6. PLAN OF STUDY FOR IMPACT ASSESSMENT

6.1 Introduction

A Plan of Study for the EIA is required in terms of the EIA regulations when a Scoping and EIA is undertaken. The objective is for the approving authorities, in this case the DEA, the DWA and MDEDET to verify that those issues and concerns identified by the EAP and the I&APs are investigated and addressed in the Environmental Impact Assessment Phase of the project. Where significant impacts have been identified and mitigation measures developed, these measures have to be included in the EMPr.

6.2 Issues raised by IAPS during scoping

The following key issues were raised by IAPs during scoping:

- Construction impacts must be adequately covered in the impact assessment;
- Integration of the water balances for Delmas Coal and KiPower is needed to ensure there are no problems in future;
- The impact of the project on water and sheep must be investigated;
- Contamination of wetlands due to the ash stack;
- Emissions need to be minimised;
- Greenhouse gas emissions must be minimised;
- Impact of the project on the dam on Haverklip farm property;
- Sufficient notification must be given to landowners for any studies to be conducted; and
- People may not enter private land without permission.

6.3 Specialist studies

The following specialist assessments will be carried out during the impact assessment. These were identified based on the issues raised to date, as well as, by the EAP and project team based on the nature of the project.

6.3.1 Air quality impact assessment

This study will be conducted by Airshed Planning Professionals. They will also prepare the licence applications for the required emissions licences for the Power Plant as required in terms of the provisions of the NEM:AQA. Since best practice measures can be applied to address construction impacts, the air impact assessment will focus on operational impacts. There are two components to the study: establishing the baseline, and the impact assessment. In this study both the Power Plant and ash stack emissions will be covered, as well as coal stockpile and sorbent storage areas.

6.3.1.1. Baseline

The main aim of air quality management is to reduce the risk to human health and the environment due to air pollution. The air quality baseline assessment will therefore aim to provide an accurate reflection of the current air quality in the region, and the air quality assessment will superimpose the air quality effects of the different aspects of the project on the baseline. This will be done by undertaking the following tasks:

- Description of legal requirements and all relevant air quality guidelines and standards. This will include the air quality legislation for South Africa, taking into account the requirements according to the National Environmental Management: Air Quality Act, the conditions of the National Framework, the national ambient standards and the minimum national emission limits for listed activities (both now available as regulations). In addition, the study will also take into account that the KiPower Power Plant is located in the Highveld
- Collect and collate ambient and meteorological data from stations in the region. This will include wind speed, wind direction, temperature, precipitation, humidity, sigma theta (if available) and solar radiation. Ambient monitored data will be assessed as made available by the client or as published in accessible literature.
- Setup of a suitable model to simulate a three dimensional wind field for the area.
- Identify all existing sources of emissions in the region to ensure cumulative impacts can be assessed.

6.3.1.2. Impact assessment

The impact assessment is based on the use of a dispersion model that simulates the way emissions would move through air and thereby reach ground levels where people, animals and plants can be affected by them. A dispersion model helps to determine the areas and extent of potential impact. Airshed will use either the USA EPA AERMOD model(which has recently superseded the widely used Industrial Source Complex (ISC) model as regulatory model in the US) or AERMOD model from the UK. The following will be undertaken for the impact assessment:

- Compile an emissions inventory for the project including all sources of emissions and all pollutants of concern. The pollutants to be addressed will include the criteria pollutants (i.e. respirable dust, SO2, NOx, CO, Benzene and Ozone), but other relevant pollutants that may become apparent from the process description will also be simulated.
- Setup of a regional dispersion model (US.EPA approved CALPUF, AERMOD or ADMS model) for dispersion simulations.
- Assess the predicted impacts based on ambient air quality standards and occupational health screening criteria. Proposed and regulated South African Standards will be used. International standards and screening criteria will also be cited where appropriate.
- Based on the preferred site location and micro site selection, a monitoring network will be proposed and mitigation measures will also be listed.
- Inputs to the EMP as indicated by the impact assessment will be proposed.
- Emission license application forms to be submitted to the DEA or to the local licensing authority (the correct authority will be determined by project timing and by the schedule for transfer of licensing responsibilities between DEA, district municipality and provincial authority).

6.3.2 Surface water impact assessment

Since best practice measures can be applied to address construction impacts, the impact assessment will focus on operational impacts. The surface water assessment will be done by J&W surface water specialists. There are several components of this assessment as follows:

- Establishment of a baseline for water quality and quantity in local rivers to ensure cumulative impacts can be assessed. Monitoring data from Delmas Coal is available;
- Flood line determinations for river and wetland crossings by conveyors and access roads;
- Water balance for the power plant and assessment of the adequacy of storm water and process water systems;
- Water balance for the ash facility and assessment of the adequacy of storm water and process water systems;
- Impact of any potential spillage or leaks from the power plant and ash facility into the local surface water bodies.

6.3.2.1. Baseline

Existing monitoring information for the area will be used to determine the current profile for water quality and flows in the area.

6.3.2.2. Flood lines

Where needed, flood line determinations will be done for river and wetland crossings, to feed into the design of the crossings, as well as for use in the water use license applications for the wetland and river crossings. Flood lines for the section of the Wilge River running past the proposed ash facility will be done to feed into the design of the ash facility.

6.3.2.3. Power plant

The water balance for the power plant will be drawn up taking into consideration the site layout, design of water retaining structures and footprint of the plant. The plant design will also be assessed in terms of GN704[2]and the NEM:WA waste regulations to ensure adequacy of water management on the plant. The potential for spills will be determined based on the design by simulating water levels in water retaining structures over time, using historical rainfall records. Specifically, historical high rainfall events will be considered to determine potential spills due to heavy rains.

6.3.2.4. Ash facility

The water balance for the ash plant will be drawn up taking into consideration the site layout, design of water retaining structures and footprint of the facility. The design will also be assessed in terms of GN704, the DWAF's Minimum Requirements, as well as the Department of Environmental Affairs' draft classification and disposal regulations to ensure adequacy of water management on the ash disposal facility. .

The potential for spills will be determined based on the design by simulating water levels in water retaining structures over time, using historical rainfall records. Specifically, historical high rainfall events will be considered to determine potential spills due to heavy rains.

[2]The GN704 regulations, promulgated under the National Water Act, stipulate the design and management requirements for water management infrastructure.

6.3.2.5. Leaks and spills

Leaks and spills will be assessed based on the likelihood of occurrence assessed for the power plant and ash facility, as well as, the potential size and water quality of such spills. These will be simulated within the receiving local rivers to determine how the water quality in rivers could change due to spills and leaks. Where necessary, mitigation measures will be recommended to avoid ensure local receiving water quality objectives are not exceeded.

6.3.3 Ground water impact assessment

Since best practice measures can be applied to address construction impacts, the impact assessment will focus on operational impacts. The objective of this assessment will be to simulate the likely leakage rate of the dry ash disposal facility into the receiving environment when using the proposed barrier system. Once the leaking rate is known and the impact on the environment determined, the significance of the impact can be established. In the case that the impact is significant, the barrier system below the ash disposal facility can be adjusted for additional protection.

This assessment will be a combined assessment by JMA Consulting, Mr Albert van Zyl and Jones and Wagener. The assessment will undertake the following work:

6.3.3.1. Baseline

A hydro census of the area will be carried out to

- Determine all current users of ground water;
- Obtain water samples from existing boreholes;
- Determine the current water quality in the area, and;
- Determine water levels in boreholes.

This work will ensure cumulative impacts can be assessed.

6.3.3.2. Geochemical modelling

Simulated ash will be analysed to define the chemical composition of the ash dam and identify potential contaminants. These simulated ash samples will be produced at the Eskom coal testing facility. Samples with sorbent will be generated to ensure the sulphate generation potential is better understood. Samples will be subjected to the following analysis:

- Acid Base Accounting;
- Sulphur speciation;
- NAG;
- XRD;
- Total Acid Digest plus ICP-MS;
- Toxic Characteristic Leach Procedure (TCLP) plus ICP-MS;
- SPLP Plus ICP-MS; and
- Water extract plus cation and anion analysis.

6.3.3.3. Characterisation of potential leachate from ash facility

The objectives for the source term characterization are:

- To provide the likely and range of seepage volumes emanating from the ash material;
- To provide the likely and range of seepage loads from the ash material based on the predicted seepage volumes and seepage qualities though the ash; and
- To provide the likely and range of leakage volumes and loads through the engineered liner system.

Two scenarios will be considered, namely:

- An open waste surface with a theoretical receptor (groundwater user) at the base of the waste profile; and
- An open waste surface and an engineered liner system with a theoretical receptor at the base of the liner system.

It will be assumed that there is no lateral seepage from the facility.

The geo-hydraulic properties of the ash materials will be determined at an approved laboratory and will include permeability, water retentivity (ability of the ash to hold water), particle density and particle size distribution analyses. The seepage analysis will be conducted using the one dimensional code of the Soil Vision finite element numerical model, which allows consideration of both unsaturated and saturated flow conditions.

The seepage rates from the waste profile will be simulated as a function of site specific climatic conditions, geo-hydraulic properties of the ash materials, disposal strategy and rate of rise of the ash profile. Seepage volumes will be determined from the modelled seepage rates and the area of the waste facility. The liner performance modelling will be based on the predicted seepage rates and characteristics of the facility and drainage and liner (barrier) systems. The predicted leakage rates will be combined with the seepage qualities to calculate the leakage loads through the liner system. The leakage loads will be compared to the loading rates determined from the Minimum Requirements to establish whether compliance is being met.

6.3.3.4. Impact assessment for ash facility

The geochemical modelling and leachate characterisation will provide the basis for the impact assessment of the ash facility. Potential leachate into the natural ground water will be simulated in a ground water dispersion model to determine what the resultant change in ground water quality would be, how far the change would be experienced and who might be impacted by the change. Should a significant impact be predicted, mitigation measures, such as an improved barrier system, will be recommended where needed to ensure potential impacts are curbed to stay within acceptable water quality standards.

6.3.4 Soils assessment

The soils assessment for the power plant area has been done previously and this information will be brought into the impact assessment. A survey of soil types will be done for the ash facility. Soil will be characterised in terms of agricultural potential.

Measures to conserve and re-use soils will be outlined in the study. This work will either be done by a J&W soils specialist or by another specialist yet to be appointed.

6.3.5 Ecology, wetlands and aquatics

Previous ecological surveys of the power plant site (Site 5) and the ash disposal facility (Site 3) has been carried out by Natural Scientific Services. This previous work will be brought into the impact assessment.

6.3.5.1. Terrestrial assessment

- An initial desktop review of available literature
- A field visit investigating the following:
  a. Habitat / vegetation communities and the common/dominant plant species within these zones using approved vegetation sampling methods;
  b. Faunal species will be recorded by both trapping methods (in the remaining natural areas between all three components) and through visual observations (visual presence of animals or evidence of animals in the form of faeces, pellets, spoor, nests, burrows, feathers etc.); and
  c. Any additional information will be recorded for any other features that may have ecological significance.
- A report detailing the information from the assessment.

6.3.5.2. Aquatic assessment

The aquatic assessment will focus mainly on the Wilge River and tributaries entering the study area from the south and exiting in the north and will include the following:

- An initial desktop review of available literature
- A field investigation in the summer season – (High Flow regime). Water quality sampling (in situ variables) specific to bio monitoring will be performed at the same time the aquatic sampling is performed;
- A report detailing the information from the assessment.

6.3.5.3. Wetland assessment

The wetland assessment will include the following:

- Identification and classification of wetland types identified;
- Delineation of wetlands in accordance with the DWAF (2005) guidelines: "A practical field procedure for identification and delineation of wetlands and riparian areas";
- Wetland Habitat Integrity Assessment. The methodology used will be dependent on the wetland types identified; and
- A report detailing the information from the assessment.

6.3.6 Traffic

Goba Consulting Engineers will undertake the traffic impact assessment. For projects of this nature, the impact of construction traffic needs to be quantified, as well as the transportation of abnormally dimensioned machine components, on the road network and the receiving environment. The site is well accessed by the national road network

(N4 and N12) as well as various provincial roads. In this light, the following study elements will be undertaken as part of this work:

- The traffic impact of construction vehicles transporting large machine components to the site will be analysed. An appropriate route will be recommended and, should the load exceed legal requirements, an abnormal load permit will be required.
- During the construction of the power station and ash disposal facility, the impact of construction vehicle and employee movements on the external road network and any disruption to the normal traffic flow as a result, will need to be examined.
- The impact both of the abnormally loaded vehicles, as well as general construction traffic on the pavement structure will need to be assessed.

The following methodology to carry out the above scope of work is proposed:

- Compile a list of technical information to be obtained from the engineering team that is to include:
  a. Details of the traffic/truck volumes operating to/from the sites as well as the arrival/departure profiles during the construction of each module of the power station (i.e. Coal Fired Power Station, Electrical Substation, Transmission Power Line, Coal Washing Plant, Coal Conveyor Belt, Ash Dump, Water Reservoir, Water Treatment Plant and Access Road);
  b. Dimensions and mass details of machine components to be transported;
  c. Destination of the truck traffic;
  d. Other vehicle movements, such as transportation of ash to be transported to the ash disposal facility by truck; and
  e. Staff movements and transport during operation of the Power Plant.
- Conduct a desktop study to determine the most feasible route for transportation of abnormal loads, contact details of all relevant authorities, procedures to be followed to obtain necessary permits for abnormal loads, contact details of recognised structural engineers for a route clearance study, etc.
- Conduct site visits to:
  a. assess the road network to/from the various sites, including the accesses onto the external road network and key intersection(s) onto the national road network;
  b. for the abnormally loaded vehicles - undertake a preliminary on-site route survey of the routes to identify any physical / engineering constraints and provide a summary of those aspects, which will require further in-depth study/survey in order to proceed.
- Obtain existing traffic counts on the external road network and where necessary arrange to undertake additional traffic count surveys and analyse this data;
- Undertake an assessment of the information provided in order to assess potential impacts on the surrounding primary, secondary and tertiary road network and any safety issues within the sites.
- Compile a traffic/transport impact assessment report that describes the issues, consequences and mitigation that may be required as a result of the proposed Power Plant.

6.3.7 Heritage

A heritage assessment will be carried out by a specialist, in compliance with the requirements of the National Heritage Resources Act of 1999 as amended. The heritage assessment will involve a detailed survey of the power plant and ash disposal facility sites, as well as major infrastructure routes for conveyors, roads and pipelines. The field survey will focus on:

- Identifying types and ranges of heritage resources;
- Describing and geo-referencing heritage resources;
- Mapping of heritage resources on (layered) maps;
- Indicating/assessing significance of heritage resources; and
- Proposing mitigation measures for heritage resources.

In the case that heritage resources, such as old buildings, have to be demolished, a secondary assessment will be required and application then made for a destruction licence. In the case of graves, application will also have to be made for the required permits to exhume and relocate these.

6.3.8 Socio-economic

MasterQ Research will conduct the socio-economic assessment. A scoping study has been completed in 2010, and the baseline information from this study has been summarised in Section 4.9. One of the key issues to be addressed in this assessment is construction related impacts.

6.3.8.1. Data collection

Additional depth will be added to data collected during the Scoping Phase such as:

- Issues/concerns raised as part of the issues and response register. Typically the public consultation process will include one on one interviews with key stakeholders, either face to face or telephonically, and focus group meetings – particularly with interest groups. As the various stakeholder groupings have different interests, all forms of I&AP consultation will be guided by a sector specific discussion guides. Where possible, the social and economic specialist will conduct their I&AP consultation on the same platform to prevent duplication and to curb costs as far as possible.
- Information on the project itself (i.e. project activities and timelines), as well as baseline data on the current and future social and economic processes in the area(s) and/or local communities likely to be affected. The following data will be studied:
  - A desktop review of the latest versions of the Victor Khanye and Govan Mbeki Local, and Nkangala and Gert Sibande District Municipalities 'Integrated Development Plans (IDP); Spatial Development Frameworks (SDF) (if available); Environmental Management Frameworks (EMF) (if available); and State of Environment Reports (SOER) (if available).
  - A desktop review of the Growth and Development Strategy (GDS), SDF and SOER of the Mpumalanga Province;

6.3.8.2. Economic Research Process

As a point of departure the social and economic specialist will try to understand the national, regional and local pressures in existence that may influence economic conditions. They will then look at the economic conditions themselves and the implications which arise from them. Finally they will research the resulting effects of a proposed project and all options in the economy at the 3 levels. Therefore, the aim is to make recommendations on the available options by adopting a holistic approach rather than focusing only on the resulting effects of a project.

The determination of economic benefits and opportunity costs will form an important information source for decision making on the developments and the manner of execution. The EA components would therefore form an integral part of the overall SEIA process. The EA will be conducted in parallel to and integrated into the SEIA Report and will consist of the following four steps:

- Step 1: Desktop and Field Research;
- Step 2: Data Modelling;
- Step 3: Data Interpretation and Impacts/Implications;
- Step 4: Report Composition.

Desktop and Field Research

Field research will take place in collaboration with the Social study and will include a site visit and I&AP consultation as outlined above.

Economic Data Modelling

The following expected economic impacts will be modelled:

- Output and Production: determine how the power plant will contribute to economic production and output on the domestic economy during both the construction as well as the operational phases.
- Employment: Determine how the power plant will contribute to employment in the domestic economy during both the construction as well as the operational phases.
- Quantification of localised production, employment and income losses close to the site for landowners, tenants and workers.
- Property impacts: how the development of the power plant may affect property values for specific land use types.
- Capital goods: Determine if there will by any loss of capital goods (such as buildings) due to the project and the cost of these.
- Determine economic displacement and hassle costs if there are possible monetary loss due to the displacement or increased level of difficulty in earning an income or conducting business.
- Benefits or loss to government in terms of tax and levies: determine which monetary values could be forfeited or gained by government as a result of the project.
- Cumulative economic effects in terms of changes to local industries and the local business climate due to power plant in the area by determining and specifying

qualitative multiple project and progressive industrialisation of the area in terms of the local and regional economy.

Modern quantitative techniques are used to process obtained data and to place this in an understandable framework. The output of the analysis is most often a series of graphs and tables. The goal is to quantify economic costs and benefits using these methods in order to form a balanced picture of the economic viability of the project. A sensitivity analysis is often conducted to cater for a series of possible scenarios, e.g.:

Impact Assessment

This component of the socio-economic study will involve modelling the direct and indirect impacts of project activities on the socio-economic environment. Given the nature of the development, the following change processes are expected to occur, which in turn would lead to a number of socio-economic impacts:

- A change in land use, affecting people's sense of place, income, etc.;
- An influx of unemployed job seekers;
- Possible continuous conflict situations with neighbouring landowners and residents of nearby towns and settlements;
- Public resistance to the proposed project;
- Employment as a result of project activities; and
- A potential increase in crime during the construction phase.

Please note that this list is not exhaustive of the socio-economic impacts expected, but merely an indication of the types of change processes that might occur.

Important to note is that the findings of the SEIA will also rely on the findings of other specialist studies, most notably the Groundwater Study, the Air Quality Study, the Noise Impact Assessment Study, the Visual Impact Assessment Study and the Land Use map. The findings of these studies are often relevant to the SEIA as:

- Impacts on visual quality affects people's sense of place;
- Impacts on air quality affects people's health;
- Increased noise levels affects people's quality of life;
- Contamination of ground water can affect people's water sources; and
- Impacts on, for example, a decrease in agricultural land can lead to economic impacts.

Mitigation Measures

The identification of mitigation and/or enhancement measures entails the formulation of recommendations regarding measures to either prevent or reduce the effect of any of the identified negative impacts, or to encourage or enhance any identified positive impacts. The predicted effectiveness of such mitigation measures will also be indicated by re-assessing al impacts post-mitigation.

6.3.9 Geo-technical

This work will be done by J&W's geotechnical specialists.

The objective of this work is to obtain a firm understanding of the material and soil conditions on the site for the purposes of the preliminary design of the Power Plant and ash disposal facility and obtaining the required licences. This detailed geotechnical fieldwork investigation will include test pitting, soil profiling, sampling and laboratory analysis, data interpretation and drafting of the geotechnical report. Laboratory testing will include foundation indicator and permeability testing in order to establish the suitability of the on-site soils for potential liner construction and capping of the ash disposal facility..The information will also be used by Black and Veatch for the foundation design of the Power Plant.

6.3.10 Noise

The noise assessment will be carried out by JH Consulting. A baseline noise survey and noise impact assessment will be carried out to measure the existing noise and predict the impact on the surroundings due to construction and operation of the plant and ash disposal facility, as well as recommend procedures and methods to mitigate such impact, if appropriate. The following are the minimum activities required to perform the assessment, assuming that the impact on sensitive receptors outside the boundaries of the site and/or specifically identified properties are required.

- The initial baseline noise measurement survey to determine existing noise levels at the boundaries of the surface infrastructure and any other possible plant sites, and at specific sensitive receptors if applicable;
- The prediction of the operational noise levels and public response at the boundaries and also at any specific individually identified potentially exposed properties outside the boundaries of the site; and
- Recommendation of mitigation methods should these be necessary or appropriate.

6.3.11 Visual

The visual assessment will be carried out by Newtown Landscape Architects.

6.3.11.1. Baseline survey

The study area will be visited and data collected and photographs taken. Data collected during the site visit will allow for a comprehensive description and characterization of the receiving environment and would identify issues that need to be addressed in the impact assessment phase for the selected sites, especially the ash disposal facility, which will be a permanent fixture of the area. It is understood that the process is iterative and contact with the client's personnel / project team throughout this and the second phase is required to ensure that issues that may affect development plans and could mitigate impact, need to be raised as soon as they are identified.

6.3.11.2. Evaluation Phase

This phase involves the determination of impacts and would utilize modelling techniques that establish visual intrusion, visibility and visual exposure of the project components. These criteria are required to rate the magnitude of the impact. The significance of the impact will be determined using the format / criteria provided by the EAP – see Section 6.4. Cumulative impacts, as wells the impacts of all phases of the project will be assessed.

