INTEGRATED WATER AND WASTE MANAGEMENT PLAN (IWWMP) IN SUPPORT OF THE CURRENT INTEGRATED WATER USE LICENSE APPLICATION (WULA)

BHP BILLITON KLIPSPRUIT COLLIERY: APPLICATION FOR WASTE ACTIVITIES

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S • E • F
STRATEGIC ENVIRONMENTAL FOCUS

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EXECUTIVE SUMMARY

The BHP Billiton Klipspruit Colliery (hereafter referred to as Klipspruit) is currently applying for a waste management license for existing waste management facilities and for the upgrade of certain waste related facilities at their operations located near the town of Ogies within the Nkangala District Municipality, in Mpumalanga Province. This will include several activities relating to the following:

- General and hazardous waste storage;
- Surface discard dump;
- Water pollution control dams including the new sump
- 3ML desalination Plant license application;
- Sewage treatment plant - change in designs from licensed facility;
- Rehabilitation of mined out areas;
- Bund areas for waste oil and tyre storage;
- Rehabilitation of areas where possible spillage may occur; and
- A recycling station.

The additional infrastructure requirements at Klipspruit and the increase in capacities will be needed to enable the mine to function optimally in terms of production, waste minimisation and general environmental impact reduction. The proposed expansion of Klipspruit’s capacity for dirty water storage would prevent excess dirty water from overflowing into the surrounding watercourses. The upgrade of the sewage treatment plant will enable the plant to function more effectively and produce less waste. Due to the increased mining occurring at Klipspruit, the affected water quantities have also increased. The increased capacity of the desalination plant will enable the mine to treat the increased quantities of affected water for reuse in the mine processes such as coal washing and dust suppression. The expansion of the current coal discard dump will enable the mine to accommodate the increased volumes of coal discard generated at the mine. In addition, Klipspruit needs to increase their abstraction of water from boreholes for the continuance of coal production. In order to prevent waste oil and waste tyres from contaminating the environment, Klipspruit further proposes to enlarge the existing bund areas for such storage.

BHP Billiton Energy Coal South Africa (BECSA) appointed Strategic Environmental Focus (Pty) Ltd (SEF) as an independent environmental consultant to produce an Integrated Water and Waste Management Plan to support the Integrated Water Use License Application (IWULA) process for the proposed upgrades to their waste management facilities in terms of Section 21 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). The following water uses in terms of Section 21 of the NWA are being applied for by Klipspruit Colliery:

SEF Project Code: 503948
### NWA Section 21

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td><strong>(a)</strong> Taking water from a water resource</td>
</tr>
</tbody>
</table>
| **(b)** Storing water | Storage of raw water in a 10 million litre water storage dam  
Storing of water in the in-pit sump as well as storing of water in pollution control dams |
| **(c)** Impeding or diverting the flow of water in a water course | Clean water runoff from the plant that drains into the Saalklapspruit. |
| **(d)** Engaging in a stream flow reduction activity contemplated in section 36 | The planting of eucalyptus species to control ground water |
| **(f)** Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit | Potential for the water stored in the dirty water storage dam and main balancing dam to spill or seep into the catchment. Treated water from the desalination plant to be discharged into the Saalklapspruit |
| **(g)** Disposing of waste in a manner which may detrimentally impact on a water resource | Storing of water in pollution control dams. |
| **(i)** Altering the bed, banks, course or characteristics of a water course | The discharge of water into the Saalklapspruit is likely to influence the characteristics of the watercourse, i.e. the water quality, habitat, biota and flow regime |
| **(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 | this is already covered in the current license. We can rather say increased pumping from the pit because we currently pump more than what we are authorized to pump |

The site is located in the quaternary catchment B20G within the Olifants Water Management Area as defined by the Department of Water Affairs (DWA). This WMA is further divided into four sub-areas and the Kipspruit Colliery is located in the Upper Olifants sub-area (DWAF, 2003). The DWA is the decision making authority in terms of the IWULA.

This document is the Integrated Water and Waste Management Plan (IWWMP) which serves as the technical supporting document to the IWULA. The following is included within this IWWMP:

**Section 1**: A description of the proposed water use activities;
**Section 2**: A description of the proposed project;
**Section 3**: A description of the current state of the environment;
**Section 4**: A description of the process undertaken;
**Section 5**: A description of the possible impacts on the surrounding water environment;
**Section 6**: A description of the proposed mitigation and management measures for all water and waste related activities;
**Section 7**: A description of the monitoring and auditing measures for the proposed
Section 8: A description of the company structure and communication systems.

A summary of the anticipated water and waste related impacts are presented below:

<table>
<thead>
<tr>
<th>Areas of Impact</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater</td>
<td>Decreased in overall ground water level due to increased abstraction</td>
</tr>
<tr>
<td></td>
<td>Contamination of groundwater due to spillages and seepage from stockpiles</td>
</tr>
<tr>
<td>Surface Water</td>
<td>Increased surface water runoff due to vegetation clearing</td>
</tr>
<tr>
<td></td>
<td>Pollution of surface water resources due to mine water discharge</td>
</tr>
<tr>
<td>Soils</td>
<td>Stripping of soils for expansion of waste management area</td>
</tr>
<tr>
<td></td>
<td>Spillages from waste facilities and seepage from stockpiles</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Construction activities for the expansion of facilities, operational activities of mining processes and effects of wind</td>
</tr>
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBBEE</td>
<td>Broad Based Black Economic Empowerment</td>
</tr>
<tr>
<td>BECSA</td>
<td>BHP Billiton Energy Coal South Africa</td>
</tr>
<tr>
<td>BH</td>
<td>Borehole</td>
</tr>
<tr>
<td>BPG</td>
<td>Best Practice Guideline</td>
</tr>
<tr>
<td>CMA</td>
<td>Catchment Management Agency</td>
</tr>
<tr>
<td>COD</td>
<td>Chemical Oxygen Demand</td>
</tr>
<tr>
<td>CRR</td>
<td>Comments and Responses Report</td>
</tr>
<tr>
<td>DEA</td>
<td>Department of Environmental Affairs</td>
</tr>
<tr>
<td>DMR</td>
<td>Department of Mineral Resources</td>
</tr>
<tr>
<td>DWA</td>
<td>Department of Water Affairs</td>
</tr>
<tr>
<td>DWAF</td>
<td>Department of Water Affairs and Forestry</td>
</tr>
<tr>
<td>EA</td>
<td>Environmental Authorisation</td>
</tr>
<tr>
<td>EAP</td>
<td>Environmental Assessment Practitioner</td>
</tr>
<tr>
<td>EC</td>
<td>Electrical Conductivity</td>
</tr>
<tr>
<td>ECO</td>
<td>Environmental Control Officer</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>ELM</td>
<td>Emalahleni Local Municipality</td>
</tr>
<tr>
<td>ELU</td>
<td>Existing Lawful Use</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Programme</td>
</tr>
<tr>
<td>EMS</td>
<td>Environmental Management System</td>
</tr>
<tr>
<td>GA</td>
<td>General Authorisation</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GGP</td>
<td>Gross Geographic Product</td>
</tr>
<tr>
<td>HDSA</td>
<td>Historically Disadvantaged South Africans</td>
</tr>
<tr>
<td>I&amp;APs</td>
<td>Interested and Affected Parties</td>
</tr>
<tr>
<td>IDP</td>
<td>Integrated Development Plan</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standard of Operations</td>
</tr>
<tr>
<td>IWUL</td>
<td>Integrated Water Use License</td>
</tr>
<tr>
<td>IWWM</td>
<td>Integrated Water and Waste Management</td>
</tr>
<tr>
<td>IWWM</td>
<td>Integrated Water and Waste Management Plan</td>
</tr>
<tr>
<td>LOM</td>
<td>Life of Mine</td>
</tr>
<tr>
<td>LED</td>
<td>Local Economic Development</td>
</tr>
<tr>
<td>LDEP</td>
<td>Local Economic Development Policy</td>
</tr>
<tr>
<td>mamsl</td>
<td>meters above mean sea level</td>
</tr>
<tr>
<td>MAP</td>
<td>Mean Annual Precipitation</td>
</tr>
<tr>
<td>MAR</td>
<td>Mean Annual Runoff</td>
</tr>
<tr>
<td>MbgI</td>
<td>meter below ground level</td>
</tr>
<tr>
<td>NDM</td>
<td>Nkangala District Municipality</td>
</tr>
<tr>
<td>PCD</td>
<td>Pollution Control Dam</td>
</tr>
<tr>
<td>RoD</td>
<td>Record of Decision</td>
</tr>
<tr>
<td>RoR</td>
<td>Record of Recommendation</td>
</tr>
<tr>
<td>RSDF</td>
<td>Regional Spatial Development Framework</td>
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<tr>
<td>RWQO</td>
<td>Resource Water Quality Objectives</td>
</tr>
<tr>
<td>SBR</td>
<td>Sequential Batch Reactor</td>
</tr>
<tr>
<td>SEF</td>
<td>Strategic Environmental Focus (Pty) Ltd</td>
</tr>
<tr>
<td>SO&amp;G</td>
<td>Soap, Oil and Grease</td>
</tr>
<tr>
<td>SS</td>
<td>Suspended Solids</td>
</tr>
<tr>
<td>SWMP</td>
<td>Stormwater Management Plan</td>
</tr>
<tr>
<td>TDS</td>
<td>Total Dissolved Solids</td>
</tr>
<tr>
<td>TSD</td>
<td>Technical Supporting Document</td>
</tr>
<tr>
<td>TSS</td>
<td>Total Suspended Solid</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>TWQR</td>
<td>Target Water Quality Range</td>
</tr>
<tr>
<td>WMA</td>
<td>Water Management Area</td>
</tr>
<tr>
<td>WQM</td>
<td>Water Quality Management</td>
</tr>
<tr>
<td>WULA</td>
<td>Water Use License Application</td>
</tr>
<tr>
<td>WRPM</td>
<td>Water Resources Yield Model</td>
</tr>
<tr>
<td>WRYM</td>
<td>Water Resources Planning Model</td>
</tr>
<tr>
<td>WWTPP</td>
<td>Waste Water Treatment Package Plant</td>
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</table>
GLOSSARY OF TERMS

**Alternative** - A possible course of action, in place of another, that would meet the same purpose and need defined by the development proposal. Alternatives considered in the Environmental Impact Assessment (EIA) process can include location and/or routing alternatives, layout alternatives, process and/or design alternatives, scheduling alternatives or input alternatives.

**Aspect** – Element of an organization’s activities, products or services that can interact with the environment.

**Auditing** - A systematic, documented, periodic and objective evaluation of how well the Environmental Management Programme (EMP) is being implemented and is performing with the aim of helping to safeguard the environment by facilitating management control which would include meeting regulatory requirements. Results of the audit help the organization to improve its environmental policies and management systems.

**Built environment** - Physical surroundings created by human activity, e.g. buildings, houses, roads, bridges and harbours.

**Conservation** - Protecting, using and saving resources wisely, especially the biodiversity found in an area.

**Contamination** - Polluting or making something impure.

**Corrective (or remedial) action** - Response required to address an environmental problem that is in conflict with the requirements of the EMP. The need for corrective action may be determined through monitoring, audits or management review.

**Degradation** - The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

**Ecology** - The relationship between living things (animals, plants and humans) and their environment.

**Environment** - Our surroundings, including living and non-living elements, e.g. land, soil, plants, animals, air, water and humans. The environment also refers to our social and economic surroundings, and our effect on our surroundings.

**Environmental Management System** – An Environmental Management System (EMS) provides guidance on how to manage the environmental impacts of activities, products and services. These systems detail the organizational structure, responsibilities, practices, procedures, processes and resources for environmental management. The ISO14001 EMS standard has been developed by the International Standards Organization (ISO).

**Environmental policy** - Statement of intent and principles in relation to overall environmental performance, providing a framework for the setting of objectives and targets.

**Hazardous waste** – Waste, even in small amounts, that can cause damage to plants, animals, their habitat and the well-being of humans, e.g. detergents, pesticides, hydrocarbons, etc.

**Impact** - A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

**Indigents** - One who is poor and cannot afford basic necessities of life like food, shelter and clothes.

**Infrastructure** - The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage.

**Integrated** - Mixing or combining all useful information and factors into a joint or unified whole.

**Integrated Environmental Management (IEM)** - A way of managing the environment by including environmental factors in all stages of development. This includes thinking about physical, social, cultural and economic factors and consulting with all the people affected by the proposed development.

**Land use** - The use of land for human activities, e.g. residential, commercial and industrial use.

**Mitigation** - Measures designed to avoid, reduce or remedy adverse impacts.

**Natural environment** - Our physical surroundings, including plants and animals, when they are unspoiled by human activities.

**Policy** - A set of aims, guidelines and procedures to inform decisions and manage an organization or structure. Policies are based on people’s values and goals.

**Process** - A number of planned steps or stages.
Recycling - Collecting, cleaning and re-using materials.

Resources - Parts of our natural environment that we use and protect, e.g. land, forests, water, wildlife, and minerals.

Stakeholders - A subgroup of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term includes the proponent, authorities and all interested and affected parties.

Stormwater management – Strategies implemented to control the effects of stormwater (surface flow of water), such as erosion, sedimentation and pollution of surface and ground water resources in the immediate and surrounding environments. This is specifically important during the construction and decommissioning phases of a project.

Sustainable development - Development that is planned to meet the needs of present and future generations, e.g. the need for basic environmental, social and economic services. Sustainable development includes using and maintaining resources responsibly.

Sustainability - Being able to meet the needs of present and future generations.

Waste Management – Classifying, recycling, treatment and disposal of waste.

Wetlands - An area of land with water mostly at or near the surface, resulting in a waterlogged habitat containing characteristic vegetation species and soil types e.g. vlei’s, swamps.

