# Property Value Analysis for Kuyasa

Farms around Delmas, Bethal and Bronkhorstspruit

## General Property Trends

- Continuous increases in agricultural property values country-wide, especially high productivity land.
- Some examples:
  - Pasture in the Eastern Cape near Port Elizabeth: R120 000 per hectare
  - Farms with irrigation rights on a major river: R64 000 per hectare
  - Maize farms in the Northern Free State: R25 000 per hectare
- Scarcity of land is manifesting in prices.

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## Trends around Delmas/Bethal/Bronkhorstspruit

- Property increasingly being owned by mines, pushing value of pasture/dryland agriculture areas artificially high.
- Not many sales occur on the open market, usually between farmers themselves.
- Land for sale is scarce in general.
- Transfer deeds show sales are few and far between

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## The Study

- Properties evaluated: 22
  - Selected for study: 14
- Transfer deed searches: 4
  - Delmas, Bethal, Nigel, Bronkhorstspruit
- Estate agents interviewed: 6
- Title deed transfer data not well captured

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## The Results

- Maximum price: R28 million
- Minimum price: R1.73 million
- Highest price (per ha):R400 000
- Lowest price (per ha): R9357
- Unweighted ave. price (per ha): R68 817
- Weighted ave. price (per ha): R29 209

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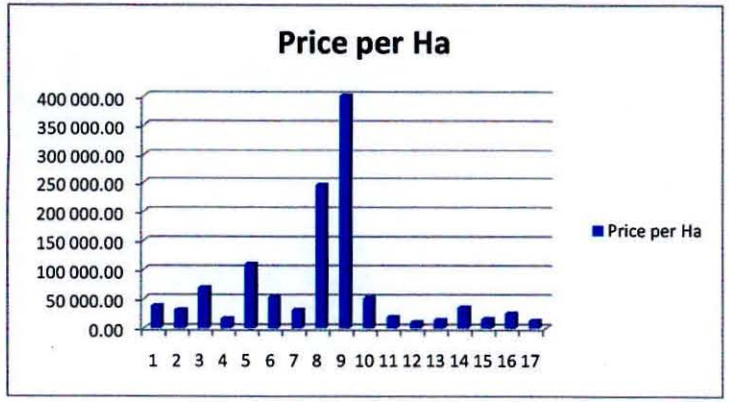



Weighted average price per hectare:

R29 209

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# NOTE

| | | | |
|---|---|---|---|
| DESCRIPTION | Ash Facility Undermining | JOB NO. | C853 |
| FILE NAME | C853-00_GEN-02_dr_undermining.doc | DATE | 30 January , 2012 |

## 1. UNDERMINING AT KUYASA COLLIERY

Kuyasa Colliery (previously known as Delmas Coal) may possibly be the location of a new powerstation and associated infrastructure to be developed by Ki-Power.

This document summarises the stability of the workings with regards to the siting of ash and return water dams onto the old colliery workings.

## 2. INPUT DATA

Input data as to pillar sizes and locations were obtained from Saxum Mining (ref: Mining Data and Parameters for Northern parts of Delmas Coal, December 2011, Saxum Mining).

Several points of interest were defined and the parameters obtained.

In the main portion of the area of interest, mainly 2 seam has been mined by bord and pillar methods (drill and blast). A small exploratory system was developed for 4 seam, however this is of limited area. The parting between 4 and 2 seam is thick enough (90% of the seam pillar centres) such that the loading should be distributed and that no negative interactions between the two seam working is anticipated. The workings are not shallow (defined as less than 40m), and hence pillar strength is an effective means of determining failure risk.

Saxum indicated that the coal seam specific pillar factor of safety (FOS) will vary from 1.77 to the west of the site to 1.84 on the east, if no additional loadings occur.

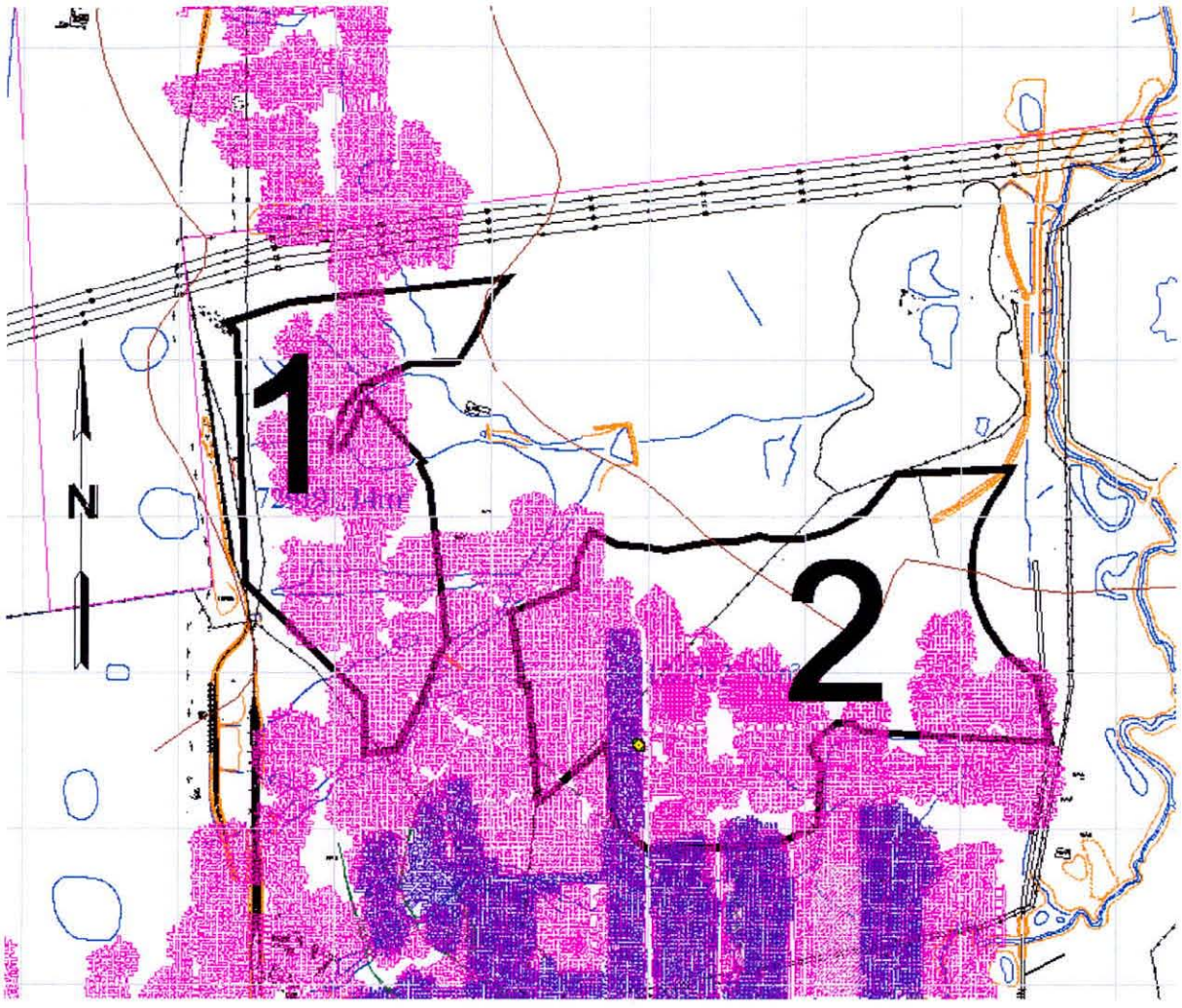


**Figure 1.** Undermining of Site 5 (from Saxum report)

## 3. ASH STACK FACTORS OF SAFETY

It is possible that new ash stacks will be sited to the west and south of the areas of interest. The height of these ash stacks will be governed by surface dimensions, and limited to about 26m to 30m in height.

The factor of safety of these workings when loaded with ash of bulk density 11.5 kN/m$^3$ will be 1.42, to the west, and 1.55 to 1.49 in the east (as per Salomon & Oravecz, 1976). These FOS's are greater than that normally recommended (by the Department of Mineral Resources, DMR) for long term structures (Bakker, 1992) of 2.0. However, the dry placing methodology, liner design and risk assessments undertaken for similar structures will allow for ash stack placing at an FOS of 1.40 and above.

If these areas are to be developed as ash stack locations, a more detailed risk assessment document will be produced.

## 4. POWER STATION FACTORS OF SAFETY

The power station and all of its sensitive structures will be located off the undermining panels to ensure that there is no risk of collapse and settlements under the structures. There will however be linear features such as conveyors, that traverse the area, as well as evaporation and water storage dams.

### 4.1 Water Storage Dam factors of Safety

For a fill dam where the maximum surcharge of water will be 3m above current ground level, the factors of safety for the two seam pillars is 1.82. This is marginally lower than the 2.0 recommended by the DMR. However, the risk of failure at these factors of safety is less than 74 / 1 000 000 or 0.0074%.

Given the location of the dams, likely wall heights and storage capacities and with natural ground sloping way from the power plant, it is unlikely that a dam breach due to sudden settlements will cause any injuries or fatalities to workers or residents. From generally accepted risk assessment protocols, this risk : likelihood relationship is deemed as a negligible risk, as a worker is not exposed to any more risk than he is from other work related or natural causes.

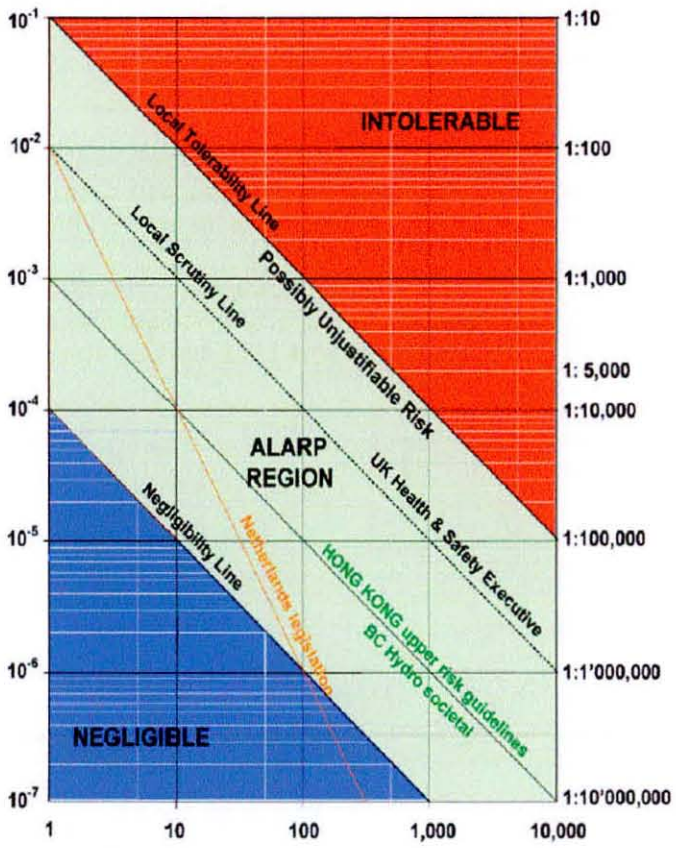


**Figure 2**. F-N diagram. F, along the vertical axis, represents the frequency of occurrence of N or more fatalities in a year and N represents the number of fatalities in a single event (from Joughin, 2011).

It is considered that the water dams can remain in their current planned location.

### 4.2 Conveyor Systems

The loading along the linear conveyor features is negligible compared to the self weight of the overburden, and is unlikely to influence the stability of the pillars.

There is one transfer house panned along the conveyor route. Assuming that this imposes a bearing load of 50kPa, this changes the pillar FOS from 1.72 to 1.68. This is a worst case design assumption as all load is assumed to be transmitted vertically downwards, i.e. the rock mass is cracked and cannot support shear loads. In reality, the point load imposed by the transfer house will be well distributed, so that the incremental loading at the pillar depth of approximately 90m will be negligible.

It is noted that approximately 20m from the current planned location of the transfer house there is effectively a single massive pillar that was left behind after the planned bords were not completed. Moving the transfer house to sit over this pillar will increase its FOS considerably.

## 5. CONCLUSIONS

Locating the power station on non-mined ground is ideal. The ash stacks can be located safely nearby, but a detailed risk assessment will be required to support the application by the mine to the Department of Mineral Resources. This can be done if the site selection study indicates that the areas are the preferred site.

The water dams / evaporation ponds for the power station may need a site specific risk assessment done once the likely storage volumes and dam heights are known. The probable factors of safety against pillar collapse should be of low risk and concern.

The conveyors and transfer houses should impose little additional loading onto the workings. However, shifting of the transfer house a small distance onto the relatively massive pillar indicated on the mine plans will increase its FOS considerably.

# Appendix C

## SUPPORTING SPECIALIST BASELINES

1. Heritage assessment by Cult Matrix
2. Social baseline by MasterQ

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**PROJECT 2010/26**

# SPECIALIST STUDY: HERITAGE SCOPING (BASIC ASSESSMENT) REPORT: INPUT INTO EIA, IWWMP AND IWULA FOR THE PROPOSED KUYASA IPP POWER GENERATION PLANT ON PORTIONS OF THE FARMS HAVERGLEN 269 IR AND HAVERKLIP 265 IR NEAR DELMAS, MPUMALANGA PROVINCE

**PREPARED FOR**

**Lizet Vermaak**

**Jones & Wagener Consulting Civil Engineers**
**Rivonia**

**DATE: 21 July 2010**

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## EXECUTIVE SUMMARY

This report contains a heritage scoping (basic assessment) investigation (heritage specialist study) in accordance with the provisions of Sections 38(1) and 38(3) of the *National Heritage Resources Act* (NHRA) (25/1999) for purposes of informing the location and implications thereof in connection with the construction and operation of the proposed power generation plant to be constructed and operated by the Kuyasa Independent Power Provider. This investigation forms part of the process of conducting the required EIA, IWWMP and IWULA that will inform the feasibility (and eventually also the final sites and Site Development Plans) with regard to the proposed project.

This heritage impact assessment investigation contains the following elements and outcomes as required in terms of the NHRA:

- A main HIA report (this report) that includes a historic built environment investigation: Farmstead and other ruins
- An archaeological impact assessment report (AIA): Investigation of any Stone and Iron Age finds (none found) and burial sites (small cemetery on Preferred Site 1, large cemetery outside development areas)

The project comprises the construction and operation of a 600 MW mine-mouth power generation facility with possible future expansion to 2400 MW, coal to be provided from the former Delmas (now Ikhwezi) Colliery. The proposed power generation facility will be owned and managed by Kuyasa as power provider independent from ESKOM.

The investigation focused on the preferred plant site (two possible locations) as well as the proposed landfill site to dispose of ash. The site is located approximately 20km southeast of Delmas, 15km northeast of Devon and 85km east of Johannesburg. The site is currently used as agricultural land and for mining activity and is located on portions of the farms Haverglen 269 IR and Haverklip 265 IR within 4 km of the former Delmas (now Ikhwezi) Colliery (operated by Kuyasa Mining). The site is approximately 210ha comprising three rectangular parcels owned by Kuyasa (Ikhwezi Colliery (Pty) Ltd. Site topography is sloping form the southeast corner of the site to the northwest corner with the deviated Wilge River as the most recognisable natural element. The site is accessed by the R-50 running east-west along the northern boundary. It is bordered on the west by an asphalt road running north-south from the R-50 as well as by a gravel road running north-south from the R-50. The distance to the asphalt road is about 900m.