6.4 Assessment of impacts

The significance (quantification) of potential environmental impacts identified during scoping and identified during the specialist investigations will be determined using a ranking scale, based on the following:

- Occurrence
  - Probability of occurrence (how likely is it that the impact may/will occur?), and
  - Duration of occurrence (how long may/will it last?)
- Severity
  - Magnitude (severity) of impact (will the impact be of high, moderate or low severity?), and
  - Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?)

Each of these factors has been assessed for each potential impact using the following ranking scales:

Probability: 5 – Definite/don't know 4 – Highly probable 3 – Medium probability 2 – Low probability 1 – Improbable 0 – None	Duration: 5 – Permanent 4 - Long-term (ceases with the operational life) 3 - Medium-term (5-15 years) 2 - Short-term (0-5 years) 1 – Immediate
Scale: 5 – International 4 – National 3 – Regional 2 – Local 1 – Site only 0 – None	Magnitude: 10 - Very high/don't know 8 – High 6 – Moderate 4 – Low 2 – Minor

The environmental significance of each potential impact will be assessed using the following formula:

Significance Points (SP) = (Magnitude + Duration + Scale) x Probability

The maximum value is 100 Significance Points (SP). Potential environmental impacts will be rated as very high, high, moderate, low or very low significance on the following basis:

- More than 80 significance points indicates VERY HIGH environmental significance.
- Between 60 and 80 significance points indicates HIGH environmental significance.
- Between 40 and 60 significance points indicates MODERATE environmental significance.
- Between 20 and 40 significance points indicates LOW environmental significance.
- Less than 20 significance points indicates VERY LOW environmental significance.

Both incremental and cumulative impacts will be assessed.

6.5 Environmental Impact Report (EIR) and EMPr

Findings and/or recommendations of the specialist studies will be integrated into a report that will be updated as comments are received from I&APs. The draft reports will be made available for a first public review, during which period a public meeting/open day will also be held. Once feedback from the IAPs has been received, these will be considered and included in the final EIR, EMPr and specialist studies.

The Final EIR together with a final construction and operation EMPr and supporting specialist reports will be submitted to DEA. At the same time the final documents will also be made available to the IAPs and commenting authorities for final review period. After the review period the DEA will commence processing the application for authorisation.

6.6 Water use license application

Additional information required for a water license application will be compiled into a Water Use License Application (WULA) in addition to the EIR and EMPr. This draft report will also be subject to public review together with the Draft EIR and EMPr, and the final documents will also be made available for final scrutiny and comment when submitted to the DEA. The WULA will be supported by an Integrated Water and Waste Management Plan (IWWMP) which will be put together using the information from the specialist assessments.

6.7 Waste license application

Additional information required for a waste license application will be compiled in the draft Licence Application Report in addition to the EIR and EMPr. This draft report will also be subject to public review together with the Draft EIR and EMPr, and the final documents will also be made available for final scrutiny and comment when submitted to the DEA. The Licence Application Report will include:

- Preliminary design drawings;
- Operating plan;
- Closure plan;
- Monitoring plan;
- Emergency Response Plan, etc.

6.8 Emissions Licence

Additional design information and the necessary application forms will be submitted to the DEA and local municipality for consideration. A preliminary license is usually provided by the local municipality based on the application. Once operation commences and the emission limits can be proven, the formal license will be issued.

6.9 Public participation during the impact assessment

Public participation will focus on the review of the Draft Environmental Impact Assessment Report (EIR) and draft Environmental Management Plan (EMPr).

The Draft EIR and EMPr will be compiled once the specialist assessments are completed. This report will meet the requirements of the EIA regulations of 2010.

In addition to the Draft EIR and EMPr, the waste license application (which will include an integrated water and waste management plan), the atmospheric emission license application, and the water use license application will also be made available for public comment.

The reports will be made available for a period of at least 40 calendar days to IAPs for comment. During this period at least one IAP meeting will be held to obtain their comments on the reports.

Thereafter the reports will be updated with IAP comments and submitted to DEA for decision-making. The final reports will also be made available on the applicable websites for IAPs to review before the DEA commence with their review and drafting of the authorisation.

Other authorisations, such as the rezoning application will similarly be made available to the public. As the authorisations and/or licences may not necessarily be issued at the same point in time, a number of notices may have to be placed to notify all of their availability. However, the IAP meeting will be held during the review of the EIA and EMPr since the specialist studies for the EIA will form the basis of the applications for the other license applications.

Once the authorisation, waste licences, emissions licence and water use license have been issued these will be made available via post, newspapers and websites for public review. This action then leads into the formal appeal period.

7. CONCLUSION AND RECOMMENDATIONS

This Draft Scoping Report meets the requirements of the EIA regulations for the scoping phase as shown in Section1.5. In addition, the site selection process, which entailed the identification and evaluation of alternative locations for the Power Plant and ash disposal facility, the work carried out during the scoping phase of the project was sufficient to identify two favoured sites to be taken forward in the EIA phase of the project for in-depth investigations.

Based on the foregoing it is therefore recommended that:

- After the first public review period, this report is updated with the IAP comments and the final documents then be made available to all commenting authorities and IAPs. After this commenting period, the DEA will be able to process the scoping report with a view to provide approval to proceed with the EIA phase of the KiPower Power Plant project.
- In the EIA phase the focus of the specialist studies and site assessments will be on Sites 3 and 5 for the Power Plant and long term ash disposal facility.
- Once the required authorisations and licences have been obtained for the Power Plant and ash disposal facility, the land rezoning process will commence.

Prav Sewmohan
EIA Coordinator

Marius van Zyl
Environmental Assessment Practitioner

14 March 2012
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Appendix A

EAP CV's

1. Marius van Zyl
2. Prav Sewmohan

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

CURRICULUM VITAE

13 February 2012
vanzyl_generalcv_feb2012

MARIUS VAN ZYL

Profession:	Environmental Management
Date of Birth:	4 July 1955
Position in firm:	Technical Director
Years with the firm:	2
Nationality:	South Africa
Education / Qualifications:	B.Sc. Honours (Biochemistry & Environmental Management)
Languages:	English, Afrikaans

Employers:

AECI (Pty) Ltd	1980
Rand Afrikaans University	1981 - 1984
Department of Water Affairs and Forestry	1984 - 1994
Jarrod Ball & Associates cc	1994 - 2005
Golder Associates Africa (Pty) Ltd	2005 - 2010
Jones & Wagener Consulting Civil Engineers (Pty) Ltd	2010 -

Areas of Expertise:

Expertise in licensing of waste management facilities, identification and evaluation of candidate landfill sites, waste characterisation and classification, Integrated Water and Waste Management Plans (IWWMPs), waste and water related regulatory processes, waste management facility monitoring and auditing, environmental management, EIAs and public participation.

Professional Affiliations:

Registered Professional Natural Scientist (Pr. Sci. Nat.)

Member of the Institute of Waste Management

Member the International Association of Impact Assessors (South African Branch)

Relevant Experience:

Waste Disposal Facility Licensing, Remediation and Upgrading:

Manganese Metal Company (MMC), Nelspruit, South Africa: Project manager for the remediation and closure of the informal Pappas Quarry hazardous waste disposal site. Tasks involved the upgrading of the groundwater model, interim capping of the site, Basic Assessment for site and compilation of the licence application report for closure.

Sappi Kraft Ltd - Ngodwana Mill, Nelspruit, South Africa: Developed the final landform and closure design for the Macrodump waste disposal facility in 1994/5. A motivation for the permitting of the site was compiled as part of the final landform design. At Golder (2009 – 2010) the project manager for the multi-disciplinary team involved in the extension of the Macrodump.

Sappi Kraft Ltd – Enstra Mill, Springs, South Africa: Project leader for the drafting of the motivation for the extension of the Sappi Enstra Landfill Site. The project involved the development of a revised landform by the Jones and Wagener's engineers, as well as input by Kobus Otto and Associates (2011).

Sappi Novobord Ltd: White River Plant White River, South Africa: Investigated and compiled the permit application with a view to closure of the Roodewal landfill site in association with other team members of Jarrod Ball & Associates

Lekoa Vaal Metropolitan Council: Boipatong Vanderbijlpark, South Africa: Investigated and developed a remedial design and operating plan for the Boipatong landfill site. The landfill was remediated to minimise the negative public and environmental impacts it had been causing. The landfill operation was upgraded with a view to closure in accordance with acceptable landfill operating practices, while at the same time accommodating the operations of a large number of informal waste salvagers on the site. The needs of the local communities, industries and authorities have been taken into account by means of a Public Consultation Programme. The landfill was also audited on a regular basis after remediation.

Transvaal Sugar Limited: Komati Mill Komatipoort, South Africa: The project entailed the investigation, permitting, development and commissioning of the new Komati Mill landfill site. It included the formulation of an operational and end-use plan. The project involved other members of Jarrod Ball & Associates cc. More recently involved in the auditing of the landfill on a regular basis with other members of Golder Associates Africa and Jones & Wagener (2011).

Kynoch Fertilizer (Pty) Limited Potchefstroom, South Africa: Project manager of the multi-disciplinary team involved in the investigation, environmental impact assessment, public consultation and permitting of Kynoch Fertilizers' hazardous gypsum tailings storage facility in association with Africon, AEMS, Jones and Wagener and Mc Trev Consultancy.

Impala Platinum Limited Rustenburg, South Africa: Project leader for the investigation, environmental scoping, environmental management plan and permitting of a new landfill site to serve Impala Platinum's Rustenburg Mine complex and the Royal Bafokeng Nation. Work was conducted in association with Mc Trev Consultancy, Groundwater Consulting Services and others.

Thohoyandou Transitional Local Council Thohoyandou, South Africa: Responsible for the environmental scoping and permitting of the informal Thohoyandou landfill site (in association with Africon and Mc Trev Consultancy.

Delta EMD (Pty) Ltd Nelspruit, South Africa: Responsible for the application for an exemption in terms of Section 20(1) of the Environment Conservation Act for Delta EMD's hazardous waste Residue Treatment Facility. Currently involved in the review of the exemption and upgrade to licence status

Vanchem Vanadium Products (Pty) Ltd (VVP) eMalahleni (Witbank), South Africa: Project manager for the identification and evaluation of candidate landfill sites, environmental impact assessment, preliminary and detailed design, and authorisation of a new calcine hazardous waste disposal facility for VVP. In order to evaluate the long term performance of the liner system, source-pathway-receptor (SPR) modelling was undertaken as part of the feasibility study phase of the project.

Waste Disposal Strategies, Systems and Procedures:

Eskom, Medupi Power Station, Lephalale: Project leader for the development of an Integrated Waste Management Plan (IWMP) for the construction phase of the power station. The project is carried out in association with Kobus Otto and Associates (2010 – 2012).

Lonmin Platinum Group, South Africa: Project leader for the development of an IWMP for the mining company's Marikana and Brakpan operations. The project is carried out in association with Kobus Otto and Associates (2011 – current).

Lekoa Vaal Metropolitan Council Vanderbijlpark, South Africa: Developed a Regional Waste Disposal Strategy for the Lekoa Vaal Region. This included a status quo analysis in which the current and future waste streams were determined and the existing landfill sites were evaluated with a view to determining future disposal needs. The status quo was followed by the identification of candidate landfill sites, the development of a waste disposal strategy and a Feasibility Study and Environmental Scoping of the best candidate landfill site.

Impala Platinum Limited Rustenburg, South Africa: Developed a waste management policy and waste management procedures for various waste types for Impala Platinum's Rustenburg Mine Complex. This was followed by the drafting of a detailed landfill operating plan for Impala Platinum's new waste disposal facility.

Gauteng Department of Agriculture, Conservation & Environment Johannesburg, South Africa: guideline document was developed for the development of Integrated Waste Management Plans (IWMPs) for usage by local authorities in Gauteng in association with other members of Jarrod Ball & Associates cc and others.

Bojanala Platinum District Municipality Rustenburg, South Africa: Assisted with the development of a strategic Integrated Waste Management Plan (IWMP) for the district municipality in association with other members of Jarrod Ball & Associates cc.

Rustenburg Local Municipality Rustenburg, South Africa: Assisted with the development of an IWMP for the municipality in association with other members of Jarrod Ball & Associates cc.

Mangaung Municipality, Bloemfontein, South Africa: Service standards for the municipality's waste disposal facilities were developed. The standards are used for the evaluation of contractors operating the waste disposal sites. The project involved the upgrading of waste management and disposal practices for the municipality. The project was done in association with other consultants.

Identification and Evaluation of Waste Disposal Sites:

COWI, Viet Tri, Vietnam: Assisted with the evaluation of a candidate landfill site earmarked for the development of a hazardous waste disposal facility in Phu Tho Province, Vietnam in association with COWI. Developed a scope of work for the field investigations and design of the proposed facility.

Simunye Sugar Estate, Simunye, Swaziland: Identified and permitted, which included an EIA, of a new waste disposal facility for the Simunye Sugar Estate in Swaziland. It involved the initial evaluation of the existing sites with a view to upgrading them. Public consultation was also undertaken as part of this project.

Sappi Ngodwana Mill Nelspruit, South Africa: Identified and evaluated candidate landfill sites to serve the paper mill, associated infrastructure and residential areas. The project was conducted in association by other members of Jarrod Ball & Associates. The favoured site is currently (2010) being licensed for development.

Southern District Council Klerksdorp, South Africa: The project involved the identification and evaluation of candidate landfill sites to serve the greater Klerksdorp, Orkney, Stilfontein area.

Rustenburg Local Municipality Rustenburg, South Africa: The project commenced with a pre-feasibility study of a candidate site identified by other consultants. This was followed by the identification of additional candidate landfill sites and evaluation in order to identify the most favourable site. The most favourable site was subjected to a feasibility study and environmental scoping exercise. The project was

conducted in association by other members of Jarrod Ball & Associates and VAPI Consulting. The favoured site is currently in the final licensing phase.

Auditing and status quo analysis:

Sasol Synfuels – Secunda: Compliance audit of the Waste Ash Disposal facility with other members of Jones & Wagener (2010, 2011).

Tauw Belgium: Conducted a due diligence audit for the takeover bid for Hansen Transmissions in Kempton Park, South Africa (2010).

Mondi Kraft Ltd - Piet Retief Mill Piet Retief, South Africa: The operation of the Mills' new waste disposal facility was evaluated for a number of years. It included the interpretation of the results obtained from the ground and surface water monitoring system.

Northam Platinum Mine Thabazimbi, South Africa: Audited the implementation of the Northam Platinum Mine's Environmental Management Plan (EMP) on an annual basis with other members of the Golder team. Audited the environmental status and operation of Northam Platinum Mine's waste disposal facility.

EnviroServ (Pty) Limited Springs & Johannesburg, South Africa: Audited the Margolis and Holfontein hazardous waste disposal facilities for a number of years in association with other members of Jarrod Ball & Associates and Golder Associates Africa in order to verify compliance with legal requirements.

MOZAL Maputo, Mozambique: Conducted an environmental due diligence audit of Metlite, a company that processes dross waste obtained from MOZAL in order to produce material for, inter alia, the explosives industry.

Johnson Matthey Germiston, South Africa: Conducted environmental due diligence audits of the company's waste management contractors in order to establish compliance with legal requirements of these companies.

Hillside Aluminium Smelter (BHP Billiton) Richards Bay, South Africa: Conducted an audit of the smelter's waste management system in order to identify shortfalls in the system. The audit was followed with the development of a waste management training manual. The project was carried out in association with other members of Jarrod Ball & Associates cc.

Chemical and Allied Industries Association (CAIA) Johannesburg, South Africa: Assisted with the development of a uniform hazardous waste management audit protocols for the Chemical and Allied Industries Association (CAIA) in association with Wiechers Environmental.

Municipal Infrastructure Investment Unit (MIIU) Thohoyandou, South Africa: Conducted a status quo analysis of the Thohoyandou Transitional Local Council's sewage water treatment and waste disposal facilities in order to establish remediation requirements, such as upgrading of the works, and organisational and training requirements.

Royal Swaziland Sugar Corporation Simunye, Swaziland: Conducted a status quo analysis of the sugar estate and mills' sewage and effluent water treatment and waste disposal facilities in order to identify environmental impacts and the need for upgrading the facilities.

ESKOM Kriel, South Africa: Conducted an audit of the operating standard of the Kriel Power Station's sewage treatment works to, inter alia, establish compliance with the Water Act's legal requirements.

Gauteng Department of Agriculture, Conservation & Environment Johannesburg South Africa: Developed a landfill evaluation pro-forma for use by government officials when inspecting and evaluating waste disposal facilities.

Waste Classification and Hazard Ratings of Industrial Waste Types

Zitholele Consulting (Pty) Ltd, Midrand, South Africa: Classification of the new ash disposal facility for Eskom's Camden Power Station. The draft DEA and Minimum Requirements classification procedures were used in this project (2011).

Sappi Kraft Ltd – Enstra Mill, Springs, South Africa: Conduct a risk profile of the Sappi Enstra landfill site leachate with a view to reclassifying the landfill site (2011).

Exxaro, Pretoria, South Africa: Conduct a classification of a ferrous metal slag with the view to using the slag in cement based products. Both the Minimum Requirements and the draft Department of Environmental Affairs' waste classification processes were used (2011).

Anglo Platinum: Polokwane Smelter: Conducted a waste risk profile of slag with a view to reclassifying the waste disposal facility of the smelter (2010).

North West Medical Waste, Klerksdorp, South Africa: Performed a hazard rating in terms of the South African hazardous waste classification system on the ash from the medical waste incinerator.

Sappi Fine Paper, Ngodwana Mill Ngodwana, South Africa: Conducted a number of hazard ratings on various waste stream originating from the paper mill. It was possible to delist a number of these waste streams and obtain permission for down-stream uses thereof.

Optimum Colliery, Hendrina, South Africa: Task manager for the investigations and evaluations into alternative disposal options for mine water treatment sludges containing gypsum.

Rand Water, Vereeniging, South Africa: Hazard rated the boiler ash waste stream and motivated for its use in road and cement brick applications.

Technic Services, Luanda, Angola: Hazard rated a number of the waste types to be disposed of on Technic Services' new landfill site with a view to establishing the liner design requirements.

Cape Metropolitan Council Cape Town, South Africa: Hazard rated sewage sludges originating from a number of sewage works. The project was undertaken in association with the Cape Biosolids Consultants, a consortium of consultants who investigated various aspects of sewage sludge management.

Delta EMD (Pty) Ltd, Nelspruit, South Africa: Responsible for the environmental evaluation of the use of a treated residue in road building applications, which led to the authorities granting permission for the use of the treated material in capped road applications.

EnviroServ (Pty) Ltd: Commented on draft waste management regulations and waste classifications systems for client and presented comments to the Department of Environmental Affairs (2010).

Anglo Platinum: Polokwane Smelter: Conducted a waste risk profile of slag with a view to reclassifying the waste disposal facility of the smelter (2010).

<u>Waste Management Training</u>

Department of Environmental Affairs, South Africa: Developed and presented a one day course on aspects of landfill performance evaluation, environmental monitoring and auditing. The training target group consisted on Control Environmental Officers of the National and Provincial Departments dealing with waste management matters (2011).

Chemical and Allied Industries Association (CAIA) Johannesburg, South Africa: Presented a short training course on the licensing procedure for waste management facilities in terms of the requirements of the National Environmental Management: Waste Act (NEM:WA) and the National Environmental Management Act (NEMA) (2010).

Mondi Forests, Piet Retief, South Africa: Developed and presented a short course in waste management for officials of Mondi Piet Retief's Forestry Division.

Swaziland Environment Authority, Mandini, Swaziland: Developed and presented an integrated waste management training course for the Swaziland Environment Authority. The course included practical excursions and exercises. The course was developed in association with other members of Jarrod Ball & Associates.

North West University's: Potchefstroom Campus, Potchefstroom, South Africa: Developed a five day course in Integrated Waste Management and Planning for the University's Centre for Environmental Management. The course is upgraded and presented on an annual basis in association with others from Golder.

Basel Convention, Nairobi, Kenya: Lectured on aspects of hazardous waste management to Kenyan Government officials and the private sector in Nairobi. This formed part of the Basel Convention initiative to develop a training centre in hazardous waste management for the English speaking countries in Africa.

COWI, Viet Tri, Vietnam: Lectured on aspects of hazardous waste management to industry employees and government officials in Viet Tri, Vietnam, in association with other members of COWI.

Environmental Impact Assessments

BHP Billiton Energy Coal South Africa, Middelburg Mines: Project manager for the environmental authorisation process for the Middelburg Water Reclamation Project (MWRP) (2010 – current).

BHP Billiton Energy Coal South Africa, Wolvekrans Colliery: Project manager of the multi-disciplinary team responsible for the environmental authorisation process for the expansion of the Boschmanskrans Section of the colliery. The project also involves the drafting of an Integrate Water and Waste Management Plan (IWWMP), as well as the Integrated Water Use Licence Application (IWULA) (2011 – current).

Kuyasa Mining: KiPower IPP Project, Delmas, South Africa: Project director of the multi-disciplinary team responsible for the environmental authorisation process for the development of a power plant and associated ash disposal facility. The project also involves the drafting of the required Integrate Water and Waste Management Plan (IWWMP), as well as, the Integrated Water Use Licence Application (IWULA) (2010 – current).

Other

Sappi Fine Papers, Springs, South Africa: Annual evaluation of the ground and surface water status of Sappi Enstra's permitted waste disposal facilities and drafting of the interpretation report (2011).

Northam Platinum, Thabazimbi, South Africa: Registered the mine's water uses in terms of the provisions of the National Water Act.