Zoning - The control of land use by only allowing specific types of development in fixed areas or zones.
1. INTRODUCTION

1.1 BACKGROUND

Strategic Environmental Focus (Pty) Ltd (SEF) has been appointed BHP Billiton Energy Coal South Africa (BECSA) to undertake an environmental application and waste license application processes for the licensing of the existing waste management activities and the proposed upgrades to waste facilities at the BHP Billiton Klipspruit Colliery situated near the town of Ogies in the Mpumalanga province. In addition, SEF has been appointed to produce an Integrated Water and Waste Management Plan (IWWMP) in support of the current water use license issued to the Klipspruit Colliery (Licence No. 24075037).

The Klipspruit Colliery became operational in October 2003 and export coal is transported to the Richards Bay Coal Terminal. The Klipspruit Colliery currently has a water use license issued in terms of Section 21 (a, j, g, f, c and i) of the National Water Act 1998 (Act No. 36 of 1998) for activities taking place on Farm Smaldeel 1 IS and Klipfontein 3 IS. The present license was issued in April 2006.

The mining area is described in terms of the main pit and mini pits. The opencast pit will still be operational for approximately ten years and will be expanded towards the townships of Phola and Weltevreden.

The main pit is mined from east to west via a dragline operation and includes the box cut spoils situated on the eastern boundary. The main haul road is located adjacent to the box cut spoils on the eastern boundary. The remainder of the mined out area between the ramps is covered by dragline spoils of which a significant portion has been levelled.

The box cut spoils is placed in a large berm parallel to the N12 highway along the northern boundary. Topsoil / subsoil stockpiles make up the western boundary of the old minipit, with the remainder of the mined out area already reclaimed. An inpit sump to store water to prevent decanting is located on the eastern edge of old minipit 2, between the mined out area and the Saalklapspruit.

The Smaldeel minipit is currently being mined by means of truck and shovel, employing the roll-over mining method. Smaldeel is situated in the south western corner of the mine. Mining in this area is from west to east. Smaldeel is reaching its Life of Mine (LOM); hence a new pit called Bankfontein is being developed to the south of Smaldeel.

Dirty water at Klipspruit Colliery is sourced mainly from the pits as well as runoff from the plant and workshop areas. Dirty water is stored in the North Pollution Control Dam (PCD), South PCD and Balancing Dam. From there, water is reused in the coal washing plant and for dust suppression within dirty areas to minimise the need to import water. Concurrent rehabilitation of mined out areas is undertaken as per the requirements and recommendations of the currently approved EMP.

Furthermore, water from pit is treated in the desalinisation plant. The desalinisation plant has a throughput capacity of 2 mega litres per day. The plant is licensed, however, due to
changes in the mining operations; a new license will be applied for to accommodate an
increase in capacity to 3 mega litres per day.

Klipspruit also has a licensed sewage treatment plant. Sewage is treated on site using a
Prentec treatment method. The sewage treatment plant will be upgraded with changes in the
design. Sewage effluent will be discharged to the balancing dam for reuse during dust
suppression. This plant will be included in the Integrated Water Use License Application.

In order to prevent waste oil and waste tyres from contaminating the environment, Klipspruit
proposes to enlarge the existing bund areas for such storage. The current waste
management facilities and the proposed expansion of waste storage facilities will be applied
for. Existing domestic waste storage facilities will also be upgraded to accommodate
additional waste generated in the mine.

Klipspruit Colliery has further plans to create a waste recycling facility. This will include the
construction of a concrete base for the sorting and packaging of waste for recycling and
reuse.

In the existing approved Environmental Management Programme (EMPr), the discard was
planned to be placed into the pit, below the level of the water table. However, there is
insufficient space under the water table for the entire discard from the increased capacity
plant, thus an alternative strategy for discard disposal was proposed during the EMPr
update. Subsequently a discard dump with a maximum height of 26 m and an area of 110 ha
was established on previously mined out areas. The waste dump’s capacity is currently
licensed for only 250 000 m$^3$ (88 286.6 tons per day), however it has since increased and the
new capacity has to be licensed.

1.2 CONTACT DETAILS

<table>
<thead>
<tr>
<th>Applicant: BHP Billiton Energy Coal SA Ltd: Klipspruit Colliery</th>
<th>Environmental Assessment Practitioner: SEF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Address (Site name and Location)</strong></td>
<td><strong>Building 4, 2nd Floor, Meiring Naude Street, Brummeria, 0184</strong></td>
</tr>
<tr>
<td>Klipspruit Colliery, Farm Klipfontein, Ogies, Mpumalanga</td>
<td></td>
</tr>
<tr>
<td><strong>Postal Address</strong></td>
<td><strong>P O Box 74785, Lynnwood Ridge, 0040</strong></td>
</tr>
<tr>
<td>Private Bag X15, Leraatsfontein, 1038</td>
<td></td>
</tr>
<tr>
<td><strong>Responsible Person</strong></td>
<td><strong>Mr Craig Allen</strong></td>
</tr>
<tr>
<td>Ms Nandi Sibanyoni</td>
<td></td>
</tr>
<tr>
<td><strong>Telephone Number</strong></td>
<td><strong>(012) 349 1307</strong></td>
</tr>
<tr>
<td>(013) 653 1208</td>
<td></td>
</tr>
<tr>
<td><strong>Facsimile Number</strong></td>
<td><strong>(012) 349 1229</strong></td>
</tr>
<tr>
<td>(013) 653 1606</td>
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</tr>
<tr>
<td><strong>E-mail Address</strong></td>
<td><strong><a href="mailto:craig@sefsa.co.za">craig@sefsa.co.za</a></strong></td>
</tr>
<tr>
<td><a href="mailto:nandi.sibanyoni@bhpbilliton.com">nandi.sibanyoni@bhpbilliton.com</a></td>
<td></td>
</tr>
</tbody>
</table>

1.3 PROPERTY DESCRIPTION & PROJECT LOCATION

The proposed facility upgrades will take place on the existing Klipspruit Colliery site located
on farms Klipfontein 3 IS and Smaldeel 1 IS. The mine is located within the Witbank
magisterial district and Nkangala District Municipality. The property is bordered on the north
by the N12 Road, to the east by the R545 Road and to the south by the R555 Road. The
central coordinates of the mine are as follows: 26°2’ 22.00’S; 29°1’ 17.35’E.
Figure 1: Locality Map of the BHP Billiton Klipspruit Colliery
Figure 2: BHP Billiton Plan indicating the Klipspruit mining area
1.4 LEGAL ASSESSMENT

In order to comply with legal requirements, the Klipspruit will at all times adhere to the DWA’s hierarchy of water management and decision making as described below. The Klipspruit will also ensure that legal routes are followed to obtain licenses and authorizations regarding the proposed project (i.e. correct applications within applicable timeframes).

Environmental legislation applicable to the Klipspruit Colliery Waste Facility Upgrade includes the following:

- National Water Act, 1998 (Act No. 36 of 1998) (NWA);
- National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA); and

1.4.1 Existing lawful uses (ELU)

Existing lawful water uses are defined in Part 3, Section 32 of the National Water Act as water uses that have taken place “at any time during a period of two years immediately before the date of commencement” of the National Water Act, 1998. The Klipspruit Colliery do not have any ELU registrations.

1.4.2 Summary of water uses

A summary of the existing and proposed water uses to be applied for is provided in Table 1. For ease of reference, the water uses have been included according to the type of water use as defined in Section 21 of the NWA.
Table 1: Summary of water uses (Complete details of authorised water uses is contained in the Klipspruit Integrated Water Use License 2006, which is appended as Annexure F with the associated supporting documentation)

| Property | S21 | Name | Description | Construction material | Date of commencement | X-coordinate | Y-coordinate | Volume (m³/day) |
|----------|-----|------|-------------|-----------------------|----------------------|--------------|--------------|----------------|----------------|
| A        | -   | -    | Water Abstraction | -                     | 12/04/2006           | -            | -            | 1500 200       |
| J        | -   | -    | Removing and disposing of water found underground | -                     | 12/04/2006           | 26° 01' 26.7" | 29° 02' 40.0" | 1500           |
| G        | -   | South Dam | Initial Remediation, Preparation, Construction, and Maintenance of the dams | According to report (License Application Report No. JW95/02/8214) | 12/06/2004 | 26° 03' 121" | 28° 59' 53" | -              |
|          |     | North Dam |                          |                        |                      | 26° 02' 47.9" | 29° 01' 3.9"   |                |
|          |     | Main Balancing Dam |                          |                        |                      | 26° 03' 2.1"  | 29° 01' 46.1" |                |
|          |     | Tailing Facility |                          |                        |                      | 26° 02' 57.2" | 29° 01' 7.3"   |                |
| F        | -   | -    | Discharging water containing waste | -                     | 12/04/2006           | -            | -            | 50             |
| C & I    | -   | Un-named tributary of the SaalKlap Spruit: Watercourse alteration | Preparing, Construction, Alteration and Maintenance of an unnamed tributary of the SaalKlap Spruit and Wilge Spruit in the Olifants catchment | According to the design drawing JW95/02/8214 | 12/04/2006 | 26° 03' 20.1" | 29° 01' 18.9" | -              |
|          |     | Un-named tributary of the Wilge River: Conveyor Crossing |                          |                        |                      | 26° 01' 14.7" | 29° 01' 40.5" |                |
|          |     | Un-named tributary of the Wilge River: Undermining Southern tributary by bord and pillar method |                          |                        |                      | 26° 03' 58.0" | 29° 00' 18.0" |                |
|          |     | Un-named tributary of the SaalKlap Spruit: Mining through streams X2 |                          |                        |                      | 26° 04' 10.4" | 29° 00' 27.2" |                |
1.4.3 Summary of relevant exemptions

No exemptions exist for water uses at the BHP Billiton Klipspruit Colliery.

1.4.4 Summary of general authorisations

Klipspruit has had no general authorisations issued.

1.5 SECTION 27 MOTIVATION

Water resources are protected by the NWA. An IWUL is therefore required in terms of Section 21 of this Act. Recognizing that the ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users, Klipspruit Colliery intends to avoid and/or minimize any negative environmental impacts on the affected water resources. Section 27 of the NWA is used as a guide for the responsible authority to aid in the decision making process of issuing and attaching conditions to water use licenses and general authorisations. It sets out the essential features of a license and the nature of the conditions that may be attached to a particular license.

1.5.1 Section 27 (1)(a) Existing lawful uses

Existing lawful water uses are defined in Part 3, Section 32 of the National Water Act as water uses that have taken place “at any time during a period of two years immediately before the date of commencement” of the National Water Act, 1998. The Klipspruit Colliery do not have any ELU registrations.

1.5.2 Section 27 (1)(b) Redressing past discrimination

The areas surrounding the Klipspruit Colliery, within 10 km, consists of the towns of Ogies, Phola and Weltevreden. During the construction phase of the proposed upgrades, temporary employment opportunities will be created and labour will be sourced from the local surrounding communities.

As part of the Social Labour Plan of the Klipspruit Colliery, as updated in May 2010, the mine subscribes to a Local Economic Development Policy (LEDP) which promotes the mine’s ongoing initiatives to align and involve themselves with Local Economic Development (LED) initiatives and the Integrated Development Plans of the Nkangala District Municipality (NDM) and the Emalahleni Local Municipality (ELM).

The Klipspruit Colliery’s LEDP indicates that the mine will continue (from 2009 – 2019) with their current LED projects as well establish new LED projects that will focus on infrastructure development, basic service provision, poverty eradication, skills development and education provision to communities. Complete details of the Local Economic Development Plan is outlined in Section 3 of the BECSA Social and Labour Plan for Klipspruit Colliery (May, 2010).
1.5.3 Section 27 (1)(c) Efficient & beneficial water use

Specifically in the context of direct water access; although the abstraction of groundwater during the construction phase will negatively impact the surrounding groundwater users, the upgraded facilities and their impact on making the mine function more efficiently will ensure that the mine becomes less dependent on a municipal water supply, thereby freeing up more water for other municipal water users. The construction of the new facilities and the capacity of the Klipspruit Colliery to process coal from other coal mine in the vicinity will also reduce the necessity for other water dependent processing plants to be built in the area. This is more environmentally friendly and economically viable.

1.5.4 Section 27 (1)(d) The socio-economic impact

The impacts described below will occur, or not, dependent on whether the water uses, as applied for, are approved.

1.5.4.1 of the water use or uses if authorised

The most noted benefits of granting authorization for the proposed upgrades include the effect that an increase in coal production will have on the local and national economy. The increased need for temporary labour during the construction phase and the more permanent employment opportunities in the operational phase will create job opportunities for local members of the surrounding communities through direct employment in the mine and through associated industries that will provide services to the mine. In addition, the increases in coal production for both export purposes and for local distribution to Eskom for local power generation is a positive for the national economy. The upgraded facilities will further allow for the optimal functioning of the mine and equip the mine to deal adequately with the build-up of polluted water thereby minimizing the risk to human health.

1.5.4.2 of the failure to authorise the water use or uses

The inability of the mine to increase coal production will have a negative impact on both the local and national economy and will reduce the amount of high quality coal exported and limit the amount of low quality coal available to Eskom for energy generation. Failure of the Department of Water Affairs to grant authorisation will also result in the build-up of polluted water on site and the Klipspruit Colliery will not have adequate facilities to store and treat the water, thereby posing a risk to the environment and to human health on site and in the surrounding area.

1.5.5 Section 27 (1)(e) Any catchment management strategy applicable to the relevant water resource

An overview of Water Resources Availability and utilisation was released by the, then, Department of Water Affairs and Forestry in 2003 for the Olifants Water Management Area (Report No. WMA 04/000/00/0203).

An Internal Strategic Perspective document for the Olifants Water Management Area was also finalised in 2004 (Report No. P WMA 04/000/00/0304).
Finally, a water quality report entitled “Development of a Reconciliation Strategy for the Olifants River Water Supply System” was finalised in December 2011 (Report No. P WMA 04/B50/00/8310/7).