This heritage impact assessment investigation contains the following elements and outcomes as required in terms of the NHRA

- A main HIA report that includes a historic built environment investigation: Recent features associated with quarrying and farming
- An archaeological investigation: Isolated scatters of Stone Age artefacts
- Comments on palaeontology: Evidence of fossils and trace fossils[1]

As a cultural landscape this environment can be classified as a combination of a historic farming landscape and a relic mining landscape, exhibiting the following recognisable heritage features:

- Tracks and fences
- Tree lanes
- Crops
- Grazing areas
- Power lines
- Ruins of farming structures, farmsteads and homesteads
- Graves
- Abandoned open-cast mine workings

The corner co-ordinates of the three land parcels are:[2]

[1] Comments by Roger Price (Council for Geoscience) on potential for fossils in coal mining areas of Witbank/Steenkoolspruit, August 2009

Landfill site (ash disposal site):

LF-1 26°13'45.41"S 28°50'8.13"E
LF-2 26°13'46.22"S 28°51'7.65"E
LF-3 26°14'12.63"S 28°51'4.69"E
LF-4 26°14'12.57"S 28°50'5.46"E

Preferred power plant site 1:

S1-1 26°14'13.03"S 28°51'12.33"E
S1-2 26°14'10.98"S 28°52'11.36"E
S1-3 26°14'58.37"S 28°52'13.23"E
S1-4 26°14'57.69"S 28°51'24.49"E

Preferred power plant site 2:

S2-1 26°14'34.34"S 28°50'6.51"E
S2-2 26°14'34.41"S 28°51'5.78"E
S2-3 26°15'27.82"S 28°51'5.72"E
S2-4 26°15'27.76"S 28°50'6.44"E

The intended development comprises the development and operation of the Kuyasa IPP facility and this provided the following "triggers" for an HIA:

- Development larger than 5000 square meters (about 210 hectares)
- Linear development longer than 300 meters (grid connections)
- The region is known for old farmsteads, old collieries and cemeteries

The general aim of any heritage impact assessment investigation and report is to ensure that the needs of socio-economic development are balanced by the needs to preserve significant heritage resources.

The purpose of this report is to identify and assess features of heritage significance, identify possible impacts and propose management measures to manage possible negative impacts. This information must enable the relevant heritage authority to authorise the proposed development as required in terms of Section 38 of the NHRA.

The investigation was conducted as follows:

- Desktop study, including perusal of existing archaeological reports, completed heritage impact assessment reports, historic maps, cadastral diagrams and general publications about the broader area
- Field survey in June 2010

Heritage impacts are categorised as:

- Neutral (no impact)
- Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries
- Indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment
- Cumulative impacts that are combinations of the above

The predicted heritage impacts on the development are as follows:

- Proposed landfill site: Neutral (no significant heritage features)
- Preferred power plant site 1: Low negative (small cemetery and ruin of old farmstead that will be affected)
- Preferred power plant site 2: Neutral (no significant heritage features)

[2] Based on co-ordinates provided by the client

Visual impacts are of less importance because the wider study area has already been extensively transformed by coal-mining and farming. The landscape horizon is characterised by power lines, railway lines, structures and dumps of collieries and grain elevators.

Heritage impacts can be managed through one or a combination of the following measures:

- Mitigation (minimising adverse impacts through further documentation and research before a place is altered or destroyed)
- Avoidance
- Compensation (balancing of making good the destruction of one heritage feature by the preservation of another one)
- Enhancement (positive impacts on heritage features)
- Rehabilitation (re-use of preserved heritage features)
- Interpretation (providing information on heritage features)
- Memorialisation (retaining the memory of important heritage features that have been destroyed)
- No action
- Relocation (historic equipment, graves)
- Alternatives

Of the above measures, "no action", mitigation and relocation apply in the case of this project.

This report complies as follows with the provisions of Section 38 (3) of the *National Heritage Resources Act* (Act 25 of 1999):

**(a) Identification and mapping of heritage resources**
**(b) Cultural significance**
**(c) Predicted impacts**
**(f) Impact management measures**

See Table 1 (below).

***TABLE 1: Identification of heritage features, impacts and mitigation measures***

| S 3(2) NHRA heritage resource | (a) Identification | | (b) Significance | (c) Impact | | (d) Recommended impact management |
|---|---|---|---|---|---|---|
| | Site | GPS | | Study area | Impact type, certainty and significance | |
| Buildings, structures, places and equipment of cultural significance | Homestead ruins | 26°13'57.28"S 28°51'16.48"E | Medium local | Outside | Neutral | No action: Remains of homesteads - outside development areas |
| | School ruin | 26°14'2.77"S 28°51'28.39"E | Low local | Outside | Neutral | No action: Ruin of Haverklip farm school – outside development areas |
| | Haverklip homestead ruin | 26°14'45.58"S 28°51'39.63"E | Low local | Preferred Site 1 | Definite destruction – low negative impact | Mitigation: Demolition permit (the place is older than 60 years) including documentation( before destruction) |
| | Haverglen farmstead ruin | 26°14'51.03"S 28°50'3.96"E | Low local | Just outside Preferred Site 2 | Possible destruction – low negative impact | No action – the place is younger than 60 years and no demolition permit is needed |
| | Abandoned open-cast collieries | - | Low local | Preferred Site 1 and 2 | Unknown | No action – the collieries are of recent origin |
| Areas to which oral traditions are attached or which are associated with intangible heritage | None | - | - | - | - | - |
| Historical settlements and landscapes | None | - | - | - | - | - |

| S 3(2) NHRA heritage resource | (a) Identification | | (b) Significance | (c) Impact | | (d) Recommended impact management |
|---|---|---|---|---|---|---|
| | Site | GPS | | Study area | Impact type, certainty and significance | |
| Landscapes and natural features of cultural significance | None | - | - | - | - | - |
| Geological sites of scientific or cultural importance | None | - | - | - | - | - |
| Archaeological and palaeontological sites | Chance finds | Unknown | Low local? | Preferred Site 1 and 2 | Unknown | Mitigation: Report and evaluate any graves or archaeological features and artefacts when found during site preparation work |
| Graves and burial sites | Haverklip farm cemetery (2 graves) | 26°14'36.12"S 28°51'39.54"E | Medium local | Preferred Site 1 | Definite destruction | Relocation of graves |
| | Farm workers' cemetery | 26°13'57.68"S 28°51'17.11"E | Medium local | Outside | Neutral | No action: Large cemetery associated with homestead remains |
| Features associated with labour history | None | - | - | - | - | |
| Movable objects | None | - | - | - | - | |

**(d) Social and economic benefits**

The development will have no direct benefits related to the conservation of heritage resources (structures) since none of significance have been identified, with the exception of the small Haverklip farm cemetery.

The latest ISEP (October 2005) has identified the need for increased base load electricity supply by the year 2010. The National Energy Regulator of South Africa (NERSA) is the regulatory authority responsible for the electricity supply industry in South Africa. In its National Integrated Resource Plan (INIRP), NERSA has determined that, while various alternative and renewable electricity generation options should be continually investigated, coal should still provide the main fuel source in South Africa. Accordingly, coal-fired power stations will be required for generation capacity expansion during the next 20 years. In 2003, the South African government decided that the future power generation capacity would be divided between ESKOM (70%) and Independent Power Producers (IPP) (30%).

**(e) Public consultation**

This is part of the environmental scoping process.

**(g) Mitigation during construction**

Except for monitoring of any further chance finds (graves, archaeological and palaeontological features) during site preparation and construction work, no mitigation measures apply.

**Findings and recommendations**

The areas proposed for the Kuyasa IPP are located in a cultural landscape classified primarily as a combination of historic farmland and a relic mining landscape landscape. This class of landscape is of very low heritage sensitivity because it is able to absorb new development with without many adverse effects.

The predicted physical impact on the proposed landfill site for ash is neutral since this area consists almost entirely of fields with crops, without any recognisable heritage features. **The use of this area as a landfill for ash disposal is therefore supported.**

The predicted physical impact on the Preferred Site 1 for the power plant is low to medium negative since it will adversely affect a homestead ruin (for which a demolition permit will be required due to its age of 60 years and older) and a small cemetery with two graves (that must be exhumed and relocated). **The use of this area for the power plant is therefore <u>not</u> supported.**

The predicted physical impact on the Preferred Site 2 for the power plant is neutral since this area mainly consists of old fields without any recognisable heritage features. The Haverglen farmstead ruin could be affected. It is located just outside the periphery) but due to its condition, age and significance the impact will be neutral and no further action is necessary. **The use of this area for the power plant is therefore supported.**

Visual intrusion as an indirect impact is not an important issue since the proposed development will be located in an environmentally degraded area (abandoned collieries, dumps, degraded parcels of farm land) and is bordering on land that has been transformed by housing, mining and infrastructure. Noise, dust, pollution and restrictions of access patterns as indirect impacts are also not issues.

From a historic built environment perspective no features of real heritage significance were identified and those features that are extant (the Haverklip homestead ruin) are typical of many others in the region.

From an archaeological perspective no finds were identified.

The nature and significance of what has been found in terms of heritage is not of such importance that the proposed ash disposal site's location should be changed or that other alternatives should be considered.

The nature and significance of what has been found in terms of heritage may imply negative impacts regarding the construction and operation of the power plant on Preferred Site 1 and therefore Preferred Site 2 is supported as a more suitable alternative.

Cultmatrix states that there are no compelling reasons not to proceed with the proposed project and that it should be allowed to continue as follows:

- Use of proposed landfill site for disposal of ash
- Use of Preferred Site 2 for the construction and operation of the power plant since it has no features of heritage significance and is also located closer to the source of coal than the Preferred Site 1

The following measures are to be adopted as heritage management mechanisms:

1. Should any hidden human remains (highly unlikely) be disturbed, exposed or uncovered during site clearing and excavations (for foundations etc), these should immediately be reported to an archaeologist. Burial remains should not be disturbed or removed until inspected by an archaeologist.
2. Site preparation activities must be monitored for the occurrence of any hidden archaeological material (Stone Age tools) and similar chance finds (such as historic middens and foundations) and if any are exposed, this should be reported to an archaeologist so that an investigation and evaluation of the finds can be made. The small pans and the drainage line are potential places where such finds may occur.
3. Site preparation activities must be monitored for the occurrence of any hidden fossils and trace fossils and if any are exposed, this should be reported to a palaeontologist so that an investigation and evaluation of the finds can be made.

**RC DE JONG**
**Public Officer and Principal Investigator**

**Date: 21 July 2010**

# 1. REPORT CONTEXT

## 1.1 General notes

1. The structure of this report is based on the following generally accepted standards for heritage scoping and impact assessment investigations:

    - SOUTH AFRICAN HERITAGE RESOURCES AGENCY, Heritage Impact Assessment: Notification of intent to develop (form)
    - DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING, PROVINCIAL GOVERNMENT OF THE WESTERN CAPE, 2005, Guideline for involving heritage specialists in EIA processes (document)
    - DEPARTMENT OF ENVIRONMENT AFFAIRS AND TOURISM, Integrated Environmental Management Guidelines
    - SOUTH AFRICAN HERITAGE RESOURCES AGENCY, 2006, *Minimum standards: Archaeological and palaeontological components of impact assessment reports* (unpublished).
    - PROVINCIAL HERITAGE RESOURCES AUTHORITY GAUTENG, 2010, *Report requirements for HIA reports* (unpublished).
    - WORLD BANK, *Environmental Assessment Sourcebook Update No 8, September 1994: Cultural Heritage in Environmental Assessment.*
    - Best-practice HIA reports submitted by Cultmatrix and other heritage consultants

2. This report is informed by the *National Heritage Resources Act* (25/1999) (NHRA) and is consistent with the various ICOMOS charters for places of cultural significance.

3. Recommendations contained in this application do not exempt the applicant from complying with any national, provincial and municipal legislation or other regulatory requirements, including any protection or management or general provision in terms of the NHRA.

4. Rights and responsibilities that arise from this report are those of the applicant and not that of Cultmatrix cc. Cultmatrix cc assumes no responsibility for compliance with conditions that may be required by SAHRA in terms of this report.

5. Cultmatrix assumes no responsibility whatsoever for any loss or damages that may be suffered as a direct or indirect result of information contained in this application. Any claim that may however arise is limited to the amount paid to Cultmatrix for services rendered to compile this report.

## 1.2 Purpose of the report

The purpose of this report is to identify and assess features of heritage significance, identify possible impacts, propose management measures to mitigate negative impacts and recommend which of the two preferred sites for the proposed power plant is the most suitable from a heritage perspective. This information must enable the relevant heritage authority to comment on the proposed development as required in terms of Section 38 of the NHRA.

The below table lists and describes the three general categories of heritage impact assessment studies and reports, which offices are involved (i.e. to which offices reports should be submitted) and which type of response is required from these offices.

It is envisaged that the offices will respond as follows:

- Either comment and decide to approve the proposed development subject to the conditions
- Or comment and reserve the decision to approve until a full Heritage Impact Assessment report (based on the final Site Development Plans for the power plant, ash disposal site and associated infrastructure for both) has been prepared and submitted

*TABLE 2: Applicable category of heritage impact assessment study and report*

| Type of study and report | Aim | Office involved | Requested response |
|---|---|---|---|
| Screening: Not this report | The aim of the screening investigation is to provide an informed heritage-related opinion about the proposed development by an appropriate heritage specialist. The objectives of this investigation are to screen potential heritage issues through a site inspection, to develop a broad understanding of heritage policy-related context, to review any existing data on the history and heritage significance of the site, to check if the site has any formal heritage status, to discuss the proposed development with heritage contacts and to scan the development proposals. The result of this investigation is a brief statement indicating potential heritage impacts/issues and the need for further investigation. | - | - |
| | | - | - |
| | | - | - |
| **Scoping (basic assessment): This report** | The aim of the scoping investigation is to analyse heritage issues and how to manage them within the context of the proposed development. The objectives are to assess heritage significance (involving site inspections and basic desktop and archival research); to identify the need for further detailed inputs by heritage specialists, to consult with local heritage groups and experts, to review the general compatibility of the development proposals with heritage policy and to assess the acceptability of the proposed development from a heritage perspective. The result of this investigation is a heritage scoping report indicating the presence/absence of heritage resources and how to manage them in the context of the proposed development. | Mpumalanga Provincial Heritage Resources Authority | Comments and approval |
| | | SAHRA Archaeology, Palaeontology and Meteorites Unit | Comments |
| | | SAHRA Burial Grounds and Graves Unit | Comments |
| Full HIA: Not this report | The aim of the full HIA investigation is to analyse and recommend heritage management mitigation measures and monitoring programmes. The objectives are to analyse heritage issues, to research the chronology of the site and its role in the broader context, to undertake a comprehensive assessment of heritage significance, to analyse the nature and scale of the proposed development, to consult with local heritage groups and experts as part of the broader EIA stakeholder engagement process, to establish the compatibility of the proposed development with heritage and other statutory frameworks and to assess alternatives in order to promote heritage conservation issues. | - | - |
| | | - | - |
| | | - | - |

### 1.3 Terms of reference

- To survey the proposed ash disposal site and the two preferred sites (for the power plant) as well as the surrounding environment
- To identify and map heritage resources that may be affected directly
- To assess the cultural significance of these heritage resources
- To assess the predicted impact of the development on these heritage resources
- To assess the benefits of conserving these heritage resources in relationship to the socio-economic benefits of the development
- To provide the public with an opportunity to comment on the heritage aspects of the proposed development
- To consider alternatives if heritage resources will be affected in a negative manner
- To determine methods to mitigate negative impacts before, during and after construction activities

### 1.4 History of the report

This report is the first draft report and has not been preceded by other reports for this particular project.