Manganese Metal Company (MMC), Nelspruit, South Africa: Peer reviewed the consulting work carried out for the identification, investigation and permitting of MMC's new hazardous landfill site at Kingston Vale, Nelspruit. Project was carried out in association with others of Jarrod Ball & Associates. As employee of Golder involved in aspects of liner performance monitoring and evaluation at the Kingston Vale landfill site.

Delta EMD, Nelspruit, South Africa: Investigated the alternative uses and environmental consequences of a treated metallurgical residue from Delta EMD. Project conducted in association with Environmental and Chemical Consultants and Golder Associates Africa.

Gauteng Department of Agriculture, Conservation & Environment, Johannesburg, South Africa: Developed and conducted performance monitoring of the multi-media bin system deployed at a number of the World Summit on Sustainable Development venues in association with Sue Posnik and Associates and others.

Kynoch Fertilizers, Potchefstroom, South Africa: Project leader for the environmental scoping and feasibility study of a storm water containment dam for Kynoch's Potchefstroom Factory. The project was carried out in association with AEMS and Hobbs Consulting. Project leader for site remediation investigation projects at Kynoch Fertilizer's Potchefstroom Factory and fertilizer depots in various locations in South Africa.

Golder Associates SrL, Italy: Project leader for desktop study on the market potential for landfill gas (LFG) clean development mechanism (CDM) projects in South Africa for Asja Ambiente Italia (Asja). Asja is an Italian based firm with extensive experience in the landfill gas to energy industry. The study was commissioned by Mr F. Belfiore of Golder Europe.

Agresu, Maputo, Mozambique: Co-ordinated the Phase 1 evaluation of landfill gas (LFG) generation at Maputo's Hulene landfill site. The project involved the siting of three gas monitoring wells, subsequent LFG monitoring and data collection. LFG modelling was undertaken by Golder's UK team using the

Gassim2 model.

Summary of other Experience / Publications

Author and co-author on a number of papers pertaining to integrated catchment management and landfill remediation

Declaration

I confirm that the above CV is an accurate description of my experience and qualifications.

______________________________ 13 February 2012

Signature of Staff Member Date

Professional Profile

Praveshni (Prav) Sewmohan

BScEng(Chem); CEAPSA

Independent Environmental Consultant

Contact details
PO Box 665 Lonehill 2062
Tel: 083 629 8825
Fax: 086 503 9471
Email: psewmohan@iburst.co.za

Services Offered

- Project coordination and management of environmental impact assessments and integrated regulatory processes
- Environmental due diligence reviews in support of mergers and acquisitions
- Environmental compliance audits and reviews of industrial sector operations
- Technical and process review of environmental impact assessment reports
- Compilation of scoping and environmental impact reports, and environmental management plans
- Compilation of technical or regulatory environmental documents and reports
- Independent environmental assessment practitioner

Experience

Environmental impact assessments

- Fertilizer depot and mixing facility near Middelburg. Personal involvement was environmental assessment practitioner for the project (1999).
- Upgrade of petrochemical plant at Secunda. Personal involvement was support to waste and water specialists conducting specialist impact assessment for the project (2000).
- Upgrade of various water and waste water treatment facilities near Brits, in Mpumalanga. Personal involvement was environmental assessment practitioner for the project (1999-2002).
- EIA coordination for City of Johannesburg 2000/01 Capex programme (total programme R820 million). Personal involvement was environmental assessment practitioner for the project and environmental project coordinator (2000-01).
- Proposed acrylic acid and acrylates complex for Sasol Sasolburg. Personal involvement was environmental assessment practitioner for the project (2000).
- Sasol Gas network conversion. Personal involvement was environmental assessment practitioner for the project (2000-01).
- Proposed upgrading and new plant for Sasol Polymers, Sasolburg. Personal involvement was environmental assessment practitioner for the project (2000-01).
- Proposed Major Expansion at Sappi Ngodwana Mill. Personal involvement was environmental assessment practitioner for the project (2001-02).
- Copeland Reactor upgrading at Sappi Enstra. Personal involvement was environmental assessment practitioner for the project (2002).
- Emalahleni Mine Water Reclamation Project. Personal involvement was environmental assessment reviewer and strategic guidance for the project (2002-03).
- Expansion of the chlor alkali facility at NCP Chlorchem. Personal involvement was environmental assessment practitioner for the project (2004-05).
- Closure and remediation of the HCH waste sites at NCP Chlorchem. Personal involvement was environmental assessment practitioner for the project (2004-2006).
- Proposed pelletising and sintering plant at Samancor Chrome, Middelburg. Personal involvement was environmental assessment practitioner for the project (2004-05).
- New DC Furnace for Samancor Chrome, Middelburg. Personal involvement was environmental assessment practitioner for the project (2005).
- New slimes facility for Vanchem, HSVC, Witbank. Personal involvement was environmental assessment practitioner for the project (2005).

- Ladle and induction furnaces projects at HSVC. Personal involvement was environmental assessment reviewer and strategic guidance for the project (2005-06).
- Section 24G assessment of new hydrochloric acid tanks at NCP Chlorchem. Personal involvement was environmental assessment practitioner for the project (2008-09).
- Effluent treatment infrastructure at NCP Chlorchem. Personal involvement was environmental assessment practitioner for the project (2008-09).
- Reprocessing, uranium and gold extraction and tailings deposition for Rand Uranium's tailings in the Randfontein area. Personal involvement is environmental assessment reviewer and strategic guidance for the project to Golder Associates (2006-current).
- Reprocessing of old gold tailings to extract residual gold and deposit on existing and a new tailings facility in Welkom for Harmony Gold. Personal involvement is environmental assessment reviewer and strategic guidance for the project to Golder Associates (2006-current).
- 2nd Expansion of the chlor alkali facility at NCP Chlorchem-Basic assessment. Personal involvement was environmental assessment practitioner for the project (2009).
- Two training telecommunications for Ericsson in Woodmead, Johannesburg – Basic assessment. Personal involvement was environmental assessment practitioner for the project (2009).
- Section 24G application for training masts erected at Ericsson, Woodmead. Personal involvement is environmental assessment practitioner for the project (2009).
- Section 24G assessment of aluminium chloride tanks at NCP Chlorchem. Personal involvement was environmental assessment practitioner for the project (2010).
- Environmental permitting of new power plant for KiPower, Delmas. Personal involvement is process coordinator for Jones and Wagener (2010-current).
- Environmental permitting for two new sewage works at Xstrata Coal, Witbank. Personal involvement is project resource to Jones and Wagener (2010-current).
- Basic Assessment for new chlorine storage receivers at NCP Chlorchem. Personal involvement is EAP appointed by NCP Chlorchem (submitted-awaiting approval).

Environmental auditing

- Evaluation of site in PE for Ford Motor Company – for sale of land. Personal involvement was lead auditor.
- Environmental due diligence audit of 8 mining and industrial operations of an industrial Holding Company for Nedbank – for purchase. Personal involvement was lead auditor.
- Environmental due diligence assessment of defunct chrome mine and beneficiation plant for potential funder for recommissioning of mine and new smelter, North-West Province. Personal involvement was lead auditor.
- Environmental and occupational health due diligence audit of 18 sites in the USA, Canada, Spain, Switzerland, Poland, Germany, UK, Australia, China and South Africa for Anglo Opertions Limited for divestiture. Personal involvement was overall coordinator and site auditor for South African operations.
- Environmental and occupational health due diligence assessment of 3 manganese operations for BHP Billiton for potential sale. Personal involvement was lead auditor.
- Environmental due diligence review of various iron ore mining and smelting operations for funders/buyers. Personal involvement was assessment of sellers' documents to highlight potential environmental concerns for the funders/buyers.
- Environmental due diligence review of two coal mines for purchase. Personal involvement was guidance to team and internal review of report and board presentation prepared by Golder.

Risk Assessments

- Risk analysis for proposed mitigation measures for fertilizer plant-Richards Bay (1998)
- Probabilistic risk analysis of alternative water management strategies for Sasol Secunda (1998)
- Probabilistic risk assessment of technology alternatives towards development of an integrated water management plan for Sappi Ngodwana (1999-2000)
- Probabilistic Risk assessment of closure options for the Daggafontein Tailings Dam (2000-01)
- Risk assessment of closure options for coal mining pit - Limeisa Spain (2001)

- Review of risk assessment model for alternative waste closure options for Manganese Metals Company, Krugersdorp (2001)
- Risk analysis of sulphur dioxide emissions at the Waterval Smelter, Rustenberg for Anglo Technical Division (2008-09)
- Review and update of the assessment model for rehabilitation and closure of the rock dumps at Sishen Mine – Anglo Technical Division (2009)

Water and effluent management

- Water quality management regarding the mining industry – strategy development for DWAF (support to Andrew Brown) (1993-94)
- Development of catchment management plans for the Nkongolwana River and Waterval River (1993)
- Development of "Catchsim" water quality simulation model for in-house use at DWAF (1993)
- Coordination of design and construction of the AMD treatment works at Brugspruit for DWAF (1993-94)
- Commissioning of and operation support for tubular reverse osmosis plant at Secunda (1995)
- Process design, commissioning and operation support for major upgrade of salty water evaporators at Secunda (1995-96)
- Process design for electrodialysis plant at Secunda (1995-96)
- Process design of small modifications to desalination plant at Secunda (1995-97)

Policy, procedures and standards

- Development of internal corporate standards for air quality, water, waste, closure and impact assessment and management for Anglo – project coordination and initial review of specialist standards for Anglo Technical Division (2007-08).
- Safety Health and Environment corporate database clean-up project – project coordination of database clean-up in preparation for transfer to new web-based system on behalf of Anglo Technical Division (2009).

Employment record

Jul 07 to present	Sole proprietor
Aug-02 to Jun-07	Golder Associates Africa (Pty) Ltd, Midrand Divisional Operations Manager/ Group Leader
Aug-01 to Jul-02	Wates Meiring and Barnard Group, Midrand Director
Nov-00 to Jul-01	L&W Environmental, Midrand Director
Oct-97 to Oct-00	Wates Meiring and Barnard, Midrand Environmental Engineer
Apr-95 to Sep-97	Sasol Technology, Secunda Engineer/Senior Engineer
Jan-93 to Mar-95	Department of Water Affairs and Forestry, Pretoria Engineer-in-training

Professional qualifications and registrations

- BScEng(Chem) – University of Durban-Westville (1992)
- Certified Environmental Assessment Practitioner – Interim Certification Board of South Africa (as of July 2004)
- Member of Engineering Council of South Africa and South African Institute of Chemical Engineers (as of 1993)
- Registered Environmental Auditor – Institute of Environmental Management and Assessment, UK (IEMA, March 2007. Stopped membership in 2010).

KIPOWER (PTY) LTD

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF A 600MW INDEPENDENT POWER PLANT AND ASSOCIATED INFRASTRUCTURE FOR KIPOWER (PTY) LTD NEAR DELMAS IN MPUMLANGA
DRAFT SCOPING REPORT

Report: JW058/10/C182- Rev A

Appendix B

SITE SELECTION INFORMATION

1. Site selection report for power plant and ash disposal facility
2. Cost comparison of different power plant and ash facility site options
3. Property value analysis in Delmas area
4. Stability analysis on undermined areas

KIPOWER (PTY) LTD

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE
PROPOSED POWER PLANT NEAR DELMAS
SITE SELECTION PROCESS

Report No.: JW102/11/C182 - Rev A

May 2011

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

DOCUMENT APPROVAL RECORD

Report No.: JW102/11/C182 - Rev A

ACTION	FUNCTION	NAME	DATE	SIGNATURE
Prepared	EAP	P Sewmohan	10/03/2011	
Reviewed	Project Director	M van Zyl	22/03/2010	
Approved				

RECORD OF REVISIONS AND ISSUES REGISTER

Date	Revision	Description	Issued to	Issue Format	No. Copies
10/3/2011	Draft	First draft for specialists comment	MvZ; BA; KT; MP; DR; JvdB; RdV	Email	1
22/3/2011	Draft	First review comments	PS	Email	1
28/3/2011	Draft	Draft for comment	TA, MS, MvZ	Email	1
18/4/2011	Final	For client sign off	TA, MS, AB, MvZ	Email	1
8/5/2011	Final	For public review	Project team	Email	1

SYNOPSIS

KiPower (Pty) Ltd is a subsidiary of Kuyasa Mining, which also owns Delmas Coal and iKhwezi Mine located approximately 10km to the south-east of the town of Delmas in the Victor Khanye Municipality, within the Nkangala District Municipality of the Mpumalanga Province.

KiPower wishes to establish a new 600MW power plant in close proximity to Delmas Coal, utilising coal from this mine as the fuel for the power plant. Associated with the power plant, would be an ash disposal facility that must also be located in close proximity to the plant.

The location of the power plant and the ash facility are key decision points in the project development. Key considerations that affect the selection of an appropriate location for the plant and associated ash facility are:

- Supply of coal
- Supply of water
- Access
- Land ownership
- Labour
- Area required for the plant
- Area required for the ash disposal facility
- Area required for the construction laydown

Both the ash disposal facility and the power plant require the following key criteria with respect to location:

- The area must preferably not be undermined due to long term ground stability risks associated with undermined areas.
- The area must not hold viable reserves of coal, which would be sterilised if the plant or ash were placed on it.
- The area should preferable have a low agricultural potential.
- Significant surface water resources must be protected due to the highly stressed nature of the local water sources.
- Known biodiversity sensitivities must be avoided, especially wetlands.
- The power plant and ash disposal facility must be within close proximity of the coal source and preferable each other.

Black and Veatch, the Owner's engineer and project managers for this project, has indicated that due to economic reasons, the power plant and ash disposal facility should preferably be within a distance of 10km from the coal source. A radius of 10km was placed around South Shaft and North Shaft. Nine potential areas were identified for location of the power plant and/or ash disposal facility within the 10km radii, including sites previously identified by Black and Veatch during their pre-feasibility assessment for the power plant.

The sites were assessed based on various technical and environmental criteria by engineers and environmental specialists. A scoring and ranking system was used to determine the most suitable sites for the power plant and ash facility.

Based on the assessment of sites, four sites will be considered further in the EIA process. These are shown in Figure A.

KIPOWER (PTY) LTD

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED POWER PLANT NEAR DELMAS

REPORT NO: JW102/11/C182 - Rev A

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KIPOWER (PTY) LTD

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED POWER PLANT NEAR DELMAS

REPORT NO: JW102/11/C182 - Rev A

1. INTRODUCTION

KiPower (Pty) Ltd is a subsidiary of Kuyasa Mining, which also owns Delmas Coal and iKhwezi Mine located approximately 10km to the south-east of the town of Delmas in the Victor Khanye Municipality, within the Nkangala District Municipality of the Mpumalanga Province.

KiPower wishes to establish a new 600MW power plant in close proximity to Delmas Coal, utilising coal from this mine as the fuel for the power plant. Associated with the power plant, would be an ash disposal facility that must also be located in close proximity to the plant.

This report outlines the site selection process to date for the power plant and the ash disposal facility.

1.1 Project background

The new power plant scope is based on a 600MW start up project. However, KiPower may wish to expand the power plant up to 2000MW in the long term. Sufficient coal is available from Delmas Coal to supply a 2000MW plant. As is standard practice for large industrial developments, the design life of the power plant is planned at 30 years.

The ash from the power plant would need to be disposed of on an ash disposal facility. For a 600MW plant approximately 136 000 tonnes per month of ash will be generated. This translates to almost 50 million tonnes of ash over an operating life of 30 years.

Thus, the location of the power plant and the ash facility are key decision points in the project development. Key considerations that affect the selection of an appropriate location for the plant and associated ash facility are outlined below.

1.1.1 Supply of coal

Coal can be supplied from either the North Shaft or South Shaft of the Delmas Coal mining operations. North Shaft has a crusher plant and will be able to supply crushed coal to the power plant. A new crusher plant would be required at South Shaft if coal is supplied directly from this shaft.

The power plant will require 2.8 million tonnes of coal per annum, given the specific characteristics of coal from Delmas Coal.

1.1.2 Supply of water

Delmas Coal is a water user, in other words, there is insufficient water available on the mine for its operating needs and it needs to import water to meet the needs of its mining operations. The mine plans to bring in potable water either by tapping into a Rand Water line that runs between Springs and Devon to the south of the mine, or by tapping into the proposed bulk water line to Delmas town. Other potential sources of water are also being investigated by the mine.

The power plant, although a dry cooling system, will have a significant water requirement, of approximately 100 000 cubic meters per month.

It is proposed that water for the mine and power plant come from the same source and therefore a separate project is running in parallel to this one, to find potential sources of water and then develop the supply pipeline to the mine and the power plant.

1.1.3 Access

The provincial R50 road runs to the north of Delmas Coal, and North shaft is accessed directly off this road – see Figure 1. It is likely that both the power plant and the ash disposal facility would require access onto this road for construction and operations.

There is a rail link that runs to the west of the mine, and some raw materials, such as the dolomite or limestone to be used for air emissions control, can be brought in via this route as well. This rail link is used to export coal from Delmas Coal.

1.1.4 Landownership

Whilst Delmas Coal and iKhwezi Mine are owned by Kuyasa Mining, the surrounding land is mainly owned by various farming enterprises and BHP Billiton. KiPower will need to purchase land and ensure it is correctly re-zoned before any industrial development can take place.

1.1.5 Labour

Skilled and unskilled labour will be required for the project both during construction and during operations. It is known that unemployment is high in Delmas and the surrounding small towns and thus this project will offer some relief in the form of employment opportunities. Nevertheless, labour is likely to be imported during construction to meet the high numbers of people required during this period. More detail on this will be available in the scoping report.

1.1.6 Plant Area required

A 600MW power plant requires some 40 hectares, whilst a 2000MW plant requires about 160 hectares. Topography and other features of the land affect the area required for the power plant.

1.1.7 Ash Disposal Area required

The ash disposal facility, far more dependent on topography and natural features, will require somewhere between 150 and 250 hectares to accommodate 600MW ash generation over 30 years. If the power plant is expanded over time, this area requirement for ash will grow as well. Thus land that allows for expansion of the ash facility would be favourable.

1.1.8 Construction lay-down

A lay-down is the area used during construction to store materials, equipment, vehicles and to house offices and ablutions for construction personnel. Power plants take 3 to 4 years to construct, and are highly labour intensive in the construction phase. As a result, some 80 to 100 hectares is envisaged for the lay-down area and needs to be considered in the site selection process.

Based on the above, the area required for the **power plant** is 40 hectares plant area + 100 hectares construction lay-down area hectares, which gives **approximately 140 hectares**, while for the **ash disposal facility** an area of **250 hectares** for ash disposal should be sufficient. The construction camp for the ash disposal facility should not require more than 5-hectares and can usually be accommodated within the overall footprint of the facility itself.

2. SITE SELECTION PROCESS

Legislation in South Africa requires that public consultation takes place during site selection. Previously, this process was usually included in the scoping phase of an environmental impact assessment. The most recent EIA regulations promulgated in June 2010 now require land owner notification and consultation prior to the commencement of an EIA. As a result a broad-area based site selection process is difficult to include within the scoping phase of the EIA mainly due to the number of potential landowners that can be involved and must be given notification before the EAI process commences. This type of notification also raises other issues regarding the pricing of land and the associated business risk to the proponent. This issue was discussed with the National Department of Environmental Affairs (DEA) and the Mpumalanga Department of Economic Development Environment and Tourism (MDEDET) on 20 January 2011. The Departments advised that site selection be carried out ahead of the EIA process to a point where sufficient definition around preferred sites was reached so that these could be taken into the scoping phase of an EIA. Land owner notification could then be carried out for the preferred sites only. The site selection process done prior to the commencement of the EIA would then be carried into the scoping phase of the EIA as a supporting report which could then be commented on in the public review process.

As a result, the outcome of this report has been used to carry out the landowner notification for preferred sites, and the preferred sites will be further investigated and assessed during the scoping phase of the EIA in order to determine the most appropriate site to take forward into the impact assessment phase, and for the development of the project in terms of land acquisition, design and permitting.

2.1 Site selection legal requirements

The National Environmental Management Act (NEMA) as amended does not indicate specific requirements for site selection or consideration of alternatives. Nevertheless, it does require that alternatives be considered and assessed in order to identify the best practicable environmental option.

The National Environmental Management: Waste Act (NEMWA) also requires that consideration of alternatives in terms of site and technology be considered. The latest Department of Water Affairs Minimum Requirements is used as a best practice guideline in assessing new applications. The Minimum Requirements outline a step-wise approach for the selection of sites, starting with a broad-area based assessment of potential sites and eliminating sites as more detail is gathered on sites that show potential for the intended use. The process outlined in this report follows this best practice guideline approach.

2.2 Methodology

A step-wise site selection process has been followed to ensure the best available location is found for the power plant and the ash disposal facility. This process is illustrated in Figure 1 and is discussed in some detail in the sections that follow.

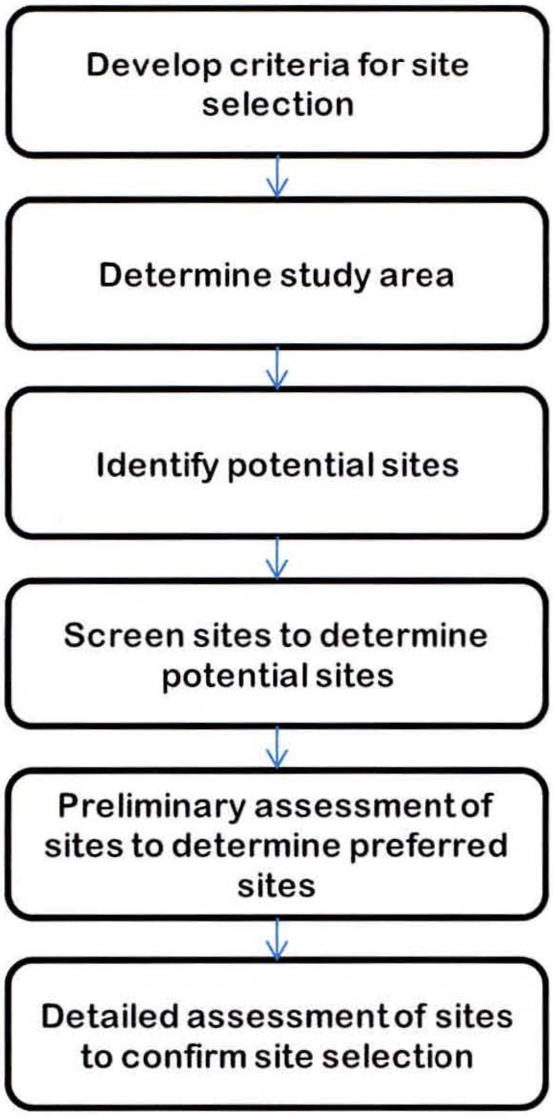


Figure 1: Site Selection Process

2.3 Key criteria for identification of potential sites

Both the ash disposal facility and the power plant require the following key criteria with respect to location:

- The area must preferably not be undermined due to long term ground stability risks associated with undermined areas.

