

Annexure G.3: Heritage Impact Assessment

HERITAGE IMPACT ASSESSMENT

(REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999))

FOR THE PROPOSED UPGRADE OF THE LEEUWKUIL WASTEWATER TREATMENT CONVEYANCES, GAUTENG PROVINCE, SOUTH AFRICA

Type of development:

Sewage Line Upgrade

Applicant:

GIBB ENVIRONMENTAL (PTY) LTD

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Project Reference:

Project number 2292

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July 2022

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APPROVAL PAGE

| | |
|-----------------------------------|---|
| Project Name | The proposed upgrade of the Leeuwkuil Wastewater Treatment conveyances, Gauteng Province, South Africa |
| Report Title | Heritage Impact Assessment for the proposed upgrade of the Leeuwkuil Wastewater Treatment conveyances, Gauteng Province, South Africa |
| Authority Reference Number | TBC |
| Report Status | Final Impact Assessment Report |
| Applicant Name | Emfuleni Local Municipality (ELM) |

| | Name | Qualifications and Certifications | Date |
|---|--------------------|---|-------------|
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| 15 August 2022 | 2292 | Technical Revision |
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REPORT OUTLINE

Appendix 6 of the GNR 326 EIA Regulations published on 7 April 2017 provides the requirements for specialist reports undertaken as part of the environmental authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

Table 1. Specialist Report Requirements.

| Requirement from Appendix 6 of GN 326 EIA Regulation 2017 | Chapter |
|--|--|
| (a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae | Section a |
| (b) Declaration that the specialist is independent in a form as may be specified by the competent authority | <i>Declaration of Independence</i> |
| (c) Indication of the scope of, and the purpose for which, the report was prepared | Section 1 |
| (cA) an indication of the quality and age of base data used for the specialist report | Section 3.4 |
| (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change; | Section 9 |
| (d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment | Section 3.4 |
| (e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used | Section 3 |
| (f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives; | Section 8 and 9 |
| (g) Identification of any areas to be avoided, including buffers | Section 8 and 9 |
| (h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers | Section 8 |
| (l) Description of any assumptions made and any uncertainties or gaps in knowledge | Section 3.7 |
| (j) a description of the findings and potential implications of such findings on the impact of the proposed activity including identified alternatives on the environment or activities; | Section 1.3 |
| (k) Mitigation measures for inclusion in the EMPr | Section 10.1 |
| (l) Conditions for inclusion in the environmental authorisation | Section 10. 1. |
| (m) Monitoring requirements for inclusion in the EMPr or environmental authorisation | Section 10. 5. |
| (n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan | Section 10.3 |
| (o) Description of any consultation process that was undertaken during the course of preparing the specialist report | Section 5 |
| (p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and | Refer to the BA report |
| (q) Any other information requested by the competent authority | No other information is requested at this time |

Executive Summary

GIBB Environmental (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner (EAP) on behalf of the Emfuleni Local Municipality (ELM) for the upgrade of the existing Leeuwkuil Wastewater treatment conveyances. Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the Project and the study area was assessed on desktop level and by a non-intrusive pedestrian field survey. Key findings of the assessment include:


- The larger Project area is characterised by various developments with some open fields in various suburbs and is considered to be of low archaeological potential;
- This was confirmed during the field survey and no archaeological sites of significance were noted and finds were limited to existing cemeteries. The general area is however not void of archaeological sites with the Duncanville Archaeological Site to the north-west of the Project;
- Heritage observations in relation to the Project footprint is three existing cemeteries two of which are declared heritage sites. These cemeteries are all located more than 60 meters from the proposed upgrades and is fenced with a concrete palisade and will not be directly affected;
- Due to the subterranean nature of the project no impacts are expected on the cultural landscape or sense of place associated with the declared sites;
- The project entails the upgrade of an existing sewer line that would have impacted on heritage resources (including sub terranean resources) if any ever existed along the sewer line alignment and no additional impacts to heritage resources are expected;
- The study area is located in an area of low to very high paleontological significance and an independent study was conducted by Prof Marion Bamford and concluded that it is extremely unlikely that any fossils would be preserved in the sands and soils of the Quaternary. There is a chance that fossils may occur in the unexposed shales of the early Permian Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr.

The impact on heritage resources is low and the project can commence provided that the recommendations in this report are adhered to, based on the South African Heritage Resource Authority (SAHRA) 's approval.

Recommendations:

- Implementation of a Chance Find Procedure for the Project (as outlined in Section 10.2).
- The study area should be monitored by the ECO during construction.
- The recorded cemeteries (Phelindaba Cemetery, the Cemetery dating to 1954, and the Boer Concentration Camp cemetery) must be indicated on development plans and avoided with a 30 m buffer zone.

Declaration of Independence

| | |
|------------------------------------|---|
| Specialist Name | Jaco van der Walt |
| Declaration of Independence | <p>I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 107 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations (as amended), that I:</p> <ul style="list-style-type: none"> • I act as an independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act. |
| Signature |  |
| Date | 18/08/2022 |

a) Expertise of the specialist

Jaco van der Walt has been practising as a CRM archaeologist for 15 years. He obtained an MA degree in Archaeology from the University of the Witwatersrand focussing on the Iron Age in 2012 and is a PhD candidate at the University of Johannesburg focussing on Stone Age Archaeology with specific interest in the Middle Stone Age (MSA) and Later Stone Age (LSA). Jaco is an accredited member of ASAPA (#159) and has conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, KZN as well as the Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia, Guinea, Afghanistan, Nigeria and Tanzania. Through this, he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

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ABBREVIATIONS

| |
|---|
| ASAPA: Association of South African Professional Archaeologists |
| BGG: Burial Ground and Graves |
| CFPs: Chance Find Procedures |
| CMP: Conservation Management Plan |
| CRR: Comments and Response Report |
| CRM: Cultural Resource Management |
| DFFE: Department of Fisheries, Forestry and Environment, |
| EA: Environmental Authorisation |
| EAP: Environmental Assessment Practitioner |
| ECO: Environmental Control Officer |
| EIA: Environmental Impact Assessment* |
| EIA: Early Iron Age* |
| EAP: Environmental Assessment Practitioner |
| EO: Environmental Officer |
| EPC: Engineering Procurement and Construction |
| EMPr: Environmental Management Programme |
| ESA: Early Stone Age |
| ESIA: Environmental and Social Impact Assessment |
| GIS: Geographical Information System |
| GPS: Global Positioning System |
| GRP: Grave Relocation Plan |
| HIA: Heritage Impact Assessment |
| LIA: Late Iron Age |
| LSA: Late Stone Age |
| MEC: Member of the Executive Council |
| MIA: Middle Iron Age |
| MPRDA: Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) |
| MSA: Middle Stone Age |
| NEMA: National Environmental Management Act, 1998 (Act No. 107 of 1998) |
| NHRA: National Heritage Resources Act, 1999 (Act No. 25 of 1999) |
| NID: Notification of Intent to Develop |
| NoK: Next-of-Kin |
| PRHA: Provincial Heritage Resource Agency |
| SADC: Southern African Development Community |
| SAHRA: South African Heritage Resources Agency |

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)

Early Stone Age (~ 2.6 million to 250 000 years ago)

Middle Stone Age (~ 250 000 to 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, 100 years ago)

The Iron Age (~ AD 400 to 1840)

Historic (~ AD 1840 to 1950)

Historic building (over 60 years old)

1 Introduction and Terms of Reference:

Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the proposed upgrade of the Leeuwkuil Wastewater Treatment conveyances within the Emfuleni Municipal area, Gauteng Province (Figure 1.1 to 1.3). The report forms part of the Basic Assessment (BA) Report and Environmental Management Programme Report (EMPr) for the development.

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial, and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The report outlines the approach and methodology utilized before and during the survey, which includes Phase 1, review of relevant literature; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey, cemeteries were recorded in the general study area. General site conditions and features on sites were recorded by means of photographs, GPS locations and site descriptions. Possible impacts were identified and mitigation measures are proposed in this report. SAHRA require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA for commenting. Upon submission to SAHRA the project will be automatically given a case number as reference. As such the EIA report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

Conduct a field study to: a) locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e. construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of ASAPA. To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).

1.2 Project Description

Project components and the location of the proposed Leeuwkuil conveyances are outlined under Table 2 and 3.