### 1.5 Legal context of the report

| ACT | COMPONENT | IMPLICATION | RELEVANCE | COMPLIANCE |
|---|---|---|---|---|
| NHRA | S 34 | Impacts on buildings and structures older than 60 years | Haverklip homestead ruin | Demolition permit |
| | S 35 | Impacts on archaeological and palaeontological heritage resources | None of significance identified | Monitor during site preparation work |
| | S 36 | Impacts on graves | Haverklip cemetery | Exhume and relocate with the necessary permits |
| | S 37 | Impacts on public monuments | None present | - |
| | S 38 | Developments requiring an HIA | Development is listed activity | Heritage scoping |
| NEMA | EIA Regulations | Activities requiring an EIA | Development is subject to an EIA | HIA is part of EIA |
| Other | - | - | - | - |

### 1.6 Strategic planning context of the project

The key enablers behind this project include:

- SA Government's initiative to introduce Independent Power Producers (IPPs) into South Africa's generation arena through Eskom's Multi-Site Baseload IPP program.
- SA Government's initiative to introduce clean Renewable Energies into South Africa's generation mix through NERSA's REFIT program.
- Intensive Energy User's initiative to enhance their security of supply and in doing so, participate in assisting SA Government by adding extra capacity to the Grid.

### 1.7 Development criteria in terms of Section 38 of the NHRA

| 1.7 | Development criteria in terms of Section 38(1) | Yes/No details |
|---|---|---|
| 1.7.1 | Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length | Yes |
| 1.7.2 | Construction of bridge or similar structure exceeding 50m in length | No |
| 1.7.3 | Development exceeding 5000 sq m | Yes |
| 1.7.4 | Development involving three or more existing erven or subdivisions | No |
| 1.7.5 | Development involving three or more erven or divisions that have been consolidated within past five years | No |
| 1.7.6 | Rezoning of site exceeding 10 000 sq m | Yes |
| 1.7.7 | Any other development category, public open space, squares, parks, recreation grounds | No |

### 1.8 Property details

| 1.8 | Property details | |
|---|---|---|
| 1.8.1 | Name and location of property | Kuyasa Independent Power Provider Project |
| 1.8.2 | Erf or farm numbers | Portions of Haverklip 265 IR and Haverglen 269 IR |
| 1.8.3 | Magisterial district | Delmas |
| 1.8.4 | Closest town | Delmas |
| 1.8.5 | Local authority | Victor Khanye Local Municipality |
| 1.8.5 | Current use | Crops, vacant |
| 1.8.5 | Current zoning | Agriculture, mining |
| 1.8.5 | Predominant land use of surrounding properties | Farming, mining |
| 1.8.9 | Total extent of properties | Not available |

### 1.9 Property ownership

| 1.9 | Property owners | |
|---|---|---|
| 1.9.1 | Farms | Portions of Haverklip 265 IR and Haverglen 269 IR |
| 1.9.2 | Name and contract address | Not available |
| 1.9.3 | Telephone number | - |
| 1.9.4 | Fax number | - |
| 1.9.5 | E-mail | - |

### 1.10 Developer

| 1.10 | Developer | |
|---|---|---|
| 1.10.1 | Name and contact address | Kuyasa Mining (Pty) Ltd |
| 1.10.2 | Telephone number | |
| 1.10.3 | Fax | |
| 1.10.4 | E-mail | |

### 1.11 Environmental practitioner

| 1.11 | Environmental Specialist | |
|---|---|---|
| 1.11.1 | Name and contact address | Lizet Vermaak, Jones & Wagener Consulting Civil Engineers, PO Box 1434, Rivonia 2128 |
| 1.11.2 | Telephone number | (011) 519-0200 |
| 1.11.3 | Fax | (011) 519-0201 |
| 1.11.4 | E-mail | Vermaak@jaws.co.za |

### 1.12 Heritage assessment practitioners

| 1.12 | Specialist (1) | |
|---|---|---|
| 1.12.1 | Name and contact address | Dr RC de Jong (Principal Member: Cultmatrix cc), PO Box 12013, Queenswood 0121, Pretoria |
| 1.12.2 | Qualifications and field of expertise | PhD (Cultural History) UP (1990), Post-Graduate Museology Diploma UP (1979), generalist heritage management specialist with experience in museums and heritage since 1983 |
| 1.12.3 | Relevant experience in study area | HIAs for mining projects in the Ogies area and for regional landfill sites at Dryden near Delmas |
| 1.12.4 | Telephone number | (082) 577-4741 |
| 1.12.5 | Fax number | (086) 612-7383 |
| 1.12.6 | E-mail | cultmat@iafrica.com |

| | | Specialist 2 |
|---|---|---|
| 1.12.1 | Name and contact address | Dr AC van Vollenhoven, Archaetnos Culture and Cultural Resource Consultants |
| 1.12.2 | Qualifications and field of expertise | BA, BA (Hons), DTO, NDM, MA (Archaeology) [UP], MA (Culture History) [US], DPhil (Archaeology) [UP], Man Dip [TUT], DPhil (History)[US], ASAPA accredited archaeologist |
| 1.12.3 | Relevant experience in study area | Archaeological studies for HIAs in the broader area as well as grave relocations |
| 1.12.4 | Telephone number | 083 291 6104 |
| 1.12.5 | Fax number | 086 520 4173 |
| 1.12.6 | E-mail | antony@archaetnos.co.za |

## 2. DEVELOPMENT CONTEXT

### 2.1 Development site/area location and boundaries

The site is located approximately 20km southeast of Delmas, 15km northeast of Devon and 85km east of Johannesburg.

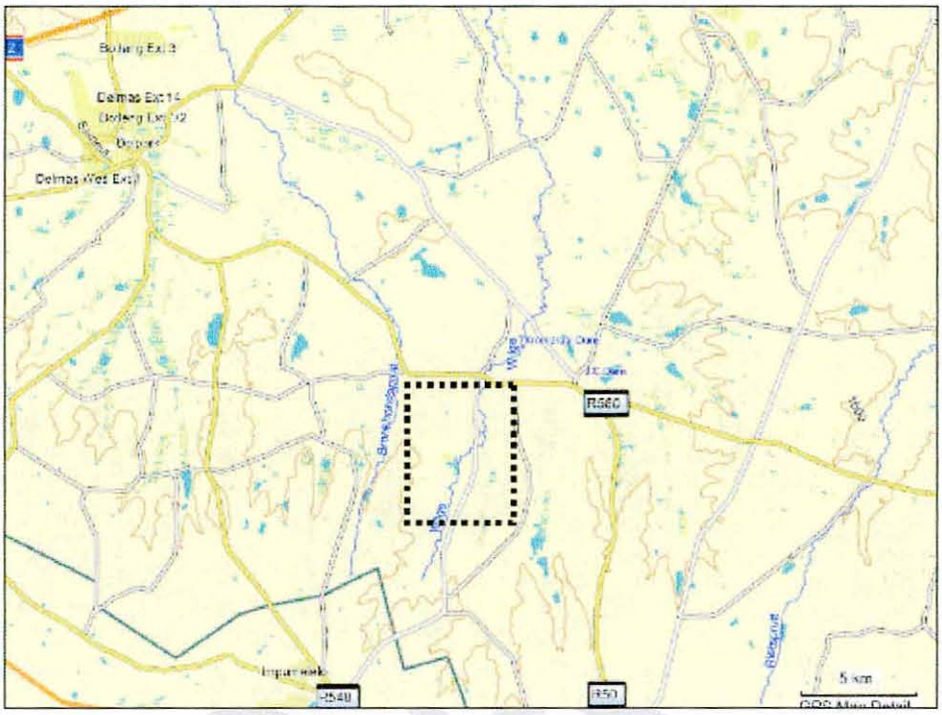


*FIGURE 1: General location of the study area*

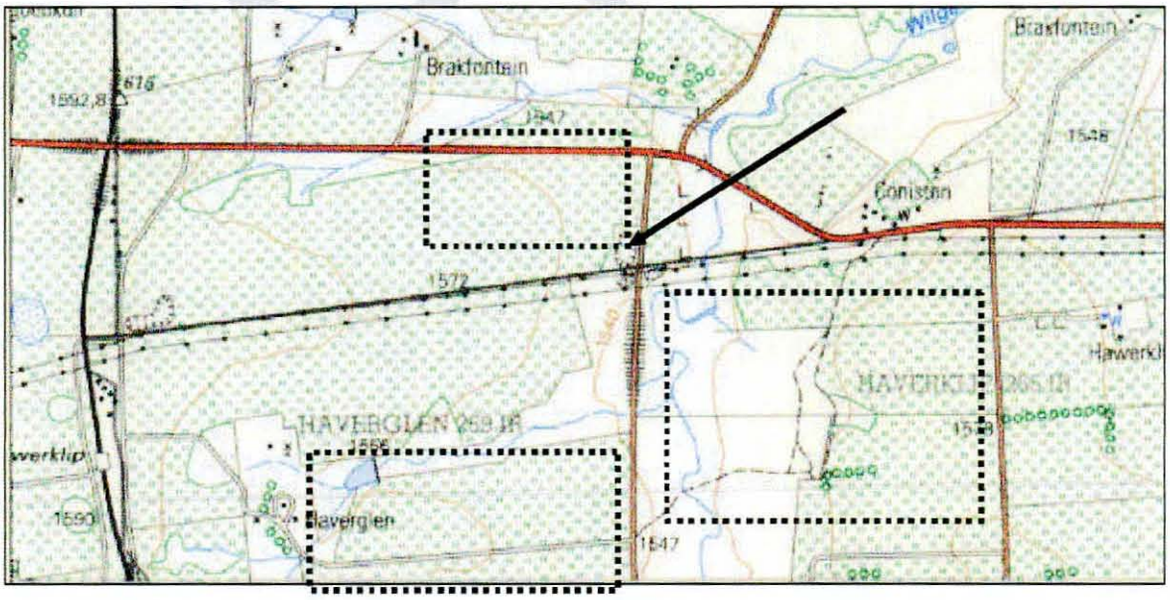


*FIGURE 2: Portion of 2628 BB Kendal (1995) – note that the collieries did not exist at the time with the exception of small pits (arrow)*

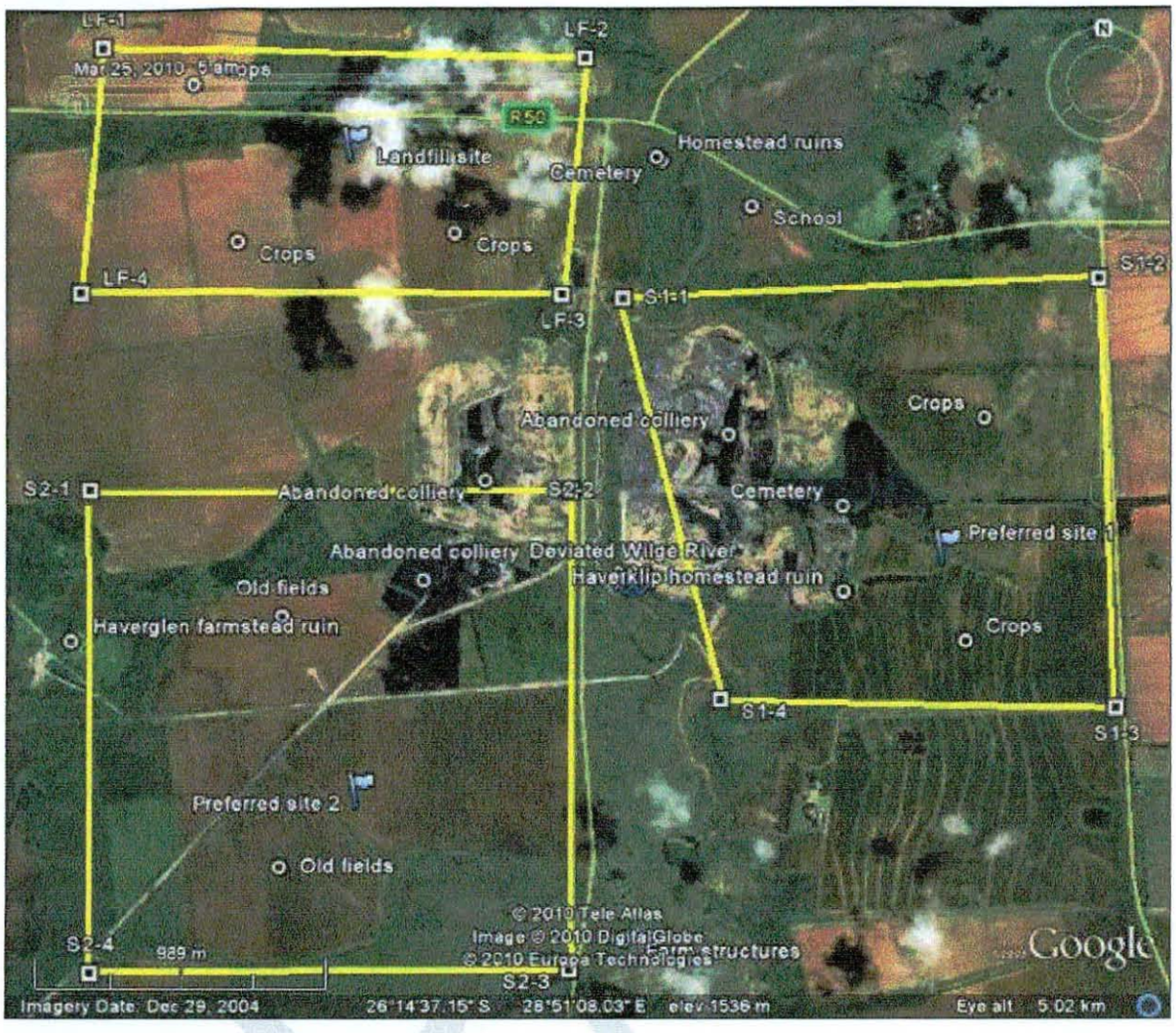


***FIGURE 3: Google Earth image (2004) of three of the sites (yellow) that were investigated with identifiable heritage characteristics***

## 2.2 Description of distinguishing regional features

### *2.2.1 Environmental features*

***TABLE 3: Environmental features***

| COMPONENT | DESCRIPTION |
|---|---|
| Acocks veld type | Turf Highveld |
| Geological and mining | Abandoned open-cast collieries |
| Geology | Arenite |
| Hydrology | Wilge River (deviated) and small tributary (on ash disposal site) |
| Land cover | Mines, quarries, cultivated land, unimproved grassland |
| Land use | Farming and mining |
| Vegetation | Moist Sandy Highveld Grassland |
| Landscape sensitivity index | 0-1 (low) |
| Slope | 0-9% |
| Terrain morphology | Slightly irregular undulating plains |
| Wetlands | Wilge River zone |

### *2.2.2 Heritage features*

***TABLE 4: Heritage features***

| S 3(2) NHRA heritage resource | DESCRIPTION |
|---|---|
| Buildings, structures, places and equipment of cultural significance | Tracks, fences, old roads, quarries, collieries, cemeteries, ruins, planted vegetation (crops and tree lanes) |
| Areas to which oral traditions are attached or which are associated with intangible heritage | None |
| Historical settlements and landscapes | None |
| Landscapes and natural features of cultural significance | None |
| Geological sites of scientific or cultural importance | None |
| Archaeological and palaeontological sites | Broader area is known for Early, Middle and late Stone Age artefacts as well as Iron Age artefacts |
| Graves and burial grounds | Two cemeteries |
| Areas of significance related to labour history | Farm workers' homestead remains |
| Movable objects | None |

### *2.2.3 Site descriptions*

The site is currently used as agricultural land and for mining activity and is located on portions of the farms Haverglen 269 IR and Haverklip 265 IR within 4 km of the former Delmas (now Ikhwezi) Colliery (operated by Kuyasa Mining). The site is approximately 210ha comprising three rectangular parcels owned by Kuyasa (Ikhwezi Colliery (Pty) Ltd. Site topography is sloping form the southeast corner of the site to the northwest corner with the deviated Wilge River as the most recognisable natural element. The site is accessed by the R-50 running east-west along the northern boundary. It is bordered on the west by an asphalt road running north-south from the R-50 as well as by a gravel road running north-south from the R-50. The distance to the asphalt road is about 900m.

