling in this area enters the valley bottom systems as diffuse flow, over an extended period (WCS, 2011).

None of the wetlands in the area is regarded as pristine due to the agricultural and mining activities, as well as infrastructure development (roads and railways) that have taken place. Wetlands in the north eastern section are the least impacted. Cultivation

has mainly taken place outside of the boundaries of the valley bottom wetlands, and as such there has been little direct effect of cultivation on these wetland systems. The hillslope seepage wetlands have however been heavily impacted by agriculture and the smaller pans have similarly been impacted by cropping. In addition, return flows from the centre pivot irrigation systems are also likely to have affected the wetlands (WCS, 2011).

All the pans have hillslope seepage wetlands on the slopes of the pan basins, indicating the flow of water from the surrounding catchment into the pans. The pan on the Farm Klipfontein (east of the R545) is used for the discharge of mine water from the underground workings of the defunct New Largo Mine. In addition, the pan also receives what appears to a low pH, sulphate rich decant in the vicinity of the old mine located immediately south of the pan. The remaining pans on the site have been affected by sand mining operations, as well as cultivation around the perimeters.

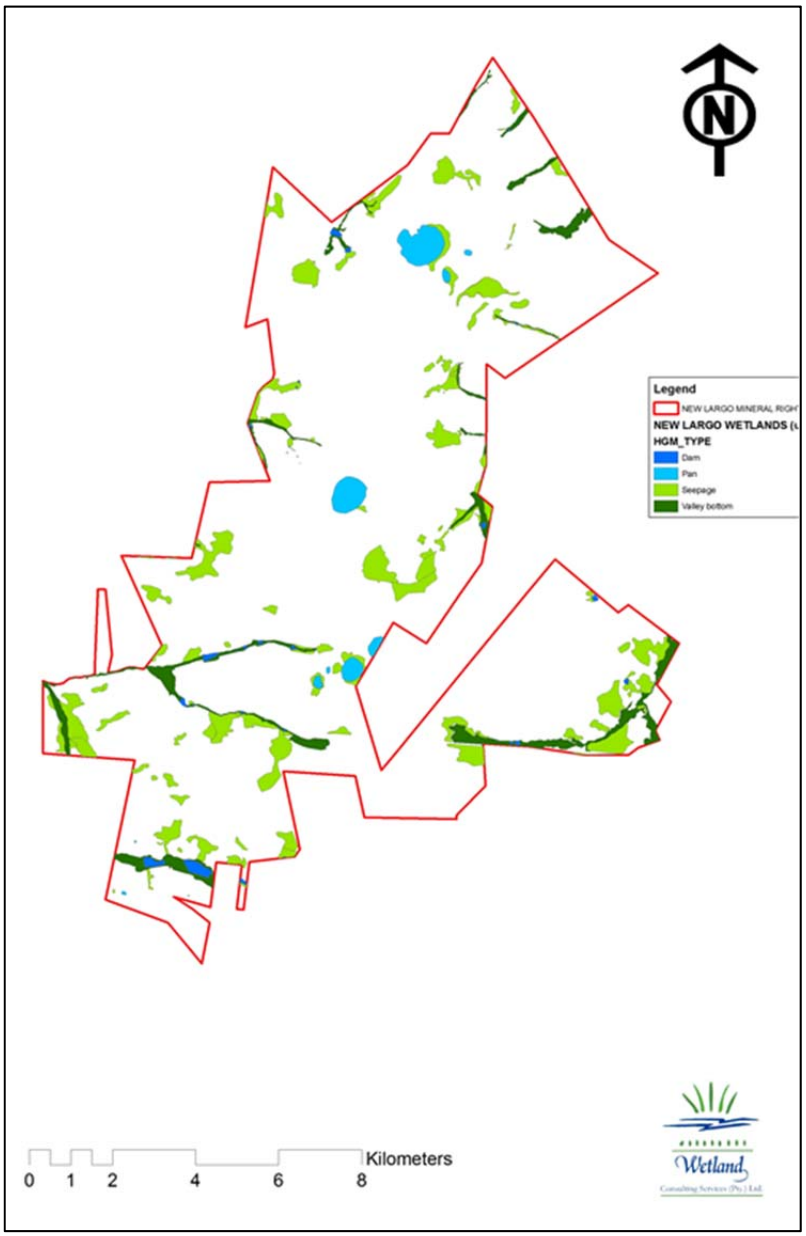

Figure 3.5.7(a): Distribution and extent of wetlands (WCS, 2011)

An assessment was done of the Present Ecological State (PES) of the wetlands. The results are summarised in **Table 3.5.7(b)** as a percentage of the area of each wetland type. The majority of the wetlands fall in Category C and D, implying that a large change in the ecosystems has occurred, but in the case of those in category C, the functioning of the system has not been severely compromised. The distribution of the wetlands in the classed identified is presented in **Figure 3.5.7(b).**

Table 3.5.7(b): Summary of PES analysis of wetlands as a percentage of each wetland type (WCS, 2011)

PES category	Valley bottom wetlands	Hillslope seepage wetlands	Pans
A (Unmodified, natural)	--	--	--
B (Largely natural)	2.0	4.5	3.2
C (Moderately modified)	71.1	30.3	40.4
D (Largely modified)	26.9	65.2	45.0

The Ecological Importance and Sensitivity (EIS) of the wetlands is summarised in **Table 3.5.7(c)** and indicated in **Figure 3.5.7(c)**. Some discrepancies were observed between the PES and EIS assessments. This apparent contradiction can be explained as follows:

- where water quality has been impacted, wetlands assume a more important role since they support processes that improve water quality;
- as more and more wetlands are transformed or lost, the remaining wetlands take on a greater significance from both a biodiversity perspective, and what they reflect in terms of landscape hydrological processes (WCS, 2011).

Table 3.5.7(c) Summary of the EIS analysis of the wetlands as a percentage of the area of each wetland type (WCS, 2011)

EIS category	Valley bottom wetlands	Hillslope seepage wetlands	Pans
A	--	--	--
B	57.1 %	28.6 %	66.7 %
C	36.0 %	65.3 %	4.3 %
D	6.9 %	6.1 %	29.0 %

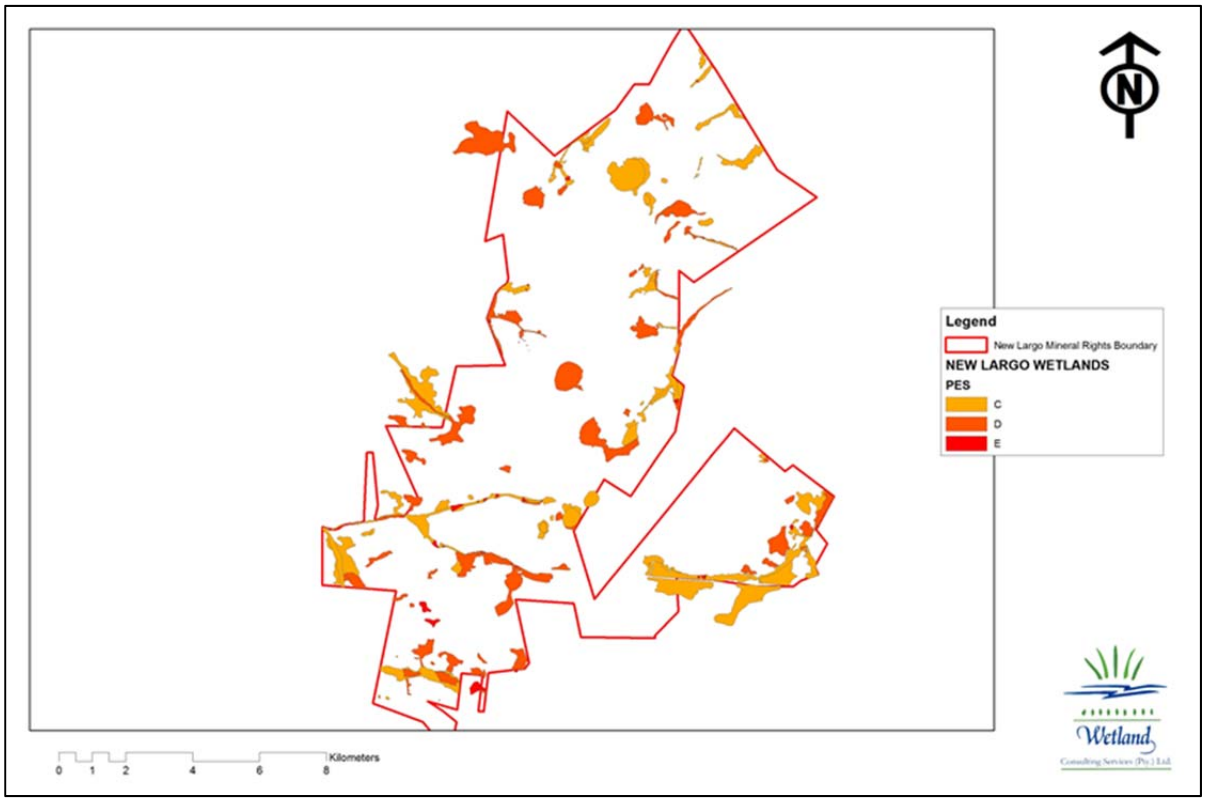

Figure 3.5.7(b): PES assessment of wetlands (WCS, 2011)

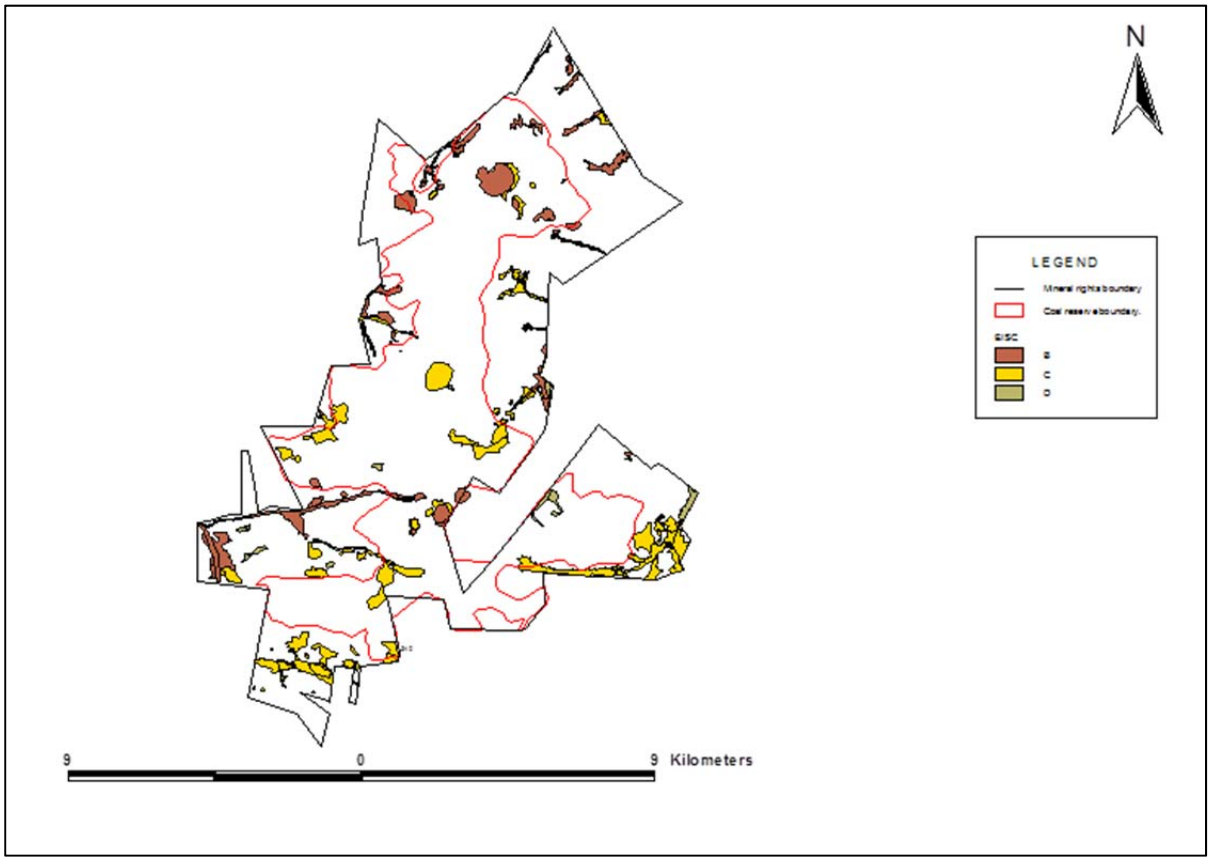

Figure 3.5.7(c): EIS assessment of wetlands (WCS, 2011)

3.5.8 Aquatic ecosystem

A detailed aquatic assessment was undertaken by EcoInfo as part of the EIA. The following standard bio-monitoring protocols were used to determine the PES of the rivers:

- Invertebrate Habitat Assessment System (IHAS);
- Index of Habitat Integrity (IHI),
- Aquatic Macro invertebrates using South African Scoring System 5 (SASS5),
- Fish using the Fish Response Assessment Index (FRAI); and
- Diatom Assessment.

A description of the PES categories is provided in **Table 3.5.8(a)** and the outcome of the assessment is provided in **Table 3.5.8(b)**.

The response metrics assessed indicated that the ecological integrity of the system is under threat due to current land use activities impacting on the general river system.

The observed present state of the river and habitat supports 10 confirmed species of fish from four families, and could potentially support another four species that occur in the general aquatic ecosystem. Of the species sampled, one can be considered highly sensitive to changes in water quality, namely *Chiloglanis pretoriae*. This is a rheophillic fish species that is highly sensitive to alterations in preferred habitat.

The Wilge River signature is Bushveld Basin 2 and the Saalboomspruit River signature is Highveld 1, which is respectively considered Critically Endangered and Endangered according the National Spatial Biodiversity Assessment. These systems are already under severe threat and pressure due to farming activities, as well as urban and mining development (EcoInfo, 2011).