Table 2: Project Description

| | |
|---|---|
| Facility Name | Leeuwkuil Wastewater Treatment conveyances |
| Applicant | Emfuleni Local Municipality (ELM) |
| Municipalities | Emfuleni Local Municipality (ELM) |
| Affected Farms¹ | Leeuwkuil 596, Duncanville 598, Klipplaatdrift 601, Waldrift 599 |
| Affected Suburbs | Sharpeville, Duncanville, Arcon Park, Richmond and Three Rivers suburbs |
| Upgrade extent | Approximately 32 km of sewage pipeline |
| Central co-ordinate of the development | -26.6730123, 27.8105448 |
| Topographic Map Number | 2627 DB & 2627 DC |

Table 3: Infrastructure and project activities

| | |
|------------------------------------|---|
| Treatment capacity required | A total treatment capacity of 104 Ml/day is required by 2035 for the South Emfuleni catchment. |
| Project aims | A total treatment capacity of 104 Ml/day is required by 2035 for the South Emfuleni catchment. Parts of the South Emfuleni catchment drains to Rietspruit WWTW and Leeuwkuil WWTW. The Emfuleni Local Municipality therefore intends to upgrade sewage pipeline conveyances will be upgraded which will improve sludge management at the Leeuwkuil WWTW and cater for future planned developments. This will accommodate sewage flows from the south Sebokeng catchment, Vereeniging catchment and Vanderbijlpark catchment to cater for the future planned development. The intention of the integration of the Vereeniging and Vanderbijlpark catchment is to create flexibility in the sewage system for both catchments, to allow for transfer of sewage from Vanderbijlpark catchment to the regional Rietspruit WWTW. |

1.3 Alternatives

No alternatives were provided for assessment as it entails the upgrade of existing infrastructure.

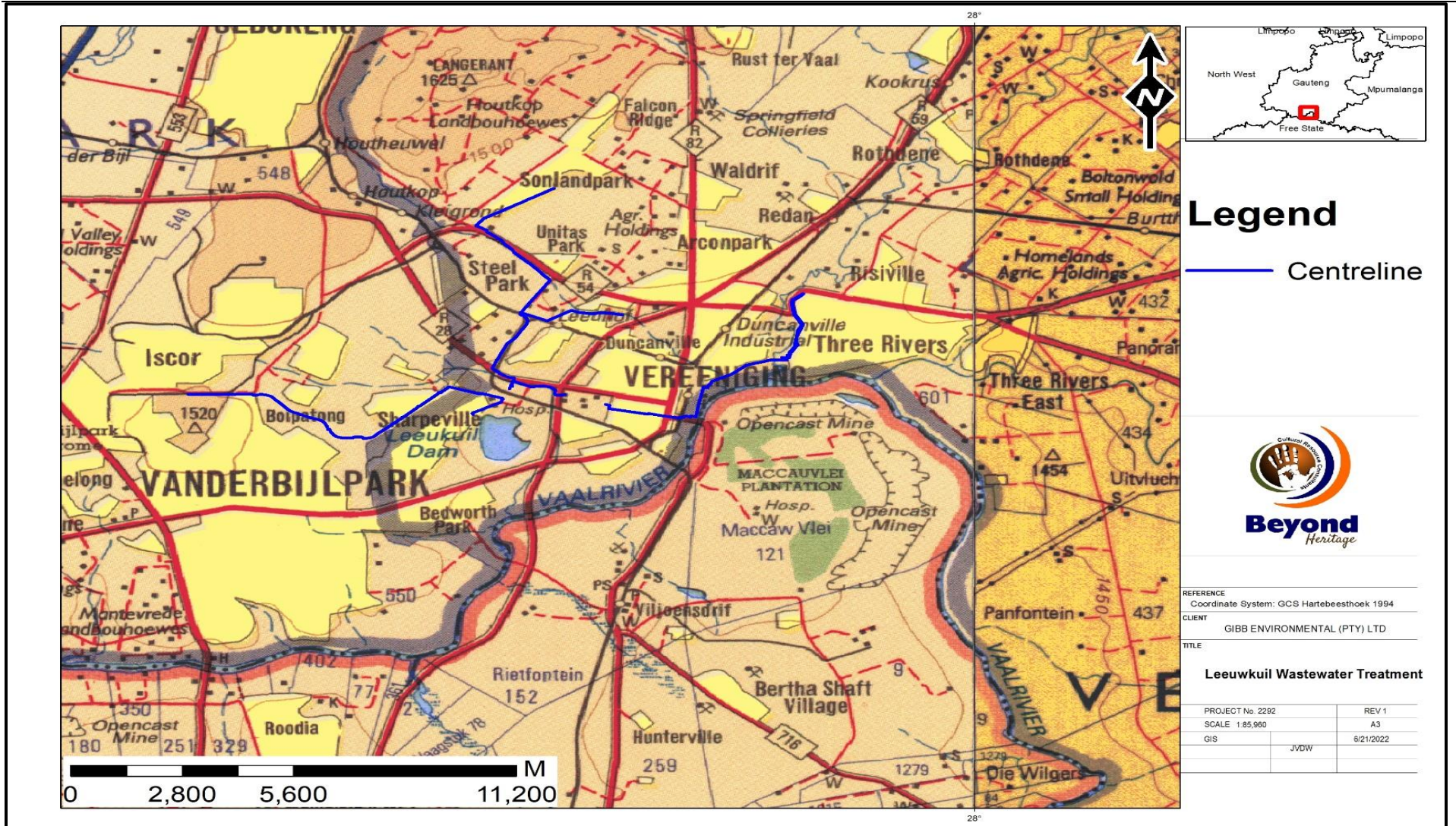


Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).

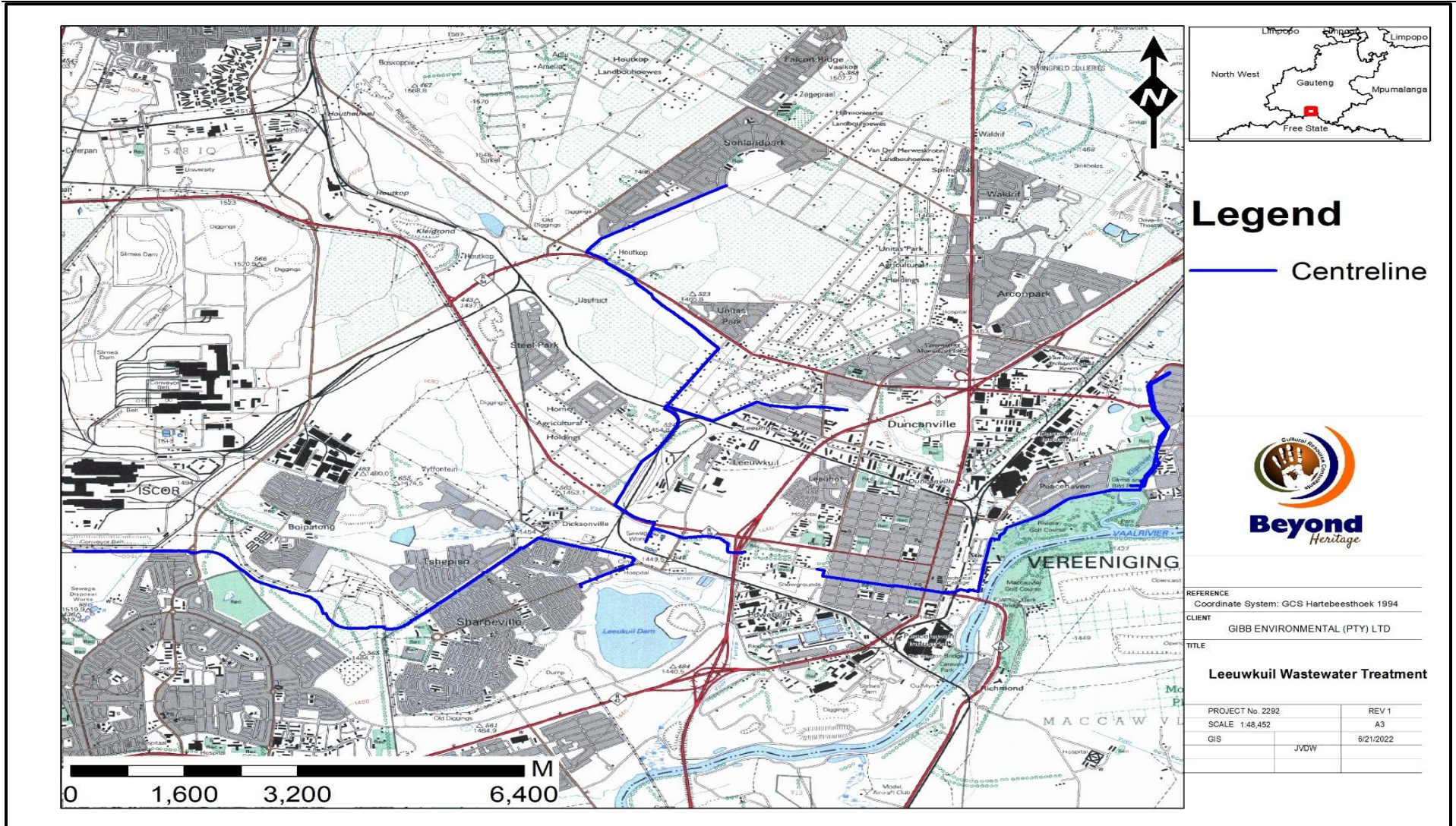


Figure 1.2. Local setting of the Project (1: 50 000 topographical map).