The corner co-ordinates of the three land parcels are:[3]

Landfill site (ash disposal site):

LF-1 26°13'45.41"S 28°50'8.13"E
LF-2 26°13'46.22"S 28°51'7.65"E
LF-3 26°14'12.63"S 28°51'4.69"E
LF-4 26°14'12.57"S 28°50'5.46"E

Preferred power plant site 1:

S1-1 26°14'13.03"S 28°51'12.33"E
S1-2 26°14'10.98"S 28°52'11.36"E
S1-3 26°14'58.37"S 28°52'13.23"E
S1-4 26°14'57.69"S 28°51'24.49"E

Preferred power plant site 2:

S2-1 26°14'34.34"S 28°50'6.51"E
S2-2 26°14'34.41"S 28°51'5.78"E
S2-3 26°15'27.82"S 28°51'5.72"E

[3] Based on co-ordinates provided by the client

S2-4 26°15'27.76"S 28°50'6.44"E

The landfill (ash disposal) site consists predominantly of cultivated lands (crops). A small tributary of the Wilge River cuts across the north-western corner, bordered by unimproved grassland. According to the site co-ordinates, the R 50 road seems to cut across the northern portion of this site, but it is unclear if the road will be deviated.

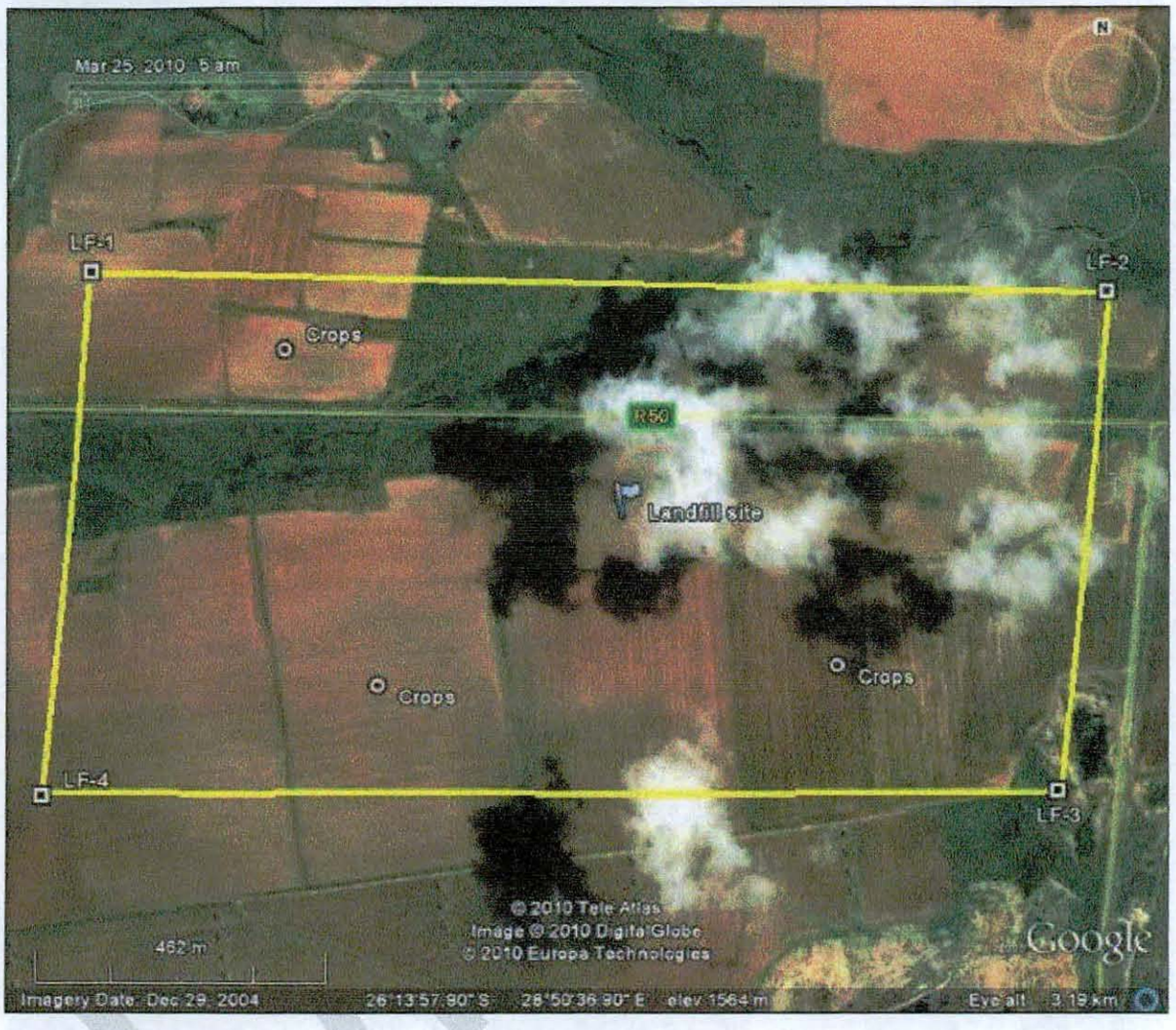


***FIGURE 4: Google Earth image (2004) of the landfill site (yellow)***

The Preferred Power Plant Site 1, on which the small Haverklip cemetery and homestead ruin occur, consists of an abandoned open-cast colliery and cultivated fields (crops). Access is via the original farm road. Planted vegetation (eucalyptus trees) demarcates the location of the original farmstead.

The Preferred Power Plant Site 2, which is subdivided through a number of gravel roads and a conveyor belt to the Delmas Colliery, consists of an abandoned open-cast colliery and cultivated fields (crops) with patches of unimproved grassland.

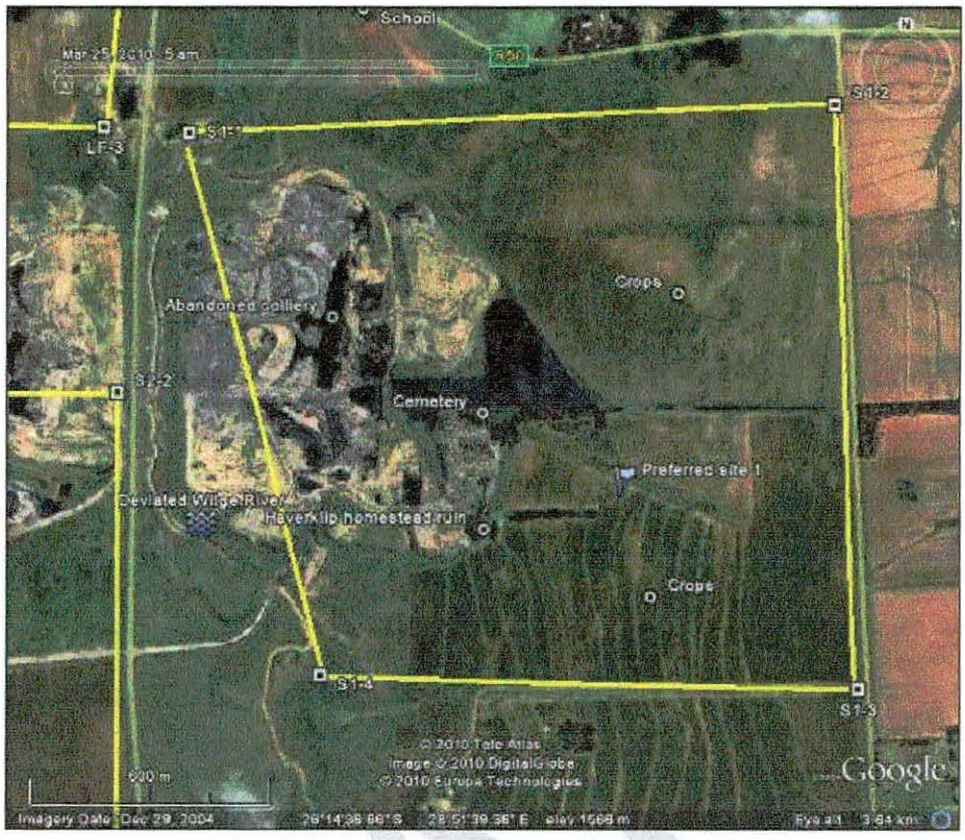


*FIGURE 5: Google Earth image (2004) of the Preferred Site 1 (yellow)*

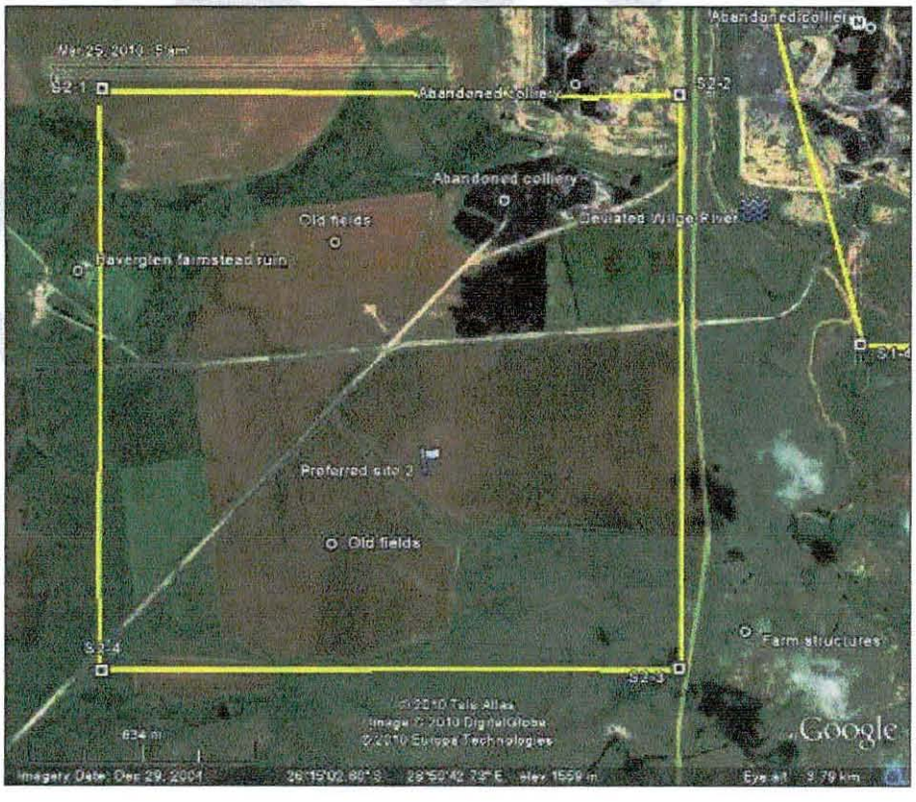


*FIGURE 6: Google Earth image (2004) of the Preferred Site 2 (yellow)*

### *2.2.4 Surrounding environment*

| AREA | DESCRIPTION |
|---|---|
| East | Road and farm land |
| North | R 50 road and farm land |
| West | Farm land, Hawerklip grain elevator, Delmas Colliery |
| South | Farm land |

### 2.3 Development description

| 2.3 | Development description | |
|---|---|---|
| 2.3.1 | Nature of proposed development | See below |
| 2.3.2 | Predicted impacts on heritage value of site and contents | With the exception of the small Haverklip cemetery and the Haverklip homestead ruin there will be no adverse impacts |
| 2.3.3 | Structures older than 60 years affected by proposed development | Haverklip homestead ruin |
| 2.3.4 | Rezoning or change of land use | Yes |
| 2.3.5 | Construction work | Yes |
| 2.3.6 | Total floor area of proposed development | - |
| 2.3.7 | Extent of land coverage of development | Not available |
| 2.3.8 | Earth moving and excavation | Yes |
| 2.3.9 | Number of storeys | Immaterial |
| 2.3.10 | Maximum height above ground level | - |
| 2.3.11 | Monetary value development | Not available |
| 2.3.12 | Time frames | Urgent |

A technology evaluation report prepared by Black & Veatch for Kuyasa determined that the boiler technology most suited to burn Kuyasa's low grade No. 4 seam coal would be circulating fluidized bed (CFB) boiler firing technology. The requirements of the siting study are therefore based on CFB technology with 4x150 MW power plant configuration with a 2-300 MW alternative. It is estimated that approximately 200ha will be required for the development of the power plant. A separate land provision will be kept for ash disposal.

The power plant and its components and associated infrastructure include:

- Power station precinct
- Power station buildings
- Administrative buildings (control buildings, medical, security etc.)
- High voltage yard
- Associated infrastructure
- Coal stock yard
- Coal and ash conveyors
- Water supply pipelines (temporary and permanent)
- Water and wastewater treatment facilities
- Ash disposal system
- Access roads (including haul roads)
- Dams for water storage
- Railway siding and/or line for sorbent supply

*FIGURE 7: The deviated Wilge River that forms the western boundary of Preferred Site 1 – note the dumps in the background*

*FIGURE 8: General view of the proposal landfill (ash disposal) site*

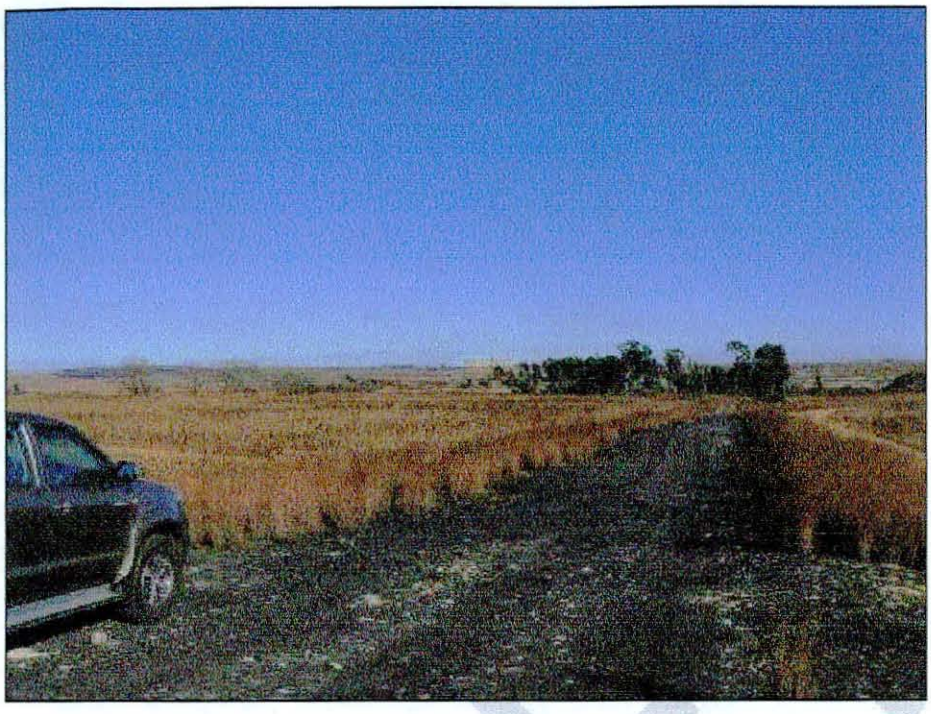

*FIGURE 9: View of the Preferred Site 1 looking west – the trees in the distance indicate the small cemetery and homestead ruin*