Table 3.5.8(a): Ecological categories used in aquatic assessment

IHI, SASS5, FRAI		
Category		**Description**
A	Very good	Unmodified state- no impacts, conditions natural.
B	Good	Largely natural- Small changes in community characteristics, most aspects natural.
C	Moderate	Moderately modified- Clear community modifications, some impairment of health evident.
D	Poor	Largely modified- Impairment of health clearly evident. Unacceptably impacted state.
E	Very poor	Seriously modified- Most community characteristics seriously modified, unacceptable state.
F	Critical	Critically modified- Extremely low species diversity- Unacceptable state.
IHAS		
Category	**IHAS score %**	**Description**
Good	>80 %	Habitat is considered to be more than adequate and able to support a diverse invertebrate fauna
Adequate	< 80% and > 70%	Habitat is considered to be adequate and able to support invertebrate fauna
Poor	< 70%	Habitat is considered to be limited and unable to support adverse invertebrate fauna
Diatoms		
Category	**Index Score**	**Description**
HIGH	> 17	High quality
HIGH	13 – 17	Good quality
MODERATE	9 – 13	Moderate quality
POOR	5 – 9	Poor quality
BAD	< 5	Bad quality

Table 3.5.8(b): Summary of PES for aquatic sampling sites in the Wilge River and Saalboomspruit systems

Site		Season	Bio monitoring protocol*				
			IHI	IHAS	Diatoms	SASS5	FRAI
NL1	Wilge River System	High flow	C	POOR	GOOD	A	C
		Low flow	C	ADEQUATE	GOOD	A	C
NL2		High flow	C	POOR	GOOD	B	A/B
		Low flow	C	POOR	GOOD	B	B/C
NL3		High flow	D	ADEQUATE	POOR	E	B
		Low flow	D	ADEQUATE	GOOD	B	B/C
NL4		Low flow	C	POOR	POOR	B	A/B
NL5		Low flow	C	POOR	POOR	C	C
NL6		High flow	D	ADEQUATE	HIGH	A	E
		Low flow	D	ADEQUATE	GOOD	B/A	C
NL7		Low flow	C	POOR	HIGH	B	C
NL8		High flow	D	POOR	HIGH	A	E
		Low flow	D	POOR	HIGH	A	C
NL9		High flow	C	N/A	HIGH	N/A	N/A
		Low flow	C	ADEQUATE	GOOD	A	C
NLS10	Saalboomspruit System	High flow	D	POOR	NO CELLS	D	E
		Low flow	D	POOR	POOR	B	C/D
NLS11		High flow	D	POOR	BAD	E	C/D
		Low flow	D	POOR	BAD	F	F
NLS12		High flow	C	POOR	GOOD	B	B
		Low flow	C	POOR	MODERATE	B	B
NLS13		High flow	C	POOR	HIGH	C/D	F
		Low flow	C	POOR	NO CELLS	F	F
NLS14		Low flow	C	POOR	NO CELLS	B	A/B
NLS15		Low flow	B	POOR	NO CELLS	C	A/B
NLS16		Low flow	C	POOR	HIGH	D	F
NLS17		High flow	C	POOR	HIGH	B	B
		Low flow	C	POOR	HIGH	B	C
NLS18		High flow	D	POOR	GOOD	B	F
		Low flow	D	POOR	HIGH	B	F

3.6 Groundwater

3.6.1 Regional geohydrology

The regional geohydrological attributes of the study area are a function of the geological host matrix distribution. The central extent of the study area is underlain by arenaceous sedimentary lithologies of the Ecca Group. The geology of the north-western and south-eastern extents of the study area is predominantly underlain by tillites of the Dwyka Group. The surface geology to the north and east of Pit A consists predominantly of lithologies of the Pretoria Group.

The groundwater within the study area primarily occurs within the weathered zone or in joints and fractures of the competent arenaceous rocks, related to tensional or compressional stresses and offloading. Groundwater also occurs along sedimentary – sedimentary or sedimentary – igneous rock contacts. Localised large water bearing fractures generally occur along the sedimentary – igneous contact zones related to the heating and cooling of the arenaceous host rock caused by the intrusion of dolerite dykes and sills as well.

The average expected borehole yield within the central parts of the study area (Ecca Group) is between 0.1 and 0.5 ℓ/s. For the northern, north-eastern, far eastern and far western extents of the study area an average yield of between 0.5 ℓ/s and 2.0 ℓ/s is expected. No large scale groundwater abstraction is indicated to occur from these intergranular and fractured aquifers within the bounds of the study area. The groundwater potential within the study area is given as being between 40% and 60%, and indicates the probability of drilling a successful borehole (yield > 0.1 ℓ/s). The probability of drilling a borehole with a yield in excess of 2 ℓ/s is however given as between 10% and 20%.

The mean annual recharge to the groundwater system in the study area is estimated to be between 50 mm and 75 mm per annum, which relates to between 6.5 and 10% of the mean annual precipitation (MAP). The groundwater contribution to ground stream base flow is estimated to be between 10 and 25 mm per annum.

The aquifer storativity (S) for the intergranular and fractured aquifers in the study area is inferred to be between 0.01 and 0.001. The saturated interstice types (storage medium) are pores in disintegrated / weathered to partly weathered and fractured rocks, as well as fractures which are restricted principally to the zone directly below the groundwater level (JMA, 2011).

3.6.2 Aquifer characterisation

Two dominant aquifer types occur at New Largo:

- a laterally extensive shallow weathered zone aquifer, and
- more localized fractured aquifer systems.

The predominant aquifer type present within the study area is the laterally extensive shallow weathered zone aquifer which occurs within the weathered and weathering related fractured zone, within the Ecca Group, Dwyka Group and Pretoria Group host rock matrices. This aquifer extends across the entire extent of the study area and has an average vertical thickness of 20.77 m. This aquifer zone will store and transport the bulk of the groundwater in the study area, and will display unconfined to semi-unconfined piezometric conditions. Due to the unconfined nature of the aquifer zone, it is as a result, highly susceptible to surface induced activities and impacts.

The localized fractured aquifers present within the study area are restricted to the contact zones between the intrusive diabase bodies and the host rock. Although these semi-confined fractured aquifers may be high yielding, they will have limited storage capacities and recharge characteristics. The bulk of the water supplied by these aquifers will be drained laterally from storage within the shallow weathered zone aquifers neighbouring onto them.

Isolated perched aquifer conditions were observed to the north-east of the proposed mining area at New Largo, beyond the extent of the delineated pit boundaries. These isolated perched aquifers are responsible for the hill slope seepages observed on the surface, but could not be accurately delineated. It is however known that they are not laterally extensive but rather form discontinuous isolated lenses which are dependent on the underlying soil profiles.

The major aquifer zones present within the New Largo study area consist of unconfined to semi-unconfined unsaturated and saturated zones:

Unsaturated Zone:

Due to the nature of the shallow weathered zone aquifer at New Largo, the top of the unsaturated zone is defined by the land surface, whilst the bottom of the unsaturated zone is defined by the groundwater table/level. The thickness of the unsaturated zone is therefore defined as the depth to the groundwater level.

The thickness of the unsaturated zone was calculated using the water level data recorded in the geohydrological investigative boreholes as well as in the boreholes identified during the groundwater hydrocensus conducted on the farms adjacent to the proposed pit extents. The thickness of the unsaturated zone (depth to the water level) varies between 0.10 m and 50 m at which the groundwater level has been affected by groundwater abstraction. The natural groundwater level depths recorded at the geohydrological investigative boreholes indicate that the natural unsaturated zone thickness varies between 2.14 m and 19.86 m with an average thickness of 8.78 m within the study area.

Saturated Zone:

The saturated zone of the shallow weathered zone aquifer at New Largo is defined at the top by the groundwater table/level and at the bottom by the weathered/fractured and fresh bedrock interface. The natural saturated aquifer zone thickness of the shallow weathered zone aquifer at New Largo is thus calculated by subtracting the measured groundwater level depth from the weathered or weathering related fractured depth as recorded at the geohydrological investigative boreholes. The thickness of the saturated zone varies between 0.00 m, at which the water level is within the fresh host rock matrix, and 27.99 m. The average saturated zone thickness within the shallow weathered zone aquifer at New Largo is 11.45 m.

Further aquifer characteristics are as follows:

- The blow yields recorded from 17 geohydrological investigative boreholes vary between 0.01 ℓ/s and 3.33 ℓ/s with an average yield of 0.23 ℓ/s;
- The arithmetic mean permeability of 15 geohydrological investigative boreholes was 0.76 m/day;
- The calculated average aquifer transmissivities of 15 geohydrological investigative boreholes was 5.06 m^2/day;

- The storativity (S) of an aquifer is defined as the volume of water that an aquifer releases from, or takes into, storage per unit surface area of the aquifer per unit hydraulic gradient. The average storativity of the shallow weathered zone aquifer at New Largo is taken as 0.002; and
- The effective porosity in the weathered zone aquifers at New Largo will vary between 0.01 and 0.07, with a bulk probable effective porosity value of 0.05.

3.6.3 Aquifer dynamics

Recharge to the shallow weathered zone aquifers at New Largo will occur annually as a function of rainfall and infiltration. The mean annual recharge to the groundwater system for the study area is estimated to be between 3% and 7% of the MAP, putting it in the recharge range of 25 mm/annum to 55 mm/annum (taking the MAP as 736 mm/annum).

The depth to the natural groundwater level at New Largo varies between 2.14 m and 19.86 m with an average thickness of 8.78 m within the study area.

The groundwater elevation within the study area ranges between 1513.30 mamsl and 1579.38 mamsl.

Groundwater generally flows from the topographical higher areas towards surface water features in the area.

3.6.4 Hydrocensus

The use of groundwater within the study area was assessed using the information obtained from the various hydrocensus' conducted within the study area between 2004 and 2011. A total of 309 groundwater receptors were identified. Of the 309 sites identified during the hydrocensus', 46 are fountains and 263 are boreholes or wells.

During the hydrocensus conducted in 2011 it was observed that around 270 people use groundwater that abstracted from within study area for domestic use. The groundwater abstracted from within the study area is used as a water supply for around 1250 large livestock, around 600 small livestock and for 2 dairy operations. Abstracted groundwater is also used in gardens, in a brick factory, for sand washing as well as the washing of coal.

Groundwater that emanates at the surface (fountains) is predominantly used as a water supply for around 1100 large livestock and 760 small livestock. Around 25 people use the water obtained from the fountains for domestic use and one fountain is identified as a water supply for a garden as well. The water obtained from several fountains is also used for sand-washing and as a water supply for dairy cattle as well.

Important to note is that 12 boreholes/wells and 5 fountains that were identified during the 2004 hydrocensus have since been destroyed as a result of dumping that has taken place to the west of the study area.

3.6.5 Groundwater quality

The groundwater quality is discussed in detail in the geohydrological report by JMA (JMA, 2011)

The groundwater quality at New Largo was observed to be fully compliant with regards to the SANS 241:2006 Drinking Water Standard. The groundwater sampled at 28 geohydrological investigative boreholes has a quality that falls within the quality range of the background groundwater quality.

1.1.1 Aquifer classification

The aquifer is rated as a Minor aquifer system in terms of the Aquifer System Management Classification with a high vulnerability in terms of the Vulnerability Classification. These ratings yield a Ground Water Quality Management Index of 6 for the shallow weathered zone aquifers, indicating that medium level ground water protection is required.

3.7 Soils

Soil characteristics in the area are as follows:

- Highly variable depth characteristics occur, with relatively small areas of rocky outcrop and ferricrete exposure (< 400 mm depth), and large areas of relatively deep (600 – 800 mm) to very deep (800 mm to > 1500 mm) *in situ* derived soils that are often associated with cultivated lands and commercial livestock farming;
- Generally moderate to low clay soils (10 – 25%) with low reserves of organic carbon (< 0.5%) and resultant high potential erodibility on the sedimentary derived (*in situ*) soils, to moderate clay (18 – 35%) contents, that are associated with better than average soil water holding characteristics (80 – 120 mm/m) and moderate land capability potential on the more basic soils and colluvial/alluvial derived materials (lower slopes);
- Poor nutrient stores in association with high permeability rates in the upper soil horizons and poor water holding characteristics for the sedimentary derived soils and impermeable to low permeability on the soils associated with the hydromorphic soils and transition zone materials (ferricrete layer – “C” Horizon) that underlies the relic land forms and lower slope positions in many cases;
- A ferricrete layer that forms a relatively impermeable barrier to sub surface water infiltration, forming sub-surface ephemeral pans and palaeo channels (sub-surface), a zone of sensitivity (restrictive barrier) that has ecological ramifications; and
- Variations in the sensitivity of the soils to a change in utilization, their workability and reaction to being disturbed, and the relative ease of re-instatement when replaced on rehabilitation (Earth Science Solutions, 2011).

4. WATER USES

4.1 Water uses associated with the project

The water uses requiring authorisation for Phases 1 and 2 of the New Largo Colliery are indicated in **Table 4.1(a)**. For ease of reference, each water use has been allocated a reference code that is reflected on a drawing that is referenced in the Table and attached in **Appendix A**.

A description of the water uses are provided below. It should be noted that not all the details of the Phase 2 water uses are available at this stage and any changes will be addressed in an application for an amendment of the water use license, if required.

4.1.1 S21(a) Taking water from a water resource

Water will be pumped from the old underground working and the advancing pit to ensure that mining activities continue (refer to S21(j) below).

Abstraction of groundwater for construction purposes will be required during the construction phase. According to GN R399 dated March 2004 (as extended in GN 837 dated 23 September 2010) quaternary catchment B20F and B20G fall within Zone C. In this Zone, 75m^3 of groundwater may be abstracted per hectare per property per annum. The boreholes are locate on Portions 1 and 4 of the farm Klipfontein 566 JR, portions 1 (± 379 ha) and 4 (±159 ha). Therefore, 28 425 m^3/a and 11 925 m^3/a may be abstracted, respectively (total of 40 350 m^3/a).

Water for the operational phase, will be obtained from a mobile treatment plant that will be established as part of the Phola-Kusile Coal Conveyor System. The mobile WTP will initially have a treatment capacity of 4 Mℓ and will treat water pumped from the old underground workings. The capacity of the mobile WTP will be increased to 8 Mℓ by 2016 as part of the New Largo Colliery project and will be ramped-up to a final treatment capacity of 24 Mℓ. Water will therefore be sourced from the underground workings, as well as from in-pit and on-site water make.