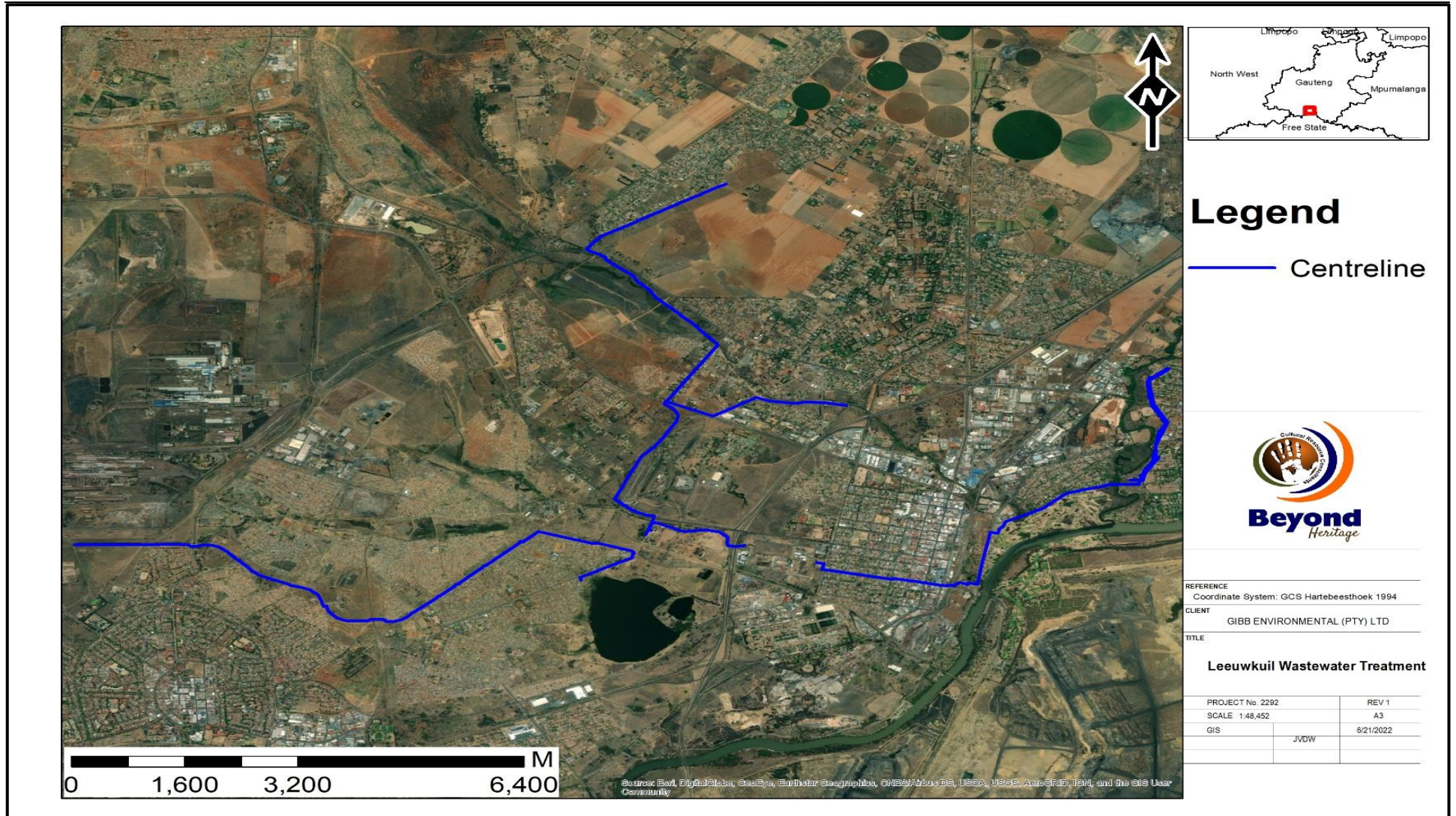


Figure 1.3. Aerial image of the development footprint and surrounds.

2 Legislative Requirements

The HIA, as a specialist sub-section of the EIA, is required under the following legislation:

- National Heritage Resources Act (NHRA), Act No. 25 of 1999)
- National Environmental Management Act (NEMA), Act No. 107 of 1998 - Section 23(2)(b)

A Phase 1 HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the PHRA if established in the province or to SAHRA. SAHRA will ultimately be responsible for the evaluation of Phase 1 HIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 HIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 HIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the SADC region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 HIA's are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision-making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925), as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

3 METHODOLOGY

3.1 Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the fieldwork phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any Environmental Authorisation (EA) process, it involves stakeholders interested in, or affected by the proposed development. The Public Participation Process is undertaken by the Environmental Assessment Practitioner (EAP, GIBB Environmental). Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process undertaken by GIBB Environmental was to capture and address any issues raised by community members and other stakeholders.

3.4 Site Investigation

The aim of the site visit was to:

- a) survey the proposed project area to understand the heritage character of the area and to record, photograph and describe sites of archaeological, historical or cultural interest;
- b) record GPS points of sites/areas identified as significant areas;
- c) determine the levels of significance of the various types of heritage resources recorded in the project area.

Table 4: Site Investigation Details

| | Site Investigation |
|--------|--|
| Date | 10 June 2022 |
| Season | <p>Winter - The time of year did not affect the survey although overall archaeological visibility was extremely low due to the built up/developed nature of the larger project area. Accessibility to a large majority of the proposed sewer lines was high due to the proposed lines running along existing roads and pipelines within the road reserve.</p> <p>Some areas contain high amounts of illegal dumping as well as raw sewage that is running across the surface. This made assessing certain areas impossible. The area was sufficiently covered to understand the heritage character of the area (Figure 3.1).</p> |