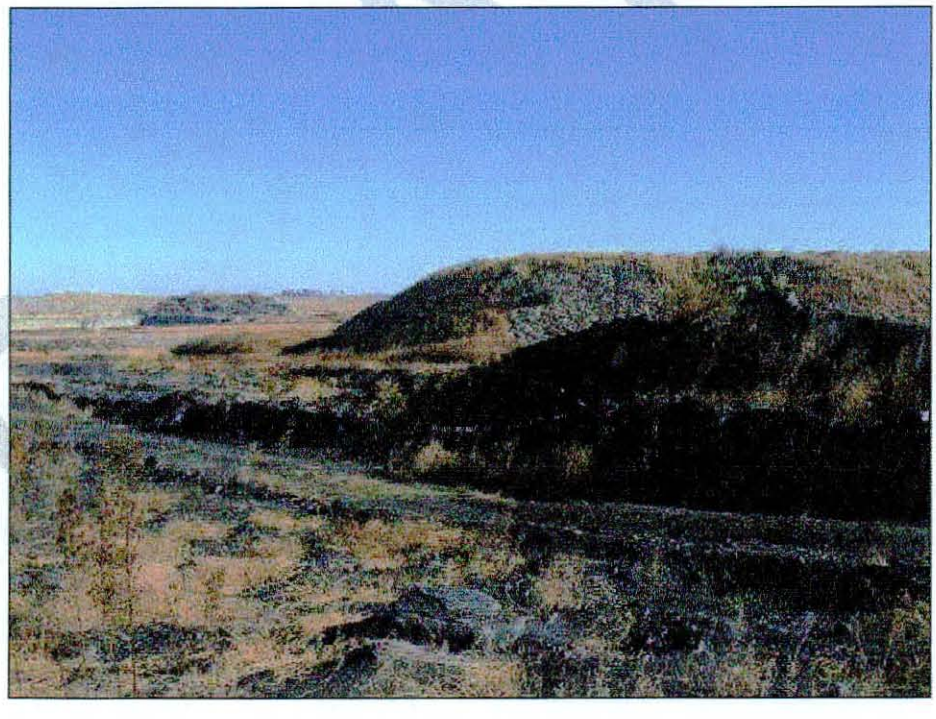

*FIGURE 10: The abandoned colliery on Preferred Site 1*

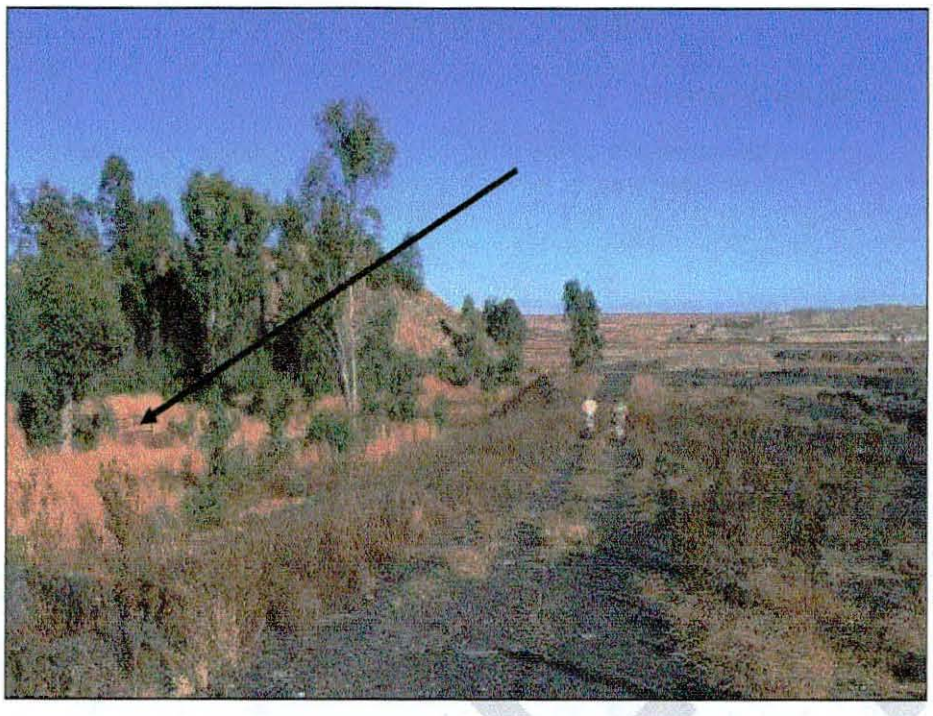

*FIGURE 11: Another view of the Preferred Site 1 showing the location of the small cemetery (arrow)*

*FIGURE 12: General view of the Preferred Site 2 looking east*

# 3. HERITAGE IMPACT CONTEXT

## 3.1 Cultural landscape evidence

The concept of cultural landscapes is of more recent origin and, although the definitions of the National Heritage Resources Act bear reference, is primarily grounded in international doctrinal texts in the form of Charters and Recommendations produced by ICOMOS and UNESCO. The most recent and authoritative text is the World Heritage Cultural Landscapes handbook, published by the World Heritage Centre (2009).

The term "cultural landscape" embraces a diversity of manifestations of the interaction between humankind and its natural environment. Cultural landscapes often reflect specific techniques of sustainable *land-use*, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature. Cultural landscapes are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal. They are categorized on the basis both of their value and of their representativity in terms of a clearly defined geo-cultural *region* and also for their capacity to illustrate the essential and distinct cultural elements of such regions. The term "cultural landscape" embraces a diversity of manifestations of the interaction between humankind and its natural environment.

The World Heritage Committee distinguishes between three categories of cultural landscapes:

- Clearly defined landscapes, designed and created intentionally by people, such as parkland and urban areas
- Organically evolved landscapes that has developed over time, including relic landscapes (where a certain activity has ceased to exist) and continuing landscapes (which retain an active social role and where the evolutionary process is still in progress)
- Associative landscapes, which are essentially natural landscapes with significant human associations in the realm of the intangible heritage

All three categories exist in the study area. However, they are too broad in terms of the practical mapping and assessment of heritage elements; hence, the following criteria for classifying the type of cultural landscape have been used:

***TABLE 5: Cultural landscape classification***

| HERITAGE LANDSCAPE CONTEXT | ELEMENTS | EVIDENCE |
|---|---|---|
| A. PALAEONTOLOGICAL LANDSCAPE CONTEXT | Fossil remains. Such resources are typically found in specific geographical areas, e.g. the Karoo and are embedded in ancient rock and limestone/calcrete formations. | None |
| B. ARCHAEOLOGICAL LANDSCAPE CONTEXT | Archaeological remains dating to the following periods:<br>• Early Stone Age<br>• Middle Stone Age<br>• Late Stone Age<br>• Early Iron Age<br>• Late Iron Age<br>• Historical | None |
| C. HISTORICAL BUILT URBAN LANDSCAPE CONTEXT | • Historical townscapes/streetscapes<br>• Historical structures; i.e. older than 60 years<br>• Formal public spaces<br>• Formally declared urban conservation areas<br>• Places associated with social identity/displacement | None |

| | | |
|---|---|---|
| **D. HISTORICAL FARMLAND CONTEXT (SECONDARY LANDSCAPE)** | **These possess distinctive patterns of settlement and historical features such as:**<br>• **Historical farm werfs**<br>• **Historical farm workers villages/settlements**<br>• **Irrigation furrows**<br>• **Tree alignments and groupings**<br>• **Historical routes and pathways**<br>• **Distinctive types of planting**<br>• **Distinctive architecture of cultivation e.g. planting blocks, trellising, terracing, ornamental planting.** | **Yes** |
| E. HISTORICAL RURAL TOWN CONTEXT | • Historical mission settlements<br>• Historical townscapes | None |
| F. PRISTINE/NATURAL LANDSCAPE CONTEXT | • Historical patterns of access to a natural amenity<br>• Formally proclaimed nature reserves<br>• Evidence of pre-colonial occupation<br>• Scenic resources, e.g. view corridors, viewing sites, visual edges, visual linkages<br>• Historical structures/settlements older than 60 years<br>• Pre-colonial or historical burial sites<br>• Geological sites of cultural significance. | None |
| **G. RELIC LANDSCAPE CONTEXT (PRIMARY LANDSCAPE)** | • **Past farming settlements**<br>• **Past industrial sites**<br>• **Places of isolation related to attitudes to medical treatment**<br>• **Battle sites**<br>• **Sites of displacement,** | **Yes** |
| H. BURIAL GROUND & GRAVE SITE CONTEXT | • Pre-colonial burials (marked or unmarked, known or unknown)<br>• Historical graves (marked or unmarked, known or unknown)<br>• Human remains (older than 100 years)<br>• Associated burial goods (older than 100 years)<br>• Burial architecture (older than 60 years) | None |
| I. ASSOCIATED LANDSCAPE CONTEXT | • Sites associated with living heritage e.g. initiation sites, harvesting of natural resources for traditional medicinal purposes<br>• Sites associated with displacement & contestation<br>• Sites of political conflict/struggle<br>• Sites associated with an historic event/person<br>• Sites associated with public memory | None |
| J. HISTORICAL FARM WERF CONTEXT | • Setting of werf and its context<br>• Composition of structures<br>• Historical/architectural value of individual structures<br>• Tree alignments<br>• Views to and from<br>• Axial relationships<br>• System of enclosure, e.g. werf walls<br>• Systems of water reticulation and irrigation, e.g. furrows<br>• Sites associated with slavery and farm labour<br>• Colonial period archaeology | None |
| K. HISTORICAL INSTITUTIONAL LANDSCAPE CONTEXT | • Historical prisons<br>• Hospital sites<br>• Historical school/reformatory sites<br>• Military bases | None |
| L. SCENIC/VISUAL | • Scenic routes | None |

| | | |
|---|---|---|
| K. AMENITY LANDSCAPE CONTEXT | • View sheds<br>• View points<br>• Views to and from<br>• Gateway conditions<br>• Distinctive representative landscape conditions<br>• Scenic corridors | |

### 3.2 Determining levels of sensitivity and potential impacts

Sensitivity is the ability of a cultural landscape (or heritage resource) to absorb changes or adapt to changes whilst maintaining an acceptable degree of cultural significance.

Within the context of this study, levels of sensitivity can generally be associated with certain classes or categories of cultural landscapes as tabulated below.

***TABLE 6: Relationship between cultural landscape classes and levels of sensitivity***

| Sensitivity level | Implication | Landscape class | Evidence |
|---|---|---|---|
| **D** | **Ability to absorb without adverse effects and very little mitigation** | **Relic mining landscape<br>Degraded farm land** | **Of little or no intrinsic, associational or contextual heritage value due to disturbed, degraded conditions or extent of irreversible damage** |
| C | Ability to absorb with some adverse effects and some mitigation | Historical farmland<br>Historical farm werfs<br>Institutional landscapes | Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context |
| B | Ability to absorb with considerable adverse effects and intensive mitigation | Burial grounds and graves<br>Palaeontological and archaeological landscapes<br>Associated landscapes | Of moderate to high intrinsic, associational and contextual value within a local context |
| A | No or very little ability to absorb | Historical built environments<br>Natural landscapes<br>Amenity/Visual/Scenic landscapes | Of high intrinsic, associational and contextual heritage value within a national, provincial and local context |

### 3.3 Determining potential impacts

***TABLE 7: Categories of development types***

| CATEGORY | DESCRIPTION | EVIDENCE |
|---|---|---|
| A: Minimal intensity development | • No rezoning involved; within existing use rights<br>• No subdivision involved<br>• Upgrading of existing infrastructure within existing envelopes<br>• Minor internal changes to existing structures<br>• New building footprints limited to less than 1000m$^2$ | No |
| B: Low-intensity development | • Spot rezoning with no change to overall zoning of a site<br>• Linear development less than 100m<br>• Building footprints between 1000m$^2$-2000m$^2$<br>• Minor changes to external envelop of existing structures (less than 25%)<br>• Minor changes in relation to bulk and height of immediately adjacent structures (less than 25%). | No |
| C: Moderate intensity development | • Rezoning of a site between 5000m2-10 000m2<br>• Linear development between 100m and 300m<br>• Building footprints between 2000m2 and 5000m2<br>• Substantial changes to external envelop of existing structures (more than 50%)<br>• Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 50%) | No |

| CATEGORY | DESCRIPTION | EVIDENCE |
|---|---|---|
| **D: High intensity development** | • **Rezoning of a site in excess of 10 000m2**<br>• **Linear development in excess of 300m**<br>• **Any development changing the character of a site exceeding 5000m2 or involving the subdivision of a site into three or more erven**<br>• **Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 100%)** | **Power plant and landfill site** |

### 3.4 Expected impact significance

*TABLE 8: Expected impact significance matrix*

| HERITAGE CONTEXT | TYPE OF DEVELOPMENT | | | |
|---|---|---|---|---|
| | CATEGORY A | CATEGORY B | CATEGORY C | CATEGORY D |
| A: High heritage value | Moderate heritage impact expected | High heritage impact expected | Very high heritage impact expected | Very high heritage impact expected |
| B: Medium to high heritage value | Minimal heritage impact expected | Moderate heritage impact expected | High heritage impact expected | Very high heritage impact expected |
| C: Medium to low heritage value | Little or no heritage impact expected | Minimal heritage impact expected | Moderate heritage impact expected | High heritage impact expected |
| D: Low heritage value | Little or no heritage impact expected | Little or no heritage impact expected | Minimal heritage value expected | **Moderate heritage impact expected** |

# 4. HERITAGE IMPACT ASSESSMENT

## 4.1 Approach

### *4.1.1 Definitions and assumptions*

The following aspects have a direct bearing on the investigation and the resulting report:

- *Cultural (heritage) resources* are all non-physical and physical human-made occurrences, as well as natural occurrences that are associated with human activity. These include all sites, structures and artefacts of importance, either individually or in groups, in the history, architecture and archaeology of human (cultural) development.

- The *cultural significance* of sites and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

- The *value* is related to concepts such as *worth*, *merit*, *attraction* or *appeal*, concepts that are associated with the (current) usefulness and condition of a place or an object. Hence, in the development area, there are instances where elements of the place have a high level of significance but a lower level of value.

- It must be kept in mind that significance and value are not mutually exclusive, and that the evaluation of any feature is based on a combination or balance between the two.

- Isolated occurrences: findings of artefacts or other remains located apart from archaeological sites. Although these are noted and samples are collected, it is not used in impact assessment and therefore do not feature in the report.

- Traditional cultural use: resources which are culturally important to people.

- All archaeological remains, artificial features and structures older than 100 years and historic structures older than 60 years are protected by the relevant legislation, in this case the National Heritage Resources Act (NHRA) (Act No. 25 of 1999). No archaeological artefact, assemblage or settlement (site) and no historical building or structure older than 60 years may be altered, moved or destroyed without the necessary authorisation from the South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority. Full cognisance is taken of this Act in making recommendations in this report.

- The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3, and the Australian ICOMOS Charter (also known as the Burra Charter) are used when determining the cultural significance or other special value of archaeological or historical sites.

- It should be kept in mind that archaeological deposits usually occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted, and it would be required that the heritage consultants would be required to be notified in order for an investigation and evaluation of the find(s) to take place (*cf.* NHRA (Act No. 25 of 1999), Section 36 (6)).

### *4.1.2 Limiting/Restricting factors*

The investigation has been influenced by the following factors related to the overall HIA:

- Unpredictability of buried archaeological remains (absence of evidence does not mean evidence of absence)

### *4.1.3 Field work*

This was done through foot and vehicle investigations of the study area in June 2010. During the site inspection the respective properties were examined in some detail. Certain parts of the landscape were found generally to exhibit low visibility and were checked at random intervals, while features in the respective landscapes that were more likely to have been foci for past human activity (e.g stands of trees) were assessed more systematically.

An assessment was made regarding reports for other developments in the region that have been submitted to SAHRA.