1.5.6 Section 27 (1)(f) The likely effect of the water use to be authorised on the water resource and on other water users

The decrease in overall groundwater levels during the construction phase will impact negatively on other surrounding land users that utilise groundwater.

The upgraded waste facilities will allow for the mine to produce less waste water and re-use a lot of water in operations, such as dust suppression, thereby decreasing their necessity for municipal water and therefore more water from the municipal supply will be available for other water users.

1.5.7 Section 27 (1)(g) The class and the resource quality objectives of the water resource

In July 2009, Golder Associates prepared an Integrated Water Resource Management Plan for the Upper and Middle Olifants Catchment for the Department of Water Affairs. The report indicated that TDS and sulphate levels in the Witbank, Middleburg and Loskop dams have been increasing since 1970 and there is a necessity to remove the sulphate load from the system. Mines, as well as power stations and industries, are regarded as the major sources. This report outlined the Resource Water Quality Objectives (RWQOs) for the upper and middle Olifants sub-areas and is to be updated in 5 years. The management of salinity will depend on the reduction of loads into the system and will involve strategy for the management of both defunct and functional mines.

1.5.8 Section 27 (1)(h) Investments already made and to be made by the water user in respect of the water use in question

BECSA have already invested financial resources in the following:
- EIA process for the proposed desalination plant;
- Basic Assessment process for the amendment of the RoD for fuel storage tanks;
- Physical infrastructure engineering design layouts for the proposed upgrades; and

1.5.9 Section 27 (1)(i) The strategic importance of the water use to be authorised

In a national context, the production of coal contributes significantly to the Gross Domestic Product (GDP) of South Africa. Coal washing, however, is a water intensive exercise that is essential to operations and the water uses to be authorised need to be considered in the context of the significance of coal to the economy of the country. The capacity of the colliery to store water in facilities such as the pollution control dams further ensures that dirty water does not contaminate surrounding water resources and that water is temporarily stored until it is treated or re-used in the plant.
1.5.10 Section 27 (1)(j) The quality of water in the water resource which may be required for the Reserve and for meeting international obligations

The water quality of the Olifants River system has been documented in the “Development of a Reconciliation Strategy for the Olifants River Water Supply System” (DWA Report No. P WMA 04/B50/00/8310/7). The mining and agricultural industry activities in the upper Olifants water management area are the main contributors to poor in-stream and riparian habitat conditions. The water quality in the water management area is generally considered to be acceptable with a few exceptions. The sulphate levels in the Loskop Dam catchment and Witbank Dam catchment were found to be in an unacceptable range. The high sulphate levels in the area are presumably attributed to the use of ammonium sulphate fertilisers and the mining activities in the area. The electrical conductivity values were also found to be somewhat high, but were still within acceptable levels. The Olifants WMA is within the Limpopo River Basin which flows from South Africa into Moçambique. Therefore, developments in South Africa impact directly on Moçambique. A Joint Water Commission exists between South Africa and Moçambique facilitates the joint utilization of the water resources of the Olifants River. International cooperation in terms of use and management of watercourses in the Olifants river basin is currently overseen by the Limpopo Water Course Commission.

1.5.11 Section 27 (1)(k) The probable duration of any undertaking for which a water use is to be authorised

The proposed increase in abstraction of groundwater will be for the duration of construction. The remaining water uses applied for will be for the duration of the operation of the mine, which, according to the updated Klipspruit Colliery Social and Labour Plan, will be until 2019 (including a 3 year closure period).
2. PROJECT DESCRIPTION

2.1 PURPOSE OF THE DOCUMENT

The purpose of this document is to provide background information for the comprehensive understanding of the water and waste management system implemented for the BHP Billiton Klipspruit Colliery. The document also serves as a technical supporting document to the application for an IWUL. This document furthermore illustrates the compliance to the DWA’s water use principles, as listed below:

Compliance with the hierarchy of Water Quality Management (WQM) and decision-making: This is an essential requirement as the hierarchy forms the foundation of DWA’s approach to Integrated Water and Waste Management (IWWM). It is essential to be able to demonstrate that the steps in the water management hierarchy, namely pollution prevention, water reuse/reclamation and water treatment principles have been considered and implemented at source.

Compliance with all legislation: This is an essential requirement of IWWM and as a minimum; every operation or water use activity should ensure that its facility fully complies with the relevant legislation, including acts, laws, regulations and license conditions. Therefore, systems need to be established and maintained to track legal compliance and to report this compliance on an annual basis, such as International Standard of Operations (ISO) systems and legal registers.

Life-cycle approach: This means that a holistic view should be taken over the full life-cycle of an activity and that the IWWMP must address all issues in a sustainable manner over the entire life cycle.

Cradle to grave principle: The operation or activity must provide proof that it accepts responsibility for all its waste streams and their consequential impacts, even when they have left their premises or boundaries.

Continual improvement: For the reason that planning, by necessity, is typically based on limited data, initial predictions can only be validated during the operational phase. The IWWMP must include measurable, quantifiable objectives, and relevant performance indicators which need to be identified, set, implemented, monitored and audited. Based on the compliance with objectives and targets, the IWWMP should be reviewed on an on-going basis and updated regularly (as stipulated) as part of compliance with the Environmental Management Systems (EMS) as well as in support of the principle of continual improvement.

Precautionary principle: IWWM must be conservative and must use appropriate and accepted techniques to determine all existing and potential impacts. In the absence of reliable data, consciously conservative assumptions must be made when undertaking any risk or impact assessments.

Site-specific considerations: The size and complexity of an IWWMP depends largely on the nature and extent of the operation, the characteristics of the hydrological water cycle at the
site, receiving water resource, receiving environment and the ecological and environmental sensitivity of the catchment management area. IWWM systems must therefore account for all site-specific considerations e.g. physical, chemical and climatic characteristics, as well as operational process factors and resource water quality and quantity objectives.

Consideration of temporal variability: IWWM must make use of accepted techniques that are capable of qualitatively and quantitatively defining water quality and quantity variations (trends) and their impact on surface and groundwater systems, currently and in the future.

Risk-based approach: The water user should apply appropriate risk assessment techniques to quantify the potential, current and long-term risks associated with its practices or activities and then apply appropriate management actions to minimize or mitigate the potentially significant risks.

Integrated Water Resource Management approach: This approach will ensure that the IWWMP takes account of catchment issues, identifies all existing and potential water and/or waste management issues relevant to the catchment area, and assesses the cumulative impact of the specific activity in context with the whole catchment area.

Public participation: To gain community acceptance, the IWWMP must address the requirements and expectations of all Interested and Affected Parties (I&APs), communities and stakeholders, including the relevant authorities. It is therefore essential that the community is consulted through the catchment management forums, and that they have access to information from planning stages to closure phases.

Management commitment: Total company and management commitment is fundamental to ensuring effective implementation of the IWWMP and to prevent and/or minimize existing and potential environmental impacts. The applicant must derive an IWWM policy, clearly stating the industry's approach to IWWM.

2.2 OBJECTIVES OF PROJECT

This section details only the project objectives. However, the waste and water related objectives make up the crux of the present proposal. The project aims to upgrade the currently approved waste management facilities at the Klipspruit Colliery. As such, the following objectives have been set for the project:

- Obtain all relevant authorisations and licenses prior to construction;
- Start construction in 2014 in order to have the relevant infrastructure in place so the increased volumes of coal can be processed starting 2015;
- Pollution prevention in all sectors;
- Continuous review of the impacts that the Klipspruit Colliery will have on the environment;
- Continuous review and implementation of management measures to minimise or prevent environmental impacts;
- Promote conservation of biodiversity of ecosystems;
- Participate in environmentally related dialogue with stakeholders and provide appropriate environmental training for all employees and contractors; and
- Maintain emergency preparedness through close community communication and forum participation as well as safety considerations.

2.3 PHYSICAL PROJECT DESCRIPTION

2.3.1 Infrastructure requirements

The infrastructure currently on site includes workshops, offices, sewage plant, an 8 million ton per annum processing plant, raw coal and product stockpiles, a rail load out facility, conveyors, filter plant, explosives magazine and earth bunkers.

As part of the current proposal, the proposed infrastructure changes are as follows:
- Infrastructure changes for the rehabilitation of mini-pit 2;
- Physical upgrades of the current desalination plant;
- Physical upgrades to the sewage treatment plant;
- Physical expansion of waste storage facilities for waste oil and tyres; and
- 10 000MI raw water storage dam.

2.3.2 Extent of operation

The proposed upgrades will be contained on the current site on which the Klipspruit Colliery is located. This will be located on the farms Klipfontein 3 IS and Smaldeel 1 IS.

2.3.3 Project life description

The proposed upgrades to facilities will be operational for the duration of the mining operations until 2019, which included 3 years of closure and decommissioning.

2.4 RESIDUE & EMISSIONS

2.4.1 Waste management

This IWWMP serves as a waste management plan, specifically for the construction and operational phases of the Klipspruit Colliery. This section provides the objectives of waste management at Klipspruit Colliery as well as defines the waste streams anticipated to be present. Section 6 provides detailed waste management activities and recommendations while Section 7 provides details on the recommended waste monitoring to be undertaken.

2.4.2 Waste stream identification & characterisation

Wastes at Klipspruit Colliery have been identified and characterised as indicated in Table 2 below. The Klipspruit Colliery additionally subscribe to an internal Waste Management Plan that aims to provide guidance to the organisation and outlines the performance requirements for effective waste management from cradle to grave. The Waste Management Plan was created in line with the BHP Billiton Charter and the applicable waste management
legislation. Emphasis is placed on pollution prevention from source by reducing, re-using and recycling. The BECSA Waste Management Plan is attached as Annexure E1.

Table 2: Waste stream identification and characterisation

<table>
<thead>
<tr>
<th>Type</th>
<th>Description / Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Waste</td>
<td>• Paper &amp; cardboard; and&lt;br&gt;• Non-hazardous, compatible canteen and tearoom waste, e.g. food, disposable cups, teabags, etc.</td>
</tr>
<tr>
<td>Non-hazardous Waste</td>
<td>General building rubble: Non-hazardous, non-compactable waste, e.g. wood, cardboard, plastic, cans, packing material, glass fiber, builder’s rubble, etc.</td>
</tr>
<tr>
<td>Hazardous Materials</td>
<td>• Oil and grease: Any oil-contaminated material e.g. brooms, sawdust, sorbents, rags, degreasing or solvent containers, used oil, oil contaminated water, etc.; &lt;br&gt;• Fluorescent tubes; and&lt;br&gt;• Batteries (Lead Cell, Nickel, Cadmium, etc.).</td>
</tr>
<tr>
<td>Sewage Treatment</td>
<td>Domestic sewage generated during the construction phase.</td>
</tr>
<tr>
<td>Other waste</td>
<td>Garden waste.</td>
</tr>
</tbody>
</table>

a) solid waste
It is estimated solid building rubble (construction material waste) will be generated during the construction phase. This building rubble will be removed to the nearest registered waste disposal site. During the operational phase, domestic waste generated will be removed to the nearest registered landfill site as and when necessary. All waste disposal activities will be undertaken in accordance with the BECSA Waste Management Plan 2009.

b) sewage / effluent
Sewage will be treated by the Prentec Treatment method. The sewage effluent will be discharged into the balancing dam and re-used for dust suppression.

2.4.3 Waste recovery & reduction

Klipspruit will at all times comply with the DWA’s hierarchy of water and waste management as described in Section 1.4. All efforts will be made to reduce the production of waste. The proposed upgrades will be instrumental in reducing the amount of waste produced at the mine. Spillage and pollution will be managed and monitored according to a waste operating procedure developed for the Klipspruit Colliery. No waste will be disposed of on-site.

Paper waste is collected and stored in a container before it is collected for recycling and all scrap is recycled.
3. PRESENT ECOLOGICAL STATUS

This section provides information on the present ecological status of the environment as related to the water uses. For more detailed ecological status information on other environmental aspects, please refer to the attached EIA reports.

3.1 CLIMATE

3.1.1 Regional climate

Most climatic data was obtained from the Bethal weather station with record of more than 60 years except for rainfall data obtained from the Ogie's rainfall station and wind data from the air quality specialist report for the Witbank area.

The climate of the study area can be described as temperate, experiencing warm summers and cold winters with sharp frost. On average the area experiences 8.3 hours of sunshine per day, and only nine days a year without sunshine. Table 2 provides information on the temperatures, rainfall and evaporation for the Ogie's area obtained from data for the year 2010.