- The area must not hold viable reserves of coal, which would be sterilised if the plant or ash were placed on it.
- The area should preferable have a low agricultural potential.
- Significant surface water resources must be protected due to the highly stressed nature of the local water sources.
- Known biodiversity sensitivities must be avoided, especially wetlands.
- The power plant and ash disposal facility must be within close proximity of the coal source and preferable each other.

2.3.1 Undermined areas:

Kuyasa Mining provided maps indicating current and future mining areas. These are shown in Figure 2.

2.3.2 Viable coal reserves

Kuyasa Mining provided maps showing viable coal reserves in the area. These are shown in Figure 3.

2.3.3 Significant sources of water

The 1:50000 topographical maps show the major drainage lines in the area. A 100m offset on either side of the drainage lines were considered as a buffer for the rivers. These are shown in Figure 4. Although a 100m offset was used, it is known that in some areas, the floodplain may be significantly wider. As a result, delineation of the floodplain and associated wetlands will be done on the preferred site(s), once these are confirmed.

2.3.4 Known biodiversity areas

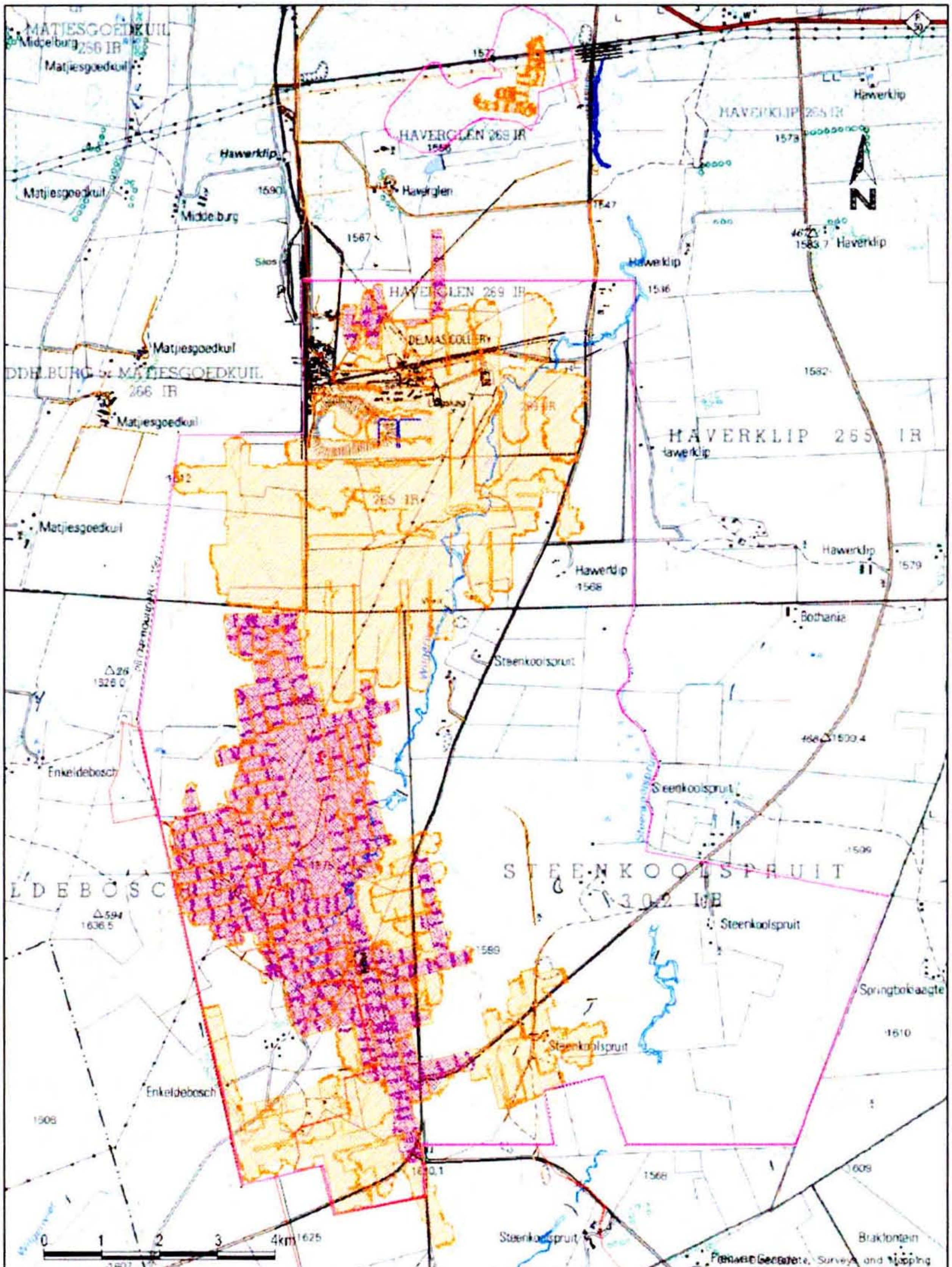
The Mpumalanga Provincial Department biodiversity sensitivity maps were used to determine any known sensitivities in the area. These are shown in Figure 5. Previous results from fieldwork in the area were also considered.

2.3.5 Proximity to coal source

Black and Veatch, the Owner's engineer and project managers for this project, has indicated that due to economic reasons, the power plant and ash disposal facility should preferably be within a distance of 10km from the coal source. A radius of 10km was placed around South Shaft and North Shaft. These radii define the study area within which sites could be identified. These are shown in Figure 6, with the above 4 criteria darkened out to indicate open areas that could be considered.

2.4 Identification of potential sites

Based on the information in Figures 2 to 6, potential areas were identified for location of the power plant and/or ash disposal facility. Sites, previously identified by Black and Veatch during their pre-feasibility assessment for the power plant (sites 1 to 5), were also included. These areas and sites are shown in Figure 7, against the darkened out areas.

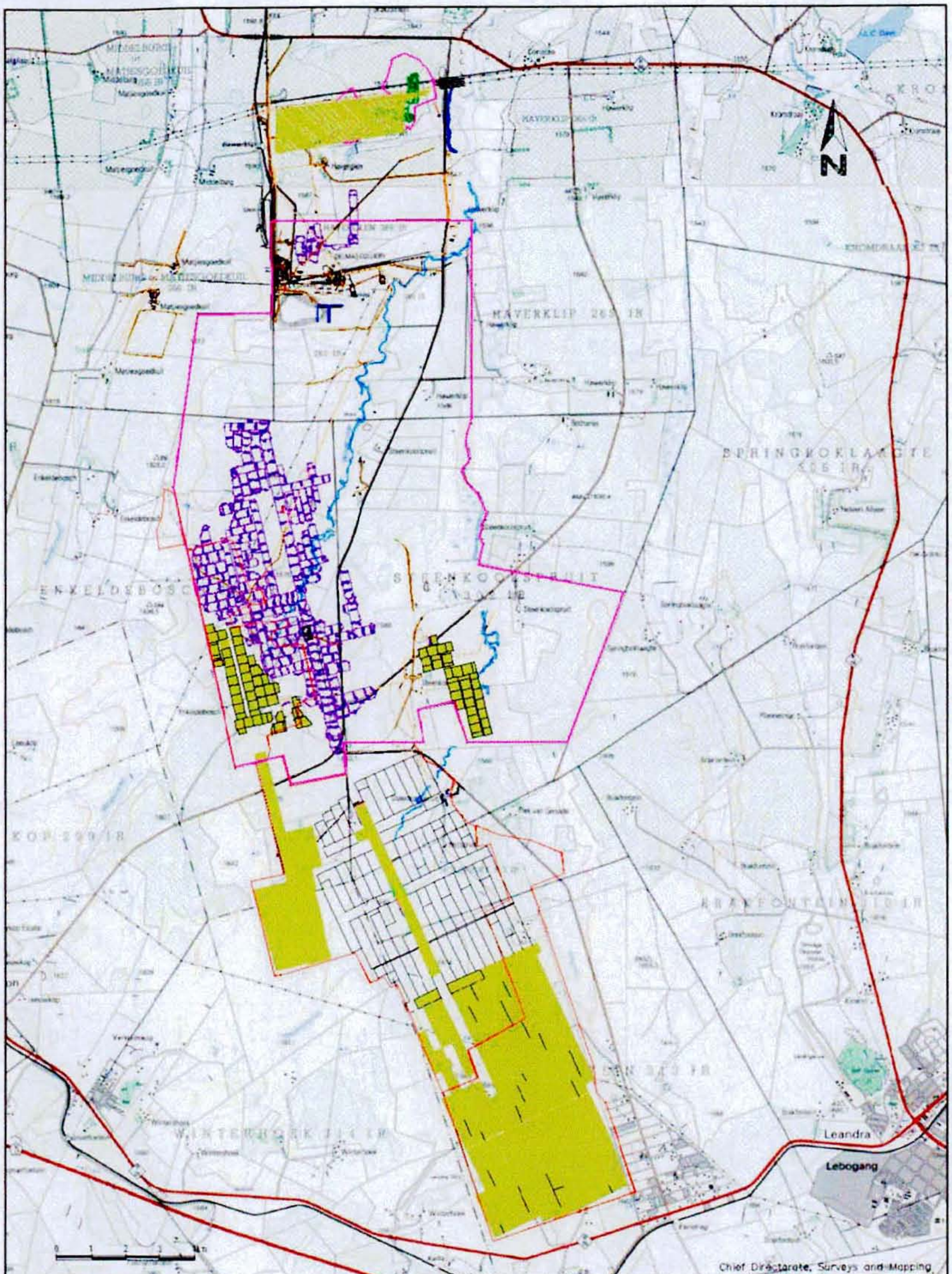


KUYASA MINING
UNDERMINED AREAS

Jones & Wagener
Consulting Civil Engineers

J & W JOB No Ø C182

FIGURE 2



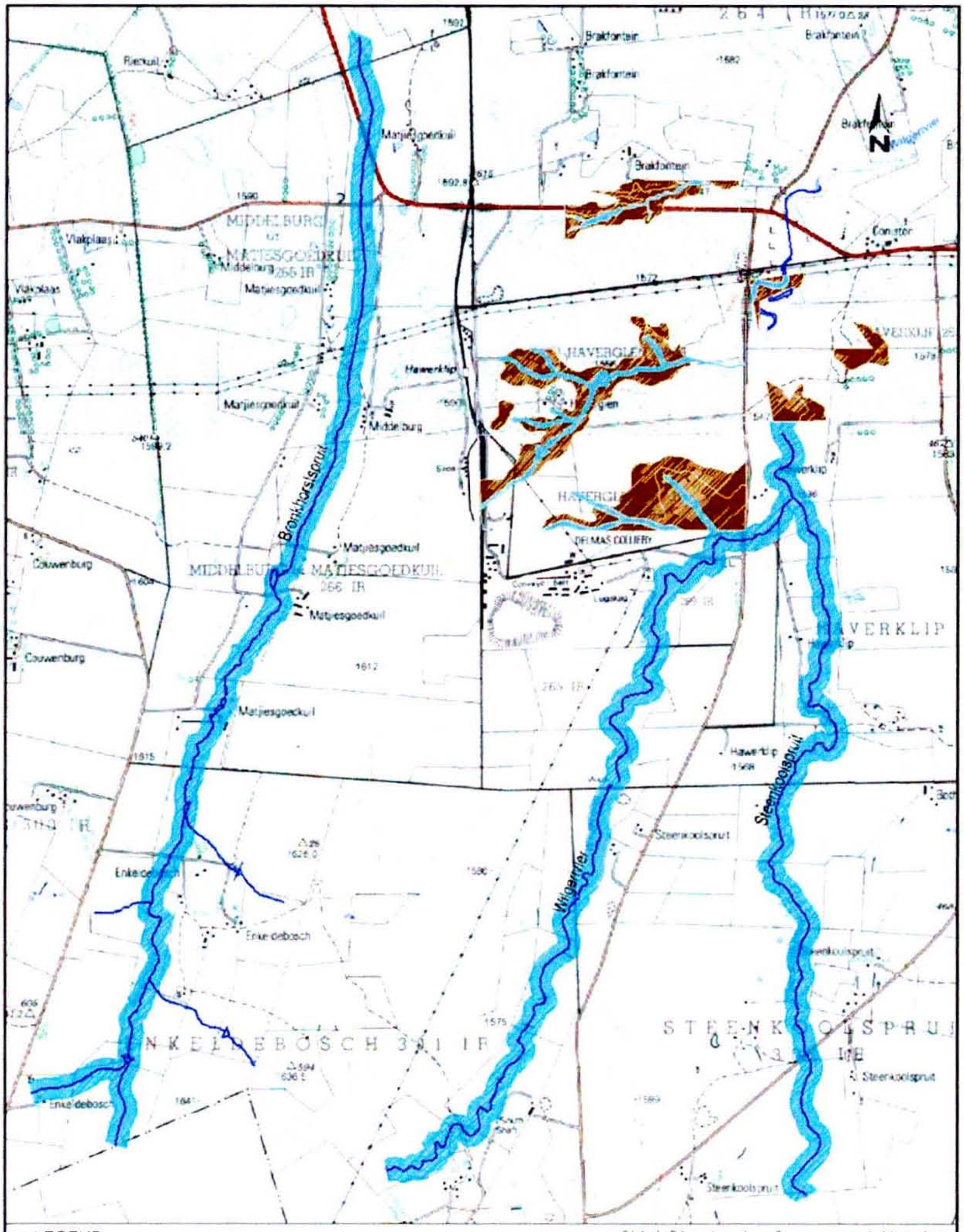
Scale 1 : 50 000 (A3)

KUYASA MINING
COAL RESERVES

Jones & Wagener
Consulting Civil Engineers

J & W JOB No. Ø C182

FIGURE 3



LEGEND

Chief Directorate, Surveys and Mapping

Scale 1 : 50 000(A4)

Surveyed wetland areas

100m watercourse offset

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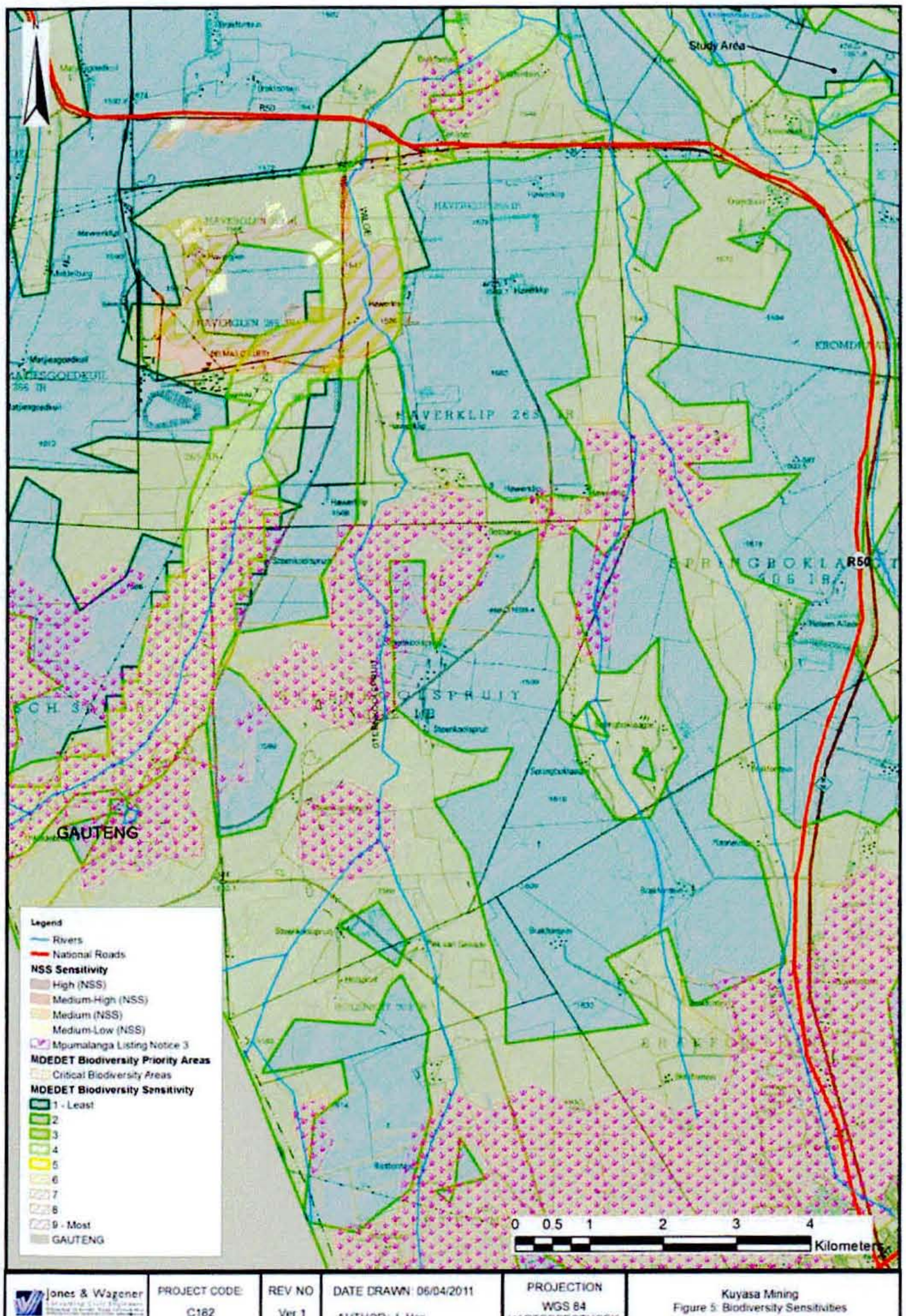
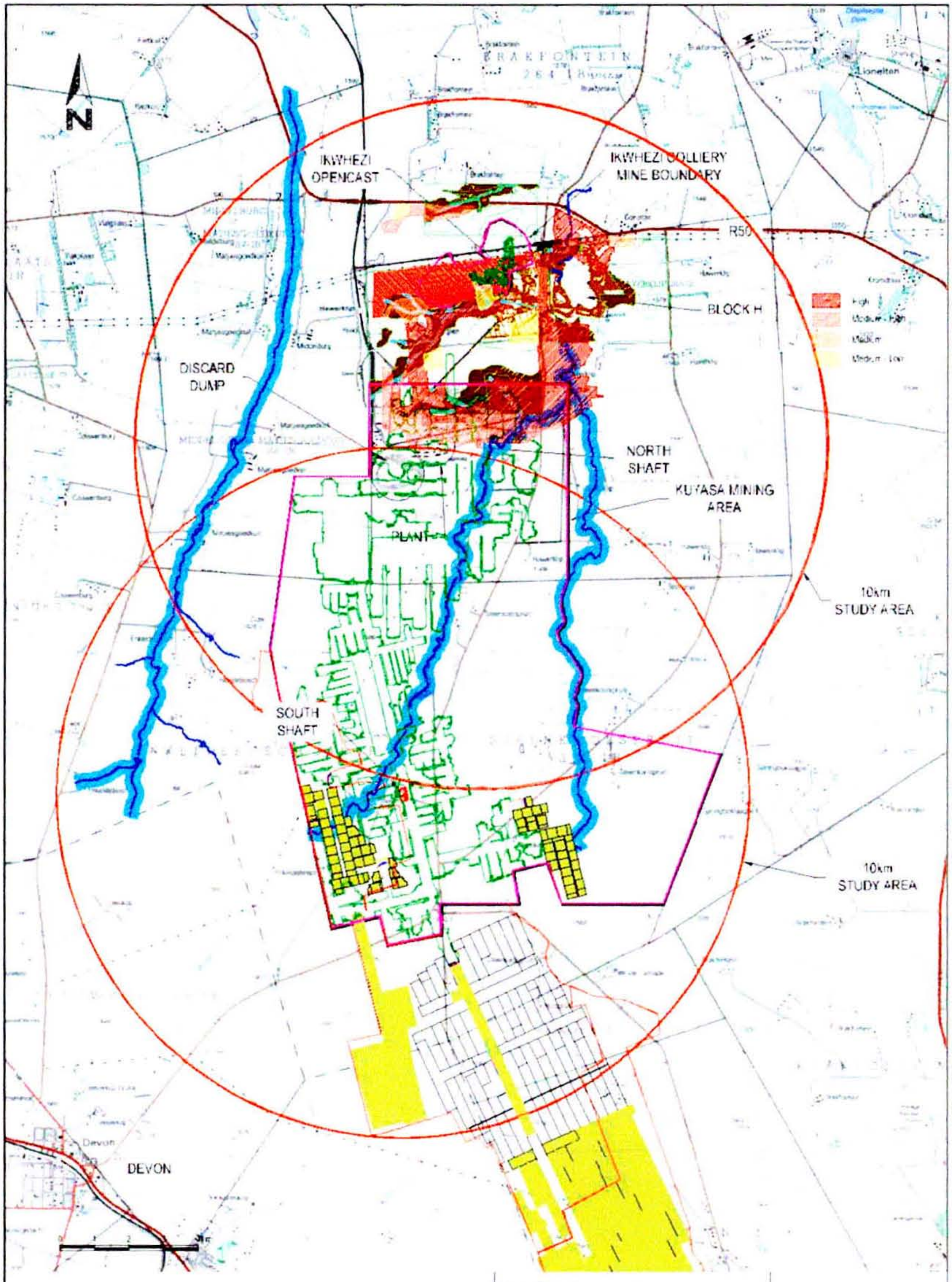
KUYASA MINING
RIVERINE AREAS

