Draft Scoping Report for the Environmental Impact Assessment and Environmental Management Programme for BHP Billiton Energy Coal South Africa (Pty) Ltd (BECSA)’s Vandyksdrift Central (VDDC) Project

Report Prepared for

BHP Billiton Energy Coal South Africa (Pty) Limited (BECSA)

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Report Prepared by

srk consulting

March 2013
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SRK Project Number 449019
March 2013

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Executive Summary

Background

BHP Billiton Energy Coal South Africa (Pty) Limited (BECSA) produces energy coal for the South African domestic and export markets, and consists of four primary coal-mining operations, Khutala Colliery, Klipspruit Colliery, Middelburg Colliery and Wolvekrans Colliery (previously known as Douglas Colliery), as well as the four processing plants of BECSA Coal Processing Services. BECSA is 100 per cent owned by BHP Billiton and located near the towns eMalahleni (Witbank) and Middelburg in the coalfields of Mpumalanga Province, South Africa (BHP, 2013).

The Wolvekrans Colliery is situated midway between eMalahleni and Kriel in the Mpumalanga Province approximately 130 km east of Johannesburg. The mine currently employs 914 people and the current production is 16 Million tons per annum (Mtpa) medium rank bituminous thermal coal.

Coal is mined using open-pit truck and shovel methods. Wolvekrans Colliery has a measured resource base of 413 Mt and an indicated resource base of 140 Mt (BHP, 2012). Wolvekrans Colliery currently comprises three opencast areas named Steenkoolspruit, Driefontein and Boschmanskrans.

The then Department of Minerals and Energy (DME) (now known as Department of Mineral Resources (DMR)) approved the amendment of the Environmental Management Programme (EMP) for the Douglas Colliery operations in 2006 (OT6/2/2/113). However, it only focussed on the opencast mining of previously underground mined areas. Although the authorisation has been obtained to mine the coal resources, the subject to this EMP Amendment and Environmental Impact Assessment (EIA) process is for the authorisation of additional activities, principally associated with removing underground water and fine coal slurry, which were not previously applied for.

The proposed Vandyksdrift Central (VDDC) Project forms part of the existing Wolvekrans Colliery which has an approved Mining Right (OT6/2/2/113) and as such an Environmental Management Program (EMPR) (OT6/2/2/113) and Integrated Water Use Licence Application (IWULA) for the current operations, which includes the mining of the VDDC Pit via opencast methodology and the dewatering of the underground workings.

The VDDC Project is a brownfields project focusing on the optimal mining of the VDDC Pit (± 1 411 ha). The current existing and approved EMPR allows for the mining of the 5, 4, 2 and 1 seam coal reserves using opencast mining methods (as per the approved EMPR). 2 Seam was previously extensively mined by underground board and pillar methods, and then used to store fine coal slurry discards (estimated volume of 23 Mt). Areas of 2 seam workings are also now flooded with water and such water and slurry needs to be removed in order to enable the open pit development.

It is the intention of BECSA to remove the fine coal slurry, to increase the dewatering capacity and to treat the water from the underground workings to an appropriate quality for discharge to the Olifants River, or for reuse.

The proposed VDDC project will require BECSA to submit the following:

- An EIA/EMP report in order to obtain environmental authorisation for the new proposed activities and management measures;
- An addendum to their current Douglas (Wolvekrans) EMPR (OT6/2/2/113) in order to obtain mineral authorisation for the new proposed activities and management measures;
- An amendment to the current Douglas (Wolvekrans) Water Use Licence (WUL) to include all additional water uses triggered by the proposed project; and
- A Waste Licence Application (WLA) in terms of the waste activities that will be triggered by some of the project related activities.

**Who will be the regulatory authorities in terms of this project?**

Before the proposed development and project can proceed, approval has to be obtained from the following regulatory authorities, in terms of their involvement and competency:

- The Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) – to review and evaluate the EIA/EMP in terms of the new proposed activities and management measures;
- Mpumalanga Department of Mineral Resources (DMR) – to review and evaluate the EMP Addendum in terms of the new proposed activities and management measures;
- Department of Water Affairs (DWA) – to review and evaluate the WUL in terms of the new water related activities and management measures; and
- Department of Environmental Affairs (DEA) – to review and evaluate the WLA in terms of the new waste activities and management measures.

**Who is conducting the EIA/EMP Amendment?**

SRK Consulting (SRK) has been appointed as an independent Environmental Assessment Practitioner (EAP) consultant to conduct the Environmental Impact Assessment (EIA) as required by NEMA and the MPRDA. Nemai Consulting (Nemai) is undertaking the public involvement component of the EIA/EMP Amendment.

**Who will evaluate the EIA/EMP Amendment?**

The Final Scoping Report will be submitted to the DMR, MDEDET, DWA and DEA for review.

The government departments will then advise the project team as to how the project should proceed for the impact assessment phase of the project. The impact assessment phase will entail detailed specialist investigations, reporting, and further stakeholder involvement.

Once a final EIA/EMP Amendment is submitted to DMR, MDEDET, DWA and DEA can a decision be taken as to whether the project may proceed or not.

DMR, MDEDET, DWA and DEA will consult with various other government departments before making a decision on whether or not to authorise this project, and to take into account other legislation for example, the National Environmental Management: Air Quality Act (Act 39 of 2004), the Mines, Health and Safety Act (Act 29 of 1996), the Heritage Resources Act (Act 25 of 1999) and others.
Description of the proposed development

Project details

BECSA’s VDDC EIA/EMP Amendment Project will entail the following main activities:

- Applying for additional capacity for dewatering from the underground workings (as currently approved in the IWULA) and treatment of water arising from mining operations;
- The establishment of a borehole field for the efficient abstraction of mine water from the underground mine workings;
- Construction and operation of desalination plant(s) for the treatment and management of water arising from the underground workings areas and associated mining activities;
- Construction and upgrading of water management infrastructure and systems associated with this project to enable discharge into the environment (Olifants River) or for potential reuse;
- Construction of pipelines for the removal and transportation of water from the underground mine workings;
- Construction and operation of a fine coal slurry processing facility and associated infrastructure (i.e. waste disposal) to process the fine coal slurry removed from the underground mine workings;
- Additional mining related infrastructure, e.g. haul roads, discard dumps, etc.;
- Relocation of discard dumps from the VDDC area to the Steenkoolspruit mining area;
- Abstraction of water from the Olifants River for start-up and commissioning activities until steady state operation is achieved;
- Potential relocation of residents adjacent to the mining area where blasting will occur in terms of the approved opencast mining area zone of influence.

Motivation for the proposed project

The proposed VDDC Project activities for which this EIA/EMP Amendment is being prepared, will allow for the safe mining of the VDDC coal resources in the opencast pit operations. Removal of underground water and fine coal slurry will facilitate the expansion of the mine into new areas (VDDC) surrounding the existing pit. The mining of the VDDC Pit is fundamental to BECSA maintaining existing production levels from Wolvekrans Colliery and will allow the mine to achieve its targeted Life of Mine (LOM) of 2040.

The treatment of the water from the underground workings will reduce the latent liability for contaminated water currently accumulating within the underground mine workings, and may provide some water for use on the mine and reduce the mine’s reliance abstraction from the Olifants River. Excess treated water can be released to the Olifants River at an acceptable quality.

Employment

Since there will be no increase in overall production at Wolvekrans Colliery, and the proposed development is to maintain the current Life of Mine (LOM) (2040) at the same production rate, no significant additional permanent job opportunities are expected. The proposed project will, however, sustain the long term employment of at least 914 employees currently employed at the Wolvekrans Colliery.

It is foreseen that temporary jobs will be created during the construction period in 2014, although it is not possible to determine the number of temporary employment at this stage.
**Proposed project schedule**

The following procedure and timing is proposed for the remainder of the EIA/EMP Amendment and project implementation:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Timeframe</th>
<th>Duration</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scoping Phase of the EIA/EMP Amendment</td>
<td>November 2012 - April 2013</td>
<td>6 months including pre-consultation</td>
<td>To develop sufficient understanding of the project and project environment so as to identify and assess anticipated impacts and scope the detailed assessment phase of the EIA effectively, where required.</td>
</tr>
<tr>
<td>Environmental Impact Assessment Phase</td>
<td>May to October 2013</td>
<td>6 months</td>
<td>To further assess identified potential environmental and social impacts, review proposed mitigation and management measures, and make recommendations for further mitigation and management, where required to maximise positive impacts and minimise negative impacts. To inform a decision regarding the project and whether it may proceed or not.</td>
</tr>
<tr>
<td>Submission of EIA/EMP Amendment Report</td>
<td>November 2013</td>
<td>Approx. 120 days after submission</td>
<td>To provide adequate and appropriate information regarding the proposed project to assist the authorities with making an informed decision.</td>
</tr>
<tr>
<td>Record of decision on the EMP /EIA</td>
<td>May 2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment order</td>
<td>Currently not confirmed</td>
<td></td>
<td>To order the equipment required for the construction phase.</td>
</tr>
<tr>
<td>Contractor appointment</td>
<td>Currently not confirmed</td>
<td></td>
<td>To appoint the contractor for the construction phase of the project</td>
</tr>
<tr>
<td>Construction phase</td>
<td>July 2014</td>
<td>24 Months</td>
<td>To establish and develop the proposed sites and associated infrastructure sufficiently for the operation phase of the project.</td>
</tr>
<tr>
<td>Operation phase</td>
<td></td>
<td></td>
<td>To commission the project infrastructure and implement the operation of the project infrastructure, and associated mitigation, management and performance monitoring measures.</td>
</tr>
<tr>
<td>Closure - decommissioning</td>
<td></td>
<td></td>
<td>Typically, closure operations will take place over a period of 3-5 years following cessation of operations at the facilities. To rehabilitate the disturbed environment sufficiently so as to meet the objectives of the closure plan (this will to some extent depend on decisions/agreements reached with the Stakeholders for the use of the project specific land post-closure, in relation to the</td>
</tr>
<tr>
<td>Activity</td>
<td>Timeframe</td>
<td>Duration</td>
<td>Purpose</td>
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</tr>
<tr>
<td>Closure – post-closure</td>
<td></td>
<td>Closure will be planned to limit any post closure activities but some monitoring may be required.</td>
<td>To ensure that there are no undue residual impacts associated with the proposed project infrastructure or that there are adequate plans in place for the management of residual impacts.</td>
</tr>
</tbody>
</table>

**Baseline environment description**

Key aspects of the baseline environment were provided for the mining authorisation application for the VDDC Pit, and are considered to be representative of the small relative area associated with the additional activities within the project area of this EMP Amendment application. These are summarised below.

**Geology**

The Wolvekrans Colliery coal reserve falls within the Witbank Coalfield, which consists of sedimentary rocks of the coal-bearing Ecca Group of the Karoo Sequence. Five coal seams are contained in a 70 m average thick succession in the coalfield, consisting primarily of sandstone with subordinate siltstone and mudstone. The succession is the Vryheid Formation of the lower Ecca group and followed the deposition of the Dwyka. The latter is of glacial origin and comprises mainly tillite. Underneath the Dwyka in the area is a volcanic pre-Karoo basement which consists mainly of rhyolitic rocks of the Rooiberg Group, Pretoria (Pulles, Howard & De Lange, 2006).

**Climate**

The VDDC Project is located in the Mpumalanga Highveld region where the climate is characterised as generally dry. Summers are warm to hot with an average daily high temperature of approximately 27°C (with occasional extremes up to 35°C). Winters range from mild to cold with an average daily high of approximately 15°C (with occasional extreme minima as low as -10°C). Frost and mist are frequently experienced during the winter months on the Mpumalanga Highveld (SRK, 2012).

The majority of precipitation is experienced during the summer months, mostly in the form of afternoon thundershowers. The mean annual precipitation (MAP) is 707 mm, with 85% of the annual rainfall occurring between October and March. The mean annual evaporation (MAE) in the region is approximately 1600 mm (SRK, 2012).

**Topography**

The general topography is characterised by gently rolling terrain east and west of the Olifants River Valley with no steep inclines or exceptionally high slopes. The Wolvekrans Colliery is situated between ~1500 and 1600 meters above mean sea level (mamsl). The average gradient of the area is 1°.

**Soil**

Sandstone is the dominant parent material (rock) type encountered in the area. Although sandstone rarely outcrops (except on the steeper western and southern slopes in proximity to the Olifants River), its dominant presence elsewhere in the VDDC Project area is indicated by the following:
• sandstone is frequently encountered below the soils in auger depth (western and southern sloping areas);
• soil texture and soil colour; and
• the presence of hard plinthite (ferricrete) in many of the profiles (gently sloping to flat areas) generally indicates that the hard plinthite overlies relatively impermeable sandstone rock at depth. The colluvial movement of sandstone-derived soils (dominant in the area) over a long period of time have frequently diluted or hidden the influence of other parent material types on soil formation (Pulles, Howard & De Lange, 2006).

Natural vegetation/plant life and biodiversity
The VDDC Project area is located in the Moist Sandy Highveld Grassland Biome (Low and Rebelo, 1996) where less than one percent of the vegetation is formally conserved and approximately 72 % is transformed (de Frey, 1999). The vegetation in the project area is also referred to as the Eastern Variation (61c) of the Bankenveld (Acocks, 1988). The Grassland Biome is one of the most threatened biomes in South Africa due to encroaching urban, agricultural and mining developments (Pulles, Howard & De Lange, 2006).

One species, Hypoxis hemerocallidea that is classified as “not threatened” was confirmed in the project area. Under the Mpumalanga Nature Conservation Act, 1998 (Act 43 of 1998) (MNCA) all species from the genus Gladiolus and family Orchidaceae are protected. A representative from the Gladiolus taxa was recorded in the project area. Seven declared weeds and / or invasive plant species from the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA) are present in the area (Pulles, Howard & De Lange, 2006).

Fauna and biodiversity
A diverse population of smaller mammals such as rabbits, meercats, and rodents and insects, reptiles and birds should occur in the project area (Pulles Howard & De Lange, 2006).

Smaller mammals such as yellow mongoose, steenbok, grey duiker, springhare and rodents have been observed. The presence of Marsh owls (Asio capensis) was taken to suggest that rodents occur in the area. Most of the birds observed were seed eaters and insectivorous birds including doves, canaries, larks, weavers and bishops. There is a large supply of food for these birds in the cultivated lands and in the natural grasslands. Few waterbird species were observed and this was considered to possibly be due to the lack of open water and the low flow in the Olifants River at the time of the survey (Pulles, Howard & De Lange, 2006).

Reptiles likely to be associated with the project area include the Common brown water snake (Lycodonomorphos rufulus) and the Egyptian cobra (Naja haje). The only reptiles observed during the field surveys were lizards on the rock outcrops (Pulles, Howard & De Lange, 2006).

Streams and wetlands
The Olifants River divides the Wolvekrans Colliery mineral rights area. Other streams and rivers within the Wolvekrans Colliery area include the Boesmanskransspruit, Steenkoolspruit and other unnamed tributaries. The Vleishaft tributary was diverted around the initial mining area of the Wolvekrans Colliery under the approved EMP (OT6/2/2/113) in 2007/8. The Steenkoolspruit is situated in the western part of the surface rights of Wolvekrans Colliery, close to the existing Steenkoolspruit opencast workings.

Sensitive areas may include both wetland areas and aquatic ecosystems (rivers/streams). While they will both be addressed as being sensitive landscapes for the purpose of this study, they will be considered separately from one another when interpreting results and conclusions to avoid misunderstanding and confusion. Wetlands provide a number of ecological services, of which
biodiversity is one. Sensitive areas can be identified by the presence of Red Data Species. Water as a whole is protected as a resource, and is therefore regarded as being sensitive.

**Surface water**

The Wolvekrans Colliery falls within the upper Olifants River basin within the Witbank Dam catchment, which is located on the Eastern Transvaal Highveld of Mpumalanga Province. This catchment eventually drains into the Witbank Dam, draining a total area of 3 446 km². There are a number of diverse land uses throughout the catchment including urban development, agriculture, power generation and coal mining. Coal mining within the catchment is extensive, as two different coal fields are mined. The VDDC Project is located close to, but up-stream, from the confluence of the Olifants River and the Steenkoolspruit.

**Groundwater**

Three different aquifer types occur in the VDDC Project area, namely:

- shallow perched aquifers;
- shallow weathered zone Karoo aquifers; and
- deep Karoo aquifers (zone below the weathered zone) (Pulles Howard & De Lange, 2006).

The groundwater flow regime of the Wolvekrans Colliery mining area's falls across three tertiary catchment areas, namely B11B, B11F and B11G. The water divide forming the northern and southern boundaries of B11F cuts respectively from the north-western and western extent of the VDDC mining area towards the east of the reserve, intersecting the proposed opencast workings. The two groundwater divides concur in the east on the farm Enkeldebosch 20IS (Pulles, Howard & De Lange, 2006).

The depth to water level observed in all the boreholes, varied between 2.69 m and 40.00 m, with a mean of 14.46 m (Pulles, Howard & De Lange, 2006).

**Noise**

Current sources of noise in the proposed area include the following:

- Traffic noise on the R544;
- Railway line;
- Wolvekrans Colliery operations, plant and associated infrastructure; and
- Other existing mining activities.

**Sites of archaeological and cultural interest**

Since most of the original vegetation in the VDDC Project area was replaced by agricultural activities and some areas were altered by mining activities, the environment has been altered and any heritage features that might have existed there may have been removed or destroyed.

The types and ranges of heritage resources discovered during the initial heritage impact assessment in the area of the VDDC Pit include several remains dating from the relatively recent past. A total of 369 individual gravesites have been identified and relocated to date.

**Visual aspects**

The VDDC Project is located in an area characterized by mining activities but also suited to agriculture in the form of either grazing for cattle or cultivated fields of maize. Anglo American's Goedehoop Colliery is situated approximately 13 km east of the VDDC Project area, the Anglo American's Kleinkopje Colliery approximately 11 km to the north, and Xstrata's Arthur Taylor Colliery approximately 8 km to the west of the VDDC Project area.
The residential suburbs of Kwajuma Village and Vandyskrdrift are located 600 m north and 2.5 km to the south-east respectively. Kriel is located approximately 20 km to the south-east of the site, with the New Clydesdale Coal mine 1 km in the same direction. The project area is situated at an altitude of between 1500 and 1600 m amsl. The topography in the area varies between flat, gentle slopes and rocky outcrops.

Traffic
The R544 tarred road from eMalahleni joins the R35 to the southeast of Kriel and connects eMalahleni and Bethal. The R544 runs adjacent the mine property along the eastern side of Vandyskrdrift towards Kriel.

Regional socio-economic structure
A brief summary of the broader socio-economic environment is as follows:

- The VDDC Project is found in the Mpumalanga Province which has a population of 3.5 million people in an area of 79 490 km² (2011, Mpumalanga Provincial Government). Mpumalanga accounts for 83% of South Africa’s coal production and is the third-largest coal-exporting region in the world (2009, GAN). Contributions to the Gross Domestic Products (GDP) figures indicate that the Mpumalanga mining activities contributed about R20 billion during the 2008 period (2010, DWEA). The coalfields of the Province feed a number of power stations situated nearby. Agriculture is also an important sector in the province with maize, sunflower and groundnuts being the major crops;
- The study area falls under the jurisdiction of the eMalahleni Local Municipality and Nkangala District Municipality. The 2007 Community Survey recorded a population of 435 217 in eMalahleni Local Municipality. It is estimated that this population is growing at a rate of approximately 4.2% per annum with relatively high migration levels being experienced due to mining operations. The municipal area has an unemployment rate of 32%. The most prominent formal sector employment opportunities in this municipal area are: mining (23%), community and social services (13.2%) and wholesale and retail (13.1%). The municipal area has an adult literacy rate of 29.3%.

Project alternatives
Alternative locations for the proposed development

Mine Water Desalination Plants
The extracted mine water will need to be treated for which two treatment facility configurations have been considered by BECSA:

- If a central, fixed location facility is chosen, probably one of two likely locations will be evaluated;
- If modular facilities are chosen, a minimum of three locations will be evaluated.

The physical placement of the mine water desalination plant(s) will be dictated by the open pit development, distance from the borehole field, the results from the hydraulic impact assessment, the type of treatment facility, previous underground mining activities, etc.

Treated Water Discharge
Various potential sites for the discharge of the treated water will be evaluated. These locations will vary and be dependent on the treatment plant designs evaluated, as well as the result of the hydraulic impact assessment.
Waste Disposal

The location of disposal sites for the residue streams from the mine water desalination process will be dependent on the options evaluated in terms of the plant location, open pit development, previous underground mining activities and space constraints within the VDDC Project area.

Mine Water Desalination Technology Options

Membrane with Lime Softening Technology

This technology consists of staged tapered Ultra Filtration (UF), Reverse Osmosis (RO) and brine softening processes. Feed water undergoes an oxidation process to oxidise iron and manganese before entering a clarification step to remove suspended solids and metal precipitates. The water is then pumped to a set of UF membranes to remove residual suspended solids and colloidal particles. The filtered water is then desalinated using RO membranes. A pressure gradient is applied to pass solution through membranes to produce a permeate stream and a concentrate stream (brine).

The recovery of the RO plant is limited by calcium sulphate. To address this, the brine produced is pumped to a gypsum reactor. In the reactor, lime is dosed to precipitate gypsum to allow further concentration by RO. The UF, RO and brine softening processes are repeated to maximise water recovery and to minimise brine production.

Ion Exchange

The ion exchange technology based treatment process considered by BECSA consisted of two main processing steps. The first stage includes settling and filtration to remove suspended solids. This is followed by an ion exchange process to reduce the overall salinity of the water. Ion exchange is a reversible chemical reaction where an ion from solution is exchanged for a similarly charged ion attached to an immobile solid particle.

