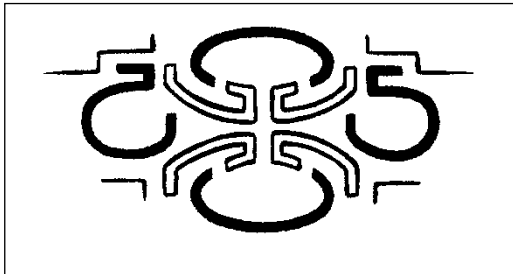


**Desktop Cultural Heritage Assessment:  
 Prospecting Right Application to prospect for Diamonds Alluvial (DA), Diamonds  
 General (D) near Douglas on the Remaining Extent and the Remaining Extent of  
 Portion 1 of the farm Klein Torquay 249, Siyancuma Local Municipality, Pixley ka  
 Seme District Municipality, Northern Cape Province**

For

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<b>Date:</b>	<b>June 2023</b>
<b>Version:</b>	<b>1 (Final Report)</b>

## Executive Summary

This report contains a desktop heritage impact assessment investigation in accordance with the provisions of Sections 38(1) and 38(3) of the *National Heritage Resources Act* (Act No. 25 of 1999) (NHRA) and focuses on predictive results as requested by Milnex CC on behalf of the client Bondeo 140 CC for the proposed prospecting Right Application to prospect for Diamonds Alluvial (DA), Diamonds General (D) near Douglas on the Remaining Extent and the Remaining Extent of Portion 1 of the farm Klein Torquay 249, Siyancuma Local Municipality, Pixley ka Seme District Municipality, Northern Cape Province. The property is located approximately 13.5 km south a Douglas, south of the Vaal-Orange Confluence. The Orange River is bordering the north-eastern boundary of the survey footprint. The scoping and EIA process for Environmental Authorisation for the proposed diamond prospecting right is conducted in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA), with section 16(3)(b) of the EIA Regulations, 2014 and Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended). Application reference number: NC 30/5/1/1/2/11457 PR.

### Recommendations

Several heritage surveys and other studies have been conducted in the general region, but none inside the current study area. Several declared Provincial Heritage sites, Middle and Later Stone Age deposits, historical structures, glacial pavements, rock art and early mining activities have been recorded in the region.

This predictive assessment (desktop) concludes that there is a high to medium probability that various cultural heritage remains are located within the proposed prospecting footprint.

As a result, it is recommended that a Phase 1 Cultural Heritage Impact Assessment should be conducted to record any possible heritage sites and to assess possible impacts by the proposed mining right application. Appropriate mitigation measures will then be proposed to minimize any potential impacts emanating from these activities.

### Definitions and abbreviations

Midden:	Refuse that accumulates in a concentrated heap.
Stone Age:	An archaeological term used to define a period of stone tool use and manufacture
Iron Age:	An archaeological term used to define a period associated with domesticated livestock and grains, metal working and ceramic manufacture
LIA:	Late Iron Age sites are usually demarcated by stone-walled enclosures
NHRA:	National Heritage Resources Act (Act No. 25 of 1999)
SAHRA:	South African Heritage Resources Agency
SAHRIS:	South African Heritage Resources Information System
PHRA-G:	Provincial Heritage Resources Authority - Gauteng
GDARD:	Gauteng Department of Agriculture and Rural Development
HIA:	Heritage Impact Assessment
DMR:	Department of Mineral Resources
I&APs:	Interested and Affected Parties

I, Francois Coetzee, hereby confirm my independence as a cultural heritage specialist and declare that I do not have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of the listed environmental processes, other than fair remuneration for work performed on this project.



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## 1. Introduction and Terms of Reference

Milnex CC an independent environmental consultant was appointed by Bondeo 140 CC to undertake the scoping and EIA process for the proposed prospecting Right Application to prospect for Diamonds Alluvial (DA), Diamonds General (D) near Douglas on the Remaining Extent and the Remaining Extent of Portion 1 of the farm Klein Torquay 249, Siyancuma Local Municipality, Pixley ka Seme District Municipality, Northern Cape Province. The property is located approximately 13.5 km south a Douglas, south of the Vaal-Orange Confluence. The Orange River is bordering the eastern and southern boundary of the survey footprint. The scoping and EIA process for Environmental Authorisation for the proposed diamond prospecting right is conducted in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA), with section 16(3)(b) of the EIA Regulations, 2014 and Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended). A desktop Cultural Heritage Assessment was requested by Milnex CC to predict the potential impact of the proposed development activities on cultural heritage remains.

## 2. Objectives

The general objective of a desktop cultural heritage survey is to predict the likelihood of cultural heritage remains consisting of both tangible and intangible archaeological and historical artefacts, structures (including graves), settlements and oral traditions of cultural significance, occurring in the area of the proposed development. Recommendations will be made in terms of the necessity for a full-scale Phase 1 Cultural Heritage Impact Assessment (and field survey).

## 3. Description of Physical Environment of Study Area

The survey footprint is located approximately 13.5 km south of Douglas, and the Orange River is bordering the eastern and southern boundary of the site.

Farm Name(s) and Portions	Klein Torquay 249 <ul style="list-style-type: none"> <li>• Remaining extent</li> <li>• Remaining extent of Portion 1</li> </ul>
Size of Survey Area	909.1985 hectares
Magisterial District	Siyancuma Local Municipality Pixley ka Seme District Municipality
1:50 000 Map Sheet	2923BD
1:250 000 Map Sheet	2922
Central Coordinates of the Development	23.792910°E 29.274540°S

**Table 1: Physical Environment**

The central region of the survey footprint falls within the Nama-Biome, particularly the Eastern Kalahari Bushveld Bioregion and more specifically the Kimberley Thornveld (SVk 4) and the sections along the Orange River falls within the Azonal Vegetation Biome, particularly the Alluvial Vegetation Bioregion and more specifically the Upper Gariep Alluvial Vegetation (AZa4). A small section in the along the eastern periphery falls within the Savanna Biome, particularly the Eastern Kalahari Bushveld Bioregion and more specifically the Vaalbos Rocky Shrubland (SVk 5). The veld type SVk 4 occurs within the

North West, Free State and Northern Cape Provinces and most of the Kimberley, Hartswater, Bloemhof and Hoopstad Districts as well as substantial parts of the Warrenton, Christiana, Taung, Boshof and to some extent the Barkly West Districts, and also includes pediment areas in the Herbert and Jacobsdal Districts. The veld type AZa4 which occurs in the Free State and Northern Cape Province and the broad alluvia of the Orange River, lower Caledon as well as lower stretches of the Vaal, Riet and Modder rivers as far as Groblershoop. These river stretches are surrounded by vegetation units of broad transitional regions between the dry facies of the Savanna and Grassland and northern regions of the Nama-Karoo Biome. The SVK 5 veld type occurs in the Northern Cape and Free State Provinces and extends along solitary hills and scattered ridges east of the confluence of the Orange and Vaal Rivers, mainly in the Kimberley and Herbert Districts and west of a line bounded by the western Free State towns of Luckhoff, Petrusburg, Dealesville, Bultfontein and Hertzogville (Mucina & Rutherford 2006).

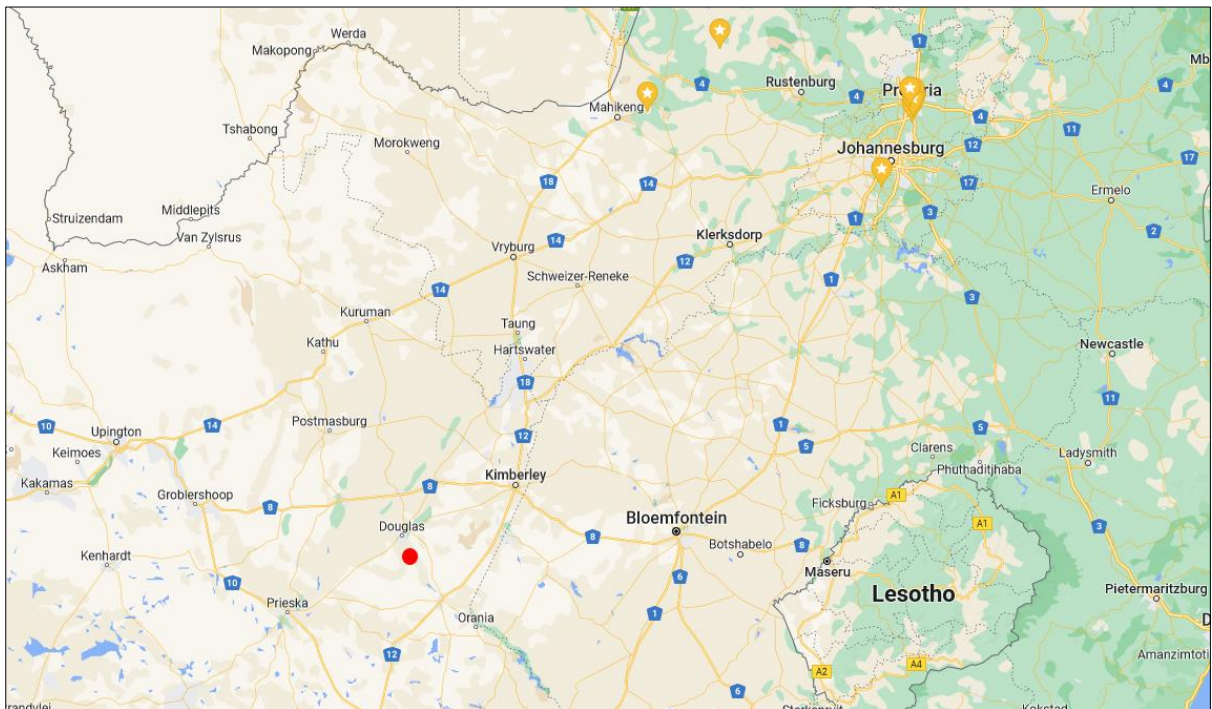
The survey footprint is characterised by open flat land bordered by the Orange River on the eastern and southern sides. Infrastructure consists several dirt roads that provide access to the area, as well as power lines, fences, houses and buildings as well as extensive agricultural fields (mostly pivots under irrigation).