Ø C182

FIGURE 4



Jones & Wagener	PROJECT CODE: C182	REV NO Ver 1	DATE DRAWN: 06/04/2011 AUTHOR: J. Hex	PROJECTION WGS 84 HARTEBEESTHOEK	Kuyasa Mining Figure 5: Biodiversity Sensitivities



KUYASA MINING
STUDY AREA WITH POTENTIAL AREAS FOR SITES

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Consulting Civil Engineers

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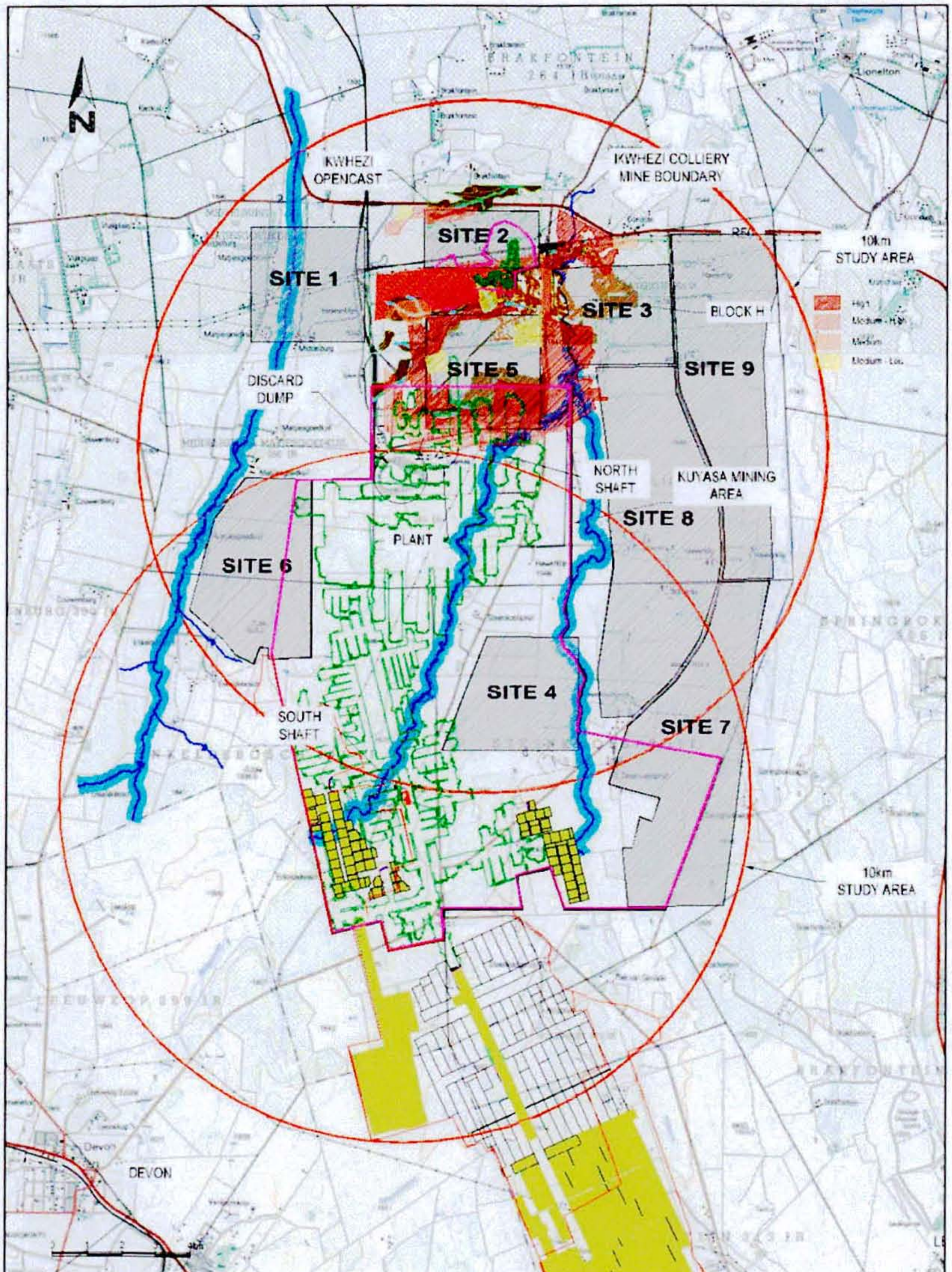
FIGURE 6



KUYASA MINING
NINE POTENTIAL SITES

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Consulting Civil Engineers

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FIGURE 7

2.5 Screening of potential sites

The identified sites were screened in terms of two sets of criteria as outlined below.

2.5.1 Technical screening for power plant

Black and Veatch provided the technical screening for the various sites. The following criteria were used to screen the sites:

- **Distance to coal supply**: The distance to coal supply affects the capital and operating costs for the power plant. The longer the distance to the plant the longer and more expensive the costs to move the coal to the plant. At this level of screening, it is uncertain whether conveyors or haul truck will be used. Nevertheless the cost is dependent on distance and as a result the distance is taken as an indication of the transport cost.
- **Topography**: The site will need to be prepared for the power plant, and depending on the contours on the site, some levelling, excavations and filling of areas may be required to provide a suitably flat foundation for the plant. Thus, the topography will affect construction cost. The contour data available for the site was considered by the engineers to determine a ranking for each site.
- **Site Constructability**: Site construction has several needs, such as space for contractor lay-down area and the shape of the site, which will determine the final site layout. Thus, both construction cost and ease of operations and maintenance are factors of this criterion.
- **Transmission connection**: The power plant will feed into the national electricity grid managed by Eskom. Eskom 275 kV transmission lines (4 circuits) run in close proximity to some of the sites and will allow for a close connection to the national grid. In case Eskom would like the connection to be made at the grid station then new lines need to run to Matla 400 kV/ 275 kV substation which is about 25 km from the power plant. The transmission connection permitting will be handled by Eskom.
- **Water supply**: This criterion is also a cost factor; the further the water source the longer the pipeline required to get it to the plant.
- **Distance to ash facility**: As for the coal, the distance to the ash facility will affect the capital and operating costs for the power plant.
- **Expansion potential**: KiPower may wish to increase the plant up to 2000MW. In which case, the site should allow for expansion within its footprint to avoid a second greenfields development cost in future.
- **Underground workings**: Due to stability considerations, current and future underground workings should be avoided. The proximity of underground workings was also considered.
- **Coal reserves**: Where possible, coal reserves should be avoided to ensure future resources are not sterilised due to the presence of a power plant on the surface.
- **Land ownership**: Land owned by Kuyasa Mining or its subsidiaries is preferable since land acquisition costs will be avoided and rezoning applications can be simplified.
- **Accessibility**: The provincial R50 runs close to most of the northern-most sites. Nevertheless the intersection may need upgrading and for the more southern sites, the local road may need upgrading from the R50 to the plant site entrance. This will affect cost of the project and may influence operational costs later.

2.5.2 Technical screening of ash disposal sites

- **Capacity of site**: This refers to the amount of ash that could be accommodated on the site. Sites that could not accommodate 30 years of ash production from a 600MW plant were not considered further for the ash disposal facility, as multiple small facilities in general have a total impact higher than a single large one.
- **Storage Efficiency**: This refers to how the site could be maximally utilised for storage of ash, which reduces the footprint needed for the facility.
- **Topography**: The topography affects the water management beneath the facility. Additional drains, sumps and pumping systems to manage the facility will add to the cost.
- **Drainage direction**: Water management is one of the critical issues for the ash disposal facility. Ideally the site must drain in one direction so that water can be effectively collected through drains and trenches. If a site straddles a ridge, the collection of water at the bottom of the facility becomes complicated and will require two sets of collection systems, which increases costs, management requirements and hence the risk of overtopping and spillage from the site.
- **Slope**: In order to ensure effective drainage of the site, a sloped site is preferred. On the other hand, a steep slope would have a higher risk of failure of the ash facility. Thus the slope of the site has to be considered from both a drainage and stability perspective. Normally a site with a slope between 2 and 4 degrees is favoured.
- **Expansion potential**: This refers to the potential to expand the facility beyond the 30-year 600MW ash generation scenario. Since KiPower is considering expansion of the plant in future, the ash disposal facility must preferably be able to expand to accommodate additional ash. Alternatively, another site would need to be developed in future. Nevertheless, if a site large enough to cater for expansion could be found now it would be preferred to a limited site.
- **Conveyor/truck access**: This refers to access to the site for a conveyor and/or haul road for the ash to be brought to the site. It should also be noted that the distance from the ash stack to the power station is of importance, but is reflected in the power station assessments.
- **Land ownership**: Land owned by Kuyasa Mining or its subsidiaries is preferable since land acquisition costs will be avoided and rezoning applications can be simplified.
- **Potential to fit plant and ash on site**: Sites that could accommodate both the ash disposal facility and the power plant were given a higher score as a single complex is preferred for easier operations as well as for land acquisition.
- **Geotechnical**: The following sub-criteria were considered in ranking the geotechnical suitability of the sites:
  - Geology: the type of geology that would influence how strong foundations will be.
  - Seepage potential
  - Soil profile
  - Soil properties
  - Founding conditions
  - Undermining or Coal Reserves
  - Terracing

- Farming potential
- Influence of Wetlands
- Developable land

2.5.3 Environmental screening of sites

The environmental screening was done by the specialists that will be assessing the project during the environmental impact assessment. The following key areas were considered in the screening of the sites:

Ground water: Ground water pollution from various sources associated with a power plant can occur. These include pollution control dams, chemical storage areas, transmission oils, water treatment plant, coal stockpile area and offices, workshops and ablutions. Thus, sensitive ground water areas, where people are dependent on ground water for potable and agricultural use, or where ground water feeds a key surface water resource, such as rivers and wetlands, should be avoided. Mitigation measures to prevent ground water pollution can and will be built into the project, however, ground water sensitivity was taken into account in the site selection process. The following sub-criteria were used to rank the sites in terms of ground water:

- Aquifer classification (using the Department of Water Affairs classification system[1]),
- Recharge potential,
- Known ground water use (by people for potable or irrigation use – boreholes known in the area),
- Known preferential flow zones such as faults dykes and other geophysical features (this was obtained from previous studies in the area),
- Impact on potential downstream use (how affected people would be if pollution from the plant arises in future),
- Thickness of unsaturated zones (or depth to the permanent ground water table), and
- Horizontal hydraulic conductivity (this measures the natural transfer water from the site to the nearest receptors – the faster ground water can get from the site to potential users, the faster pollution would also spread if it occurs).

Surface water: Surface water pollution from various sources associated with a power plant can occur. These include overflows from pollution control dams, contaminated storm water from storage areas such as coal and other raw materials, oils and greases from workshops and equipment, etc. As for ground water, sensitive surface resources should be avoided. Mitigation measures can be built into the project, which will influence the cost. Nevertheless, the sensitivity of surface water resources was considered in the site selection process. The following sub-criteria were used to rank the sites in terms of surface water:

- Proximity to major water courses: The closer the site to major water courses, the more likely that any pollution from the plant would reach the water course.
- Potential disturbance of minor water courses (tributaries): Drainage lines within the site would need to be managed to ensure no contaminated water flows to major

[1] Water Resource Protection Policy Implementation: Resource Directed Measures For Protection Of Water Resources, Aquifer Classification system; Parsons et al; 24 September 1999

rivers and streams, and the more drainage lines or the bigger the flows in drainage lines within a site, the more costly the mitigation measures will be.

- Level of storm water management required: Clean water entering the site must be diverted around the site and dirty water falling within the site must be captured if it becomes contaminated. The larger the volumes of storm water requiring management on the site, the more costly the measures to manage it effectively will be.
- Potential water quality impacts: This takes into account the sensitivity of the local water resources and the effect potential pollution from the plant would have on the local resources.
- Requirement for watercourse crossings: Water crossings will have a impact due to the construction of bridges to allow for coal, water and/or access roads to be built. The more water crossings required for site, the less desirable that site is.

Economic: This assessment is from an external perspective and is not related to the construction and operation costs associated with the plant. The following sub-criteria were used to rank the site in terms of economic implications:

- Impact on Agriculture: The loss of land for agricultural use.
- Impact on Land Values: The impact on surrounding properties as a result of the presence of a power plant.
- Impact on Local Businesses: The presence of the power plant on local business.

Ecology: Potential impacts on flora and fauna in the area were considered. Information from previous studies in the area as well the Mpumalanga Provincial Department database[2] was used. The following sub-criteria were considered:

- Wetlands/rivers – the ecosystem functions and services supplied by these wetlands/rivers was considered together with the sensitivity of the aquatic ecosystems.
- Biodiversity – the sensitivity of terrestrial ecosystems, and the fauna and flora therein, was considered.

Aesthetic/other: This assessed the following potential impacts:

- Visual: This relates to the visibility of the site for potentially sensitive viewers.
- Proximity to people: this relates to how close people would be to the power plant.
- Cultural/archaeological: This relates to known cultural and archaeological resources on the site. This will be confirmed with a detailed assessment during the impact assessment.

2.5.4 Ranking methodology

The following scoring system was used to rank the sites against each other.

Scoring scale

1	Unacceptable
2	Tolerable
3	Acceptable

[2] MDEDET, 2011: CD of various shapefiles from MDEDET head office provided January 2011.

4	Good site
5	Ideal

Some criteria were considered to count more heavily than others. As a result, a weighting system was used to ensure some criteria counted more than others, as follows:

Weighting

1	Nice to have
2	Significant
3	Most important

The weighted score for each criterion is simply a product of the weighting and the ranking assigned by each specialist. The various criteria scores are then added up to give a total. The highest total is the best ranked score and the lowest total is the worst ranked score. The results are given in Section 2.4.

2.6 Description of potential sites

Each of the nine sites are described in more detail in **Appendix B**. It is noted that some sites are not suitable simply because these are too small. Table 1 provides the sizes of the sites and it is indicated which sites will not be considered further for either the power plant or ash disposal facility or both. As discussed in Section 1.1.8, a minimum size of 140 ha is required for the power plant and 250 hectares is required for the ash disposal facility

Table 1: Size of potential sites

Site No.	Size (ha)	Further consideration
Site 1	270	Due to riverine areas, the area remaining for ash disposal facility is too small.
Site 2	135	Eliminated due to inadequate size for either the power plant or the ash disposal facility.
Site 3	215	Can only be considered for power plant. Too small for ash disposal facility.
Site 4	269	Can be considered for either power plant or ash disposal facility
Site 5	270	Can be considered for either power plant or ash disposal facility
Site 6	370	Can be considered for either power plant or ash disposal facility
Site 7	602	Can be considered for both power plant and ash disposal facility
Site 8	666	Can be considered for both power plant and ash disposal facility, although the northern section is preferred due to potential biodiversity sensitivities within the southern portion.
Site 9	537	Can be considered for both power plant and ash disposal facility, although the northern section is preferred due to potential biodiversity sensitivities within the southern portion.

2.7 Selection of candidate sites for detailed investigation

2.7.1 Power plant

Based on the criteria, ranking and weighting scores outlined in Section 2.3, the results for the power plant are given in Tables 1 and 2 and detailed in **Appendix A**. It was assumed in the scoring that the final location of the plant within each site would be chosen such that sensitivities that may exist on the site would be avoided or mitigated adequately with engineering measures.

Table 2: Technical ranking of sites for use for the power plant

Site number:		1	3	4	5	6	7	8	9
	Weighting								
Distance to coal	3	3	3	2.5	4.5	3	2	3	2
Topography	2	4	3	4.5	3.5	4	4	3	4
Site Constructability	1	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Transmission connection	3	5	4.5	1.5	3	2	2	3	4.5
Water supply	2	2	3	5	3.5	3	4	3	3
Distance to ash facility (ash at Site 4)	3	1	1.5	5	2.5	3	4	3.5	3
Distance to ash facility (ash at Site 5)	3	3	4	2.5	5	3	2	3.5	3
Distance to ash facility (ash at Site 3)	3	2	5	1.5	4	1	2.5	4.5	4.5
Expansion potential	2	1	4.5	5	5	5	5	5	5
Underground workings	2	5	5	5	3	5	3	3	3
Coal reserves	3	3	5	5	5	3	3	3	3
Land ownership	3	2	5	2	4	2	2	2	2
Accessibility	2	5	5	4	4	2	3	4	5
Score-weighted (assuming Site 4 for ash facility)		80.5	102.5	99.5	99.5	81.5	81.5	84	88
Score-weighted (assuming Site 5 for ash facility)		86.5	110	92	107	81.5	75.5	84	88
Score-weighted (assuming Site 3 for ash facility)		83.5	113	89	104	75.5	77	87	92.5
Rank (ash at site 4)		8	1	2	2	6	6	5	4
Rank (ash at site 5)		5	1	3	2	7	8	6	4
Rank (ash at site 3)		6	1	4	2	8	7	5	3

(yellow)	Needs to be confirmed with field work
(red)	Top scoring sites

Table 3: Environmental ranking of sites for use for the power plant

Site number:		1	3	4	5	6	7	8	9
Criteria	Weighting								
Ground water consolidated score	3	2.8	2.6	2.5	3.2	3.1	3.1	3.1	3.1
Aquifer classification	2	3	3	3	3	3	3	3	3
Recharge potential	2	2	2	2	4	4	4	4	4
Known groundwater use	1	3	4	3	3	2	2	2	2
Known preferential flow zones (geo)	3	3	2	2	3	3	3	3	3
Impact on potential downstream use	2	3	3	3	3	3	3	3	3
Thickness of unsaturated zones	1	3	2	1	3	3	3	3	3
Horizontal hydraulic conductivity	2	3	3	3	3	3	3	3	3
Surface water consolidated score	3	1. 5	2.7	2.3	2.2	2.8	2.6	2.9	2.9
Proximity to major water courses	3	1	2	2	2	2	2	2	2
Potential disturbance of minor water courses (tributaries)	2	1	4	4	2	2	3	3	3
Level of stormwater management required	3	1	2	1	2	3	3	3	3
Potential water quality impacts	2	1	3	2	2	4	2	4	4
Requirement for watercourse crossings - access and coal	3	3	3	3	3	3	3	3	3
Economic consolidated score	2	4	4	2.75	2.5	2.25	2.25	2.25	2.25
Impact on Agriculture	2	4	4	2	1	1	1	1	1
Impact on Land Values	1	4	4	3	4	3	3	3	3
Impact on Local Businesses	1	4	4	4	4	4	4	4	4
Ecology consolidated score	3	1	3	1	3	2	2.4	3	3.4
Wetlands/rivers	3	1	3	1	3	2	2	3	3
Biodiversity	2	1	3	1	3	2	3	3	4
Aesthetic/other consolidated score	2	2.3	3. 7	3. 7	5	3. 3	3	3. 7	3
Visual	1	3	2	5	5	4	4	5	3
Proximity to people	1	2	4	3	5	3	2	3	3
Cultural/archaeological	1	2	5	3	5	3	3	3	3
Weighted overall score		28.6	36.3	32.6	45.2	36.2	34.3	38.3	38.2
Overall Ranking		8	4	7	1	5	6	2	3

(yellow)	Needs to be confirmed with field work
(red)	Top scoring sites

2.7.2 Ash facility

Based on the criteria, ranking and weighting scores outlined in Section 2.3 and detailed in **Appendix A**, the results for the ash disposal facility are given in Tables 3 and 4. It was assumed in the scoring that the best location within the site would be used for the ash facility and concept footprints were created to indicate the area required for ash disposal. Thus it was assumed that sensitivities that may exist on the site would be avoided or mitigated as far as possible.

Table 4: Technical ranking of sites for use for the ash disposal facility

Site number		4	5	6	7	8	9
	Weighting						
Capacity	3	5	3	5	5	5	5
Storage Efficiency	3	4	4	4	3	3	4
Topography	3	3	4	4	3	3	4
Drainage direction	3	2	4	3	2	4	4
Slope	3	3	4	3	3	4	3
Expansion potential	2	3	1	3	5	5	5
Wetlands/rivers	3	2	2	2	3	2	3
Conveyor/truck access	1	2	3	3	2	2	2
Land ownership	3	2	4	2	2	2	2
Potential to fit plant and ash on site	1	3	0	3	3	5	5
Geology	3	4	3	5	4	4	2
Score-weighted		86	89	96	90	98	98
Rank		6	5	3	4	1	1
	Top scoring sites						

Table 5: Environmental ranking of sites for use for the ash disposal facility

Site number		4	5	6	7	8	9
Criteria	Weighting						
Ground water consolidated score	3	2.1	3	3	3	3	2.9
Aquifer classification	2	3	3	3	3	3	3
Recharge potential	2	1	3	4	4	4	3
Known gw use	2	3	3	2	2	2	2
Known preferential flow zones (geo)	3	2	3	3	3	3	3
Impact on potential downstream use	2	1	3	3	3	3	3
Thickness of unsaturated zones	1	1	3	3	3	3	3
Horizontal hydraulic conductivity	2	3	3	3	3	3	3
Surface water consolidated score	3	2.9	2.75	2.75	2.4	2.75	2.75
Proximity to major water courses	3	2	2	2	2	2	2
Potential disturbance of minor water courses (tributaries)	2	4	2	2	3	3	3
Level of stormwater management required	2	2	2	4	2	4	4
Potential water quality impacts	3	3	3	3	3	3	3
Requirement for watercourse crossings - access	2	4	5	3	2	2	2

Site number		4	5	6	7	8	9
Criteria	Weighting						
Economic consolidated score	2	2.75	2.5	2.25	2.25	2.25	2.3
Impact on Agriculture	2	2	1	1	1	1	1
Impact on Land Values	1	3	4	3	3	3	3
Impact on Local Businesses	1	4	4	4	4	4	4
Ecology consolidated score	3	1	3	2	2.4	3	3.4
Wetlands/rivers	3	1	3	2	2	3	3
Biodiversity	2	1	3	2	3	3	4
Aesthetic/ Other consolidated score	2	3	5	3.4	3	2.6	2.2
Visual	2	3	5	4	4	2	1
Proximity to people	2	3	5	3	2	3	3
Cultural/ecological	1	3	5	3	3	3	3
Weighted overall score		29.5	41.25	34.55	33.95	35.95	35.9
Ranking		6	1	4	5	2	3

(red)	Top scoring sites
(yellow)	To be confirmed with field work

2.8 Consolidation of technical and environmental scores

In order to combine the technical and environmental scores, the two *rankings* were added to give a final ranked score. In this case the lowest ranked score is the best site. The results are shown in Tables 5 and 6. Again it is noted that these scores are based on optimising the location of the power plant and ash facility to avoid sensitivities.