The process uses nitric acid to produce a cation nitrate (such as calcium nitrate) from the cation exchange step and ammonia to produce and ammonium anion (such as ammonium sulphate) from the anion exchange step. The ion exchange process is claimed to desalinate the water to a quality lower than that permitted for discharge into the environment and thus a portion of the filtered water by-passes the ion exchange step to be blended further on.

Process, Activity and Operation Alternatives

Treatment Options

A trade-off study was performed and found that the WTP using Membrane with Lime Softening Technology may be a suitable technology, as described above.

Waste Handling

A trade-off study will be conducted to evaluate waste management alternatives for the residue streams generated from the mine water desalination process.

Post mining land use

Post mining land use options will be further explored in the closure. Land use is determined by a number of factors. These include the land use determined for the Wolvekrans mining operations as a whole, the VDDC Pit end land use specifically, and the associated issues of climate, resources, population growth, economic activity and topography etc. Historically the VDDC Project area land was used primarily for grazing and some crops (maize) growing locally. It is anticipated that post-mining land use will be the equivalent of its current use, i.e. grazing. The feasibility of this alternative
will be investigated and it will include community involvement to determine the most acceptable post mining land use.

Environmental assessment process

Approach to the environmental impact assessment

In line with the objectives of an EIA, this process seeks to identify the environmental consequences of a proposed project from the beginning and helps to ensure that the project, over its life cycle, will be environmentally acceptable and integrated into the surrounding environment in a sustainable way.

Two parallel processes are being followed during the Scoping Phase of this EIA/EMP Amendment application, being an Environmental Technical process and the Public Participation process.

Public participation process

Public involvement activities undertaken to date

Activities undertaken to date for the public involvement process during the Scoping Phase include:

- Development of stakeholder database;
- Preparation of documentation for notification of stakeholders (background information document, invitation letters, media advertisement and site notices) and distribution of these;
- Public notification;
- Public comment period of Background Information Document (BID);
- Public meeting;
- Public Review of Draft Scoping Report; and
- Collation of comments received into an Issues Report.

Anticipated impacts

As a result of the project team’s understanding of the project and previous experience on projects of a similar nature, the following potential impacts are anticipated:

<table>
<thead>
<tr>
<th>Environmental aspect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology</td>
<td>Even though the geology will be affected by the drilling of boreholes for the abstraction of underground water and slurry, these areas will form part of the opencast mining already approved and therefore the impact will be negligible.</td>
</tr>
<tr>
<td>Topography</td>
<td>The predominant modifications to the topography of the area will be the result of topsoil, subsoil, overburden and discard facilities. Although additional facilities are planned, these will be in line with the character of this mining area.</td>
</tr>
<tr>
<td>Soils</td>
<td>Soil impacts from the water treatment plants and associated infrastructure will be negligible in light of the fact that these activities will take place on previously disturbed mining areas.</td>
</tr>
<tr>
<td>Fauna and Flora</td>
<td>Impacts on biodiversity are anticipated to be negligible as the footprint for the proposed area has been disturbed by existing mining and the VDDC Pit development, as well as regional and local residential activities.</td>
</tr>
<tr>
<td>Surface Water</td>
<td>A positive impact is expected as a result of the controlled release of treated water into the Olifants River through a probable minor increase in river flow. The proposed WTP (s), residue storage facilities, storm water management facilities and discard facilities will cause minor losses of runoff to the natural environment, and reduced natural catchment yield. The impacts will be managed by storm water management measures in order to...</td>
</tr>
<tr>
<td>Environmental aspect</td>
<td>Description</td>
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<tr>
<td>--------------------------------------</td>
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<tr>
<td><strong>Environmental aspect</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>mininise the impact of additional runoff within the proposed expansion development area, within the context of the overall VDDC Pit development. The proposed project activities development will be in accordance with Regulation 704 to encourage diversion of clean storm water to the receiving water courses and management of impacted storm water, and within the context of the overall VDDC Pit development.</td>
<td></td>
</tr>
<tr>
<td><strong>Water quality</strong></td>
<td>Minor water quality impacts on rivers, streams and potential wetlands are anticipated as storm water runoff from contaminated areas and wetting of roads will be managed through accepted commitments, within the context of the overall VDDC Pit development. Potential positive water quality impacts can be expected due to the treatment of the mine water and potential discharge of excess mine treated water into the environment.</td>
</tr>
<tr>
<td><strong>Groundwater</strong></td>
<td>Local water users and uses will be ascertained through the studies. Impact on the project area local ground water system due to water abstraction is anticipated, though largely accommodated within the context of the overall VDDC Pit development. Establishment of the discard facilities may also impact on groundwater resources.</td>
</tr>
<tr>
<td><strong>Availability</strong></td>
<td>Slurry will be removed from the current underground workings prior to opencast mining. The slurry will be treated and the excess treated water will be discharged. However infiltration of underground water into the opencast workings may impact the water quality. Therefore in terms of groundwater quality special attention will be given to:</td>
</tr>
</tbody>
</table>
|                                     | - Potential for Acid Mine Drainage; and  
<p>|                                     | - Potential seepage from stockpiles.                                                                                          |
| <strong>Quality</strong>                          | Again, the impacts associated with the specific project infrastructure will be considered within the context of the overall VDDC Pit development. The impacts, and management measures, will be considered within the context of the overall VDDC Pit development. The slurry will be removed from the current underground workings prior to opencast mining. The slurry will be treated and the excess treated water will be discharged. However infiltration of underground water into the opencast workings may impact the water quality. Therefore in terms of groundwater quality special attention will be given to: |
| <strong>Air Quality</strong>                      | Negligible air quality changes may be expected as a result of increased windblown dust caused by the following construction phase activities: blasting, dust from the discard facility and conveyors, stockpiles of material and the movement of vehicles over unpaved road surfaces and odours from the waste emanating from the mine water treatment plants. Wind erosion over bare soil in areas with no vegetation and stockpiles will also have impacts on air quality of the area. Mitigation and management may be required, again, to be considered within the context of the overall VDDC Pit development. |
| <strong>Noise</strong>                            | Noise impacts from the construction of mine water treatment plants and the slurry processing facility will be minimal and short in duration whilst during operation these levels will be managed to within regulatory limits. Noise impacts from the establishment of the discard facilities will be negligible as these will be a continuation of current stockpile establishment activities. |
| <strong>Archaeology</strong>                      | With construction activities on site there will be disturbance to the land and this could result in a resultant impact on items of historical and paleontological value. Mitigation measures will ensure that no damage is incurred. The impacts, and management measures, will be considered within the context of the overall VDDC Pit development. A Heritage assessment will be conducted as part of the EIA, aiming to identify any such buildings or other sites of cultural interest in the VDDC Project footprint. |
| <strong>Visual</strong>                           | The predominant modifications to the aesthetics of the area will be the result of topsoil, subsoil, overburden and discard facilities. Although additional facilities are planned, these will be in line with the character of this mining area.                                                                                                                                                  |
| <strong>Vibrations</strong>                       | The closest settlement to the proposed project is Kwajuma village approximately 600 m to the north of VDDC. Minimal vibrations are expected as a result of the construction activities.                                                                                                                                                                      |
| <strong>Disruption to existing services and infrastructure</strong> | Existing services in the area will be determined so as to minimise any disturbance to these. Mitigation and management may be required within the context of the overall VDDC Pit development.                                                                                                                                                                                                 |</p>
<table>
<thead>
<tr>
<th>Environmental aspect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-economic</td>
<td>The proposed project is required to enable the VDDC Project to proceed and extend the life of mine of Wolvekrans Colliery, thereby maintaining employment opportunities for local communities; it is anticipated that the proposed development will maintain the life of Wolvekrans Colliery and maintain employment up to 2040. The proposed development will thereby continue to stimulate economic opportunities in the Vandyksdrift/Kriel area through the employment of local people and use of local contractors during construction. Economic downstream effects are expected to remain unchanged as expenditure in the area remains the same.</td>
</tr>
</tbody>
</table>

**Proposed process for the remainder of the studies**

**Public involvement**

The following is recommended with regard to the public consultation to be conducted during the remainder of the Scoping phase of the study:

- An introductory meeting will be held with stakeholders, to inform them of the proposed project, the required regulatory processes and requirements, and to provide them with an opportunity to provide comments to the project team which will need to be taken into account during the EIA/EMP phase;
- The Draft Scoping Report will be made available to all registered stakeholders for review and comments;
- After comment has been received on this Draft Scoping Report, a Final Draft Scoping Report will be made available for public review;
- Upon consolidation and any further comments and issues, the report will be finalised and submitted to DMR, MDEDET, DWA and DEA for approval before the project can continue to the EIA/EMP phase of the study.

The following is recommended with regard to the public consultation to be conducted during the EIA/EMP phase of the study:

- A progress feedback letter will be sent to all identified or registered stakeholders following the completion of the scoping phase to thank those that participated to date, and keeping them informed of the next steps in the project;
- DMR and MDEDET will then make comment with regard to the way forward for the assessment phase of the study and this work will then proceed accordingly;
- A Draft EIA/EMP Report will then be generated for the Project activities and this will, once again, be made available for public comment;
- A public meeting will be held with stakeholders, and summary reports and an updated Issues Report, will be distributed to all registered stakeholders;
- Upon consolidation and any further comments and issues, the report will be finalised and submitted to DMR and MDEDET for a decision regarding the project; and
- The environmental authorisation decision will be communicated to all key stakeholders as well as those that have participated in the study to date.
Environmental Impact Assessment and Environmental Management Programme development

The following is recommended in terms of the technical scope of the Impact Phase of the EIA/EMP Amendment application.

- Impact assessment including the following specialist investigations:
  - Biodiversity study;
  - Closure Liability Assessment;
  - Groundwater study;
  - Heritage Impact Assessment;
  - Hydraulic Impact Assessment;
  - Land Use and Land Capability Plan;
  - Rehabilitation Plan;
  - Soil study;
  - Surface water study;
  - Waste Licence Application;
  - Water Use License Application;
  - Wetland Impact Assessment.

- An EIA/EMP Amendment Application will be compiled to mitigate the impacts identified in the impact assessment;
- Stakeholder feedback;
- The final EIA/EMP Amendment Application will be submitted to the DMR following the incorporation of stakeholder comment and a meeting with key stakeholders to ensure that their comments have been addressed in the final report;
- Record of Decision: after having reviewed the final EIA/EMP Amendment Application, regulatory authorities will pass a record of decision and this outcome will be communicated to stakeholders thereafter.

Conclusions and Recommendations

All of the proposed activities will be located in areas that have been disturbed through previous mining, farming and or residential activities.

The proposed water treatment plant(s) and associated infrastructure will be operated with the objective of reducing the level of the water found underground. Once this objective has been achieved, these facilities will make way for the authorised mining of the VDDC Open Pit (OT6/2/2/113).

It is currently assessed that potential environmental impacts that could arise can be mitigated in line with GN 704, Mining Best Practice Guidelines and EMP Commitments of the previously authorised mining of the VDDC pit (OT6/2/2/113).

In lieu of the above, no environmental fatal flaws have been identified during the Scoping Phase of this study, for the proposed VDDC Project.

A comprehensive public involvement programme is in operation in order to identify critical issues and concerns. The EIA process is, however, iterative and therefore additional issues/impacts may be identified that requires further investigation/consideration.

The process that will be followed during the detailed Impact Assessment phase will meet the requirements of the legislation to ensure that the regulatory authorities receive sufficient information to enable informed decision-making.
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Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (South Africa) (Pty) Ltd (SRK) by BHP Billiton Energy Coal South Africa (Pty) Limited (BECSA). The opinions in this Report are provided in response to a specific request from BECSA to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK’s investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.
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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>BECSA</td>
<td>BHP Billiton Energy Coal South Africa (Pty) Limited</td>
</tr>
<tr>
<td>BS</td>
<td>Brine Softening</td>
</tr>
<tr>
<td>BSR</td>
<td>Biological Sulphate Reduction</td>
</tr>
<tr>
<td>CV</td>
<td>Curriculum Vitae</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EIAR</td>
<td>Environmental Impact Assessment Report</td>
</tr>
<tr>
<td>DEIAR</td>
<td>Draft Environmental Impact Assessment Report</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Programme</td>
</tr>
<tr>
<td>EMPR</td>
<td>Environmental Management Programme Report</td>
</tr>
<tr>
<td>DEA</td>
<td>Department of Environmental Affairs</td>
</tr>
<tr>
<td>DEAT</td>
<td>National Department of Environmental Affairs and Tourism</td>
</tr>
<tr>
<td>DME</td>
<td>Department of Minerals and Energy</td>
</tr>
<tr>
<td>DMR</td>
<td>Department of Mineral Resources</td>
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<tr>
<td>DWA</td>
<td>Department of Water Affairs</td>
</tr>
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<td>DWAF</td>
<td>Department of Water Affairs and Forestry</td>
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<td>DWEA</td>
<td>Department Water and Environmental Affairs</td>
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<td>GA</td>
<td>General Authorisation</td>
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<tr>
<td>GAN</td>
<td>Global Africa Network</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GG</td>
<td>Government Gazette</td>
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<tr>
<td>GGP</td>
<td>Gross Geographic Product</td>
</tr>
<tr>
<td>GN</td>
<td>General Notice</td>
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<tr>
<td>ha</td>
<td>Hectare</td>
</tr>
<tr>
<td>HIA</td>
<td>Heritage Impact Assessment</td>
</tr>
<tr>
<td>I&amp;APs</td>
<td>Interested and Affected Parties</td>
</tr>
<tr>
<td>IWULA</td>
<td>Integrate Water Use License Application</td>
</tr>
<tr>
<td>IWWMP</td>
<td>Integrated Water and Waste Management Plan</td>
</tr>
<tr>
<td>LOM</td>
<td>Life of Mine</td>
</tr>
<tr>
<td>kV</td>
<td>kilo-volts</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>MAE</td>
<td>Mean Annual Evaporation</td>
</tr>
<tr>
<td>MDEDET</td>
<td>Mpumalanga Department of Economic Development, Environment and Tourism</td>
</tr>
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<td>MHSA</td>
<td>Mine, Health and Safety Act No 29 of 1996</td>
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</tr>
<tr>
<td>Mm$^3$</td>
<td>Million Cubic Meters</td>
</tr>
<tr>
<td>Mtpa</td>
<td>Mega/Million tons per annum</td>
</tr>
<tr>
<td>MTPA</td>
<td>Mpumalanga Tourism and Parks Agency</td>
</tr>
<tr>
<td>MPRDA</td>
<td>Mineral and Petroleum Resources Development Act No 28 of 2002</td>
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<tr>
<td>MVA</td>
<td>Mega-Volt Ampere</td>
</tr>
<tr>
<td>NEMA</td>
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<tr>
<td>NWA</td>
<td>National Water Act No 36 of 1998</td>
</tr>
<tr>
<td>POS</td>
<td>Plan of Study</td>
</tr>
<tr>
<td>REM</td>
<td>Remainder</td>
</tr>
<tr>
<td>RO</td>
<td>Reverse Osmosis</td>
</tr>
<tr>
<td>SLP</td>
<td>Social and Labour Plan</td>
</tr>
<tr>
<td>TDS</td>
<td>Total Dissolved Solids</td>
</tr>
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<td>TWQGR</td>
<td>Target water quality guideline range</td>
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<tr>
<td>UF</td>
<td>Ultra Filtration</td>
</tr>
<tr>
<td>VDDC</td>
<td>Vandyksdrift Central</td>
</tr>
<tr>
<td>WTP</td>
<td>Water Treatment Plant</td>
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<td>WUL</td>
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1 Introduction and Scope of Report

BHP Billiton Energy Coal South Africa (Pty) Limited (BECSA) produces energy coal for the South African domestic and export markets, and consists of four primary coal-mining operations, Khutala Colliery, Klipspruit Colliery, Middelburg Colliery and Wolvekrans Colliery (previously known as Douglas Colliery), as well as the four processing plants of BECSA Coal Processing Services. BECSA is 100 per cent owned by BHP Billiton and located near the towns eMalahleni (Witbank) and Middelburg in the coalfields of Mpumalanga Province, South Africa (BHP, 2013).

The Wolvekrans Colliery is situated midway between eMalahleni and Kriel in the Mpumalanga Province approximately 130 km east of Johannesburg.

The mine currently employs 914 people and the current production is 16 Million tons per annum (Mtpa) medium rank bituminous thermal coal.

Coal is currently mined using open-pit truck and shovel methods. Wolvekrans Colliery has a measured resource base of 413 Mt and an indicated resource base of 140 Mt (BHP, 2012). Wolvekrans Colliery currently comprises one opencast area named the Steenkoolspruit Pit.

The then Department of Minerals and Energy (DME) (now known as Department of Mineral Resources (DMR)) approved the amendment of the Environmental Management Programme (EMP) for the Douglas Colliery operations in 2006 (OT6/2/2/113). However, it only focussed on the opencast mining of previously underground mined areas. Although the authorisation has been obtained to mine the coal resources, the subject to this EMP Amendment and Environmental Impact Assessment (EIA) process is for the authorisation of additional activities, principally associated with removing underground water and fine coal slurry, which were not previously applied for.

These proposed developments require environmental authorisation in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998) and the Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002), therefore an Environmental Impact Assessment / Environmental Management Plan (EIA/EMP) is required for the environmental authorisation.

SRK Consulting has been appointed as an independent consultant to conduct the Environmental Impact Assessment (EIA). The process consists of two phases: Scoping and Impact Assessment. This report serves to document the results of the scoping phase and will be placed in various public locations to give interested and affected parties (I&APs) the opportunity to comment.

1.1 Report Structure

This Scoping Report has been prepared to meet the requirements of the MPRDA and NEMA and includes information on the following:

- The approach adopted for the Scoping Phase of the study;
- The proposed developments at BECSA;
- Listed activities in terms of NEMA that requires authorisation;
- Scheduled activities in terms of NEM:WA that requires authorisation;
- The Baseline Environment within which these developments are proposed to be established;
- Anticipated environmental, social and cultural impacts;
- Alternatives that have been considered as part of the scoping phase of the study;
- The proposed scope for the assessment phase of the EIA/EMP Amendment Process;
- Conclusions of the scoping phase.
Regulation 28 of GNR 543 printed in terms of NEMA precisely stipulate the minimal requirement and issues that need to be addressed in a scoping report. This scoping report strives to address all these requirements as per regulations. Table 1-1 indicates the regulations that have been addressed and the section of the scoping report where these requirements can be found.

Table 1-1: Requirement of section 28 of GN R No 543

<table>
<thead>
<tr>
<th>GNR 543 (28)</th>
<th>Description of Regulation</th>
<th>Section</th>
<th>Page</th>
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<tr>
<td>(1)(a)</td>
<td>Details and expertise of the EAP</td>
<td>Section 1</td>
<td>3</td>
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<td>(1)(b)</td>
<td>Description of the proposed activity</td>
<td>Section 4</td>
<td>5</td>
</tr>
<tr>
<td>(1)(c)</td>
<td>Description of alternatives</td>
<td>Section 9</td>
<td>55</td>
</tr>
<tr>
<td>(1)(d)</td>
<td>Description of the property and location of the activity on the property</td>
<td>Section 2.1</td>
<td>3</td>
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<tr>
<td>(1)(e)</td>
<td>Description of the affected environment</td>
<td>Section 7</td>
<td>28</td>
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<td>(1)(f)</td>
<td>Consideration of legislation and guidelines</td>
<td>Section 6</td>
<td>15</td>
</tr>
<tr>
<td>(1)(g)</td>
<td>Description of environmental issues and potential impacts</td>
<td>Section 8</td>
<td>52</td>
</tr>
<tr>
<td>(1)(h) and (k) to (m)</td>
<td>Details of the Public Participation Process</td>
<td>Section 11</td>
<td>59</td>
</tr>
<tr>
<td>(1)(i)</td>
<td>Need and desirability of the proposed activity</td>
<td>Section 5</td>
<td>14</td>
</tr>
<tr>
<td>(1)(j)</td>
<td>Identification, advantages and disadvantages of proposed activity.</td>
<td>Section 5</td>
<td>14</td>
</tr>
<tr>
<td>(1)(n)</td>
<td>Plan of Study for the EIA</td>
<td>Section 12</td>
<td>60</td>
</tr>
<tr>
<td>(1)(o) and (p)</td>
<td>Required information by the Competent Authority.</td>
<td>N/A</td>
<td>N/A</td>
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</tbody>
</table>

1.2 Scoping Phase Study Objective

The objectives of the Scoping Phase are to:

- Contextually understand the overall project and project area;
- Identify stakeholders and future engagements;
- Identify key issues and anticipated impacts that require investigation through the undertaking of specialist studies; and
- Set the terms of reference for the specialist studies for the next phase (undertaking of the Impact Assessment (IA) and development of the EMP).

Based on the need to meet the above mentioned objectives, an approach for the Scoping Phase has been developed which:

- Takes cognizance of the regulatory requirements in terms of NEMA, MPRDA and the National Water Act (Act 36 of 1998) (NWA) and any other acts where applicable;
- Allows for a flexible and appropriate public involvement programme;
- Meets the requirements of the DMR;
- Makes use of existing information wherever possible (i.e. existing EMPs, EMP/EIAs and specialist studies);
- Allow for public comment on the Draft and Final Scoping Report prior to finalisation and submission to the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) and DMR; and
- The involvement of key specialists early in the project (during the Scoping Phase) so as to facilitate the identification of fatal flaws and inform project alternative decisions.
2 Details of Applicant

2.1 Name and Address of Operation, Operation’s Owner and Responsible Person

Name and Address of Operation
Wolvekrans Colliery
Vandyksdrift Road, Middelburg
Contact person: Herman Swanepoel – General Manager: Wolvekrans Colliery

Operations Owner
BHP Billiton Energy Coal South Africa (Pty) Limited (BECSA)
Tel: (013) 653 1100
Fax: (013) 653 1197

Responsible Person
Mr Vikesh Dhanooklal – Senior Manager: Mining Rights

2.2 Name and Address of the Owner of the Land and the Title Deed Description

The surface areas that might be affected by the proposed projects are listed below:

- Portions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14 of the farm Vandyksdrift 19 IS;
- Portions 1, 2, and 25 of the farm Steenkolspruit 18 IS;
- Portions 4, 8, 9, 11, 12, 13, 14 and the remainder extent of the farm Kleinkopje 15 IS;
- Portions 6, 9, 10, 13, 35 and remainder extent of the farm Wolvekrans 17 IS;
- Portions 1, 3, 6 and the remainder extent of the farm Rietfontein 43 IS;
- Portions 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 15 and the remainder extent of the farm Middeldrift 42 IS; and
- Portion 31 of the farm Kromfontein 30 IS.