Table 3: Climate data breakdown (2010)

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean Monthly Temperature (°C)</th>
<th>Average Daily Temperature</th>
<th>Average Monthly Rainfall (Ogie’s Rainfall Station)</th>
<th>A-pan Evaporation (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max</td>
<td>Min</td>
<td>Distribution</td>
<td>Max</td>
</tr>
<tr>
<td>Jan</td>
<td>19.5</td>
<td>25.8</td>
<td>17.80</td>
<td>128.1</td>
</tr>
<tr>
<td>Feb</td>
<td>19.2</td>
<td>24.4</td>
<td>13.65</td>
<td>97.6</td>
</tr>
<tr>
<td>Mar</td>
<td>18.0</td>
<td>24.5</td>
<td>10.78</td>
<td>77.6</td>
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<tr>
<td>Apr</td>
<td>15.2</td>
<td>22.1</td>
<td>5.85</td>
<td>42.1</td>
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<tr>
<td>May</td>
<td>11.7</td>
<td>19.6</td>
<td>2.43</td>
<td>17.5</td>
</tr>
<tr>
<td>Jun</td>
<td>8.4</td>
<td>16.9</td>
<td>1.18</td>
<td>8.5</td>
</tr>
<tr>
<td>Jul</td>
<td>8.5</td>
<td>17.1</td>
<td>0.97</td>
<td>7.0</td>
</tr>
<tr>
<td>Aug</td>
<td>11.5</td>
<td>20.1</td>
<td>1.35</td>
<td>9.7</td>
</tr>
<tr>
<td>Sep</td>
<td>14.8</td>
<td>23.1</td>
<td>3.25</td>
<td>23.4</td>
</tr>
<tr>
<td>Oct</td>
<td>17.2</td>
<td>24.5</td>
<td>10.11</td>
<td>72.8</td>
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<td>Nov</td>
<td>18.8</td>
<td>24.5</td>
<td>16.14</td>
<td>116.2</td>
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<tr>
<td>Dec</td>
<td>19.0</td>
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<tr>
<td>Annual</td>
<td>15.1</td>
<td>22.5</td>
<td>100</td>
<td>719.8</td>
</tr>
</tbody>
</table>

3.1.2 Mean monthly and annual rainfall

The rainy season in Ogie’s extends from October through to April when ±90% of the rainfall occurs. The humidity is low during the day and increasing slightly as the temperature cools at night. Rainfall peaks occur in December and January. During the dry winter months of June, July and August only ±3.5% of the rainfall occurs. The average annual precipitation is ± 720mm while the average A-pan evaporation is 1730mm, almost 2.5 times the annual rainfall.
3.1.3 Minimum and maximum temperatures

The mean daily maximum temperature is 25.8°C in January (midsummer) and 17.1°C in July (mid-winter). Average daily minimum temperature is 13.2°C in January and 0.2°C in July.
3.1.4 Wind
The windrose in Figure 5 illustrates the frequency of hourly wind from the 16 cardinal wind directions, with wind indicated from the direction it blows, i.e. easterly winds blow from the east. It also illustrates the frequency of average hourly wind speed in six wind speed classes. Generally the winds are light and seldom exceed 5.4 m/s.

The prevalence of light winds measured at Witbank is similar to that described for the larger area with more than 90% of all wind recorded being less than 5 m/s (Figure 5). The average annual wind speed is 3.1 m/s and the station experienced calm conditions for approximately 12.5% of the observation period. The prevailing winds in Witbank are predominantly westerly, northerly easterly and east-south easterly, associated with the relative location and strength of the Indian Ocean anticyclone and the low pressure trough over the southern African interior. The annual frequency of occurrence of westerly and northerly winds is more than 7% and 10% respectively, and the combined frequency of easterly and east-south-easterly winds exceed 20%. The wind speeds from these sectors are generally light to moderate with strong south to south-westerly winds in excess of 8.5 m/s occurring at times.

![Annual Wind Roses of the Witbank area (SAWS, 2010)](image)

Figure 5: Annual Wind Roses of the Witbank area (SAWS, 2010)

3.1.5 Incidence of extreme weather conditions

Severe frost can occur at times with the average first and last days of frost being 21 May and 1 September, respectively. The average duration of the frost period is 103 days. Extreme first and last dates of recorded frost over a period of 30 years are 15 April and 18 October respectively. Bethal receives only 3 hailstorms on average annually. These storms are most prevalent in early summer.
3.2 SURFACE WATER

Information was obtained from literature, and Klipspruit Colliery Revised and Consolidated EIA and EMP, dated March 2009, compiled by SRK Consulting.

The project is located within the Olifants River catchment with the quaternary sub-catchment B20G of the Limpopo-Olifants primary drainage region. From the mining area, streams drain to the Saalklapspruit which drains into the Wilge River which is part of the Loskop dam catchment. The Mean Annual Runoff (MAR) for Loskop dam is $397 \times 10^6 \text{m}^3$.

Testing for water quality indicated that the water draining northwards is suitable for drinking but contains slightly elevated iron levels. The stream flowing southwards has elevated manganese levels. The water downstream of the site is used primarily for agriculture and by Phola residents for washing themselves and laundry.

Wetlands occupy 96.3 ha of the study area and are divided into three types namely drainage lines, depressions and hillslopes. These wetlands cannot be regarded as pristine when compared with reference conditions.

In line with the conditions of the integrated Water Use Licence No. 24075037 (2006), Klipspruit Colliery has implemented surface water monitoring and biomonitoring programmes, which are discussed in more detail in Section 7.

3.2.1 Water management area

The Klipspruit Colliery falls in the B20G quaternary catchment in the Olifants Water Management Area (WMA). The main tributaries of the Olifants WMA are the Wilge, Elands and Ga-Selati Rivers on the left bank and the Steelpoort, Blyde, Klaserie, and Timbavati on the right bank.

This WMA is further divided into 4 sub-areas, and the Klipspruit Colliery is located in the Upper Olifants sub-area which constitutes the catchment of the Olifants River down to Loskop Dam. This sub-area is characterised by the extensive coal reserves in the southern region in the areas of Witbank and Middelburg (DWAF, 2004). The Upper Olifants sub-area is also the most urbanised of the WMA, with the population expected to grow in the future.

The Olifants River originates in the Highveld of Mpumalanga and the water management area covers three provinces, i.e. Gauteng, Mpumalanga and Limpopo. The sub-area consists of the catchment of the Olifants River down to Loskop Dam (DWAF, 2003).

The Olifants WMA is $54,570 \text{m}^2$ in size, taking into account only the South African portion of the Olifants River Catchment. Urban, industrial and mining industries constitute 19% of the total requirements for water in the Olifants Water Management Area. The contribution of urban, industrial and mining sectors to the gross geographic product is more than 50%.

In addition, most of the water in the upper Olifants sub-area is used as cooling water for thermal power stations. This is a highly consumptive activity and requires high quality water. According to DWAF (2003), future growth in water requirements in this WMA will be in the power generation, urban, industrial and mining sectors with the largest impact being in the Upper Olifants sub-area.
Figure 6: The Olifants Water Management Area indicating the sub-area boundaries (DWAF, 2003)
3.2.2 Surface water hydrology

The Olifants WMA is highly regulated in terms of water related infrastructure. According to the Internal Strategic Perspective developed by the then, Department of Water Affairs and Forestry for the Olifants WMA in 2004, a Water Resources Yield Model (WRYM) and Water Resources Planning Model (WRPM) does exist for the Olifants WMA. However, there is still uncertainty as to the availability of surface water and groundwater at the local level and more detailed hydrological studies are required.

Most of the surface runoff originates in the higher rainfall southern and mountainous regions of this WMA. The main storage dams in the Upper Olifants sub-area are the Bronkhorpspruit, Witbank, Doringpoort, Middelburg and Loskop.

3.2.3 Surface water quality

The water quality of the upper Olifants catchment is largely influenced by the coal mining undertaken in the area. This influences the quality of water in the Witbank and Middelburg Dam catchments as well as in the Spookspruit and Klipspuit catchments. The Integrated Water Resource Management Plan prepared by Golder Associates for the DWA (Report No. P WMA 04/000/00/7007) indicates acid conditions in the Klipspuit and Kromdraaispruit catchments due to failed neutralisation plants. It further indicated that the TDS and sulphate levels in the Witbank, Middelburg and Loskop Dam have been increasing since 1970.

3.2.4 Mean annual runoff (MAR)

The Mean Annual Runoff figures for the Olifants WMA sub-areas have been obtained from DWAF, 2003. It is indicated that more detailed studies are required for a more accurate representation of the mean annual runoff. Table 4 below shows the natural mean annual runoff and ecological reserve.

<table>
<thead>
<tr>
<th>Sub Area</th>
<th>Natural MAR</th>
<th>Ecological Reserve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Olifants</td>
<td>465</td>
<td>83</td>
</tr>
<tr>
<td>Middle Olifants</td>
<td>481</td>
<td>69</td>
</tr>
<tr>
<td>Steelpoort</td>
<td>396</td>
<td>94</td>
</tr>
<tr>
<td>Lower Olifants</td>
<td>698</td>
<td>214</td>
</tr>
<tr>
<td>Total</td>
<td>2040</td>
<td>460</td>
</tr>
</tbody>
</table>

The MAR for various catchments was also calculated using the WRSM90 monthly hydrological model. The runoff estimates are presented in the table below.
### Table 5: Mean Annual Runoff (MAR) for catchment areas

<table>
<thead>
<tr>
<th>Catchment</th>
<th>Catchment Area (km²)</th>
<th>MAR (x10⁶ m³)</th>
<th>% of MAR at Loskop Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – north western tributary (Smaldeel) measured at the N12</td>
<td>7.5</td>
<td>0.3</td>
<td>0.08</td>
</tr>
<tr>
<td>B – main mining area, measured at the N12</td>
<td>14.2</td>
<td>0.7</td>
<td>0.2</td>
</tr>
<tr>
<td>C – south eastern side, measured at the reserve boundary</td>
<td>5.4</td>
<td>0.3</td>
<td>0.08</td>
</tr>
<tr>
<td>D – largely off the mining area on the south eastern side, measured at the reserve boundary</td>
<td>8.4</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>E – western catchment upstream of the mining area</td>
<td>8.6</td>
<td>0.4</td>
<td>0.1</td>
</tr>
</tbody>
</table>

#### 3.2.5 Resource class & river health

Resource class and river health is defined in Table 5 below. These definitions are obtained from the DWA’s River Health Programme.

The Ecological Water Requirements Assessment for the Olifants River was compiled in 2001 at the request of the Department of Water Affairs and Forestry for planning purposes to address the increased water demands in the catchment. The document provides information regarding the aquatic ecosystem conditions in the catchment. This report was created with significant input from specialist investigations and provides an overview of the overall objectives for each of the upper, middle and lower catchment areas with information on the present ecological state, trajectory of change, status quo scenario and the ecological class of rivers and dams in each sub-catchment.

### Table 6: Resource class and river health

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

As per the description outlined in section 1.5.7 above.

3.2.7 Surface water user survey

Agriculture in the Olifants WMA is the largest water user and thus irrigation uses great amount of water. Agricultural activity is more prevalent in the Middle Olifants, Steelpoort and Upper Olifants sub-areas rather than the Upper Olifants. The Upper Olifants sub-area is characterised by largely by the six coal-fired power stations operated by Eskom. The water requirement for the power stations are met with water transfers from outside the WMA. This is further regulated at a national level and not considered in the surveys conducted at the WMA level.

In terms of domestic water users, the Upper Olifants sub-area is the most urbanised of the sub-areas and, therefore, has the highest domestic demands. The extensive coal mining activities in the Upper Olifants sub-area places further constraints on the water resources. A further water user in the area is industry that uses water for the manufacturing process. It is noted that most industries in the catchment receive water from the municipalities.

Surface water use downstream of the mine is largely agricultural. Water is also utilized by residents of Phola for washing and laundry (SRK, 2009). Farm owners in the vicinity rear cattle and grow maize and soya and they utilise water from dams, boreholes and rainfall.

3.2.8 Sensitive areas survey

A wetland study was conducted as part of the original EIA process undertaken by Oryx Environmental. The wetlands found in the study area are all non-riparian systems except one pan which is a seepage wetland. The wetlands were found to occupy 96.3 ha of the study area. Following the development of the mine infrastructure thus far and the workings of the operational phase of the mine, all of the hillslope seepage wetlands and an estimated 37% of drainage line seepage wetlands have been lost. This loss of wetlands impacts severely on the long term biodiversity support function. However, the wetland habitat has not been considered to be in pristine condition when compared with the reference conditions in the area. The recommended mitigation measures of the approved EMP is the re-creation of similar riparian habitat in the vicinity and for a structured monitoring programme to be implemented to determine the degree of success achieved subsequent to creating the new habitat. The impacts of the loss of wetlands in the area have a further effect on the biodiversity (flora and fauna) in the area. The loss of biodiversity due to the loss of wetland habitat was considered to be low in the original EIA due to the floral and faunai species being common to the area and the size of the lost habitat considered small in relation to the entire study area.

3.3 GROUNDWATER

According to DWA (2003) groundwater is extracted in large quantities throughout the Olifants WMA, with the greatest volume extracted in the Middle Olifants sub-area. The remaining portion of the Olifants WMA is considered to have limited groundwater potential due the underlying hard rock formations. However, there is concern over the pollution of groundwater through acid mine leachate in the coal mining regions of the Upper Olifants sub-area.
3.3.1 Aquifer characterisation

Specialist studies undertaken as part of the original EIA process included a complete groundwater assessment. As part of the groundwater survey, 13 boreholes were drilled. The depth of the water was found to vary between 0m and 37.02m with a mean of 5.67m. Water strikes were recorded in 7 of the 13 boreholes drilled between depths of 6m and 22m. Three different aquifer types were found to occur in the area; i.e. shallow perched aquifers, shallow weathered zone Karoo aquifers and Deep Karoo aquifers.

3.3.2 Groundwater quality

As per the original groundwater survey, the groundwater quality was found to be of very good quality. The pH values ranged from 5.1 – 8.9, indicating that no long-term mining related impacts occurred. Electrical conductivity showed full to marginal compliance to the SA drinking water standards with total dissolved solids marginally complying with the SA drinking water standards. Total alkalinity indicated natural elevated levels in some of the boreholes on site and the low sulphate levels found indicate an un-impacted environment.

3.3.3 Hydro census

During the hydro census conducted as part of the original EIA process by Oryx Environmental, boreholes, springs, well and fountains were encountered. Of the 32 boreholes found, 18 were found to be in use. Of the active boreholes, 15 were found to be used primarily for domestic purposes, three were used for agricultural and domestic uses and three boreholes are used for stock watering purposes. The boreholes supply water to approximately 400 people and approximately 250 large and small stock units. These figures are based on surveys conducted around 2002 – 2003. Complete details of the hydrocensus were included in the revised EIA and EMP produced by SRK in 2009 for submission to the DMR.

3.3.4 Potential pollution source identification

The mining operations of coal mines in the Upper Olifants catchment is seen as a major polluter of water resources in the WMA. Of particular concern is the pollution of groundwater through acidic mine leachate in both operational and defunct mines in the Upper Olifants sub-area. It should be considered that the Upper Olifants sub-area is the most urbanised of the four sub-areas in the Olifants WMA and pollution from dense settlements lead to sedimentation, faecal contamination and eutrophication of water resources.