Douglas normally receives about 211 mm of rain per year, with most rainfall occurring mainly during autumn. The chart below (lower left) shows the average rainfall values for Douglas per month. It receives the lowest rainfall (0 mm) in June and the highest (57 mm) in March. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Douglas range from 18.4°C in June to 32.9°C in January. The region is the coldest during July when the mercury drops to 1°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures (SAexplorer 2018).

Current Zoning	Agricultural land
Economic activities	Farming and mining
Soil and basic geology	The bedrock of the Orange River valley between the confluence of the Vaal and the Orange River at Douglas and Prieska is dominated by flat-lying Dwyka tillite and siltstone of the Karoo Supergroup. The Dwyka typically comprises matrix-supported diamictite with both local and transported pebbles and boulders as dropstones in a rock-flour matrix. Underlying the Dwyka, and exposes where the Orange River has incised through that sequence, are lavas of the Ventersdorp, Supergroup, overlain (in places by sediments of the Transvaal Group, comprising shales, quartzites and dolomites. The bedrock is cut by faults and dolerite dykes, which are rarely exposed. The surface on which the Dwyka was deposited was irregular with several topographic highs. Lower elevation terraces (less than about 30 m above present river bed) of the Orange River are typified by up to 30% sand matrix with a high proportion of zeolite-rich sand lenses and a high proportion of red Drakensberg basalt clasts. These gravels normally exhibit intermediate to low diamond grades. They are typically cobble-pebble gravels with occasional boulders.
Prior activities	Agriculture
Socio Economic Environment	The Siyancuma Local Municipality is situated within the Pixley Ka Seme District of the Northern Cape Province. It is bordered by the ZF Mgcawu and Frances Baard Districts in the north, Siyathemba and Thembelihle in the south, the Free State Province in the east, and the ZF Mgcawu

	<p>District in the west. It is one of the eight municipalities that make up the district, accounting for 16% of its geographical area. The Siyancuma Municipality’s total population of 35 938 (2016) can be broken down as follows: Coloured 67.80 %, African 25.30 %, White 6.69 % and Asian 0.21 %. The level of education of the population above the age of 20, is of significance, because it shows an increase in matric and higher education qualifications of 3,6% and 3,5% respectively from 2011 to 2016, while the figure for people with no schooling decreases with 7,0%. This represents a positive improvement in terms of increasing the levels of literacy within the municipality.</p>
<p>Evaluation of Impact</p>	<p>An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits NHRA (Act No. 25 of 1999, Section 38(3d)): <b>Positive</b></p>

**Table 2: Socio-economic environment**



**Figure 1: Regional context of the survey footprint located south of Douglas (indicated by the red area)**



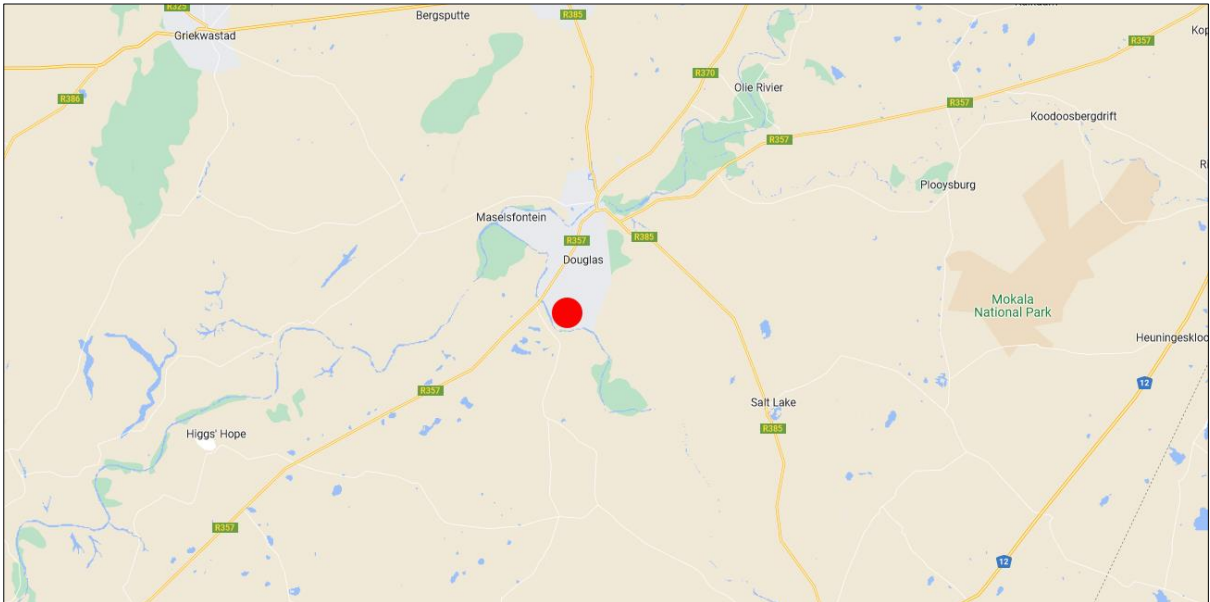


Figure 2: Local context of the survey area located south of Douglas (indicated by the red area)

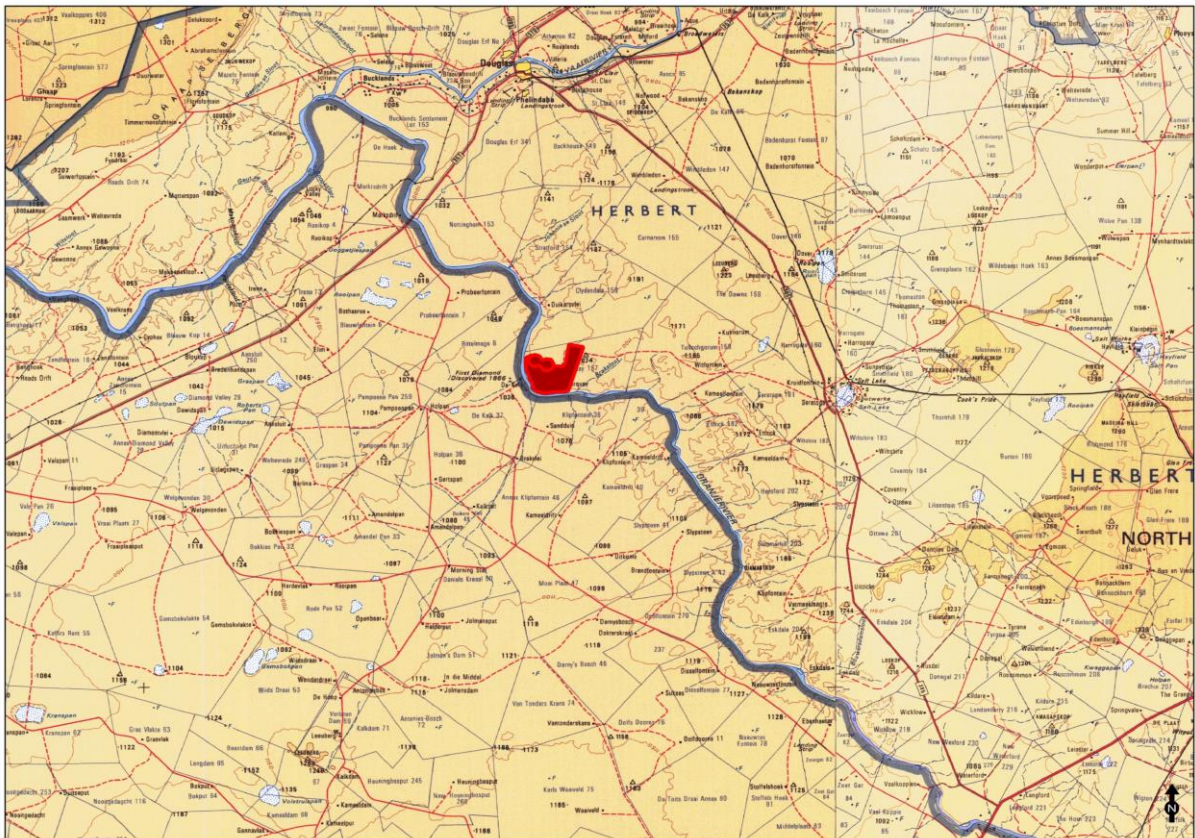


Figure 3: Local context of the survey footprint (1:250 000 Map 2922 and 2924)



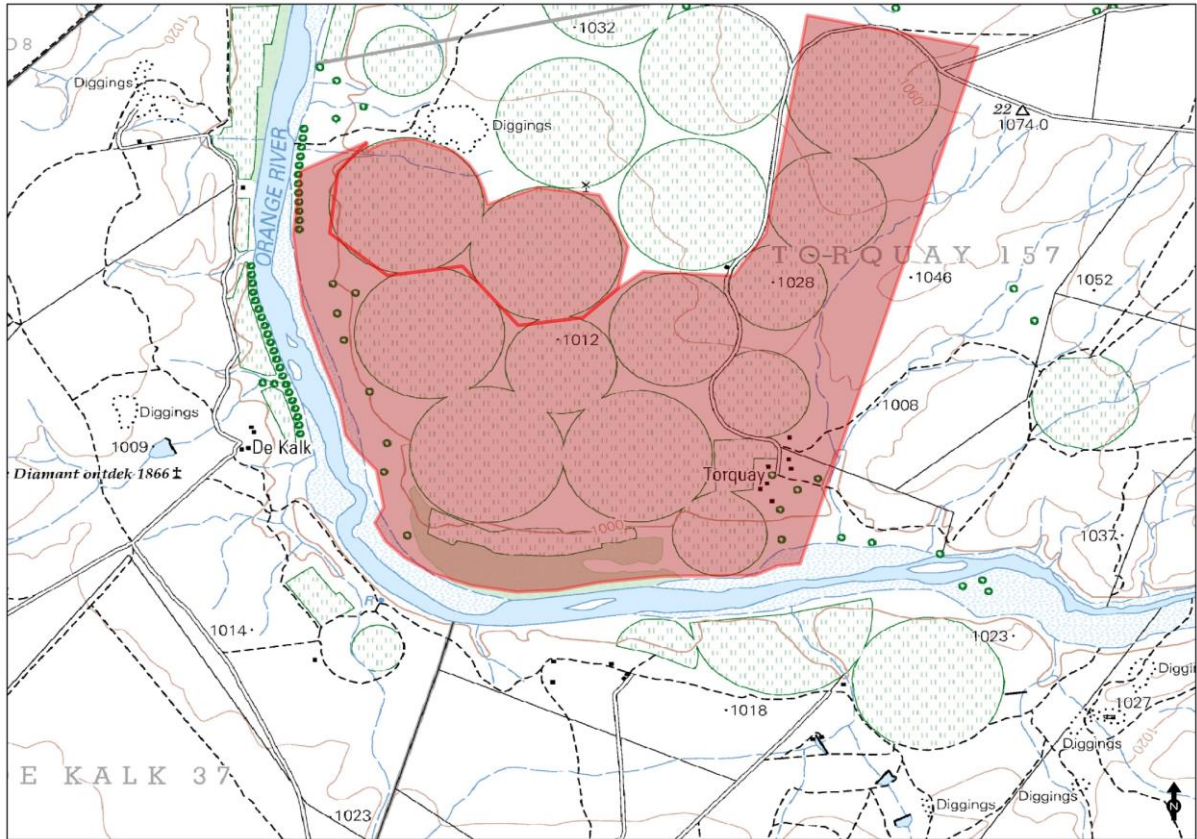


Figure 4: The survey area as indicated on the 1:50 000 topographic map 2923BD (2005)