### *4.1.4 Desktop study*

- Published literature
- Aerial images (contemporary)
- Cadastral diagrams
- Archival records
- Maps (historical and contemporary)

### *4.1.5 Verbal information*

None

### 4.2 General issues of site and context

| *4.2.1 Context* | | |
|---|---|---|
| | *(check box of all relevant categories)* | *Brief description/explanation* |
| | Urban environmental context | • Roads<br>• Fences<br>• Tracks<br>• Farmstead ruins<br>• Power lines<br>• Mines<br>• Cultivated lands<br>• Unimproved grassland |
| x | Rural environmental context | |
| | Natural environmental context | |
| **Formal protection (NHRA)** | | |
| | Is the property part of a protected area (S. 28)? | No |
| | Is the property part of a heritage area (S. 31)? | No |
| **Other** | | |
| | Is the property near to or visible from any protected heritage sites? | No |
| | Is the property part of a conservation area or special area in terms of the Zoning Scheme? | No |
| | Does the site form part of a historical settlement or townscape? | No |
| x | Does the site form part of a rural cultural landscape? | Relic farm land and mining land |
| | Does the site form part of a natural landscape of cultural significance? | No |
| | Is the site within or adjacent to a scenic route? | No |
| | Is the property within or adjacent to any other area which has special environmental or heritage protection? | No |

| | | |
|---|---|---|
| | Does the general context or any adjoining properties have cultural significance? | No |

| ***4.2.2 Property features and characteristics*** | | |
|---|---|---|
| | *(check box if YES)* | *Brief description* |
| x | Have there been any previous development impacts on the property | Yes: Roads, tracks, grazing land, fences, open-cast collieries, cultivated lands, ruins, graves, etc. |
| x | Are there any significant landscape features on the property? | Wilge River (deviated due to mining) |
| | Are there any sites or features of geological significance on the property? | No |
| | Does the property have any rocky outcrops on it? | No |
| x | Does the property have any fresh water sources (springs, streams, rivers) on or alongside it? | Wilge River |
| | Does the property have any sea frontage? | No |
| | Does the property form part of a coastal dune system? | No |
| | Are there any marine shell heaps or scatters on the property? | No |
| | Is the property or part thereof on land reclaimed from the sea? | No |

| ***4.2.3 Heritage resources on the property*** | | |
|---|---|---|
| | *(check box if present on the property)* | *Name / List / Brief description* |
| **Formal protections (NHRA)** | | |
| | National heritage site (S. 27) | No |
| | Provincial heritage site (S. 27) | No |
| | Provisional protection (s.29) | No |
| | Place listed in heritage register (S. 30) | No |
| **General protections (NHRA)** | | |
| x | structures older than 60 years (S. 34) | Haverklip homestead ruin |
| x | archaeological site or material (S. 35) | Possible (chance finds) |
| x | palaeontological site or material (S. 35) | Possible (chance finds) |
| x | graves or burial grounds (S. 36) | Haverklip cemetery (small) |
| | public monuments or memorials (S. 37) | No |
| **Other** | | |
| | Any heritage resource identified in a heritage survey (state author and date of survey and survey grading/s) | No |
| | Any other heritage resources (describe) | No |

| ***4.2.4 Property history and associations*** | | |
|---|---|---|
| | *(check box if YES)* | *Brief description/explanation* |
| x | Provide a brief history of the property (e.g. when granted, previous owners and uses). | See Appendix 1 |

| *4.2.4 Property history and associations* | | |
|---|---|---|
| | Is the property associated with any important persons or groups? | No |
| | Is the property associated with any important events, activities or public memory? | No |
| | Does the property have any direct association with the history of slavery? | No |
| | Is the property associated with or used for living heritage? | No |
| | Are there any oral traditions attached to the property? | No |

### 4.3 Summarised identification and significance assessment of heritage resources

See Appendix 3 for significance assessment criteria

***TABLE 9: Identification and significance assessment of heritage features***

| S 3(2) NHRA heritage resource category | ELEMENTS | INDICATORS OF HERITAGE SIGNIFICANCE | | | | | | | | | | CUMULATIVE SIGNIFICANCE RATING (TOTAL 30) 1-9 = Low 10-19 = Medium 20-30 = High |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | HISTORICAL | RARE | SCIENTIFIC | TYPICAL | AESTHETIC | TECHNOLOGICAL | PERSON COMMUNITY | LANDMARK | MATERIAL CONDITION | SUSTAINABILITY | |
| Buildings, structures, places and equipment of cultural significance | Homestead ruins | 1 | 0 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 5 = Low local |
| | School ruin | 1 | 0 | 0 | 1 | 0 | 0 | 3 | 1 | 0 | 0 | 6 = Low local |
| | Haverklip homestead ruin | 1 | 0 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 5 = Low local |
| | Haverglen farmstead ruin | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 = Low local |
| | Abandoned open-cast collieries | 0 | 0 | 1 | 1 | 0 | 1 | 3 | 1 | 1 | 1 | 9 = Low local |
| Areas to which oral traditions are attached or which are associated with intangible heritage | None | - | - | - | - | - | - | - | - | - | - | - |
| Historical settlements and landscapes | None | | - | - | - | - | - | - | - | - | - | - |
| Landscapes and natural features of cultural significance | None | - | - | - | - | - | - | - | - | - | - | - |
| Geological sites of scientific or cultural importance | None | - | - | - | - | - | - | - | - | - | - | - |
| Archaeological and palaeontological sites | Stone Age artefacts and fossils (chance finds) | - | - | - | - | - | - | - | - | - | - | Unknown |
| Graves and burial grounds | Small Haverklip cemetery | 2 | 0 | 0 | 3 | 1 | 0 | 3 | 0 | 3 | 3 | 15 = Medium local |
| | Large cemetery | 2 | 0 | 0 | 3 | 1 | 0 | 3 | 0 | 3 | 3 | 15 = Medium local |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Areas of significance related to labour history | None | - | - | - | - | - | - | - | - | - | - | - |
| Movable objects | None | - | - | - | - | - | - | - | - | - | - | - |

### 4.4 Impact assessment

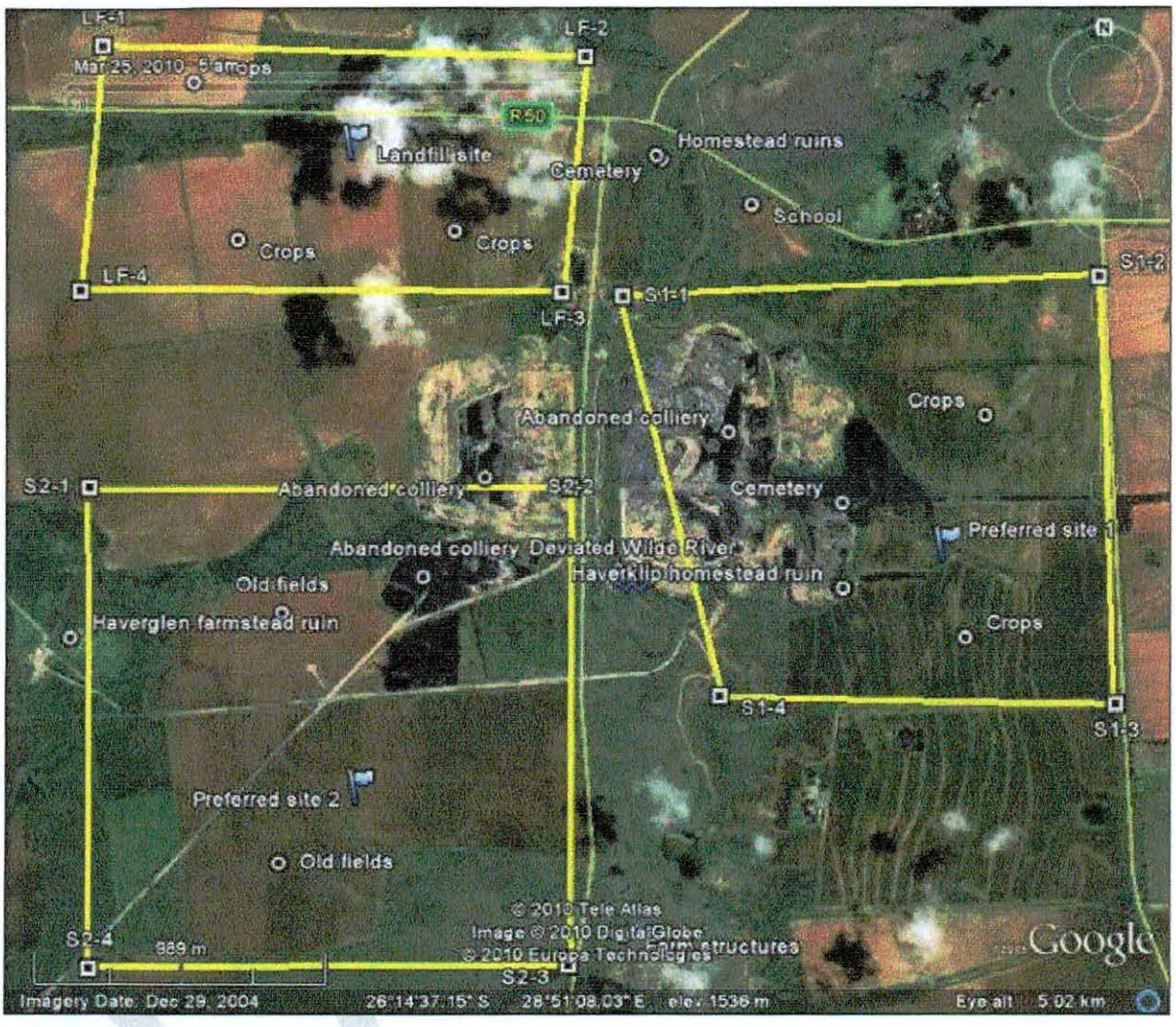


***FIGURE 13: Google Earth image (2004) of the three sites (yellow) that were investigated with identifiable heritage characteristics***

#### *4.4.1 Haverklip cemetery*

| S 3(2) NHRA heritage resource | (a) Identification | | (b) Significance | (c) Impact | | (d) Recommended impact management |
|---|---|---|---|---|---|---|
| | Site | GPS | | Study area | Impact type, certainty and significance | |
| Graves and burial sites | Haverklip farm cemetery (2 graves) | 26°14'36.12"S 28°51'39.54"E | Medium local | Preferred Site 1 | Definite destruction | Relocation of graves |


*FIGURE 14: Google Earth image (2004) indicating the location of the cemetery (top) and homestead ruin (bottom) on the Preferred Site 1*

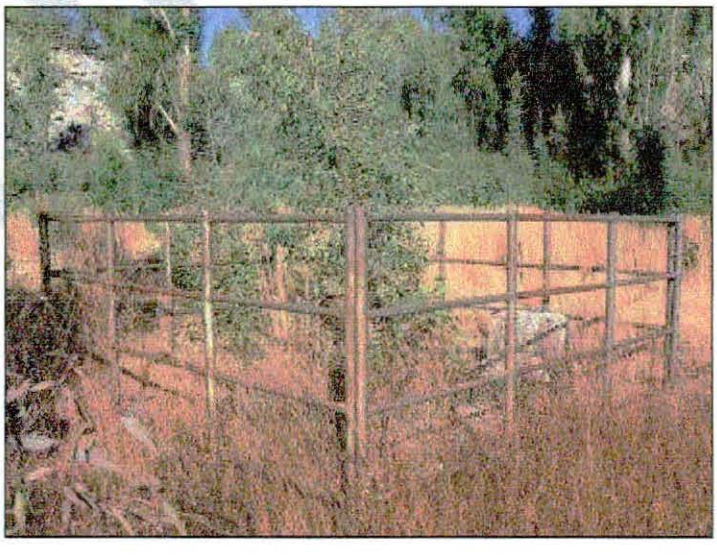

*FIGURE 15: The cemetery on the Preferred Site 1, which contains two graves*

### 4.4.2 Haverklip homestead ruin

| S 3(2) NHRA heritage resource | (a) Identification | | (b) Significance | (c) Impact | | (d) Recommended impact management |
|---|---|---|---|---|---|---|
| | Site | GPS | | Study area | Impact type, certainty and significance | |
| Buildings, structures, places and equipment of cultural significance | Haverklip homestead ruin | 26°14'45.58"S 28°51'39.63"E | Low local | Preferred Site 1 | Definite destruction – low negative impact | Mitigation: Demolition permit (the place is older than 60 years) including documentation( before destruction) |

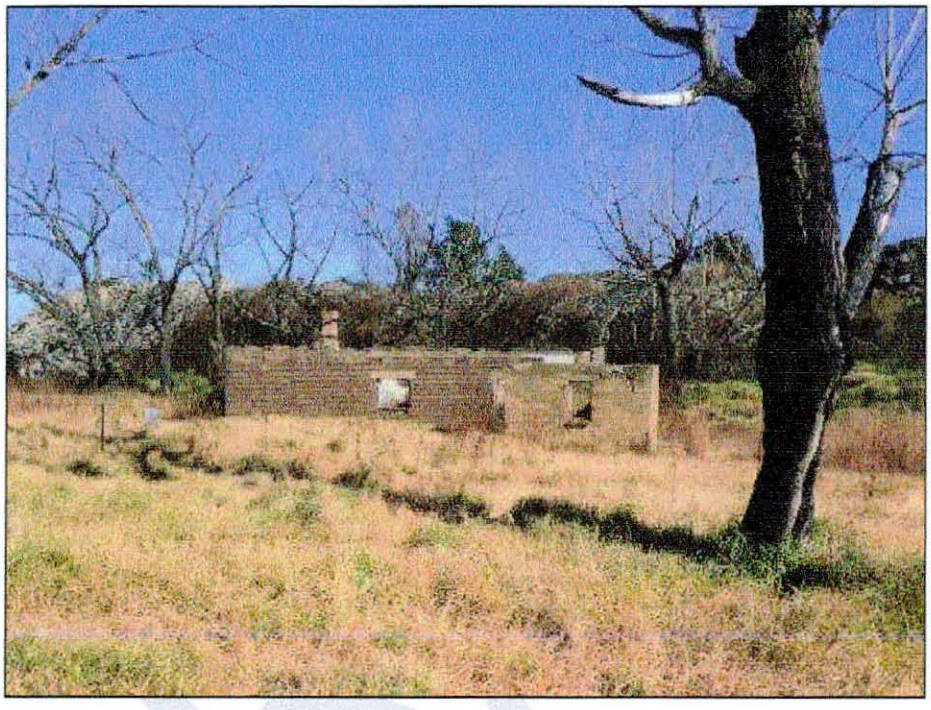

*FIGURE 16: Haverklip homestead ruin*

### 4.4.3 Haverglen farmstead ruin

| S 3(2) NHRA heritage resource | (a) Identification | | (b) Significance | (c) Impact | | (d) Recommended impact management |
|---|---|---|---|---|---|---|
| | Site | GPS | | Study area | Impact type, certainty and significance | |
| Buildings, structures, places and equipment of cultural significance | Haverglen farmstead ruin | 26°14'51.03"S 28°50'3.96"E | Low local | Just outside Preferred Site 2 | Possible destruction – low negative impact | No action – the place is younger than 60 years and no demolition permit is needed |