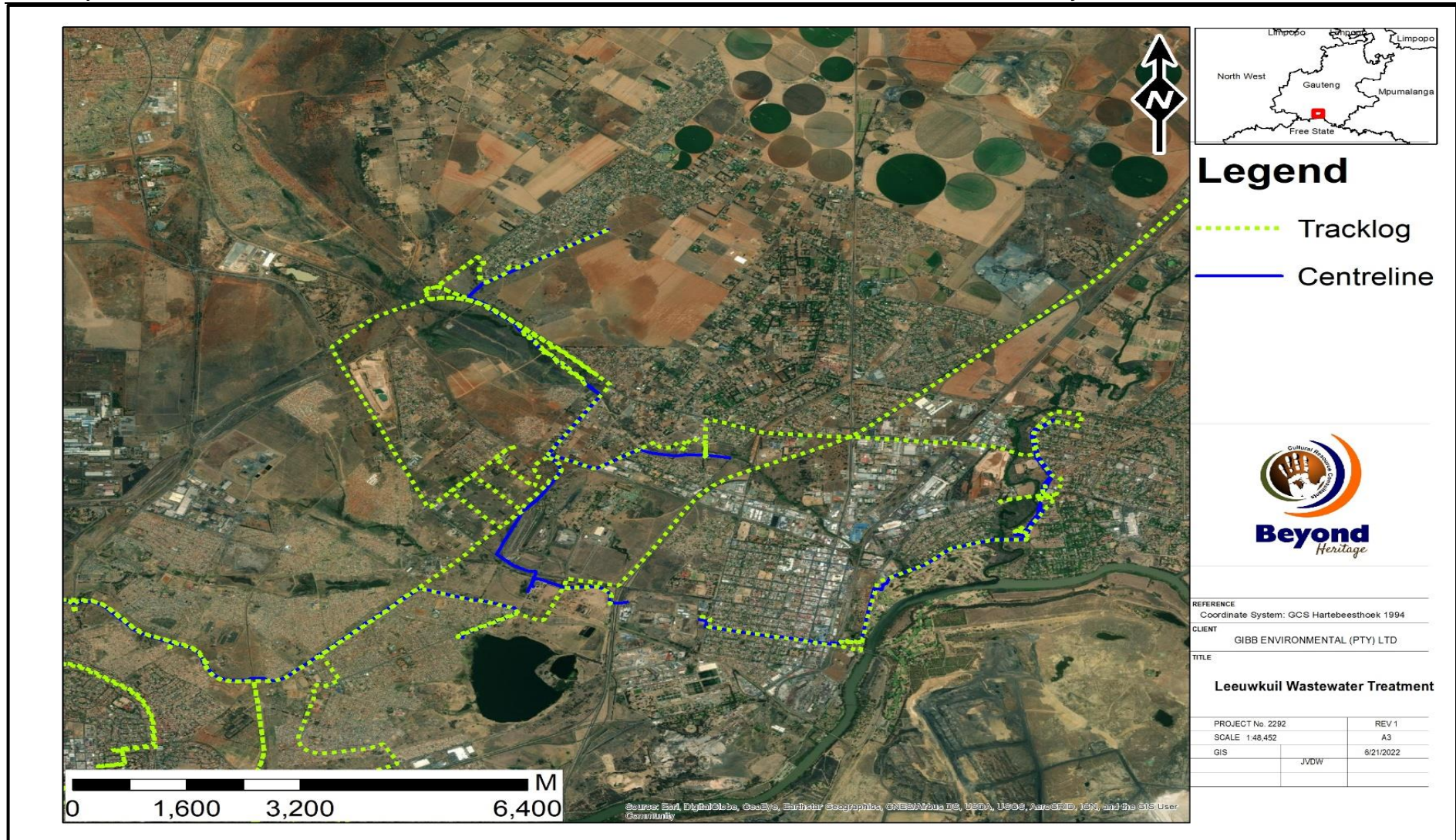


Figure 3.1. Tracklog of the survey path in green.

3.5 Site Significance and Field Rating

Section 3 of the NHRA distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

- Its importance in/to the community, or pattern of South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
- Sites of significance relating to the history of slavery in South Africa.

The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed project the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface.

This section describes the evaluation criteria used for determining the significance of heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:

- The unique nature of a site;
- The integrity of the archaeological/cultural heritage deposits;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined/is known);
- The preservation condition of the sites; and
- Potential to answer present research questions.

In addition to this criteria field ratings prescribed by SAHRA (2006), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 10 of this report.

Table 5. Heritage significance and field ratings

| FIELD RATING | GRADE | SIGNIFICANCE | RECOMMENDED MITIGATION |
|-------------------------------|--------------|--------------------------|--|
| National Significance (NS) | Grade 1 | - | Conservation; national site nomination |
| Provincial Significance (PS) | Grade 2 | - | Conservation; provincial site nomination |
| Local Significance (LS) | Grade 3A | High significance | Conservation; mitigation not advised |
| Local Significance (LS) | Grade 3B | High significance | Mitigation (part of site should be retained) |
| Generally Protected A (GP. A) | - | High/medium significance | Mitigation before destruction |
| Generally Protected B (GP. B) | - | Medium significance | Recording before destruction |
| Generally Protected C (GP.C) | - | Low significance | Destruction |

3.6 Impact Assessment Methodology

The impact assessment methodology was provided by GIBB Environmental (Pty) Ltd and aims to assess the significance of potential impacts in terms of the following criteria:

- i. Cumulative impacts;
- ii. Nature of the impact;
- iii. Extent of the impact;
- iv. Probability of the impact occurring;
- v. The degree to which the impact can be reversed;
- vi. The degree to which the impact may cause irreplaceable loss of resources; and
- vii. The degree to which the impact can be mitigated.

3.7. Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of graves and other cultural material cannot be excluded. This limitation is successfully mitigated with the implementation of a Chance Find Procedure and monitoring of the study area by the Environmental Control Officer (ECO). This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components will be highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

According to Census 2011, Emfuleni Local Municipality has a total population of 721 663, of which 85,4% are black African, 12% are white, 1,2% are coloured, and 1,0% are Indian/Asian. Of those 20 years and older, 3,6 % completed primary school, 36,7% have some secondary education, 32,4% completed matric, and 12,9% have some form of higher education. The percentage with no form of schooling is 4,0%. Of the population, 202 543 people are economically active (employed or unemployed but looking for work) and, of these, 34,7% are unemployed. Of the 85 594 economically active youth (15–35 years) in the area, 45% are unemployed.

5 Results of Public Consultation and Stakeholder Engagement:

5.1.1 Stakeholder Identification

Adjacent landowners and the public at large were informed of the proposed activity as part of the BA process by the EAP. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process. No heritage concerns have been raised thus far.

6 Literature / Background Study:

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

6.1 Literature Review (SAHRIS)

The full study area under investigation was not previously covered by heritage surveys and few HIA's was conducted in the immediate area. Studies conducted in the general area that were consulted is listed in Table 7.

Table 6. Heritage reports conducted in the greater study area

| Author | Year | Project | Findings |
|-------------------------------|------|---|---|
| Van der Walt, J. & Hutten, M. | 2017 | Heritage Impact Assessment for the Proposed Construction of a Filling Station and a Retail Centre On Holding 63, Johandeo, Gauteng Province | No archaeological findings were recorded |
| Pistorius, J. C.C. | 2018 | A Phase I Heritage Impact Assessment Study for the Proposed SAB Glass Bottle Manufacturing Plant in Vereeniging in the Gauteng Province. | No archaeological findings were recorded. |
| Magoma, M. | 2011 | Archaeological Impact Assessment for the Proposed Establishment of a Cemetery on Portion 51 of Zuurfontein Farm 591, Bophelong Area in Vaal. | No archaeological findings were recorded. |
| Pistorius, J.C.C. | 2010 | A Phase I Heritage Impact Assessment (HIA) Study for the Extension with View of Closure, of the Boitshepi Landfill Site, Between Boipatong and Tshepiso Near Vanderbijlpark, Gauteng. | No archaeological findings were recorded. |
| Van Schalkwyk, J. | 1998 | A Survey of Cultural Resources in the Emfuleni Development Area, Vanderbijlpark, Gauteng. | Middle Stone Age tools were found on the surface as well as two farming related structures relating to recent historical times. |
| Coetzee, F.P. | 2019 | Desktop Cultural Heritage Assessment: Proposed Re-Modelling and Expansion of Ramosukula Secondary School on Portion 59. | No archaeological findings were recorded. |
| Van Schalkwyk, J. | 2011 | Heritage Impact Assessment for the Proposed Expansion of the Rietspruit Waste Water Treatment Works, Sedibeng District Municipality, Gauteng Province. | No archaeological findings were recorded. |
| Van der Walt, J. | 2008 | Archaeological Impact Assessment For The Proposed Polokong Primary School, Johandeo, Sebokeng, Gauteng Province | No archaeological findings were recorded. |
| Birkholtz, P & Hutton, M. | 2013 | Proposed Establishment of a New Residential Township on Portion 228 of the farm Houtkop 594 IQ, Sebokeng, Emfuleni Local Municipality, Gauteng Province Heritage Impact Assessment | No archaeological findings were recorded. |

| | | | |
|-----------|------|--|--|
| Magoma. M | 2014 | Phase 1 Archaeological Impact Assessment Specialist Study Report For The Proposed New Meteor Substation And Associated 88kv Powerlines In Sebokeng Township Of Emfuleni Local Municipality Within Sedibeng District Municipality. Gauteng Province | Graves, heritage sites, stone assemblages and historical structures were recorded. |
|-----------|------|--|--|

The Leeuwkuil Project is situated on the north-eastern portions of Vanderbijlpark in Gauteng. The archaeological record for the greater study area consists of the Stone Age, Iron Age, and Historical period (Figure 6.1).