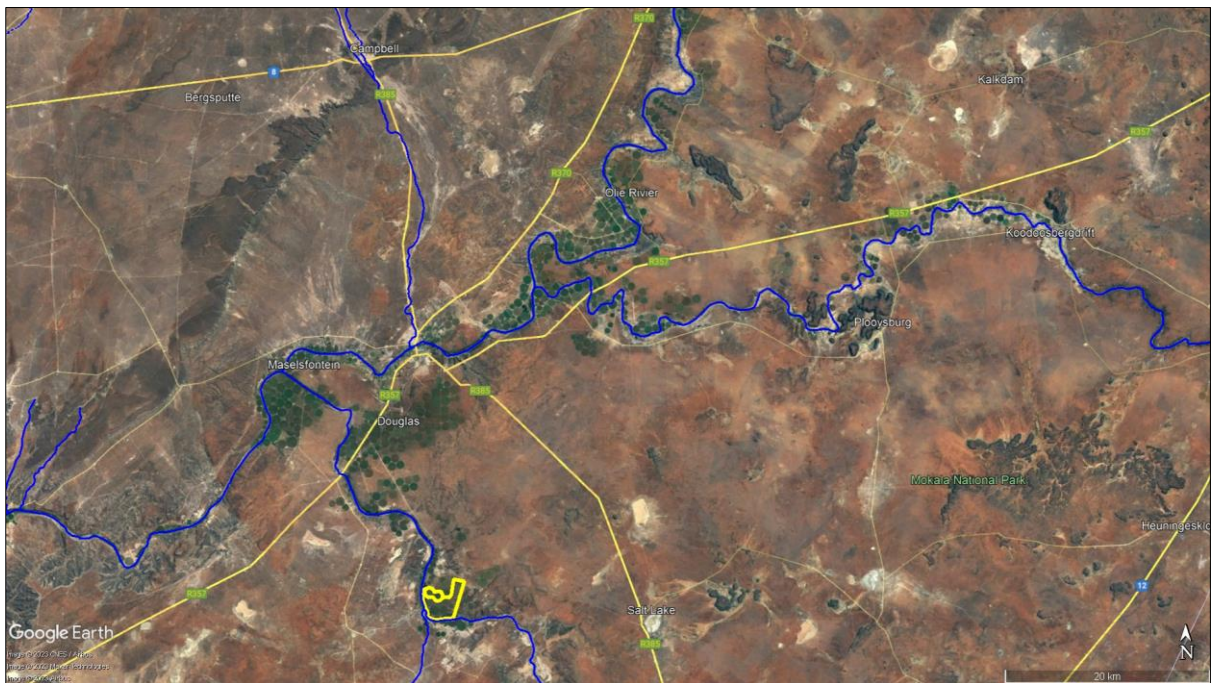


Figure 5: Survey area within a regional context (Google Earth Pro 2023)





Figure 6: Survey area within a local context (Google Earth Pro 2023)

#### 4. Proposed Project Description

The proposed mining activities will include the following:

##### **Pitting**

A trial pit/test pit or inspection pit investigation is a highly effective way of obtaining data on the sub surface soil and rock conditions which underlie a prospecting sight. It allows for the various soils and rock types to be locked, the soil to be sampled and a preliminary assessment to be made. Pits will be dug, locked, sampled and backfilled. To dig the pits the applicant will make use of the systems of Pierre de Jager, the appointed project geologist. The applicant will at the end of the pitting process have locked the pits with the following information:

- A description of the soil and rock types from ground level to the base of the pits;
- Record of rock head depth and refusal depth, a list of where the samples will be taken, a record of where ground water seepage will be recorded;
- A general note of the geology and conditions in the vicinity of the test pits;
- Pitting will be done within the period of 15 months once the prospecting right has been granted.

It is planned that 35 pits will be dug (it may be less depending on the results) at an extent of 3.5 m (length) x 1.5 m (width) x 0.5-5m (depth).

##### **Trenches**

Due to nature of the alluvial diamond deposit, samples are not taken for assay as would be normal practice to evaluate hard rock precious or base-metal prospects. The diamond distribution pattern grade of alluvial diamonds is also of such a nature that there is no repeatability of sample results, even from adjacent samples. Bulk samples will have to be taken to determine the average sample grade. By taking of the bulk samples, the applicant foresees to determine the grade of the diamond deposits as the number of carats contained in 100 tons (cpht) of gravel and to determine the average diamond sizes.

During these activities the applicant will then establish the size and value distribution of trenches. Diamond distribution patterns of alluvial deposits varies to such a nature that there is no repeatability of sample results even from adjacent samples. Alluvial diamond deposits can only be sampled through bulk sampling comprising thousands of cubic meters of gravel. Given the extent of the area and the grades expected to be very low, the applicant will have to process bulk samples of approximately 240 000 tonnes.

The appointed geologist will advise where the samples will be taken. Bulk samples will not be taken along a systematic grid as in the case of drilling. As the anticipated mining plan for the properties will be based on high volumes (low grades), the bulk samples will have to address average recovery. As indicated, the bulk sampling exercise has to be conducted to determine the grades (cpht), the diamond size distribution and thereafter to sell the diamonds to determine the diamond values.

The plant/ bulk sampling technique will be that of a typical South African alluvial diamond mining operation. The method is a strip mining process with oversize material and tailings recovered from the plant will be used as backfill material prior to final rehabilitation. Gravels are excavated, loaded and transported to the treatment facility using dump trucks. The bulk sampling operation will be conducted using a fleet of conventional open pit mining equipment comprising of dump trucks supported by appropriate excavators and front-end-loaders. All equipment is planned to be diesel driven.

Before excavation commences vegetation will be cleared from the proposed bulk sampling block. These will be done as per environmental regulations. Top soil will then be removed and stored separately for later used for rehabilitation. The bulk samples will be made in the form of box cuts the dimensions of these individual box cuts will on average be 30 m long x 40 m wide. It is estimated that the bulk samples will be 3 m in depth. Gravel will be removed by excavators and will be loaded directly into dump trucks. Ore will be hauled to the screening plant. The material will be screened where after the screened material will be moved to the processing plant where the gravel will be processed. Concentrate will be moved to the sorting plant where the concentrate will be sorted. It is estimated that pitting and trenching will take approximately 15 months.

It is planned that 50 trenches will be dug at an extent of 40 m (length) x 30 m (width) x 3 m (depth).

### **Water uses**

Water uses under Section 21 (a,b c, I, g & j) of the NWA may be triggered, thus a Water Use Licence Application (WULA) considering the proposed area is adjacent to the Orange River. The river borders the proposed area to the east and south. Thus, a Water Use Licence Application (WULA) will be needed in cases there will be encroachment. When needed a WULA will be lodged with the department of Water & Sanitation (DWS). Since 2 x 16 feet washing pan will be used, the amount of water for the pans will be 30 000 L/hour from which 30% is re-used.

## 5. Legal Framework

<p><b>Description of the overall activity. (Indicate Mining Right, Mining Permit, Prospecting right, Bulk Sampling, Production Right, Exploration Right, Reconnaissance permit, technical co-operation permit, Additional listed activity)</b></p>	<p>1) <b>Listing Notice 1, (GNR 327), Activity 19:</b> <i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</i></p> <p>2) <b>Listing Notice 1 (GNR 327), Activity 20 (Amended GNR 517: 2021):</b> <i>“Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice or in Listing Notice 3 of 2014, required to exercise the prospecting right</i></p> <p>3) <b>Listing Notice 1 (GNR 327), Activity 27:</b> <i>“The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation.”</i></p> <p>4) <b>Listing Notice 2 (GNR 325), Activity 19 (Amended GNR 517: 2021):</b> <i>“The removal and disposal of minerals which requires permission contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, Listing Notice 1 of 2014 or in Listing Notice 3 of 2014, required to exercise the permission.</i></p> <p>5) <b>Listing Notice 3 GNR 324, Activity 12:</b> <i>The clearance of an area of 300 square metres or more of indigenous vegetation; (g) Northern Cape (ii) Within critical biodiversity areas identified in systematic biodiversity plans adopted by the competent authority (vi) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland</i></p> <p>6) <b>Listing Notice 3 (GNR 324), Activity 4:</b> <i>The development of a road wider than 4 metres with a reserve less than 13,5 metres. (g) Northern Cape: (i) Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i></p> <p>According to the CBA map the proposed area falls within Critical Biodiversity Area 1 and 2. Prospecting right with bulk samples for the prospecting of <b>Diamonds Alluvial (DA) &amp; Diamonds General (D)</b>, including associated infrastructure, structure and earthworks. Please note that the mining of stockpiles will still be done, but is now exempt from the list of Waste Management Activities (GNR 921, as amended)</p>
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**Table 3: Listing Notices: 2017 Regulations**