3 Details of the Environmental Assessment Practitioner

The study has been undertaken by SRK Consulting SA (Pty) Ltd. SRK commenced its practices in 1974 as has since been involved in a large variety of environmental studies. SRK Consulting is a South African founded international organisation of professionals providing a comprehensive range of consulting services to natural resource industries and organisations. SRK’s Johannesburg and Pretoria offices are staffed with over 200 professional consultants operating in a range of disciplines, mainly related to the water, environmental, social and mining sectors. Supporting expertise is available within these offices, and the national and international offices, for all environmental projects.

The project team consists of the following members (Table 3-1), and for the purpose of this EIA, can be contacted at SRK Consulting:
Table 3-1: Details of the EIA/EMP project team

<table>
<thead>
<tr>
<th>Details</th>
<th>Name</th>
<th>SRK Consulting</th>
<th>Nemai Consulting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Practitioner</td>
<td>Dr Andrew Wood</td>
<td>Dr Laetitia Coetser</td>
<td>Selma Nel</td>
</tr>
<tr>
<td></td>
<td>Project Partner and Reviewer</td>
<td>Project Manager and report preparation</td>
<td>Project coordinator and report preparation.</td>
</tr>
<tr>
<td>Address</td>
<td>PO Box 55291, Northlands 2116</td>
<td>PO Box 35290, Menlo Park 0081</td>
<td>PO Box 55291, Northlands 2116</td>
</tr>
<tr>
<td></td>
<td>(011) 441 1111</td>
<td>(012) 361 9821</td>
<td>(011) 441-1111</td>
</tr>
<tr>
<td></td>
<td>(011) 880 8086</td>
<td>(012) 361 9912</td>
<td>(011) 880 8086</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:awood@srk.co.za">awood@srk.co.za</a></td>
<td><a href="mailto:lcoetser@srk.co.za">lcoetser@srk.co.za</a></td>
<td><a href="mailto:snel@srk.co.za">snel@srk.co.za</a></td>
</tr>
<tr>
<td>Curricula Vitae</td>
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</tbody>
</table>

Curricula Vitae of the project team members listed above can be found in Appendix A.

3.1 Independence of the Environmental Assessment Practitioners

SRK consulting hereby declares independence of the proposed Vandyksdrift Central (VDDC) Project.

The independence of the Environmental Assessment team is aimed at reducing the potential for bias in the process of the EIA as associated authorizations. SRK Consulting, nor any sub-consultants and specialists, have any correlation or interest in the proposed project or future/present developments influenced by this project in any way.

The Project Partner and Reviewer (Dr Andrew Wood) and the Project Manager (Dr Laetitia Coetser) are appropriately qualified and registered with the relevant professional bodies. Dr Coetser is registered as Professional Natural Scientists with the South African Council of Natural Scientific Professions. Dr Wood is also registered as a Chartered Biologist. The Curriculum Vitae (CV) of the key SRK Consulting staff members for this project can be found in Appendix A.
4 Brief Project Description

4.1 Project Background

This project is currently in the planning stage and therefore some of the details provided in this section of the report remain subject to contextual change, although they are the preferred alternatives from the information gathered to date.

The proposed VDDC Project forms part of the existing Wolvekrans Colliery (previously known as Douglas Colliery) which has an approved Mining Right (OT6/2/2/113) and as such an Environmental Management Program (EMPR) (OT6/2/2/113) and Integrated Water Use Licence Application (IWULA) for the current operations, which includes the mining of the VDDC Pit via opencast methodology and the dewatering of the workings.

The VDDC Project is a brownfields project focusing on the optimal mining of the VDDC Pit (± 1 411 ha). The current existing and approved EMPR allows for the mining of the 5, 4, 2 and 1 seam coal reserves using opencast mining methods (as per the approved EMPR). 2 seam was previously extensively mined by underground board and pillar methods, and then used to store fine coal slurry discards (estimated volume of 23 Mt). Areas of 2 seam workings are also now flooded with water and such water and slurry need to be removed in order to enable the open pit development.

Fine coal slurry was disposed of in the past into the previous underground mine workings. These workings are now earmarked for pillar extraction where water has accumulated. It is the intention of BECSA to remove the fine coal slurry, to increase the dewatering capacity and to treat the water from the underground workings to an appropriate quality for discharge to the Olifants River, or for reuse.

BECSA’s VDDC Project for which this EIA/EMP Amendment is being prepared, will entail the following main activities:

- Applying for additional capacity for dewatering from the underground workings (as currently approved in the IWULA) and treatment of water arising from mining operations;
- The establishment of a borehole field for the efficient abstraction of mine water from the underground mine workings;
- Construction and operation of desalination plant (s) for the treatment and management of water arising from the underground workings areas and associated mining activities;
- Construction and upgrading of water management infrastructure and systems associated with this project to enable discharge into the environment (Olifants River) or for potential reuse;
- Construction of pipelines for the removal and transportation of water from the underground mine workings;
- Construction and operation of a fine coal slurry processing facility and associated infrastructure (i.e. waste disposal) to process the fine coal slurry removed from the underground mine workings;
- Additional mining related infrastructure, e.g. haul roads, discard dumps, etc.;
- Relocation of discard dumps from the VDDC area to Steenkoolspruit mining area;
- Abstraction of water from the Olifants River for start-up and commissioning activities until steady state operation is achieved;
- Potential relocation of residents adjacent to the mining area where blasting will occur in terms of the approved opencast mining area zone of influence.

Refer to Figure 4-5 and Figure 4-6 for illustration of the proposed Water Treatment Layout and Figure 4-7 for a layout of the proposed associated infrastructure.
Removal and Management of Fine Coal Slurry:

A borehole field will be established that will enable BECSA to efficiently remove supernatant water from the fine coal slurry. The slurry will subsequently be accessed to be loaded and transported to a tip to manage the high percentage of coal fines during the mining operation. The coal fines will then be put through a process of screening and thickening.

A trade-off study will be conducted to evaluate various alternatives with regard to the management of final coal fines which will include options such as presses, or dewatering in paddocks.

Currently, the water elevation at the coal 2 seam is 1508 metres above mean sea level (mamsl). Water will need to be extracted to an elevation of 1494 mamsl before opencast mining can commence. This equates to a dewatering volume estimated to be 16.8 Mm³. The supernatant water in the fine coal slurry area is estimated to be 6.5 Mm³.

The extracted mine water will need to be treated for which a waste licence will be required for the treatment plant. Two treatment facility configurations have been considered by BECSA:

- A central water treatment facility; and
- Modular water treatment facilities.

Water Treatment Plants (WTPs):

The current conceptual design is for three separate, modular Water Treatment Plants (WTPs) using membrane desalination technology. The practical design basis and technology selection may change as further detailed design is undertaken, but the treated water quality specifications will be appropriate for discharge to the Olifants River or reuse.

A preliminary trade-off study was performed and found that the WTP using Membrane with Lime Softening Technology could be a suitable technology. This technology could consist of staged tapered Ultra Filtration (UF), Reverse Osmosis (RO) and Brine Softening (BS) processes.

The process could potentially follow the steps described below.

Feed water undergoes an oxidation process to oxidise iron and manganese before entering a clarification step to remove suspended solids and metal precipitates. The water is then pumped to a set of UF membranes to remove residual suspended solids and colloidal particles. The filtered water is then desalinated using RO membranes. A pressure gradient is applied to pass solution through membranes to produce a permeate stream and a concentrate stream (brine).

The recovery of the RO plant is limited by calcium sulphate. To address this, the brine produced is pumped to a gypsum reactor. In the reactor, lime is dosed to precipitate gypsum to allow further concentration by RO. The UF, RO and brine softening processes are repeated to maximise water recovery and to minimise brine production (See Figure 4-1).

A summary of the trade-off study will be included as part of the EIA Phase.
Membrane based process with Brine Softening is the technology of choice for desalination of mine water in the Highveld and Witbank Coalfields. Two full scale commercial plants, namely the eMalahleni WTP and the Optimum WTP are operational in the catchment with the construction of the Middelburg Water Reclamation Plant in progress.

The Membrane Based Technology (MBT) with BS produces metal-rich gypsum sludge, gypsum sludge and brine waste streams. At similar operating plants, the gypsum sludge is made available as a raw material and the metal-rich gypsum sludge and brine can be disposed of in a waste management facility designed to handle such waste.

The method of storage for the waste streams produced from these WTPs will be dependent on the outcome of the trade-off study and will be finalised during the EIA Phase.

Three modular Water Treatment Facilities could be constructed and operated:

- The Vleishaft WTP;
- The Isiyalu 1 WTP;
- The Isiyalu 2 WTP.

Table 4-1 summarises the design capacities of the WTPs.

<table>
<thead>
<tr>
<th>Water Treatment Facility</th>
<th>WTP Design Treatment Rate (Mm$^3$ per annum)</th>
<th>Average Treatment Rate (ML/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vleishaft</td>
<td>7.3</td>
<td>20</td>
</tr>
<tr>
<td>Isiyalu 1</td>
<td>8.03</td>
<td>22</td>
</tr>
<tr>
<td>Isiyalu 2</td>
<td>6.57</td>
<td>18</td>
</tr>
</tbody>
</table>

It is anticipated that water attenuation facilities in the form of two Erichsen Dams with a capacity of approximately 640 m$^3$ each will also be required to operate in association with the WTPs.
Another alternative could be to design the WTP in such a way that the mine water is pumped directly to a 1st unit plant which will form part of the WTP facility.

The existing Vleishaft Dam which has a holding capacity of approximately 600,000 m$^3$ is also licensed to store mine water. Figure 4-5 and Figure 4-6 illustrates the Water Treatment Layout.

The intent is to treat the underground mine water to acceptable levels so that it can be discharged to the Olifants River (A separate WUL amendment to the existing WUL will be submitted). Existing mine water desalination water treatment plants in the area have demonstrated that mine water can be treated to acceptable water quality levels; although the practical treated water quality specifications will be determined by the impact assessment informing the WUL Amendment.

Alternative discharge points for the treated water will be evaluated as part of the Hydraulic Impact Assessment.

The above mentioned project will require that the existing Douglas Colliery’s EMP be amended to include and reflect on the relocation of the current discard facilities to Steenkoolspruit pit once it has been rehabilitated, as well as additional mining related activities and infrastructure.

Wolvekrans has a detailed waste management procedure (Appendix B) which will be updated to include the water treatment plants. This procedure adopts the principles behind the National Waste Management Strategy 2010. The conceptual approach to waste management is underpinned by the waste hierarchy. The foundation of the hierarchy and the first choice of measures in the management of waste include waste avoidance and reduction. Where this cannot be achieved, waste should be recovered, reused, recycled and treated. Only as a last resort, should waste be disposed of.

4.2 Regional Setting

Wolvekrans Colliery falls within the Mpumalanga Province. Access to the proposed site is through the regional road (R544).

The regional location of Wolvekrans is shown in Figure 4-3.

4.3 Magisterial District, Municipality and Administrative Boundaries

In terms of the administrative boundaries, the Wolvekrans Colliery is located within the Mpumalanga province. At the municipal level the Wolvekrans Colliery falls with the Nkangala and eMalahleni, district and local Municipality, respectively.

4.4 Directions and Approximate Distances to the Nearest Towns

The Wolvekrans Colliery is situated midway between eMalahleni and Kriel in the Mpumalanga Province approximately 130 km east of Johannesburg. Figure 4-2, Figure 4-3 and Figure 4-4 provides an indication of the locality of the proposed project. The closest residential establishments to the mine are the townships of Kwajuma Village (600 m), Vandyksdrift (700 m) and Springbok Village (4 km).
Figure 4-2: Locality of the Proposed Development

Figure 4-3: Regional Locality of the Proposed Development
Figure 4-4: Locality of the Proposed Development within the Surface Rights of BECSA
Figure 4-5: Layout of Proposed Water Management Infrastructure
Figure 4-6: Layout of Proposed Dirty Water and Waste Management Infrastructure
Figure 4-7: Layout of Proposed Associated Infrastructure
5 Motivation for the Proposed Project

The proposed VDDC Project activities for which this EIA/EMP Amendment is being prepared, will allow for the safe mining of the VDDC coal resources in the opencast pit operations. Removal of underground water and fine coal slurry will facilitate the expansion of the mine into new areas (VDDC) surrounding the existing pit. The mining of the VDDC Pit is fundamental to BECSA maintaining existing production levels from Wolvekrans Colliery and will allow the mine to achieve its targeted Life of Mine (LOM) of 2040.

The treatment of the water from the underground workings will reduce the latent liability for contaminated water currently accumulating within the underground mine workings, and may provide some water for use on the mine and reduce the mine’s reliance abstraction from the Olifants River. Excess treated water can be released to the Olifants River at an acceptable quality.

5.1 Benefits of the Project

BECSA has a comprehensive Social and Labour Plan (SLP) which aims to uplift their employees and to benefit the community in the form of employment and upliftment. The SLP is comprised of 14 sub-plans which are structured to achieve these objectives. The SLP document contains the following broad categories:

- Baseline Socio-Economic Survey Study;
- Skills Development Plan;
- Career Progression Plan; and
- Mentorship Plan.

The SLP is a significant benefit of the mine. Another benefit is the economic growth of the surrounding towns as well as the country, in the form of an increase in Gross Domestic Product (GDP).

5.2 The ‘No Project’ Option

BECSA has received authorisation for the mining operations, but requires opportunity to remove, and treat, affected underground mine water, and fine coal slurry, as well as to relocate current discard dumps in order to access the coal resources.

If the project was not to proceed, the additional economic activity, skills development and available jobs would not be created, the coal reserves would be sterilised and remain unutilised, the current land uses and economic activities would continue as at present, with little or no economic growth developing in the region.

Seeing that the Wolvekrans Colliery is one of the main coal supplier to ESKOM’s Duvha Power Station, the implications of not proceeding with this proposed project, may lead to provincial and even national energy supply problems.

There are currently no foreseeable significant environmental impacts that will outweigh the economic benefits that would be generated by the project, however this will be further assessed during the environmental impact assessment.

There is a high demand for coal in South Africa and internationally. This means that should Wolvekrans Colliery not mine the new planned areas, it will be a lost opportunity for the South African economy, as well as for power generation buffer stock (in the case of emergency situations with current local coal supply).
6 Legal and Policy Framework

The following Acts and Regulations, at this point in time, will be applicable during the construction of the proposed VDDC Project and associated infrastructure. These requirements will be adhered to during the EIA/EMP Amendment phase and further legal review will be undertaken during the course of the project.

6.1 The Constitution of the Republic of South Africa

Section 24 states that everyone has the right:

a) To an environment that is not harmful to their health or well-being; and
b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that.
   (i) Prevent pollution and ecological degradation;
   (ii) Promote conservation; and
   (iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

6.2 The National Environmental Management Act, Act 107 of 1998

The National Environmental Management Act (NEMA) as amended in 2010 contains a set of principles in Chapter 2 that govern environmental management. These principles must be adhered to and taken into consideration during the impact assessment phase. The competent authority, before authorizing an application, must take these principles into account.

The Environment is defined in the NEMA as the following;

“environment” means the surroundings within which humans exist and that are made up of —

i. the land, water and atmosphere of the earth;
ii. micro – organisms, plants and animal life;
iii. any part or combination of (i) or (ii) and the interrelationship among and between them; and
iv. the physical, chemical, aesthetic and cultural, properties and conditions of the foregoing that influence human health and well-being.

The principles of NEMA are as follows;

1. The principles set out in this section apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and —
   a. shall apply alongside all other appropriate and relevant considerations, including the State’s responsibility to respect, protect, promote and fulfil the social and economic rights in Chapter 2 of the Constitution and in particular the basic needs of categories of persons disadvantaged by unfair discrimination;
   b. serve as the general framework within which environmental management and implementation plans must be formulated;
   c. serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment;
   d. serve as principles by reference to which a conciliator appointed under this Act must make recommendations; and
2. Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.

3. Development must be socially, environmentally and economically sustainable.
   a. Sustainable development requires the consideration of all relevant factors including the following:
      i. That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
      ii. that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
      iii. that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
      iv. that waste is avoided, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;
      v. that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
      vi. that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
      vii. that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
      viii. that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.
   b. Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.
   c. Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.
   d. Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.
   e. Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.
   f. The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured.
   g. Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge.
h. Community well-being and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.

i. The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.

j. The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.

k. Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.

l. There must be intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.

m. Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.

n. Global and international responsibilities relating to the environment must be discharged in the national interest.

o. The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people’s common heritage.

p. The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.

q. The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.

r. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

Section 28 of the NEMA should be adhered to during all times of construction, operation and decommissioning of the proposed VDDC Project. Section 28 applies to all activities taking place, and not solely focused on the listed activities being applied for. Section 28 (1) states that:

“Every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or reoccurring”. If pollution cannot be prevented then appropriate measures must be taken to minimize or rectify such pollution.

6.3 EIA Regulations (GNR 543)

The EIA Regulations (GNR 543) were promulgated in terms of Sections 24 of the NEMA, to manage the process, methodologies and requirements for the undertaking of an EIA. The EIA Regulations were published on the 18 June 2010 and came into effect on the 2nd August 2010. The EIA regulations (GNR 543) stipulate that the applicant for a development listed under GNR 544, 545 or 546 must appoint an independent Environmental Assessment Practitioner (EAP) to manage the EIA process. It defines two broad categories of EIA, namely a Basic Assessment and a Full EIA. A Basic Assessment is generally intended for smaller scale projects, or activities whose impacts are well understood and can be easily managed. The process for a Basic Assessment is
described in regulations 21 to 25 of GN R544 and the environmental consultant must conduct a public participation process as set out in regulation 54 to 56.

A full EIA as stipulated in GNR 544 consists of a Scoping and impact assessment phase. This form of an EIA is generally intended for larger scale projects, whereby the environmental impacts are more diverse and extensive thereby a more comprehensive means of impact identification is required. The impacts of such a project may lead to extensive environmental degradation, or solely require a scoping phase in order to assess and identify impacts not easily predicted or identified.

The process for a full EIA is described in regulations 26 to 35 of GNR 543 and the environmental consultant must conduct a scoping process, followed by an impact assessment process, with public participation as set out in regulations 54 to 56.

6.4 Listed Activities

The following listed activities have been identified in terms of Government notices No R.544, 545 and 546 in Government Gazette No. 33306 of 18 June 2010 and requires authorization in terms NEMA.

**G33306 18 June 2010 R544**

9 The construction of facilities for infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water -

(i) with an internal diameter of 0.36 metres or more; or

(ii) with a peak throughput of 120 litres per second or more, excluding where:

a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or

b. where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse

**Construction of facilities and infrastructure associated with:**

- **Transportation of water from VDDC underground mine workings (dewatering) to surface via pipeline systems.** Water will be stored in surface attenuation dams from which it will be recycled or sent to the water treatment plants. Treated water will ultimately be discharged into the Olifants River, or reused. It is expected that the pipelines required for the dewatering of the VVDC area will have an internal diameter greater than 0.36 metres.

11 The construction of:

(i) canals;

(ii) channels;

(iii) bridges;

(iv) dams;

(v) weirs;

(vi) bulk storm water outlet structures;

(vii) marinas;

(viii) jetties exceeding 50 square metre in size;

(ix) slipways exceeding 50 square metres in size;

(x) buildings exceeding 50 square metres in size, or

(xi) infrastructure or structures covering 50 square metres or more;
where such construction occurs within watercourse or within 32 meters of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.

**Construction of various clean and dirty water management systems, which will include the construction of various channels, clean and dirty water systems (including attenuation dams). Some of this infrastructure may be in close proximity (less than 32 m) to the Olifants River that flows to the south of the VDDC Pit area.**

The decommissioning and re-construction of an explosives magazine in close proximity of the Olifants River (Explosives Act 15 of 2003 will be taken into account).

12 The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 500 cubic metres or more, unless such storage falls within the ambit of activity 19 of Notice 545 of 2010;

This proposed project will require the construction of various dams, e.g. pollution control dams, return water dams and clean and dirty water attenuation dams. These proposed off-stream water storage facilities will have a combined capacity of more than 50 000 m$^3$.

18 The infilling or depositing of any material of more the 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from

(i) a watercourse;
(ii) the sea;
(iii) the seashore;
(iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distances the greater-but excluding where such infilling, depositing, dragging, excavation, removal or moving

(i) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or
(ii) occurs behind the development setback line.

**Earth moving activities of at least 5 cubic meters associated with the VDDC Project as a result of infrastructure constructed in close proximity of the Olifants River.**

22 The construction of a road, outside urban areas.

(i) with a reserve wider than 13.5 metres; or,

(ii) where no reserve exists where the road is wider than 8 metres, or

for which an environmental authorization was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010.