South Africa: A short chronology

Early Stone Age: 2 million - 250 000 BP. Hominins producing core and pebble tools, later stages includes handaxes and blades.

Middle Stone Age: 250 000 - 40 000 / 25 000 BP. *Homo Sapiens*. Prepared core techniques, formal tools, points, scrapers and backed artefacts. Occasionally includes bone points and ostrich eggshell fragments and grindstones.

Later Stone Age: 40 000 - 100 BP. Wide range of formal microlithic tools. Ostrich eggshell fragments, beads, rock art.

Ceramic Final Later Stone Age: 2000 BP. Wide range of formal microlithic tools, with thin-walled pottery, with some sites having faunal remains of ovicaprids.

Early Iron Age: 200 - 900 CE. Arrival of Bantu-speaking farmers who lived in sedentary settlements often located next to rivers. They kept livestock, cultivated sorghum, beans and cowpeas. Introduced metallurgy to the region and manufactured thick-walled pottery.

Middle Iron Age: 900 - 1300 CE. Confined to the modern-day Limpopo Province, and associated with early state formation, such as Mapungubwe and associated sites.

Late Iron Age: 1300 - 1840 CE. Marks the arrival of ancestral Eastern Bantu-speaking Nguni and Sotho-Tswana communities. Settlements are often located on or near hilltops for defensive purposes. The Iron Age as an archaeological period ends with the Mfecane, 1820s to 1840s CE. An event that caused major socio-political upheaval.

Historic events

1652: Dutch East India Company establishes refreshment station at modern-day Cape Town.

1658: First slave ships arrive at Table Bay.

1660 - 1793: Various armed conflicts between Khoisan and Europeans, several frontier wars between Europeans, Khoisan and Xhosa communities.

1795 - 1807: First British occupation of the Cape, the Dutch East India Company collapses, and slave trade is abolished.

1808 - 1820: Several frontier wars and first British Settlers arrive.

1820 - 1840: Onset of the Mfecane, abolishment of slavery and slaves are freed at the Cape. Dutch farmers started to migrate towards the interior of South Africa, what will become known as the 'Great Trek'.

1860 - 1880: Discovery of mineral wealth, diamonds and gold. Establishment of the Zuid-Afrikaansche Republiek (ZAR).

1899 - 1902: The South African War.

1910 - 1945: Unification of South Africa, formation of the ANC, World War I and World War II.

BP - Before Present
CE - Common Era

Figure 6.1. Summary of archaeological and historical events in South Africa.

6.1.1 Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contain sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. The three main phases can be divided as follows;

- * Later Stone Age; associated with Khoi and San societies and their immediate predecessors. Recently to ~30 thousand years ago
- * Middle Stone Age; associated with Homo sapiens and archaic modern humans. 30-300 thousand years ago.
- * Earlier Stone Age (ESA); associated with early Homo groups such as Homo habilis and Homo erectus. 400 000-> 2 million years ago.

Several Stone Age sites are on record near Vereeniging and Meyerton, dating to the ESA and more specifically the Acheulean Industry (van Riet Lowe, 1937, 1952; van Riet Lowe & van der Elst, 1949; van der Elst 1950; Mason, 1962). This ESA sequence is collectively known as the 'Three Rivers Sites' or the 'Vereeniging Sites' (Kuman, 2007). With several locales (e.g., Klip River Quarry, Henley-on-Klip and Meyerton Townlands) located well away from the project footprint. Most of the artefacts are made from dolerites and andesites as well quartzites at the Henley-on-Klip and Meyerton Townlands site.

The Henley-on-Klip site was identified in a road cutting, between Meyerton and Heidelberg (van Riet Lowe & van der Elst, 1949). The Meyerton Townlands site was exposed during pipeline trenching by the Rand Water Board who exposed gravels associated with the Klip River (le Roux and le Roux, 1959). MSA and LSA assemblages are on record for the general area (van der Elst, 1950).

6.1.2 Iron Age

The archaeology of farming communities of southern Africa encompasses three phases. The Early Iron Age (200-900 CE) represents the arrival of Bantu-speaking farmers in southern Africa. Living in sedentary settlements often located next to rivers, these farmers cultivated sorghum, beans, cowpeas, and kept livestock. The Middle Iron Age (900-1300 CE) is mostly confined to the Limpopo Valley in southern Africa with Mapungubwe Hill probably representing the earliest 'state' in this region (Huffman, 2007).

The Late Iron Age (1300-1840s CE) marks the arrival and spread of ancestral Eastern Bantu-speaking Nguni and Sotho-Tswana communities into southern Africa. The location of Late Iron Age settlements is usually on or near hilltops for defensive purposes. The Late Iron Age as an archaeological period ended by 1840 CE, when the Mfecane caused major socio-political disruptions in southern Africa (Huffman 2007). The Tswana occupied the larger study region since the 16th century. They occupied large stone walled towns, housing thousands of individuals. There are three known capitals of the Tswana namely Molokwane, Kaditshwene, and Kweneng. The closest capital is Kweneng located just 27km north east of Vereeniging in the Suikerbosrand Nature Reserve. Kweneng is considerably larger than the other capitals and is about 4,5km long and 2,7km wide. The occupation of Kweneng ended in the early 19th century during the turbulent time of the Mfecane which caused social unrest as conflict broke out within the Highveld and bordering areas (Sadr 2019; 2020).

During the mid-17th century Europeans started to settle in modern-day Cape Town. During and after the conflict caused by the Mfecane (1820-1840), during the reign of king kaSenzangakhona Zulu, known as Shaka, Dutch-speaking farmers started to migrate to the interior regions of South Africa. A period that is marked by various skirmishes and battles between the local inhabitants, Dutch settlers and the British (Gilliomee & Mbenga, 2007).

6.1.3 Historical context of Vereeniging and Vanderbijlpark

In 1879, a geologist named George W Stow discovered coal north of the Vaal River on the farm Leeuikuil. The discovery of the new coal fields led to the establishment of the Zuid Afrikaansehe en Oranye Vrystaatsche Steenkool en Minerale Mijn Vereeniging (ISCOR) by Samuel Marks and Isaac Lewis. Marks and Lewis commissioned Stow to purchase all of the farms in the area containing coal-bearing mineral deposits. The company started mining coal in 1879 and established a township at Leeuikuil. The town that developed within the area was named Vereeniging after the last word in the company's name. In 1902 Boer and British generals met in Vereeniging to discuss the terms of peace marking the end of the Boer War (see www.arcelormittalsa.com).

IsCOR first established a plant in Pretoria with production starting in 1934. The Second World War brought about a higher need for steel. The Pretoria steel works had reached its production capacity and it was decided to build a plate rolling mill in Vereeniging to accommodate wartime needs with the idea that this would later form part of a fully integrated steel works. After the war, it was decided that the new steelworks were to be developed. The area chosen is today known as Vanderbijlpark and is located west of Vereeniging along the Vaal River as it was seen to be ideal for the new integrated steel work. The plant was officially opened on 4 October 1947 (Pistorius, 2010).

The first black township close to Vanderbijlpark was established in 1949 and was called as Bophelong while the second was called Boipatong. Other townships such as Seboreng around the ISCOR Vanderbijl works were later developed to supply labour demands by the expanding industrial centre. The plant is still operational today and is one of the world's largest inland steel mills (Pistorius, 2010).

6.1.4 Sharpeville and Boipatong Massacres

In 1960, citizens were protesting against the pass laws of the Apartheid regime of the time. On the 21st of March, 67 people were killed and 186 people were wounded by the police during the protest (Van der Walt and Hutten, 2017). Victims of the Sharpeville massacre were buried in the Phelindaba Cemetery which was declared a National Heritage site in 2016. In 1961, another massacre occurred in the township of Boipatong where 46 people were killed by Inkatha members (Van der Walt and Hutten, 2017).

6.1.5 Graves and Burial sites

The Phelindaba Cemetery (-26.670253, 27.88697) is situated along the proposed pipeline upgrade along Boundary Street. The cemetery is formally fenced and conserved. The cemetery is also referred to as the Sharpeville Massacre victims Grave Sites and was declared a National Heritage site by SAHRIS in 2016. A Boer Concentration Camp Cemetery (-26.675094, 27.911119) is situated in the area away from the proposed pipeline upgrade. The cemetery is also formally fenced and conserved. The pipeline upgrade stops approximately 120km from the eastern fence and continues again approximately 340m behind the western fence. Another cemetery dating from 1954 (-26.682314, 27.863629) is situated east of the proposed pipeline upgrade next to Mareka Street. The cemetery is a small open field currently occupied with a squatter camp, grazing animals, illegal dumping of household refuse, and some graves found further into the open field away from the street. All of the cemeteries will not be directly impacted by the proposed pipeline upgrade (see Figures 8.1 and 8.2).