4.1.2 S21(b) Storing water

Treated water will be pumped to a 1 Mℓ potable water reservoir located at the WTP. From this reservoir, water will be pumped to a 250 kℓ elevated potable water tank provided as part of the Phola-Kusile Coal Conveyor System. Water for Phases 1 and 2 of the New Largo Colliery will be provided from this elevated tank. Potable water will gravitated to the reticulation system that supplies the buildings, workshops, offices, Tips 1 and 2 and the explosives magazine.

Potable water is required for dust suppression at the conveyor transfer points, as well as for dust suppression at Tips 1 and 2. This will be sourced from the elevated water tanks and stored in Jo-Jo tanks at the transfers and Tips.

An additional 1 Mℓ storage tank will be established close to the abovementioned reservoir during Phase 2 when the coal beneficiation plant is developed.

Fire water will be sourced from two fire water tanks (420 kℓ each) next to the potable water reservoir. This was also provided as part of the Phola-Kusile Coal Conveyor System.

4.1.3 S21(c) Impeding or diverting the flow of water in a watercourse and/or S21(i) altering the bed, banks, course or characteristics of a watercourse

A number of wetlands and other watercourses are present in the proposed mining area. These watercourses will be mined partially or completely as indicated on Drawing C184-04-002 in **Appendix A**.

A number of watercourses will also be altered due to the development of infrastructure in the vicinity, or within, the watercourses:

- The haul road on the mine will cross 10 watercourses, most of which are seepage wetlands;
- The re-alignment of the R545 provincial road will involve 11 watercourse crossings in the Saalboomspruit catchment, most of which are valley bottom wetlands;
- One borrow pit will be established within a seepage wetland;
- Two borrow pits will be developed on the edge of a pan and a valley bottom wetland respectively.

4.1.4 S21(f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit

Treated water that is not used to supply in the water demand of the mine, will be discharged to the receiving watercourses. On average, over the life of mine, it is expected that clean water will be discharged to the system at an average rate of approximately 13 300 m^3/day (J&W, 2011).

The discharge volume and positions will be finalised according to the recommendations of the Reserve Determination study.

Due to the significant storage required during extreme events in excess of the legislated current design parameters, AAIC is investigating the option to store and then discharge water from predetermined compartments in the 1 200 Mℓ PCD to the receiving environment. This will only be done if the water complies with the discharge standards. This option is still under investigation and will be subject to:

- Discussion and agreement with DWA regarding standards to which the water has to comply and the rainfall event(s) during which this could be considered;
- The development of an operating plan for the dam in which this is detailed;
- Obtaining the required authorisations.

Further details will be included in the final IWWMP.

4.1.5 S21(g) Disposing of waste in a manner which may detrimentally impact on a water resource

Overburden stockpile

Spoils (overburden and interburden) from the initial box-cut will be placed on an overburden stockpile to the west of the mining operation. Thereafter, live placement of the overburden will take place and each consecutive strip will be dealt with in a continuous roll-over mining method.

It was recommended by the geohydrologial specialist that placement should be in the sequence of hard overburden at the bottom of the spoils, covered by soft overburden and then soil. The reason for this layering is to mimic the natural soil and lithological profile as far as possible. In order to do this effectively, the soils, soft overburden and hard overburden should be individually and separately stripped ahead of the advancing box-but, to minimize the mixing of the material (JMA, 2011b).

At the end of the life of the mine, the stockpiled material removed from the initial box-cut will be used in the rehabilitation of the final mining areas.

Discard disposal

During the initial years (Phase 1), coal from the northern pit will be dispatched directly from the crushing plants to the Kusile Power Station and therefore no discard will be generated.

From 2023 when Dragline 2 will be commissioned and mining operations move to poorer quality coal in the southern pit, a coal beneficiation plant will be commissioned. The overall yield per saleable tonne after the beneficiation plant is commissioned is estimated to be in the region of 85%. This implies that 15% of the raw material feed to the processing plant will be removed as coal discard. The total estimated discards

generated over the life of mine will be approximately 94 million tons. Following a conservative approach, disposal facilities for 100 million tons is being planned.

Discard from the coal beneficiation plant will be disposed of in-pit in three compartments as indicated in **Figure 4.1.5(a).** Discard will be spread evenly on the No. 2 Seam floor. Details for each compartment are provided in **Table 4.1.5(a)**.

Table 4.1.5(a): Details of in-pit discard disposal

Compartment number	Location	Period in use	Amount of discard	Depth of discard
Compartment 1	North pit	2023 – 2039	6.3 million tons	0.45 m
Compartment 2	Central pit	2023 – 2063	82.7 million tons	2.2 m
Compartment 3	South pit	2043 – 2058	4.8 million tons	0.5 m

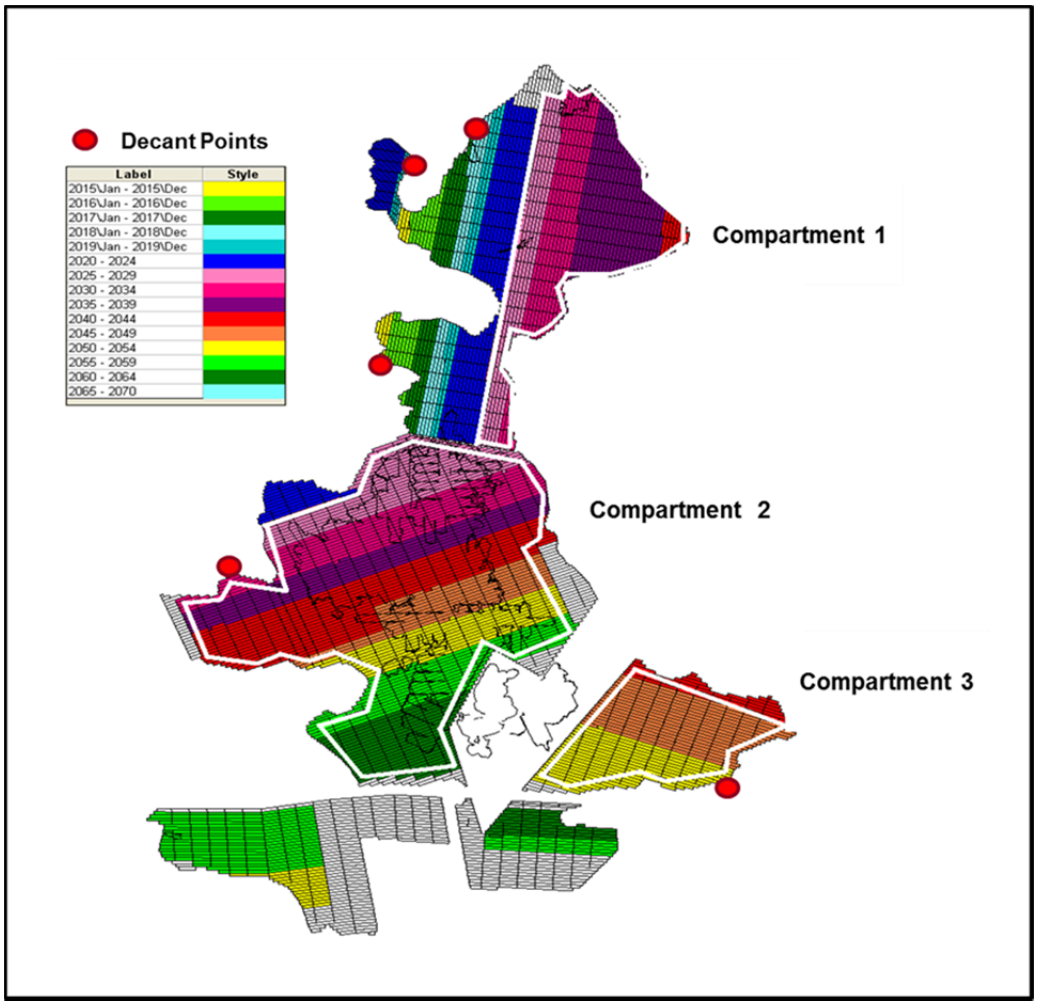

Figure 4.1.5(a): In-pit discard disposal areas

In addition, a temporary surface discard dump will be developed on backfilled open cast workings. Provision has been made for an area of 700 m x 700 m which will provide for 20 Mt over a period of 20 years. *In situ* ground preparation is envisaged (impact roller or similar) or alternatively discard will be dumped and pushed out

progressively (approximately 1 m thick) before the provision of compacted layers. The discard dump will have side slopes of 1:8, and progressive rehabilitation will be done. Provision will be made for clean water diversion and dirty water collection (ref: summary received from Duncan Cameron).

This facility will be used during circumstances when in-pit discard disposal is not possible. It will be located in the southern portion of the northern mining area as indicated on Drawing C184-04-005 attached in **Appendix A**. The material will eventually be backfilled into the pit.

No further details of this facility were available at the time of compilation of the draftb IWULA and the final design of this facility should be based on its siting and the risk posed to the environment.

ROM stockpile and emergency ROM stockpiles

Although not a waste steam, the stockpiling of coal could potentially impact on the water resource and therefore appropriate protection should be provided.

A ROM stockpile will be located in the plant area as indicated on Drawing C184-04-005 in Appendix A. Coal will be dispatched from the stockpile to the Kusile Power Station.

An Emergency ROM stockpile will be located at each of the two Tips. The base of these facilities will be prepared by rip and re-compaction of the in situ material, followed by the provision of a 150mm bentonite augmented layer and a 150mm layer of G7 material compacted to 95% MOD AASHTO. Clean storm water diversion berms will be placed on the upstream sides and dirty water collection drains will be constructed from concrete to collect any seepage from the facilities. Dirty water will be conveyed to the closest PCD. Details of these facilities are indicated on Drawings number 0000-0130-CED-0127 and 0000-0130-CED-0128 by Semane, attached in **Appendix G**.

Pollution control dams

A number of pollution control facilities will be developed as part of the water management system. This includes the 36 Mℓ Plant Area PCD, the 15 Mℓ Admin Area PCD, the 1 200 Mℓ PCD and 100 Mℓ balancing Mℓ at the WTP; the 10 Mℓ bulk water supply storage dam, as well as the eight pit ramp transfer dams and the polluted water dam at Tip 2.

Admin Area and Plant Area PCD's

Contaminated run-off from the Admin Area and DMS plant will be collected in the Admin Area PCD and Plant Area PCD respectively. These dams will have a capacity of 15 Mℓ and 36 Mℓ respectively and will be lined with 2mm HDPE. The details of the Admin Area PCD are indicated on Drawings number 000-0130-CED-0192 and 000-0130-CED-0193 and for the Plant Area PCD on Drawings number 000-0130-CED-0190 and 000-0130-CED-0191 by Semane.

The Plant Area PCD will also receive effluent from the sewage treatment plant.

These dams will be equipped with a silt trap and is designed to accommodate at least a 1:50 year flood event. Water from these dams will be pumped to the 100 Mℓ balancing dam.

Polluted water dam at Tip 2

Dirty water run-off at Tip 2 will be collected in a lined 10 Mℓ PCD indicated on Drawing 0000-0130-CED-0229 by Semane. This dam will be lined with 2 mm HDPE (similar to

the Plant Area PCD as indicated on Drawing number 000-0130-CED-0190) and will be equipped with a silt trap.

Pit ramp transfer dams

Water make from the pits will be pumped into eight pit ramp transfer dams situated at the haul road ramps. These will each have a capacity of 5 Mℓ and will be lined with 2 mm HDPE (similar to the Plant Area PCD as indicated on Drawing number 000-0130-CED-0190) and will be equipped with a silt trap. Details of these dams are provided in Drawings number 0000-0130-CED-0232 to 0000-0130-CED-0236 for the five pit ramp transfer dams that will be constructed during Phase 1.

From the storage dams, water will be pumped to stilling chambers in buried pipelines. Water will flow from the stilling chambers into a double silt trap upstream of the 100 Mℓ balancing dam situated at the WTP.

10 Mℓ bulk water storage dam

Water to be used for dust suppression on the haul roads will be stored in the 10 Mℓ bulk water supply storage dam which will be sourced from the 100 Mℓ balancing dam. This dam will be lined with 2 mm HDPE as indicated on Drawings number 0000-0130-CED-0278 and 0000-0130-CED-0279.

PCD at surface discard dump

The surface discard dump to be constructed on a backfilled area will be equipped with a 5 Mℓ PCD indicated on Drawing 0000-0130-CED-0203 by Semane. This dam will be lined with 2 mm HDPE (similar to the Plant Area PCD as indicated on Drawing number 000-0130-CED-0190) and will be equipped with a silt trap.

1 200 Mℓ dewatering reservoir and 100 Mℓ balancing dam

The 1 200 Mℓ dewatering reservoir and 100 Mℓ balancing dam therefore provides the central dirty water storage and are located adjacent to the WTP from where it will be the main supply to the WTP. The 1 200 Mℓ dewatering reservoir will consist of five compartments, each with differing capacity (refer to Drawings number 0000-0130-CED-0230 and 0000-0130-CED-0231 attached in Appendix G). It will be lined with 2 mm HDPE (similar to the Plant Area PCD as indicated on Drawing number 000-0130-CED-0190) and will be equipped with a silt trap and all inlet and outlet structures will consist of reinforced concrete.

Inflows into the 1 200 Mℓ dam are as follows (refer to the water flow diagram attached in Appendix G).

- Dirty water from the Admin Area PCD;
- Dirty water from the Plant Area PCD;
- Dirty water from the eight Pit Water Transfer Dams;
- Dirty run-off from the ROM stockpiles and emergency ROM stockpiles;
- Dirty run-off from the Tip 1 and Tip 2 areas;
- Dirty water from the PCD at the discard dump;
- Mine water from the old underground workings.

Final void dam

The 1 200 Mℓ dam will be able to accommodate the 1:50 year event up to 2018 and the 1:100 and 1:250 year events up to 2017. Thereafter additional storage will be required for extreme events. Currently the preferred option is an in-pit dam (Final Void Dam) located in Pit G, in the north western corner of the mine. The dam has an estimated a capacity of 1 000 Mℓ and will become available in 2022. The dam basin will be shaped and lined with 2 mm HDPE (refer to Drawing number 000-0130-CED-0274 in Appendix G).