Table 6: Overall ranked score for locating the power plant

Site no.	1	3	4	5	6	7	8	9
Environmental	8	4	7	1	5	6	2	3
Technical	5	1	3	2	7	8	6	4
Total	13	5	10	3	12	14	8	7
Overall ranking	7	2	5	1	6	8	4	3

Table 7: Overall ranked score for locating the ash disposal facility

Ranking	4	5	6	7	8	9
Environmental	6	1	4	5	2	3
Technical	6	5	3	4	1	1
Total	12	6	7	9	3	4
Overall ranking	6	3	4	5	1	2

In order to see if the weighting of the environmental and technical rankings would change the overall ranking, two different weightings were applied. These are shown in Tables 7 to 10.

2.8.1 Overall ranked scores with a higher weighting on environmental criteria

Table 8: Overall ranked score for locating the power plant, with higher weighting on environmental criteria

Ranking	Weighting	1	3	4	5	6	7	8	9
Environmental	2	8	4	7	1	5	6	2	3
Technical	1	5	1	3	2	7	8	6	4
Total		21	9	17	4	17	20	10	10
Overall ranking		8	2	5	1	5	7	3	3

Table 9: Overall ranked score for locating the ash disposal facility with higher weighting on environmental criteria

Ranking	Weighting	4	5	6	7	8	9
Environmental	2	6	1	4	5	2	3
Technical	1	6	5	3	4	1	1
Total		18	7	11	14	5	7
Overall ranking		6	2	4	5	1	2

2.8.2 Overall ranked scores with a higher weighting on technical criteria

Table 10: Overall ranked score for locating the power plant, with higher weighting on technical criteria

Ranking	Weighting	1	3	4	5	6	7	8	9
Environmental	1	8	4	7	1	5	6	2	3
Technical	2	5	1	3	2	7	8	6	4
Total		18	6	13	5	19	22	14	11
Overall ranking		6	2	4	1	7	8	5	3

Table 11: Overall ranked score for locating the ash disposal facility with higher weighting on technical criteria

Ranking	Weighting	4	5	6	7	8	9
Environmental	1	6	1	4	5	2	3
Technical	2	6	5	3	4	1	1
Total		18	11	10	13	4	5
Overall ranking		6	4	3	5	1	2

3. CONCLUSION

The site selection has indicated that Sites 3 and 5 should be considered further for the power plant. Sites 3 and 5 remain top ranking sites irrespective of weighting and should be further investigated for the establishment of the power plant.

Sites 8 and 9 should be considered further for the ash disposal facility. Site 5 ranks the same as site 9 if environmental considerations are given higher weighting in the evaluation for ash disposal.

Site 3 already belongs to Kuyasa Mining and if combined with Sites 8 and 9 for ash disposal, it would keep the power plant and ash disposal facility in close proximity to each other. Based on the information currently at hand and the evaluation of the various specialists, Site 5 is the preferred site for the location of the power plant followed by Site 3. For the ash disposal facilities, Sites 8 and 9 are currently the preferred sites. If land within these sites cannot be acquired then Site 5 can be considered for the ash facility.

4. RECOMMENDATIONS

It is recommended that:

- KiPower investigate acquisition of land within the northern portions of Sites 8 and 9 so that these two sites can be taken into the scoping process of the EIA for the development of ash disposal facilities. Further detailed fieldwork to confirm site sensitivities must be carried out during the scoping and EIA phases of the EIA process, and
- Sites 3 and 5 should be taken forward in the scoping and EIA phases of the EIA process for the development of the power plant. Further detailed fieldwork to confirm site sensitivities must be carried out during the scoping and EIA phases of the EIA process.

It is noted that since sites 3 and 5 are already acquired by Kuyasa Mining, Kuyasa Mining, on behalf of KiPower prefer the installation of the power plant on Site 3 and the ash facility on Site 5 but has agreed to the investigation of sites 8 and 9 during scoping.

Prav Sewmohan — Marius van Zyl

4 July 2011

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KIPOWER (PTY) LTD

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED POWER PLANT NEAR DELMAS

Report: JW102/11/C182 - Rev A

Appendix A

DETAILED SCORING SYSTEM OF SITES

TECHNICAL SCORING SYSTEM FOR THE POWER PLANT

The technical scoring for the various sites are based on the following criteria:

- Distance to coal supply
- Topography
- Site Constructability
- Transmission connection
- Water supply
- Distance to ash facility
- Expansion potential
- Underground workings
- Coal reserves
- Land ownership
- Accessibility

A weighting was applied to these criteria, with a higher weighting indicating a criteria considered more important than a criteria with a lower weighting. The following weighting was applied by Black and Veatch.

Weighting

1	Nice to have/least important
2	Significant
3	Most important

Technical criteria for power plant	Weighting
Distance to coal	3
Topography	2
Site Constructability	1
Transmission connection	3
Water supply	2
Distance to ash facility	3
Expansion potential	2
Underground workings	2
Coal reserves	3
Land ownership	3
Accessibility	2

Sites were scored individually for each criteria as follows:

1	Unacceptable
2	Tolerable
3	Acceptable
4	Good site
5	Ideal

So, for an ideal site which would score the highest value of 5 for all criteria, the weighted score would be calculated as follows:

Technical criteria for power plant	Ideal site un-weighted score	Weighting	Ideal site weighted score
Distance to coal	5	3	3x5=15
Topography	5	2	2x5=10
Site Constructability	5	1	1x5=10
Transmission connection	5	3	3x5=15
Water supply	5	2	2x5=10
Distance to ash facility	5	3	3x5=15
Expansion potential	5	2	2x5=10
Underground workings	5	2	2x5=10
Coal reserves	5	3	3x5=15
Land ownership	5	3	3x5=15
Accessibility	5	2	2x5=10
Total ideal site score	55		135

The worst possible site would score as follows:

Technical criteria for power plant	Worst un-weighted score	Weighting	Worst weighted score
Distance to coal	1	3	3x1=3
Topography	1	2	2x1=2
Site Constructability	1	1	1x1=1
Transmission connection	1	3	3x1=3
Water supply	1	2	2x1=2
Distance to ash facility	1	3	3x1=3
Expansion potential	1	2	2x1=2
Underground workings	1	2	2x1=2
Coal reserves	1	3	3x1=3
Land ownership	1	3	3x1=3
Accessibility	1	2	2x1=2
Total ideal site score	11		26

TECHNICAL SCORING FOR ASH FACILITY

The technical scoring for sites are based on the following criteria:

- Capacity of site
- Storage Efficiency
- Topography
- Drainage direction
- Slope
- Expansion potential
- Conveyor/truck access
- Land ownership
- Potential to fit plant and ash on site
- Geotechnical

The weighting of criteria provided by Jones and Wagener is as follows:

Technical criteria for ash facility	Weighting
Capacity	3
Storage Efficiency	3
Topography	3
Drainage direction	3
Slope	3
Expansion potential	2
Wetlands/rivers	3
Conveyor/truck access	1
Land ownership	3
Potential to fit plant and ash on site	1
Geology	3

So, for an ideal site which would score 5 for every criteria, the weighted score would be as follows:

Technical criteria for ash facility	Ideal site un-weighted score	Weighting	Ideal site weighted score
Capacity	5	3	3x5=15
Storage Efficiency	5	3	3x5=15
Topography	5	3	3x5=15
Drainage direction	5	3	3x5=15
Slope	5	3	3x5=15
Expansion potential	5	2	2x5=10
Wetlands/rivers	5	3	3x5=15
Conveyor/truck access	5	1	1x5=5
Land ownership	5	3	3x5=15
Potential to fit plant and ash on site	5	1	1x5=5
Geology	5	3	3x5=15
Total score	55		140

The worst possible site would score as follows:

Technical criteria for ash facility	Worst un-weighted score	Weighting	Worst weighted score
Capacity	1	3	3x1=3
Storage Efficiency	1	3	3x1=3
Topography	1	3	3x1=3
Drainage direction	1	3	3x1=3
Slope	1	3	3x1=3
Expansion potential	1	2	2x1=2
Wetlands/rivers	1	3	3x1=3
Conveyor/truck access	1	1	1x1=1
Land ownership	1	3	3x1=3
Potential to fit plant and ash on site	1	1	1x1=1
Geology	1	3	3x1=3
Total score	11		28

ENVIRONMENTAL SCORING FOR POWER PLANT AND ASH FACILITY

The environmental criteria for the power plant and ash facility are the same.

Environmental Criteria	Weighting
Ground water	3
Surface water	3
Economic	2
Ecology	3
Aesthetic/other	2

Each environmental criteria has sub-criteria. Different weightings were used for the power plant and the ash facility as shown below.

Environmental Criteria and sub-criteria	Weighting for power plant	Weighting for ash facility
Ground water		
Aquifer classification	2	2
Recharge potential	2	2
Known groundwater use	1	2
Known preferential flow zones (geo)	3	3
Impact on potential downstream use	2	2
Thickness of unsaturated zones	1	1
Horizontal hydraulic conductivity	2	2
Surface water		
Proximity to major water courses	3	3
Potential disturbance of minor water courses (tributaries)	2	2
Level of stormwater management required	3	2
Potential water quality impacts	2	3
Requirement for watercourse crossings - access and coal	3	2
Economic		
Impact on Agriculture	2	2
Impact on Land Values	1	1
Impact on Local Businesses	1	1
Ecology		
Wetlands/rivers	3	3
Biodiversity	2	2
Aesthetic/other		
Visual	1	2
Proximity to people	1	2
Cultural/archaeological	1	1

For each environmental criteria, the sub-criteria scores had to be combined to provide a criteria score with a maximum of 5. The following table shows how this was done for an ideal power plant site, for a criteria score for ground water.

Ground water sub-criteria	Ideal site score	Weighting for power plant	Weighted sub-criteria score
Aquifer classification	5	2	2x5=10
Recharge potential	5	2	2x5=10
Known groundwater use	5	1	1x5=5
Known preferential flow zones (geo)	5	3	3x5=15
Impact on potential downstream use	5	2	2x5=10
Thickness of unsaturated zones	5	1	1x5=5
Horizontal hydraulic conductivity	5	2	2x5=10
Total weighted sub-criteria score		13	65
Ground water consolidated score (max site un-weighted score is 5, and weighted score is 15)	65/13 = 5	3	3x5=15

The following table shows how this was done for the worst possible power plant site, for a criteria score for ground water.

Ground water sub-criteria	Worst score	Weighting for power plant	Weighted sub-criteria score
Aquifer classification	1	2	2x1=2
Recharge potential	1	2	2x1=2
Known groundwater use	1	1	1x1=1
Known preferential flow zones (geo)	1	3	3x1=3
Impact on potential downstream use	1	2	2x1=2
Thickness of unsaturated zones	1	1	1x1=1
Horizontal hydraulic conductivity	1	2	2x1=2
Total weighted sub-criteria score		**13**	**13**
Ground water consolidated score (max site un-weighted score is 1, min site weighted score is 3)	**13/13 = 1**	**3**	**3x1=3**

The consolidated scores are then weighted and added as for the technical scores. Thus for an ideal site, the following maximum weighted score would be obtained:

Environmental Criteria	Unweighted site score	Weighting	Weighted site score
Ground water	5	3	5x3=15
Surface water	5	3	5x3=15
Economic	5	2	5x2=10
Ecology	5	3	5x3=15
Aesthetic/other	5	2	5x2=10
Total ideal weighted score			**65**

For a worst-case site, the following minimum weighted score would be obtained:

Environmental Criteria	Unweighted site score	Weighting	Weighted site score
Ground water	1	3	1x3=3
Surface water	1	3	1x3=3
Economic	1	2	1x2=2
Ecology	1	3	1x3=3
Aesthetic/other	1	2	1x2=2
Total worst-case weighted score			**13**

KIPOWER (PTY) LTD

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED POWER PLANT NEAR DELMAS

Report: JW102/11/C182 - Rev A

Appendix B

SPECIALIST ASSESSMENT OF SITES

BIODIVERSITY ASSESSMENT
A report was provided by Natural Scientific Services, and is attached as Appendix B-1.

GEOTECHNICAL ASSESSMENT
Geotechnical considerations that were used to determine the scoring of the sites is attached as Appendix B-2.

SURFACE AND GROUND WATER
Surface water scoring was undertaken by Mr Mike Palmer (hydrologist and water specialist) of Jones and Wagener and were added to the scoring tables. A separate report was not provided.

Ground water scoring was undertaken by Mr Jaco van der Berg of JMA Consulting (ground water specialists) and were added to the scoring tables. A separate report was not provided.

ECONOMIC INPUTS
Economic scoring was done by MasterQ (social and economic specialists) and were added to the scoring tables. A separate report was not provided.

AESTHETIC INPUTS
Aesthetic criteria were scored on previous cultural surveys for the area, as well as existing topographic mapping. The scoring was done by the EAP of Jones and Wagener. A separate report was not provided.

TECHNICAL INPUTS

Power plant
The technical scoring was done by Black and Veatch based on available topographical and physical mapping of the areas. A separate report was not provided.

Ash disposal facility
Donovan Rowe of Jones and Wagener (land fill engineer) consulted with the geotechnical, biodiversity, ground water and surface water specialists in order to develop concept footprints on each site based on available topographical and physical mapping of the areas. These were then scored and ranked by the engineer. A separate report was not provided but the concept footprints were used for land owner notification.

Attention: Prav Sewmohan
C/O
Jones & Wagener
P.O. Box 1434
Rivonia
2128

15 February 2011

Our Ref: **1385**

Dear Prav,

SITE SELECTION – BIODIVERSITY AND RIVER/WETLAND RANKINGS

NSS
Natural Scientific Services CC
2003/077331/23

27 Tudor Park
61 Hillcrest Ave
Randburg, 2194

Tel: +27 (0) 11 787 7400
Fax: +27 (0) 11 787 7407

Email: post@nss-sa.co.za

Members:
Kate MacEwan BSc (Hons) (WITS)
Kathy Taggart MSc (WITS)
Susan Abell MSc (WITS)

Jones & Wagener (J&W) are in the process of re-visiting the site selection for the proposed location of the Kuyasa Power Plant and Ash Dump. They have selected 9 sites (**Figure 1**) based on suitable areas within a 10km radius of North and South Shaft. Natural Scientific Services (NSS) have ranked these sites based on the ranking scale and weighting provided by J&W (**Table 1** and **2**) for the biodiversity and wetland/river components.

Table 1 Scoring Scale

1	Unacceptable
2	Tolerable
3	Acceptable
4	Good site
5	Ideal

Table 2 Weighting

1	Nice to have
2	Significant
3	Most important

It must be noted that without having visited the sites, the rankings are based on a desktop review only. For the rivers and wetlands the desktop review included the review of Google imagery for the presence of river and wetland habitat. The desktop review for the biodiversity component was based on the findings, from the 2009 Biodiversity Assessment undertaken by NSS, in relation to the various habitat types identified and the Mpumalanga C-Plan data (**Figure 2**).

The rankings for the various sites have been indicated in **Table 3**, with the assumptions/notes listed below.

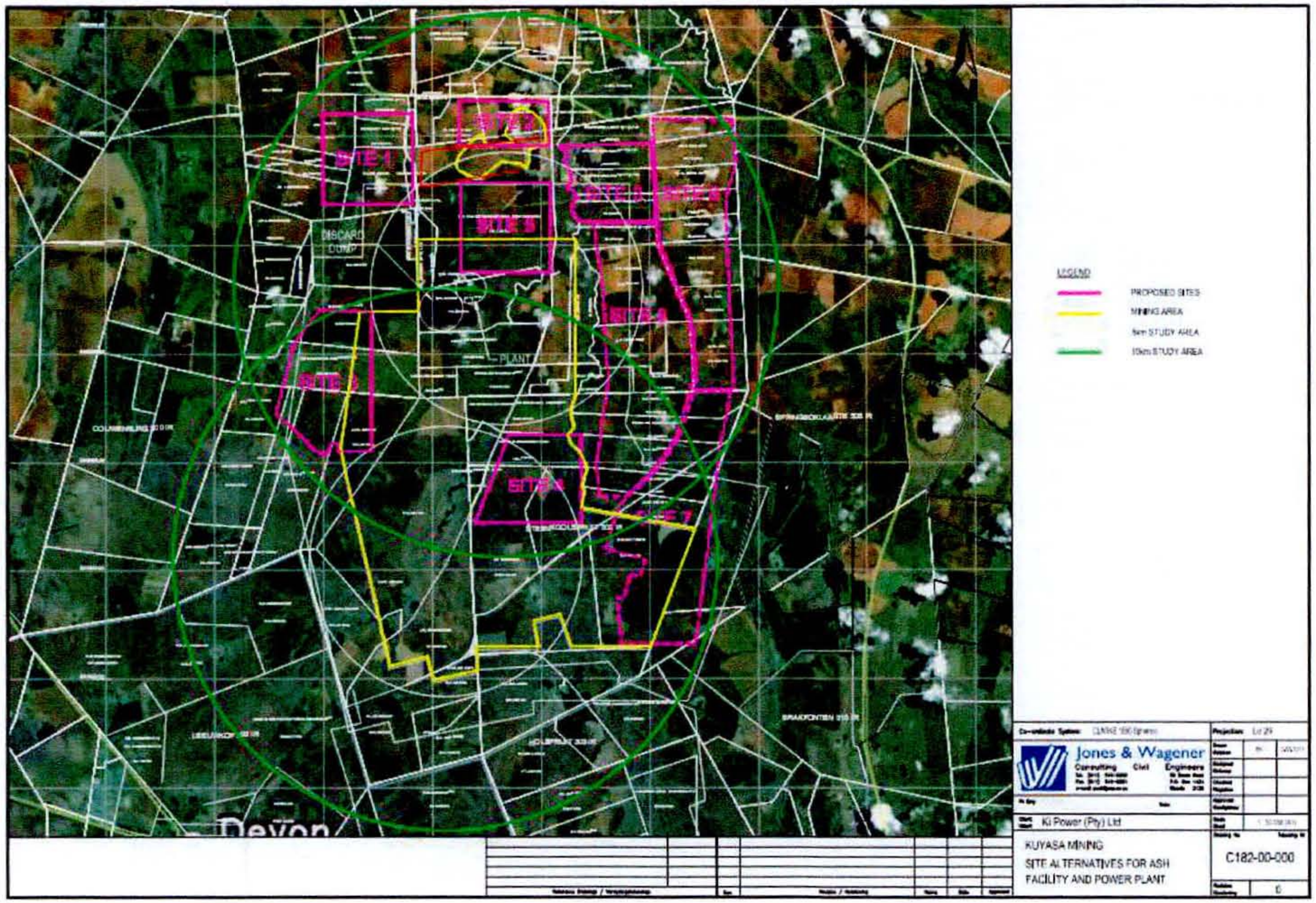

Figure 1 Site Selection – Kuyasa Power Plant and Ash Dump

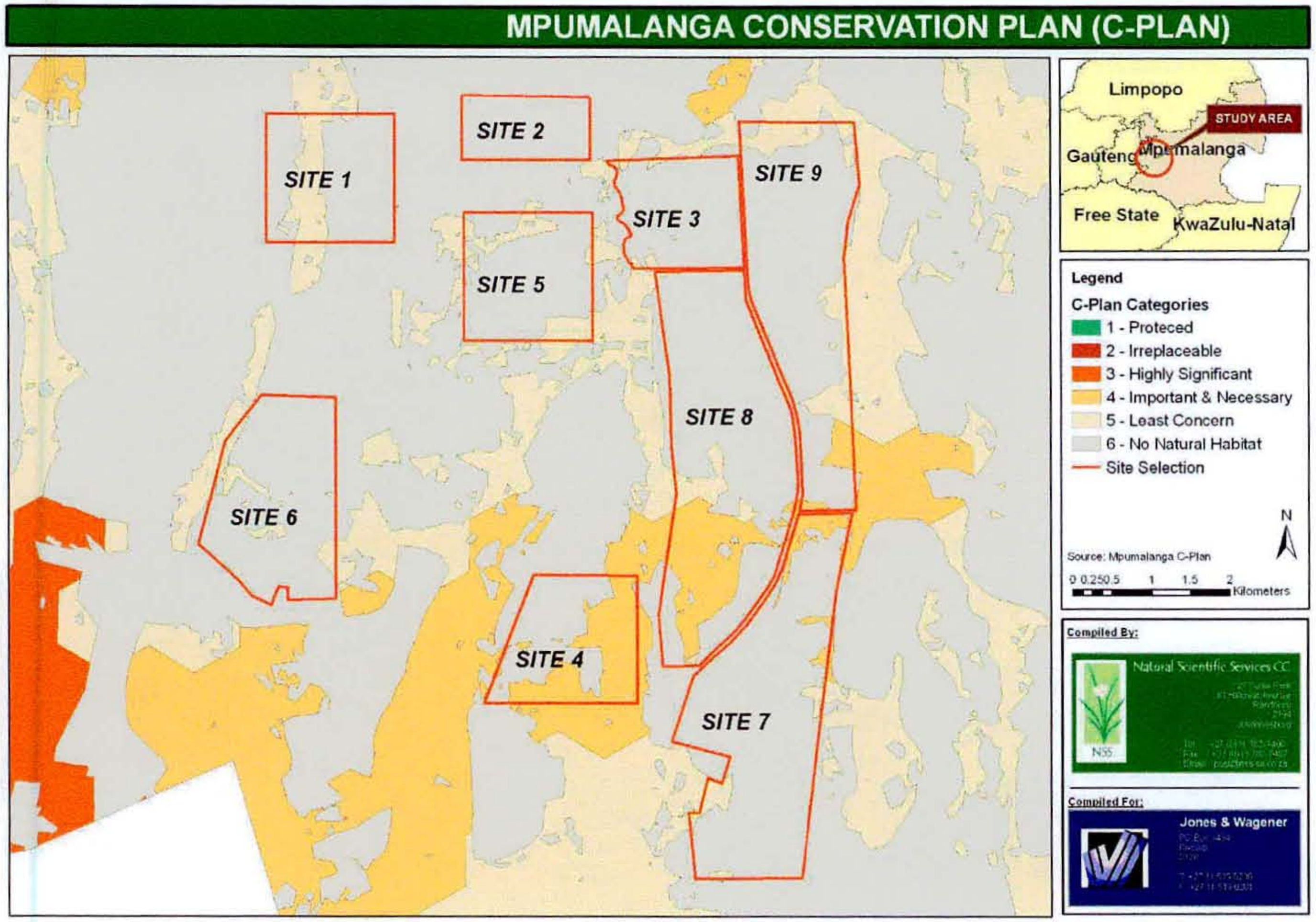

Figure 2 Mpumalanga C - Plan data

Table 3 **Biodiversity and wetland/river rankings for the Delmas Power Plant and Ash Dump**

Site number	Weighting	1	2	3	4	5	5 - alt	6	7	8	8-Alt	9
Wetlands/rivers	3	1	3	3	1	1	3	2	2	1	3	3
Biodiversity	2	1	4	3	1	1	3	2	3	1	3	4
Score-unweighted		**2**	**7**	**6**	**2**	**2**	**6**	**4**	**5**	**2**	**6**	**7**
Score-weighted		**5**	**17**	**15**	**5**	**5**	**15**	**10**	**12**	**5**	**15**	**17**

ASSUMPTIONS/ NOTES

Site 1

Site 1 is unacceptable as it is located over a wetland/drainage system and would cut off the drainage of this system.