7 Description of the Physical Environment

The Leeuwkuil project is situated on the north eastern portions of Vanderbijlpark which include the Sharpeville, Duncanville, Acorn Park, Richmond and Three Rivers suburbs. The planned upgrades for the Leeuwkuil WWTW conveyances fall within lifestyle estates, lodges, small holdings/ properties, existing construction sites, housing developments and the above mentioned suburbs. The northern sections of the project traverses' agricultural lands. The larger surrounding environment is largely developed and disturbed and very little of the natural or historical landscape remains. The surrounding landscape is almost entirely

built up with a small number of open fields situated between the various suburbs. These open fields are however also highly disturbed due to past and current town development projects. The Vaal River is a major landmark which runs along the southern edge of the greater SRSS project area.

The project falls within the Grassland Biome, specifically the Soweto Highveld Grassland with the area being defined as gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix* (Mucina and Rutherford, 2006). In places not disturbed, only scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover. General site conditions are illustrated in Figures 7.1 to 7.6.



Figure 7.1. Portions of the Leeuwkuil project under construction.



Figure 7.2. Portions of the Leeuwkuil project already under construction.



Figure 7.3. General site conditions along the Kliprivier.



Figure 7.4. Pipeline alignment along the edge of a row of properties next to the Kliprivier.



Figure 7.5. Existing sewage line marked by manholes.



Figure 7.6. Manholes marking the existing sewage line.

8 Findings of the Survey

8.1 Heritage Resources

This assessment focusses on the Leeuwkuil conveyances and no natural or historical environments exist within various estates along the Vaal River, suburbs, townships and industrial areas. The few open fields that exist within the project area have been disturbed by past development projects, illegal squatter camps, illegal dumping and existing pipelines to the extent that no historical or archaeological material were noted on the surface. Heritage finds are limited to existing cemeteries outside of the impact areas and the Duncanville Archaeological site is also indicated in the wider area (Figure 8.1 – 8.2). The cemeteries are briefly described in Table 8 and general site conditions are indicated in Figure 8.3 – 8.6). The Duncanville archaeological site is located away from the project footprint and not further discussed here.

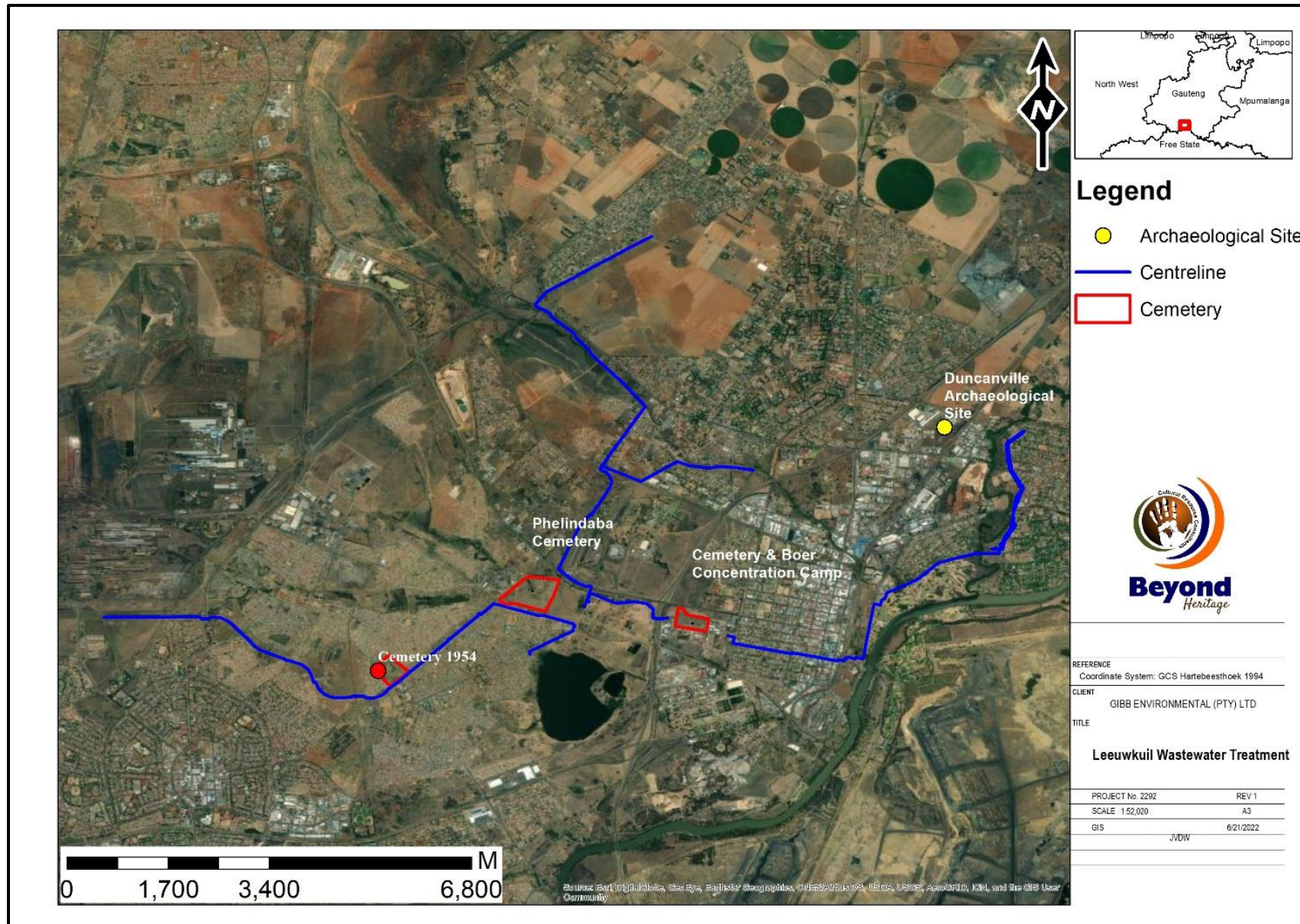


Figure 8.1. Observation points in relation the project area.

Table 7. Recorded observations in the study area.

| LABEL | LONGITUDE | LATITUDE | DESCRIPTION | SIGNIFICANCE |
|---|--------------------|--------------------|---|--|
| Cemetery 1954 | 27° 51' 49.0630" E | 26° 40' 56.3303" S | The cemetery is situated east of the proposed pipeline upgrade next to Mareka Street. The cemetery is a small open field currently occupied with a squatter camp, grazing animals, illegal dumping, and graves found further into the open field away from the street. The site is indicated on maps dating to 1954 | Local Significance LS |
| Phelindaba Cemetery | 27° 53' 13.0912" E | 26° 40' 12.9098" S | The proposed pipeline upgrade is located along Boundary Street, adjacent to the cemetery. The cemetery is formally fenced and conserved. The cemetery is also referred to as the Sharpeville Massacre victims Grave Sites. The cemetery was declared a National Heritage site by SAHRIS in 2016. | National Significance NS – Grade 1. National Heritage Site |
| Boer Concentration Camp Cemetery | 27° 54' 40.0280" E | 26° 40' 30.3372" S | The site is situated between two sections of the proposed pipeline upgrades. The cemetery is formally fenced and conserved. The pipeline upgrade stops approximately 120m from the eastern fence and continues again approximately 340m behind the western fence. | Local Significance LS – Grade 3A |
| Duncanville Archaeological Site | 27° 55' 39.63" E | 26° 39' 48.9636" S | Duncanville archaeological site is situated near the western edge of the proposed pipeline upgrades. The site was declared a Provincial Heritage Site by SAHRIS in 1944. | Provincial Significance PS – Grade 2 |



Figure 8.2. General site conditions at the Cemetery dating to 1954 illustrating refuse dumping and animal grazing.



Figure 8.3. General site conditions at the cemetery dating to 1954.



Figure 8.4. General view of pipeline location at the cemetery dating to 1954.