**Haul roads will be required as part of this project, in order to gain access to opencast mining areas and between the various mining related infrastructure. These roads will be wider than 13.5 m.**

28 The expansion of existing facilities for any process or activity where such expansion will result in the need for new, or amendment of, an existing permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.
The following facilities or processes will be expanded in terms of the proposed project, and therefore requires an amendment to the Integrated Water Use License (included but not limited to):

- increasing the dewatering capacity as approved in the current IWULA to remove water from the underground workings;
- increasing the capacity of the existing Vleishaft dam; and
- upgrading of Bob Henry Dam (part of surface water management infrastructure planned).

The expansion of facilities or infrastructure for the bulk transportation of water, sewage or storm water where:

(a) the facility or infrastructure is expanded by more than 1000 metres in length; or
(b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more-
excluding where such expansions:

(i) relates to transportation of water, sewage or storm water within a road reserve; or
(ii) where such expansion will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.

Current pipelines may be required to be extended by more than 1 000 metres in length or increase the throughput capacity by 10% to accommodate the transport of mine water collecting underground to the desalination plants located on the surface.

The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.

Waste management facility for the WTP waste i.e. Waste Slurry Paddock (Approximately 1M m³ waste slurry will be stored on-site).

The construction of new water storage facilities and other water management systems as well as the discharging of treated water into the environment, will required that the current Integrated Water Use License (IWULA) be updated to include all the new relevant water uses;
The IWULA and Integrated Water and Waste Management Plan (IWWMP) will also need to be updated to include (but not limited to):

- increased volume of water abstracted from underground operations;
- abstraction of water from the Olifants River for the start-up of the treatment plants;
- activities within 500 m of wetlands and other water courses
- the explosives magazine which will be located approximately 130 m from the Olifants River;
- activities associated with water management for the project, etc.

*Please note that additional changes to the IWULA and IWWMP in terms of the water uses may be required and will be determined as part of the EIA/EMP process.

10 The construction of facilities or infrastructure for the transfer of 50,000 cubic metres or more water per day, from and to or between any combination of the following:

(i) water catchments;
(ii) water treatment works, or
(iii) impoundments;

excluding treatment works where water is to be treated for drinking purposes.

Water will be transferred via dewatering boreholes and a pipeline system from underground to impoundments as well as to the Water Treatment Plants;

Treated water will be discharged to the Olifants River via pipeline systems, or made available for reuse.

15 Physical alternation of undeveloped, vacant or derelict land for residential, retail commercial, recreational, industrial, or institutional use where the total area to be transformed is 20 hectares or more;

except where such physical alternation takes place for:

(i) linear development activities, or
(ii) agriculture or afforestation where activity 16 in the Schedule will apply.

New development footprint greater than 20 hectares, including but not limited to buildings, infrastructure (i.e. water treatment plants, slurry paddocks, return water dams, haul roads, overburden stockpiles, discard dumps, new coal slurry tip, temporary stockpile, slurry processing plant, increased capacity of existing Vleishaft dam, dirty water attenuation dams etc.), landscaping, construction camps and earth moving activities.

19 The construction of dam, where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-mark of the dam covers an area of 10 hectares or more.

Some of the proposed dirty attenuation dams and potentially the return water dams may be constructed to have a dam wall higher than 5 metres.

(Dam safety Regulations under the Water Act will also be taken into consideration in terms of this activity).
13 The clearance of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation. In critical biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority.

New development footprint areas.

New development footprint, including but not limited to buildings, infrastructure (i.e. water treatment plants, slurry paddocks, return water dams, haul roads, overburden stockpiles, discard dumps, new coal slurry tip, temporary stockpile, fine coal slurry processing plant, increased capacity of existing Vleishafi dam, dirty water attenuation dams etc.), landscaping, construction camps and earth moving activities.

*Affected areas will be confirmed as part of the Biodiversity studies to be performed as part of the EIA/EMP process.

14 The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for:

(1) purposes of agriculture or afforestation inside areas identified in spatial instruments adopted by the competent authority for agriculture or afforestation purposes;

(2) the undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the activity is regarded to be excluded from this list;

(3) the undertaking of a linear activity falling below the thresholds in Notice 544 of 2010.

(a) In Mpumalanga:

All areas outside urban areas.

New development footprint including but not limited to buildings, infrastructure, landscaping, construction camps, areas of earth moving activities.

6.5 The National Environmental Management: Waste Act, Act 59 of 2008

The National Environmental Management: Waste Act (NEMWA) was implemented on 1 July 2009 and section 20 of the Environment Conservation Act 73 of 1989, under which waste management was previously governed, was repealed. The main objectives of the NEMWA are to:

Reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; and to provide for:

1. National norms and standards for regulating the management of waste by all spheres of government;
2. Specific waste management measures;
3. The licensing and control of waste management activities;
4. The remediation of contaminated land; to provide for the national waste information system; and
5. Compliance and enforcement.

The objectives of NEMWA involve the protection of health, well-being and the environment by providing reasonable measures for the minimization of natural resource consumption, avoiding and minimizing the generation of waste, reducing, recycling and recovering waste, and treating and safely disposal of waste as a last resort.

In general, the act seeks to ensure that people are aware of the impact of waste on their health well-being and the environment, and in the process giving effect to section 24 of the constitution, in ensuring an environment that is not harmful to health and well-being.

Waste is defined in the NEMWA as follows:

“waste” means any substance, whether or not that substance can be reduced, re-used, recycled and recovered

a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;
b) which the generator has no further use of for the purposes of production;
c) that must be treated or disposed of; or
d) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but -

i) a by-product is not considered waste; and

ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste.

In terms of the NEMWA, all waste management activities must be licensed. According to Section 44 of the Act, the licensing procedure must be integrated with an environmental impact assessment process in accordance with the EIA Regulations in GNR R543 printed in terms of the NEMA. Government Notice 719, which was implemented on 3rd July 2009, removed all waste management activities from the EIA Regulations GN R386 and GN R387, resulting in new NEMA listed activities namely GNR 544 and GNR545. Government Notice 718 lists the waste management activities that require licensing. A distinction is made between Category A waste management activities, which require a Basic Assessment, and Category B activities, which require a full EIA (Scoping followed by Impact Assessment). EIA Regulation GN R543 defines the process requirements that must be followed for Basic Assessment and full EIA.

The following activities have been identified from Government Notice R 718 Category A and Government Notice 718 Category B, printed in terms of the National Environmental Management: Waste Act (Act no 59 of 1998):

4(1) The storage including the temporary storage of hazardous waste in lagoons.

The storage of Metal-rich Gypsum Sludge, Gypsum Sludge and Brine with an estimated volume of 500 ton/day (product from WTPs) in a Waste Slurry Paddock. Approximately 1Mm$^3$ of waste slurry will be stored on-site.

4(7) The treatment of effluent, wastewater or sewage with an annual throughput capacity of 15 000 m$^3$ or more.

Water Treatment Plants (Vleishaft WTP, Isiyalu 1 WTP and Isiyalu 2 WTP) with a throughput capacity of 60 Ml/day or more (Please note that Pre-Feasibility Studies are currently underway and that the design basis and number of WTPs may change based on the outcome of the study).

4(11) The construction of facilities for activities listed in Category B or this Schedule (not in isolation to associated activity).

The construction of:
- **Water Treatment plants (Conceptually indicated as Membrane Based with Brine Softening)**
- **Water Treatment Plant Waste Management Facility conceptually for the disposal of Metal-rich Gypsum sludge, Gypsum sludge and Brine from WTPs, if the chosen technology generates such waste streams**;
- **Erichsen Dams with capacities of approximately 640 m³ each (It is anticipated that two Erichsen Dams will be constructed at each of the WTOs)**;
- **Pipelines to dispose brine from water treatment to Water Treatment Plant Waste Management Facility.**

### 6.6 The National Water Act (36 of 1998)

The National Water Act (NWA) is the primary regulatory legislation, controlling and managing the use of water resources as well as the pollution thereof. The NWA is applied and enforced by the Department of Water Affairs (DWA).

Section 22(2) (d) of the NWA stipulated that a water user may not waste water. Section 19 focuses on the regulator control of pollution. Pollution is defined as;

"the direct or indirect alternation of the physical, chemical or biological properties of a water resource so as to make it:"

(i) less fit for any beneficial purpose for which it may reasonably be expected to be used; or

(ii) harmful or potentially harmful –

i. to the welfare, health or safety of human beings;

ii. to any aquatic or non-aquatic organism;

iii. to the resource quality; or

iv. to property.

The persons held responsible for taking measures to prevent pollution from occurring, recurring or continuing include persons who own, control, occupy or use the land. This is stipulated in Section 19 (1). This obligation to protect the water resources of the country is initiated by any activity or process on the land which could, has or is continually pollution water resources.

The following measures are prescribed in the section 19(2) of the NWA to prevent pollution:

- cease, modify or control any act or process causing the pollution;
- comply with any prescribed standard or management practice;
- contain or prevent the movement of pollutants;
- eliminate any source of the pollution;
- remedy the effects of pollution; and
- remedy the effects of any disturbance to the bed or banks of a watercourse.

In terms of Section 21 of the NWA water uses are considered to be the taking of water from a water resource, storing of water, impounding or diverting the flow of water in a water course, altering the bed, bank, course or characteristics of water courses and the disposal of water containing waste, disposing of waste in a manner which may detrimentally impact on a water resource and disposing in any manner of water which contains waste from, or which has been heated in, any industrial process or power generation process. All activities involving these water users need to be licensed before commencement of the required activities. All these waster uses
will require a license in terms of Section 22 of the NWA unless permissible under Schedule 1 in terms of Section 39 of the act.

Schedule 1 activities involve the General Authorization (GA) of water users which normally focus on small scale domestic usages of water, therefore will not be necessary for the purpose of this study. However GA’s may be restricted to a particular water resource, category of persons, geographical area or a period of time. GA’s do though still need to conform to any other applicable legislation.

The alteration or disturbance of the bed or banks of a river, will possibly take place during the construction of the proposed VDDC Project. The amendment to the WULA will be incorporated into the EIA and public participation process where applicable.

The following water uses will be applied for or amended:

21(a) Taking of water from a resource (new use)

The following potential Section 21(a) water uses are envisaged:

- Pumping water from a river or from a borehole
- Abstraction of rainwater from open cast areas
- Re-use of water from dirty water containment facilities.

21(b) Storing of water (amendment)

The following potential Section 21(b) water uses are envisaged:

- Storage of potable water
- Storage of process water in attenuation dams

21(c) and (i) Impeding, diverting and altering the flow of water in a watercourse (amendment)

Alteration of any drainage lines including storm water management infrastructure.

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

Irrigation using waste water (Associated Section 21(g) water use i.e. dust suppression.

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

The following potential Section 21(f) water uses are envisaged:

- Discharged of treated water to Olifants River
- Discharge of waste or wastewater directly into a water resource under extreme storm events.

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

The following Section 21(g) water uses are envisaged:

- Increase of capacity to dispose of water into the Dirty Water Dam (Vleishaft Dam) containment infrastructure including storm water collection dams, process water holding tanks, coal stockpile areas, discard/overburden dumps, slurry disposal etc.

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

Increase of capacity to abstract water from underground as well as open cast pit

37(1)(a) Irrigation of any land with waste or water containing waste generated through any industrial activity or by a water work (amendment);

Water used for dust suppression.
6.7 The National Heritage Resources Act (25 of 1999)

The protection and management of South Africa’s heritage resources are controlled by the National Heritage Resources Act 25 of 1999. The enforcing authority for this act is the South African National Heritage Resources Agency (SAHRA). In terms of the Act, historically important features such as graves, trees, archaeology and fossil beds are protected. Similarly, culturally significant symbols, spaces and landscapes are also afforded protection. In terms of Section 38 of the National Heritage Resources Act, SAHRA can call for a Heritage Impact Assessment (HIA) where certain categories of development are proposed. The Act also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that if such an assessment is deemed adequate, a separate HIA is not required. Should a permit be required for the damage or removal of specific heritage resources, Sasol Synfuels will submit a separate application for these activities to the SAHRA for approval, should these resources be potentially damaged or removed. The activities identified in the Act as requiring a notification of SAHRA include:

Section 38

(1)(a): “The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(1)(c): Any development or other activity which will change the character of a site

i. exceeding 5 000 m² in extent; or

ii. involving three or more existing erven or subdivisions thereof; or

iii. involving three or more erven or divisions thereof which have been consolidated within the past 5 years; or

iv. the costs of which will exceed a sum in terms of regulations by SAHRA or a provincial heritage resource authority.

The Wolvekrans footprint area has been fundamentally transformed by the establishment of farming activities over the area, as well as historic mining and associated activities. Phase 1 and Phase 2 Heritage impact studies have been conducted in 2004 and 2005 on a large portion of the proposed project area. These studies found several graves and remains from relatively recent past. The graves were relocated after approval from SAHRA was provided and the remains from the relatively recent past were classified as insignificant and will be demolished during the opencast activities. However, there is the possibility of the presence of local farmsteads, graves and artefacts on the site of the proposed Vandyksdrift Central expansion and thus a Heritage Impact Assessment on this portion will be conducted.

6.8 Other Legislation and Guidelines to be considered

The following additional guidelines and South African Legislation will be considered during the impact assessment phase.

6.8.1 Other Legislation

- National Environmental Management: Biodiversity Act (10 of 2004);
- Environmental Conservation Act (73 of 1989);
- National Environmental Management: Air Quality Act (39 of 2004);
- Conservation of Agricultural Resources Act (43 of 1983);
- Mpumalanga Nature Conservation Act (10 of 1998);
- Mpumalanga Parks Agency Act (5 of 2005);
6.8.2 Guidelines

- DEAT. 2002. Integrated Environmental Management, Information series 2: Scoping (Department of Environmental Affairs and Tourism (DEAT. 2002));
- DEAT. 2002. Integrated Environmental Management, Information series 4: Specialist Studies (Department of Environmental Affairs and Tourism (DEAT. 2002));
- DEA (2010), Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 5, Department of Environmental Affairs;

- DWA Best Practice Guidelines including:
  - A2: Water Management for Mine Residue Deposits;
  - A4: Pollution control dams;
  - A5: Water Management for Surface Mines;
  - A6: Water Management for Underground Mines;
  - G1: Storm Water Management;
  - G2: Water and Salt Balances;
  - G3: Water Monitoring Systems;
  - G4: Impact Prediction;
  - G5: Water Management Aspects for Mine Closure;
  - H1: Integrated Mine Water Management;
  - H2: Pollution Prevention and Minimisation of Impacts;
  - H3: Water Reuse and Reclamation;
  - H4: Water Treatment.

- DMR. 2010. Guideline for the Compilation of a Scoping Report with due regard to Consultation with Communities and Interested and Affected Parties;
- DMR. 2010. Guideline for Consultation with Communities and Interested and Affected Parties.
- DMR. 2002. Guideline for Consultation with Communities and Interested and Affected Parties. As required in terms of Sections 10(1)(B), 22(4)(B), and 39, read together with Regulation 49 (2) of the MPRDA; and
- DMR. 2002. Guideline for the Compilation of a Scoping Report. As required in terms of Sections 10(1) (B), 22(4) (B), and 39, read together with Regulation 49 (2) of the MPRDA.
7 Description of the baseline environment

This section was largely populated using information provided in the approved Douglas EMP Amendment (Pulles Howard & De Lange, 2006) as well as specialist studies supporting this EIA/EMP Amendment Application. Further specialist studies are underway which will provide up to date information that will be communicated in the Environmental Impact Assessment Report.

Key aspects of the baseline environment were provided for the mining authorisation application for the VDDC Project, and are considered to be representative of the small relative area associated with the additional activities within the project area of this EIA/EMP Amendment Application. These are summarised below.

7.1 Geology

7.1.1 Regional Geology

The Wolvekrans Colliery coal reserve falls within the Witbank Coalfield, which consists of sedimentary rocks of the coal-bearing Ecca Group of the Karoo Sequence. Five coal seams are contained in a 70 m-average thick succession in the coalfield, consisting primarily of sandstone with subordinate siltstone and mudstone. The succession is the Vryheid Formation of the lower Ecca group and followed the deposition of the Dwyka. The latter is of glacial origin and comprises mainly tillite. Underneath the Dwyka in the area is a volcanic pre-Karoo basement which consists mainly of rhyolitic rocks of the Rooiberg Group, Pretoria (Pulles, Howard & De Lange, 2006).

The partings between the seams are remarkably constant; however, seam splits are fairly common. The basement had a significant influence on the nature, distribution and thickness of the overlying sedimentary rocks, especially the coal seam thickness and coal quality. This is especially true for the lower coal seams (No’s 1 and 2) and less for the higher seams (Pulles, Howard & De Lange, 2006).

7.1.2 Stratigraphical Composition

- The average soft overburden depth is 8.50 m and consists of soil, clay and ferricrete.
- The geological weathering profile shows the average weathered depth to be approximately 16 m.
- The total lithology consists mostly of sandstone (39%), mudstone (21.7%) and coal seams (18.9%), followed by soft overburden (13%) and other minor lithologies (total 7.3%) (Pulles, Howard & De Lange, 2006).

7.1.3 Structural Geology

The Ogies dyke is situated between 300-1500 m north of the proposed mine workings. Literature widely states that the Ogies dyke is about 15 m thick and can be followed for about 100 km along strike. It devolitised the coal on either side over a distance of up to 300 m, suggesting that it probably acted as a magma conduit for a considerable length of time (Pulles, Howard & De Lange, 2006).

Several dykes are present throughout the study area, however the most dominant presence of dolerite dykes and sills are present in the southeast of the study area (Pulles, Howard & De Lange, 2006).

7.1.4 Coal Horizons

- The No 5 coal seam has the most limited occurrence mostly due to weathering.
- The No 4 coal seam is present through most of the area but is also limited in the west due to weathering.
- The No 3 coal seam is very thin and more widely present than the No 4 and No 5 seams. It is also limited in the west due to weathering near the Olifants River.
- The No 1 and No 2 coal seams were intersected in most of the exploration boreholes. The mineable and uneconomically bands of the No 2 seam makes up a total which average at 10.4 m throughout the study area. The thickness of the No 1 coal seam average at 2.7 m.
- The No 2 coal seam is the most prominent and economically viable to mine in this area.

7.2 Climate

The VDDC Project is located in the Mpumalanga Highveld region where the climate is characterised as generally dry. Summers are warm to hot with an average daily high temperature of approximately 27°C (with occasional extremes up to 35°C). Winters range from mild to cold with an average daily high of approximately 15°C (with occasional extreme minima as low as -10°C). Frost and mist are frequently experienced during the winter months on the Mpumalanga Highveld (SRK, 2012).

The majority of precipitation is experienced during the summer months, mostly in the form of afternoon thundershowers. Mean annual precipitation (MAP) is 707 mm, with 85% of the annual rainfall occurring between October and March. Mean annual evaporation (MAE) in the region is approximately 1600 mm (SRK, 2012).

7.2.1 Precipitation

Long-term monthly average rainfall figures for various stations within the Witbank region are given in Table 7-1 and depicted in Figure 7-1. Long-term average total annual rainfall is in the range of 730 mm to 750 mm. Rain falls mainly in summer from October to April, with the peak being in January for the region (SRK, 2012).

Table 7-1: Long-term Monthly Rainfall Figures (mm) for Various Stations within the eMalahleni Region

<table>
<thead>
<tr>
<th>Station</th>
<th>Jan</th>
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<th>May</th>
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<th>Jul</th>
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<tr>
<td>Middelburg</td>
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<td>132</td>
<td>103</td>
<td>88</td>
<td>42</td>
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<td>Bethal</td>
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<td>134</td>
<td>94</td>
<td>78</td>
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</table>
7.2.2 Evaporation

Evaporation data was available from the Weather Bureau for Ogies for the period 1910 to 1998 (Table 7-2). Total monthly evaporation rates over the period range from 76 mm in June to 179 mm in December months. Total annual evaporation rates range from 1 326 mm to 2 062 mm during the 1910 to 1998 period, with an average evaporation rate of 1 600 mm/annum.

Table 7-2: Mean Monthly Evaporation for Ogies Rainfall Station for the Period 1910 – 1998

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<tr>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
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<th>Aug</th>
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<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Total</th>
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<tr>
<td>179</td>
<td>147</td>
<td>145</td>
<td>111</td>
<td>94</td>
<td>7</td>
<td>83</td>
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<td>143</td>
<td>173</td>
<td>163</td>
<td>179</td>
<td>1 600</td>
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</tbody>
</table>

7.2.3 Temperature

Monthly mean and hourly maximum and minimum temperatures are given in Figure 7-2.

Temperatures range between -5.0 and 33.7 °C. The highest temperatures were recorded in October and the lowest in May. During the day, temperatures increase to reach maximum at around 15:00 in the afternoon. Ambient air temperatures decreases to reach a minimum at around 07:00 i.e. just before sunrise.
Figure 7-2: Temperature Information for Kriel (World Weather Online, 2012)

7.2.4 Surface Wind Fields

Wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period.

The wind field is predominantly characterised by winds from the eastern and north-western quadrants. The wind speed is generally moderate; 68% less than 8 m/s although peak wind speeds greater than 10 m/s have been recorded (~3.4%). Calm conditions prevailed 3.7% during the period 2006 to mid-2012 with an average wind speed of 5.2 m/s.