Waste disposal facilities may potentially contaminate groundwater resources through runoff from high rainfall events. The Klipspruit Colliery does currently operate its own sewage treatment works and it is proposed that the capacity of this facility is increased. All waste water will be treated on site and will be re-used for activities such as dust suppression. However, any waste treatment facility harbours the potential to contaminate soils and groundwater through accidental leaks or spills of effluent.

Waste disposal for domestic and non-hazardous waste is also a potential source of pollution is inadequate landfill facilities are available in the vicinity which necessitates the build-up of waste on site.
3.3.5 Groundwater model

A groundwater model was produced for the Klipspruit Colliery prior to the initial EIA phase for the development of the mine. This model provided an indication of the underground water balance and fed into the production of the overall mine water balance report produced by Jones and Wagener, 2003. The Klipspruit Water balance is discussed in further detail in Section 6.4.5. In addition, as per the requirements of the approved EMP and the conditions of the Klipspruit Integrated Water Use License (2006), the Klipspruit Colliery has designed and implemented a complete groundwater monitoring programme which is detailed in Section 7 of this report.

3.4 SOCIO-ECONOMIC ENVIRONMENT

Although a great number of negative environmental and social impacts exist with the development of mines, the South African economy is dependent on the export of natural resources as a major contributor to the GDP. The mining industry in the Upper Olifants Water Management sub-area constitutes approximately 19% of the water requirement for the region but contributes more than 50% to the gross geographic product. The mining industry is also a major employer or unskilled, semi-skilled and skilled labour.

The proposed upgrades to the Klipspruit colliery will have local socio-economic impacts in the creation of temporary and permanent jobs in the construction and operational phases. It will also contribute to the national economy through the increased coal output for export purposes and the greater availability of coal for national power generation by Eskom, thereby also contributing to Eskom reaching its short and medium term targets of increasing energy output.

Klipspruit Colliery has a Local Economic Development Plan in place with current projects and proposed projects that focus on infrastructure development, basic service provision, poverty eradication, skills development and education provision to communities. The revised Social and Labour for the Klipspruit Colliery highlights the socio-economic benefits in greater detail.
4. IWWMP STRATEGIES AND OBJECTIVES

4.1 OBJECTIVES AND STRATEGIES

Section 2.2 above described the overall objectives for the Klipspruit Colliery waste facility upgrades. This section provides further details regarding the water and waste related strategies of the project. The management and mitigation objectives for water and waste at the Klipspruit Colliery are based on the principles contained in the DWA’s Best Practice Guideline (BPG) Series (2006-2008). The applied principles are described below.

- A water balance will be developed and updated throughout the construction phase based on measurements taken and predictions made;
- Monitoring of the water quality of the abstracted groundwater and the treated waste water will be undertaken regularly to ensure that optimum water quality is available for human consumption and that waste water quality complies to the DWA standards; and
- Monitoring and auditing reports will be generated and submitted as and when required by the DWA.

The objectives set for the current project, as per section 2.2., are listed below:

- Obtain all relevant authorisations and licenses prior to construction;
- Start construction in 2014 in order to have the relevant infrastructure in place so the increased volumes of coal can be processed starting 2015;
- Pollution prevention in all sectors;
- Continuous review of the impacts that the Klipspruit Colliery will have on the environment;
- Continuous review and implementation of management measures to minimise or prevent environmental impacts;
- Promote conservation of biodiversity of ecosystems;
- Participate in environmentally related dialogue with stakeholders and provide appropriate environmental training for all employees and contractors; and
- Maintain emergency preparedness through close community communication and forum participation as well as safety considerations.

4.2 STRATEGIC ACTIONS OF IWWMP

According to the IWWMP guideline, 2008: “Taking a strategic approach means to seek solutions that could prevent the causes of water pollution at source, rather than to treat the symptoms thereof. This usually entails that a long-term view on water management needs to be considered”.

The following actions will be taken by Klipspruit (as well as the implementation of the above objectives) to ensure water management is aimed at pollution prevention:

- Water management activities will be implemented at all times and reviewed after construction to ensure applicability;
• Mitigation measures will be undertaken throughout the construction and operational phases. The need for and implementation frequency of such activities will be reviewed subsequent to completion of the construction phase; and
• Implementation of the measures provided in this document will be undertaken to ensure minimisation or prevention of the impacts described in Section 5.2.

4.3 KEY PERFORMANCE AREAS AND INDICATORS

Key performance areas (KPAs) of the water related environment includes prevention of pollution as well as equitable and appropriate use of the water resources. The KPAs address strategy, institutional matters and sustainable management of the water resources. The KPAs addressed by Klipspruit Colliery are in the areas of water balance, pollution prevention, water quality and erosion control.

The Key Performance Indicators (KPIs) take the broad areas considered a step further in the development of tangible and measureable objectives against which progress may be tracked.

In terms of monitoring performance and in keeping with the recommendations made in the approved EMP, two yearly submissions of a monitoring and performance assessment is compiled in accordance with regulation 55 of the MPRDA.
5. IMPACT ASSESSMENT

5.1 METHODOLOGY FOLLOWED

The following methodology has been adopted from the DWA’s Draft Operational Guideline entitled “Operational Guideline to assist in the Compilation of a Water and Waste Management Plan Version 0.4”, dated January 2008.

Table 7: Ranking scales for impact assessment

<table>
<thead>
<tr>
<th>Duration = D</th>
<th>Magnitude = M</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - Permanent</td>
<td>10 - Very high/do not know</td>
</tr>
<tr>
<td>4 - Long term (ceases with operational life)</td>
<td>8 - High</td>
</tr>
<tr>
<td>3 - Medium term (5-15 years)</td>
<td>6 - Moderate</td>
</tr>
<tr>
<td>2 - Short term (0-5 years)</td>
<td>4 - Low</td>
</tr>
<tr>
<td>1 - Immediate</td>
<td>2 - Minor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale = S</th>
<th>Probability = P</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - International</td>
<td>5 - Definite/do not know</td>
</tr>
<tr>
<td>4 - National</td>
<td>4 - Highly probable</td>
</tr>
<tr>
<td>3 - Regional</td>
<td>3 - Medium probability</td>
</tr>
<tr>
<td>2 - Local</td>
<td>2 - low probability</td>
</tr>
<tr>
<td>1 - Site</td>
<td>1 - Improbable</td>
</tr>
<tr>
<td>0 - None</td>
<td>0 - None</td>
</tr>
</tbody>
</table>

SIGNIFICANCE POINTS (SP) = (D+M+S) X P

<table>
<thead>
<tr>
<th>Impact Level</th>
<th>Points Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (H)</td>
<td>&gt; 60 points</td>
</tr>
<tr>
<td>Moderate (M)</td>
<td>30 – 60 points</td>
</tr>
<tr>
<td>Low (L)</td>
<td>&lt; 30 points</td>
</tr>
<tr>
<td>No significance</td>
<td>0</td>
</tr>
</tbody>
</table>

Positive impacts

The maximum value of significance points is 100. Environmental effects could therefore be rated as either high (H), moderate (M), or low (L) significance, as seen above.

5.2 POSSIBLE IMPACTS ON THE ENVIRONMENT

Impacts have been divided into construction and operational phase impacts.
### Table 8: Anticipated impacts and the significance thereof

<table>
<thead>
<tr>
<th>Activity</th>
<th>Impact</th>
<th>Mitigation</th>
<th>Significance points</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction phase impacts on groundwater</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abstraction of groundwater</td>
<td>The abstraction of water in the construction phase may lead to a decrease in overall ground water levels and the limited or decreased availability of this resource to other groundwater users in the area. The upgraded facilities will decrease the mine’s dependence on water resources and the municipal water supply. This impact is, therefore, seen to be limited to the duration of the construction phase and the time thereafter for the groundwater resource to return to its previous state.</td>
<td>• Groundwater levels should be closely monitored via the existing network of on-site boreholes; and • Alternative sources of water for construction activities may need to be sourced if surrounding land users are significantly affected by this impact.</td>
<td>Duration = 2</td>
<td>Scale = 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Magnitude = 8</td>
<td>Probability = 4</td>
</tr>
<tr>
<td>Construction camp establishment</td>
<td>It is not anticipated that establishment of the construction camp will have a significant negative impact on the groundwater quality. However, should any spillages (e.g. hydrocarbon or hazardous chemicals) occur, the chemicals may infiltrate the groundwater resource.</td>
<td>Groundwater levels should be closely monitored via the existing network of on-site boreholes.</td>
<td>Duration = 2</td>
<td>Scale = 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Magnitude = 2</td>
<td>Probability = 2</td>
</tr>
<tr>
<td><strong>Construction phase impacts on surface water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearing of vegetation</td>
<td>The stripping of vegetation for the construction of new infrastructure and the development of the new box pit for further mining operations could lead to additional erosion and increased surface water runoff into the adjacent water resources.</td>
<td>• A surface water monitoring programme is currently in place and reports produced quarterly; and • If erosion is perceived to be excessive, a silt trap may be constructed below the construction area.</td>
<td>Duration = 2</td>
<td>Scale = 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Magnitude = 2</td>
<td>Probability = 3</td>
</tr>
<tr>
<td>Construction activities for infrastructure development</td>
<td>Construction activities are anticipated to have an impact on the remaining drainage line wetlands and pan on site. Other identified wetlands in the Bankfontein area are not perceived to be functioning.</td>
<td>• Berms and cutoffs may be inserted to protect the pan from construction activities; and • Mitigation of the drainage lines will not be possible.</td>
<td>Duration = 5</td>
<td>Scale = 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Magnitude = 4</td>
<td>Probability = 4</td>
</tr>
<tr>
<td><strong>Construction Phase impacts on Soils</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stripping of land</td>
<td>Impact on viable soils and land capability, since</td>
<td>• All topsoil removed to be store in</td>
<td>Duration = 4</td>
<td>30 = moderate</td>
</tr>
</tbody>
</table>

SEF Project Code: 503948

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<table>
<thead>
<tr>
<th>Activity</th>
<th>Impact</th>
<th>Mitigation</th>
<th>Significance points</th>
<th>Significance</th>
</tr>
</thead>
</table>
| for the expansions to the bund areas, storage areas for waste tyres and recycling station | most land is arable | appropriate designated area and is to be re-used for rehabilitation of mined out areas • Stripping of soils to take place in winter months to try and maintain structural integrity of soils as far as is possible • The seed bed should be adequately prepared to facilitate re-vegetation as per the rehabilitation plan • Amelioration of soil should be undertaken to enhance the agricultural potential of soils since the end use of the land post-closure will be to return to grazing land | Scale = 3  
Magnitude = 3  
Probability = 3 |  |
| Hydrocarbon spills from waste oil storage and construction vehicles | Contamination of surface and sub-surface soils | • Construction should preferably take place during the dry season • All construction vehicles should be parked in demarcated areas when not in use and drip trays should be placed under vehicles to collect any spillages/leaks • If hydrocarbon spills occur these should be cleaned using SUNSORB (or similar product) and the contaminated soils removed from site and dispose of at an appropriate registered landfill site | Duration = 2  
Scale = 3  
Magnitude = 2  
Probability = 3 | 21 = low |

**Construction Phase impacts on Air Quality**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Impact</th>
<th>Mitigation</th>
<th>Significance points</th>
<th>Significance</th>
</tr>
</thead>
</table>
| Construction vehicles travelling on exposed surfaces, earthworks, clearing of vegetation and the effects of wind on site | The mentioned activities will result in an increase in the ambient dust levels on site which will be further exacerbated by the effects of wind and clearing of vegetation which will expose more earth surfaces | • Appropriate dust suppression methods must be applied • Exposed soil stockpiles shall be covered, kept damp or protected using organic binding agents or alternative techniques that are not water intensive • The clearing of vegetation must be kept to a minimum and only where required. • Avoid unnecessary movement of construction vehicles • Vehicles travelling on unsurfaced roads | Duration = 3  
Scale = 3 | 36 = moderate |
<table>
<thead>
<tr>
<th>Activity</th>
<th>Impact</th>
<th>Mitigation</th>
<th>Significance points</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>must travel at a speed that creates minimal dust entrainment</td>
<td>Magnitude = 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>An appropriate dust monitoring programme should be implemented.</td>
<td>Probability = 4</td>
<td></td>
</tr>
<tr>
<td><strong>Operational Phase impacts on Groundwater</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seepage from stockpiles and dams</td>
<td>The potential for seepage from coal stockpiles and spillage from storage and pollution control dams exist on-site that could have a detrimental impact on groundwater resources.</td>
<td>• Seepage collection and detection drains currently intercept most of the leachate; and&lt;br&gt;• A groundwater monitoring is to be implemented on site particularly around features like coal stockpiles and dams.</td>
<td>Duration = 4</td>
<td>33 = moderate</td>
</tr>
<tr>
<td>Abstraction of groundwater</td>
<td>Abstraction of water during the operational phase will be minimal or limited to a reasonable extent. The groundwater table will thus have the opportunity to recharge the water lost during the construction phase.</td>
<td>• Groundwater levels should be closely monitored via the existing network of on-site boreholes; and&lt;br&gt;• Alternative sources of water for construction activities may need to be sourced if surrounding land users are significantly affected by this impact.</td>
<td>Duration = 4</td>
<td>22 = low</td>
</tr>
<tr>
<td><strong>Operational Phase impacts on surface water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mine water discharge</td>
<td>The discharge of mine water into adjacent water resources due to spillages if excess water is stored during the high rainfall years could impact the water quality of surface water. This will also impact the associated water fauna and downstream water users.</td>
<td>• Dirty water is re-used as far as is possible in the coal washing process and for dust suppression on site.&lt;br&gt;• Water pollution dams have been constructed on site for the storing of water for further use in the plant operations&lt;br&gt;• A surface water monitoring is currently implemented on site and is undertaken quarterly.</td>
<td>Duration = 4</td>
<td>27 = low</td>
</tr>
<tr>
<td>Operational phase of upgraded facilities (positive impact)</td>
<td>The proposed upgrades will enable the mine to function more effectively and the appropriate re-use of water on site will reduce the mine’s requirements for a municipal water, thereby</td>
<td>Positive impact. No mitigation necessary.</td>
<td>Duration = 4</td>
<td>22 = low</td>
</tr>
</tbody>
</table>
### Operational Phase Impacts on Soils