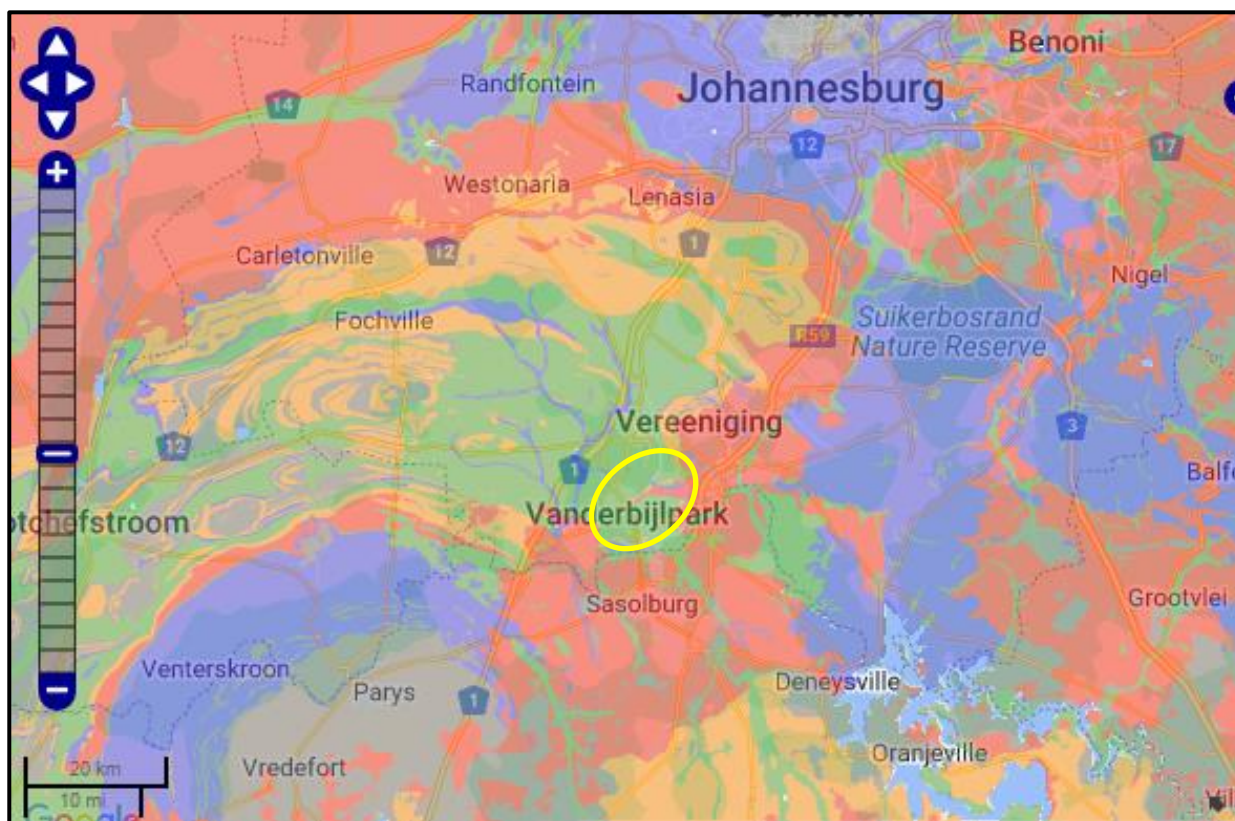
Figure 8.5. Existing powerline marking the pipeline alignment at the Cemetery dating to 1954.

8.2 Cultural Landscape

The study area is characterised by extensive developments including multiple lifestyle estates, lodges, small holdings/properties, existing construction sites, housing developments and various suburbs. The planned pipelines also occasionally traverse open fields situated in between various suburban developments and existing estates. Vanderbijlpark is known as an industrial area that was developed in 1943 after the increasing demand of steel during the Second World War. By 1947 it was decided that a fully integrated steelworks would be built in Vanderbijlpark. In the decades proceeding, the steelworks kept expanding and is still operational to this day. It is currently the largest operational inland steel mill in the world. Industrial activities in Vanderbijlpark gave rise to the development of surrounding townships and suburbs to support the growing need for labour at the mills (see www.arcelormittalsa.com) and the landscape can be described as industrial.

8.3 Paleontological Heritage

According to the SAHRA Paleontological map the study area is of varying paleontological significance with small areas of low, high, and very high palaeontological significance, majority of the study footprint shows moderate palaeontological significance (Figure 8.6). During quarrying operations in Vereeniging yielded fossiliferous sandstone outcrops. *Neoggarathiopsis*, *Gangamopteris*, and *Glassopteris* were the most commonly found (Pistorius 2018). An independent study was conducted by Prof Marion Bamford and concluded that it is extremely unlikely that any fossils would be preserved in the sands and soils of the Quaternary. There is a chance that fossils may occur in the unexposed shales of the early Permian Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr.



| 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 | These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map |

Figure 8.6. Paleontological sensitivity of the approximate study area (yellow polygon) as indicated on the SAHRA Palaeontological sensitivity map.

9 Potential Impact

No archaeological remains of significance were recorded within the study area although important Stone Age sites are located in the area. The Phelindaba Cemetery and Boer Concentration Camp Cemetery are of high social significance with the Phelindaba cemetery being declared as a National Heritage site by SAHRIS in 2016. The Boer Concentration Camp Cemetery is situated between two sections of the proposed pipeline upgrades. The pipeline upgrade stops approximately 120m from the eastern fence and continues again approximately 340m behind the western fence. Both cemeteries are located more than 30 meters from the proposed upgrades and are fenced with a concrete palisade and will not be directly impacted on.

The Cemetery dating to 1954, is situated east of the proposed pipeline upgrade next to Mareka Street. The cemetery is a small open field currently occupied with a squatter camp, grazing animals, dumping, and graves further into the open field away from the street and the proposed upgrades. These graves are more than 309m from the proposed upgrades and will not be directly impacted by the Project. The heritage impact of the Leeuwkuil WWTW conveyances project is therefore low.

Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a Chance Find Procedure. All known sites should be avoided and additional recommendations in this report should be implemented during all phases of the project.

Cumulative impacts considered as an effect caused by the proposed action that results from the incremental impact of an action when added to other past, present, or reasonably foreseeable future actions (Cornell Law School Information Institute, 2020). Cumulative impacts occur from the combination of effects of various impacts on heritage resources. The importance of identifying and assessing cumulative impacts is that the whole is greater than the sum of its parts. In the case of this project, impacts can be mitigated to an acceptable level. However, this and other projects in the area can have a negative impact on heritage sites in the area where these sites have been destroyed unknowingly.

9.1.1 Construction Phase

It is assumed that the construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure. These activities can have a negative and irreversible impact on heritage features if any occur. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.2 Operation Phase

No impacts are expected during the operation phase.

9.1.3 Impact Assessment for the Project

No sites of heritage importance will be directly impacted through the proposed pipeline upgrading. No archaeological sites require mitigation for the project to continue. The existing cemeteries must be avoided with a 30m buffer zone.