Waste facilities at WTP

Due to the rate of development in the field of water treatment, a decision has not been made regarding the technology that will be used in the full-scale WTP. The waste streams associated with the WTP has therefore also not been identified. However, it is anticipated that the generation of brine may be unlikely, but a gypsum waste stream is expected.

Dust suppression

Dust suppression on haul roads and wash-down water at the coal washing plant, conveyors and tips will be done utilising treated water from the WTP (not chlorinated). The expected demand for dust suppression is 219 000 m^3/annum (or 18 250 m^3/month).

4.1.6 S21(j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people

At 2022, the opencast mining activities will intersect the existing underground workings. Based on the preferred mine plan it is estimated that approximately 4.16 million m^3 needs to be dewatered from the underground workings. Initial dewatering from boreholes is scheduled for a period of four (4) years (2018 – 2021) at a rate of 86 670 m^3/month.

Following this initial dewatering, on-going dewatering will be required for the remainder of the life of mine from the opencast face. An average dewatering rate of 6 900 m^3/month (230 m^3/day) is expected. The actual dewatering rate will however vary with time as mining progresses up- and downhill on the coal seam floor.

Groundwater will be pumped at a rate that is sufficient to maintain groundwater levels below the “Environmental Safe Water Level” (ESWL). This is to maintain all polluted water in-pit and prevent surface and sub-surface decant into the receiving environment.

The proposed position for dewatering pumps is indicated in Drawing C184-04-007 attached in **Appendix A.** Details of the pumping positions are provided in **Table 4.1.6(a).** Positions 1 – 4 denote the points to be dewatered in the three years prior to opencast mining activities in the area.

Table 4.1.6(a): Details of dewatering points

Pump	Co-ordinates		Start date
Pump 1	25°57’50.28’’S	28°57’51.17’’E	2018
Pump 2	25°57’26.29’’S	28°57’14.15’’E	2018
Pump 3	25°58’2.35’’S	28°56’43.94’’E	2018

Pump	Co-ordinates		Start date
Pump 4	25°58'3.53''S	28°56'6.38''E	2018
Pump 5	25°58'38.21''S	28°58'9.77''E	When necessary
Pump 6	25°59'5.74''S	28°58'40.51''E	When necessary
Pump 7	25°58'46.58''S	28°57'20.34''E	When necessary
Pump 8	25°59'8.06''S	28°57'22.60''E	When necessary
Pump 9	25°59'49.60''S	28°57'48.83''E	When necessary

Table 4.1(a): Summary of water uses at the New Largo Colliery

SECTION	REFERENCE CODE	WATER USE MAP REFERENCE (APPENDIX A)	ENGINEERING DRAWING BY SEMANE (APPENDIX G)	DESCRIPTION OF WATER USE	PROPERTY	TITLE DEED	START DATE
GENERAL AUTHORISATION							
Section 21(a): Taking water from a water resource	BH1		N/A	Abstraction of water from borehole into underground workings for construction purposes	Ptn 4 and RE1 of Klipfontein 566 JR		June 2013
	BH2		N/A	Abstraction of water from borehole into underground workings for construction purposes			June 2013
	BH3		N/A	Abstraction of water from borehole into underground workings for construction purposes			June 2013
Section 21(b): Storage of water	Pot1	C184-04-004		1 Mℓ potable water reservoir	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	Pot1, Pot2, Pot3			Three 250 kℓ potable water tanks for water dust suppression at conveyor transfer and at Tips 1 and 2	To be confirmed		2015
LICENCE REQUIRED							
Section 21(a): Taking water from a water resource	Pump 1 – Pump 4	C184-04-007	N/A	*Abstraction from old underground workings:* Water will be abstracted from the old underground workings and treated to potable water standards or discharge standards determined by Reserve Detrermination. Abstraction will be via boreholes as listed under S21(j).	See S21(j) below		2018
	Pump 5 – Pump 9	C184-04-007	N/A	Abstraction from workings: Water will be abstracted from the old underground workings and new workings and treated to potable water standards. Abstraction will be via boreholes as listed under S21(j).	See S21(j) below		When required
	N/A	N/A	N/A	*Abstraction from advancing pits:* Water will be abstracted from the opencast workings and treated to potable water standards. Abstraction will be via moveable pumps as mining proceeds	Moveable pumps as mining proceeds and where required		2015
Section 21(c): Impeding or diverting the flow of water in a watercourse and/or **Section21(i):** Altering the course, bed, banks or characteristics of a water course	W1	C184-04-002	N/A	Mining of wetland	RE of Honingkrantz 536 JR		2025 (within 500m by 2020)
	W2	C184-04-002	N/A	Mining of wetland and construction of ramp through wetland	Ptn 1 of Honingkrantz 536 JR		2017
	W3	C184-04-002	N/A	Mining of pan	RE of Honingkrantz 536 JR		2020 (within 500m by 2017)
	W4	C184-04-002	N/A	Mining of wetland	RE of Honingkrantz 536 JR		2035
	W5	C184-04-002	N/A	Mining of wetland	RE of Honingkrantz 536 JR		2030
	W6	C184-04-002	N/A	Mining of wetland	RE of Honingkrantz 536 JR		2035
	W7	C184-04-002	N/A	Mining through portion of wetland	RE of Honingkrantz 536 JR		2035
	W8	C184-04-002	N/A	Mining through portion of wetland	RE of Honingkrantz 536 JR		2035
	W9	C184-04-002	N/A	Mining within 500m of wetland	13/1 of Roodepoortjie 326 JS		2030 (within 500m by 2025)
	W10	C184-04-002	N/A	Mining through portion of wetland	RE of Hartbeesfontein 537 JR	T7182/2011	2016
	W11	C184-04-002	N/A	Mining through wetland and construction of haul road	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	W12	C184-04-002	N/A	Mining on edge of wetland and construction of haul road through wetland	Ptn 9 Klipfontein 566 JR		2015
	W13	C184-04-002	N/A	Mining through portion of wetland and construction of haul road through wetland	RE/1 of Klipfontein 566 JR	T7182/2011	2020 (within 500m by 2016)
	W14	C184-04-002	N/A	Mining of pan	Ptn 12/4 and RE/1 of Klipfontein 566JR	T7182/2011	2025

SECTION	REFERENCE CODE	WATER USE MAP REFERENCE (APPENDIX A)	ENGINEERING DRAWING BY SEMANE (APPENDIX G)	DESCRIPTION OF WATER USE	PROPERTY	TITLE DEED	START DATE
	W15	C184-04-002	N/A	Mining through portion of wetland and construction of haul road through wetland	Portion 5 of Klipfontein 566JR		2025
	W16	C184-04-002	N/A	Mining of wetland	Portion 34 of Klipfontein 568JR		2030
	W17	C184-04-002	N/A	Mining through portion of wetland	RE of Honingkrantz 536 JR		2035
	W18	C184-04-002	N/A	Mining of wetland	Portions 6 and 31 of Klipfontein 568JR		2040
	W19	C184-04-002	N/A	Mining of wetland	Portions 2 and 9 of Vlakfontein 569 JR		2040
	W20	C184-04-002	N/A	Mining of wetland	Portion 7 of Klipfontein 568 JR		2050
	W21	C184-04-002	N/A	Mining of wetland	Portions 9 and 10 of Vlakfontein 569 JR		2055
	W22	C184-04-002	N/A	Mining of wetland	Portions 9 and 10 of Vlakfontein 569 JR; Portions 7 and 13 of Klipfontein 568JR		2055
	W23	C184-04-002	N/A	Mining of pan	Portion 13 of Klipfontein 568JR	T7182/2011	2055
	W24	C184-04-002	N/A	Mining on the edge of wetland and within 500m from wetland	Portions 12, 13, 14, 15 and 16 of Klipfontein 568JR	T7182/2011	2060
	W25	C184-04-002	N/A	Mining of wetlands	Portions 4 and 58 of Van Dyksput 241 IR		2050
	W26	C184-04-002	N/A	Mining within 500m from wetland	Portion 75 of Heuvelfontein 215 IR		2050
	W27	C184-04-002	N/A	Mining within 500m from wetland	Portion 37 of Heuvelfontein 215 IR		2050
	W28	C184-04-002	N/A	Mining through wetland	Portions RE/1 and 11 of Bankfontein 216 IR	T13322/1998	2050
	ConCr	C184-04-005		Crossing of watercourse by conveyor between Tip 1 and Tip2	RE/13 of Klipfontein 566 JR		2024
	RCR1	C184-04-002	0000-0130-CED-0400 to 0000-0130-CED-0415	New R545 road crossing of watercourse (chainage 2 015 m)	RE of Honingkrantz 536 JR		2016
	RCR2	C184-04-002		New R545 road crossing of watercourse (chainage 3 175 m)	RE of Honingkrantz 536 JR		2016
	RCR3	C184-04-002		New R545 road crossing of watercourse (chainage 4 500 m)	RE of Honingkrantz 536 JR		2016
	RCR4	C184-04-002		New R545 road crossing of watercourse (chainage 4 600 m)	RE of Honingkrantz 536 JR		2016
	RCR5	C184-04-002		New R545 road crossing of watercourse (chainage 4 670 m)	RE of Honingkrantz 536 JR		2016
	RCR6	C184-04-002		New R545 road crossing of watercourse (chainage 4 758 m)	RE of Honingkrantz 536 JR		2016
	RCR7	C184-04-002		New R545 road crossing of watercourse (chainage 7 300 m)	RE of Honingkrantz 536 JR		2016
	RCR8	C184-04-002		New R545 road crossing of watercourse (chainage 9 425 m)	Portion 3/1 of Roodepoortjie 326 JS		2016
	RCR9	C184-04-002		New R545 road crossing of watercourse (chainage 10 850 m)	Portion 26 of Roodepoortjie 326 JS		2016
	RCR10	C184-04-002		New R545 road crossing of watercourse (chainage 10 875 m)	Portion 26 of Roodepoortjie 326 JS		2016
	RCR11	C184-04-002		New R545 road crossing of watercourse (chainage 12 575 m)	Portion 16 of Roodepoortjie 326 JS		2016
	PCD1	C184-04-004	N/A	Construction of PCD1 in wetland	RE of Hartbeesfontein 537 JR	T7182/2011	2015

SECTION	REFERENCE CODE	WATER USE MAP REFERENCE (APPENDIX A)	ENGINEERING DRAWING BY SEMANE (APPENDIX G)	DESCRIPTION OF WATER USE	PROPERTY	TITLE DEED	START DATE
	PWTD3	C184-04-004	N/A	Construction of PWTD3 in wetland	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	PWTD5	C184-04-005	N/A	Construction of PWTD5 within wetland	RE/1 of Klipfontein 566 JR	T7182/2011	2016
	HRC1	C184-04-002	0000-0130-CED-0074 to 0000-0130-CED-0082 and 0000-0130-CED-0114	Haul road crossing of watercourse	Portion 1 of Honingkrantz 536 JR		2015
	HRC2	C184-04-002		Haul road crossing of watercourse	Portion 1 of Honingkrantz 536 JR		2015
	HRC3	C184-04-002		Haul road crossing of watercourse	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	HRC4	C184-04-002		Haul road crossing of watercourse	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	HRC5	C184-04-002		Haul road crossing of watercourse	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	HRC6	C184-04-002		Haul road crossing of watercourse	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	HRC7	C184-04-002		Haul road crossing of watercourse	Ptn 9 of Klipfontein 566 JR		2019
	HRC8	C184-04-002		Haul road crossing of watercourse	RE of Klipfontein 566 JR	T7182/2011	2019
	HRC9	C184-04-002		Haul road crossing of watercourse	Ptn 6 of Klipfontein 566 JR		2019
	HRC10	C184-04-002		Haul road crossing of watercourse	Ptn 5 of Klipfontein 566 JR		2019
	BP1	C184-04-002	N/A	Establish borrow pit within wetland	RE/13 of Klipfontein 566 JR		2015
	BP2	C184-04-002	N/A	Establish borrow pit within 500 m of wetland	Ptn 6 of Klipfontein 566 JR		2015
	BP3	C184-04-002	N/A	Establish borrow pit within wetland	Ptn 12/4 and RE/1 of Klipfontein 566JR		2015
	Admin area	C184-04-004	N/A	Development of parking areas	RE of Hartbeesfontein 537 JR	T7182/2011	2015
Section 21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit	To be confirmed	To be confirmed	To be confirmed	Discharge of treated water from WTP	To be confirmed based on Reserve determination		2015
Section 21(g): Disposal of waste in a manner that could detrimentally impact on a water course	BW1	C184-04-004	0000-0130-CED-0278 0000-0130-CED-0279	10 Mℓ Bulk water supply storage dam	Ptn 60 of Klipfontein 566 JR		2015
	ROM STCKPL	C184-04-004		ROM Stockpile	Ptn 60 of Klipfontein 566 JR		2015
	EROM1	C184-04-004	0000-0130-CED-0128	Emergency ROM stockpile at Tip 1	Ptn 60 of Klipfontein 566 JR		When required
	EROM2	C184-04-003	0000-0130-CED-0127	Emergency ROM stockpile at Tip 2	RE/1 and RE/13 of Klipfontein 566 JR		When required
	PWTD1	C184-04-003	0000-0130-CED-0232	Pit Ramp Transfer Dam between Ramps A4 and G2	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	PWTD2	C184-04-003	0000-0130-CED-0233	Pit Ramp Transfer Dam between Ramps G2 and A3	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	PWTD3	C184-04-004	0000-0130-CED-0234	Pit Ramp Transfer Dam at Ramp A2	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	PWTD4	C184-04-005	0000-0130-CED-0235	Pit Ramp Transfer Dam at Ramp C2	Ptn 59 and RE/13 of Klipfontein 566 JR	T7182/2011	2015