**Activity:** Spills from waste oil facility or sewage treatment facility and seepage from stockpiles  
**Impact:** Contamination of surface and sub-surface soils

- Regular maintenance and upgrading of existing infrastructure should be prioritised, in order to prevent any leakages or spillages.
- Existing environmental damages should be remedied as a matter of urgency where possible (i.e. removal of untreated sewerage from adjacent areas).
- Any possible sewage spillage will be collected as quickly as possible and returned to the system for treatment.
- All contractors/employees should be made aware of the EMPr, which is a legally binding document

<table>
<thead>
<tr>
<th>Scale</th>
<th>Magnitude</th>
<th>Probability</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

**Significance Points:**

- **Scale = 3**
- **Magnitude = 4**
- **Probability = 2**

**Significance:** 24 = low

### Operational Phase Impacts on Air Quality

**Activity:** Operational activities of mining process and wind effects  
**Impact:** The operational activities of the mining process will impact the air quality surrounding the mine and the effects of wind will result in raising surface particulate matter from stockpiles and discard stack

- Appropriate dust suppression methods must be applied.
- Exposed soil stockpiles shall be covered, kept damp or protected using organic binding agents or alternative techniques that are not water intensive.
- Vehicles travelling on unsurfaced roads must travel at a speed that creates minimal dust entrainment.
- The implementation of an appropriate

<table>
<thead>
<tr>
<th>Scale</th>
<th>Magnitude</th>
<th>Probability</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

**Significance Points:**

- **Scale = 3**
- **Magnitude = 3**
- **Probability = 3**

**Significance:** 36 = moderate

---

**SEF Project Code:** 503948
<table>
<thead>
<tr>
<th>Activity</th>
<th>Impact</th>
<th>Mitigation</th>
<th>Significance points</th>
<th>Significance</th>
</tr>
</thead>
</table>
|          |        | dust monitoring programme is undertaken.  
• Early re-vegetation of disturbed areas should be considered | Probability = 4 |              |
5.3 RISKS TO THE ENVIRONMENT

For the purposes of this management plan, the risks to the environment have been considered with specific reference to the impact of activities on surface and groundwater resources and to support the updates to the present integrated water use license. The upgrading of facilities at the Klipspruit Colliery is undertaken in line with the BECSA Health, Safety and Environment (HSE) (Annexure E4) policy that underpin BHP Billiton's commitment to undertaking operations in a sustainable manner with an emphasis on preventing and reducing pollution. The HSE policy further addresses BHP Billiton's dedication to minimising the impacts of their operations on the environment, through the control of pollution, waste and hazardous material and through the rehabilitation and conservation of cultural resources. The BHP Billiton charter (Annexure E5) also solidifies the emphasis that the company places on environmental responsibility and sustainability. Risks to the water related environment during the construction and operational phases can be summarised as surface water quality impacts and groundwater quantity and quality impacts. Cumulative impacts on the water environment are related to the combined groundwater and surface water contamination caused by coal mines and other industries in the area.

Other impacts (detailed in the EIAs) on the environment are:

- Impacts on soil and land capability;
- Increases surface water runoff;
- Potential destruction of flora and displacement of fauna;
- Dust generation and impacts on air quality; and
- Increased noised levels during construction phase.

5.4 RISKS TO HUMAN HEALTH

The current operation of the mine and any continued activity poses a risk to human health of residents in the vicinity and employees of the mine through cumulative factors of water and air pollution.

A S&EIR process has been undertaken in conjunction with the production off this IWWMP for the licensing of existing waste management facilities at Klipspruit and for the application for environmental authorization for the the expansion of waste facilities. In addition, amendments to the existing integrated water use license are required subsequent to the proposed expansion of facilities. The documents produced for each of these processes complement each other and should the respective departments not grant authorisation for the proposed upgrades, the accumulation of polluted water on site could ultimately pose a risk to the environment and to human health. The accumulation of polluted water on site could pose a risk to staff on-site and surrounding land users, e.g. downstream users in Phola.
6. OPERATIONAL ACTIONS OF IWWMP

6.1 ENVIRONMENTAL MANAGEMENT PHILOSOPHY

BHP Billiton Energy Coal South Africa (BECSA) is committed to providing a safe and healthy work environment, ensuring sound environmental management and supplying good quality services. This is achieved with continual improvement of business practices and prevention of pollution as well as complying with relevant legislation, regulations and other requirements, and ensuring an enlightened work-force. To provide such an environment, the BHP Billiton Klipspruit Colliery will:

- Conduct its operations with due regard to South African legislation, standards and other requirements relevant to the business in terms of safety, health and environment;
- Train and hold employees and contractors accountable for performance within their areas of responsibility pertaining to safety, health and potential environmental impacts, ensuring high quality products and services;
- Prevent pollution through awareness, recycling, environmental monitoring, auditing and investigation into improved control measures and applying remedial actions.
- Provide a structure and responsibility in order to facilitate effective safety, health and environmental management, to contribute effectively to the company’s business;
- Communicate the safety, health and environment policy to employees, contractors and visitors to ensure their understanding of obligations in respect of this policy; and
- Protect the environment (both the natural systems on site as well as the responsible consumption of natural resources), ensuring sustainable biodiversity.

6.2 MANAGEMENT OPTIONS (EVALUATION OF ALTERNATIVE OPTIONS)

6.2.1 Short-term alternatives
   a. Layout Alternative

In terms of the Bankfontein amendment, options for mining from north to south were considered since the general fall on the coal seam is toward the north. However, mining from east to west is more cost effective and is more effective for clean water drainage, ensuring that the entire clean catchment will not be required to be diverted prior to mining.

   b. Alternate water sources

Sourcing water from the Emalahleni Water Treatment Plant as an alternate water source was considered. This option is however not viable due to the amount of water anticipated to be necessary. Additional infrastructure (such as large pipes) will also have to be installed to transport municipal water to the site. Boreholes are already in place and the availability of water is considered sufficient for this project (dependent upon the groundwater reserve determination).

   c. No go alternative

The no-go alternative will result in earmarked areas not being rehabilitated and the build-up of pollutants on site will pose a risk to the operations of the mine, the surrounding environment and human health. The inability of the Klipspruit Colliery to increase its capacity will further have a dire effect on the South African economy, which is still dependent on coal as an energy source.
6.2.2 Long term alternatives

a. Alternate water sources

Should the present plans for the expansion of waste facilities proceed, it is anticipated that the amount of waste produced by the Klipspruit Colliery will be reduced and the water requirements for operations of the mine will be reduce. However, should this be inadequate, sourcing of water from the municipality will have to be considered.

b. No go alternative

The no-go alternative will result in earmarked areas not being rehabilitated and the build-up of pollutants on site will pose a risk to the operations of the mine, the surrounding environment and human health. It is in the best interest of the surrounding community, the mine and the environment for the additional infrastructure to be developed and rehabilitation to occur concurrently with mining operations. This ensures that the impacts to the environment are minimized as far as is possible and this makes complete rehabilitation post-closure more effective.

6.3 SELECTED MANAGEMENT OF IDENTIFIED RISKS

BECSA have drafted policy documents that serve as a guideline to staff in the management of selected risks. This includes a Crisis and Emergency Management Plan that outlines a standard procedure for emergency preparedness. This document is included as Annexure E2. In addition, the closure cost estimate produced in the original EIA and approved EMPr outlines the estimated costs involved in the rehabilitation of the mining area post-closure. This cost estimate is attached as Annexure F.

Table 9: Management measures

<table>
<thead>
<tr>
<th>Activity</th>
<th>Management and mitigation measures</th>
</tr>
</thead>
</table>
| Abstraction of groundwater        | • Only the necessary amounts of water needed for construction activities and domestic purposes will be abstracted. The applicant will at all times ensure that water will not be wasted and that the resource will be utilised equitably and appropriately.  
  • Although minimal water will be used during the operational phase, the applicant will continue to ensure and monitor that water is not wasted. |
| Construction camp establishment and related activities | • Care will be taken at all times to prevent spillages or wastage of any kind. Should spillages occur, it will be cleaned up immediately and the contaminated material will be disposed of in a correctly marked container which will be emptied, as and when necessary, by a registered waste removal company and taken to an appropriate landfill site.  
  • Concurrent rehabilitation will occur to ensure that no erosion takes place on-site and to prevent degradation as far as possible. Erosion control measures will be established.  
  • Berms will be established to prevent stormwater from entering the site. This will also prevent the stormwater from possibly coming into contact with contaminated water.  
  • All construction vehicles should be kept in good working condition and drip trays should be placed under vehicles when parked to collect spills. |
<p>| Usage of the WWTPP                | • Should any spillages occur, these will be immediately cleaned up and placed in a marked container. The container will be emptied, as and when necessary, by a registered waste removal company and taken to an appropriate landfill site. |</p>
<table>
<thead>
<tr>
<th>Activity</th>
<th>Management and mitigation measures</th>
</tr>
</thead>
</table>
| Clearing of vegetation        | • An ecologically sound stormwater management plan needs to be compiled prior to construction.  
• Construction should, ideally, take place in the dry season.  
• Areas exposed to erosion should be vegetated with species naturally occurring in the area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Usage of roads across drainage lines | • Should any spillages occur, these will be immediately cleaned up and placed in a marked container which will be emptied by a registered waste removal company and taken to an appropriate landfill site.  
• Vehicles will remain on the designated roads and not venture into sensitive areas, such as drainage lines. This will minimize and/or prevent soil erosion.  
• Maintenance of the roads and road verges will be undertaken regularly to prevent and/or remediate erosion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Operational phase of upgraded facilities | • Positive impact. Mitigation not applicable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

6.4 WATER USE AND MANAGEMENT

6.4.1 Water supply

Water supply at the mine will be obtained from existing boreholes throughout the site. Water from the boreholes will be used during the construction phase of the proposed waste facility upgrades. The different water supplies and the management thereof are discussed below:

a) Potable water supply
Potable water will be obtained from existing borehole water treated at each construction camp and the on-site complex. The plant at the on-site complex will continue to be used during the operational phase. Additional potable water is obtained from the Emalahleni Water Treatment line via the Phola plant.

b) Process water supply
Process water for the construction phase will be obtained from the existing boreholes on site. It will be ensured that water is not unnecessarily abstracted or wasted. Actual volumes used for process water will also be determined and used as part of the water balance update. Process water supply for mining activities are obtained from the pits (box cuts) according to the terms outlined in Appendix II of the Klipspruit Integrated water use license 2006 (Annexure F).

6.4.2 Clean water management facility

As per the indications in the revised EMPr produced by SRK in 2009, clean water run-off emanating from upstream plant and workshop areas will be diverted around the plant and Water Management Dam to drain into the Saalklapspruit. This will be achieved with the use of canals or berms, which will be of an appropriate size to prevent flooding up to the 1:50 year flood event.

6.4.3 Dirty water containment system

Other runoff and seepage emanating from the coal stockpiles, plant and workshop will be routed to the North Pollution Control Dam and will be pumped to the partitioned 10ML Raw Water
Storage Dam to be constructed for re-use. Runoff from the railway siding will be directed to the South Pollution Control Dam and will thereafter be pumped into the contaminated side of the Raw Water Storage Dam and will be re-used in the plant.

6.4.4 Sewage management facilities

Sewage will be treated on-site using the Prentec treatment method and the sewage effluent will be discharged into the tailings dam. Prentec uses Sequential Batch Reactor (SBR) treatment for sewage and industrial waste water management. SBR reactors are used to treat waste water such as domestic sewage or industrial effluent in batches. Oxygen is then introduced into the waste water reducing biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in order to make it suitable for the safe discharge into rivers or for reuse on land. These types of sewage treatment plants produce high quality final effluent and require very little operational supervision (Prentec, 2013).

6.4.5 Water balance

The water balance for the study site was undertaken during the original EIA process for the authorisation for the development of the Klipspruit Colliery. The Langsloot gauge was used for historical rainfall was used for the calculation as it was perceived to be more representative of the extreme conditions experienced in the study area. This original water balance calculation was calculated on 8 year sequences. The current period falls within the 9 – 16 year period. A snapshot of the water balance that was calculated and presented in the revised and approved EIA and EMP is given below.

It was anticipated that by this point in the mining operations, the mine would reach a steady state and the plant will be fully operational. The large volumes of water anticipated to be needed for the operation of the plant (then predicted at 5Ml/day) would not result in a positive water balance.

An additional study to determine the “Mine water balance and intermine flow for Klipspruit Colliery” was produced by the Institute for Groundwater Studies in 2006 following the initial operational period of the mine. This study determined that mining at Klipspruit was undertaken in a relatively dry environment and, until 2006 no excess water conditions were experienced. The amount of recharge to the mine was estimated to increase to a maximum of 4 Ml/day at the anticipated closure of the mine. Due to the uniform slope of the initial surface, it was further anticipated that the recharge coefficient could drop by 50% post-rehabilitation, dependent only on the quality of the rehabilitation. This would therefore, potentially, mean that the recharge to the mine could drop to 2 Ml/day post-rehabilitation.