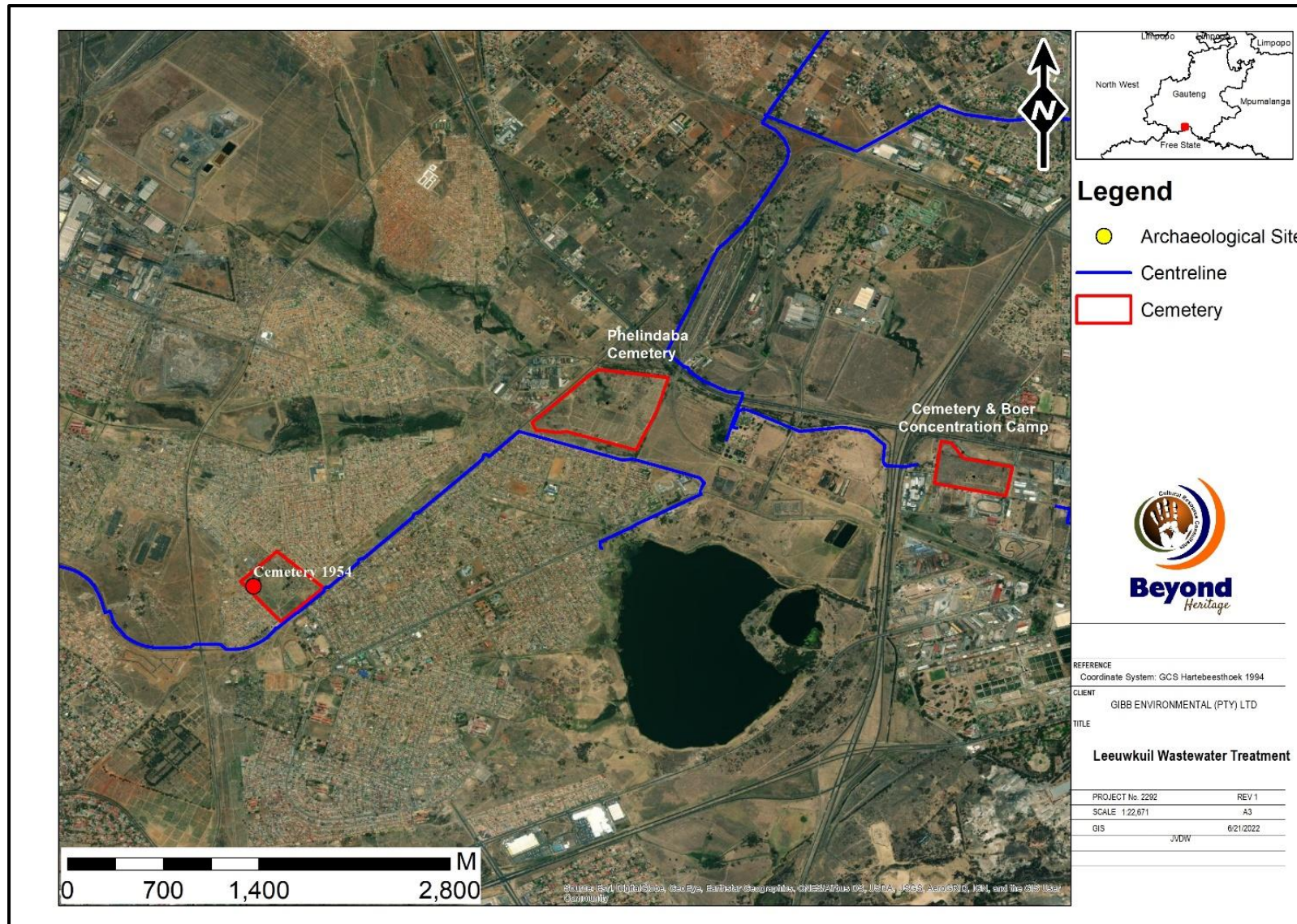


Figure 9.1. Cemeteries in relation to the project area. The red dot at the cemetery dating to 1954 indicate the location of the graves while the red polygon indicate the proposed extend of the cemetery indicated on the 1954 maps.

Table 8. Impact assessment of the project on heritage resources.

| Construction Phase | | | | | | | | | | | | | | | | |
|--------------------|----------|--------|---------------|----------|-------------|-------------|--------------|--|-----------------|--------|---------------|----------|-------------|-------------|--------------|------------|
| Pre-mitigation | | | | | | | | Recommended | Post-Mitigation | | | | | | | |
| Impact | Duration | Extent | Irreplaceable | Severity | Consequence | Probability | Significance | Mitigation | Duration | Extent | Irreplaceable | Severity | Consequence | Probability | Significance | Confidence |
| Leeuwkuil | 4 | 1 | 1 | -2 | -12 | 1 | -12 | Avoid known features and implement chance find procedure | 1 | 1 | 1 | -1 | -3 | 1 | -3 | High |
| Cumulative | 4 | 1 | 1 | -2 | -12 | 1 | -12 | Avoid known features and implement chance find procedure | 1 | 1 | 1 | -1 | -3 | 1 | -3 | High |

10 Conclusion and recommendations

The Project area is characterised by various developments with a number of open fields situated between the various suburbs. These open fields have been highly disturbed through development projects, informal squatter camps, illegal dumping and existing pipelines. The Leeuwkuil conveyance project footprint is located along existing sewerage pipelines, thus the study area is already highly disturbed and is considered to be of low heritage potential. This was confirmed during the field survey and no archaeological sites of significance were noted and finds were limited to a cemetery dating to 1954, the Phelindaba cemetery and the Boer Concentration Camp Cemetery. The latter two cemeteries have formal concrete palisade fencing and all three are located more than 30 meters from the Project and will not be directly impacted.

According to the SAHRA Paleontological sensitivity map the study area is of varying paleontological significance but majority of the project footprint is of moderate palaeontological significance (Figure 8.6). An independent study was conducted by Prof Marion Bamford (2022) and concluded that it is extremely unlikely that any fossils would be preserved in the sands and soils of the Quaternary. There is a chance that fossils may occur in the unexposed shales of the early Permian Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr.

The impact of the project on heritage resources is very low and the project can commence with the implementation of the recommendations in this report are implemented as part of the EMPr, based on the South African Heritage Resource Authority (SAHRA's) approval.

10.1 Recommendations for condition of authorisation

The following recommendations for Environmental Authorisation apply and the project may only proceed based on approval from SAHRA:

Recommendations:

- Implementation of a Chance Find Procedure for the Project (as outlined in Section 10.2).
- The study area should be monitored by the ECO during construction.
- The recorded cemeteries (1945 Cemetery, Phelindaba Cemetery, and Boer Concentration Camp cemetery) must be indicated on development plans and avoided with a 30 m buffer zone.

10.2 Chance Find Procedures

10.2.1 Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefore chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below and monitoring guidelines for this procedure are provided in Section 10.5.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

10.2.2 Monitoring Program for Palaeontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the contractor/s to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the contractor/s /environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. If required annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished, then no further monitoring is required.

10.3 Reasoned Opinion

The overall impact of the project is considered to be low. Residual impacts can be managed to an acceptable level through implementation of the recommendations made in this report. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

10.4 Potential risk

Potential risks to the proposed project are the occurrence of intangible features and unrecorded cultural resources (of which graves and subsurface cultural material are the highest risk). This can cause delays during construction, as well as additional costs involved in mitigation and possible layout changes.

10.5 Monitoring Requirements

Day to day monitoring can be conducted by the Environmental Control Officers (ECO). The ECO or other responsible persons should be trained along the following lines:

- *Induction training:* Responsible staff identified by the contractor/ECO should attend a short course on heritage management and identification of heritage resources.
- *Site monitoring and watching brief:* As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are from construction activities. The ECO should monitor all such activities daily. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 9. Monitoring requirements for the project

| Heritage Monitoring | | | | | |
|-----------------------------|---------------------|--|-----------------------------|-----------------------------------|--|
| Aspect | Area | Responsible for monitoring and measuring | Frequency | Proactive or reactive measurement | Method |
| Cultural Heritage Resources | Entire project area | ECO | Weekly (construction phase) | Proactively | <ul style="list-style-type: none"> • If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: <ol style="list-style-type: none"> 1. Cease all works immediately; 2. Report incident to the Sustainability Manager or similar; 3. Contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities. • Only recommence operations once impacts have been mitigated. |

10.6 Management Measures for inclusion in the EMPr

Table 10. Heritage Management Plan for EMPr implementation

| Area | Mitigation measures | Phase | Timeframe | Responsible party for implementation | Target | Performance indicators (Monitoring tool) |
|----------------------------------|---|-----------------------------------|-------------------------------------|--------------------------------------|--|--|
| General project area | Implement Chance Find Procedure in case possible heritage finds are uncovered | Construction | Throughout the construction phase | Applicant EPC Contractor | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA | ECO Checklist/Report |
| General project area | Monitoring by the ECO. | Construction | Throughout the construction phase | Applicant EAP | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA | ECO Checklist/Report |
| Phelindaba Cemetery | Avoid the cemetery with a 30m buffer zone. | Pre-construction and Construction | Throughout the life of the project. | Applicant EAP | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA | ECO Checklist/Report |
| Boer Concentration Camp cemetery | Avoid the cemetery with a 30m buffer zone. | Pre-construction and Construction | Throughout the life of the project. | Applicant EAP | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA | ECO Checklist/Report |
| Cemetery dating to 1954 | Avoid the cemetery with a 30m buffer zone. | Pre-construction and Construction | Throughout the life of the project. | Applicant EAP | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA | ECO Checklist/Report |

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