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**SAVANNAH ENVIRONMENTAL (PTY) LTD: PROPOSED
NIGEL GAS TRANSMISSION PIPELINE PROJECT,
EKURHULENI METROPOLITAN MUNICIPALITY,
GAUTENG PROVINCE**

Archaeological Impact Assessment



**Innovation in
Sustainability**

The logo for EOH, consisting of the letters 'EOH' in a bold, white, sans-serif font with a small triangle above the 'O'.

Prepared for: **Savannah Environmental (Pty) Ltd**

Prepared by: **Exigo Sustainability (Pty) Ltd**

ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE PROPOSED NIGEL GAS TRANSMISSION PIPELINE PROJECT IN THE NIGEL AREA OF THE EKURHULENI METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE

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DECLARATION

I, Nelius Le Roux Kruger, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Nigel Gas Transmission Pipeline Project in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required expertise in conducting the specialist report and I will comply with legislation, including the relevant Heritage Legislation (National Heritage Resources Act no. 25 of 1999, Human Tissue Act 65 of 1983 as amended, Removal of Graves and Dead Bodies Ordinance no. 7 of 1925, Excavations Ordinance no. 12 of 1980), the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment (SAHRA and the CRM section of ASAPA), regulations and any guidelines that have relevance to the proposed activity;
- I have not, 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;
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Signature of specialist
Company: Exigo Sustainability
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EXECUTIVE SUMMARY

This report details the results of an Archaeological Impact Assessment (AIA) study subject to an Environmental Basic Assessment (BA) process for the proposed Nigel Gas Transmission Pipeline Project between the towns of Nigel and Dunnottar in the Ekurhuleni Metropolitan Municipality, Gauteng Province. The project entails the proposed development of a gas transmission pipeline measuring **10km** and **0.15m** routing from the Consol Glass factory in Nigel to the Farm Grootfontein 165 Portion 44, located 8km to the north of the factory. For the pipeline, a trench of **0.5m** wide and approximately **1.5-2.5m** deep will be excavated within road reserves throughout the proposed alignment. The report includes background information on the area’s archaeology, its representation in Southern Africa, and the history of the larger area under investigation, survey methodology and results as well as heritage legislation and conservation policies. A copy of the report will be supplied to the Gauteng Provincial Heritage Resources Authority (Gauteng-PHRA) and recommendations contained in this document will be reviewed.

Project Title	Nigel Gas Transmission Pipeline Project
Project Location	S26.35302° E28.45662° (Northern Dunnottar offset) S26.42050° E28.44910° (Southern Nigel offset)
1:50 000 Map Sheet	2628AD
Farm Portion / Parcel	Various / Municipal
Magisterial District / Municipal Area	Ekurhuleni Metropolitan Municipality
Province	Gauteng Province

The history of the Southern Highveld is reflected in a rich archaeological landscape. Sites, documenting Earlier, Middle and Later Stone Age habitation occur throughout, mostly in open air locales or in sediments alongside rivers or pans. Bantu-speaking tribes moved into this area during the last millennia and these presumably Sotho-Tswana groups occupied the landscape during the Late Iron Age times at around AD 1500-1800. Settlement by Iron Age communities occurred near rivers and close to rocky outcrops. European farmers, settling in the area since the middle of the 19th century, divided up the landscape into a number of farms. Regionally, the archaeology of the Southern Highveld depicts the interaction between the first humans and their adaptation and utilization to the environment, the migration of people, technological advances, warfare, contact and conflict. Contained in its archaeology are traces of conquests by Bantu-speakers, Europeans and British imperialism encompassing the struggle for land, resources and political power. Specifically, the Witwatersrand holds sites dating to the Colonial Period, primarily related to the Gold Mining industry of the past century and resulting urbanization and industrialization. However, the bulk of the proposed Nigel Gas Transmission Pipeline Project area has been altered and transformed as a result of urbanisation and mining development which might have removed or obscured signs of archaeological material which is normally subterranean. The following general recommendations are made based on general observations at the site:

- The poorly preserved remains of a Historical Period settlement area occur along a northern section of the project footprint south of the M45 road (**Site EXIGO-NGP-HP01**). The site is rated as low heritage significance and impact seems unlikely but legislation requires that an alteration / destruction permit be obtained from the relevant heritage resources authority (SAHRA, SAHRA Built Environment Unit)

should the site be altered at any stage. It is recommended that the site and its surrounds be closely monitored by an informed ECO during development in order to avoid the destruction of previously undetected heritage remains.