<b>NAME OF ACTIVITY</b> (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc E.g. for mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)	<b>Aerial extent of the Activity Ha or m<sup>2</sup></b>	<b>LISTED ACTIVITY</b> <b>Mark with an X where applicable or affected.</b>	<b>APPLICABLE LISTING NOTICE (GNR 324, GNR 325 or GNR 326)</b>
<b>Prospecting Right:</b> <b>BULK SAMPLING: 500, 000 tons to be washed.</b> 909.1985 Ha <b>Pits:</b> 35 pits with dimensions of (3.5m x 1.5m x0.5-5m) <b>Trenches:</b> 10 trenches with dimensions (200m x 100m x0.5-5m) <b>Listing Notice 1, (GNR327), Activity 19:</b> <i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</i>	Extent of the proposed portions is 909.1985 ha. Concurrent backfilling will take place in order to rehabilitate.	X	Listing Notice 1: (GNR327), Activity 19
<b>Prospecting Right:</b> <b>BULK SAMPLING: 500, 000 tons to be washed.</b> 909.1985 Ha <b>Pits:</b> 35 pits with dimensions of (3.5m x 1.5m x0.5-5m) <b>Trenches:</b> 10 trenches with dimensions (200m x 100m x0.5-5m) <b>Listing Notice 1 (GNR 327), Activity 20 (Amended GNR 517: 2021):</b> <i>“Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as</i>	Extent of the proposed portions is 909.1985 ha. Concurrent backfilling will take place in order to rehabilitate.	X	Listing Notice 1 (GNR 327), Activity 20 (Amended GNR 517: 2021)
<b>Prospecting Right:</b> <b>BULK SAMPLING: 576 000 tonnes</b> 4209.3984 Ha <b>Pits:</b> 250 pits, with dimensions of 4m x 4m x 5m each. <b>Trenches:</b> 80 trenches with dimensions of 40m x 50m x 5m each <b>Listing Notice 1 (GNR 327), Activity 20 (Amended GNR 517: 2021):</b> <i>“Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice or in Listing Notice 3 of 2014, required to exercise the prospecting right”</i>	Random indigenous vegetation clearance of over a 209.3984 Ha area. Concurrent backfilling will take place in order to Rehabilitate.	X	Listing Notice 1 (GNR 327), Activity 20

<p><b>Clearance of indigenous vegetation:</b>  <b>BULK SAMPLING: 576 000 tonnes</b>  4209.3984 Ha  <b>Pits:</b> 250 pits, with dimensions of 4m x 4m x 5m each.  <b>Trenches:</b> 80 trenches with dimensions of 40m x 50m x 5m each  <b>Listing Notice 2 (GNR 325), Activity 15:</b> " <i>The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-</i>  <i>(i) the undertaking of a linear activity; or</i>  <i>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</i>"</p>	<p>Random indigenous vegetation clearance of over a 4209.3984 Ha area.  Concurrent backfilling will take place in order to rehabilitate</p>	<p>X</p>	<p>Listing Notice 2 (GNR 325), Activity 15</p>
<p><b>Clearance of indigenous vegetation:</b>  <b>BULK SAMPLING: 500, 000 tons to be washed.</b>  909.1985 Ha  <b>Pits:</b> 35 pits with dimensions of (3.5m x 1.5m x0.5-5m)  <b>Trenches:</b> 10 trenches with dimensions (200m x 100m x0.5-5m)  <b>Listing Notice 1, GNR 327, Activity 27:</b> "The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation."</p>	<p>Extent of the proposed portions is 909.1985 ha.  Concurrent backfilling will take place in order to rehabilitate.</p>	<p>X</p>	<p>Listing Notice 1, (GNR 327), Activity 27</p>
<p><b>Prospecting:</b>  <b>BULK SAMPLING: 500, 000 tons to be washed.</b>  909.1985 Ha  <b>Pits:</b> 35 pits with dimensions of (3.5m x 1.5m x0.5-5m)  <b>Trenches:</b> 10 trenches with dimensions (200m x 100m x0.5-5m)  <b>Listing Notice 2, GNR 325, Activity 19 (As amended GNR 517: 2021):</b> "The removal and disposal of minerals which requires permission contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, Listing Notice 1 of 2014 or in Listing Notice 3 of 2014, required to exercise the permission.</p>	<p>Extent of the proposed portions is 909.1985 ha  Concurrent backfilling will take place in order to rehabilitate.</p>	<p>X</p>	<p>Listing Notice 2, GNR 325, Activity 19 (As amended GNR 517: 2021)</p>

<p><b>Storage of dangerous goods:</b>  <b>BULK SAMPLING: 500, 000 tons to be washed.</b>  909.1985 Ha  <b>Pits:</b> 35 pits with dimensions of (3.5m x 1.5m x0.5-5m)  <b>Trenches:</b> 10 trenches with dimensions (200m x 100m x0.5-5m)  <b>Listing Notice 3 GNR 324, Activity 10:</b> <i>The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. (g) Northern Cape (vi) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.</i></p>	<p>Extent of the proposed portions is 909.1985 ha. Concurrent backfilling will take place in order to rehabilitate.</p>	<p>X</p>	<p>Listing Notice 3 GNR 324, Activity 10 (h)(vi)</p>
<p><b>Clearance of indigenous vegetation:</b>  <b>BULK SAMPLING: 500, 000 tons to be washed.</b>  909.1985 Ha  <b>Pits:</b> 35 pits with dimensions of (3.5m x 1.5m x0.5-5m)  <b>Trenches:</b> 10 trenches with dimensions (200m x 100m x0.5-5m)  <b>Listing Notice 3 GNR 324, Activity 12:</b> <i>The clearance of an area of 300 square metres or more of indigenous vegetation; (g) Northern Cape (vi) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland</i></p>	<p>Extent of the proposed portions is 909.1985 ha. Concurrent backfilling will take place in order to rehabilitate.</p>	<p>X</p>	<p>Listing Notice 3 GNR 324, Activity 12 (h)(vi)</p>
<p><b>Listing Notice 3 (GNR 324), Activity 4:</b> The development of a road wider than 4 metres with a reserve less than 13,5 metres. (g) Northern Cape: (i) Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;  <b>According to the CBA map the proposed area falls within Critical Biodiversity Area 1 and 2.</b></p>	<p>Extent of the proposed portions is 909.1985 ha. Concurrent backfilling will take place in order to rehabilitate.</p>	<p></p>	<p>Listing Notice 3 GNR 324, Activity 4 (g)(i)(ee)</p>

Table 4: Listing notices

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE APPLIED
The Constitution of the Republic of South Africa (Act No. 108 of 1996)	
The National Environmental Management Act (Act No. 107 of 1998)	Section 24(1) Section 28(1)
The National Water Act (Act No. 36 of 1998)	Section 21



Air Quality Act (Act No. 39 of 2004)	
National Forests Act, Act of 84 of 1998	
The National Heritage Resources Act (Act No. 25 of 1999)	Section 38, 34, 35, 36
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	
Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)	
The National Water Act (Act No. 36 of 1998);	
Mine Health and Safety Act (Act No. 29 of 1996) (MHSA)	
Biodiversity Act (Act 10 of 2004)	
Siyancuma Local Municipality Integrated Development Plan (IDP)	
Pixley ka Seme District Municipality Integrated Development Plan (IDP)	

**Table 5: Legal framework**

- Section 38 of the NHRA (Act No. 25 of 1999) stipulates that the following activities trigger a heritage survey:

Development criteria in terms of Section 38(1a-e) of the NHRA (Act No. 25 of 1999)	Yes/No
Construction of road, wall, powerline, pipeline, canal or other linear form of development or barrier exceeding 300m in length	No
Construction of bridge or similar structure exceeding 50m in length	No
Development exceeding 5000 m <sup>2</sup> in extent	Yes
Development involving three or more existing erven or subdivisions	No
Development involving three or more erven or divisions that have been consolidated within past five years	No
Rezoning of site exceeding 10 000 m <sup>2</sup>	No
Any other development category, public open space, squares, parks, recreation grounds	No

**Table 6: Activities that trigger Section 38 of the NHRA**

- Field rating system as recommended by SAHRA:

Field Rating	Grade	Significance	Recommended Mitigation
National Significance	Grade I	High significance	Conservation by SAHRA, national site nomination, mention any relevant international ranking. No alteration
Provincial Significance	Grade II	High significance	Conservation by provincial heritage authority, provincial site nomination. No alteration whatsoever without permit
Local Significance	Grade III-A	High significance	Conservation by local authority, no alteration whatsoever without permit from provincial heritage authority. Mitigation as part of development process not
Local Significance	Grade III-B	High significance	Conservation by local authority, no external alteration without permit from provincial heritage authority. Could
Generally Protected A	Grade IV-A	High/medium significance	Conservation by local authority. Site should be mitigated before destruction. Destruction permit required from
Generally Protected B	Grade IV-B	Medium significance	Conservation by local authority. Site should be recorded before destruction. Destruction permit required from provincial heritage authority.
Generally Protected C	Grade IV-C	Low significance	Conservation by local authority. Site has been sufficiently recorded in the Phase 1 HIA. It requires no further recording before destruction. Destruction permit

**Table 7: Field rating system to determine site significance**

- Heritage resources have lasting value in their own right and provide evidence of the origins of South African society and they are valuable, finite, non-renewable and irreplaceable.

- All archaeological remains, features, structures and artefacts 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, Section 34 & 35)**. The Act makes an archaeological impact assessment as part of an EIA and EMPR mandatory (see **Section 38**). No archaeological artefact, assemblage or settlement (site) may be moved or destroyed without the necessary approval from the **South African Heritage Resources Agency (SAHRA)**. Full cognisance is taken of this Act in making recommendations in this report.
- Cognisance will also be taken of the Mineral and Petroleum Resources Development Act (Act No 28 of 2002) and the National Environmental Management Act (Act No 107 of 1998) when making any recommendations.
- Human remains older than 60 years are protected by the NHRA, with reference to Section 36. Human remains that are less than 60 years old are protected by the Regulations Relating to the Management of Human Remains (GNR 363 of 22 May 2013) made in terms of the National Health Act No. 61 of 2003 as well as local Ordinances and regulations.
- With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise.
- 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 (International Council on Monuments and Sites) Charter (also known as the Burra Charter) are used when determining the cultural significance or other special value of archaeological or historical sites.
- A copy of this report will be submitted on SAHRIS as stipulated by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999), Section 38 (especially subsection 4) and the relevant Provincial Heritage Resources Authority (PHRA).
- Note that the final decision for the approval of permits, or the removal or destruction of sites, structures and artefacts identified in this report, rests with the SAHRA (or relevant PHRA).