SECTION	REFERENCE CODE	WATER USE MAP REFERENCE (APPENDIX A)	ENGINEERING DRAWING BY SEMANE (APPENDIX G)	DESCRIPTION OF WATER USE	PROPERTY	TITLE DEED	START DATE
	PWTD5	C184-04-005	0000-0130-CED-0236	Pit Ramp Transfer Dam at Ramp C1	RE/1 of Klipfontein 566 JR	T7182/2011	2015
	PWTD6	C184-04-006	Not currently available (Phase 2)	Pit Ramp Transfer Dam at Ramp E3	RE/1 of Klipfontein 566 JR	T7182/2011	2019
	PWTD7	C184-04-006	Not currently available (Phase 2)	Pit Ramp Transfer Dam at Ramp E4	Ptn 66 of Klipfontein 566 JR	T7182/2011	2019
	PWTD8	C184-04-006	Not currently available (Phase 2)	Pit Ramp Transfer Dam	Ptn 66 of Klipfontein 566 JR	T7182/2011	2024
	PCD1	C184-04-004	0000-0130-CED-0192 0000-0130-CED-0193	15 Mℓ Admin Area Pollution Control Dam	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	PCD2	C184-04-005	0000-0130-CED-0229	10 Mℓ Pollution Control Dam at Tip2	RE/1 of Klipfontein 566 JR	T7182/2011	2023
	PCD3	C184-04-004	0000-0130-CED-0190 0000-0130-CED-0191	36 Mℓ Plant Area Pollution Control Dam	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	PCD4	C184-04-005	0000-0130-CED-0230	100 Mℓ Balancing at WTP and 1 200 Mℓ dewatering reservoirs	Ptn 17/13 of Klipfontein 566 JR	T7182/2011	2015
	Dewatering Reservoirs	C184-04-005	0000-0130-CED-0230	1 200 Mℓ dewatering reservoirs at WTP	Ptn 17/13 of Klipfontein 566 JR	T7182/2011	First 600 Ml 2015; second 600 Ml by 2017
	Inpit Water Storage	C184-04-003	0000-0130-CED-0274	In-pit water storage in Final Void Dam (~1 000 Mℓ)	RE of Hartbeesfontein 537 JR	T7182/2011	2020
	Inpit Discard	Figure 6.2.4(a)	N/A	In-pit disposal of discard	Part of Pits A and C, as well as Pits D, E and F		2023
	Discard dump	C184-04-005	0000-0130-CED-0203	Surface discard dump on backfilled area with associated 5 Mℓ PCD and silt trap	Ptn 59 of Klipfontein 566 JR	T7182/2011	2023
	Overburden stockpile	C184-04-003		Overburden stockpile from initial box cut	RE of Hartbeesfontein 537 JR	T7182/2011	2015
	Dust	N/A		Dust suppression with treated water (water containing waste) will be used for dust suppression	On haul roads, stockpiles		2015
Section 21(j): removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people	Pump 1	C184-04-007	N/A	Dewatering of old underground workings	RE/4 of Klipfontein 566 JR	T7437/2009	2018
	Pump 2	C184-04-007	N/A	Dewatering of old underground workings	RE/1 of Klipfontein 566 JR	T7182/2011	2018
	Pump 3	C184-04-007	N/A	Dewatering of old underground workings	RE/1 of Klipfontein 566 JR	T7182/2011	2018
	Pump 4	C184-04-007	N/A	Dewatering of old underground workings	Ptn 66 of Klipfontein 566 JR	T7182/2011	2018
	Pump 5	C184-04-007	N/A	Dewatering of old underground workings	Ptn 2 of Vlakfontein 569 JR		When required
	Pump 6	C184-04-007	N/A	Dewatering of old underground workings	Ptn 2 of Vlakfontein 569 JR		When required
	Pump 7	C184-04-007	N/A	Dewatering of old underground workings	Ptn 5 of Vlakfontein 569 JR		When required
	Pump 8	C184-04-007	N/A	Dewatering of old underground workings	Ptn 5 of Vlakfontein 569 JR		When required
	Pump 9	C184-04-007	N/A	Dewatering of old underground workings	Ptn 9 of Vlakfontein 569 JR		When required

4.2 Integrated water and waste management

A detailed Integrated Water and Waste Management Plan (IWWMP) was developed for the project and documented in report number JW193/11/C184.

4.3 Potential pollution sources

The sources that could potentially impact on the water resource and the potential mechanism of impact are indicated in **Table 4.3(a)**.

Table 4.3(a): Potential pollution sources

POTENTIAL POLLUTION SOURCE	DESCRIPTION	POTENTIAL MECHANISM OF IMPACT
Old underground workings	Decant of mine water	Seepage into aquifers and watercourses
Advancing mine workings	Potential decant points	Seepage to aquifers or decant into surface water
	In-pit water storage	
	In-pit discard disposal	
Overburden dump	Unlined	Seepage into aquifers and contaminated run-off entering watercourses
Pollution control dams and associated silt traps	Lined facilities	Seepage to aquifers if liner integrity is compromised. Spillage will be captured in dirty water management system and could result in an impact if not contained.
Surface discard dump	Located on backfilled area	Impacts similar to advancing mine workings
ROM stockpile	Lined facility with leachate collection system.	Seepage to aquifers if liner integrity or seepage collection is compromised.
Emergency ROM stockpiles	Base lined with bentonite mixed layer. Within dirty water management system.	Seepage into aquifers
Dirty water conveyance system	Concrete lined canals	Seepage to aquifers if integrity is compromised. Potential spillage into watercourses if design capacity is breached due to lack of maintenance.
Product stockpile (if constructed)	Lined facility with leachate collection system.	Seepage to aquifers if liner integrity or seepage collection is compromised.
Brine disposal facility	Lined facility	Seepage to aquifers if liner integrity is compromised.
Gypsum handling facility	Concrete pad	Seepage to aquifers if liner integrity is compromised. Contaminated run-off if storage capacity is exceeded

POTENTIAL POLLUTION SOURCE	DESCRIPTION	POTENTIAL MECHANISM OF IMPACT
Sewage treatment plant	Package plant with effluent to PCD and sludge removed off site	Seepage to aquifers through leakages
Workshops	Oil traps	Local hydrocarbon impact if compromised
Bulk oil storage facilities		Local hydrocarbon impact if compromised. Seepage into aquifers or impact on surface water resource
Hydraulics fluid and oil spillages from mining equipment, such as haulage trucks	Roads and other areas, such as tips	Local hydrocarbon impact
Salvage yard	Various waste streams	Seepage to aquifers or contaminated run-off if adequate protection (e.g. lining/bunding) is not provided

5. IMPACT ASSESSMENT

A detailed environmental impact assessment was undertaken for the proposed mine by Synergistics Environmental Services and is therefore not repeated here. The detailed report was submitted separately to the authorities by Synergistics. A detailed description of the EIA process, studies undertaken and consultation undertaken are provided in the EIA report. A summary of the outcome of the impact assessment methodology and outcome is provided below.

5.1 Impact assessment methodology

The identification and description of impacts are described by Synergistics as follows (Synergistics, 2012):

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the proposed project. The process involves consideration of, inter alia: the purpose and need for the project; views and concerns of interested and affected parties; social and political norms, and general public interest.

The methodology used for assessing impacts associated with the proposed project follows the philosophy of environmental impact assessments, as described in the booklet Impact Significance, Integrated Environmental Management Information Series 5 (DEAT, 2002b). The philosophy is summarised by the following extracts:

- *"The impact magnitude [or intensity] and significance should as far as possible be determined by reference to legal requirements, accepted scientific standards or social acceptability. If no legislation or scientific standards are available, the EIA practitioner can evaluate impact magnitude based on clearly described criteria. Except for the exceeding of standards set by law or scientific knowledge, the description of significance is largely judgemental, subjective and variable. However, generic criteria can be used systematically to identify, predict, evaluate and determine the significance of impacts." (DEAT, 2002b).*

- *"Determining significance [of impacts] is ultimately a judgement call. Judgemental factors can be applied rigorously and consistently by displaying information related to an issue in a standard worksheet format." (Haug et al., 1984 taken from DEAT, 2002b).*

The purpose of undertaking an impact assessment is to ensure that the project proactively considers environmental issues as part of the project planning and decision-making processes throughout the project life cycle.

For each environmental component (i.e. visual, air quality, health), impacts will be identified and described in terms of: detectability / visibility of the impact, exposure of receptors to the impact, compliance with legislation and standards, other applicable targets, limits or thresholds of concern, the level of change / intrusion imposed, and receptor sensitivity.

The impact assessment considered:

- *Physical, biological, social and economic components of the environment and their interrelationships;*
- *The ability of receptors and affected parties to adapt to changes and thus maintain livelihoods after the operation has closed;*
- *The effects of all stages of the project life cycle, including planning construction, operation, decommissioning and post closure must be considered;*
- *Positive and negative environmental and social impacts;*
- *Direct, indirect, induced and cumulative impacts;*
- *Short- and long-duration impacts within the zone(s) of influence, and extreme events;*
- *Potential trans-boundary effects and global impacts (e.g. air pollution, withdrawal of water from an inter-provincial waterway and emission of greenhouse gasses);*
- *Potential impacts on local communities and/or other vulnerable individuals or groups;*
- *Socio-political risks (e.g. political instability);*
- *Impacts associated with supply chains where the resource(s) utilised by the project are sensitive.*

The perceived sensitivity of receptors (people and/or receiving environment) will be professionally judged based on available scientific data (fact) and feedback from public participation processes (views, opinions, attitudes, and concerns) as documented in the Public Consultation Documentation and the Impact Rating criteria. The following impacts will be described:

<u>Existing Impacts (Impacts of Existing Developments within Project Impact Area)</u>

The proposed coal mine is located in an area affected by various historical and existing activities including mining, processing, agriculture, residential, major roads and highways and other linear infrastructure as well as the Kusile Power Station which is currently under construction.

The assessment of existing impacts will consider the current level of environmental degradation associated with existing developments, as well as developments under construction and new or planned developments that will be operational at implementation of New Largo and for which the impacts have been defined – these

new developments will include the Kusile Power Station, the R545 road relocation and the Phola-Kusile Coal Conveyor.

Defining the current level of degradation associated with existing developments is essential to understand and enable the assessment of cumulative impacts (see Section 0 below). The assessment of existing impacts is qualitative and limited to the area of impact for the individual environmental components.

Incremental Impacts

Incremental impacts refers to the impacts of an activity looked at in isolation (impacts of an individual activity), thus not considering the combined, cumulative or synergistic impacts of the activity, or the cumulative impacts of the activity with other activities or the existing impacts. The environmental impact report will describe the incremental impacts of the development alternatives.

No-go Development Impacts

The no-go development is considered as an alternative in the evaluation of development alternatives. In the environmental impact assessment the no-go development impacts would be similar to the existing impacts.

The no-go development will have high negative impacts on the cost and timing of coal supply to Kusile Power Station, delivery of electricity to the national grid, and associated impacts on the national economy and it is therefore assumed that if the proposed New Largo Colliery is not allowed to be developed, an alternative coal supply and transportation of that coal supply will have to be found to supply Kusile.

Cumulative Impacts

For this project, cumulative impacts will be determined as:

Existing Impacts	**+**	***Incremental Impacts***	**=**	***Cumulative Impacts***
Existing impacts within the project area of impact for individual project components (current level of degradation) associated with existing developments.		*Impacts of the proposed New Largo Colliery and associated activities and infrastructure*		*Existing impacts (current level of degradation) associated with existing developments and developments under construction combined with the impacts of the proposed New Largo Colliery and associated activities and infrastructure*

In the assessment above, existing impacts often also represent the impacts of the no-go development option.

5.2 Impact assessment outcome

A summarised outcome of the impact assessment is provided in tabular format in **Table 5.2(a)** to **Table 5.2(c)** for the construction, operational phase, decommissioning and closure, and post-closure phases respectively.

The EMP compiled for the construction and operation phase is attached in **Appendix B**.

Table 5.2(a): Impact assessment: Construction Phase (Synergistics, 2012)

	Impact	Existing Impact	Project Impact		Cumulative Impact		No-Go Development	Alternative Development Impact
			Unmitigated	Mitigated	Unmitigated	Mitigated		
A1	Climate and Greenhouse Emissions.	Neg High	Neg Low	Neg Low	Neg High	Neg Moderate	Neg High	Likely to be higher than New Largo Colliery due to transport of coal.
A2	Air Quality.	Neg High	Neg Moderate	Neg Moderate	Neg High	Neg Moderate	Neg High	Likely to be higher than New Largo Colliery due to transport of coal.
A3a	Groundwater Quality.	Neg Low	Neg Low	Neg Low	Neg Moderate	Neg Low	Neg Moderate	Likely to be similar to that of New Largo Colliery
A3b	Groundwater Quantity.	Neg Low	Neg Low	Neg Low	Neg Moderate	Neg Low	Neg Moderate	Likely to be similar to that of New Largo Colliery
A4a	Surface Water Quality.	Neg Moderate	Neg Moderate	Neg Moderate	Neg High	Neg Moderate	Neg Moderate	Likely to be similar to that of New Largo Colliery
A4b	Surface Water Quantity.	Neg Low	Neg Moderate	Neg Low	Neg Moderate	Neg Low	Neg Low	Likely to be similar to that of New Largo Colliery
B1a	Ecology and Biodiversity (Terrestrial Habitats).	Neg High	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg High	Could be similar to that of New Largo Colliery
B1b	Ecology and Biodiversity (Aquatic Habitats).	Neg Moderate	Neg Very High	Neg High	Neg Very High	Neg High	Neg Moderate	Could be similar to that of New Largo Colliery
B1c	Wetlands (Biodiversity and Water).	Neg High	Neg Very High	Neg High	Neg Very High	Neg High	Neg High	Could be similar to that of New Largo Colliery
C1	Soils and Land Capability.	Neg Moderate	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Moderate	Could be similar to that of New Largo Colliery
C2	Roads, Traffic and Infrastructure.	Neg Moderate	Neg Moderate	Neg Low	Neg Moderate	Neg Moderate	Neg Moderate	Likely higher than New Largo Colliery due to transport of coal.
C3	Social Impacts.	Neg High	Neg High	Neg Moderate	Neg Very High	Neg Moderate	Neg High	Likely to be similar to that of New Largo Colliery
C4	Land Use Change (Impact on Existing Land Uses).	Neg Low	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Low	Likely to be similar to that of New Largo Colliery
C5a	Economic Impacts of Coal Supply to Kusile.	Neg High	Neg Very High	Pos Very High	Neg Very High	Pos Very High	Neg High	Coal supply to Kusile could be delayed with significant negative consequences.
C5b	Benefits of New Largo Colliery versus Existing Economic Activities.	Pos Moderate	Pos Very High	Pos Very High	Pos Very High	Pos Very High	Neg Very High	Likely to be similar to that of New Largo Colliery
C6	Noise Impacts.	Neg Low	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Low	Likely to be similar to that of New Largo Colliery
C7	Blasting impacts.	None	Neg High	Neg Low	Neg High	Neg Low	None	Likely to be similar to that of New Largo Colliery
C8	Visual Impacts.	Neg High	Neg Moderate	Neg Moderate	Neg High	Neg High	Neg High	Could be similar to that of New Largo Colliery
D1	Cultural and Heritage Impacts.	Neg Low	Neg Low	Neg Low	Neg Low	Neg Low	Neg Low	Could be similar to that of New Largo Colliery