As per the recommendation of the approved EMP, the water balance assessment should be updated annually.
6.4.6 Water Re-use and Reclamation

There are, primarily, two areas in which water re-use and reclamation are considered. These are the re-use of water for plant operations, like dust suppression and coal washing, and the runoff of water from stockpiles. Run-off originating from areas upstream of the plant and workshop areas is diverted around the plant by means of canals and berms. In addition, the clean run-off from rehabilitated spoils will be diverted so as to return to the Saalklapspruit.

Run-off from the main coal stockpiles is stored in the water storage dam and is re-used in the operations of the plant. Dirty water is, therefore, used for dust suppression on the haul roads within and surrounding the pit. With the proposed capacity increases and the development of the Bankfontein pit, water requirements for dust suppression are anticipated to increase. Estimates from the approved EIA and EMP put dust suppression requirements at between 500 and 800 m$^3$/day. The recorded water use for dust suppression in 2006–2007 was averaged at 470 m$^3$/day, therefore the estimate of 500 to 800 m$^3$/day seems reasonable in the context of the impending expansions. Dirty water generated on-site is also used in the coal washing plant. Water accumulated from heavy rainfall events in the summer months are stored in the pollution control dams and balancing dam to be re-used in the coal washing process. The water requirements for the coal washing plant were estimated in the revised EIA and EMP at 3000 to 3500 m$^3$/day.

6.5 WASTE MANAGEMENT

BECSA developed a waste management plan in 2009 with the intent to provide guidance and to provide performance requirements for effective waste management from cradle to grave. This
policy is aligned with BHP Billiton’s Charter, other standard operating procedure documents and the relevant South African waste legislation. The plan emphasizes pollution prevention from source by reducing, re-using and recycling and outlines the responsibilities for each level of staff employed at BECSA.

The BECSA Waste Management Plan is included as Appendix E1.

### 6.6 REHABILITATION AND MITIGATORY MEASURES

Mitigatory measures as described above will be implemented throughout the project lifetime. Concurrent rehabilitation of the affected environmental aspects (specifically water and waste - for other environmental aspects refer to the EIAs previously conducted) will take place throughout the construction, operational and decommissioning phases as it occurs. This will include the maintenance of the roads and associated erosion prevention/management.

The rehabilitation of certain waste facilities is a part of the current proposal and a detailed rehabilitation plan exists as part of the plan for the decommissioning and closure of the mine, as per the requirements of the Department of Mineral Resources. The anticipated land use for the mine post-closure and post-rehabilitation is for it to return to grazing land.

Rehabilitation of the mine as outlined in the approved EMP is addressed in terms of roads, final voids, decline and ventilation shafts, pollution control dams, replacement of soils and re-vegetation of rehabilitated areas. Soils removed prior to the construction of the offices and workshops have been stockpiled and will be used in the proposed rehabilitation.

The discard stack will rehabilitated once mining operations have ceased and the final slope area to be rehabilitated will be approximately 110 ha. The final rehabilitation of the discard stack will be re-evaluated prior to undertaking the work relative to the availability of soil types. A minimum layer of 600mm thickness will reduce the uptake of salt and prevent erosion for a topsoil only cover. The alternative considered is for the inclusion of a non-carbonaceous intermediate fill between the discard and topsoil that will reduce the topsoil requirement to a 300mm thickness. This would be dependent on whether the non-carbonaceous material is able to be retrieved from operations before bulk open cast stripping.

The Klipspruit Colliery will also make provision for the reestablishment of wetland habitat and stream rehabilitation as part of the rehabilitation plan in response to the unavoidable destruction of wetland habitat during the construction phase of the mine operation.

As per the recommendations of the DMR for mining operations, maintenance and aftercare of the mine area should continue for 2 to 3 years after production ceases on the mine. This should include the annual fertilising of rehabilitated areas, the control of alien invasive vegetation (e.g. wattle) and general maintenance and rehabilitation of cracks and subsidence. A monitoring programme should also be instituted for the monitoring of surface and subsurface water for 2 to 3 years post-closure.
6.7 SOIL AND LAND CAPABILITIES

Soil erosion can become a problem during the construction phase unless properly managed. It is therefore imperative that topsoil stripped for construction activities be stored and utilised after the completion of construction. The soil structure and functionality needs to be preserved in order to enable maximum utilisation of the soil.

The land capability will be altered during the course of the development. It is anticipated that the project will be long term in its duration, i.e. until the proposed decommissioning and closure of the mine currently set for 2019. Subsequent to this a full rehabilitation plan will be implemented over the course of three years and to the satisfaction of the DMR and DWA, to return the land to its pre-development state as far as is possible.

Mitigation measures have been recommended in the revised EIA and EMP for the management of soils and land capabilities. These mitigation measures are currently implemented by Klipspruit Colliery and will continue to be implemented through the life of the mine until full rehabilitation measures are undertaken post-closure. These include the stripping of soils in the winter months, separation of grey/black and red/yellow soils, the preparation of the seed-bed to limit erosion and facilitate the re-vegetation programme and the amelioration of soils to enhance the agricultural potential of the soil. Topsoil to be stripped from new development areas should also be stored in demarcated areas with as little compaction as is possible. The stockpiles of topsoil should not be maintained higher than 10m, although direct placement and re-use if preferred.
7. MONITORING AND AUDITING SYSTEMS

7.1. WATER MONITORING

The water monitoring cycle as described by the DWA in the Best Practice Guidelines G3: Water Monitoring Systems, have been illustrated below.

A surface water and groundwater monitoring programme has been developed to assess the quality and levels of the water within the mine and in the surrounding environment. Baseline water quality and quantity information has been ascertained from previous specialist studies and was used to inform the water monitoring programme.

7.1.1. GROUNDWATER MONITORING

Groundwater monitoring is currently undertaken quarterly by Klipspruit at the following localities:

<table>
<thead>
<tr>
<th>Description</th>
<th>Co-ordinates</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>KGM B 2 Sampling level 16.00m</td>
<td>S26°01'15.3&quot; EO29°00'50.6&quot;</td>
<td>Sept, Dec, Mar, Jun</td>
</tr>
<tr>
<td>KGM B 4 Sampling level 17.5m</td>
<td>S26°01'15.3&quot; EO29°00'50.6&quot;</td>
<td>Sept, Dec, Mar, Jun</td>
</tr>
<tr>
<td>KGM B 11 Sampling level 27.0m</td>
<td>S26°02'16.1&quot; EO29°00'07.1&quot;</td>
<td>Sept, Dec, Mar, Jun</td>
</tr>
<tr>
<td>BSW 3 Sampling level 28m</td>
<td>S26°01'31.0&quot; EO29°02'12.1&quot;</td>
<td>Sept, Dec, Mar, Jun</td>
</tr>
<tr>
<td>KGM B 9</td>
<td>S26°03'43.9&quot; EO29°00'25.5&quot;</td>
<td>Sept, Dec, Mar, Jun</td>
</tr>
</tbody>
</table>
• All groundwater monitoring samples are submitted for analysis at an accredited laboratory and are analysed for the monitoring constituents listed below and checked against the SANS 241 drinking standards for water.

• Monitoring constituents: acidity, pH, Total Alkalinity (TALK), Electrical Conductivity (EC), Total Calcium Carbonate (TCaCO3), Total Dissolved Solids (TDS), Suspended Solids (SS), NH4, Ca, Cl, Mg, NO3, K, Na, SO4, Al, F, Fe and Mn

The water qualities determined for the monitoring localities should further be measured against the DWAF Target Water Quality Guidelines (1996, 1998) for aquatic ecosystems and domestic use.

7.1.2. SURFACE WATER MONITORING

A surface water quality monitoring programme has been implemented by Klipspruit for a range of localities within the mine operations as well as upstream and downstream of the mine as per the requirements of the approved EMPr and the adhering to the conditions outlined in the current water use license. In addition, Klipspruit also monitors surface and discharge water quality points weekly. The localities are listed in the tables below.

Table 11: Surface Water Monitoring Points (from the BECSA Environmental Monitoring and Measurement Policy – see appendix E3)

<table>
<thead>
<tr>
<th>Description</th>
<th>Co-ordinates</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>K14 Main Office Kitchen Domestic</td>
<td>S26°03'06.9“ EO2°02'27.3&quot;</td>
<td>Monthly</td>
</tr>
<tr>
<td>K16 Project Office Domestic B/H</td>
<td>S26°03'10.9&quot; EO29°00'15.3&quot;</td>
<td>Monthly</td>
</tr>
<tr>
<td>K1 Southern farm dam in O/C section</td>
<td>S26°01.915’ EO29°01.689’</td>
<td>Monthly</td>
</tr>
<tr>
<td>K2 Northern farm dam in O/C section</td>
<td>S26°01.866’ EO29°01.499’</td>
<td>Monthly</td>
</tr>
<tr>
<td>K3 D/S mining area</td>
<td>S26°01.262’ EO29°01.654’</td>
<td>Monthly</td>
</tr>
<tr>
<td>K9 D/S mining area and Phola township - below confluence</td>
<td>S26°00.507’ EO29°01.484’</td>
<td>Monthly</td>
</tr>
<tr>
<td>K7 D/S mining area and Phola township - above confluence</td>
<td>S26°00.780’ EO29°01.483’</td>
<td>Monthly</td>
</tr>
<tr>
<td>K10 D/S mining area and Phola township - Zaid tributary</td>
<td>S26°00.588’ EO29°01.433’</td>
<td>Monthly</td>
</tr>
<tr>
<td>K13 Sump B</td>
<td>S26°01.418’ EO29°01.621’</td>
<td>Monthly</td>
</tr>
<tr>
<td>K20 Mini Pit 2 Ramp1</td>
<td>S26°01.332’ EO29°01.288’</td>
<td>Monthly</td>
</tr>
<tr>
<td>K21 Main Pit Ramp 1</td>
<td>S26°01.394’ EO29°01.476’</td>
<td>Monthly</td>
</tr>
<tr>
<td>K4 Zaid Concer Collier River</td>
<td>S26°03’52.6” EO28°59’ 13.6”</td>
<td>Monthly</td>
</tr>
<tr>
<td>K5 Enslin Farm Estate Dam</td>
<td>S26°04’06.3” EO29°00’18. 6”</td>
<td>Monthly</td>
</tr>
<tr>
<td>K6 Kendal United 2 and 4 Seam Dam</td>
<td>S26°03’57.2” EO2 9’00’06.1”</td>
<td>Monthly</td>
</tr>
<tr>
<td>K 8 Ogies Colliery U/g Mining Dam</td>
<td>S26°04’10.9” EO2 9’02’55.5”</td>
<td>Monthly</td>
</tr>
<tr>
<td>K17 Phola Bridge River</td>
<td>S26°00’19.7” EO29°01’33.7”</td>
<td>Monthly</td>
</tr>
</tbody>
</table>
### Table 12: Surface and Discharge Water Quality Sampling Points (from the BECSA Environmental Monitoring and Measurement Policy – see appendix E3)

<table>
<thead>
<tr>
<th>Description</th>
<th>Co-ordinates</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desal Plant Discharge</td>
<td>S25°01.588 E029°01.009</td>
<td>Weekly</td>
</tr>
<tr>
<td>N12 Discharge Canal</td>
<td>S25°01.237 E029°01.009</td>
<td>Weekly</td>
</tr>
<tr>
<td>K15 Discharged water - Balancing dam</td>
<td>S26°03.151° E029°01.454'</td>
<td>Weekly</td>
</tr>
<tr>
<td>Sewage Effluent</td>
<td>S26°03.001&quot; E029°02.020&quot;</td>
<td>Weekly</td>
</tr>
<tr>
<td>K18 North dam</td>
<td>S26°03.044&quot; E029°00.561'</td>
<td>Weekly</td>
</tr>
<tr>
<td>K19 South Dam</td>
<td>S26°03.251° E028°59.560&quot;</td>
<td>Weekly</td>
</tr>
</tbody>
</table>

- All surface water monitoring samples are submitted for analysis at an accredited laboratory and are analysed for the monitoring constituents listed below and checked against the SANS 241 drinking standards for water.
- Monitoring constituents: acidity, pH, Total Alkalinity (TALK), Electrical Conductivity (EC), Total Calcium Carbonate (TCaCO3), Total Dissolved Solids (TDS), Suspended Solids (SS), NH4, Ca, Cl, Mg, NO3, K, Na, SO4, Al, F, Fe and Mn
- All surface water monitoring results are submitted by Klipspruit to the Department of Water Affairs monthly as per the requirements of the Integrated Water Use License.
- In addition, microbiological samples are taken for K14, K16 and Water Tank and these are analysed for Standard plate count, Total Coliforms and Faecal Coliforms.

### 7.1.3. AQUATIC BIOMONITORING

In line with the requirement and conditions of the Water Use Licence (WUL), Klipspruit Colliery has instituted a bio-monitoring programme. As per the WUL, bio-monitoring is undertaken 3 times a year in annual cycles beginning in 2007 and continues presently. Five surface water monitoring points were originally monitored. Two of the points chosen (Klipspruit 1 and 2) have been removed from monitoring list as these areas have been mined over. The locations of the monitoring points are as follows:

### Table 13: Aquatic Biomonitoring Points (from the BECSA Environmental Monitoring and Measurement Policy – see appendix E3)

<table>
<thead>
<tr>
<th>Description</th>
<th>Co-ordinates</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klipspruit 1 Shallow, seasonal stream and sedge wetland situated on the eastern side of the future surface mining area on the farm Klipfontein 3 IS.</td>
<td>S: 26°02’ 01.1’’ E: 29°01’ 41.5’’</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Klipspruit 2 First order stream situated on the western side of the future surface mining area on the farm Klipfontein 3 IS.</td>
<td>S: 26°01’ 58.0’’ E: 29°01’ 21.3’’</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Klipspruit 3 Perennial stream and <em>Typha capensis</em> wetland system situated downstream of current and future surface mining operations.</td>
<td>S: 26°01’ 18.3” E: 29°01’ 38.9”</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Klipspruit 4 Site located on the Saalklapspruit upstream of the confluence with the perennial stream</td>
<td>S: 26°00’ 55.2” E: 29°01’ 03.1”</td>
<td>Quarterly</td>
</tr>
</tbody>
</table>
The results of each sampling event describe the impacts observed, the water quality, the present ecological state as well as a description of the aquatic macroinvertebrates using the Invertebrate Habitat Assessment System. The results of the most recent monitoring event in March 2013 indicated an improvement in the ecological condition of 2 of the surface water monitoring points that has had a positive impact on the functioning of one of the associated wetlands and therefore has impacted positively on the water that enters the Saalklapspruit (SEF, 2013).