## **6. Study Approach/Methodology**

Geographical information (ESRI shapefiles) on the proposed prospecting areas was supplied by Milnex CC. The most up-to-date Google Earth images and topographic maps were used to indicate the survey area. Topographic maps were sources from the Surveyor General. Please note that all maps are orientated with north facing upwards (unless stated otherwise).

The strategy during this survey was to survey a representative sample of the footprint that forms part of the application. The area is very homogeneous with large areas covered with red Kalahari sand and limestone outcrops, and erosion and mining areas along the Orange River. Existing access tracks were used with selected areas surveyed more intensely using pedestrian survey techniques.

## 6.1 Review of existing information/data

Additional information on the cultural heritage of the area was sourced from the following records:

- National Mapping Project by SAHRA (which lists heritage impact assessment reports submitted for South Africa);
- Environmental Potential Atlas (ENPAT);
- Online SAHRIS database;
- National Automated Archival Information retrieval System (NAAIRS);
- Maps and information documents supplied by the client; and
- Several heritage surveys have been conducted in the vicinity of the survey area (published and unpublished material on the area) (Beaumont 2006, Coetzee 2018, De Wit 2017, Dreyer 2008, Engelbrecht & Fivaz 2018, Higgett & Nel 2014, Matenga 2019, Morris 2005a, 2005b, 2007 and 2011, Rossouw 2022; Van Ryneveld 2005a, 2005b, 2013), Van Schalkwyk 2022a & 2022b)
- McGregor Museum, Kimberley: Archaeology Department (Beaumont & Morris 1990, 2004; Morris 2011).

Several heritage surveys and research projects have been completed outside the project footprint during the last few decades (Breuil 1948; Goodwin 1928 & Söhnge et al 1937; Van Hoepen 1927). Please note that the well-known rock art site Driekopseiland is situated roughly 200 km to the east of the survey footprint (Morris 2002).

Several heritage impact assessments have been completed in the general vicinity of the survey footprint (Morris 2005a, 2005b and 2007) which yielded mostly Early and Middle Stone Age sites as well as rock art (engravings). On the farm De Kalk 37 a plaque marks the 1866 discovery of the Eureka diamond (erected by the then National Monuments Council) and several Middle Stone Age scatters were recorded (Van Ryneveld 2005a). In 1867 the first diamond was discovered by Erasmus Jacobs near Hopetown on De Kalk. The ruins of the Jacobs family residence are declared a Grade II Provincial Heritage Site (GN 1705, 1980). The discovery of diamonds near Hopetown and in Kimberley led in part to the conflicts of the First and Second Anglo Boer Wars. Significant events associated with the Second Anglo-Boer War or South African War, took place in the region. A survey was also conducted of portions of the farm Ettrick 182 where a large low density Middle Stone Age site was recorded (Van Ryneveld 2005b). A survey on the farm Disselfontein 77 yielded small numbers of Later Stone Age and Early Stone Age lithics including a handaxe, bifaces as well as over 100 Middle Stone Age scatters (De Wit 2017). A survey on the remainder of the farm Tullochgorum No. 158 and the Remainder of Farm Kameeldrift No. 285 recorded a historical livestock enclosure and a MSA scatter (van Ryneveld 2013). A larger study near Hopetown also recorded six Middle Stone Age lithic scatters and a grave site (Engelbrecht & Fivaz 2018). A survey on the farm Sleepsteen 21 yielded two Early Stone Age and three Middle Stone Age lithic scatters and isolated finds (Higgett & Nel 2014). A heritage assessment was completed in selected areas within the current survey footprint on the farm Kameeldrift 285 (40) (Dreyer 2008) and although no heritage sites were recorded several isolated Stone Age flakes, pebbles and cores were noted (no coordinates are listed). On the farm Katlani 236 near Douglas, Matenga (2019) recorded 43 Stone Age sites, two rock art (engraving) sites, two historical farmhouses and two graveyards. Van Schalkwyk (2022a) also mentions a low density scatter of MSA stone tools on the farm Aansluit 250, as well as one grave and historical farmhouse buildings. An assessment of the farm Duikersvlei north of the current survey area, yielded no historical or archaeological remains (Rossouw 2022). A

survey conducted by Van Schalkwyk (2022b) surveyed the farms Stratford 154 and Portion 2 of the farm Torquay 157 (249), which is located adjacent to the footprint of this current study. A small section of outcrop with glacial striations was recorded as well as low and high density Middle Stone Age surface scatters.

Please note that a screening study was done on sections of the farm Roode Kop 5 by Morris (2011) for a PV solar development, came to the conclusion that varying densities of surface Stone Age scatters occur in the region. Generally older material may be found in terraces or terrace remnants above and away from the river, while Later Stone Age material and perhaps burials might occur near the river bank. Rock engravings are not known in this locality but may occur if suitable outcrops of either dolerite or Ventersdorp andesite occur. No major colonial era features could be detected at this stage. Note that a field survey of the farm Roode Kop 5 was conducted in 2021 (Morris 2021). Of importance is that Morris clearly defines a widespread surface 'background scatter' of Middle Stone Age artefacts. This he recognises to be the case over the entire area surveyed that is artefacts lacking assemblage coherence or integrity, subject to erosion and/or secondary deposition, being parts of palimpsests with mixing of material of possibly differing age. This has also been defined and clearly characterised by Orton (2016).

According to the SAHRIS database several heritage sites occur in the region, but none within the footprint of the survey area. Several glacial pavements are known along the Orange River, especially further to the north and south of the current survey footprint. Rock art also occur further to the north and east.

The following declared Provincial Level (Grade 2) heritage sites are known in the region:

- Ruins of Jacobs House (Site ID: 28473; 9/2/043/0004) (Declared on 22/02/1980). This site is located on the other side of the Orange River from the current survey footprint. In this vicinity Schalk van Niekerk in 1867 noticed the "pretty stone" found by the young Erasmus Jacobs and used by the children as a plaything. It proved to be the first authenticated diamond to be found in South Africa. Known later as the "Eureka", it was purchased by De Beers Consolidated Mines in 1966 and presented to Parliament. The house was already derelict in 1880. All that remains is the stone base of the house.
- Glacial pavements (Site ID: 28494; 9/2/038/0014) (Declared on 4/10/1996). The glacial pavements located north of the survey footprint at Bucklands and Blaauwboschdrift, like those at Nooitgedacht.
- Old wagon bridge (Site ID: 28474; 9/2/043/0004) (Declared on 22/06/1990). The bridge located south of the current survey footprint was ordered from Westwood Baillie and Co Scotland. It was shipped to Cape Town. The bridge is of stone construction. Tall supporting cement pillars cross the Orange River.
- Glacial pavement (Site ID: 28492; 9/2/038/0015) (Declared on 04/03/1994). The glacial pavements located north of the current survey area at Bucklands and Blaauwboschdrift, like those at Nooitgedacht and part of the Griqualand West Dwyka Series.









Figure 9: Indicating the survey area on a Field Intelligence Department map near Douglas and surrounds, dating to 1900

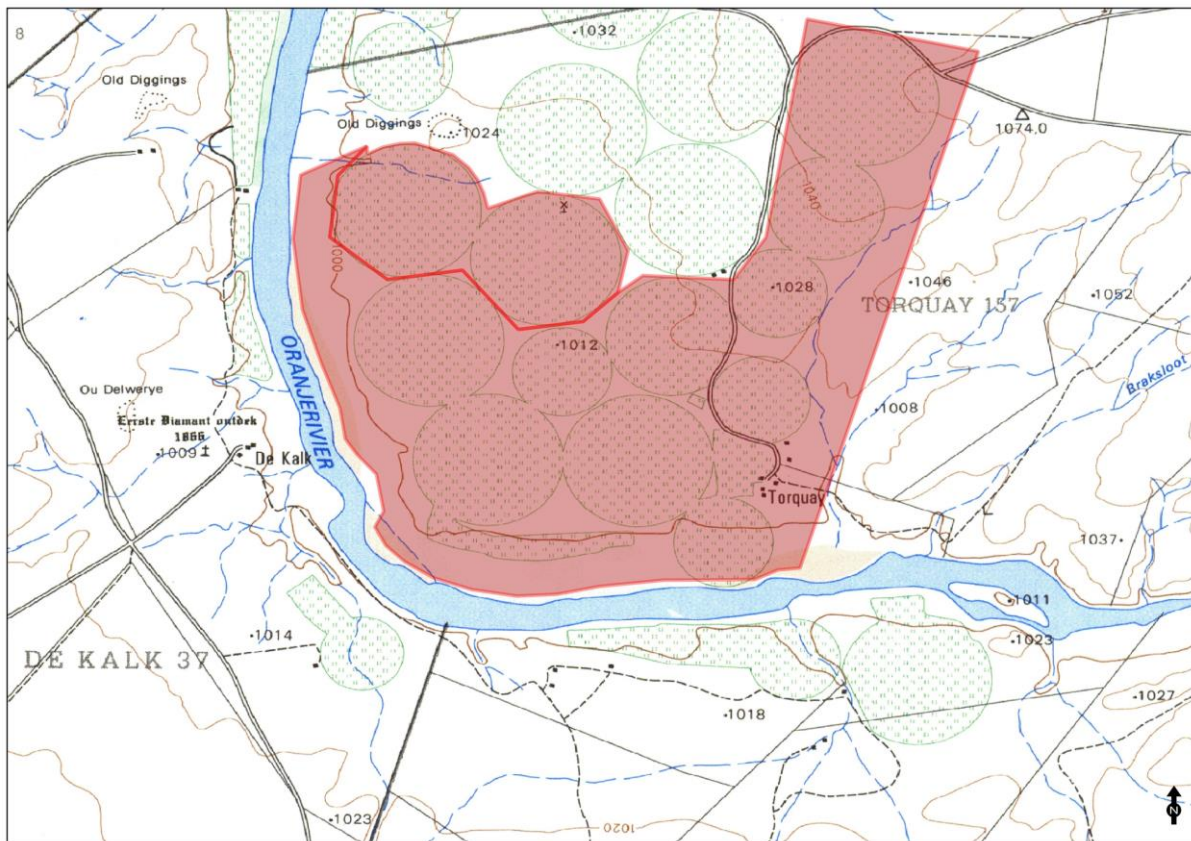


Figure 10: The survey area as indicated on the 1:50 000 topographic map 2923BD (1988)