During day-time the wind field is characterised by wind from the north-westerly sector with less frequent wind form the east (<9%) with 2.5% calm conditions. Seasonally, the wind flow pattern conforms to the period average wind flow pattern.
<table>
<thead>
<tr>
<th>January</th>
<th>February</th>
<th>March</th>
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<tbody>
<tr>
<td><img src="image" alt="Wind distribution for eMalahleni January" /></td>
<td><img src="image" alt="Wind distribution for eMalahleni February" /></td>
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<td>April</td>
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<td><img src="image" alt="Wind distribution for eMalahleni June" /></td>
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<td>July</td>
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<td><img src="image" alt="Wind distribution for eMalahleni July" /></td>
<td><img src="image" alt="Wind distribution for eMalahleni August" /></td>
<td><img src="image" alt="Wind distribution for eMalahleni September" /></td>
</tr>
<tr>
<td>October</td>
<td>November</td>
<td>December</td>
</tr>
<tr>
<td><img src="image" alt="Wind distribution for eMalahleni October" /></td>
<td><img src="image" alt="Wind distribution for eMalahleni November" /></td>
<td><img src="image" alt="Wind distribution for eMalahleni December" /></td>
</tr>
</tbody>
</table>

Figure 7-3: Wind roses for eMalahleni (Windfinder, 2012)
Wind is predominantly from the east and east-south-east, although winds from a northerly direction are also recorded. The average wind speeds in the area are 6 knots and the probability of wind occurring in the area is 12% (Windfinder, 2012).

7.3 Topography

The general topography is characterised by gently rolling terrain east and west of the Olifants River Valley with no steep inclines or exceptionally high slopes. The Wolvekrans Colliery is situated between ~1500 m and 1600 m above sea level. The average gradient of the area is 1°.

7.4 Pedology

7.4.1 Soil

Sandstone is the dominant parent material (rock) type encountered in the area. Although sandstone rarely outcrops (except on the steeper western and southern slopes in proximity to the Olifants River), its dominant presence elsewhere in the VDDC Project area is indicated by the following:

i) sandstone is frequently encountered below the soils in auger depth (western and southern sloping areas);

ii) soil texture and soil colour; and

iii) the presence of hard plinthite (ferricrete) in many of the profiles (gently sloping to flat areas) generally indicates that the hard plinthite overlies relatively impermeable sandstone rock at depth. The colluvial movement of sandstone-derived soils (dominant in the area) over a long period of time have frequently diluted or hidden the influence of other parent material types on soil formation (Pulles, Howard & De Lange, 2006).

Shale and slate is encountered at the bottom of a number of soil profiles in three distinct small patches to the west and south of the survey area. Colluvium of mixed origin occurs in the valley bottom (wetland) positions where the Katspruit soil form is present (Pulles, Howard & De Lange, 2006).

The soils encountered in the survey area as a whole, may be divided into seven broad groups, the relative abundance of which are as follows:

### Table 7-4: Soil Types Encountered in the Survey Area (Pulles, Howard & De Lange, 2006)

<table>
<thead>
<tr>
<th>Soil</th>
<th>Soil forms</th>
<th>Area (ha)</th>
<th>% of total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red apedal</td>
<td>Hutton, Bainsvlei</td>
<td>1128.68</td>
<td>35.5</td>
</tr>
<tr>
<td>Yellow-brown apedal</td>
<td>Avalon, Glencoe, Clovelly, Griffin and Pinedene</td>
<td>826.71</td>
<td>26</td>
</tr>
<tr>
<td>Soil</td>
<td>Soil forms</td>
<td>Area (ha)</td>
<td>% of total area</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------------</td>
<td>-----------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Neocutanic</td>
<td>Tukulu, Oakleaf</td>
<td>88.07</td>
<td>2.8</td>
</tr>
<tr>
<td>Shallow</td>
<td>Mispah, Dresden</td>
<td>62.05</td>
<td>1.9</td>
</tr>
<tr>
<td>E-horizon</td>
<td>Longlands, Wasbank, Kroonstad, Fernwood, Vilafontes</td>
<td>340.22</td>
<td>10.8</td>
</tr>
<tr>
<td>Wetland</td>
<td>Westleigh, Katspruit, Champagne</td>
<td>182.37</td>
<td>5.7</td>
</tr>
<tr>
<td>Man-made</td>
<td>Witbank</td>
<td>99.42</td>
<td>3.1</td>
</tr>
</tbody>
</table>

The remaining 450.19 ha (14.2 %) of the survey area are comprised of man-made features. Figure 7-4 shows the soil map for the proposed mining area.
Figure 7-4: Soil map for the proposed mining area (Scale 1:40 000)
7.4.2 Pre-mining Land Capability

Land capability classes were determined using the Chamber of Mines Handbook of Guidelines for Environmental Protection (Volume 3, 1981), and is summarised in Table 7-5 and illustrated in Figure 7-5:

Table 7-5: Pre-mining Land Capability Units for the Proposed Project Area (Pulles, Howard & De Lange, 2006)

<table>
<thead>
<tr>
<th>Capability class</th>
<th>Area (ha)</th>
<th>% of total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arable</td>
<td>1742.13</td>
<td>54.8</td>
</tr>
<tr>
<td>Grazing</td>
<td>296.51</td>
<td>9.3</td>
</tr>
<tr>
<td>Wetlands (permanent)</td>
<td>111.97</td>
<td>3.5</td>
</tr>
<tr>
<td>Wetlands (seasonal)</td>
<td>177.54</td>
<td>5.6</td>
</tr>
<tr>
<td>Wetlands (temporary)</td>
<td>239.11</td>
<td>7.5</td>
</tr>
<tr>
<td>Wilderness (natural)</td>
<td>60.88</td>
<td>1.9</td>
</tr>
<tr>
<td>Wilderness (man-made)</td>
<td>450.19</td>
<td>14.2</td>
</tr>
<tr>
<td>Rehabilitated areas</td>
<td>99.42</td>
<td>3.2</td>
</tr>
</tbody>
</table>

7.4.3 Pre-mining Land Use

The current land use is summarised in Table 7-6 and shown Figure 7-6.

Table 7-6: Pre-mining Land Use for the Proposed Project Area (Pulles, Howard & De Lange, 2006)

<table>
<thead>
<tr>
<th>Present land use</th>
<th>Area (ha)</th>
<th>% of total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>540.81</td>
<td>17.02</td>
</tr>
<tr>
<td>Cultivated</td>
<td>1210.29</td>
<td>38.09</td>
</tr>
<tr>
<td>Grassland</td>
<td>734.84</td>
<td>23.13</td>
</tr>
<tr>
<td>Wetland</td>
<td>453.49</td>
<td>14.27</td>
</tr>
<tr>
<td>Trees</td>
<td>78.34</td>
<td>2.46</td>
</tr>
<tr>
<td>Water (dams)</td>
<td>40.38</td>
<td>1.27</td>
</tr>
<tr>
<td>Infrastructure/roads</td>
<td>119.56</td>
<td>3.76</td>
</tr>
</tbody>
</table>
Figure 7-5: Pre-mining Land Capability for the Proposed Project Area (Scale 1:40 000)
Figure 7-6: Pre-mining Land Use for the Proposed Project Area (Scale 1:40 000)
The soils covering the VDDC Project area will be assessed in more detail during the EIA phase in order to define wetland areas, determine the impacts on land capability / agricultural potential and to determine the permeability of the soil.

7.5 Natural Vegetation/Plant Life and Biodiversity

The VDDC Project area is located in the Moist Sandy Highveld Grassland Biome (Low and Rebelo, 1996) where less than 1% of the vegetation is formally conserved and approximately 72% is transformed (de Frey, 1999). The vegetation in the project area is also referred to as the Eastern Variation (61c) of the Bankenveld (Acocks, 1988). The Grassland Biome is one of the most threatened biomes in South Africa due to encroaching urban, agricultural and mining developments (Pulles, Howard & De Lange, 2006).

A list of potential red data plant species that may occur in this study area was obtained from the National Botanical Institute. One species, *Hypoxis hemerocallidea* that is classified as "not threatened" was confirmed in the project area. Under the Mpumalanga Nature Conservation Act, 1998 (Act 43 of 1998) (MNCA) all species from the genus *Gladiolus* and family Orchidaceae are protected. A representative from the *Gladiolus* taxa was recorded in the project area. Seven declared weeds and / or invasive plant species from the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA) are present in the area (Pulles, Howard & De Lange, 2006).

According to the Terrestrial sensitivity map issued by the Mpumalanga Tourism and Parks Agency, the VDDC Project area is situated in an area that has ‘no natural habitat remaining’ and an area of ‘least concern’. Current disturbances in these areas include opencast mining, grazing of livestock, agricultural production of maize and the invasion of alien species.

More detailed surveys will be conducted during the EIA phase to determine the grass, herb and tree species of the area as well as any red data, endemic or medicinal species.

7.6 Streams and Wetlands

The Olifants River divides the Wolvekrans Colliery mineral rights area. Other streams and rivers within the Wolvekrans Colliery area include the Boesmanskransspruit, Steenkoolspruit, the Vleishaft tributary and other unnamed tributaries. The Steenkoolspruit is situated in the western part of the surface rights of Wolvekrans Colliery, close to the existing Steenkoolspruit opencast workings.

Sensitive areas may include both wetland areas and aquatic ecosystems (rivers/streams). While they will both be addressed as being potentially sensitive landscapes for the purpose of this study, they will be considered separately from one another when interpreting results and conclusions. Wetlands provide a number of ecological services, of which biodiversity is one. Sensitive areas can be identified by the presence of Red Data Species. Water as a whole is protected as a resource, and is therefore regarded as being potentially sensitive.

According to the Aquatic sensitivity map issued by the Mpumalanga Tourism and Parks Agency, the VDDC Project area is situated in an ‘ecosystem maintenance’ area. However this area has been disturbed with no natural vegetation remaining due to agricultural and mining activities of the past.

The wetland impact assessment will determine the existence and extent of any streams and wetlands that might fall within the boundary of the VDDC Project area associated with this EIA/EMP Amendment Application. This information will be provided in the Environmental Impact Assessment Report.
7.7 Fauna and Biodiversity

A diverse population of smaller mammals such as rabbits, meercats, and rodents and insects, reptiles and birds should occur in the project area (Pulles, Howard & De Lange, 2006).

Smaller mammals such as yellow mongoose, steenbok, grey duiker, springhare and rodents have been observed. A burrow was noted that may house an aardvark. This siting requires further identification and the Mpumalanga Parks Board will be contacted in this regard. The presence of Marsh owls (*Asio capensis*) was taken to suggest that rodents occur in the area. Most of the birds observed were seed eaters and insectivorous birds including doves, canaries, larks, weavers and bishops. There is a large supply of food for these birds in the cultivated lands and in the natural grasslands. Few water bird species were observed and this was considered to possibly be due to the lack of open water. and the low flow in the Olifants River at the time of the survey. The list of birds that may occur in the study area includes birds commonly associated with water bodies such as the Olifants River (Pulles Howard & De Lange, 2006).

Reptiles likely to be associated with the project area include the Common brown water snake (*Lycodonomorphos rufulus*) and the Egyptian cobra (*Naja haje*). The only reptiles observed during the field surveys were lizards on the rock outcrops (Pulles Howard & De Lange, 2006).

Updated survey information will be provided in the EIA Report as a detailed Biodiversity Assessment of the VDDC Project area associated with this amendment is currently underway.

7.8 Surface Water

Wolvekrans Colliery falls within the upper Olifants River basin within the Witbank Dam catchment, which is located on the Eastern Transvaal Highveld of Mpumalanga Province. The catchment breakdown is given in Table 7-7.

Table 7-7: Catchment Breakdown

<table>
<thead>
<tr>
<th>Catchment Type</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>B</td>
</tr>
<tr>
<td>Secondary</td>
<td>B1</td>
</tr>
<tr>
<td>Tertiary</td>
<td>B11</td>
</tr>
<tr>
<td>Quaternary</td>
<td>B11B &amp; B11F</td>
</tr>
</tbody>
</table>

7.8.1 Receiving Water Resource

The Steenkoolspruit/Olifants River confluence occurs immediately west and downstream of the VDDC Project area. Downstream of the mine, the river flows to the Witbank dam, then the Loskop dam and subsequently through the central part of the Kruger National Park to Mozambique. It joins the Limpopo River and discharges to the Indian Ocean on the east African coastline (Pulles, Howard & De Lange, 2006).

In terms of the catchment description, the receiving water resource is an important concept. The receiving water resource is the point below which the mine's impact on the catchment is considered to be negligible. This implies that aspects such as surface water users need only be defined down to the receiving water body. It is motivated that the receiving water resource for the proposed new development is the Witbank Dam, for the following reasons:

- Witbank Dam is the first large dam downstream of the mine;
- The catchment area to the Witbank Dam is 3 579 km² while that for Loskop Dam (the next large dam downstream of the mine) totals some 12 285 km²; and
Furthermore, Witbank Dam is considered to be more critical than Loskop Dam in terms of sulphates, the likely primary constituent of concern in terms of mine water management (assuming neutral water quality) (Pulles, Howard & De Lange, 2006).

### 7.8.2 Surface Water Quality

Regular sampling (monthly) has been undertaken along the Olifants River. The locations and site notations are shown in Figure 7-8. Samples have been analysed for pH, EC, SO\(_4\), TDS, NO\(_3\), Cl, Total Alkalinity, Ca, Mg, Na, Fe, F, Mn, Al, K and Si (Pulles, Howard & De Lange, 2006).

A comparison of water qualities upstream and downstream of the proposed new development to the Witbank Dam catchment objectives, as set out in the existing Water Use Licence for Douglas Colliery (based on a Preliminary Reserve determination by DWA) is given for the key constituents of pH and SO\(_4\) in Figure 7-7 (Pulles, Howard & De Lange, 2006).

From Figure 7-7 it is evident that the downstream water quality is lower (improved quality) for the majority of time than the upstream (incoming) water quality, mainly as a result of the dilution factor of the Steenkoolspruit. Apart from pH, the upstream water quality, and subsequently also the downstream water quality, does not comply with the Reserve requirements for the majority of the time (Pulles, Howard & De Lange, 2006).

### 7.8.3 Surface Water Use

Wolvekrans Colliery is situated in a farming district, where water from the Olifants River and the Steenkoolspruit is used extensively for irrigation, formal and informal domestic use and livestock watering. The lower reaches of the Olifants River (just before entering the Witbank Dam) is utilised for recreational use, i.e. fishing, boating. The water from the Witbank Dam is used for industrial purpose (e.g. Duvha Power Station), formal domestic use (eMalahleni Local Municipality), informal domestic use and recreational activities (Pulles, Howard & De Lange, 2006).

Figure 7-9 indicates the locality of the current use downstream of the proposed new development up to the Witbank Dam. Aquatic life is also present as a downstream user, although not indicated specifically in the figure (Pulles, Howard & De Lange, 2006).
Figure 7-7: Water Quality Upstream and Downstream in the Olifants River of the Proposed Project Area
Figure 7-8: Location of Surface Water Monitoring Points (Scale 1:60 000)
Figure 7-9: Surface Water Use in the Project Area and Downstream up to Witbank Dam (Scale 1:90 216)
Table 7-8: South African Water Quality Guidelines (DWAF, 1996a)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Water Quality Guideline value for:</th>
<th>Aquatic Ecosystems</th>
<th>Domestic</th>
<th>Recreation (Full Contact)</th>
<th>Industry (cat. 3)</th>
<th>Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Livestock</td>
</tr>
<tr>
<td>pH</td>
<td>within 5% of background</td>
<td>6 - 9</td>
<td>6.5 - 8.5</td>
<td>6.5 - 8.0</td>
<td>N/A</td>
<td>6.5 - 8.4</td>
</tr>
<tr>
<td>EC (mS/m)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>SO₄</td>
<td>N/A</td>
<td>0 – 200</td>
<td>N/A</td>
<td>0 - 200</td>
<td>0 - 1000</td>
<td>N/A</td>
</tr>
<tr>
<td>TDS</td>
<td>within 15% of background</td>
<td>0 – 450</td>
<td>N/A</td>
<td>0 - 450</td>
<td>0 - 1000 *</td>
<td>&lt; 40</td>
</tr>
<tr>
<td>V</td>
<td>N/A</td>
<td>0 - 0.1</td>
<td>N/A</td>
<td>N/A</td>
<td>0 - 1</td>
<td>0 - 0.10</td>
</tr>
<tr>
<td>Cl</td>
<td>N/A</td>
<td>0 - 100</td>
<td>N/A</td>
<td>0 - 100</td>
<td>0 - 1500 *</td>
<td>0 - 1.00</td>
</tr>
<tr>
<td>Alkalinity</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>0 - 300</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Ca</td>
<td>N/A</td>
<td>0 - 32</td>
<td>N/A</td>
<td>0 - 1000</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Mg</td>
<td>N/A</td>
<td>0 - 30</td>
<td>N/A</td>
<td>0 - 500</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Na</td>
<td>N/A</td>
<td>0 - 100</td>
<td>Na</td>
<td>0 - 2000</td>
<td>&lt; 70</td>
<td></td>
</tr>
<tr>
<td>Fe</td>
<td>N/A</td>
<td>0 - 0.1</td>
<td>N/A</td>
<td>0 - 0.3</td>
<td>0 - 10</td>
<td>0 - 5</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 0.75</td>
<td>0 - 1</td>
<td>N/A</td>
<td>N/A</td>
<td>0 - 2</td>
<td>0 - 2</td>
</tr>
<tr>
<td>Mn</td>
<td>&lt; 0.18</td>
<td>0 - 0.05</td>
<td>N/A</td>
<td>0 - 0.2</td>
<td>0 - 10</td>
<td>0 - 0.02</td>
</tr>
<tr>
<td>K</td>
<td>N/A</td>
<td>0 - 50</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

7.9 Groundwater

7.9.1 Aquifer Types

Three different aquifer types occur in the VDDC Project area, namely:

- shallow perched aquifers;
- shallow weathered zone Karoo aquifers; and
- deep Karoo aquifers (zone below the weathered zone) (Pulles, Howard & De Lange, 2006).

The shallow perched aquifers are restricted to the soil (soft overburden) horizon. The soft overburden thickness distribution for the Steenkoolspruit area averages at 7 m, with a maximum thickness of about 19 m. Perched conditions were observed in two monitoring boreholes, at blow-yields ranging between 0.01 and 0.05 l/s (Pulles, Howard & De Lange, 2006).

The host rock for the other two aquifer types is clastic Karoo sedimentary rocks and coal seams. A large range of grain-size distribution is present for the argillitic to arenaceous sediments, which will necessarily influence the hydraulic characteristics of the host rock. The coal seams are considered to be uniform in their hydraulic characteristics except for on their contact zones (Pulles, Howard & De Lange, 2006).

7.9.2 Groundwater Flow

The groundwater flow regime of the Wolvekrans Colliery mining area falls across three tertiary catchment areas, namely B11B, B11F and B11G. The water divide forming the northern and southern boundaries of B11F cuts respectively from the north-western and western extent of the VDDC Project area towards the east of the reserve, intersecting the proposed opencast workings.
The two groundwater divides concur in the east on the farm Enkeldebosch 20IS (Pulles, Howard & De Lange, 2006).

The direction and velocity of groundwater flow are governed by the groundwater level elevation distribution. In general it is safe to assume that the groundwater level elevation distribution within the shallow weathered zone aquifer will emulate the surface topography. Subject to the above it can therefore be stated that groundwater flow directions in areas not impacted by mining will be perpendicular to the surface topography contour lines form high ground towards the streams and rivers. A regional groundwater flow direction map for the entire shallow weathered zone aquifer is attached as Figure 7-10. This figure gives the groundwater flow directions as currently governed by topography (Pulles, Howard & De Lange, 2006).

Assuming an average surface gradient of not more than 3.2%, relating to an average groundwater gradient of not more than 2.5%, and subject to the estimated values for hydraulic conductivity and effective porosity used for the calculation, the natural groundwater seepage velocity in the shallow weathered zone aquifers is estimated at 0.014 m/day, or 5.1 m/year (Pulles, Howard & De Lange, 2006).

### 7.9.3 Groundwater Levels

The depth to water level observed in all the boreholes, varied between 2.69 m and 40.00 m, with a mean of 14.46 m. If all boreholes with an artificially lowered (e.g. pumping) water level are excluded from the calculation, the average depth to water level in the natural aquifer system will be at 8.44 m below surface. In topographically higher areas it might naturally attenuate to a depth of about 13 m and in the lower areas, where the topography cuts the water table, it is 0 m with resulting fountains (Pulles, Howard & De Lange, 2006).

### 7.9.4 Groundwater Quality

Wolvekrans Colliery has a comprehensive groundwater monitoring network in place and groundwater qualities are measured on a quarterly basis. The monitoring points within the greater project area are shown in Figure 7-11. The monitoring system at the VDDC study area consists of a number of monitoring boreholes that was drilled to target specific aquifer zones. The following discussion summarizes the characteristics of the groundwater chemistry for the VDDC Project mining area:

- The background (baseline) groundwater quality is of a good quality;
- Any mining related impact, anticipated to manifest as increased TDS, especially SO$_4$, and possibly low pH, will be clearly identifiable, when superimposed on the background groundwater quality;
- Due to its low concentration in the background groundwater quality, the best water quality variable to use, in order to identify and delineate coal mining related impacts on the groundwater system, is SO$_4$. Other variables like EC, TDS, and pH can be used as secondary indicators and interpreted with SO$_4$;
- No depletion of pH occurs in the study area that shows that any acidification is present despite elevated SO$_4$ values in mining impacted boreholes that indicate that pyrite oxidation is present. The fact that no depletion in pH has occurred show that sufficient buffering capacity exist in the aquifer host-rocks (at least until present) to prevent acid mine drainage;
- Overall very few groundwater samples of the area fall within the background groundwater image as a result of current mining and agriculture activities (Pulles, Howard & De Lange, 2006);
- Boreholes DGM-UB72 and UB88 (see Figure 7-11) are representative of stagnant underground water that is the result of long-term exposure to coal pillars;
- Boreholes UB112 and UB113 (see Figure 7-11) show water qualities normally associated with recently recharged ground water. These boreholes were sampled according to the protocol provided to Yanka. It is possible that the boreholes are partially blocked; and
The berm boreholes (BB130 and BB131, see Figure 7-11) are representative of qualities that will flow into the new opencast pits. Although not pristine, the compliance assessment shows good quality distribution (JMA Consulting, 2011).