- Two burial sites occur in the project area and these highly significant heritage resources are protected in terms of heritage and social by the National Heritage Resource Act (NHRA 1999). It is essential that the long-term conservation of the sites is ensured. The Nigel Municipal Cemetery (**Site EXIGO-NGP-BP01**) occurs east of the M63 road and approximately 10m east from the proposed pipeline alignment. The pipeline alignment runs within the road reserve which had previously been impacted on by the establishment and construction of municipal services (water and electricity lines) and impact on the adjacent cemetery is unlikely. It is primarily recommended that a heritage conservation buffer of at least 10m be implemented from the nearest graves in the cemetery, to the periphery of the impact buffer of construction activities. It is further recommended that a conservation buffer of 3m from the cemetery fence to the periphery of the impact buffer of construction activities be observed. A temporary construction barricade should be erected along areas where this measure proves unfeasible, i.e. in areas where construction activities might encroach on the 3m buffer. A site management plan detailing strict site management conservation measures should be compiled for the cemetery. The cemetery and burials at the site should be monitored on a bi-weekly basis by an informed ECO or by the heritage Specialist in order to detect any impact on the resource at the earliest opportunity. Should the developer not be able to uphold the recommendations stated above, it is then recommended that the proposed alignment be rerouted along the road servitude west of the M63 in order avoid construction encroaching on the conservation buffer for the cemetery. An additional informal cemetery was documented in an open field directly west of the M63 road and south of Dunnotar, approximately 100m west of the proposed pipe alignment (**Site Exigo-NGP-BP02**). Even though impact on the site seems improbable it is recommended that a conservation buffer of at least 50m be implemented around the site. The developer should consider fencing off the burial site in order to clearly demarcate the presence and extent of this sensitive heritage resource in the larger development landscape. The cemetery and burials at the site should be monitored on a frequent basis by an informed ECO or by the heritage Specialist in order to detect any impact on the resource at the earliest opportunity.
- **Should impact on any burial or cemetery in the project area prove inevitable at any stage of development, full grave relocation processes should be effected. This measure should be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions, laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials (see Addendum B).**
- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO is recommended during the planning and construction phases of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.
- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that the possibility of undetected archaeological remains occurring elsewhere in the project area should not be excluded. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development

This report details the methodology, limitations and recommendations relevant to these heritage areas, as well as areas of proposed development. It should be noted that recommendations and possible mitigation measures are valid for the duration of the development process, and mitigation measures might have to be implemented on additional features of heritage importance not detected during this Phase 1 assessment (e.g. uncovered during the construction process).

Nigel Gas Transmission Pipeline Project Heritage Sites Locations

Site Code	Coordinate S E	Short Description	Mitigation Action
EXIGO-NGP-HP01	S26.35371° E28.44821°	Historical Period Site	Site Monitoring: Frequent monitoring during construction by the heritage consultant or an ECO familiar with the heritage occurrences of the site. Alteration / destruction permitting if site is impacted on.
EXIGO-NGP-BP01	S26.40559° E28.44252°	Burial Site	Avoidance: Implement a heritage conservation buffer of at least 10m from the nearest graves in the cemetery. Implement a conservation buffer of 3m from the cemetery fence to the periphery of the impact buffer of construction activities but where unfeasible, erect a temporary construction barricade along areas where construction might encroach on the 3m buffer. Site Monitoring: Strict weekly monitoring during construction by the heritage consultant or an ECO familiar with the heritage occurrences of the site. Implement site management plan. Grave Relocation: Legally compliant grave relocation if impact on any human burial site is foreseen.
EXIGO-NGP-BP02	S26.36081° E28.43306°	Burial Site	Avoidance: Implement a heritage conservation buffer of at least 50m around the burial site. Possible fencing of the site and implementation of access control. Site Monitoring: Frequent monitoring during construction by the heritage consultant or an ECO familiar with the heritage occurrences of the site. Implement site management plan. Grave Relocation: Legally compliant grave relocation if impact on any human burial site is foreseen.

NOTATIONS AND TERMS/TERMINOLOGY

Absolute dating: Absolute dating provides specific dates or range of dates expressed in years.