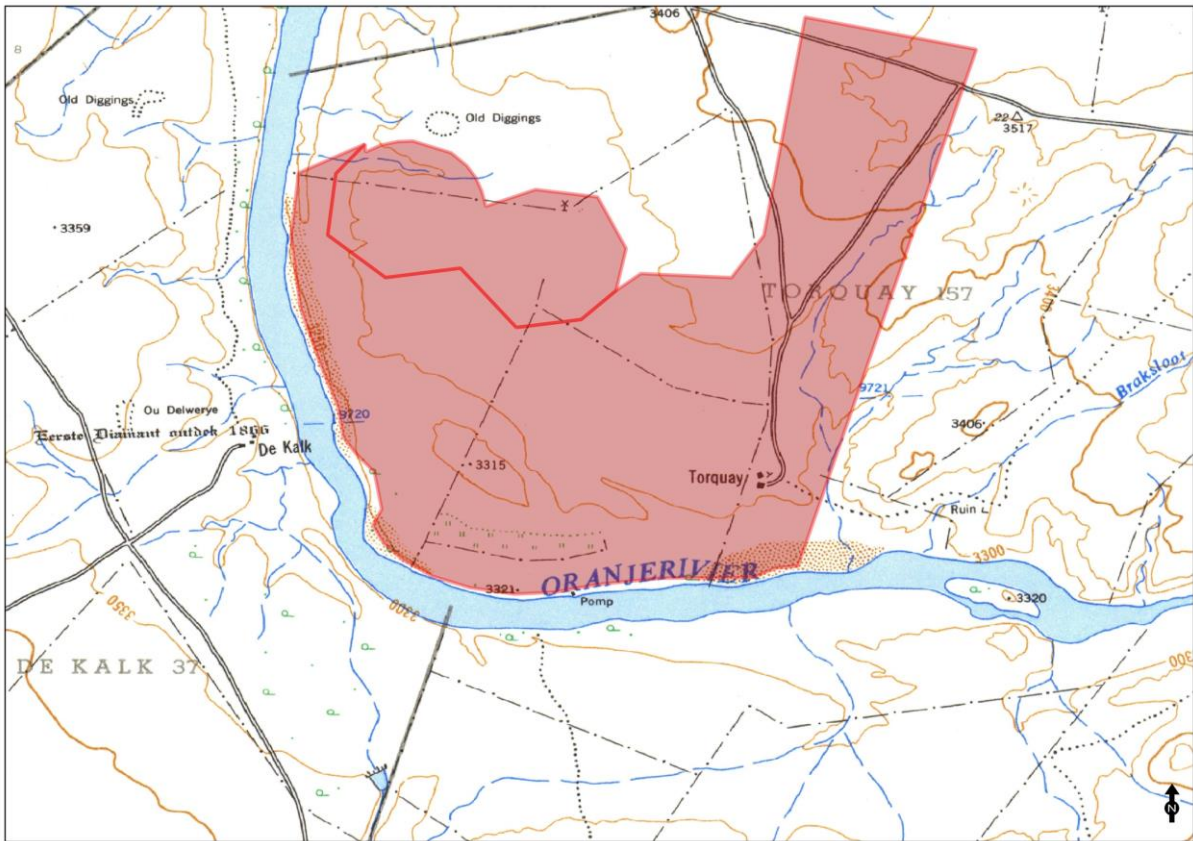


Figure 11: The survey area as indicated on the 1:50 000 topographic map 2923BD (1964)

Note that on the 1:50 000 Topographic map (2923BD) of the region dated to 1964 that none of the agricultural fields (pivots) have been erected. It is only visible in the 1988 map. Also, house structures were already erected by 1964 keeping in mind that the farm was probably surveyed during the late 19<sup>th</sup> century. No specific rock art sites are known along this section of the Orange River (see Figure 13).

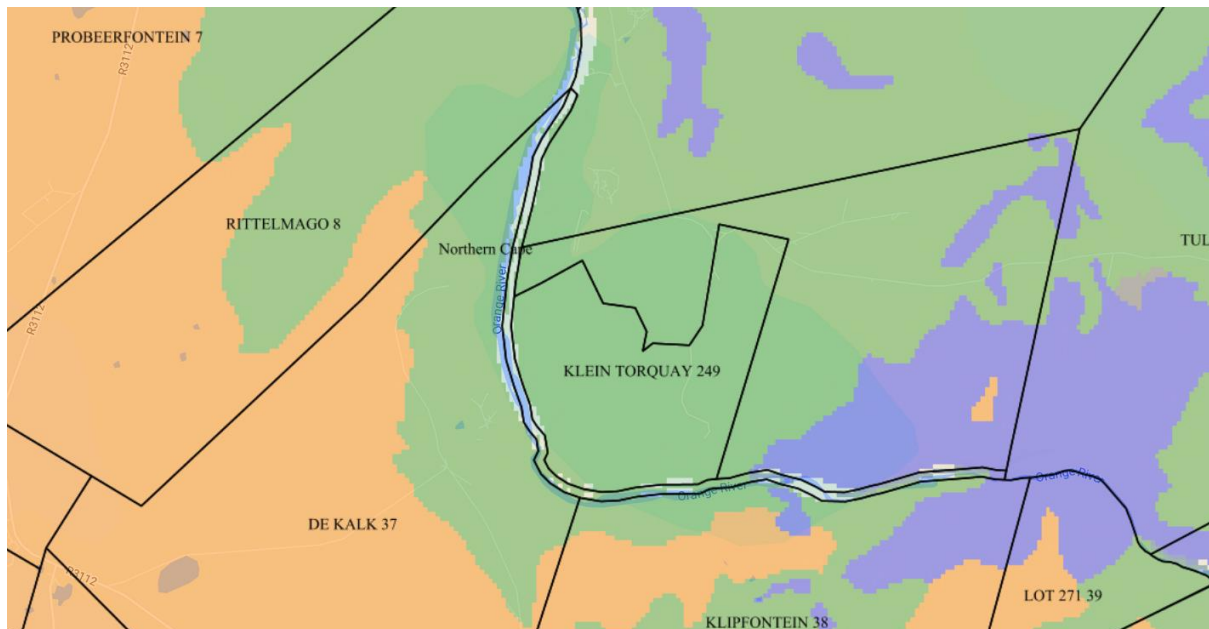


Figure 12: Rock art sites in the general region near the survey area (after Morris 1988)

## 6.2 Palaeontological sensitivity

The original mineralogy of the lava consisted of lath-like feldspar and pyroxene set in a glassy groundmass, but this composition has been fundamentally changed to mineralogy comparable to that of a greenschist. The feldspars have been partly or completely saussuritised. The pyroxene, which probably consisted of augite has been uralitised and the glassy groundmass has been devitrified. Thus the rocks now chiefly consist of secondary minerals such as chlorite, epidote, clinozoisite, calcite, sericite and uralite. The Gordonia Formation comprises red and yellow fine-grained sand. Although the formation is an Aeolian deposit no dunes are present in the area. Any dunes that might have been present must have become destroyed during reworking of the sand.





**Figure 13: Palaeontological sensitivity zones as indicated for the survey footprint (SAHRIS 2023)**

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	Will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The palaeontological sensitivity map was extracted from the SAHRIS database and clearly shows that the survey footprint as Green (Moderate) sensitivity. As a result a desktop study assessment will be required for the survey footprint.

## 7. Recommendations and Conclusions

Several heritage surveys and other studies have been conducted in the general region, but none inside the current study area. Several declared Provincial Heritage sites, Middle and Later Stone Age deposits, historical structures, glacial pavements, rock art and early mining activities have been recorded in the region.

This predictive assessment (desktop) concludes that there is a high to medium probability that various cultural heritage remains are located within the proposed prospecting footprint.

As a result, it is recommended that a Phase 1 Cultural Heritage Impact Assessment should be conducted to record any possible heritage sites and to assess possible impacts by the proposed mining right application. Appropriate mitigation measures will then be proposed to minimize any potential impacts emanating from these activities.

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## Addendum 1: Archaeological and Historical Sequence

The table provides a general overview of the chronological sequence of the archaeological periods in South Africa.

PERIOD	APPROXIMATE DATES
Earlier Stone Age	more than 2 million years ago to >200 000 years ago
Middle Stone Age	<300 000 years ago to >20 000 years ago
Later Stone Age (Includes hunter-gatherer rock art)	<40 000 years ago up to historical times in certain areas
Early Iron Age	c. AD 200 - c. AD 900
Middle Iron Age	c. AD 900 – c. AD 1300
Late Iron Age (Stonewalled sites)	c. AD 1300 - c. AD 1840 (c. AD 1640 - c. AD 1840)

< = less than; > = greater than

### Archaeological Context

#### Stone Age Sequence

Concentrations of Early Stone Age (ESA) sites are usually present on the flood-plains of perennial rivers and may date to over 2 million years ago. These ESA open sites may contain scatters of stone tools and manufacturing debris and secondly, large concentrated deposits ranging from pebble tool choppers to core tools such as handaxes and cleavers. The earliest hominins who made these stone tools, probably not always actively hunted, instead relying on the opportunistic scavenging of meat from carnivore kill sites.

Middle Stone Age (MSA) sites also occur on flood plains, but are also associated with caves and rock shelters (overhangs). Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris. Tools may have been hafted but organic materials, such as those used in hafting, seldom preserve. Limited drive-hunting activities are also associated with this period.

Sites dating to the Later Stone Age (LSA) are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material. By using San (Bushman) ethnographic data a better understanding of this period is possible. South African rock art is also associated with the LSA.