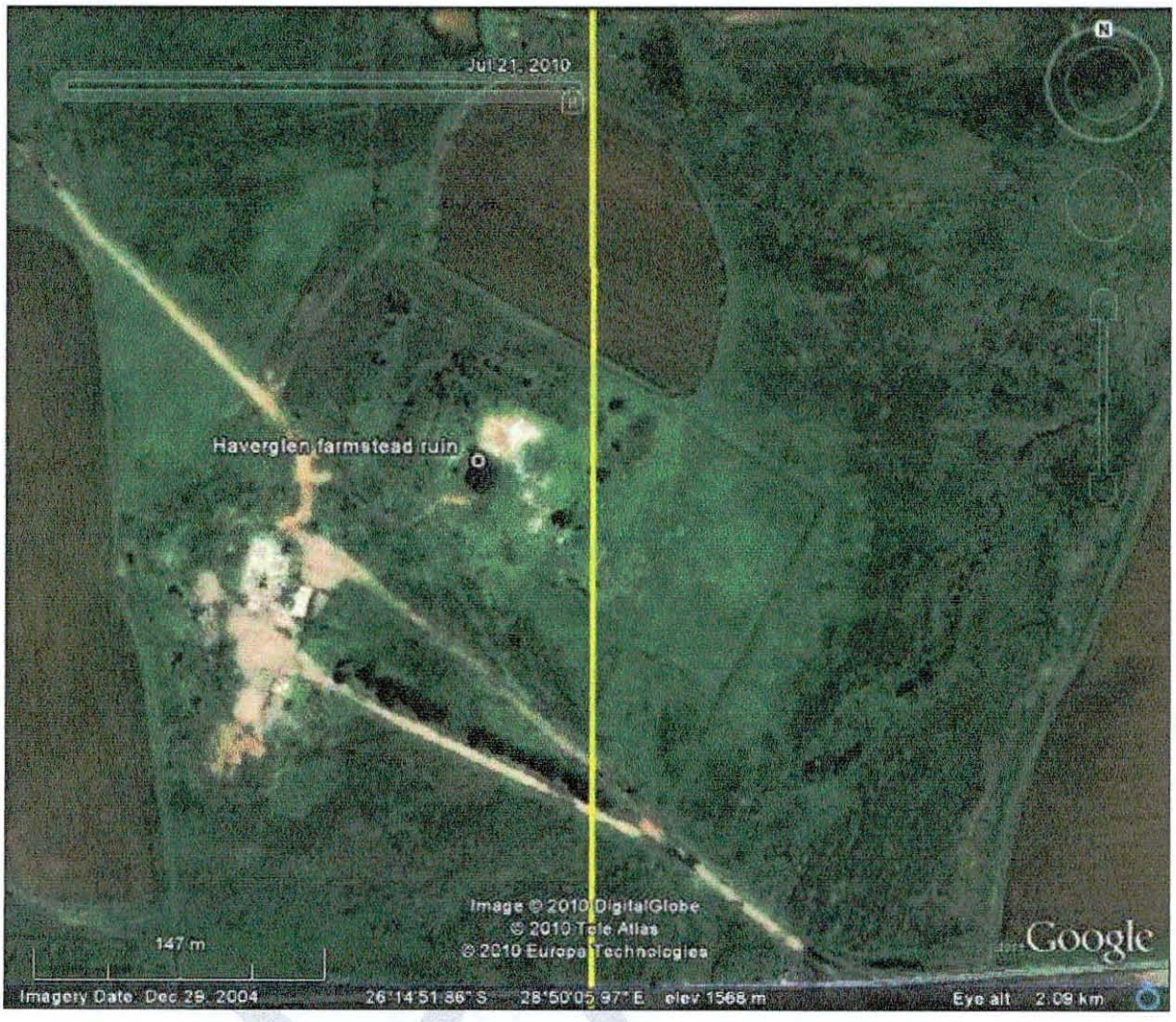


***FIGURE 17: Google Earth image (2004) of a portion of the Preferred Site 2 (the yellow line is the western boundary) indicating the location of the Haverglen farmstead ruin***

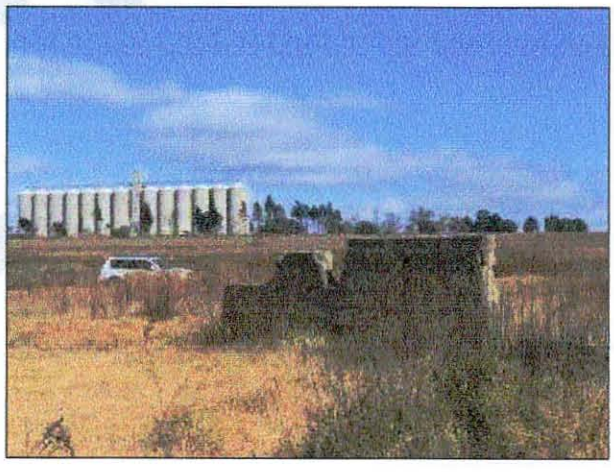

***FIGURE 18: The Haverglen farmstead ruin with the Hawerklip grain elevator in the far distance***

### *4.4.4 Summarised impact assessment*

***TABLE 10: Identification of heritage features, impacts and impact management measures***

| S 3(2) NHRA heritage resource | (a) Identification | | (b) Significance | (c) Impact | | (d) Recommended impact management |
|---|---|---|---|---|---|---|
| | Site | GPS | | Study area | Impact type, certainty and significance | |
| Buildings, structures, places and equipment of cultural significance | Homestead ruins | 26°13'57.28"S 28°51'16.48"E | Medium local | Outside | Neutral | No action: Remains of homesteads - outside development areas |
| | School ruin | 26°14'2.77"S 28°51'28.39"E | Low local | Outside | Neutral | No action: Ruin of Haverklip farm school – outside development areas |
| | Haverklip homestead ruin | 26°14'45.58"S 28°51'39.63"E | Low local | Preferred Site 1 | Definite destruction – low negative impact | Mitigation: Demolition permit (the place is older than 60 years) including documentation( before destruction) |
| | Haverglen farmstead ruin | 26°14'51.03"S 28°50'3.96"E | Low local | Just outside Preferred Site 2 | Possible destruction – low negative impact | No action – the place is younger than 60 years and no demolition permit is needed |
| | Abandoned open-cast collieries | - | Low local | Preferred Site 1 and 2 | Unknown | No action – the collieries are of recent origin |
| Areas to which oral traditions are attached or which are associated with intangible heritage | None | - | - | - | - | - |
| Historical settlements and landscapes | None | - | - | - | - | - |
| Landscapes and natural features of cultural significance | None | - | - | - | - | - |
| Geological sites of scientific or cultural importance | None | - | - | - | - | - |
| Archaeological and palaeontological sites | Chance finds | Unknown | Low local? | Preferred Site 1 and 2 | Unknown | Mitigation: Report and evaluate any graves or archaeological features and artefacts when found during site preparation work |
| Graves and burial sites | Haverklip farm cemetery (2 graves) | 26°14'36.12"S 28°51'39.54"E | Medium local | Preferred Site 1 | Definite destruction | Relocation of graves |
| | Farm workers' cemetery | 26°13'57.68"S 28°51'17.11"E | Medium local | Outside | Neutral | No action: Large cemetery associated with homestead remains |
| Features associated with labour history | None | - | - | - | - | |
| Movable objects | None | - | - | - | - | |

### 4.5 Social and economic benefits

The development will have no direct benefits related to the conservation of heritage resources (structures) since none of significance have been identified, with the exception of the small Haverklip farm cemetery.

The latest ISEP (October 2005) has identified the need for increased base load electricity supply by the year 2010. The National Energy Regulator of South Africa (NERSA) is the regulatory authority responsible for the electricity supply industry in South Africa. In its National Integrated Resource Plan (INIRP), NERSA has determined that, while various alternative and renewable electricity generation options should be continually investigated, coal should still provide the main fuel source in South Africa. Accordingly, coal-fired power stations will be required for generation capacity expansion during the next 20 years. In 2003, the South African government decided that the future power generation capacity would be divided between ESKOM (70%) and Independent Power Producers (IPP) (30%).

### 4.6 Consultation with affected communities

This is part of the EIA process.

### 4.7 Identification of other risk sources

The following project actions may impact negatively on any potential palaeontological and archaeological sites and remains.

The actions are likely to occur during the preparation phases of the proposed project:

- Earthworks and excavations may expose or uncover objects and artefacts and unmarked human burials.

### 4.8 Key mitigation and enhancement measures before and during construction

- Monitor for chance finds (e.g. burial sites, old waste disposal sites, artefacts, fossils)

### 4.9 Consideration of alternatives

The nature and significance of what has been found in terms of heritage is not of such importance that the proposed ash disposal site's location should be changed or that other alternatives should be considered.

The nature and significance of what has been found in terms of heritage may imply negative impacts regarding the construction and operation of the power plant on Preferred Site 1 and therefore Preferred Site 2 is supported as a more suitable alternative.

### 4.10 Summarised findings and recommendations

The areas proposed for the Kuyasa IPP are located in a cultural landscape classified primarily as a combination of historic farmland and a relic mining landscape. This class of landscape is of very low heritage sensitivity because it is able to absorb new development with without many adverse effects.

The predicted physical impact on the proposed landfill site for ash is neutral since this area consists almost entirely of fields with crops, without any recognisable heritage features. **The use of this area as a landfill for ash disposal is therefore supported.**

The predicted physical impact on the Preferred Site 1 for the power plant is low to medium negative since it will adversely affect a homestead ruin (for which a demolition permit will be required due to its age of 60 years and older) and a small cemetery with two graves (that must be exhumed and relocated). **The use of this area for the power plant is therefore <u>not</u> supported.**

The predicted physical impact on the Preferred Site 2 for the power plant is neutral since this area mainly consists of old fields without any recognisable heritage features. The Haverglen farmstead ruin could be affected. It is located just outside the periphery) but due to its condition, age and significance the impact will be neutral and no further action is necessary. **The use of this area for the power plant is therefore supported.**

Visual intrusion as an indirect impact is not an important issue since the proposed development will be located in an environmentally degraded area (abandoned collieries, dumps, degraded parcels of farm

land) and is bordering on land that has been transformed by housing, mining and infrastructure. Noise, dust, pollution and restrictions of access patterns as indirect impacts are also not issues.

From a historic built environment perspective no features of real heritage significance were identified and those features that are extant (the Haverklip homestead ruin) are typical of many others in the region.

From an archaeological perspective no finds were identified.

Cultmatrix states that there are no compelling reasons not to proceed with the proposed project and that it should be allowed to continue as follows:

- Use of proposed landfill site for disposal of ash
- Use of Preferred Site 2 for the construction and operation of the power plant since it has no features of heritage significance and is also located closer to the source of coal than the Preferred Site 1

The following measures are to be adopted as heritage management mechanisms:

1. Should any hidden human remains (highly unlikely) be disturbed, exposed or uncovered during site clearing and excavations (for foundations etc), these should immediately be reported to an archaeologist. Burial remains should not be disturbed or removed until inspected by an archaeologist.
2. Site preparation activities must be monitored for the occurrence of any hidden archaeological material (Stone Age tools) and similar chance finds (such as historic middens and foundations) and if any are exposed, this should be reported to an archaeologist so that an investigation and evaluation of the finds can be made. The small pans and the drainage line are potential places where such finds may occur.
3. Site preparation activities must be monitored for the occurrence of any hidden fossils and trace fossils and if any are exposed, this should be reported to a palaeontologist so that an investigation and evaluation of the finds can be made.

## APPENDIX 1: SOCIO-CULTURAL HISTORY OF DEVELOPMENT AREA

***Early Stone Age***

*In South Africa the ESA dates from about 2 million to 250 000 years ago, from the early to middle Pleistocene. Over this time, the archaeological evidence shows, as our early ancestors advanced physically, mentally and socially they invented stone and bone tools and learned to control fire and exploit natural resources effectively. The earliest tools clearly manufactured by our ancestors and their relatives (early hominids) date to 2,5 million years ago, from the site of Gona in Ethiopia. These tools showed that early hominids were able to select a suitable raw material and flake it for a specific purpose. As many of the bones found in association with early tools bear cut marks, scientists have inferred that early hominids were chipping flakes off cobbles in order to create a sharp edge with which to cut meat from animal carcasses. It would seem that these early stone tools helped early hominids to access a high-protein food source in sufficient quantity to develop their brains – the brain being metabolically the most expensive organ in the body.*

*This earliest stone tool industry is called the Oldowan, after Olduvai Gorge in Tanzania where the tools and their importance to hominid development were first recognised by Mary Leakey in the 1960s.*

*To date Oldowan tools have only been found in Africa. This early technology is fairly consistent across Africa, in that the tools are mainly simple flakes struck from cobbles, a technology that appears to have been sufficient to meet the needs of early hominids as it persisted for a long time. At sites like Olduvai Gorge and Koobi Fora in Kenya, Oldowan tools remained unchanged until about 1,5 million years ago. Oldowan technology thus represents a long period of successful adaptation, which lasted for almost a million years. In South Africa the Oldowan Industry dates from about 2 million years ago. There is still some debate about which hominid made the Oldowan tools as there were at least two hominids in South Africa at that time which were capable of doing so. The first was an early form of Homo, and the second was Paranthropus robustus, which went extinct approximately one million years ago. Because the technology did not disappear when Paranthropus went extinct, it is often assumed that Homo was the toolmaker.*

*About 1,7 million years ago more specialised tools appeared, developing first in Africa then spreading to Asia and Europe through the movement of hominids out of Africa. These core tools, which are known as Acheulean tools after the French site, Saint Acheul, where they were first discovered in the 1800s, were intentionally designed to have sharper and straighter edges and studies suggest they were used to carry out a range of activities including butchering animals, chopping wood, digging up roots and cracking bone. Interestingly, even though the tools were named after a French site, they only appeared in Europe about 500 000 years ago.*

*The hominid species Homo ergaster has been credited with the manufacture of the Acheulean tools in South Africa. Compared with earlier hominids, Homo ergaster was physically almost like us; it had a larger brain, and was relatively modern in face, body proportion and height. In fact, it had a body very much like our own. Homo ergaster ranged over vast areas of territory, and occupied a variety of habitats, including drier, more open grassland settings. Most importantly, Homo ergaster became more dependent on tools; it became a habitual tool user.*

*Oldowan and Acheulean tools are widely distributed across South Africa, where they are most commonly found in association with water sources such as lakes and rivers. Unfortunately, because of this there are very few sites where the tools are found in a primary context, that is, exactly where the user left them. Most of the tools have either been washed into caves or eroded out of riverbanks and washed down rivers.*

(Source: Peter Delius (ed), 2006, *Mpumalanga – Reclaiming the Past, Defining the Future)*

There are only a few places in Mpumalanga where Early Stone Age tools have been found and the development area is not known as a site.

***Middle Stone Age***

*By 250 000 the large hand axes and cleavers of the Earlier Stone Age had begun to diminish in numbers, and our ancestors started to employ a different technique in order to produce a greater variety of tools of diverse shapes and sizes. This change in technology marks the beginning of the Middle Stone Age*

*(MSA). MSA tools are generally smaller, and, unlike ESA tools, which were produced by removing flakes, MSA tools were the flakes. These flakes were of a predetermined size and shape and were produced by preparing the core and striking the flake off. Long, parallel-sided blades, as well as triangular flakes, were commonly produced. The hafting of stone tools onto bone or wood to produce spears, knives or axes also became popular during the MSA, which reflected a shift from scavenging to spear hunting. During the MSA early humans still settled along or near water sources, but also took shelter in caves. Importantly, the MSA marks the transition from a more archaic Homo to anatomically modern humans, Homo sapiens. With this physical development the first signs of art, decoration and symbolism began to emerge.*

*Although the MSA has not been extensively studied in Mpumalanga, evidence for this period has been excavated from Bushman Rock Shelter, a well-known site situated on the farm Klipfonteinhoek in the Ohrigstad District.*

(Source: Peter Delius (ed), 2006, *Mpumalanga – Reclaiming the Past, Defining the Future)*

Middle Stone Age finds (isolated and out of context) may occur along the Wilge River and its tributary, but during the fieldwork phase none have been found.

***Late Stone Age***

*The Later Stone Age (LSA), which occurred from about 20 000 years ago, is signalled by a series of technological innovations and social transformations within these early hunter-gatherer societies. The hunting apparatus now included two important innovations, the bow and the link-shaft arrow. Link-shaft arrows were constructed with a poisoned bone tip, a link and shaft that fell away on impact, leaving the poison tip imbedded in the animal. Other innovations included bored stones, used as digging-stick weights to aid in uprooting tubers and roots; small stone tools, often less than 25 mm in length, used for cutting meat and scraping hides; polished bone tools such as needles; twine made from plant fibre or leather; tortoiseshell bowls; fishing equipment, including hooks and sinkers; bone tools with decoration; high frequencies of ostrich eggshell beads and an increase in ornaments and artwork.*

*There appears to be a gap in the Mpumalanga LSA record between 9 000 BP and 5 000 BP. This may have to do with the general dearth of Stone Age research in the province, but it also encompasses a period of rapid warming and major climate fluctuation, which may have forced people to seek out more protected and viable environments in this area.*

*We pick up the Mpumalanga Stone Age record again in the mid-Holocene at the farm Honingklip (HKLP) near Badplaas in the Carolina District. Here two LSA sites were found on opposite sides of a bend in the Nhlazatshe River, about 1km west of its confluence with the Teespruit. The HKLP sites are in the foothills of the Drakensberg, where the climate is warmer than the Highveld but cooler than the lowveld.*

(Source: Peter Delius (ed), 2006, *Mpumalanga – Reclaiming the Past, Defining the Future)*

Late Stone Age finds (isolated and out of context) may occur along the Wilge River and its tributary, but during the fieldwork phase none have been found.