Table 5.2(b): Impact assessment: Operational Phase (Synergistics, 2012)

	Impact	Existing Impact	Project Impact		Cumulative Impact		No-Go Development	Alternative Development Impact
			Unmitigated	Mitigated	Unmitigated	Mitigated		
A1	Climate and Greenhouse Emissions.	Neg High	Neg Moderate	Neg Moderate	Neg Very High	Neg High	Neg High	Likely to be higher than New Largo Colliery due to transport of coal.
A2	Air Quality.	Neg High	Neg High	Neg Moderate	Neg High	Neg High	Neg High	Likely to be higher than New Largo Colliery due to transport of coal.
A3a	Groundwater Quality.	Neg Moderate	Neg Very High	Neg Moderate	Neg Very High	Neg Moderate	Neg Moderate	Likely to be similar to that of New Largo Colliery
A3b	Groundwater Quantity.	Neg Low	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Moderate	Likely to be similar to that of New Largo Colliery
A4a	Surface Water Quality.	Neg Moderate	Neg Very High	Neg Moderate	Neg Very High	Neg Moderate	Neg Moderate	Likely to be similar to that of New Largo Colliery
A4b	Surface Water Quantity.	Neg Low	Neg High	Pos Moderate	Neg High	Pos Moderate	Neg Low	Likely to be similar to that of New Largo Colliery
B1a	Ecology and Biodiversity (Terrestrial Habitats).	Neg High	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg High	Could be similar to that of New Largo Colliery
B1b	Ecology and Biodiversity (Aquatic Habitats).	Neg Moderate	Neg Very High	Neg High	Neg Very High	Neg High	Neg Moderate	Could be similar to that of New Largo Colliery
B1c	Wetlands (Biodiversity and Water).	Neg High	Neg Very High	Neg High	Neg Very High	Neg Very High	Neg High	Could be similar to that of New Largo Colliery
C1	Soils and Land Capability.	Neg Moderate	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Moderate	Could be similar to that of New Largo Colliery
C2	Roads, Traffic and Infrastructure.	Neg Moderate	Neg Moderate	Neg Low	Neg Moderate	Neg Moderate	Neg Moderate	Likely higher than New Largo Colliery due to transport of coal.
C3	Social Impacts.	Neg High	Neg High	Neg Moderate	Neg Very High	Neg High	Neg High	Likely to be similar to that of New Largo Colliery
C4	Land Use Change (Impact on Existing Land Uses).	Neg Low	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Low	Likely to be similar to that of New Largo Colliery
C5a	Economic Impacts of Coal Supply to Kusile.	Neg High	Neg Very High	Pos Very High	Neg Very High	Pos Very High	Neg Very High	Coal supply to Kusile could be delayed with significant negative consequences.
C5b	Benefits of New Largo Colliery versus Existing Economic Activities.	Pos Moderate	Pos Very High	Pos Very High	Pos Very High	Pos Very High	Pos Moderate	Likely to be similar to that of New Largo Colliery
C6	Noise Impacts.	Neg Low	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Low	Likely to be similar to that of New Largo Colliery
C7	Blasting impacts.	None	Neg High	Neg Low	Neg High	Neg Low	None	Likely to be similar to that of New Largo Colliery
C8	Visual Impacts.	Neg High	Neg Moderate	Neg Moderate	Neg High	Neg High	Neg High	Could be similar to that of New Largo Colliery
D1	Cultural and Heritage Impacts.	Neg Low	Neg Low	Neg Low	Neg Low	Neg Low	Neg Low	Could be similar to that of New Largo Colliery

Table 5.2(c): Impact assessment: Decommissioning and Closure Phase (Synergistics, 2012)

	Impact	Existing Impact	Project Impact		Cumulative Impact		No-Go Development	Alternative Development Impact
			Unmitigated	Mitigated	Unmitigated	Mitigated		
A1	Climate and Greenhouse Emissions.	Neg High	Neg Low	Neg Low	Neg High	Neg Moderate	Neg High	Likely to be higher than New Largo Colliery due to transport of coal.
A2	Air Quality.	Neg High	Neg Moderate	Neg Moderate	Neg High	Neg Moderate	Neg High	Likely to be higher than New Largo Colliery due to transport of coal.
A3a	Groundwater Quality.	Neg Low	Neg Low	Neg Low	Neg Moderate	Neg Low	Neg Moderate	Likely to be similar to that of New Largo Colliery
A3b	Groundwater Quantity.	Neg Low	Neg Low	Neg Low	Neg Moderate	Neg Low	Neg Moderate	Likely to be similar to that of New Largo Colliery
A4a	Surface Water Quality.	Neg Moderate	Neg Moderate	Neg Moderate	Neg High	Neg Moderate	Neg Moderate	Likely to be similar to that of New Largo Colliery
A4b	Surface Water Quantity.	Neg Low	Neg Moderate	Neg Low	Neg Moderate	Neg Low	Neg Low	Likely to be similar to that of New Largo Colliery
B1a	Ecology and Biodiversity (Terrestrial Habitats).	Neg High	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg High	Could be similar to that of New Largo Colliery
B1b	Ecology and Biodiversity (Aquatic Habitats).	Neg Moderate	Neg Very High	Neg High	Neg Very High	Neg High	Neg Moderate	Could be similar to that of New Largo Colliery
B1c	Wetlands (Biodiversity and Water).	Neg High	Neg Very High	Neg High	Neg Very High	Neg High	Neg High	Could be similar to that of New Largo Colliery
C1	Soils and Land Capability.	Neg Moderate	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Moderate	Could be similar to that of New Largo Colliery
C2	Roads, Traffic and Infrastructure.	Neg Moderate	Neg Moderate	Neg Low	Neg Moderate	Neg Moderate	Neg Moderate	Likely higher than New Largo Colliery due to transport of coal.
C3	Social Impacts.	Neg High	Neg High	Neg Moderate	Neg Very High	Neg Moderate	Neg High	Likely to be similar to that of New Largo Colliery
C4	Land Use Change (Impact on Existing Land Uses).	Neg Low	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Low	Likely to be similar to that of New Largo Colliery
C5a	Economic Impacts of Coal Supply to Kusile.	None	None	None	None	None	None	Coal supply to Kusile could be delayed with significant negative consequences.
C5b	Benefits of New Largo Colliery versus Existing Economic Activities.	Pos Moderate	Neg Moderate	Pos Moderate	Pos Moderate	Pos Moderate	Pos Moderate	Likely to be similar to that of New Largo Colliery
C6	Noise Impacts.	Neg Low	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Low	Likely to be similar to that of New Largo Colliery
C7	Blasting impacts.	None	Neg High	Neg Low	Neg High	Neg Low	None	Likely to be similar to that of New Largo Colliery
C8	Visual Impacts.	Neg High	Neg Moderate	Neg Moderate	Neg High	Neg High	Neg High	Could be similar to that of New Largo Colliery
D1	Cultural and Heritage Impacts.	Neg Low	Neg Low	Neg Low	Neg Low	Neg Low	Neg Low	Could be similar to that of New Largo Colliery

Table 5.2(d): Impact assessment: Post Closure Phase (Synergistics, 2012)

	Impact	Existing Impact	Project Impact		Cumulative Impact		No-Go Development	Alternative Development Impact
			Unmitigated	Mitigated	Unmitigated	Mitigated		
A1	Climate and Greenhouse Emissions.	Neg High	Neg Low	Neg Low	Neg High	Neg High	Neg High	Likely to be higher than New Largo Colliery due to transport of coal.
A2	Air Quality.	Neg High	Neg Low	Neg Low	Neg High	Neg High	Neg High	Likely to be higher than New Largo Colliery due to transport of coal.
A3a	Groundwater Quality.	Neg Moderate	Neg Very High	Neg Moderate	Neg Very High	Neg Moderate	Neg Moderate	Likely to be similar to that of New Largo Colliery
A3b	Groundwater Quantity.	Neg Low	Neg High	Neg Moderate	Neg High	Neg Moderate	Neg Moderate	Likely to be similar to that of New Largo Colliery
A4a	Surface Water Quality.	Neg Moderate	Neg Very High	Neg Moderate	Neg Very High	Neg Moderate	Neg Moderate	Likely to be similar to that of New Largo Colliery
A4b	Surface Water Quantity.	Neg Low	Neg High	Pos Moderate	Neg High	Pos Moderate	Neg Low	Likely to be similar to that of New Largo Colliery
B1a	Ecology and Biodiversity (Terrestrial Habitats).	Neg High	Neg Moderate	Pos Moderate	Neg High	Pos Moderate	Neg High	Could be similar to that of New Largo Colliery
B1b	Ecology and Biodiversity (Aquatic Habitats).	Neg Moderate	Neg Very High	Neg High	Neg Very High	Neg High	Neg Moderate	Could be similar to that of New Largo Colliery
B1c	Wetlands (Biodiversity and Water).	Neg High	Neg Very High	Neg High	Neg Very High	Neg Very High	Neg High	Could be similar to that of New Largo Colliery
C1	Soils and Land Capability.	Neg Moderate	Neg Moderate	Pos Moderate	Neg Moderate	Pos Moderate	Neg Moderate	Could be similar to that of New Largo Colliery
C2	Roads, Traffic and Infrastructure.	None	Neg Low	Neg Low	Neg Low	Neg Low	Neg Moderate	Likely higher than New Largo Colliery due to transport of coal.
C3	Social Impacts.	Neg High	Neg High	Neg Low	Neg High	Neg Moderate	Neg High	Likely to be similar to that of New Largo Colliery
C4	Land Use Change (Impact on Existing Land Uses).	Neg Low	Neg Moderate	Pos Moderate	Neg Moderate	Pos Moderate	Neg Low	Likely to be similar to that of New Largo Colliery
C5a	Economic Impacts of Coal Supply to Kusile.	None	None	None	None	None	None	Coal supply to Kusile could be delayed with significant negative consequences.
C5b	Benefits of New Largo Colliery versus Existing Economic Activities.	Pos Moderate	Neg Moderate	Pos Moderate	Pos Moderate	Pos Moderate	Pos Moderate	Likely to be similar to that of New Largo Colliery
C6	Noise Impacts.	Neg Low	Neg Low	Neg Low	Neg Low	Neg Low	Neg Low	Likely to be similar to that of New Largo Colliery
C7	Blasting impacts.	None	None	None	None	None	None	Likely to be similar to that of New Largo Colliery
C8	Visual Impacts.	Neg High	Neg Low	Neg Low	Neg High	Neg Moderate	Neg High	Could be similar to that of New Largo Colliery
D1	Cultural and Heritage Impacts.	Neg Low	None	None	Neg Low	Neg Low	Neg Low	Could be similar to that of New Largo Colliery

6. MOTIVATION FOR LICENCE APPLICATION

6.1 Authorisations required

6.1.1 Water uses requiring authorisation

A description of the water uses at the New Largo Colliery is provided in section 4.1.

6.1.2 Existing lawful water uses

There are no existing water uses as this is a proposed new mine.

A separate application has been submitted as part of the Phola-Kusile Coal Conveyor system for the following water uses that are relevant to the New Largo Colliery (refer to the IWULA (JW117/11/C184) and IWWMP (JW118/11/C184) for that project). Should these be authorised, the water uses will continue as part of the New Largo Colliery in the long term:

- Brine disposal facility and gypsum handling facility at the WTP (section 21(g));
- Storage of water for dust suppression and fire water (a 1 Mℓ treated water reservoir will be located at the mobile WTP and two 420 kℓ fire tanks) (section 21(a));
- Storage of potable water in 250 kℓ tank (section 21(a)) and
- A pre-treatment storage facility (7.5 Mℓ raw water storage) at the mobile WTP for the storage of abstracted water from the old mine workings (section 21(g)).

6.1.3 Relevant exemptions

Exemption is required from the following provisions of GN R 704 dated 4 June 1999:

- *Regulation 4(a): Locate or place any residue deposit, dam, reservoir together with any associated structure or any other facility within the 1:100 year floodline or within a horizontal distance of 100 m from any watercourse*

  Five of the pit polluted water transfer dams, the Admin Area PCD and the overburden dump are located within 100 m from wetlands.

  None of the infrastructure is located within the 1:100 year floodline.

- *Regulation 4(b): Conduct underground or opencast mining, prospecting or any other operation or activity under or within the 1:50 year floodline or within a horizontal distance of 100 m from any watercourse*

  Mining will take place within a number of watercourses and wetlands as indicated on Drawing number C184-04-002.

- *Regulation 4(c): Place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the working of any underground or opencast mine excavation*

  The majority of the discard will be disposed of in the mine voids (refer to section 4.1.5). Provision is also made for a surface discard dump (20 Mt) on a backfilled area for the disposal of discard in circumstances where in-pit discarding may not be possible (e.g. spontaneous combustion). **Error! Reference source not found.**

6.1.4 General authorisations

The storage of potable water from the WTP in the 1 Mℓ storage facility and the 250 kℓ potable water tanks fall within the ambit of the General Authorisations published in GN 399 dated 24 March 2006.

6.1.5 Other

The 1 200 Mℓ PCD exceeds 50 Mℓ and/or a wall height of 5 m and therefore the dam has to be registered with the DWA in terms of the Dam Safety Regulations published in GN R1560 dated 25 July 1986.