7.2. DUST MONITORING

Klipspruit Colliery has instituted a dust monitoring programme. All samples are analysed by an accredited laboratory and results follow the classification ranking according to SANS 1929:2005. All dust monitoring samples provides an indication of the following information: lab reference, site name, sampled commencement date, sample collection date, mass collected, sampling period, settle-able particles, classification, and comments. The dust monitoring points are presented in the table below.

Table 14: Dust Monitoring Points (from the BECSA Environmental Monitoring and Measurement Policy – see appendix E3)

<table>
<thead>
<tr>
<th>Description</th>
<th>Co-ordinates</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPF1 Windmill Dam</td>
<td>S26°02.029' E029°00.380'</td>
<td>Monthly</td>
</tr>
<tr>
<td>KPF2 Enslin</td>
<td>S26°03.916' E029°00.489'</td>
<td>Monthly</td>
</tr>
<tr>
<td>KPF3 Nursery</td>
<td>S26°04.520' E029°02.665'</td>
<td>Monthly</td>
</tr>
<tr>
<td>KPF4 Ogies Mill</td>
<td>S26°03.009' E029°02.551'</td>
<td>Weekly</td>
</tr>
<tr>
<td>KPF5 Phola</td>
<td>S26°00.952' E029°02.125'</td>
<td>Monthly</td>
</tr>
<tr>
<td>KPF6 SFF Dam</td>
<td>S26°02.115' E029°03.312'</td>
<td>Monthly</td>
</tr>
<tr>
<td>KPF7 Stolz</td>
<td>S26°02.263' E029°03.835'</td>
<td>Monthly</td>
</tr>
<tr>
<td>KPF8 Frigate Mining</td>
<td>S26°00.558' E029°01.374'</td>
<td>Monthly</td>
</tr>
<tr>
<td>KPF9 Ogies school</td>
<td>S26°02.538' E029°04.043'</td>
<td>Monthly</td>
</tr>
</tbody>
</table>

7.3. WASTE MONITORING

Waste monitoring allows for the control of wastage and enhances the possibilities of waste recovery and reduction. Management of waste will occur as described in the BECSA Waste Management Plan developed in 2009. Monitoring of waste should include the following:

- Identification and classification of waste into definite categories;
- Ensure awareness and training of employees regarding waste management;
- Measuring the amount of each type of waste that is produced within a specific time period;
• Separation of different waste types to prevent cross-contamination and ensure proper disposal to the correct landfill sites;
• Ensuring that each waste type is correctly managed according to specifications;
• Monitor the removal and disposal of waste – frequency and place of disposal; and
• Regularly ensure that all waste related contractors are licensed and competent.
• Refer to waste management procedure/plan.

Further to the generation of waste on-site are the details of the discard stack. Since the anticipated volume of discard will exceed the amount that can be accommodated below the water table, an alternative discard strategy has been produced. Discard will be placed on spoils that have been leveled but not rehabilitated and discard will be stacked in phases starting in July 2013. The anticipated maximum stack height as per the revised EIA and EMP will be 26m above previous natural ground with an average height of 15m.

7.4. DATA MANAGEMENT AND REPORTING

Monitoring data will be recorded in a central database and reported upon. Water quality results will be evaluated once received from the laboratory. The data is assessed and corrective actions developed if there are any anomalies. Monthly DWA reports are developed.

Time series plots and trend analysis by water quality constituents is undertaken. Water reports address at least the following: water consumption, water quality and areas of concern.

All reporting procedures will be undertaken in accordance with the requirements outlined in the approved EMP and as per the recommendations of the WUL.

7.5. ENVIRONMENTAL MANAGEMENT SYSTEM

An Environmental Management System (EMS) is a tool utilized in ensuring that the environmental consequences of an action are considered at each of the planning, decision-making, implementation and monitoring stages of a project. The EMS developed for the original operational capabilities of the mine will be upgraded to include any changes that will arise from the proposed physical upgrades to the Klipspruit Colliery. Such procedures include amongst others:

• Safety, Health and Environmental Quality Policy;
• Emergency procedure;
• Monitoring and auditing procedures;
• Waste Management procedure; and
• Environmental training procedure.

The EMS will be implemented at all times to ensure adherence to environmental legislation as well as to ensure environmental sustainability. The requirements of the Environmental Management system and the processes needed to be put into place is described in further detail in the Environmental Management Programme compiled in conjunction with the Environmental Impact Report.
The recommendations of the above-mentioned report as well as the requirements of the integrated water use license are actively implemented by Klipspruit Colliery.

The adequate functioning of the EMS is further dependent on the monitoring and compliance measures undertaken. This includes the development of surface and groundwater monitoring programmes undertaken quarterly as well as the annual revision of air quality, noise impacts, water balance and changes in flora and fauna. In addition, an annual revision of the financial provision for closure is undertaken in line with the requirements of the DMR. A monitoring and performance assessment of the EMP is also undertaken every two years. Annual internal audits on compliance are conducted and submitted to the regional Department of Water Affairs and an annual external audit is undertaken to monitor compliance with the conditions of the water use license.

7.6. REPORTING OF INCIDENTS

The current procedure for the management of environmental incidents is contained within the Crisis and Emergency Management Plan. This procedure may be amended to specify the correct ways to handle environmental incidents as well as the recording of such incidents. Records will be kept of all incidents in the environmental impact register established on-site. Specific reporting sheet templates are provided in the Environmental Management Plan (EMP).

Klipspruit Colliery current subscribe to a communication procedure that addresses environmental incidents, with significant incidents duly reported to the MDEDET and DMR as per legal requirements.

As per the Crisis and Emergency Plan (revised in 2013) currently in operation at the Klipspruit Colliery, all staff are made aware of the protocol and the relevant emergency numbers.

7.7. ENVIRONMENTAL IMPACT REGISTER

An environmental impact register is kept on-site at all times at the Klipspruit Colliery. All employees and stakeholders as well as the relevant Departments will have access to the register upon request.

7.8. AUDITING AND REPORTING

As per the conditions of the EA, regular environmental audits are undertaken to establish compliance with the EA. Although such is not a condition of the EA, conditions stipulated in the IWUL will also be audited.

An independent Environmental Control Officer (ECO) should be on site periodically to monitor activities. The ECO must conduct, at a frequency as determined by the DWA, independent environmental audits. The audits are to verify the project’s compliance with the IWWMP and the License conditions.

The audit requirements as per the WUL indicate that annual internal audit on compliance should be undertaken by Klipspruit Colliery that is submitted to the Regional Director (of the Department of Water Affairs). In addition, Klipspruit Colliery is to appoint an independent external auditor to conduct annual compliance audits and the final reports are to be submitted to the Regional
Director (of the Department of Water Affairs). The Klipspruit Colliery currently undertakes both internal and external audits as per the above-mentioned recommendations.
8. INSTITUTIONAL ARRANGEMENT

8.1 ORGANISATIONAL STRUCTURE

Klipspruit Organizational Structure

8.2 ENVIRONMENTAL MANAGEMENT: RESOURCES (ENVIRONMENTAL SUPPORT DIVISION)

Environmental management at Klipspruit will take place according to the Environmental Management Plans developed as part of the various applications made. The management plan in Section 6 of this IWWMP will also be used as part of environmental management.

Environmental management will focus mainly on water resources, flora, fauna, soil, heritage features and the social aspects of the project.

8.3 AWARENESS AND TRAINING

All employees at the site are made aware of environmental issues that may occur as well as management measures to be implemented to mitigate or prevent such impacts from occurring. Environmental awareness training complements other training occurring at the sites, such as health and safety. Every employee of the Klipspruit Colliery undergoes an induction annually which includes information on the environmental management system subscribed to.

8.4 COMMUNICATION

This section of the IWWMP details the external communication with the stakeholders and Interested and Affected Parties (I&APs). Additional details of the public participation process undertaken for the IWULA can be found in Annexure E.

Klipspruit Colliery has an on-site communication specialist and a community specialist whose responsibilities centre around stakeholder engagement. Regular stakeholder days are set aside
in the year as well as one-on-one discussions with stakeholders to address pressing issues. Regular reports are prepared for the authorities to convey information on stakeholder engagement.

A public participation process was also undertaken as part of the EIA process for the licensing of, and expansion to, existing waste facilities.

8.4.1 Identification of stakeholders
A database was developed to include the following sectors:

- National Government;
- Provincial Government;
- Local municipality;
- Parastatals;
- Non-government organisations;
- Other companies and forums;
- Farmers unions;
- Surrounding land owners; and
- Other I&APs.

Refer to Annexure E1 for a list of the I&APs contacted regarding the project.

8.4.2 Documents for public review
The project was announced on 07 October 2011 in the following manner (see Appendix E for public announcement documentation):

- Publication of media advertisements in the local newspaper, ‘Die Witbank Nuus’;
- On-site notices advertising the S&EIR process were placed on and around the site; and
- Distribution of letters by fax/ by hand/ post/ email to I&APs including Registration and Comment Sheets.

The public were given an opportunity to comment on the application and procedure from 7 October 2011 until 7 November 2011.

A period of 40 calendar days (14 July – 23 August 2012) was provided to the State Departments and the registered I & APs for the review and commenting phase of the Draft Scoping Report. The availability of the Draft Scoping Report was announced by means of personal letters to all the I&APs on the distribution list and by adverts placed in the abovementioned newspaper.

In addition, the Draft Scoping Report was distributed for comment as follows:

- Left in public venues (Ogies Public Library, Phola Public Library and BHP Billiton Klipspruit Colliery offices);
- Hand-delivered/ couriered to the relevant authorities; and
- Posted on SEF’s website at http://www.sefsa.co.za.
All the comments and concerns raised by I&APs during the S&EIR process were captured in a Comment and Response Report.

This IWWMP together with the IWULA will be released into the public domain together with the draft Environmental Impact Report (EIR).

A period of 30 calendar days (24 October 2013 – 25 November 2013) has been provided to the State Departments and Registered I&APs for the review and commenting phase of the Draft Environmental Impact Report (EIR) and IWWMP. The availability of the Draft EIR and IWULA will be announced by means of personal letters to all the registered I&APs on the distribution list.

In addition, the Draft EIR and IWWMP will be distributed for comment as follows:

- Left in public venue (Ogies Public Library, Phola Public Library and BHP Billiton Klipspruit Colliery Offices);
- Hand-delivered/ couriered to the relevant authorities; and
- Posted on SEF’s website at http://www.sefsa.co.za.

Subsequent to completion of the public review, a comments and response report (CRR) will be compiled to capture and address the comments obtained from the I&APs. The CRR will be submitted to the DWA as supporting information to the application.
9. OVERALL WATER AND WASTE MANAGEMENT PLAN

<table>
<thead>
<tr>
<th>Areas of Impact</th>
<th>Impacts</th>
<th>Mitigation</th>
<th>Timeframe</th>
<th>Responsible Mine Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater</td>
<td>Decreased in overall ground water level due to increased abstraction</td>
<td>Monitoring of groundwater levels via the existing borehole network</td>
<td>From present – 2-3 years post closure</td>
<td>Environmental Superintendent/Specialist/Team</td>
</tr>
<tr>
<td></td>
<td>Contamination of groundwater due to spillages and seepage from stockpiles</td>
<td>Monitoring of groundwater quality quarterly as per the BECSA Environmental Monitoring and Measurement Plan</td>
<td>From present – 2-3 years post closure</td>
<td>Environmental Superintendent/Specialist/Team</td>
</tr>
</tbody>
</table>
| Surface Water   | Increased surface water runoff due to vegetation clearing | • An adequate stormwater management plan needs to be adhered to.  
• Concurrent rehabilitation should take place. | Current | Environmental Superintendent/Specialist/Team |
|                 | Pollution of surface water resources due to mine water discharge | • Dirty water re-used within the mine for plant operations and dust suppression.  
• Surface water monitoring programme to be continued as per the BECSA Environmental Monitoring and Measurement Plan. | From present – 2-3 years post-closure | Environmental Superintendent/Specialist/Team |
| Soils           | Stripping of soils for expansion of waste management area | • Topsoils removed should be stored for use in rehabilitation  
• Stripping should be limited to winter if possible  
• Amelioration of soil to be undertaken  
• Seed bed should be prepared for re-vegetation | Construction phase – 2014 | Environmental Superintendent/Specialist/Team |
| Spillages from waste facilities and seepage from stockpiles | • Construction to take place in winter  
• Regular maintenance and upgrading of facilities should take place  
• Environmental damages should be remedied as a matter of urgency where possible  
• All contractors should be made aware of the EMPr, which is a legally binding document |  |
|---|---|---|
| Air Quality | Construction activities for the expansion of facilities, operational activities of mining processes and effects of wind | • Appropriate dust suppression measures to be implemented, as per approved EMPr  
• Exposed stockpiles shall be covered, or kept damp, or protected using organic binding agents  
• Dust monitoring programme to be implemented at selected localities, as per the BECSA Environmental Management and Measurement Plan | Operational Phase of mining  
Environmental Superintendent/Specialist/Team |
10. REFERENCES


Strategic Environmental Focus (2013) *Klipspruit Colliery Aquatic Biomonitoring Assessment Autumn 2013*, June 2013

Websites:

Prentec (Pty) Ltd website: [http://www.prentec.co.za](http://www.prentec.co.za)

Accessed 24 May 2013