Figure 7-10: Regional Groundwater Flow Direction
Figure 7-11: Location of Groundwater Monitoring Points in the greater project area
7.9.5 **Overall Aquifer Classification**

The aquifers of the VDDC Project area can in general be classified as medium potential aquifers. They do have a viable exploitation potential for domestic and stock-watering application. However, limited use of groundwater by external users in the proposed project area is present and the aquifers do not support formal domestic or irrigation applications at present. The Kleinkopje community use limited volumes of water (Pulles, Howard & De Lange, 2006).

Most groundwater samples in the proposed mining area already show a mining and agricultural related impact (Pulles, Howard & De Lange, 2006).

7.10 **Air Quality**

7.10.1 **Baseline Air Quality**

Dust outfall is monitored on a continuous basis via dust outfall buckets at 10 monitoring points at Wolvekrans and analysed on a monthly basis (Pulles, Howard & De Lange, 2006).

7.10.2 **Sources and Receptors**

In terms of the air pollution index factors, the following areas are classified as being significant sources that require control measures and management plans to minimise the air quality impacts:

- Discard dumps;
- Open pit operations (spoil heaps); and
- Haul roads from pits to plants (Pulles, Howard & De Lange, 2006).

Three dust sensitive environments were identified, i.e.:

- KwaJuma informal settlement (Pulles, Howard & De Lange, 2006); and
- Vandyksdrift village.

7.11 **Noise**

Current sources of noise in the proposed area include the following:

- Traffic noise on the R544;
- Railway line;
- Wolvekrans Colliery operations, plant and associated infrastructure; and
- Existing mining activities.

7.11.1 **Baseline (Residual) Sound Levels**

Baseline sound levels were previously recorded for the Steenkoolspruit opencast mining area as well as at potentially noise sensitive environments that were identified. The results are presented in Table 7-9.

**Table 7-9: Baseline (Residual) Sound Levels**

<table>
<thead>
<tr>
<th>No</th>
<th>Location</th>
<th>Average Sound Level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Proposed New Opencast Mining Area. (No significant noise sources)</td>
<td>32,8</td>
</tr>
<tr>
<td>2.</td>
<td>Informal settlement of approximately five houses at Western Border, next to Olifants River. (Dragline of neighbouring opencast mine in operation approximately 800 m to 1000 m away)</td>
<td>39,8</td>
</tr>
<tr>
<td>3.</td>
<td>Eastern side, at community of approximately thirty informal houses. (Human activity, poultry and vehicular traffic)</td>
<td>40,0</td>
</tr>
</tbody>
</table>
dBA  decibels on the A weighting scale

Meteorological Conditions:
- Wind Speed  1.3 to 2.1 m/s
- Temperature  19.8 to 21.4 ºC
- Humidity  43%

7.11.2 Baseline Measurements

The proposed site is situated in tranquil surroundings and an average residual sound level of 32.8 dBA was recorded in areas where no development was observed. Baseline measurements within the noise sensitive areas ranged from 39.8 dBA (Kleinkopje community) to 49.2 dBA (Vandyksdrift Village).

The typical rating level for rural areas (SABS Code of Practice 0103-1994) range between 35 dBA (night time) and 45 dBA (day time).

7.12 Sites of Archaeological and Cultural Interest

Since most of the original vegetation in the VDDC Project area was replaced by agricultural activities and some areas were altered by mining activities, the environment has been altered and any heritage features that might have existed there may have been removed or destroyed.

In accordance with Section 38 of the National Heritage Resources Act (NHRA), No. 25 of 1999, an independent heritage consultant was appointed to conduct a Heritage Impact Assessment to determine if any sites, featuring objects of cultural heritage significance, occur within the boundaries of the area where it is planned to extend the mining activities.

7.12.1 Identification of Heritage Resources

The types and ranges of heritage resources discovered during the initial heritage impact assessment in the area of the VDDC Project include several remains dating from the relatively recent past. A total of 369 individual gravesites have been identified and relocated to date.

7.12.2 Significance of Heritage Resources

The levels of significance of the heritage resources have been determined by means of various criteria, including ideological (symbolic) significance, aesthetic significance, uniqueness, cultural (historical) significance, state of preservation and research value. Based on these criteria, the following conclusions on the significance of the identified heritage resources were made:

- The historical house can be considered to be of some significance with regard to criteria such cultural (historical) significance, research value, uniqueness and aesthetic significance.
- The remains dating from the relatively recent past cannot be considered to be of outstanding significance.

7.13 Visual Aspects

The VDDC Project is located in an area characterized by mining activities but also suited to agriculture in the form of either grazing for cattle or cultivated fields of maize.

The residential suburbs of Kwajuma Village and Vandyskdrift are located 600 m north and 2.5 km to the south-east respectively. Kriel is located approximately 20 km to the south-east of the site, with the New Clydesdale Coal mine 1 km in the same direction. To the east of the site disturbed open land and grass fields can be found. To the south is the Olifants River, disturbed open land and grass fields. To the west and north of the site the current land use is dominated by mining, and disturbed open land.
The project area is situated at an altitude of between 1500 and 1600 m amsl. The topography in the area varies between flat, gentle slopes and rocky outcrops.

7.14 Traffic

The R544 tarred road from Witbank joins the R35 to the southeast of Kriel and connects Witbank and Bethal. The R544 runs adjacent the mine property along the eastern side of Vandyksdrift towards Kriel.

7.15 Regional Socio-Economic Structure

A brief summary of the broader socio-economic environment is as follows:

- The VDDC Project is found in the Mpumalanga Province which has a population of 3.5 million people in an area of 79 490 km² (2011, Mpumalanga Provincial Government). Mpumalanga accounts for 83% of South Africa’s coal production and is the third-largest coal-exporting region in the world (2009, GAN). Contributions to the GDP figures indicate that the Mpumalanga mining activities contributed about R20 billion during the 2008 period (2010, DWEA). The coalfields of the Province feed a number of power stations situated nearby. Agriculture is also an important sector in the province with maize, sunflower and groundnuts being the major crops;

- The VDDC Project area falls under the jurisdiction of the eMalahleni Local Municipality and Nkangala District Municipality. The 2007 Community Survey recorded a population of 435 217 in eMalahleni Local Municipality. It is estimated that this population is growing at a rate of approximately 4.2% per annum with relatively high migration levels being experienced due to mining operations. The municipal area has an unemployment rate of 32%. The most prominent formal sector employment opportunities in this municipal area are: mining (23%), community and social services (13%) and wholesale and retail (13%). The municipal area has an adult literacy rate of 29%.

7.16 Regional Context

7.16.1 Population

There are two small settlements in close proximity to the VDDC Project area; i.e. Vandyksdrift and Springbok Village. Vandyksdrift is located approximately 2.5 km south-east of the VDDC Project and Springbok Village approximately 4.5 km north-east of the project area.

The closest towns to the VDDC Project area are Kriel and eMalahleni. Kriel is located approximately 20 km to the south-east and eMalahleni approximately 22 km to the north of the VDDC Project area. eMalahleni is the main service centre in close proximity to the project area.

7.16.2 Economic Activities

Mining, the production of electricity and basic ferro-manufacturing, related to the availability of coal and energy form the basis of the region’s economic base. This area exports coal, steel and steel products. The economy of the area is therefore also sensitive to world economic cycles and demand for coal and steel.

82% of South Africa’s primary energy requirements come from coal. Domestic coal sales amount to ~50% of mineral sales, while coal exports are the second biggest earner of foreign exchange after gold. Coal mined in South Africa is used primarily for the production of electricity (43%), while 34% is used by commerce and industry and 24% is exported.

7.17 Local Context

7.17.1 Local Rural Community

There is a small rural community, known as the Kwajuma Village, living in close proximity (±600 m) to the north of the proposed VDDC pit. A relocation action plan will be drafted to manage the
relocation of the inhabitants as BHP’s policy is that no people may live within 1000 m of mining activities.

7.17.2 Employment

BECSA currently employs ~ 914 people and constitutes an important source of employment in the local area.

8 Anticipated impacts

As a result of the project team’s understanding of the project and previous experience on projects of a similar nature, the potential impacts that are anticipated are summarised in Table 8-1.
### Table 8-1: Summary of Potential Environmental Impacts

<table>
<thead>
<tr>
<th>Environmental aspect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geology</strong></td>
<td>Even though the geology will be affected by the drilling of boreholes for the abstraction of underground water and slurry, these areas will form part of the opencast mining already approved and therefore the impact will be negligible.</td>
</tr>
<tr>
<td><strong>Topography</strong></td>
<td>The predominant modifications to the topography of the area will be the result of topsoil, subsoil, overburden and discard facilities. Although additional facilities are planned, these will be in line with the character of this mining area.</td>
</tr>
<tr>
<td><strong>Soils</strong></td>
<td>Soil impacts from the water treatment plants and associated infrastructure will be negligible in light of the fact that these activities will take place on previously disturbed mining areas.</td>
</tr>
<tr>
<td><strong>Fauna and Flora</strong></td>
<td>Impacts on biodiversity are anticipated to be negligible as the footprint for the proposed area has been disturbed by existing mining and the VDDC Pit development, as well as regional and local residential activities.</td>
</tr>
<tr>
<td><strong>Surface Water</strong></td>
<td>A positive impact is expected as a result of the controlled release of treated water into the Olifants River through a probable minor increase in river flow. The proposed WTP(s), residue storage facilities, storm water management facilities and discard facilities will cause minor losses of runoff to the natural environment, and reduced natural catchment yield. The impacts will be managed by storm water management measures in order to minimise the impact of additional runoff within the proposed expansion development area, within the context of the overall VDDC Pit development. The proposed project activities development will be in accordance with Regulation 704 to encourage diversion of clean storm water to the receiving water courses and management of impacted storm water, and within the context of the overall VDDC Pit development.</td>
</tr>
<tr>
<td><strong>Water quality</strong></td>
<td>Minor water quality impacts on rivers, streams and potential wetlands are anticipated as storm water runoff from contaminated areas and wetting of roads will be managed through accepted commitments, within the context of the overall VDDC Pit development. Potential positive water quality impacts can be expected due to the treatment of the mine water and potential discharge of excess mine treated water into the environment.</td>
</tr>
<tr>
<td><strong>Groundwater</strong></td>
<td>Local water users and uses will be ascertained through the studies. Impact on the project area local ground water system due to water abstraction is anticipated, though largely accommodated within the context of the overall VDDC Pit development. Establishment of the discard facilities may also impact on groundwater resources.</td>
</tr>
<tr>
<td><strong>Availability</strong></td>
<td>Slurry will be removed from the current underground workings prior to opencast mining. The slurry will be treated and the excess treated water will be discharged. However infiltration of underground water into the opencast workings may impact the water quality. Therefore in terms of groundwater quality special attention will be given to: Potential for Acid Mine Drainage; and Potential seepage from stockpiles. Again, the impacts associated with the specific project infrastructure will be considered within the context of the overall VDDC Pit development.</td>
</tr>
<tr>
<td>Environmental aspect</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td>Negligible air quality changes may be expected as a result of increased windblown dust caused by the following construction phase activities: blasting, dust from the discard facility and conveyors, stockpiles of material and the movement of vehicles over unpaved road surfaces and odours from the waste emanating from the mine water treatment plants. Wind erosion over bare soil in areas with no vegetation and stockpiles will also have impacts on air quality of the area. Mitigation and management may be required, again, to be considered within the context of the overall VDDC Pit development.</td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td>Noise impacts from the construction of mine water treatment plants and the slurry processing facility will be minimal and short in duration whilst during operation these levels will be managed to within regulatory limits. Noise impacts from the establishment of the discard facilities will be negligible as these will be a continuation of current stockpile establishment activities.</td>
</tr>
<tr>
<td><strong>Archaeology</strong></td>
<td>With construction activities on site there will be disturbance to the land and this could result in a resultant impact on items of historical and paleontological value. Mitigation measures will ensure that no damage is incurred. The impacts, and management measures, will be considered within the context of the overall VDDC Pit development. A Heritage assessment will be conducted as part of the EIA, aiming to identify any such buildings or other sites of cultural interest in the VDDC Project footprint.</td>
</tr>
<tr>
<td><strong>Visual</strong></td>
<td>The predominant modifications to the aesthetics of the area will be the result of topsoil, subsoil, overburden and discard facilities. Although additional facilities are planned, these will be in line with the character of this mining area.</td>
</tr>
<tr>
<td><strong>Vibrations</strong></td>
<td>The closest settlement to the proposed project is Kwajuma village approximately 600 m to the north of VDDC. Minimal vibrations are expected as a result from the construction activities.</td>
</tr>
<tr>
<td><strong>Disruption to existing services and infrastructure</strong></td>
<td>Existing services in the area will be determined so as to minimise any disturbance to these. Mitigation and management may be required within the context of the overall VDDC Pit development.</td>
</tr>
<tr>
<td><strong>Socio-economic</strong></td>
<td>The proposed project is required to enable the VDDC Project to proceed and extend the life of mine of Wolvekrans Colliery, thereby maintaining employment opportunities for local communities: it is anticipated that the proposed development will maintain the life of Wolvekrans Colliery and maintain employment up to 2040. The proposed development will thereby continue to stimulate economic opportunities in the Vandyksdrift/Kriel area through the employment of local people and use of local contractors during construction. Economic downstream effects are expected to remain unchanged as expenditure in the area remains the same.</td>
</tr>
</tbody>
</table>
9 Consideration of Project Alternatives

The positioning of the proposed activities are largely constricted as a result of the future mining activities and associated activities such as topsoil, subsoil and overburden stockpiles, opencast ramps and haul roads, clean and dirty water separation structures, and discard disposal facilities. These constraints limit the possible locations for the proposed dewatering and treatment infrastructure. The Olifants River is also in close proximity (~ 100 – 1000 m) from the proposed activities. Tradeoffs might need to be agreed upon.

In terms of Section 28(c) and (j) of the EIA regulations feasible and reasonable alternatives need to be identified. The scoping report should include a description on these alternatives to the proposed activity, including the advantageous and disadvantageous that the activity or alternative may have on the environment as well as how the community may be affected by the activity.

According to GNR 543 an alternative is defined as:

"an alternative in relation to a proposed activity refers to the different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- the property on which or location where it is proposed to undertake the activity;
- the type of activity to be undertaken;
- the design or layout of the activity; and
- the operational aspects of the activity."

The following alternatives are general considerations for proposed developments:

- Location – where is the best place for specific project infrastructure;
- Process/activity/operation – are there other ways of meeting the same objective than the proposed development;
- Scheduling – this can be at what stage of the project for major developments or at what time of the day for routine, on-going activities;
- Inputs – relating to different possible inputs into the system e.g. different types of chemicals, different types of building materials, different employment strategies, different designs;
- No-go option - the option for the proposed development not to take place at all.

These are detailed further in the section below.

9.1 Location Alternatives

9.1.1 Mine Water Desalination Plants

The extracted mine water will need to be treated for which two treatment facility configurations have been considered by BECSA:

- If a central, fixed location facility is chosen, probably one of two likely locations will be evaluated; or
- If modular facilities are chosen, a minimum of three locations will be evaluated.

The physical placement of the mine water desalination plant(s) will be dictated by the open pit development, distance from the borehole field, the results from the hydraulic impact assessment, the type of treatment facility, previous underground mining activities, etc.
9.1.2 Treated Water Discharge

Various potential sites for the discharge of the treated water will be evaluated. These locations will vary and be dependent on the treatment plant designs evaluated as well as the result of the hydraulic impact assessment.

9.1.3 Waste Disposal

The location of disposal sites for the residue streams from the mine water desalination process will be dependent on the options evaluated in terms of the plant location, open pit development, previous underground mining activities and space constraints within the VDDC Project area.

9.2 Scheduling Alternatives

9.2.1 Treated Water Discharge

A surface water impact assessment (hydraulic impact assessment) will provide recommendations on the scheduling of discharges of treated water which will take into consideration seasonality, downstream water users, process efficiency, etc.

9.3 Input alternatives

9.3.1 Mine Water Desalination Technology Options

Membrane with Lime Softening Technology

This technology consists of staged tapered Ultra Filtration (UF), Reverse Osmosis (RO) and brine softening processes. Feed water undergoes an oxidation process to oxidise iron and manganese before entering a clarification step to remove suspended solids and metal precipitates. The water is then pumped to a set of UF membranes to remove residual suspended solids and colloidal particles. The filtered water is then desalinated using RO membranes. A pressure gradient is applied to pass solution through membranes to produce a permeate stream and a concentrate stream (brine).

The recovery of the RO plant is limited by calcium sulphate. To address this, the brine produced is pumped to a gypsum reactor. In the reactor, lime is dosed to precipitate gypsum to allow further concentration by RO. The UF, RO and brine softening processes are repeated to maximise water recovery and to minimise brine production (See Figure 4-1).

Ion Exchange

The ion exchange technology based treatment process considered by BECSA consists of two main processing steps. The first stage includes settling and filtration to remove suspended solids. This is followed by an ion exchange process to reduce the overall salinity of the water. Ion exchange is a reversible chemical reaction where an ion from solution is exchanged for a similarly charged ion attached to an immobile solid particle.

The process uses nitric acid to produce a cation nitrate (such as calcium nitrate) from the cation exchange step and ammonia to produce and ammonium anion (such as ammonium sulphate) from the anion exchange step. The ion exchange process is claimed to desalinate the water to a quality lower than that permitted for discharge into the environment and thus a portion of the filtered water by-passes the ion exchange step to be blended further on.
9.4 Process, Activity and Operation Alternatives

9.4.1 Treatment Facility Designs

As explained previously under location alternative, the extracted underground mine water will need to be treated for which two high-level mine water treatment facility configurations have been considered by BECSA:

- A central water treatment facility; and
- Modular water treatment facilities.

Alternative 1 – Central water treatment facility

This alternative is based on the approach that the WTP is designed in such a way that the mine water is pumped straight to a 1st unit plant which will form part of the WTP facility.

Alternative 2 – Modular water treatment facilities

This alternative is based on having several smaller modular plants spread out over the property.

9.4.2 Treatment Options

A trade-off study was conducted and found that the WTP using Membrane with Lime Softening Technology may be a suitable technology as described above.

9.4.3 Waste Handling

A trade-off study will be conducted to evaluate waste management alternatives for the residue streams generated from the mine water desalination process.

9.5 Post Mining Land Use

Post mining land use options will be further explored in the closure plan. Land use is determined by a number of factors. These include the land use determined for the Wolvekrans Colliery mining operations as a whole, the VDDC Project end land use specifically, and the associated issues of climate, resources, population growth, economic activity, topography, etc. Historically the VDDC Project land was used primarily for grazing and as some crops (maize) growing locally. It is anticipated that post-mining land use will be the equivalent of its current use, i.e. grazing. The feasibility of this alternative will be investigated and it will include community involvement to determine the most acceptable post mining land use.

9.6 No-go Option

If the project was not to proceed, the additional economic activity, skills development and available jobs would not be created, the coal reserves would be sterilised and remain unutilised, the current land uses and economic activities would continue as at present, with little or no economic growth developing in the region.

Seeing that the Wolvekrans Colliery is one of the main coal supplier to ESKOM’s Duvha Power Station, the implications of not proceeding with this proposed project, may lead to provincial and even national energy supply problems.

There is a high demand for coal in South Africa and internationally. This means that should Wolvekrans Colliery not mine the new planned areas, it will be a lost opportunity for the South African economy, as well as for power generation buffer stock (in the case of emergency situations with current local coal supply).
There are currently no foreseeable significant environmental impacts that will outweigh the economic benefits that would be generated by the project, however this will be further assessed during the environmental impact assessment.

10 Procedure to Plan and Develop the Proposed Project

Table 10-1 shows the procedure and timing is proposed for the remainder of the EIA/EMP Amendment and project implementation:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Potential Timeframe</th>
<th>Duration</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scoping Phase of the EIA/EMP Amendment</td>
<td>November 2012 - March 2013</td>
<td>5 months including pre-consultation</td>
<td>To develop sufficient understanding of the project and project environment so as to identify and assess anticipated impacts and scope the detailed assessment phase of the EIA effectively, where required.</td>
</tr>
<tr>
<td>Environmental Impact Assessment Phase</td>
<td>April to October 2013</td>
<td>8 months</td>
<td>To further assess identified potential environmental and social impacts, review proposed mitigation and management measures, and make recommendations for further mitigation and management, where required to maximise positive impacts and minimise negative impacts. To inform a decision regarding the project and whether it may proceed or not.</td>
</tr>
<tr>
<td>Submission of EIA/EMP Amendment Report</td>
<td>November 2013</td>
<td>Approx. 120 days after submission</td>
<td>To provide adequate and appropriate information regarding the proposed project to assist the authorities with making an informed decision.</td>
</tr>
<tr>
<td>Record of decision on the EMP/EIA</td>
<td>May 2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment order</td>
<td>Currently not confirmed</td>
<td></td>
<td>To order the equipment required for the construction phase.</td>
</tr>
<tr>
<td>Contractor appointment</td>
<td>Currently not confirmed</td>
<td></td>
<td>To appoint the contractor for the construction phase of the project.</td>
</tr>
<tr>
<td>Construction phase</td>
<td>July 2014</td>
<td>24 Months</td>
<td>To establish and develop the proposed sites and associated infrastructure sufficiently for the operation phase of the project.</td>
</tr>
<tr>
<td>Operation phase</td>
<td></td>
<td></td>
<td>To commission the project infrastructure and implement the operation of the project infrastructure, and associated mitigation, management and performance monitoring measures.</td>
</tr>
<tr>
<td>Closure - decommissioning</td>
<td>Typically, closure operations will take place over a period of 3-5 years following cessation</td>
<td></td>
<td>To rehabilitate the disturbed environment sufficiently so as to meet the objectives of the closure plan (this will to some extent depend on</td>
</tr>
<tr>
<td>Activity</td>
<td>Potential Timeframe</td>
<td>Duration</td>
<td>Purpose</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>of operations at the facilities.</td>
<td>decisions/agreements reached with the Stakeholders for the use of the project specific land post-closure, in relation to the proposed land use of the wider Wolvekrans Colliery upon its closure and rehabilitation.</td>
<td></td>
</tr>
<tr>
<td>Closure – post-closure</td>
<td>Closure will be planned to limit any post closure activities but some monitoring may be required.</td>
<td>To ensure that there are no undue residual impacts associated with the proposed project infrastructure or that there are adequate plans in place for the management of residual impacts.</td>
<td></td>
</tr>
</tbody>
</table>

11 Public Involvement Activities Undertaken to Date

11.1 Stakeholder Engagement and EIA/EMP Amendment Process

The following stakeholder groups were identified and involved in the public involvement component of the project.