Site 2

Site 2 is only acceptable if the access road runs along the existing dirt road to the east of Site 2 and 5 and does not cross the wetland to the south of the site.

Site 3

This site is acceptable from a biodiversity perspective if:

- The site remains outside of the wetland boundaries and associated buffers; and
- If the crossing to gain access to the site is over the existing river diversion.

Site 4

Site 4 is unacceptable for the following reasons:

- It is located within the boundary of the wetland;
- It is located in an Important and Necessary site as identified by the Mpumalanga C-Plan (**Figure 2**); and
- It is located between two river systems which is not ideal from both a wetland/river and biodiversity perspective, due to drainage into the two systems and the biodiversity corridor between the systems.

Site 5

This site is unacceptable if the boundary of the site extends into the floodplain of the Wilge and into the wetland to the north. Should the size of the site be reduced to within the agricultural areas the scoring scale will change (Site 5-alt).

Site 5 – alt

Site 5-alt has been ranked assuming that the site does not extend to within the wetland boundaries of the Wilge and the wetland to the North.

Site 6

Site 6 is surrounded by wetlands. It is assumed that the site will stay out of all wetlands and associated buffers.

Site 7

It has been assumed that:

- Existing road networks are used;
- That the site stays out of wetland boundaries; and
- That the site stays out of the Important and Necessary areas in the south (**Figure 2**).

Site 8

Site 8 has scored unacceptable due to the length it runs along the adjacent wetland/river system and the fact that the southern area is situated in an Important and Necessary area according to Mpumalanga C-Plan (Figure 2).

Site 8 – alt

Site 8-alt has been ranked assuming the following:

- Only the northern 3rd of the site is used;
- That Site 3 is used for the power plant; and
- The site stays out of the wetland boundary and associated buffer. This site receives a high ranking as it will result in a short distance between the power plant and it will result in only one watercourse crossing.

Site 9

Site 9 is only an acceptable/good site if:

- Access is along existing roads or at the existing Wilge crossing immediately upstream of the diversion;
- If only the northern portion (adjacent to Site 3) is used;
- If the boundary does not extend into the wetland on the east; and
- If Site 3 is used for the Power Plant.

We trust we have interpreted your requirements correctly. Please do not hesitate to contact us if there are aspects of our ranking that you would like to discuss further.

Kind Regards

Kathy Taggart
for Natural Scientific Services

GEOTECHNICL SITE RATING

FACTOR		AREA & RATING			AREA & RATING			AREA & RATING			AREA & RATING		
	Weighting	1	PP	AF	2	PP	AF	3	PP	AF	4	PP	AF
Geology	2	Karoo – possibility of dolomite within a depth of 100m.	3	3	Karoo – possibility of dolomite within a depth of 100m.	2	2	Karoo – possibility of dolomite within a depth of 100m.Karoo – possibility of dolomite	2	2	Karoo and dolerite.	5	4
Seepage	1	Moderate	2	2	Slight	3	3	Slight	4	4	Seasonal	3	3
Soil profile	2	Transported soils (sandy) to 0,6m-1,0m on clayey residual soils	3	4	Transported sandy soils. Clayey residual soils upto 5m thick	3	4	Transported sandy soils. Clayey residual soils 3m to 5m thick	3	4	Shallow clay, possibly upto 1m thick on shallow bedrock	4	3
Soil property	2	Potentially active residual soils	3	4	Potentially active	3	4	Potentially active	3	4	Active clays	3	4
Founding conditions	2	Fair: 3m to 5m on very stiff to very soft rock	3	4	Fair: from 3m on very stiff to very soft rock	3	4	Fair: 3m to 5m on very stiff to very soft rock	3	4	Good: shallow very dense to very soft rock from 1m to 2m	5	4
Undermining or Coal Reserves	3	To be established – open cast to east	3	3	Backfilled opencast and undermining	0	0	To be established assumed unlikely	4	4	To be established assumed unlikely	5	5
Terracing	2	Nominal to moderate	3	2	Nominal	4	4	Nominal in east, moderate west	4	4	Nominal	5	5
Farming potential	1	Dominantly arable	2	2	Arable	2	2	Arable	2	2	Arable & grazing	3	3
Influence of Wetlands	1	Moderate to severe	1	2	Slight	4	4	Extensive in the west	1	1	Nominal to the west	3	3
Develop-able land	2	Limited	1	1	Limited by opencast	1	1	Fair with a possible extension into site 8	4	4	Possible extension to the south	4	4
		Rating Total	**24**	**27**		**25**	**28**		**30**	**33**		**40**	**38**
		Weighted Total	**46**	**51**		**41**	**47**		**57**	**63**		**76**	**72**
Value for "First-cut" rating	**2**		1	**2**		2	2		2	3		4	4

FACTOR		AREA & RATING			AREA & RATING			AREA & RATING			AREA & RATING		
	Weighting	5	PP	AF	6	PP	AF	7	PP	AF	8	PP	AF
Geology	2	Karoo dolerite in south	4	4	Dominantly Karoo – dolerite in south	5	5	Karoo and dolerite	5	5	Karoo and dolerite	5	5
Seepage	1	Slight	4	4	Slight	4	4	Slight	4	4	Slight	4	4
Soil profile	2	Residual Karoo & dolerite	4	4	Transported sand and residual clayey sands	4	4	Thick sandy and clayey residual soils	3	4	Thick sandy transported and clayey residual	3	4
Soil profile	2	Potentially active	3	4	Potentially active clays	3	4	Potentially active	3	4	Collapse and heave	3	4
Founding conditions	2	Fair – likely to be from 3m to 5m	3	4	Fair to good probably 1m to 3m	5	4	Fair Possible about 5m	3	4	Fair to deep	2	4
Undermining or Coal Reserves	3	Only In the south section	3	3	To be established assumed unlikely	4	4	To be established assumed unlikely	4	4	To be established assumed unlikely	4	4
Terracing	2	Nominal	4	4	Nominal	4	4	Nominal in south east	4	4	Nominal in north	4	4
Farming potential	1	Arable	3	3	Arable	2	2	Arable	3	3	Arable in west	3	3
Influence of Wetlands	1	Slight in south east	3	3	Negligible	5	5	Negligible	4	4	Negligible	4	4
Developable land	2	Fair - limited to north area	2	2	Good	5	5	Fair to good particularly in the south east	4	4	Limited to north area	3	3
		Rating Total	**33**	**35**		**41**	**41**		**37**	**40**		**35**	**39**
		Weighted Total	**59**	**63**		**75**	**75**		**67**	**73**		**63**	**71**
Value for "First-cut" rating	2		3	3		5	5		4	4		3	4

Scoring scale		Geotech score
1	Unacceptable	20 -25
2	Tolerable	26 - 30
3	Acceptable	31 -35
4	Good site	36 - 40
5	Ideal	>41

Weighting

1	Not important
2	Important
3	Most important

GEOTECHNICL SITE RATING

FACTOR		AREA & RATING		
	Weighting	9	PP	AF
Geology	2	Karoo – possibility of dolomite within a depth of 100m	2	2
Seepage	1	Moderate primarily in north	3	3
Soil profile	2	Sandy transported and residual clays	3	3
Soil property	2	Collapse on heave	3	3
Founding conditions	2	Fair 3 – 5m	3	4
Undermining or Coal Reserves	3	Not evident	4	4
Terracing	2	Moderate	2	2
Farming potential	1	Arable	2	2
Influence of Wetlands	1	In north and east	2	2
Developable land	2	Limited	2	2
		Rating Total	**26**	**27**
		Weighted Total	**49**	**51**
Value for "First-cut" rating	**2**		2	2

Scoring scale		Geotech score
1	Unacceptable	20 -25
2	Tolerable	26 - 30
3	Acceptable	31 -35
4	Good site	36 - 40
5	Ideal	>41

Weighting

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

NOTE

DESCRIPTION	Ash Facility Costing: Rev C	JOB NO.	C853
FILE NAME	C853_Ash_stack_costing.doc	DATE	30 August , 2011

1. SITE SCREENING: ASH FACILITY COSTING

The Ki-Power IPP currently has four sites that are entering the scoping phase of the project. It is intended at the end of scoping phase to have one power plant site and one ash facility site chosen, which will be subject to detailed impact assessment.
In order to further assess and screen potential sites, it is needed to develop engineering capital and operating costs, as well as closure/post closure costs. These costs will be used to compare the options to each other. The costs should also include other key infrastructure such as conveyor/haul road from plant to the ash facility. Costs were based on a concept level design for the ash facility taking into consideration site specific characteristics since these costs will be used for comparative purposes only.

The following site configuration options exist:

- Power plant at Site 3, ash at Site 5
- Power plant at site 3, ash at Site 8
- Power plant at site 3, ash at Site 9
- Power plant at site 5, ash at Site 8
- Power plant at site 5, ash at Site 9

The relative costings of these ash disposal systems were detailed in the J&W Note: Ash Facility Costing: Rev B. After the end of that phase of investigation with a further round of constraint assessments, the options have been amended to be:

- Power plant at site 5, ash at Site 8
- Power plant at site 5, ash at Site 9
- Power plant at site 5, ash at Site 2, 5 and 3A (this requires 4 individual stacks).
- Power plant at site 5, ash at Site 3 A and B, requiring full pit rehabilitation

The costs documented here are from a battery limit of an ash conveyor and road at the edge of the power station fence and covers cost components such as:

- Conveyor infrastructure leading to the ash stack,
- Load out facility at the stack,
- Ash stack landfill
- Contaminated stormwater handling
- Minor pumps for irrigation water cycling
- Final closure shaping and rehabilitation.

Sensitivity studies as to final landfill liner requirements and possible land purchase costs were also done, together with adding coal handling conveyors to the battery limits.

1.1 Ash Stack Assumptions

Design storage is 30 years for 600MW = 48 600 000 tons.
Ash stack of 1:4.5 side slopes modelled on the actual survey for each site, with a max height of 40m agl.
Where the areas are small, the site is topped out so as to remain at least 100m minimum working width on the top surface (for the small sites this approximates to about 20 -25m high).
Nominal ash bulk density is 1 t/m^3
Landfill specifications and standards as per Notice 432 of 2011, Department of Environmental Affairs; Draft National Standard For Disposal Of Waste To Landfill
Topsoil stripping and final rehabilitation cover of 400mm soil.
Conveyor access and servitude based on 20m wide terrace.
River crossing based on 3m x 3m cast-in situ culvert units, nominal 15m wide.

Operational costs of truck and haul based on Vendor Quotation, amended as per:

- Diesel cost at R11.00 per litre
- Dust control to be done by contractor
- +25 % contingencies, sundries, owners engineer's costs etc.

Operational costs of conveyors based on costing model by Vogel (1981).
Land cost for Sites 8 and 9 at approximately R50 000 000 in total.

Post closure costs such as ongoing water quality monitoring are not included as they are the same for all options.

Key variables at this stage remain:

- Waste Classification- this determines the landfill liner specification.
- Land purchase costs.
- Phasing of ash stack construction and capital outlay.

1.2 Inclusion of Coal handling

At the request of Black & Veatch, the costing models were revised to reflect that material handling for the options requires coal to be moved from colliery plant to the power station as well as ash. A single costing analysis should combine both elements to ensure that the best overall system is selected.

The costing models were thus modified to include:

- Capital cost estimates for a conveyor and haul road from the coal plant (North shaft) to possible power station sites.
- Operating costs for a conveyor from the coal plant (North shaft) to possible power station sites.

If coal is sourced from the South shaft it will impact all options equally and is not a deciding factor in locating the power station.

The operational costs involved in moving coal from the shaft to the power station and from station to the ash disposal site (conveyors) as well as the truck component are shown below. These are expressed in real costs per annum, as a cost per ton figure is not appropriate due to the mass loss of ignition.

1.3 Rehabilitation Assumptions on Site 3

The use of the full Site 3 area requires that the existing pit and overburden stockpile materials be levelled so that the ash stack can be extended over this area. The estimated void to be filled to re-instate the original ground slope is 4.2 x $10^6 m^3$. The amount of available material in the stockpiles is 2.2 x $10^6 m^3$.

The void must be filled so that settlement of the fill material does not pose a threat to the liner integrity or the stability of the ash stack. It must therefore be done under engineered conditions i.e.:

- Placed on smoothed clean foundation at the base of the pit.
- Placed in layers and compacted. If the stockpile material is relatively fine, then layers of 300mm thickness would be sufficient. If there are boulders in the overburden stockpiles the placement must be as per a typical rockfill placement, with thicker lifts allowed but with heavier impact rollers being used.
- Full quality control procedures to ensure sufficient compaction is being attained must be used.

This methodology ensures that the final liner is placed on an engineered terrace, with little further scope for deformations.

The alternative of placement of loose material to allow settlement under its own self-weight will result in a backfill that can settle between 4 to 10% of the pit depth. It will be extremely difficult to engineer a composite liner to accomodate this. Initial placement of loose material and the use of dynamic compaction to densify the fill later is possible but very expensive.

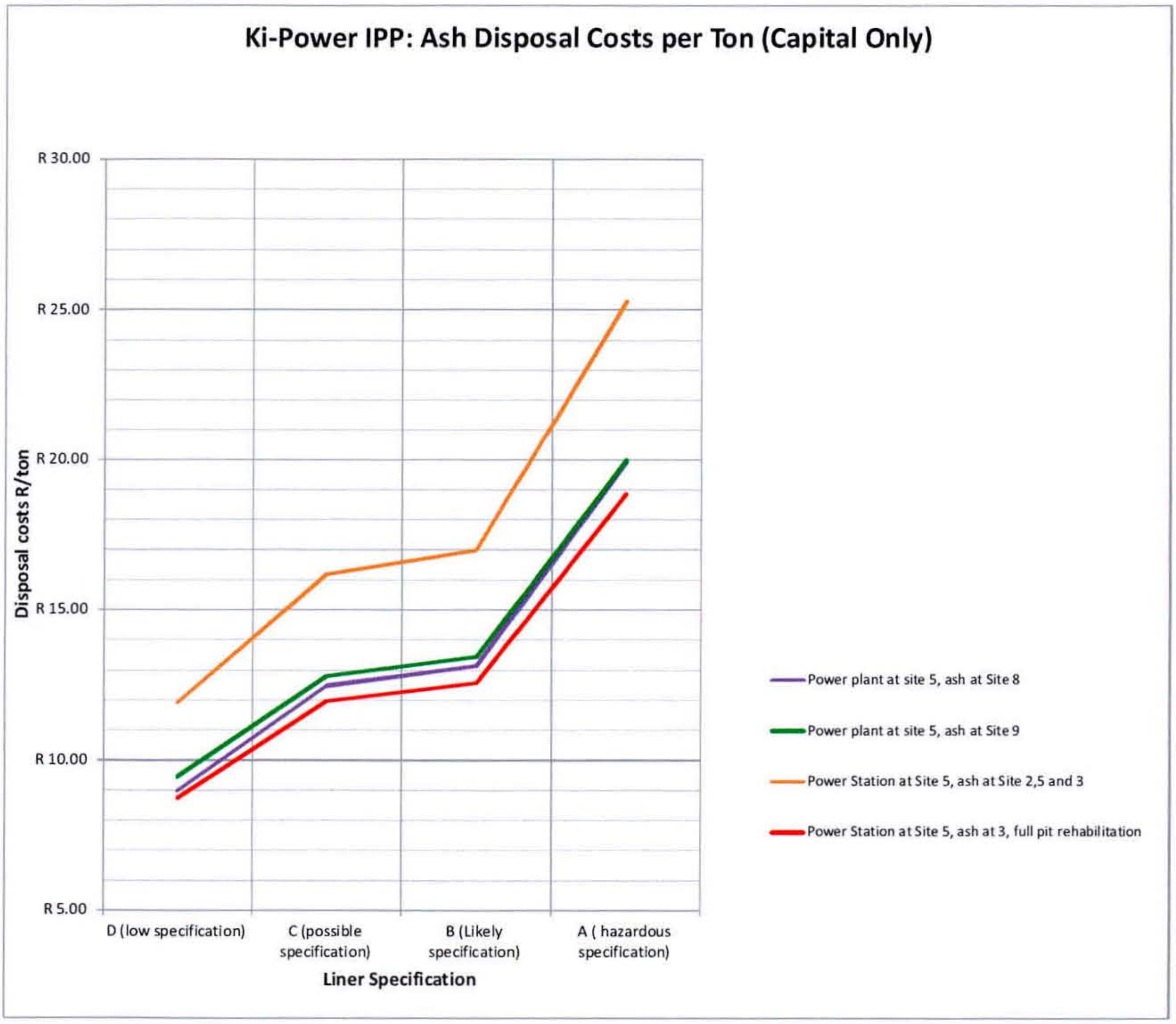
For the full Site 3 footprint to be used, development must start on the eastern, uphill component, called Phase A giving approximately 15 years for the backfill operations to be completed as part of operational costs. Once the backfill is complete, Phase B will be developed on top of the old pit. This site will probably require two pollution control dams, one for each Phase.

Rehabilitation Costing Assumptions

The mine, i.e. Kuyasa Colliery, is responsible for the backfill and rehabilitation of the existing pit on its property. However, the use of loosely placed fill is generally acceptable for this type of application. The use of graders, compaction equipment and water carts to ensure engineered properties are obtained should be for the account of the power station. This is estimated to be approximately R4.00 per cubic metre filled, for a nominal total of R16.4M. The mine component of the rehabilitation cost would be estimated in the R65 to R80M order of magnitude.

2. CAPITAL COST EVALUATION METHODOLOGY

Priced Bills of Quantities were derived for each facility for each potential landfill liner type. This includes capital (defined at initial construction and final closure costs) and upfront capital (initial construction costs only). The total capital values are plotted below for all combinations of Power Station and ash stack location. It is of interest to note that there is a low cost variation between Type B and Type C liner. This is of importance as it will be likely that the waste classification study will assign the waste to one or the other of these two options. The Class A liner, for hazardous waste, will almost double capital costs.