The following chronological sequence was recently established by prominent Stone Age archaeologists (Lombard et al 2012):

#### Later Stone Age

- Age Range: recent to 20-40 thousand years ago

- General characteristics: expect variability between assemblages, a wide range of formal tools, particularly scrapers (microlithic and macrolithic), backed artefacts, evidence of hafted stone and bone tools, borers, bored stones, upper and lower grindstones, grooved stones, ostrich eggshell (OES) beads and other ornaments, undecorated/decorated OES fragments, flasks/flask fragments, bone tools (sometimes with decoration), fishing equipment, rock art, and ceramics in the final phase.
  - **Ceramic or Final Later Stone Age**
    - Generally < 2 thousand years ago
    - MIS 1
    - Contemporaneous with, and broadly similar to, final Later Stone Age, but includes ceramics
    - Economy may be associated with hunter-gatherers or herders

#### **Technological characteristics**

- Stone tool assemblages are often microlithic
- In some areas they are dominated by long end scrapers and few backed microliths; in others formal tools are absent or rare
- Grindstones are common, ground stone artefacts, stone bowls and boat-shaped grinding grooves may occur
- Includes grit- or grass-tempered pottery
- Ceramics can be coarse, or well-fired and thin-walled; some times with lugs, spouts and conical bases; sometimes with decoration; sometimes shaped as bowls
- Ochre is common
- Ostrich eggshell (OES) is common
- Metal objects, glass beads and glass artefacts also occur
- **Final Later Stone Age**
  - 100 – 4000 years ago
  - MIS 1
  - Hunter-gatherer economy

#### **Technological characteristics**

- Much variability can be expected
- Variants include macrolithic (similar to Smithfield [Sampson 1974]) and/or microlithic (similar to Wilton) assemblages
- Assemblages are mostly informal (Smithfield)
- Often characterised by large untrimmed flakes (Smithfield)
- Sometimes microlithic with scrapers, blades and bladelets, backed tools and adzes (Wilton-like)
- Worked bone is common
- OES is common
- Ochre is common
- Iron objects are rare
- Ceramics are absent
- **Wilton**
  - 4000 – 8000 years ago

- MIS 1
- At some sites continues into the final Later Stone Age as regional variants (e.g. Wilton Large Rock Shelter and Cave James)

### **Technological characteristics**

- Fully developed microlithic tradition with numerous formal tools
  - Highly standardised backed microliths and small convex scrapers (for definition of standardisation see Eerkens & Bettinger 2001)
  - OES is common
  - Ochre is common
  - Bone, shell and wooden artefacts occur
- **Oakhurst**
    - 7000 – 12 000 years ago
    - MIS 1
    - Includes Albany, Lockshoek and Kuruman as regional variants

### **Technological characteristics**

- Flake based industry
  - Characterised by round, end, and D-shaped scrapers and adzes
  - Wide range of polished bone tools
  - Few or no microliths
- **Robberg**
    - 12 000 to 18 000 years ago
    - MIS 2

### **Technological characteristics**

- Characterised by systematic bladelet (<26mm) production and the occurrence of outils ecailles or scaled pieces
  - Significant numbers of unretouched bladelets and bladelet cores
  - Few formal tools
  - Some sites have significant macrolithic elements
- **Early Late Stone Age**
    - 18 000 – 40 000 years ago
    - MIS 2-3
    - Informal designation
    - Also known as transitional MSA-LSA
    - Overlapping in time with final Middle Stone Age

### **Technological Characteristics**

- Characterised by unstandardised, often microlithic, pieces and includes the bipolar technique
- Described at some sites, but not always clear whether assemblages represent a real archaeological phase or a mixture of LSA/MSA artefacts

## **Middle Stone Age**

- Age Range: 20 000 – 30 000 years ago
- General characteristics: Levallois or prepared core techniques (for definitions see Van Peer 1992; Boeda 1995; Pleurdeau 2005) occur in which triangular flakes with convergent dorsal scars, often with faceted striking platforms, are produced. Discoidal systems (for definition see Inizan et al. 1999) and intentional blade production from volumetric cores (for definition see Pleurdeau 2005) also occur; formal tools may include unifacially and bifacially retouched points, backed artefacts, scrapers, and denticulates (for definition see Bisson 2000); evidence of hafted tools; occasionally includes marine shell beads, bone points, engraved ochre nodules, engraved OES fragments, engraved bone fragments, and grindstones.
- In the sequence below we highlight differences or characteristics that may be used to refine interpretations depending on context.
  
- **Final Middle Stone Age**
  - 20 000 – 40 000 years ago
  - MIS 3
  - Informal designation partly based on the Sibudu sequence

### **Technological characteristics**

- Characterised by high regional variability that may include, e.g. bifacial tools, bifacially retouched points, hollow-based points
- Triangular flake and blade industries (similar to Strathalan and Melikane)
- Small bifacial and unifacial points (similar to Sibudu and Rose Cottage Cave)
- Sibudu point characteristics: short, stout, lighter in mass compared to points from the Sibudu technocomplex, but heavier than those from the Still Bay
- Can be microlithic
- Can include bipolar technology
- Could include backed geometric shapes such as segments, as well as side scrapers

### **Sibudu**

- 45 000 – 58 000 years ago
- MIS 3
- Previously published as informal late Middle Stone Age and post-Howieson's Poort at Sibudu
- Formerly known post-Howieson's Poort, MSA 3 generally, and MSA III at Klasies River

### **Technological characteristics**

- Most points are produced using Levallois technique
- Most formal retouch aimed at producing unifacial points
- Sibudu unifacial point (type fossil) characteristics: faceted platform; shape is somewhat elongated with a mean length of 43.9 mm), a mean breadth of 26.8 mm and mean thickness of 8.8 mm (L/B ratio 1.7); their mean mass is 11.8 g (Mohapi, 2012)
- Some plain butts
- Rare bifacially retouched points
- Some side scrapers are present
- Backed pieces are rare



- **Howieson's Poort**
- 58 000 – 66 000 years ago
- MIS 3-4

#### **Technological characteristics**

- Characterised by blade technology
- Includes small (<4 cm) backed tools, e.g. segments, scrapers, trapezes and backed blades
- Some denticulate blades
- Pointed forms are rare or absent

- **Still Bay**

- 70 000 – 77 000 years ago
- MIS 4-5a

#### **Technological characteristics**

- Characterised by thin (<10 mm), bifacially worked foliate or lanceolate points
- Semi-circular or wide-angled pointed butts
- Could include blades and finely serrated points (Lombard et al. 2010)

- **Pre-Still Bay**

- 72 000 – 96 000 years ago
- MIS 4-5

#### **Technological characteristics**

- Characteristics currently being determined / studied

- **Mossel Bay**

- 77 000 to —105 000 years ago
- MIS 5a-4
- Also known as MSA II at Klasies River or MSA 2b generally

#### **Technological characteristics**

- Characterised by recurrent unipolar Levallois point and blade reduction
- Products have straight profiles; percussion bulbs are prominent and often splintered or ring-cracked
- Formal retouch is infrequent and restricted to sharpening the tip or shaping the butt

- **Klasies River**

- 105 000 to —130 000 years ago
- MIS 5d-5e
- Also referred to as MSA I at Klasies River or MSA 2a generally

#### **Technological characteristics**

- Recurrent blade and convergent flake production
- End products are elongated and relatively thin, often with curved profiles
- Platforms are often small with diffused bulbs
- Low frequencies of retouch
- Denticulate pieces

- **Early Middle Stone Age**
  - Suggested age MIS 6 to MIS 8 (130 000 to —300 000 years ago)
  - Informal designation

#### **Technological characteristics**

- This phase needs future clarification regarding the designation of cultural material and sequencing
- Includes discoidal and Levallois flake technologies, blades from volumetric cores and a generalised toolkit

- **Earlier Stone Age**

- Age range: >200 000 to 2 000 000 years ago
- General characteristics: early stages include simple flakes struck from cobbles, core and pebble tools; later stages include intentionally shaped handaxes, cleavers and picks; final or transitional stages have tools that are smaller than the preceding stages and include large blades.
- In the sequence below we highlight differences or characteristics that may be used to refine interpretations depending on context.

- **ESA-MSA transition**

- 200 to —600 thousand years ago
- MIS 7-15

#### **Technological characteristics**

- Described at some sites as Fauresmith or Sangoan
- Relationships, descriptions, issues of mixing and ages yet to be clarified
- Fauresmith assemblages have large blades, points, Levallois technology, and the remaining ESA components have small bifaces
- The Sangoan contains small bifaces (<100 mm), picks, heavy and light-duty denticulated and notched scrapers
- The Sangoan is less well described than the Fauresmith

- **Acheulean**

- 300 thousand to —1.5 million years ago
- MIS 8-50

#### **Technological characteristics**

- Bifacially worked handaxes and cleavers, large flakes > 10 cm
- Some flakes with deliberate retouch, sometimes classified as scrapers
- Gives impression of being deliberately shaped, but could indicate result of knapping strategy
- Sometimes shows core preparation
- Generally found in disturbed open-air locations

- **Oldowan**

- 1.5 to >2 million years ago
- MIS 50-75

### **Technological characteristics**

- Cobble, core or flake tools with little retouch and no flaking to predetermined patterns
- Hammerstones, manuports, cores
- Polished bone fragments/tools

### **Iron Age Sequence**

In the northern regions of South Africa at least three settlement phases have been distinguished for early prehistoric agropastoralist settlements during the **Early Iron Age** (EIA). Diagnostic pottery assemblages can be used to infer group identities and to trace movements across the landscape. The first phase of the Early Iron Age, known as **Happy Rest** (named after the site where the ceramics were first identified), is representative of the Western Stream of migrations, and dates to AD 400 - AD 600. The second phase of **Diamant** is dated to AD 600 - AD 900 and was first recognized at the eponymous site of Diamant in the western Waterberg. The third phase, characterised by herringbone-decorated pottery of the **Eiland** tradition, is regarded as the final expression of the Early Iron Age (EIA) and occurs over large parts of the North West Province, Northern Province, Gauteng and Mpumalanga. This phase has been dated to about AD 900 - AD 1200. These sites are usually located on low-lying spurs close to water.

The Late Iron Age (LIA) settlements are characterised by stone-walled enclosures situated on defensive hilltops c. AD 1640 - AD 1830). This occupation phase has been linked to the arrival of ancestral Northern Sotho, Tswana and Ndebele (Nguni-speakers) in the northern regions of South Africa with associated sites dating between the sixteenth and seventeenth centuries AD. The terminal LIA is represented by late 18th/early 19th century settlements with multichrome Moloko pottery commonly attributed to the Sotho-Tswana. These settlements can in many instances be correlated with oral traditions on population movements during which African farming communities sought refuge in mountainous regions during the processes of disruption in the northern interior of South Africa, resulting from the so-called difaqane (or mfecane).