***Early Iron Age occupation***

*The expansion of early farmers, who, among other things, cultivated crops, raised livestock, mined ore and smelted metals, occurred in this area between AD 400 and AD 1100. Dates from Early Iron Age sites indicated that by the beginning of the 5th century AD Bantu-speaking farmers had migrated down the eastern lowlands and settled in the Mpumalanga lowveld. Subsequently, farmers continued to move into and between the lowveld and Highveld of Mpumalanga until the 12th century. These Early Iron Age sites tend to be found in similar locations. Sites were found within 100m of water, either on a riverbank or at the confluence of streams. The close proximity to streams meant that the sites were often located on alluvial fans. The nutrient rich alluvial soils would have been favoured for agriculture. The availability of floodplains and naturally wetter soils would have been important for the practice of dryland farming. This may have been particularly so during the Early Iron Age when climate reconstruction for the interior of South Africa suggests decreased rainfall between AD 900 and AD 1100 and again after AD 1450.*

*Burned dagha and plaster with pole impressions found at these early lowveld sites indicated that early farmers lived in fairly permanent agricultural villages. Grindstones and an imprint of millet or domestic Pennisetum in a piece of pottery from an AD 400 site on the northern border of Mpumalanga provided the*

*first evidence of the cultivation of millet in South Africa. Remains of iron tools indicated that metalworking was also practised. Iron was an important commodity, and ores in the form of haematite and magnetite were either picked up off the surface or mined from shafts dug into the ground. Large cattle byres with pits were also significant features of EIA Highveld sites dating from AD 600.*

(Source: Peter Delius (ed), 2006, *Mpumalanga – Reclaiming the Past, Defining the Future)*

Mining and farming activities have transformed the area and no traces of Early Iron Age settlements were found.

***Late Iron Age occupation***

*While there is some evidence that the EIA continued into the 15th century in the lowveld, on the escarpment it had ended by AD1100. The Highveld, particularly around Lydenburg, Badfontein, Sekhukhuneland, Roossenekal, and Steelpoort, became active again from the 15th century onwards. This later phase, termed the Late Iron Age (LIA), was accompanied by extensive stonewalled settlements.*

*Trade no doubt played an important role in the economy of these early societies. Goods were traded both locally and further afield. Control of resources such as metal provided a solid economic base that was fairly impervious to changes in the environment. Traditional sources of wealth were easily bolstered as metals were used in place of cattle to encourage key marriage alliances, and at the same time used to purchase livestock and other trade items from outside the country.*

*Local trade consisted of metal, salt, thatch, poles, cattle and grain. Salt was produced from alkaline springs. This valuable commodity could be obtained by paying a tithe to the chief on whose land the salt was located. However, there were examples of mass production where salt was 'balled' for transport and sold for huge profit in salt scarce areas. By the 1700s, with growing trade wealth, economically driven centres of control began to emerge and, following the establishment of Portuguese trade posts, the Mpumalanga landscape became an important thoroughfare for both local and foreign traders.*

(Source: Peter Delius (ed), 2006, *Mpumalanga – Reclaiming the Past, Defining the Future)*

Typical late Iron Age features such as stone-walled settlements, potsherds, hut floors, middens and iron artefacts were not found in the study area due to disturbance by farming and mining activities. Isolated artefacts may be found along the river courses, but during the fieldwork phase none were identified.

***Colonial settlement***

*In 1845 the establishment of a Boer settlement at Ohrigstad marked the beginning of a new phase in the history of the Eastern Transvaal. The first Trekkers to settle in the area were the followers of A H Potgieter, who moved from Mooi River in the south-western Transvaal. Trekkers from Natal led by J J Burger joined them. Tensions between the two groups soon surfaced and the difficulties facing the community were compounded by malaria, which decimated the population, and stock disease, which ravaged their herds. In 1848, partly to escape this disease and conflict-ridden community, Potgieter and his followers moved north and founded the town of Schoemansdal. Most of those who remained behind moved to higher-lying lands to the south. The town of Lydenburg became the new centre of the community and white settlers slowly established themselves in the wider region. The Trekkers' political fractiousness did not, however, diminish. In 1856 the Lydenburg community seceded from the Zuid Afrikaansche Republiek (ZAR) – a development that was symptomatic of the fragility of the wider state. Political instability and racial exclusivity – blacks were infamously denied any equality in church or state – however, co-existed with strong traditions of popular democracy. It was not until 1864 that political unity was achieved among the main Trekker communities in the Transvaal and even thereafter the state remained both rudimentary and cash strapped.*

*Once the Trekkers had established what they saw as their right to the land they set about distributing it among themselves. The land was demarcated into large farms and title deeds were issued. The initial policy was that all burghers (citizens) were entitled to two farms of 3 000 morgen each (about 6 330 acres or 2 564 hectares) from the state. White newcomers to the Transvaal were quickly granted citizenship and the land that went with it. Farms, which were not distributed, remained government property and the ZAR, which battled to raise revenue, increasingly fell back on its principal asset – land.*

*This profligate distribution of land could not be sustained. From 1860 land grants to burghers were reduced to one 3 000 morgen farm each. After 1866 newcomers no longer received any grant of land and from 1871 this prohibition applied even to the sons of burghers.*

*The most consistent supply of labour for those farmers able to enforce their claim to ownership of the land came from African families living on their property. The practice that developed in the area was that five families of a group were expected to render unpaid labour service to the landowner but were then spared from further demands on their labour or their produce by officials or neighbouring farmers. Elements of a patriarchal pact underpinned these arrangements as male elders within African communities used their authority over both women and youths to meet the farmers' appetite for workers. Over the subsequent decades the amount of labour that could be extracted from resident workers would be a source of recurring strife. Communities settled on land owned by absentee landlords were often able to secure their tenure through payments of rent in cash or kind, to the considerable irritation of their white neighbours, who believed they should be forced to work for them.*

(Source: Peter Delius (ed), 2006, *Mpumalanga – Reclaiming the Past, Defining the Future)*

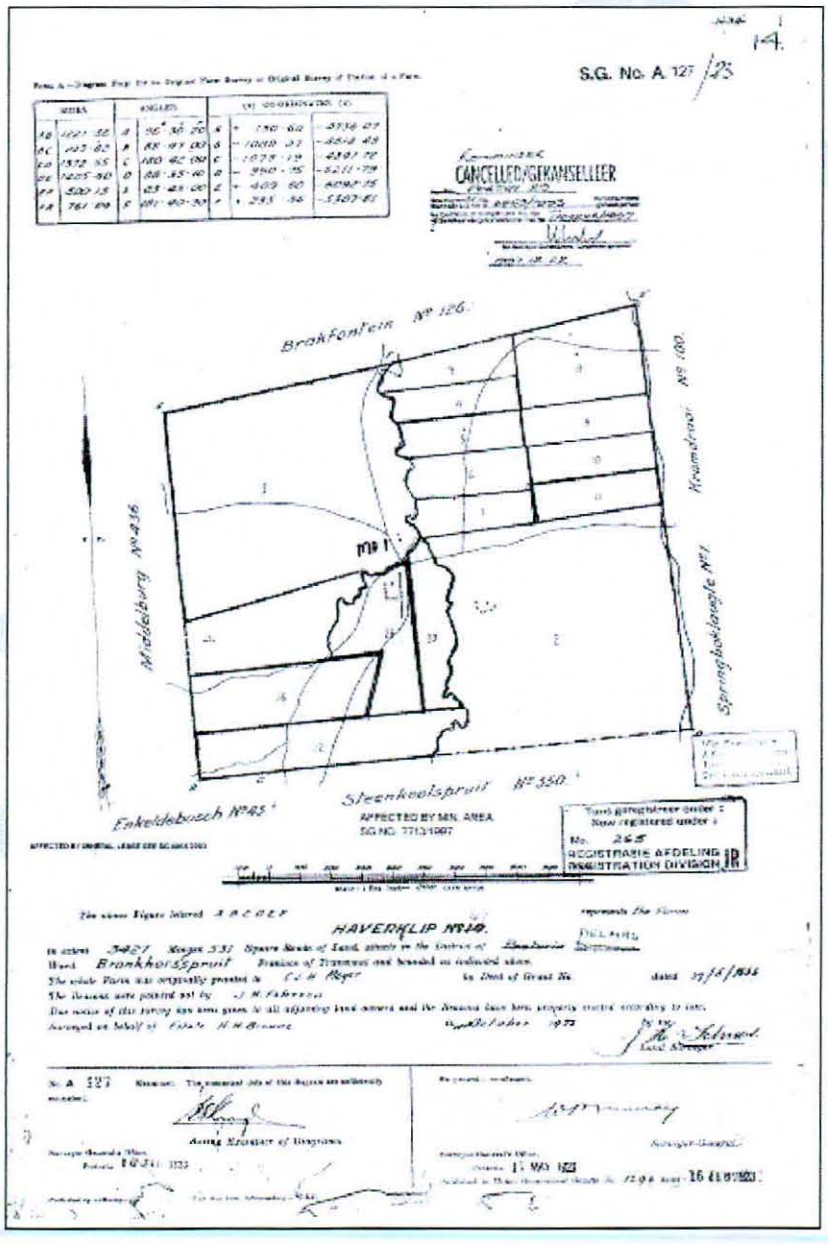


***FIGURE 19: Survey diagram (1923) of the farm Haverklip***

The farm Haverklip (the origin of the name is uncertain, but it could refer to the occurrence of oats-like vegetation on rocky areas) was granted by the Transvaal government to CJH Meyer in June 1866. In 1970 the western portion was resurveyed and renamed Haverglen.

Some of the farms were divided and subdivided many times over. Each subdivided portion often had a separate farmstead where the owner lived. Black tenant farmers and sharecroppers were allowed to live on the land in return for providing farm labour to the white farmers. They lived in homesteads away from the main farmstead. The homestead remains and large cemetery outside the development areas are associated with this community, as well as the ruin of the farm school.

The cultivated fields, planted trees, ruins and cemeteries are associated with farming history.

***Coal mining***

*Though gold mining has a longer history, coal mining is Mpumalanga's most important industrial activity. Today the province produces 80 per cent of South Africa's coal. Coal mining had already begun in Mpumalanga in 1868 when Thomas Baines recorded that farmers in the Middelburg district were extracting outcropped coal for their own use. However, it was only after the discovery of gold on the Witwatersrand in 1886 that large-scale coal mining was undertaken in the vicinity of the town of Witbank. This initial venture was very short lived. Once coal was discovered around Brakpan and Springs in 1887, the Witbank coalmines closed down. There was no rail link between Witbank and the Rand, which made the cost of using Witbank's coal much higher than that of the closer coal of Springs and Brakpan. Viable commercial coal mining in Mpumalanga, therefore, had to wait until a cost-effective railway link had been established.*

*Once that had happened and freight rates had dropped to a reasonable level, the Witbank coalfields came on stream. The coal deposits are concentrated around Witbank and run eastwards for about 48 km past the town of Middelburg to the town of Belfast. The coalfields are approximately 40 km wide. The first coalmines – the Douglas, Transvaal and Delagoa Bay, Witbank, and Landau collieries – were all located around Witbank and the quality of coal they produced was higher than that produced on the East Rand and found a ready market on the gold mines, as well as being used for domestic heating. In the 1890s some of the coal was already being exported via Delagoa Bay. The coal was also relatively easy to mine as it lay close to the surface, at a depth of 100 m or less*

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*In the first two decades of the 20th century, coal production expanded rapidly and many new collieries were founded. The price of coal dropped and, in response, a number of coalmines sought to form an association known as the Transvaal Coal Owners Association 'for the purpose of regulating both output and price, and to put an end to what was considered in some quarters as ruinous competition'. Advocates of the move argued that this course of action was justifiable because 'the large amount of capital invested in the companies is entitled to a fair return'. However, there were negative aspects to this development from an economic point of view – a reduction in competition can be bad for efficiency and for workers. But it is also possible that the association enhanced the capacity of coalmines and facilitated further investment and development of the industry. Not all the Witbank collieries joined this association, however. In particular, Sigismund Neumann, who operated a significant colliery, decided it was better to go it alone.*

*One positive outcome of the formation of the association was that it enabled more efficient interaction with international buyers. As explained by a leading member of the association in 1907: 'instead of each colliery going in for the shipping trade, and the internal trade, the Association is able to allot the export trade orders to certain collieries who have the necessary quality, the railway trade to other collieries who have the quality required for the railway, and the internal trade, that is for industries, to other collieries, who do not perhaps enjoy the same high value of coal'. In this way the Association allowed the coalmines to find a larger market at a lower cost.*

*By 1946 a modern coal industry was emerging in Witbank and Middelburg. In the Transvaal 34 large collieries produced 99,7 per cent of the province's coal. Of these 23 were in the Witbank-Middelburg coalfield. An additional coal producing area was emerging around the town of Ermelo, where six collieries had been established, though these were small compared with those in Witbank. The coal commission of 1946 reported that Transvaal and Orange Free State collieries had sold more than 20 million tons of coal in that year. Capital invested totalled £11,5 million, yielding an after tax profit of £1,6 million. The commission also established that there were sufficient reserves of high-grade steam coal in the Witbank-Middelburg area to last for well over 100 years. Problems were, however, beginning to emerge with the*

*way the industry was organised, with some of the smaller collieries in Witbank expressing dissatisfaction with the restrictive practices imposed by the Transvaal Coal Owners Association. They complained that the association, 'raised standards of quality unnecessarily high for the purpose of stifling competition, was inflexible towards competing producers and slow to welcome new members'. Thus we see the problems that emerge when institutional power is used to entrench the position of established businesses.*

*Between 1940 and 1960 Mpumalanga's coal output increased from 13 million to 25 million tons. But, while the industrialisation of South Africa expanded rapidly in the 1950s and 1960s, which, to an extent, created an expanding internal market for coal, the demand for coal both locally and internationally was being adversely affected by the switch to oil as the dominant form of energy. In South Africa this trend was offset a little by the government's decision to convert coal into oil, but there was nevertheless significant cause for concern. In response, the Anglo American Corporation, the largest company in South Africa and the largest coalmining company in Mpumalanga, undertook initiatives to locate new markets for South Africa's coal. In the mid-1960s three research programmes were initiated within the company: a technical programme to probe the nature and potential of South African coals, a marketing programme in the West European energy market, and, arising from this, a transportation study. As a result of these efforts and additional forms of government support, Mpumalanga's coalmines became increasingly oriented to the international export market. This trend continued through the 1980s despite the imposition of sanctions against South Africa.*

(Source: Peter Delius (ed), 2006, *Mpumalanga – Reclaiming the Past, Defining the Future)*

The two collieries on the farms Haverglen and Haverklip date to the late 1990s and are therefore of no special heritage significance, in contrast to the much older Delmas Colliery.

## APPENDIX 2: INFORMATION SOURCES USED IN THIS REPORT

**Databases**

Environmental Potential Atlas, Department of Environmental Affairs and Tourism.
Heritage Sites Database, Pretoria
SAHRA database of archaeological impact assessment reports (2009)

**Literature**

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WILSON, MGC, & ANHAEUSSER, CR, 1998, *The mineral resources of South Africa*, Council for Geoscience Handbook 16. Pretoria: Council for Geoscience.

**Maps**

2628 BB Kendal (1995)
Cadastral farm diagrams of Haverklip and Haverglen
Maps provided by client

**Aerial photos**

Google Earth (2004)

**Other information**

Mr Roger Price, Council for Geoscience, Pretoria, August 2009

Jones and Wagener specialist briefing document regarding a heritage specialist study, 20 July 2009