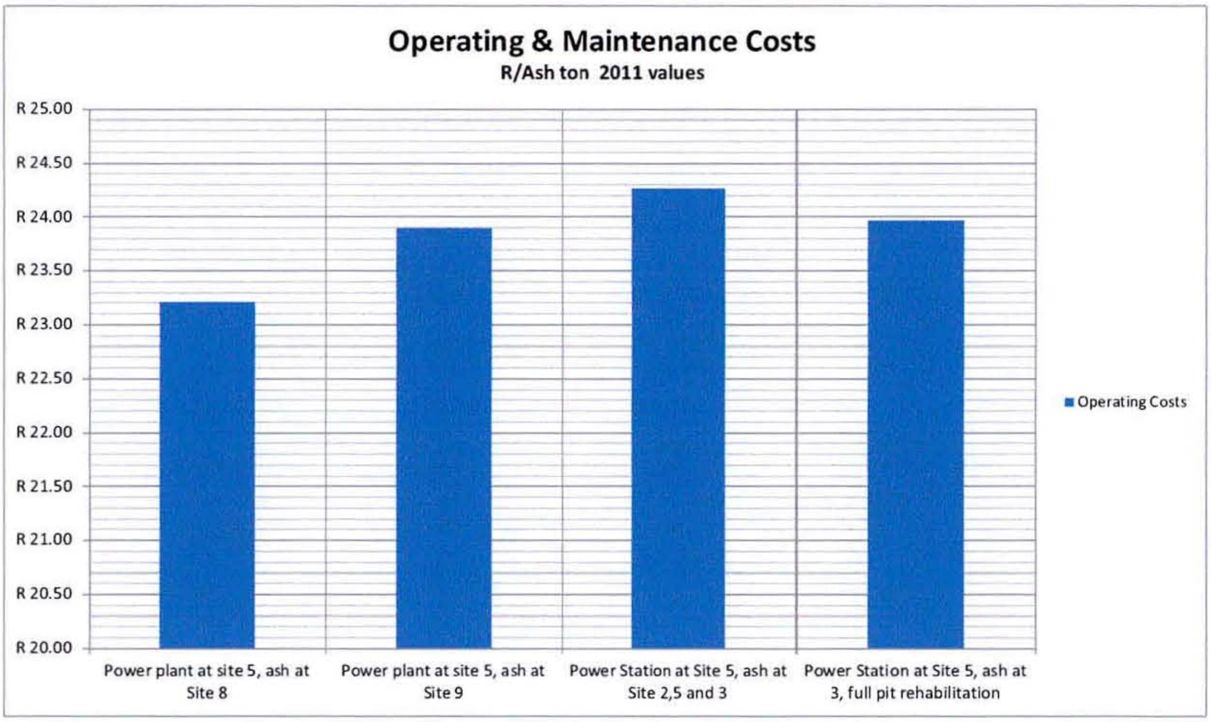
The use of a single site for the full 30 years storage is far cheaper than using 4 smaller sites. The use of multiple small sites of very low height results in the liner costs not being amortised over sufficient life, giving rise to very high capital costs per ton placed. The use of Site 3 is the cheapest as no land purchase is required.

3. OPERATING COST EVALUATION

The ash disposal operating costs of the combinations are tabulated below. Locating the power station on Site 5 and ash stack on site 8 is the cheapest, followed next by the power station on Site 3, and ash stack on site 8. However there is only a 5% difference between all options. This is a function of relatively high overhead costs for operating staff, engineering monitoring etc. which are the same for all sites.

Options	Operating Costs / ton	% Difference from lowest
Power plant at site 5, ash at Site 8	R 23.21	0%
Power plant at site 5, ash at Site 9	R 23.89	3%
Power Station at Site 5, ash at Site 2,5 and 3	R 24.26	5%
Power Station at Site 5, ash at 3, full pit rehabilitation	R 23.96	3%

This is shown graphically below.



3.1 Materials Handling Costs

When the operating costs are extended to include the cost of coal handling, the overall pattern remains very similar.

Options	Materials Handling Costs per Year	Difference from lowest	% Difference from lowest
Power plant at site 5, ash at Site 8	R 42,500,200	R 0.00	0%
Power plant at site 5, ash at Site 9	R 43,605,850	R 1,418,310	3%
Power Station at Site 5, ash at Site 2,5 and 3	R 44,205,250	R 2,017,710	4%
Power Station at Site 5, ash at 3, full pit rehabilitation	R 43,719,250	R 1,531,710	3%

This indicates that locating the ash at Site 8 is the cheapest alternative for all materials handling. The remaining alternatives are all very similar at a premium of 3 to 5 %.

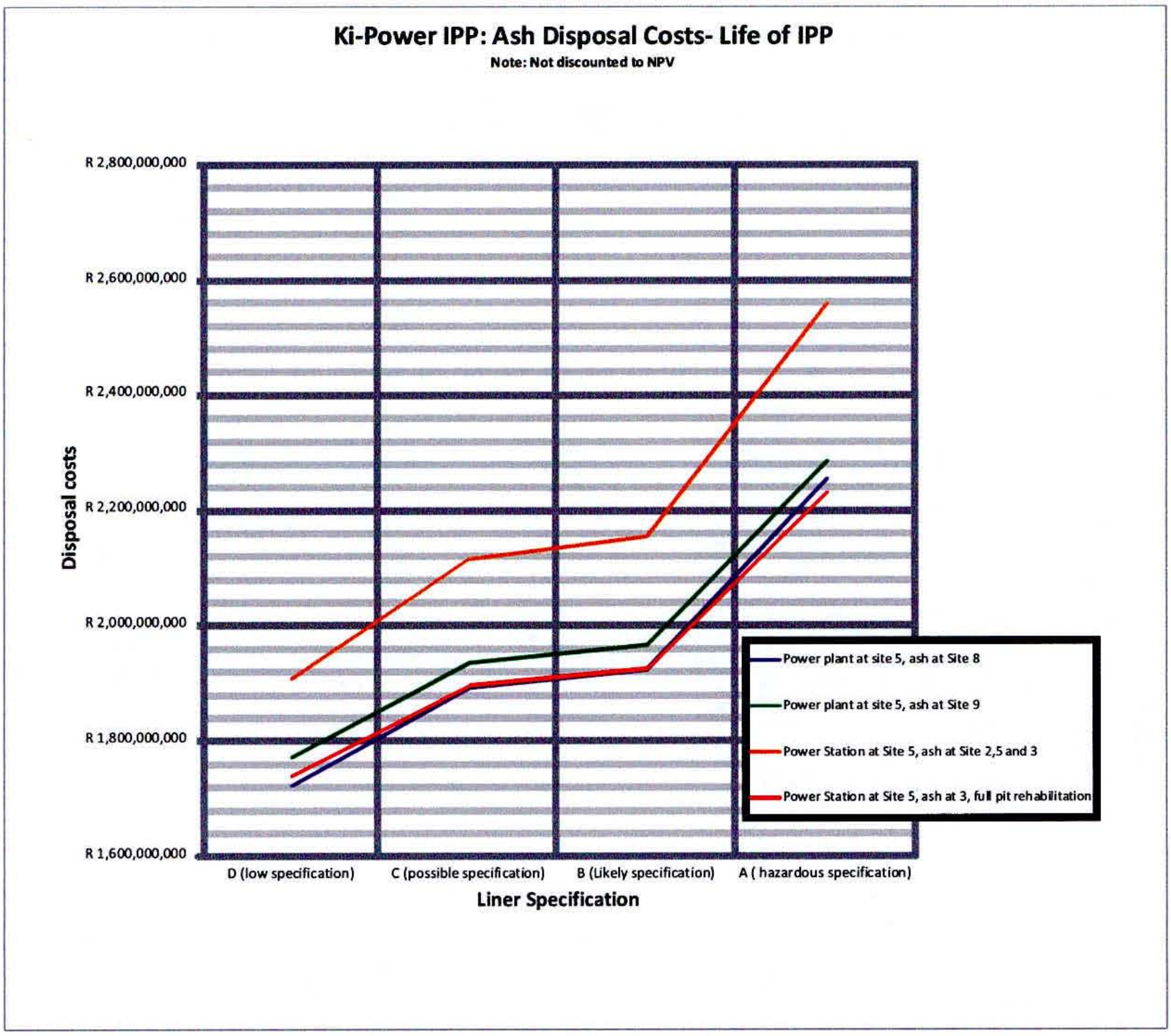
4. LIFE CYCLE COST EVALUATION METHODOLOGY

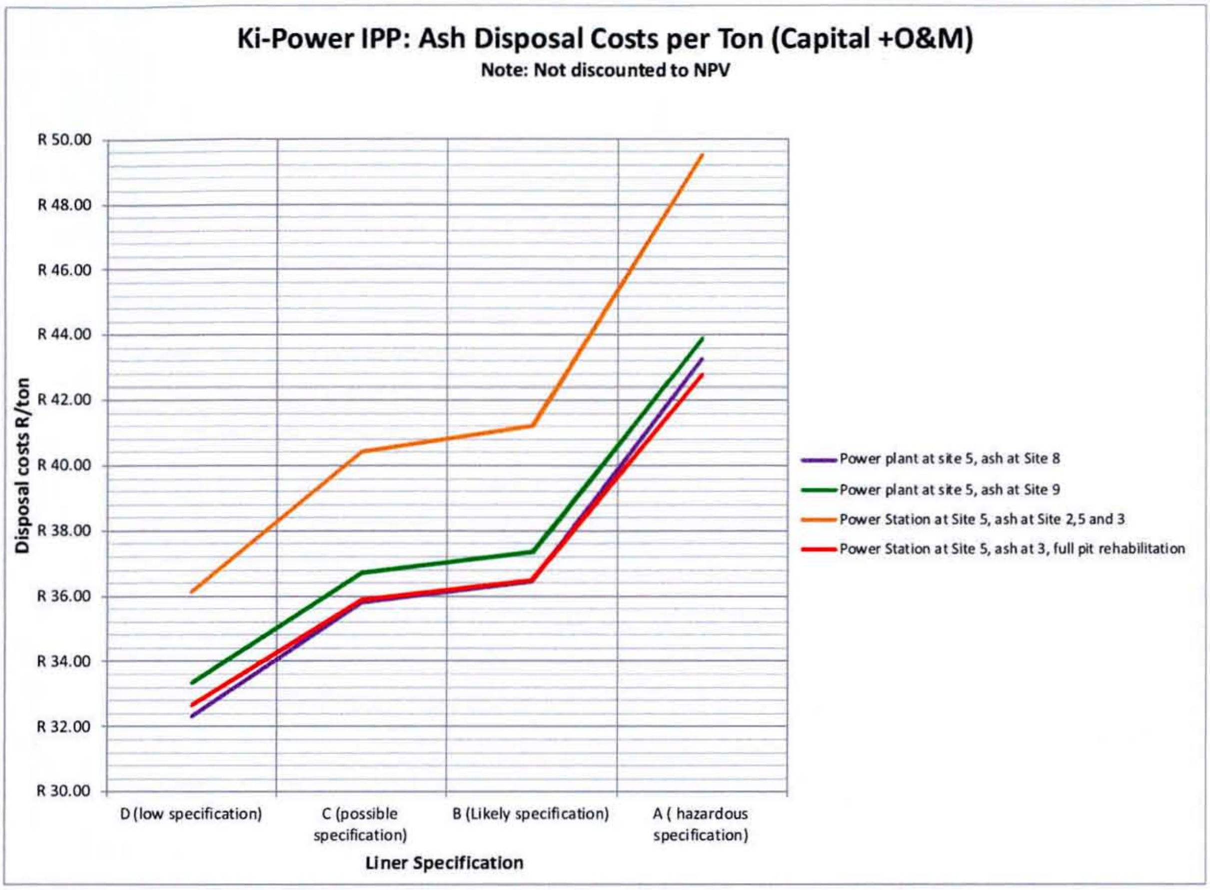
The total capital and full operational costs for the facility were then evaluated, keeping landfill type as a variable. They are also unitised to obtain a capital cost per ton placed, to ensure that small variations in capacity do not favour any given site due to this exercise. This method does not try and escalate or discount according to inflation and project IRR's and reflects a snapshot of 2011 values only. It is also simplified by assuming that construction of an entire facility occurs in Year 1, and rehabilitation occurs in year 30, in reality capital outlay will be smoothed out over the entire period. This methodology indicates that locating the ash stack on site 8 is as cheap as the stack on Site 3.

The life cycle costs (not discounted to NPV) also indicates that locating the power station on Site 5 and ash stack on Site 8 has the lowest costs for all landfill categories. As an example, for a Class B landfill, the following lifecycle costs were estimated.

Options	Total Lifecycle Costs	% Difference from lowest
Power plant at site 5, ash at Site 8	R 1,850,819,087	0%
Power plant at site 5, ash at Site 9	R 1,961,310,604	6%
Power Station at Site 5, ash at Site 2,5 and 3	R 2,151,451,377	16%
Power Station at Site 5, ash at 3, full pit rehabilitation	R 1,922,214,135	4%

Given that a NPV discount methodology applied to the design cases excluding coal handling did not change the rankings from the non-discounted costing methods, no NPV analysis was done for these cases.


Ki-Power IPP: Ash Disposal Costs- Life of IPP
Note: Not discounted to NPV
R 2,800,000,000
R 2,600,000,000
R 2,400,000,000
R 2,200,000,000
R 2,000,000,000
R 1,800,000,000
R 1,600,000,000
Disposal costs
D (low specification)
C (possible specification)
B (Likely specification)
A (hazardous specification)
Liner Specification
Power plant at site 5, ash at Site 8
Power plant at site 5, ash at Site 9
Power Station at Site 5, ash at Site 2,5 and 3
Power Station at Site 5, ash at 3, full pit rehabilitation

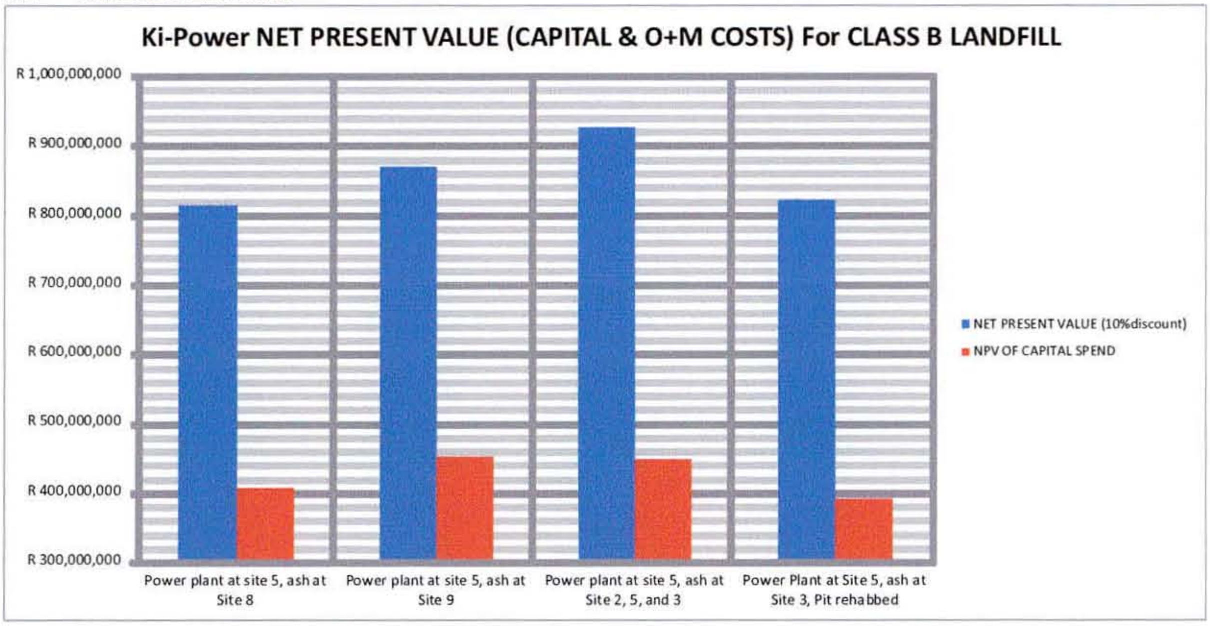


5. NET PRESENT VALUE ASSESSMENTS

The Net Present Value of the life cycle costs were calculated for a Class B landfill liners, as this is one of the most likely liner design based on a desktop evaluation of the ash analysis. These were calculated on the following assumptions:

- 2011 costs
- A net discount rate of 10% (i.e. after inflation effects and Project IRR's are accounted for).

5.1 Class B Landfill



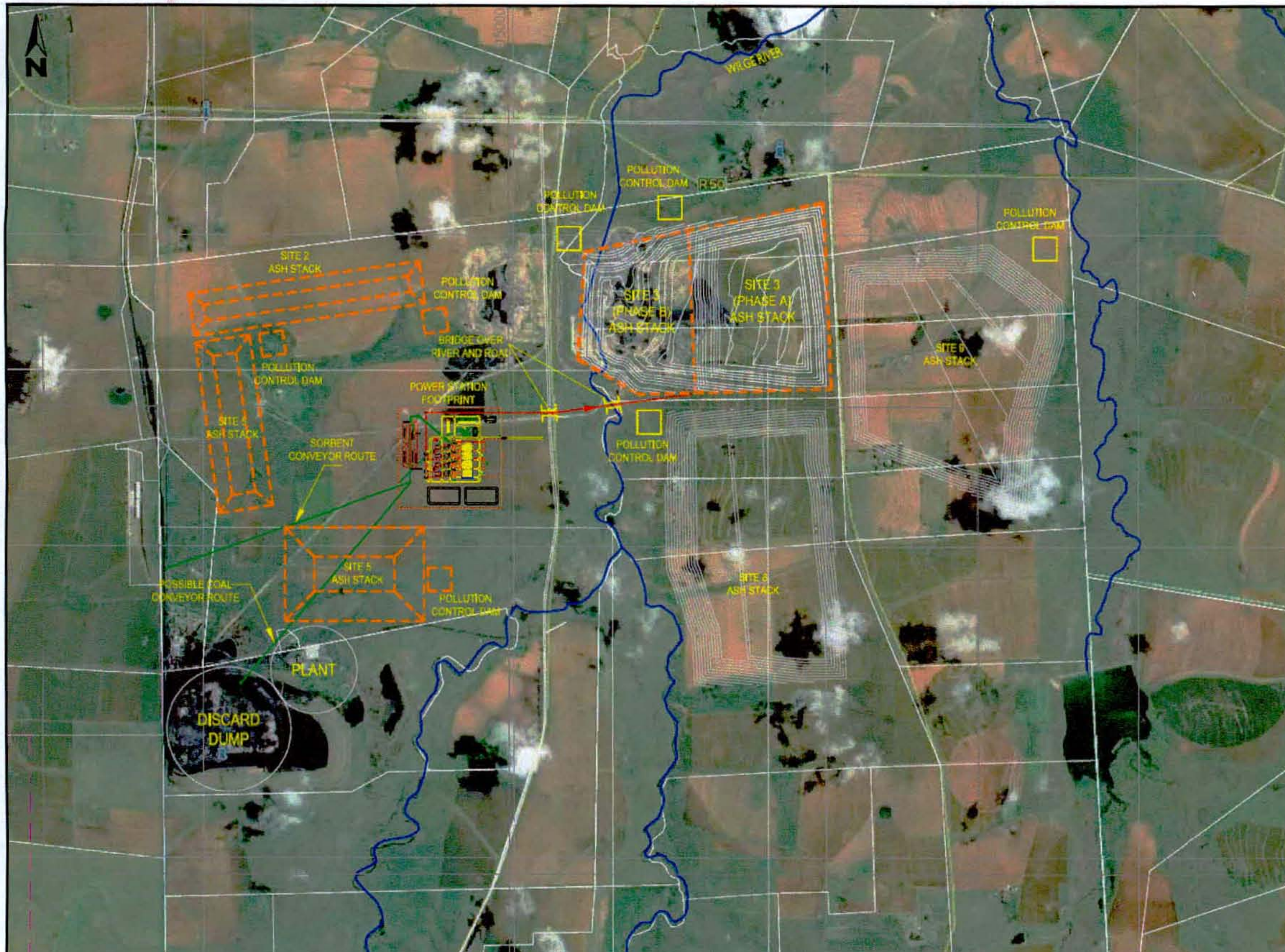
For the Class B Liner the Ash stack at Site 3 has the lowest NPV of capital costs at R387M, and is a function of shorter conveyors and no upfront land purchases. Site 8 has the lowest total ownership costs after discounting, but less than 1% difference as compared to Site 3.

The use of 4 smaller sites is the most inefficient based on a NPV analysis.

Options	Total cost Capex & Opex - NPV	Total Capex NPV	% Capex Difference from lowest
Power plant at site 5, ash at Site 8	R 810,309,204	R 404,156,712	4%
Power plant at site 5, ash at Site 9	R 865,453,205	R 448,899,879	16%
Power Station at Site 5, ash at Site 2,5 and 3	R 923,642,836	R 445,684,731	15%
Power Station at Site 5, ash at 3, full pit rehabilitation	R 817,645,677	R 387,398,900	0%

6. CONCLUSIONS

The costing exercises indicate there is little real difference between a 30 year ash stack on Site 8 or on the full Site 3. Locating the Power Station at Site 5, Ash stack at Site 8 has the lowest total lifecycle cost in both NPV and non discounted costing methods. The primary cost reducing factor is that the upfront ash handling conveyor and access roads are minimised. However, a NPV capital costing only scenario indicates that using Site 3 is the cheapest for ash disposal capital spending as there is no upfront land purchases, with only a marginal operating cost premium. The use of multiple small sites around the perimeter of the power station is the most inefficient use of area, and this is reflected in the high costs of developing these small facilities.



STORAGE VOLUMES

SITE	VOLUME (m³)	LIFE
8	49 265 000	30.4 YEARS
9	51 173 000	31.6 YEARS
2, 3A, 5	48 600 000	30 YEARS
3A & B	49 270 000	30.4 YEARS

BASED ON 600 MW PLANT

KEY

- POLLUTION CONTROL DAM
- BRIDGE OVER RIVER & ROAD
- COAL CONVEYOR & ROAD ROUTE
- ASH CONVEYOR
- RIVERS

Co-ordinate System: CLARKE 1880 Spheroid
Projection: Lo 29

Jones & Wagener
Consulting Civil Engineers
Tel. (011) 519-0200
Fax. (011) 519-0201
e-mail post@jaws.co.za
56 Bevan Road
P.O. Box 1434
Rivonia 2128

Ki Power (Pty) Ltd
KUYASA MINING

SCALE 1 : 25 000

0 0.25 0.5 1 1.5 2.0 2.5 3.0Km

Scale 1 : 25 000 A3

POTENTIAL ASH STACK FOOT PRINTS - POWER STATION ON SITE 5

J & W JOB No. Ø C853

FIGURE 4 Rev B