### **Ethno-historical Context**

#### ***Kimberley and surrounds***

The diamonds originated some 60 million years ago with volcanic activity which blew up groups of pipes through the earth's crust. Many of the kimberlite pipes were entirely eroded away and the diamond content dispersed along the beds of rivers such as at Hopetown and Barkley West. The first diamond rush took place at Hopetown which was followed by a much greater discovery in 1870 in the gravels of the Vaal River at Barkley West. The Bultfontein Mine resulted, the farm first owned by Cornelius du Plooy. In December 1870 diamonds were discovered at Du Toit's Pan on the farm Dorstfontein. In May 1871 a new discovery was made on the farm Vooruitzicht which resulted in Colesberg Koppie known as the 'New Rush'. This diamond rush eventually resulted in what became known as the 'Big Hole' of Kimberley Mine, the largest man-made hole in the world.

Kimberley, named after the Secretary of State for Colonies, the Earl of Kimberley, grew quickly together with its twin, Beaconsfield (named after Benjamin Disraeli, the Earl of Beaconsfield). Beaconsfield served as the centre for Bultfontein, Wessel and Du Toit's Pan Mines. The two towns eventually amalgamated to form one city in 1912.

Kimberley became a municipality in 1877. By 1882 a tramway connected Kimberley with Beaconsfield and the streets were illuminated with the first electric lights in Southern Africa. All the smaller diggings were eventually taken up in the amalgamation that took place between Cecil Rhodes's De Beers Mine and Barney Barnato's Kimberley Central Mining Company in 1888.

Various alluvial diamond digging was going on in the region, but it seems Canteen Kopje was one of the first and started in 1869 and continued until 1927. It was declared a National Monument in 1948. The site also yielded extensive Stone Age deposits that were excavated by Peter Beaumont of the McGregor Museum. The site is famous for containing Later Stone Age, Middle Stone Age and Earlier Stone Age (Acheulian) stone tools (Beaumont & Morris 1990).



Figure 14: Canteen kopje in the 1870s (Sketch by A. A. Anderson)

A study of archival information however indicates the presence of the redoubts and encampments of the Boer forces during the South African war of 1899-1902 present just outside the study area. During the South African War, also referred to as the Anglo Boer war, Kimberley was besieged by Boer forces from 14 October 1899 to 15 February 1900. For four months the Boer forces placed a total lock down on the town of Kimberley and besieged it until the town was relieved by General French on 15 February 1900. For the siege to be of any success the Boer forces needed to construct numerous redoubts and encampments around the town to control access in and out of town. The British military had to change its strategy for the war as public opinion demanded that the sieges of Kimberley, Ladysmith and Mafeking be relieved before the Boer capitals were assaulted. The first attempt at relief of Kimberley under Lord Methuen was stopped at the battles of Modder River and Magersfontein. The 124-day siege was finally relieved on 15 February 1900 by a cavalry division under Lieutenant-General John French, part of a larger force under Lord Roberts. The battle against the Boer general Piet Cronjé continued at Paardeberg immediately after the town itself was relieved.



Figure 15: The siege of Kimberley (R.H. Wishart)

The extension of the line to Kimberley was as a direct result of the discovery of diamonds in that area in 1869. The line from De Aar to the Orange River was officially opened in November 1884. Due to a world-wide economic slump the Cape Colony was in a recession and it was only after the British Government advanced £400 000 the line to Kimberley could be completed. The 121km track between the Orange River and Kimberley was opened on 28 November 1885. The history of the construction of the railway line between Kimberley and Hotazel seems to have been as a direct result of the discovery of various minerals in this region. The line was built in various sections first from Kimberley to Barkly West and then from Barkly West to Koopmansfontein. The line was then extended from Koopmansfontein to Postmasburg and from Postmasburg to Lohathla. As more mining development was earmarked it necessitated the extension of the line from Lohathla to Sishen and at a later stage from Sishen to Hotazel. It seems from archival documents that a proposal was submitted for the establishment of a railway line from Kimberley to Barkly West with its terminus at Borrelskop, a railway siding between Longlands and Delportshoop in 1922. The line between Kimberley, Barkly West and Koopmansfontein thus had to be completed between 1922 and 1930 although the precise date on which the extension of the railway line was inaugurated could not be established.

For both wars, Kimberley was the main centre for mustering and training the Cape Corps which was served by a hospital and a convalescent depot. During the Second World War, Number 21 Air School of the Empire Air Training Scheme was based at Alexanderfontein just outside the city. Kimberley (Dutoitspan) Cemetery contains two Commonwealth burials

of the First World War and 14 from the Second World War. The cemetery lies on the eastern outskirts of Kimberley, to the northern side of Dutoits Pan mine.

## **Douglas**

Douglas is an agricultural and stock farming town situated near the confluence of the Orange and Vaal Rivers in the Northern Cape province of South Africa. Notably the rural town has a diverse population, with mostly state institutions and the anchor private employer, GWK, an agricultural company.

The town was founded in 1848 as a mission station on the farm Backhouse by the Reverend Isaac Hughes. In 1867, a group of Europeans from Griquatown signed an agreement giving them the right to establish a town. The town was named after General Sir Percy Douglas, Lieutenant Governor of the Cape Colony.

Douglas lies almost halfway between Kimberley and the town of Prieska. Douglas is regarded as somewhat of an oasis - the town lies where the Orange and Vaal rivers meet, hence farm land is fertile.

Douglas is also an historic town, with years of diamond digging and the missionaries to thank for some of its quaint little houses. More excitingly, it has a series of glacial pavements that date back 290 million years and a number of rock engravings made from stone tools. You will need permission to see these from the McGregor Museum in Kimberley, which is only 100 kilometres away from Kimberley, making it an obvious stop over en route to view the Big Hole and other exciting tourist attractions.

## **Hopetown**

Hopetown was founded in 1850 when Sir Harry Smith extended the northern frontier of the Cape Colony to the Orange River. A handful of settlers claimed ground where there was a natural ford over the Orange River, and by 1854 a frontier town had developed. Hopetown was named after William Hope, Auditor-General and Secretary of the Cape Colony Government at the time. Hopetown was a quiet farming area until several large diamonds, most notable the Eureka Diamond and the Star of South Africa, were discovered there between 1867 and 1869 (<https://en.wikipedia.org/wiki/Hopetown>).

**Addendum 2: Surveyor General Farm Diagram**

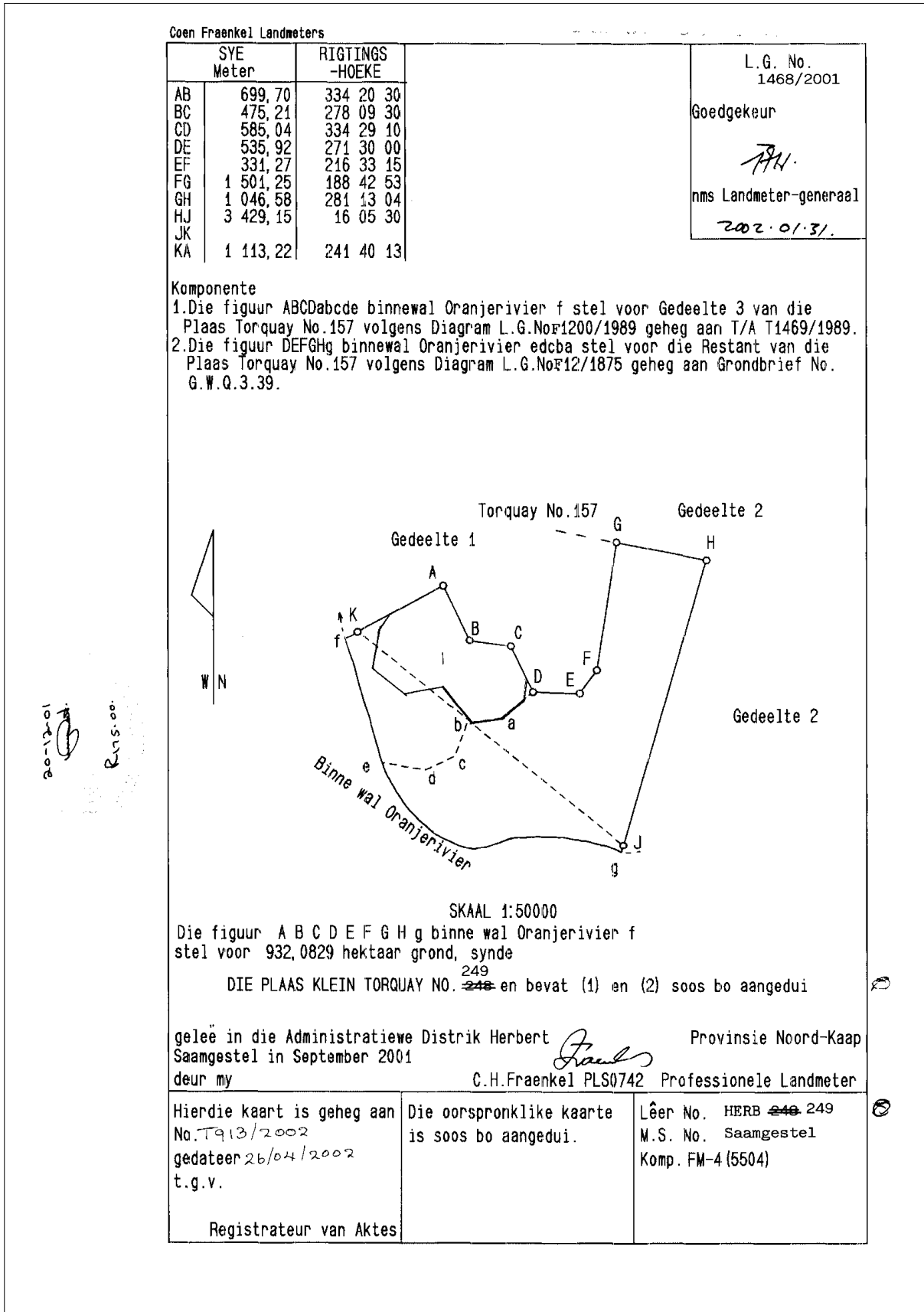


Figure 16: Surveyor General's map of the farm Klein Torquay 249 which was first surveyed in 1875