AAIC will also register the STP and WTP as waterworks in terms of GN R2834 dated 27 December 1985 in terms of the Water Act, 1956.

6.2 Section 27 motivation

6.2.1 Existing lawful water uses

All the water uses associated with the proposed New Largo Colliery is new water uses which require authorisation in terms of the NWA. Water uses associated with the Phola-Kusile Coal Conveyor system is discussed in section 6.1.2.

6.2.2 Redress the results of past racial and gender discrimination

AAIC is a broad-based black economic empowerment company in which Anglo American has a 73% shareholding and was formed in 2007. AAIC has a number of domestic and export-focused coal operations, including Kriel Colliery and Zibulo multi-product mine. Greenfield projects include New Largo, Elders and Heidelberg.

AAIC is led by the Lithemba Consortium and Pamodzi Coal, and has a beneficiary base that will benefit in excess of 27 000 individuals, the majority of whom are female Historically Disadvantaged South Africans. Women's Development Bank Investment Holdings is also a shareholder.

An independent broad-based Community Trust that will benefit historically disadvantaged communities around AAIC operations has been formed. A copy of the Social and Labour Plan for the New Largo Colliery is attached in the IWWMP, in which more details are provided of these initiatives.

6.2.3 Efficient and beneficial use of water in the public interest

South Africa's national electricity utility, Eskom, currently relies on coal fired power stations to produce approximately 95% of the electricity generated in South Africa. Therefore, until alternative energy generation options are implemented on a large enough scale, Eskom is totally dependent on coal mining (Synergistics, 2011). The Kusile Power Station is aimed at meeting the growing energy demand in South Africa.

AAIC and Eskom maintain that the proposed New Largo Colliery is needed to:

- Ensure the supply of a secure, long-term supply of coal to the Kusile Power Station;
- Enable the Kusile Power Station to provide power to the national electricity grid on schedule;
- Address power shortages in the national grid since there are no short to medium term options to replace the Kusile Power Station's energy generation capacity at a national level;

- Avoid negative impacts of energy shortages on national economic growth and development;
- Achieve the objectives and targets set out in IRP2010 and the National Government's national electricity generation strategy (Synergistics, 2012).

The water uses associated with the New Largo Colliery will therefore assist in ensuring the Eskom meets its objectives in terms of supplying in the electricity need of the country.

6.2.4 Socio economic impact of the water uses if authorised or of the failure to authorise the water uses

The total value of lost current economic activity totals R312 million over 45 years as a result of the mining activity expanding in the mining area. However, the estimated turnover value of coal mining operations over the 45 years is estimated at R6.1 billion (2011 values). The gained economic activity in mining is therefore much higher than the lost economic activity valued (Demacon, 2011).

Electricity supply is a critical issue in South Africa and the proposed project is expected to improve the stability of the service. From a greater societal perspective the project will therefore have a positive impact. Concerns do however exist about the long term impact on food security due to cumulative loss of high potential agricultural land. The proposed project will take place in an area surrounded by industrial development, and many of the impacts are already taking place and therefore stakeholders are familiar with potential impacts. A small number of stakeholders will bear the majority of impacts of a project that is in the interest of the country at large. The largest number of impacts will result from a change in land use and an influx of people (Ptersa, 2011).

6.2.5 Applicable catchment management strategy

The catchment management strategy for the Olifants River Water Management Area has not been developed. However, a number of studies and planning initiatives have been undertaken by the DWA for this area. This includes *inter alia*:

- Development of an Interim Water Quality Management Plan for the Klipspruit catchment (1995);
- Development of a Water Quality Management Plan for the Witbank Dam and Middelburg Dam catchments (1993);
- Assessment of the impact of abandoned and defunct coal mines within the Loskop Dam Catchment (2001);
- Ecological Water Requirements Assessment for the Olifants River (2001);
- Validation study for the Olifants WMA (2006);
- Development of a Reconciliation Strategy for the Olifants WMA;
- Classification of significant water resources in the Olifants WMA (project commenced 2011).

6.2.6 Impact of the water uses on the water resource and on other water users

A detailed impact assessment was undertaken for the New Largo Colliery as described in section 5. Key findings of the impact assessment are as follows (Synergistics, 2012):

New Largo Colliery will be an extensive opencast coal mine and, as for any coal mine of this scale, it would be associated with impacts of a very high significance that will require careful management and specialised long-term mitigation at considerable cost. Some of the impacts and mitigation will remain a risk and a cost for many years after mining has ceased.

The project will impact on a number of wetlands within in the mining area. Although the active treatment of water will assist with reducing this impact by returning clean water to the streams, the seasonality of the streams will be affected, which will impact on downstream wetlands and aquatic habitats. The destruction on wetlands can be regarded as residual. In addition, the majority of the land within the coal reserve consists of agricultural productive land, interspersed with small pockets of natural grasslands vegetation types classified as endangered, mainly as remnants in areas not suitable for agriculture.

Most of the negative social impacts of a project such as New Largo Colliery are often experienced locally by the people living in close proximity to the project. Impacts on the lives and livelihood of the project's future neighbours will require pro-active mitigation and in certain cases, compensation measures, which will have to be discussed with affected parties on a case by case basis. The various impacts of the New Largo Colliery are discussed in detail in Section 8 and have been rated, for all project activities and project phases, in Section 9 – these sections clearly indicate that there are substantial negative impacts as well as substantial positive impacts.

When considering the impacts of the proposed New Largo Colliery, the importance of the project in the national (South African) interest must be considered.

Kusile will require a constant supply of ~17 Mt per year over a life span of 55+ years. This requires a massive coal reserve. The New Largo Colliery coal reserve is located directly to the east of Kusile, between the N4 highway in the north and the N12 highway in the south, with a small portion of the coal reserve found to the south of the N12 highway.

In terms of scale and tonnages required, it is the opinion of the Environmental Assessment Practitioner that there is no alternative coal mine, or combination of smaller coal mines, that could supply this coal on schedule and at the correct grade, quality and quantities – with less environmental impacts than those associated with the New Largo Colliery. In the light of the discussions regarding the need and desirability of the development as outlined in the EIA Report, it is clear that New Largo Colliery is the best suited coal reserve to supply Kusile. This conclusion was reached based on the Environmental Assessment Practitioner's professional experience working with coal mines throughout all the major coal fields in Mpumalanga, Kwa-Zulu Natal and Limpopo provinces of South Africa.

The Environmental Assessment Practitioner for this project is of the opinion that there are no notable uncertainties and knowledge gaps that should affect an 'in principle' approval of the New Largo Colliery project.

Regardless of the obvious need for the project to be approved timeously to supply coal to Kusile, and to continue to provide a constant supply of coal to Kusile, potential changes are required to AAIC's optimised mine plan in order to exclude priority sensitive areas.

There are several portions of the New Largo coal reserve where mining by underground methods has taken place in the past, the largest and most extensive being the now defunct underground New Largo Coal Mine. It is estimated that approximately 20% of the reserve area comprises of defunct collieries with reserves

contained both in pillars and roof and/or floor of the workings. About ~45 Mt of coal over an area of 1300 hectares have been extracted by previous mining activities.

Collapse of old underground workings and spontaneous combustion poses a hazard to both the workforce and equipment if not adequately managed. AAIC has extensive experience in opencast mining of previously mined underground workings and safe work practices employed at these collieries will be implemented. However, the presence of the old underground workings do pose significant limitations on the mining methods chosen as well as on mine scheduling / sequencing to achieve safe mining conditions and achieve the required coal qualities for Kusile. AAIC views opencast mining using draglines, supported by small truck and shovel operations, as the only mining method to:

- Extract the shallow coal seams with a low stripping ratio (tons of overburden/tons of coal), generally too shallow for underground mining;
- Recover coal reserves remaining in areas previously mined by underground methods;
- Maximise the utilisation of the New Largo coal reserve and thus maximising coal supply to Kusile in order to sustain Kusile for the longest period of time possible from the New Largo coal reserve;
- Produce the vast quantities of coal required by Kusile.

Extensive sand mining operations are taking place within the New Largo coal reserve area. New Largo Colliery is thus not entirely a Greenfields mining project and a number of the wetlands, including one pan and several streams are impacted due to historical mining. Extensive coal mining takes place to the south of the New Largo coal reserve and there are reserves to the east where BHP Billiton has prospecting rights.

The New Largo coal reserve consists of areas with high quality coal and areas with lower quality coal, which will have to be blended in order to ensure a consistent supply of coal that meets Eskom's quality requirements for coal supply to Kusile, which uses pulverised coal combustion technology.

6.2.7 Class and resource quality objectives

In 2010 the DWA identified the need to undertake the classification of significant water resources in the Olifants WMA in accordance with the Water Resources Classification System and has commissioned Golder Associates Africa to assist with the classification process. Zitholele Consulting is assisting with the public consultation process of this project. The determination of management classes of the significant water resources in the Olifants WMA will describe the desired condition of the resource, and conversely, the degree to which it can be utilised by incorporating the economic, social and ecological goals of the users and stakeholders (DWA, 2011). This project is still in process and the management class of water resources in the Olifants WMA has therefore not been concluded yet.

The Directorate National Water Resource Planning (DNWRP) of the (then) Department of Water Affairs and Forestry (DWAF) developed a water quality management strategy for the Upper and Middle Olifants River catchment, which was published in 2009 (DNWRP, 2009). Interim Resource Water Quality Objectives (RWQO) were determined that will be reviewed once the water quality component of the ecological Reserve has been updated (in five years' time) (DNWRP, 2009).

Quaternary catchment B20F is considered to have rehabilitation potential, while quaternary catchment B20G is considered transformed in terms of the river component of the National Spatial Biodiversity Assessment (EcoInfo, 2011).

6.2.8 Investments already made and to be made by the water user

Capex for New Largo Colliery (mine and WTP): R 11 billion

Capex for R545 re-alignment: R 160 million.

According to AAIC, the capital cost for the WTP may vary between R15 and R25 million/Mℓ/day and operational costs between R4.50 and R7.00/m^3 treated at current values (Synergistics, 2012).

6.2.9 Strategic importance of water uses

South Africa's national electricity utility, Eskom, currently relies on coal fired power stations to produce approximately 95% of the electricity generated in South Africa. Therefore, until alternative energy generation options are implemented on a large enough scale, Eskom is totally dependent on coal mining (Synergistics, 2011). The Kusile Power Station is aimed at meeting the growing energy demand in South Africa.

AAIC and Eskom maintain that the proposed New Largo Colliery is needed to:

- Ensure the supply of a secure, long-term supply of coal to the Kusile Power Station;
- Enable the Kusile Power Station to provide power to the national electricity grid on schedule;
- Address power shortages in the national grid since there are no short to medium term options to replace the Kusile Power Station's energy generation capacity at a national level;
- Avoid negative impacts of energy shortages on national economic growth and development;
- Achieve the objectives and targets set out in IRP2010 and the National Government's national electricity generation strategy (Synergistics, 2012).

6.2.10 Quality of water resource which may be required for the Reserve and to meet international obligations

The Reserve Determination will be completed by April 2012 and the discharge from the WTP will be based on the outcome of this study.

6.2.11 Probable duration of any undertaking for which a water use is to be authorised

The New Largo Colliery will be operational for approximately 50 years. Some of the water uses, such as the watercourse crossings and mining within wetlands are permanent water uses. Treatment of impacted water and the discharge into the water resource is expected to continue well beyond the life of mine.

6.3 Supporting documents

The following documents are submitted in support of the application for a water use licence:

- Relevant specialist reports as compiled as part of the EIA (this was submitted separately as part of Environmental Impact Report);

- Copy of IWWMP (Appendix C)
- Title deeds (Appendix D);
- Completed application forms (Appendix E);
- Proof of payment of application fee (Appendix F); and
- Design drawings by Semane (Appendix G).

7. PUBLIC PARTICIPATION

7.1 Process

An integrated, comprehensive public participation process was undertaken by Zitholele Consulting for all the authorisation processes undertaken for the project. Key aspects included (Synergistics, 2012):

7.1.1 Identification of Interested and Affected Parties

Potential Interested and affected parties (I&APs) were identified through networking and the use of the existing AAIC and Eskom I&AP databases that have been developed since 2006. The existing databases included landowners, neighbouring landowners and people who participated in previous EIA processes in the area. Press advertisements and site posters were used to identify new I&APs.

7.1.2 Notifications to Interested and Affected Parties

Potential I&APs were notified about the project and the public participation process by means of:

- Direct letters to affected landowners within the AAIC prospecting right area (potential future mining right area);
- Press advertisements and site notices during both the project announcement, the scoping and impact assessment phases;
- Individual notifications to people who may be affected by the proposed development on the existing New Largo and Kusile Power Station I&AP databases (via telephone, email and/or fax) during the project announcement phase and the scoping phase;
- Individual meetings with holders of mining or prospecting rights within the AAIC prospecting right area (potential future mining right area), during both the project announcement phase and the scoping phase;
- Meetings with owners of land within the AAIC prospecting right area (potential future mining right area);
- Individual written notifications to all registered I&APs (by registered mail);
- Individual written notifications to Victor Khanye Local Municipality, previously Delmas (Mayor and Councillor), eMalahleni Local Municipality, previously Witbank (Municipal Manager), and Nkangala District Municipality (Mayor and Municipal Manager);
- Notifications will be sent to all registered I&APs about the review of the draft IWWMP and IWULA reports, the public feedback meetings, as well as the review of the final EIA report.

7.1.3 Notifications to Relevant Authorities

The following government departments were notified about the project, invited to a general announcement meeting and additional meetings during the review periods of the draft and final scoping reports:

- Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET);
- Department of Environmental Affairs (DEA);
- Department of Water and Environmental Affairs (DWA);
- Department of Agriculture, Forestry and Fisheries (DAFF);
- Mpumalanga Department of Agriculture, Rural Development and Land Administration;
- Mpumalanga Department of Public Works, Roads and Transport (DPWRT)
- Department of Public Works;
- Department of Mineral Resources;
- South African Heritage Resources Agency (SAHRA);
- Mpumalanga Tourism and Parks Agency;
- Mpumalanga Department of Labour;
- South African National Biodiversity Institute (SANBI).