- Landowners of the site or any alternative sites;
- Owners and occupiers of land adjacent to the site or any alternative sites;
- Land claimants;
- Land occupiers;
- Identified other persons (including on adjacent and non-adjacent properties) whose socio-economic conditions may be directly affected by the proposed project;
- The Local Municipality eMalahleni (The Magisterial District is Nkangala District Municipality);
- Non-Governmental organizations and interested parties;
- The relevant Government Departments (national, local and provincial) including the DMR, the Department of Land Affairs (DLA), The DWA, DEA and Mpumalanga Department Economic Development, Environment and Tourism (MDEDET), agencies and institutions responsible for the various aspects of the environment and for infrastructure which may be affected by the proposed project;
- Xstrata, Anglo and associated mining operations.

The initial stakeholder database (Appendix C) for this EIA comprised a total of about 144 I&APs in and around the Proposed Development Study area.

11.2 Announcement of Opportunity to Become Involved

The opportunity to participate in the EIA and to register as an I&AP was announced in January 2013 as follows:

- Distribution of a letter of invitation, personally addressed to an initial 144 I&APs accompanied by a Background Information Document (BID) and registration and comment sheet.
- Placing of copies of the invitation letter, Background Information Document, registration and comment sheet at 4 public places (Table 11-1) in the study area.
- Posting of the invitation letter, BID and registration and reply sheet on the SRK website.
- Newspaper advertisements in the Witbank News and Middelburg Observer.
• Site notices were erected at several places in the study area. Appendix C provides the text of the site notice.

Table 11-1: Public Places at which BIDs were made Available.

<table>
<thead>
<tr>
<th>Location</th>
<th>Address</th>
<th>Tel. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kriel Golf Club</td>
<td>Bethal Main Road between Ogies &amp; Kriel</td>
<td>017 617 1145</td>
</tr>
<tr>
<td>Blinkpan Police Station</td>
<td>2250 Main Road Komati Village</td>
<td>013 295 3160</td>
</tr>
<tr>
<td>eMalahleni Library</td>
<td>Corner Hofmeyer and Elizabeth Street eMalahleni</td>
<td>013 690 6229</td>
</tr>
<tr>
<td>SRK Website</td>
<td>Pretoria</td>
<td>012 361 9821</td>
</tr>
</tbody>
</table>

11.3 Obtaining Comment and Contributions

I&APs could contribute issues and suggestions either in writing by completing and returning comment sheets, or verbally by phone, or by attending focus group meetings. At the time of going to print no comments or contributions were received.

11.4 Comments and Response Report

Issues raised during the Scoping Phase are captured in a Comments and Response Report. This report will be updated on an on-going basis to include any additional I&AP contributions that may be received as the EIA process proceeds, and as the findings of the EIA become available.

12 Plan of Study for EIA and EMP

Potential biophysical and social impacts have been identified during the scoping phase of the project.

No fatal flaws have been identified thus far although some environmental impacts are anticipated for the proposed VDDC Project.

Potential impacts, including cumulative impacts will be further investigated and assessed in the Environmental Impact Assessment phase of the project. Mitigation measures will be identified and included within the Environmental Management Plan of the EIA phase.

The EIA plans to effectively address and assess significant environmental impacts, aiming to provide the MDEDET, DMR and the DEA with sufficient coherent information in order for them to make a sound decision regarding the proposed VDDC Project.

The Plan of Study for the EIA/EMP Amendment Process is set out below for review by the authorities and I&AP’s. The rationale for the different levels of study for the various environmental components is derived from the expected severity of impacts and the level of confidence required in their prediction. The level of information required to develop adequate practical management and mitigation measures were also used as a consideration in determining the Terms of Reference for the specialist studies.

A key component of the EIA/EMP Amendment Process is the direction and quality control of the work undertaken by the specialist and sub-contractors. SRK will review all specialists’ reports and assess them according to high quality criteria. Integration of environmental information in the planning of the project and the harmonizing of the Waste License, Water Use License and EIA into one integrated assessment of the project is the key to the success of the EIA/EMP Amendment Process.
12.1 Purpose of this Plan of Study

The scoping phase of this EIA/EMP Amendment Process has identified potential environmental impacts, and recognized the potential for alternative for site locations, input, scheduling, treatment, etc. These alternatives will need further investigation, which will commence during the EIA phase. The Plan of Study (POS) is the conclusion to the scoping report. This Plan of Study outlines the process to be followed during the course of the EIA/EMP Amendment Process, and is submitted to the DEA and MDEDET for approval. The purpose of the POS is to layout an effective methodology to be followed during the assessment of impacts, in order to meet the requirements of NEMA (including requirement for NEM:WA). The POS has been compiled in terms of GN No R 543 printed in terms of NEMA.

12.2 Description of the Activity

The description of the activity in conjunction with the nature and background to the VDDC Project is outlined in Section 4. The VDDC Project is planned for construction on the following properties:

- Portions 1, 2, 3, 4 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14 of the farm Vandyksdrift 19 IS;
- Portions 1, 2, 5, and 25 of the farm Steenkoolspruit 18 IS;
- Portions 4, 8, 9, 11, 12, 13, 14 and the remainder extent of the farm Kleinkopje 15 IS;
- Portions 6, 9, 10, 13, 35 and remainder extent of the farm Wolvekrans 17 IS;
- Portions 1, 3, 6 and the remainder extent of the farm Rietfontein 43 IS;
- Portions 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 15 and the remainder extent of the farm Middeldrift 42 IS; and
- Portion 31 of the farm Kromfontein 30 IS.

The proposed VDDC Project forms part of the existing Wolvekrans Colliery (previously known as Douglas Colliery) which has an approved Mining Right (OT6/2/2/113) and as such an Environmental Management Program (EMPR) (OT6/2/2/113) and Integrated Water Use Licence Application (IWULA) for the current operations, which includes the mining of the VDDC Pit via opencast methodology and the dewatering of the workings.

The VDDC Project is a brownfields project focusing on the optimal mining of the VDDC Pit (± 1 411 ha). The current existing and approved EMPR allows for the mining of the 5, 4, 2 and 1 seam coal reserves using opencast mining methods (as per the approved EMPR). 2 seam was previously extensively mined by underground board and pillar methods, and then used to store fine coal slurry discards (estimated volume of 23 Mt).

Fine coal slurry was disposed of in the past into the previous underground mine workings. These workings are now earmarked for pillar extraction where water has accumulated. It is the intention of BECSA to remove the fine coal slurry, to increase the dewatering capacity and to treat the water from the underground workings to an appropriate quality for discharge to the Olifants River, or for reuse.

BECSA’s VDDC Project for which the EIA/EMP Amendment Application is being made, will entail the following main activities:

- Applying for additional capacity for dewatering from the underground workings (as currently approved in the IWULA) and treatment of water arising from mining operations;
- The establishment of a borehole field for the efficient abstraction of mine water from the underground mine workings;
- Construction and operation of desalination plant (s) for the treatment and management of water arising from the underground workings areas and associated mining activities;
• Construction and upgrading of water management infrastructure and systems associated with this project to enable discharge into the environment (Olifants River) or for potential reuse;
• Construction of pipelines for the removal and transportation of water from the underground mine workings;
• Construction and operation of a fine coal slurry processing facility and associated infrastructure (i.e. waste disposal) to process the fine coal slurry removed from the underground mine workings;
• Additional mining related infrastructure, e.g. haul roads, discard dumps, etc.;
• Relocation of discard dumps from the VDDC area to Steenkoolspruit mining area;
• Abstraction of water from the Olifants River for start-up and commissioning activities until steady state operation is achieved;
• Potential relocation of residents adjacent to the mining area where blasting will occur in terms of the approved opencast mining area zone of influence

Removal and Management of Fine Coal Slurry:

A borehole field will be established that will enable BECSA to efficiently remove supernatant water from the top of the slurry. The remaining slurry will be loaded and transported to a tip to manage the high percentage of fines. The fines will then be put through a process of screening and thickening.

A trade-off study will be conducted to evaluate various alternatives with regard to the management of final fines which will include options such as presses or dewatering in paddocks.

Currently, the 2 seam water elevation is 1508 mamsl. Water will need to be extracted to an elevation of 1494 mamsl before opencast mining can commence. This equates to a dewatering volume of 16.8 Mm$^3$. The supernatant water in the slurry area is estimated to be 6.5 Mm$^3$.

The extracted mine water will need to be treated for which a waste licence will be required. Two mine water treatment facility configurations have been considered by BECSA:

• A central water treatment facility; and
• Modular water treatment facilities.

The mine water treatment requirements profile will have an initial peak of 60 Ml/day during the dewatering of the VDDC Pit area.

Water Treatment Plants (WTPs):

The current conceptual design is for three separate, modular Water Treatment Plants (WTPs) using membrane desalination technology. The practical design basis and technology selection may change as further detailed design is undertaken, but the treated water quality specifications will be appropriate for discharge to the Olifants River or reuse.

A preliminary trade-off study was performed and found that the WTP using Membrane with Lime Softening Technology could be a suitable technology. This technology could consist of staged tapered Ultra Filtration (UF), Reverse Osmosis (RO) and Brine Softening (BS) processes.

The process could potentially follow the steps described below.

Feed water undergoes an oxidation process to oxidise iron and manganese before entering a clarification step to remove suspended solids and metal precipitates. The water is then pumped to a set of UF membranes to remove any residual suspended solids and colloidal particles. The filtered water is then desalinated using RO membranes. A pressure gradient is applied to pass solution through membranes to produce a permeate stream and a concentrate stream (brine).

The recovery of the RO plant is limited by calcium sulphate. To address this, the brine produced is pumped to a gypsum reactor. In the reactor, lime is dosed to precipitate gypsum to allow further
concentration by RO. The UF, RO and brine softening processes are repeated to maximise water recovery and to minimise brine production (See Figure 4-1).

A summary of the trade-off study will be included as part of the EIA Phase.

Membrane based process with Brine Softening is the technology of choice for desalination of mine water in the Highveld and Witbank Coalfields. Two full scale commercial plants, namely the eMalahleni WTP and the Optimum WTP are operational in the catchment with the construction of the Middelburg Water Reclamation Plant in progress.

The Membrane Based Technology (MBT) with BS produces metal-rich gypsum sludge, gypsum sludge and brine waste streams. At similar operating plants, the gypsum sludge is made available as a raw material and the metal-rich gypsum sludge and brine can be disposed of in a waste management facility designed to handle such waste.

The method of storage for the waste streams produced from these WTPs will be dependent on the outcome of the trade-off study and will be finalised during the EIA Phase.

Three modular Water Treatment Facilities could be constructed and operated:

- The Vleishaft WTP;
- The Isiyalu 1 WTP;
- The Isiyalu 2 WTP.

Table 4-1 summarises the design capacities of the WTPs.

It is anticipated that water attenuation facilities in the form of two Erichsen Dams with a capacity of approximately 640 m$^3$ each will also be required to operate in association with the WTPs.

Another alternative could be to design the WTP in such a way that the mine water is pumped directly to a 1st unit plant which will form part of the WTP facility.

The existing Vleishaft Dam which has a holding capacity of approximately 600,000 m$^3$ will also be used for the storage of mine water. Figure 4-5 and Figure 4-6 illustrates the Water Treatment Layout.

Alternative discharge points for the treated water will be evaluated as part of the Hydraulic Impact Assessment.

The above mentioned project will require that the existing Douglas Colliery’s EMP be amended to include and reflect on the relocation of the current discard facilities to the rehabilitated Steenkoolspruit pit as well as additional mining related activities and infrastructure.

Wolvekrans has a detailed waste management procedure (Appendix B) which will be updated to include the water treatment plants. This procedure adopts the principles behind the National Waste Management Strategy 2010. The conceptual approach to waste management is underpinned by waste hierarchy. The foundation of the hierarchy and the first choice of measures in the management of waste include waste avoidance and reduction. Where this cannot be achieved, waste should be recovered, reused, recycled and treated. Only as a last resort should waste be disposed of.

12.3 EIA progress

An application for authorization in terms of Section 24 (5) read in conjunction with Section 44 of the NEMA, in respect of a listed activity identified in GN No 544 and GN no 545 printed in terms of the NEMA was submitted to the MDEDET. An acceptance letter was issued with the reference number from MDEDET: 17/2/3N-215.
The public participation conducted thus far is described in Section 11 of this document.

The next step in the process is the compilation of a Draft Scoping report and Plan of Study.

This report is the Draft Scoping report, whereby issues requiring further investigation have been identified and contains the POS that will be the approved project plan for the rest of the EIA/EMP Amendment Process.

12.4 Tasks to be performed

The following is an outline of the tasks to be performed during the course of the EIA Phase. Consultation with the authorities will be highlighted in this section.

12.4.1 Potential Environmental Impacts Identified During Scoping

This Scoping Report has highlighted a number of anticipated impacts resulting from the VDDC Project for which this EIA/EMP Amendment Application is being made. As a result of the Scoping Phase, which was based on an intense screening process and available literature, a summary of the anticipated impacts have been identified for further assessment and mitigation during the EIA Phase. The following potential environmental impacts have been identified:

- Geology;
- Topography;
- Soils;
- Land Capability;
- Groundwater impacts;
- Surface water impacts;
- Biodiversity impacts;
- Air Quality Impacts;
- Noise;
- Heritage;
- Visual;
- Vibrations; and
- Socio - Economical aspects.

These impacts will be further assessed during the Impact Assessment Phase of the EIA.

12.4.2 Environmental Impact Assessment

Upon acceptance of the Scoping Report from the competent authority an Environmental Impact Assessment Report (EIAR) will be compiled. The purpose of the Impact Assessment Phase of this EIA is to systematically assess the impacts of the proposed VDDC Project on the immediate and surrounding biophysical and socio environment. The proposed alternatives will be equally assessed based on environment and financial feasibility. Mitigation measures are to be proposed for the easing of environmental impacts of the proposed activity. The EIAR will thus include the following:

- Details of the EAP who compiled the report;
- The expertise of the EAP;
- A detailed description of the proposed activities;
- A description of the properties on which the activity is to be undertaken;
- Details of the public participation process conducted during the compilation of the EIAR;
- A description of the need and desirability of the project;
- Description of alternatives of the proposed activity, including the advantages and disadvantages;
12.4.3 Alternatives

According to Section 28(c) and (j) of GN R No 543, feasible alternatives need to be considered and assessed during the Scoping and EIA phase of the project. Section 9 of this report provides a detailed description of the alternatives to the proposed VDDC Project.

12.4.4 Authority Consultation

On-going consultation with the DMR, DEA, MDEDET and DWA will be conducted during the course of the EIA.

All draft reports will be provided to the competent authorities for review prior to awarding the I&AP’s the opportunity to comment. Further specialist consultations with the competent authorities will be conducted should they become necessary. Authority consultation is considered to be an on-going process until the termination of the environmental process.

DMR, DEA, MDEDET and DWA will be consulted in order for them to obtain a comprehensive understanding of the project.

Other authorities that may be included are the Local and District Municipalities, ward councillors, and others identified during the scoping phase of the project. Additional authorities identified during the EIA should be consulted.

12.5 Public Consultation

The public consultation programme undertaken during the Scoping Phase of the project will allow for inclusion of the comments of I&AP’s. These comments will be incorporated into this report, and a comprehensive stakeholder database has been developed. With progression into the project life cycle, this database will be continually updated.

These parties will be kept informed of the progress during the planning phase of the project, as well as engagement should the input of the I&AP’s be deemed necessary. The draft EIA/EMP will be available for comment in October 2013. This review process will include the availability of the report in public places and on the internet.

The public participation will be conducted on terms of Section 54 – 56 of the GNR 543 printed in terms of the NEMA. The Draft Scoping report will be provided to the Competent Authorities prior to awarding the registered I&AP an opportunity to comment.
12.5.1 Draft Scoping Report

The Draft Scoping Report will be placed at the following public places for comment by registered I&AP:

**Table 12-1: Public Places at which Draft Scoping Reports were made Available.**

<table>
<thead>
<tr>
<th>Location</th>
<th>Address</th>
<th>Tel. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kriel Golf Club</td>
<td>Bethal Main Road between Ogies &amp; Kriel</td>
<td>017 617 1145</td>
</tr>
<tr>
<td>Blinkpan Police Station</td>
<td>2250 Main Road Komati Village</td>
<td>013 295 3160</td>
</tr>
<tr>
<td>eMalahleni Library</td>
<td>Corner Hofmeyer and Elizabeth Street eMalahleni</td>
<td>013 690 6229</td>
</tr>
<tr>
<td>SRK Website</td>
<td>Pretoria</td>
<td>012 361 9821</td>
</tr>
</tbody>
</table>

This report will be made available for a 40 day period to I&AP’s who will be notified of the availability of the Draft Scoping Report through email, fax, posted letters and placement of newspaper adverts, upon which comments can be made.

As this is also a Waste License Application the Authorities have an additional 20 days to provide comment on the Draft Scoping report.

12.5.2 Final Draft Scoping Report

The Final Draft Scoping Report will be placed at the following public places for comment by registered I&AP:

**Table 12-2: Public Places at which Final Draft Scoping Reports will be made Available.**

<table>
<thead>
<tr>
<th>Location</th>
<th>Address</th>
<th>Tel. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kriel Golf Club</td>
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<td>Pretoria</td>
<td>012 361 9821</td>
</tr>
</tbody>
</table>

This report will be made available for a 40 day period. I&AP’s will be notified of the availability of the Final Draft Scoping Report through email, fax, posted letters and placement of newspaper adverts, upon which comments can be made.

12.5.3 Final Scoping Report

The final Scoping Report will consider the comments received by the Competent Authorities as well as registered I&AP’s. These will be consolidated into the Final Scoping Report. Registered I&AP’s will be given the opportunity to comment on the Final Scoping Report within a period of 21 days as from the notification date. I&AP’s will be notified on the submission of the Report to the Competent Authorities and be supplied with the information to lodge any comments. These comments will be directed to the Competent Authority with a copy sent to Dr Laetitia Coetser at SRK Consulting.

12.5.4 Draft Environmental Impact Assessment Report (DEIAR)

The draft report will be made available to the competent authority prior to awarding I&AP’s the opportunity to comment on the draft report. The Draft report will be made available to the public through the lodging of the report for comment at the public locations in Table 3-1.
Registered I&AP’s will be informed of the lodging of the draft report through email, fax, posted letters and the placement of newspapers adverts. The report will be made available for a 40 day commenting period.

All comments and issues raised by I&AP’s will be consolidated into the draft report and attached as an appendix with the relevant response issued by the EAP (Appendix C).

As this is also a Waste License Application the Authorities have an additional 20 days to provide comment on the Draft EIA report.

12.5.5 Final Draft Environmental Impact Assessment Report (FDEIAR)

The final draft report will be made available to the competent authority prior to awarding I&AP’s the opportunity to comment on the draft report. The Final Draft report will be made available to the public through the lodging of the report for comment at the public locations in Table 12-2.

Registered I&AP’s will be informed of the lodging of the draft report through email, fax, posted letters and the placement of newspapers adverts. The report will be made available for a 40 day commenting period.

All comments and issues raised by I&AP’s will be consolidated into the draft report and attached as an appendix with the relevant response issued by the EAP (Appendix C).

12.5.6 Final Environmental Impact Assessment Report (EIAR)

Registered I&AP’s will be notified on the availability of the Final Environmental Impact Assessment Report. The final report should be made available for a commenting period of 21 days.

Comments raised on the final report will be submitted to the competent authority with a copy sent to Dr Laetitia Coetser at SRK Consulting.

12.5.7 Environmental Management Program (EMP)

An EMP will be compiled for the proposed VDDC Project and submitted to the competent authorities in conjunction with the EIAR. The EMP will prioritize management and mitigation measures for the construction operation and decommissioning of the proposed VDDC Project.

The EMP will be based on the recommendations from the specialist studies conducted, professional judgement of the EIA project team and inputs from I&AP’s.

BECSA (as the project proponent) will be required to adhere to the mitigation and management measures put forth in the EMP.

12.5.8 Appeal

All registered stakeholders will be notified on the acceptance or refusal of the Environmental Authorization and Waste Licence Application. I&AP’s will be reminded on the opportunity to appeal to the Minister of Water and Environment Affairs on the decision made by DEA.

The appeal may be lodged within 12 days after the issuing of the Environmental Authorization.