7.1.4 Press Advertisements and Site Notices

Press advertisements were placed in the following newspapers between 22 March and 25 March 2011:

- Streeknuus;
- Corridor Gazette
- Ekasi News;
- Witbank News;
- Mpumalanga News;
- Middelburg Herald;
- Middelburg Observer;
- Ridge Times;
- The Echo; and
- Springs Advertiser.

Press advertisements focusing on the proposed R545 road deviation were placed in the following newspapers between 13 and 15 July 2011 (please note that these adverts also highlighted the proposed New Largo Colliery project and invited participants to participate in the EIA process):

- Streeknuus;
- Ekasi News;

- Witbank News;
- Mpumalanga News;
- Beeld.

Site notices (posters) were placed at various locations between 18 March and 25 March 2011. Site notices focusing mainly on the R545 road deviation were also placed at various locations on 14 July 2011. Please note that the site notices placed on 14 July 2011 also highlighted the proposed New Largo Colliery project and invited participants to participate in the EIA process.

Approximately 10 000 flyers focussing mainly on the R545 road deviation were handed out on 12 August 2011 at the following locations:

- R545 (Kendal/ Balmoral) off-ramps from the N12 highway;
- R545 (Kendal/ Balmoral) off-ramps from the N4 highway;
- Intersection of the R545 and R104 provincial roads;
- R545 (Phola/ Ogies) on and off-ramps to and from the N12; and
- Intersection of the R555 and R545 (Phola/ Ogies) provincial roads.

The flyers also highlighted the proposed New Largo Colliery project and invited participants to participate in the EIA process.

7.1.5 Registration of Interested and Affected Parties

People and/or organisations were registered as I&APs for the project if they:

- Attended one of the consultation meetings;
- Responded to notification letters and documentation, press advertisements, site posters or flyers;
- Own land within or adjacent to the proposed development footprint area;
- Hold mining or prospecting rights within the development footprint area;
- Own, operate or administrate infrastructure affected by the project; and
- Contacted Zitholele and/or Synergistics telephonically, or via fax, e-mail or post.

7.1.6 Background Information Document

A background information document (BID) was circulated in March 2011 to all landowners either personally or via registered mail, while all the identified I&APs received an electronic copy via e-mail.

Another BID focusing on the proposed R545 road deviation was distributed in July 2011 to all landowners either personally or via registered mail, while all the identified I&APs received an electronic copy via e-mail. Both these documents included a response sheet and a request for written comments. The BID distributed in July 2011 also highlighted the proposed New Largo Colliery project and invited participants to participate in the EIA process.

7.1.7 General Public Meetings

General public meetings were held on 12 and 13 May 2011 at the ‘Ons Huisie’ guesthouse situated next to the Kendal/Balmoral road.

A meeting was also held on 20 May 2011 with Dr Koos Pretorius of the Federation for a Sustainable Environment, Ms Carol Wentzel and Ms Annamie Duvenhage from the Bronkhorstspruit and Wilge River Conservation Association in Witbank to discuss the proposed project with them.

A water focus group meeting was held on 26 July 2011 that was attended by almost 80 people. Concerns regarding water resources were discussed. This meeting came about through a special request by stakeholders during the public meetings which were held on 12 and 13 May 2011.

7.1.8 Consultation with Landowners and Mining / Prospecting Right Holders

AAIC is in discussion with the owners of the affected properties.

Two meetings were held with Malachite Mining regarding access to their property should the proposed developments be implemented.

AAIC is in on-going discussions with Mr. Truter (from Truter Boerdery Trust), Mr. Cherry, SANRAL, Ingwe Coal Corporation and Eskom, directly affected landowners.

AAIC is in the process of requesting property valuations on directly affected land owned by Witbank Brickworks and Mr Van Heerden. A meeting was held between AAIC and Witbank Brickworks on 15 November 2011 regarding property purchases.

AAIC is in discussions with tenants and occupiers of land owned by AAIC.

AAIC is in on-going discussions with Mr Byrne (from Kendal Poultry Farm), a directly affected landowner, who is in the process of obtaining valuation on his properties.

Respective negotiations regarding property purchases are in process between AAIC and directly affected landowners, Ms Roos and Macphail Distributors.

A purchase agreement has been reached between AAIC and Mr Strick a directly affected farmer.

7.1.9 Consultation about the proposed Water Treatment Plants and the Waste Management License Application Process

The need for a waste management license was conveyed to I&APs and authorities at all of the public and authority meetings. During the initial meetings, the development of mobile WTPs and development of a permanent WTP later in the life of New Largo Colliery were presented as an integral part of the New Largo Colliery.

During July 2011, I&APs were informed of AAIC's intention to develop the first 4 Mℓ mobile WTP at an earlier date to treat water currently found in the old mine workings and to supply a portion of the water to the Phola-Kusile Coal Conveyor for dust suppression and fire protection. Since this first 4Mℓ mobile WTP will be commissioned before the New Largo Colliery, it will form part of a separate WML application. The second mobile WTP and waste activities associated with the mine form part of the WML application for New Largo Colliery.

A notification letter distributed to I&APs on 30 September 2011 included the announcement of the separate WML application for the first 4 Mℓ mobile WTP and its associated wastes. Site notices were placed on 27 October and an advertisement was published on 20 November 2011 to notify stakeholders of the proposed treatment plant and to invite comments from I&APs.

7.1.10 Focused Authority Meetings

A meeting was held with Mr Stanford Macevele and his colleagues from the DWA Regional Office in Bronkhorstspruit on 9 May 2011. The purpose of the meeting was to:

- Inform the department about the proposed New Largo Colliery;
- Obtain clarification on applicable water uses, legal requirements for the development, mining of wetlands and pans, reserve determination, the WUL process to be followed and the review and decision making panel.

A meeting was held with Dr Garth Batchelor of the MDEDET in Witbank on 19 May 2011. The purpose of the meeting was to:

- Inform MDEDET about the proposed New Largo Colliery;
- Obtain clarification on the environmental legal requirements for the development and the environmental authorisation, and the EIA process to be followed.

A meeting was held with Dr Paul Meulenbeld and Mr Pieter Ackerman of the DWA in Pretoria on 17 June 2011. The purpose of the meeting was to:

- Inform DWA about the proposed New Largo Colliery;
- Introduce the water and wetland environment;
- Obtain clarification on applicable water uses, legal requirements for the development, mining of wetlands and pans, reserve determination, the WUL process to be followed and the review and decision making panel.

A meeting was held with Mr Mpho Tshitangoni of the DEA in Pretoria on 30 September 2011. The purpose of the meeting was to clarify the structure and way forward for the Waste Management License Application process.

A meeting was held with Mr Samuel Mathavhela of the DMR in Witbank on 10 October 2011. The purpose of the meeting was to:

- Inform DMR about the proposed New Largo Colliery;
- Obtain clarification on the legal requirements for the development and the mining right approval, and the EMP process to be followed.

A meeting was held with Mr Stanford Macevele and Ms Madi Moloto from the provincial office of the DWA in Bronkhorstspruit on 11 October 2011. The purpose of the meeting was to:

- Inform DWA about the proposed New Largo Colliery;
- Introduce the water and wetland environment;
- Obtain clarification on applicable water uses, legal requirements for the development, mining of wetlands and pans, reserve determination, the WUL process to be followed and the review and decision making panel.

A meeting was held with Mr Frans Druyts and Keith Mnisi of the Civil Design Directorate of the DWA in Pretoria on 28 October 2011. The purpose of the meeting was to discuss the civil engineering designs and requirements.

7.1.11 Review of the IWULA and IWWMP

The IWULA and IWWMP will be made available for public and authority review from 12 March to 13 April 2012. All registered I&APs will be notified in writing of the availability of the document for review, and they will be requested to submit comments.

Electronic versions of the reports will be published on www.synergistics.co.za and www.zitholele.co.za and they will be circulated to all landowners and registered I&APs who provided an e-mail address. Hard copies will be made available at AAIC offices near Witbank, at the venue of the public meetings for the project, and at the Synergistics offices in Johannesburg. Additional copies can be made available on request.

The locations where the reports will be available for review are listed in **Table 7.1.11(a)**.

Table 7.1.11(a): Locations of reports for public review

CONTACT PERSON	LOCATION	CONTACT DETAILS
Printed Copies		
Ms Ntombi Jela	Ogies Public Library, 61 Main Street, Ogies	Tel: 013 643 1150 or 643 1027
Engela	El Toro Restaurant on the R545 near the Kendal Power Station.	Tel: 082 854 8594
Cindy Smith	Anglo American Inyosi Coal (Pty) Ltd Environmental Services offices, Witbank.	Tel: 013 691 5117
Lierieka Cuyler	Synergistics Environmental Services. 64 Wessels Road, Rivonia, Johannesburg.	Tel: 011 807 8225
Electronic Copies		
Lierieka Cuyler	www.synergistics.co.za or internet-based file download site (information available on request via email from Synergistics).	Tel: 011 807 8225, or send email request to marline@synergistics.co.za
Andre Joubert	www.zitholele.co.za	Tel: 011 207 2077
Andre Joubert	On request via email from Zitholele Consulting.	Phone 011 207 2077, or send email request to andrej@zitholele.co.za

7.2 Issues and responses

Detailed issues and response register is contained in the EIA Report. In summary, the issues related to water resources are as follows (Synergistics, 2012):

- Effects on water regime due to impact on wetlands;
- Impacts on water quality in streams and boreholes and impacts on neighbours and downstream users;
- Acid mine drainage / contaminated mine water (decant) reaching downstream environments;
- Impacts on boreholes and springs and aquifers due to blasting and dewatering;
- Impacts due to the disposal of coal discard in mine pit and/or on surface;
- Impacts of old oil storage in nearby old underground mine workings;
- Water monitoring positions, timeframes and adequacy of monitoring network to assess impacts on environment and neighbours;
- Compensation for impacts on neighbours;

- Recourse if neighbours are impacted but have difficulty proving the impact.

AAIC has committed to the installation of a WTP to treat all polluted water from start of project. The following concerns were raised regarding the treatment of water as mitigation measure for water quality management:

- The WTP will have to stay in operation and be viable for many years (200+ years) after closure of the mine;
- Financial provisions for management of water impacts during life of the mine for many years after closure;
- What would the real capital and operational costs be?
- Who will pay for it, especially many years after closure?
- If the base case is to release water to streams, how will the operation of the WTP be financed as water will not be sold?
- Future long-term energy source for WTP;
- Seasonality of flow would be lost if constant releases from WTP will be made;
- Positions of water released from the WTP should be chosen carefully to avoid erosion and impacts on downstream environments of the various streams affected;
- The findings of the Reserve Determination should be used to determine points and quantities for release of treated water;
- Ability of treatment plant to treat water contaminated due to stored bunker oil;
- The impacts on streams and wetlands due to the change to topography (lowering of the open cast mining area after mining) should be considered.

8. CONCLUSION AND RECOMMENDATION

8.1 Conclusion

The New Largo Colliery will provide coal to the Kusile Power Station, which is of strategic importance in the current long-term power supply strategy for the country.

It will be an extensive opencast coal mine associated with impacts of a very high significance that will require careful management and specialised long-term mitigation at considerable cost. In the opinion of the Environmental Assessment Practitioner, there is no alternative coal mine, or combination of smaller coal mines, that could supply the Kusile Power Station with coal on schedule and at the correct grade, quality and quantities – with less environmental impacts than those associated with the New Largo Colliery. It is therefore regarded as the best suited coal reserve to supply the Kusile Power Station (Synergistics, 2012).

A number of watercourses will be destroyed or impacted on due to the opencast mining activities. Since no on-site mitigation is possible

8.2 Recommended licence conditions

The following conditions are recommended for inclusion in the water use licence:

- The water balance should be calibrated using monitored data and should be reviewed annually and updated as may be required;

- A waste inventory should be developed one year after the mine becomes operational. This should be used to develop an integrated waste management plan;
- The IWWMP should be reviewed and updated every five years to take cognisance of any changes in the water balance, any resultant changes in the water and waste management measures, as well as changes to the mining schedule or development;
- Method statements should be developed for construction or mining activities within, or close to watercourses. This should be done in conjunction with a wetland and/or aquatic specialist and should be implemented during the construction phase;
- Monitoring of surface water, groundwater and the aquatic ecosystem should be done according to the monitoring programme outlined in the IWWMP;
- An Operations, Maintenance and Emergency Preparedness Manual should be developed for all water and waste containment facilities.

9. REFERENCE LIST

Anglo American Inyosi Coal (AAIC). (2011). Presentation at Water Focus Meeting on 26 July 2011.

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Synergistics Environmental Services. 2012. New Largo Colliery, Environmental Impact Assessment Report (Draft). (Report number S0403/NL/EIA01).

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Tolmay Hopkins
Project Manager

Marius van Zyl
Project Reviewer

John Glendinning
Project Director
for Jones & Wagener

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APPENDIX A

WATER USE DRAWINGS

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A.2 C184-04-002: S21(c)&(i) Water Uses

A.3 C184-04-003: Water Uses (Sheet 1 of 4)

A.4 C184-04-004: Water Uses (Sheet 2 of 4)

A.5 C184-04-005: Water Uses (Sheet 3 of 4)

A.6 C184-04-006: Water Uses (Sheet 4 of 4)

A.7 C184-04-007: Dewatering point layout

APPENDIX B

ENVIRONMENTAL MANAGEMENT PLAN

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B.1 Environmental Management Plan (Synergistics, 2012)

APPENDIX C

INTEGRATED WATER AND WASTE MANAGEMENT PLAN

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H.1 JW193/11/C184

REFER TO SEPARATELY BOUND REPORT

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TO BE INCLUDED IN FINAL DOCUMENT

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APPLICATION FORMS

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APPENDIX G

ENGINEERING DESIGNS FROM SEMANE CONSULTING ENGINEERS

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G.4 Admin Area PCD: 0000-0130-CED-0192 and 0000-0130-CED-0193

G.5 10 Mℓ PCD at Tip 2: 0000-0130-CED-0229

G.6 Surface discard dump and PCD: 0000-0130-CED-0202 and 0000-0130-CED-0203

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G.11 Emergency ROM stockpiles: 0000-0130-CED-0127 and 0000-0130-CED-0128

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