13 Future Investigation in the EIA

13.1.1 Terms of Reference

Due to the context of the proposed site, several of the anticipated impacts can’t be further assessed and mitigated without the use of specialist studies. The terms of reference for the proposed specialist studies have been developed and outlined in Table 13-1.
Table 13-1: Recommended Specialist Investigations and Scope of Work

<table>
<thead>
<tr>
<th>Specialist Study</th>
<th>Scope</th>
</tr>
</thead>
</table>
| **Biodiversity** | Vegetation assessment:  
  - Detailed desktop study regarding the general vegetation of the area according to Mucina et. al. (2006), Low & Rebelo (1996) and Acocks (1988);  
  - The conservation plans of the Mpumalanga Tourism and Parks Agency, as well as the site specific findings associated with the broad results of the National Spatial Biodiversity Assessment are included;  
  - The guidelines of the Mpumalanga Tourism and Parks Agency (MTPA) will be followed. The first floristic survey will be conducted during the wet season, with a second assessment during the dry season;  
  - Baseline flora assessment will be completed for the proposed VDDC project area, not covered as part of the Douglas EMP; and  
  - Fulfilment of the minimum requirements for floral studies as stipulated by the MTPA.  
  Faunal Assessment:  
  **Mammals:**  
  - List of all potential mammals and the results of a desktop study on the mammals;  
  - The presence of habitats and potential of identified red data species will be verified during the mammal assessment. Detailed mammal survey will be conducted in order to record following:  
    - All mammals encountered or noted during the surveys will be recorded;  
    - Tracks and dung of mammals encountered during the survey will be, where possible, identified and recorded (if possible);  
    - A list of the most prominent mammal species;  
    - A list of rare and endangered species encountered during the survey, as well as species listed according to the results of a desktop study but which were not recorded during the survey;  
    - A list of protected species that occur on the potential list but not recorded during the site visits or surveys;  
    - A list of exotic or introduced vertebrate species occurring on the property.  
  **Birds:**  
  - List of all potential birds and the results of a desktop study on the birds;  
  - The presence of habitats and potential of identified red data species will be verified during the mammal assessment;  
  - Detailed studies on water birds within all wetland areas will be conducted;  
  - The presence of potential red data and endemic birds and their preferred habitats will be compiled prior to the bird’s survey. The following will be recorded during the bird survey:  
    - All birds encountered or noted during the surveys will be recorded;  
    - A list of the most prominent birds encountered and possible species that can be expected to be present;  
    - A list of rare and endangered species encountered during the survey;  
    - Possible migration species that are not on site during the survey must be assessed from literature surveys;  
    - A species list of all the birds that can possibly be present within the relevant grid in which the farms are situated must be compiled.  
  **Invertebrates and Butterflies**  
  - Evaluation and monitoring of invertebrate biodiversity will be included and must
<table>
<thead>
<tr>
<th>Specialist Study</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>contain information on groups including ants, ground living beetles (Tenebrionidae and Carabidae), termites, leafhoppers, spiders, and scorpions as required by the Mpumalanga Tourism and Parks Agency minimum requirements. Methodology of how the field surveys will be conducted will be included.</td>
</tr>
</tbody>
</table>

**Amphibians and Reptiles**
- List of all potential amphibians and reptiles and the results of a desktop study on the amphibians and reptiles;
- The presence of habitats and potential of identified red data species will be verified during the mammal assessment;
- The presence of amphibians and reptiles will be evaluated and all frogs and reptiles encountered will be recorded by means of a field survey;
- Detailed assessment of the frogs and reptiles within all wetlands will be conducted;
- Night surveys will be conducted on the frog species in areas accessible at night.

The following will be recorded during the survey:
- All frogs, snakes, lizards, terrapins, monitors, tortoises etc. encountered or noted during the surveys will be recorded;
- A list of the most prominent amphibian and reptile species will be compiled;
- A list of rare and endangered species encountered during the survey, as well as species listed according to the results of a desktop study but which were not recorded during the survey, will be compiled;
- A list of protected species that occur on the potential list but not recorded during the site visits or surveys.

**Vegetation and habitat survey:**
- In each vegetation type (ecosystem) present on the site:
  - Determine plant species composition as completely as possible;
  - Vegetation and plant species conservation status;
  - Assess the conservation status, endemism, rarity, vulnerability, sensitivity of individual red data species, also of the suitable habitat types for red data species, if applicable.

**Special areas**
- Identify ecological sensitive areas;
- Identify problem areas in need of special treatment or management, e.g. erosion, degraded areas, reclamation areas etc;
- Make recommendations on proposed development in terms of the results obtained.

**EIA**
- Evaluate the vegetation and terrain ecology in terms of the impact of the proposed development;
- What is the envisaged impact on the vegetation;
- On the various plant communities (ecosystems);
- On specific plant species, especially red data or other rare (protected) species
- Animals;
- Lesser extent on soil, topography, general ecology e.g. water regime, erosion, drainage, degradation, waste management;
- How can the impact be mitigated;
- Evaluate alternatives;
- Photographic records will be incorporated within the EIA/EMP report.
<table>
<thead>
<tr>
<th>Specialist Study</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closure costing</td>
<td>1. A detailed list of the various steps that need to be undertaken to return an activity and its sub-units to its post mining land use;</td>
</tr>
<tr>
<td>Assessment</td>
<td>2. Determine the various actions required to demolish the infrastructure; and</td>
</tr>
<tr>
<td></td>
<td>3. Calculating costs in terms of the DMR Guideline.</td>
</tr>
<tr>
<td>Groundwater study</td>
<td>1. Undertaking a literature review and collect baseline data to establish the quality and quantity of groundwater resources at the candidate sites;</td>
</tr>
<tr>
<td></td>
<td>2. Undertake an assessment of potential impacts of the proposed project and infrastructure on the groundwater during and after construction and operations;</td>
</tr>
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<td></td>
<td>3. Potential cumulative impacts of the other project, mines and industries in the area;</td>
</tr>
<tr>
<td></td>
<td>4. Assess the groundwater impacts because of open cast mining activities upon the project specific activities of water abstraction and treatment;</td>
</tr>
<tr>
<td></td>
<td>5. Propose mitigation measures that could reduce eliminate or prevent the occurrence of the identified impacts and comment on the effectiveness of these; and</td>
</tr>
<tr>
<td></td>
<td>6. Compile a groundwater monitoring plan for the operational phase of the project.</td>
</tr>
<tr>
<td>Heritage Impact</td>
<td>1. Detailed description of all archaeological artefacts, structures (including graves) and settlements documented in the area (including photographs);</td>
</tr>
<tr>
<td>Assessment</td>
<td>2. Establish the level of sensitivity/importance of the archaeological remains in the area;</td>
</tr>
<tr>
<td></td>
<td>3. Oral traditions related by the local communities will be a high priority when establishing the significance of archaeological and historical remains as well as graves in formal cemeteries and informal burials; and</td>
</tr>
<tr>
<td></td>
<td>4. Propose practical mitigation measures for predicted impacts as a result of the proposed development.</td>
</tr>
<tr>
<td>Hydraulic Impact</td>
<td>1. Prepare the hydrology of the river at the point near the river. This will be estimated using the WR2000 model to get the runoff from 1920 to present. Extensive hydrology for the catchment has been done and BECSA must obtain the available hydrology of the river from the authorized discharge programme for the Olifants and from the Reserve determination study;</td>
</tr>
<tr>
<td>Assessment</td>
<td>2. Determine flows for different percentiles (i.e. what is Feb’s flow for a very dry 10 percentile flow). This can be substantially abstracted from various studies done for the authorized discharge programme;</td>
</tr>
<tr>
<td></td>
<td>3. The qualities of water in the river for various times of the year will be extracted from the authorized discharge programme and from DWA database;</td>
</tr>
<tr>
<td></td>
<td>4. Determine the impact of discharging water into the Olifants utilising simple impact/dilution ratios;</td>
</tr>
<tr>
<td>Pedology</td>
<td>1. Soil assessment report including mitigation of soil erosion;</td>
</tr>
<tr>
<td></td>
<td>2. Land capability assessment report including mitigation for loss of land capability; and</td>
</tr>
<tr>
<td>Rehabilitation Plan</td>
<td>The basis of the rehabilitation plan will be to develop the closure criteria into action plans that when implemented will mitigate the risks requiring mitigation and will meet the closure objectives for the mine. Aspects which will be considered include:</td>
</tr>
<tr>
<td></td>
<td>1. Physical stability of surface reclamation;</td>
</tr>
<tr>
<td></td>
<td>2. Environmental quality, especially in terms of possible contaminated water decant and contamination of local groundwater;</td>
</tr>
<tr>
<td></td>
<td>3. Land use / land capability;</td>
</tr>
<tr>
<td></td>
<td>4. Health and safety considerations;</td>
</tr>
<tr>
<td></td>
<td>5. Biodiversity;</td>
</tr>
<tr>
<td>Specialist Study</td>
<td>Scope</td>
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</table>
|                  | • Aesthetic quality;  
|                  | • The rehabilitation plan will take cognisance of the project life cycle and will develop short, medium and long term requirements which if implemented would allow the mine to be in a position at the end of Life of Mine to have rehabilitated all non-operational areas progressively, with the result that there is minimal rehabilitation backlog;  
|                  | • Rehabilitation options; and  
|                  | • Feedback on rehabilitation plan including agreement on monitoring requirements. |
| Surface water study | • Catchment boundaries of the areas that will be impacted upon by the final layout of the project infrastructure will be outlined on a map;  
|                  | • Hydrological calculations will be undertaken for the affected areas to determine the flows and Storm water volumes that will need to be contained or diverted;  
|                  | • Identify potential storm water controls that will be required to meet GN704 requirements including bunding, clean water diversions, dirty water collection canals and pollution control dams. The water controls will be sized to meet regulation 704;  
|                  | • The proposed controls will be presented to the client to ensure that the plan meets with their approval and a meeting with the stakeholders as defined by the client will be undertaken;  
|                  | • Controls to meet Regulation 704 will be indicated on a drawing;  
|                  | • A report of the assumptions and results will be prepared;  
|                  | • Develop a post closure water balance;  
|                  | • The water balance for post closure conditions will include the evaporation, runoff and flows of water emanating from the discard dump areas as well as the rehabilitated areas;  
|                  | • The dumps and rehabilitated areas will be placed on a plan along with the water management structures;  
|                  | • The runoff and evaporation from these areas will be estimated on a monthly scale and indicated on a schematic plan. The runoff from rainfall will be done using best estimates of rainfall runoff based on the WRSM2000 monthly rainfall/runoff from natural areas and estimates of rehabilitated and dump areas;  
|                  | • This will be done for wet, dry and average conditions;  
|                  | • The storm water management master plan will be done in line with the Best Practice Guidelines prepared for Storm water Management (BPG G1: Storm water Management, DWAF, August 2006);  
|                  | • Preparation of flood lines; and  
|                  | • Report summarising the assessment including hydrology and hydraulic outputs. |
| Topography       | Information regarding the general topography of the area needs to be included.  
|                  | A short description of the site-specific topography of the VDDC Project area is required. The following activities will be undertaken:  
|                  | • Literature review of available information;  
|                  | • Develop a map indicating topographical aspects;  
|                  | • Report writing on background, methodology and results;  
|                  | • Inclusion of report within the EIA/EMP; and  
|                  | • Review and update documents. |
### Specialist Study

<table>
<thead>
<tr>
<th>Study</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Licence</td>
<td>• Establish waste generation;</td>
</tr>
<tr>
<td></td>
<td>• Characterize waste types;</td>
</tr>
<tr>
<td></td>
<td>• Characterize waste geochemistry; and</td>
</tr>
<tr>
<td></td>
<td>• The potential impacts in terms of the waste generation at the proposed expansion areas.</td>
</tr>
<tr>
<td>Wetland Impact Assessment</td>
<td>• Develop a map showing the location, delineation and classification of the wetlands and riparian areas of the Mining Right Area;</td>
</tr>
<tr>
<td></td>
<td>• Assessment of the present ecological state (including map);</td>
</tr>
<tr>
<td></td>
<td>• Determine the ecological importance and sensitivity and the functional importance of the wetlands;</td>
</tr>
<tr>
<td></td>
<td>• Detailed assessment of aquatic ecosystems across aspects such as macro invertebrates, fish, diatoms, water quality and habitat integrity;</td>
</tr>
<tr>
<td></td>
<td>• Determine likely impacts expected due to the proposed developments, and appropriate mitigation and/or management measures will be recommended for inclusion in the EIA and EMP, as well as a monitoring plan; and</td>
</tr>
<tr>
<td></td>
<td>• A map will be produced indicating problem and sensitive areas as well as proposed developments in relation to delineated wetlands.</td>
</tr>
<tr>
<td>WUL</td>
<td>• Identification of water uses associated with the VDDC Project;</td>
</tr>
<tr>
<td></td>
<td>• Gather information about the water uses;</td>
</tr>
<tr>
<td></td>
<td>• Complete associated documentation;</td>
</tr>
<tr>
<td></td>
<td>• Meeting with DWA to discuss application process.</td>
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### 13.2 Impact Assessment Methodology

The EIA will be undertaken according to SRK Consulting’ standard criteria for impact assessment which are detailed below:

The first stage of Impact Assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change.

The significance of the impact is then assessed by rating each variable numerically according to defined criteria as outlined in Table 13-2.

The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance rating matrix as shown in Table 13-3 and Table 13-4.

The assessment of significance should be undertaken twice. Initial significance should be based on only natural and existing mitigation measures (including built-in engineering designs). The subsequent assessment should take into account the recommended management measures required to mitigate the impacts.
### Table 13-2: Criteria for assessing significance of impacts

<table>
<thead>
<tr>
<th>SEVERITY OF IMPACT</th>
<th>RATING</th>
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</thead>
<tbody>
<tr>
<td>Insignificant / non-harmful</td>
<td>1</td>
</tr>
<tr>
<td>Small / potentially harmful</td>
<td>2</td>
</tr>
<tr>
<td>Significant / slightly harmful</td>
<td>3</td>
</tr>
<tr>
<td>Great / harmful</td>
<td>4</td>
</tr>
<tr>
<td>Disastrous / extremely harmful</td>
<td>5</td>
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<table>
<thead>
<tr>
<th>SPATIAL SCOPE OF IMPACT</th>
<th>RATING</th>
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</thead>
<tbody>
<tr>
<td>Activity specific</td>
<td>1</td>
</tr>
<tr>
<td>Mine specific (within the mine boundary)</td>
<td>2</td>
</tr>
<tr>
<td>Local area (within 5 km of the activity boundary)</td>
<td>3</td>
</tr>
<tr>
<td>Regional</td>
<td>4</td>
</tr>
<tr>
<td>National</td>
<td>5</td>
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<table>
<thead>
<tr>
<th>DURATION OF IMPACT</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>One day to one month</td>
<td>1</td>
</tr>
<tr>
<td>One month to one year</td>
<td>2</td>
</tr>
<tr>
<td>One year to ten years</td>
<td>3</td>
</tr>
<tr>
<td>Life of operation</td>
<td>4</td>
</tr>
<tr>
<td>Post closure / permanent</td>
<td>5</td>
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</tbody>
</table>

<table>
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<tr>
<th>FREQUENCY OF ACTIVITY / DURATION OF ASPECT</th>
<th>RATING</th>
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<tbody>
<tr>
<td>Annually or less / low</td>
<td>1</td>
</tr>
<tr>
<td>6 monthly / temporary</td>
<td>2</td>
</tr>
<tr>
<td>Monthly / infrequent</td>
<td>3</td>
</tr>
<tr>
<td>Weekly / life of operation / regularly / likely</td>
<td>4</td>
</tr>
<tr>
<td>Daily / permanent / high</td>
<td>5</td>
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<table>
<thead>
<tr>
<th>FREQUENCY OF IMPACT</th>
<th>RATING</th>
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</thead>
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<tr>
<td>Almost never / almost impossible</td>
<td>1</td>
</tr>
<tr>
<td>Very seldom / highly unlikely</td>
<td>2</td>
</tr>
<tr>
<td>Infrequent / unlikely / seldom</td>
<td>3</td>
</tr>
<tr>
<td>Often / regularly / likely / possible</td>
<td>4</td>
</tr>
<tr>
<td>Daily / highly likely / definitely</td>
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Table 13-3: Significance Rating Matrix

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<th>Likelihood (Frequency of activity + Frequency of Impact)</th>
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<th>5</th>
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<th>15</th>
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<td>7</td>
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<td>12</td>
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<tr>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
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<td>24</td>
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Table 13-4: Positive/Negative Mitigation Ratings

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<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Very high</td>
<td>126-150</td>
<td>Improve current management</td>
<td>Maintain current management</td>
</tr>
<tr>
<td>2</td>
<td>High</td>
<td>101-125</td>
<td>Improve current management</td>
<td>Maintain current management</td>
</tr>
<tr>
<td>3</td>
<td>Medium-high</td>
<td>76-100</td>
<td>Improve current management</td>
<td>Maintain current management</td>
</tr>
<tr>
<td>4</td>
<td>Low-medium</td>
<td>51-75</td>
<td>Maintain current management</td>
<td>Improve current management</td>
</tr>
<tr>
<td>5</td>
<td>Low</td>
<td>26-50</td>
<td>Maintain current management</td>
<td>Improve current management</td>
</tr>
<tr>
<td>6</td>
<td>Very low</td>
<td>1-25</td>
<td>Maintain current management</td>
<td>Improve current management</td>
</tr>
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</table>
14 Conclusion

This concludes the Draft Scoping Report. The report has presented:

- the environmental process undertaken so far;
- a brief description of the proposed projects;
- a baseline description of the current environment;
- the issues and concerns raised by stakeholders during the scoping study;
- the alternatives being considered by the project team;
- the POS for EIA;
- the Specialist Studies to be undertaken; and
- the Impact Assessment Methodology.

All of the proposed activities will be located in areas that have been disturbed through previous mining, farming and or residential activities.

The proposed water treatment plant and associated infrastructure will be operated with the objective of reducing the level of the water found underground. Once this objective has been achieved, these facilities will make way for the authorised mining of the VDDC Open Pit (OT6/2/2/113).

It is currently assessed that potential environmental impacts that could arise can be mitigated in line with GN 704, Mining Best Practice Guidelines and EMP Commitments of the previously authorised mining of the VDDC pit (OT6/2/2/113).

In lieu of the above, no environmental fatal flaws have been identified during the Scoping Phase of this study, for the proposed VDDC Project.

A comprehensive public involvement programme is in operation in order to identify critical issues and concerns. The EIA process is, however, iterative and therefore additional issues/impacts may be identified that requires further investigation/consideration.

The process that will be followed during the detailed Impact Assessment Phase will meet the requirements of the legislation to ensure that the regulatory authorities receive sufficient information to enable informed decision-making.
15 Submission of the Draft Scoping Report to the Competent Authorities

The Draft Scoping Report was submitted to the following Organs of State, as summarised in Table 15-1.

Table 15-1: Competent Authorities to receive the Draft Scoping Report

<table>
<thead>
<tr>
<th>Department</th>
<th>Contact Person</th>
<th>Postal Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Mineral Resources (DMR)</td>
<td>Ms Martha Mokonyane</td>
<td>DD Environment Private Bag X7279 Witbank 1035</td>
</tr>
<tr>
<td>Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET)</td>
<td>Mr Mashudu Mutengwe</td>
<td>Private Bag X7279 Witbank 1035</td>
</tr>
<tr>
<td>Department of Water Affairs (DWA)</td>
<td>Ms Betty Mnquni (DWA – Mpumalanga)</td>
<td>Private Bag X10580 Bronkhorstspruit 1020</td>
</tr>
<tr>
<td>Department of Environmental Affairs (DEA)</td>
<td>Mr Herbert Kutama</td>
<td>Private Bag X447 Pretoria 0001</td>
</tr>
<tr>
<td>South African Heritage Resources Agency</td>
<td>Mr Troy Phili</td>
<td>237 Lynnwood Road, Brooklyn, Pretoria 0181</td>
</tr>
<tr>
<td>eMalahleni Local Municipality</td>
<td>Mr Erald Nkabinde</td>
<td>PO Box 3 Witbank 1035</td>
</tr>
<tr>
<td>Nkangala District Municipality</td>
<td>Ms Elizabeth Tshabalala</td>
<td>PO Box 437, Middelburg, 1050</td>
</tr>
</tbody>
</table>

Prepared by

Selma Nel, Dr Laetitia Coetser
Environmental Scientists

Reviewed by

Dr Andrew Wood
16 References


DEAT. 2002. Integrated Environmental Management, Information series 2: Scoping (Department of Environmental Affairs and Tourism (DEAT. 2002))

DEAT. 2002. Integrated Environmental Management, Information series 3: Stakeholder Engagement (Department of Environmental Affairs and Tourism (DEAT. 2002))

DEAT. 2002. Integrated Environmental Management, Information series 4: Specialist Studies (Department of Environmental Affairs and Tourism (DEAT. 2002))


DMR. 2002. Guideline for the Compilation of a Scoping Report. As required in terms of Sections 10(1) (B), 22(4) (B), and 39, read together with Regulation 49 (2) of the MPRDA.

DMR. 2002. Guideline for Consultation with Communities and Interested and Affected Parties, Department of Mineral Resources.


DMR. 2010. Guideline for Consultation with Communities and Interested and Affected Parties.

DMR. 2010. Guideline for the Compilation of a Scoping Report with due regard to Consultation with Communities and Interested and Affected Parties.


Environment Conservation Act (73 of 1989)


Mpumalanga Parks Agency Act (5 of 2005).


Appendices

Appendix A: Curriculum Vitae of Team Members
Appendix B: Waste Management Procedure
Appendix C: Comments and Response Report
SRK Report Distribution Record

Complete this form and include it as the final page for each copy of the report produced.

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<td>Dr Laetitia Coetser</td>
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<tr>
<td>Mr Mashudu Mutengwe</td>
<td>Mpumalanga Department of Economic Development,</td>
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<td>March 2013</td>
<td>Dr Laetitia Coetser</td>
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<td></td>
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<td>Ms Alucia Tjale</td>
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<tr>
<td>Mrs J Cathro</td>
<td>eMalahleni Public Library</td>
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<tr>
<td>Ms Erica Choltz</td>
<td>Kriel Golf Club</td>
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<tr>
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<tr>
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