Archaeological record: The archaeological record minimally includes all the material remains documented by archaeologists. More comprehensive definitions also include the record of culture history and everything written about the past by archaeologists.

Artefact: Entities whose characteristics result or partially result from human activity. The shape and other characteristics of the artefact are not altered by removal of the surroundings in which they are discovered. In the Southern African context examples of artefacts include potsherds, iron objects, stone tools, beads and hut remains.

Assemblage: A group of artefacts recurring together at a particular time and place, and representing the sum of human activities.

Context: An artefact's context usually consists of its immediate *matrix*, its *provenience* and its *association* with other artefacts. When found in *primary context*, the original artefact or structure was undisturbed by natural or human factors until excavation and if in *secondary context*, disturbance or displacement by later ecological action or human activities occurred.

Cultural Heritage Resource: The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

Cultural landscape: A cultural landscape refers to a distinctive geographic area with cultural significance.

Cultural Resource Management (CRM): A system of measures for safeguarding the archaeological heritage of a given area, generally applied within the framework of legislation designed to safeguard the past.

Feature: Non-portable artefacts, in other words artefacts that cannot be removed from their surroundings without destroying or altering their original form. Hearths, roads, and storage pits are examples of archaeological features

Lithic: Stone tools or waste from stone tool manufacturing found on archaeological sites.

Matrix: The material in which an artefact is situated (sediments such as sand, ashy soil, mud, water, etcetera). The matrix may be of natural origin or human-made.

Midden: Refuse that accumulates in a concentrated heap.

Microlith: A small stone tool, typically knapped of flint or chert, usually about three centimetres long or less.

Monolith: A geological feature such as a large rock, consisting of a single massive stone or rock, or a single piece of rock placed as, or within, a monument or site.

Phase 1 CRM Assessment: An Impact Assessment which identifies archaeological and heritage sites, assesses their significance and comments on the impact of a given development on the sites. Recommendations for site mitigation or conservation are also made during this phase.

Phase 2 CRM Study: In-depth studies which could include major archaeological excavations, detailed site surveys and mapping / plans of sites, including historical / architectural structures and features. Alternatively, the sampling of sites by collecting material, small test pit excavations or auger sampling is required. Mitigation / Rescue involves planning the protection of significant sites or sampling through excavation or collection (in terms of a permit) at sites that may be lost as a result of a given development.

Phase 3 CRM Measure: A Heritage Site Management Plan (for heritage conservation), is required in rare cases where the site is so important that development will not be allowed and sometimes developers are encouraged to enhance the value of the sites retained on their properties with appropriate interpretive material or displays.

Provenience: Provenience is the three-dimensional (horizontal and vertical) position in which artefacts are found. Fundamental to ascertaining the provenience of an artefact is *association*, the co-occurrence of an artefact with other archaeological remains; and *superposition*, the principle whereby artefacts in lower levels of a matrix were deposited before the artefacts found in the layers above them, and are therefore older.

Random Sampling: A probabilistic sampling strategy whereby randomly selected sample blocks in an area are surveyed. These are fixed by drawing coordinates of the sample blocks from a table of random numbers.

Site (Archaeological): A distinct spatial clustering of artefacts, features, structures, and organic and environmental remains, as the residue of human activity. These include surface sites, caves and rock shelters, larger open-air sites, sealed sites (deposits) and river deposits. Common functions of archaeological sites include living or habitation sites, kill sites, ceremonial sites, burial sites, trading, quarry, and art sites,

Stratigraphy: This principle examines and describes the observable layers of sediments and the arrangement of strata in deposits

Systematic Sampling: A probabilistic sampling strategy whereby a grid of sample blocks is set up over the survey area and each of these blocks is equally spaced and searched.

LIST OF ABBREVIATIONS

Abbreviation	Description
ASAPA	Association for South African Professional Archaeologists
AIA	Archaeological Impact Assessment
BP	Before Present
BCE	Before Common Era
BGG	Burial Grounds and Graves
CRM	Culture Resources Management
ECO	Environmental Control Officer
EIA	Early Iron Age (also Early Farmer Period)
EIA	Environmental Impact Assessment
EFP	Early Farmer Period (also Early Iron Age)
ESA	Earlier Stone Age
GIS	Geographic Information Systems
HIA	Heritage Impact Assessment
ICOMOS	International Council on Monuments and Sites
K2/Map	K2/Mapungubwe Period
LFP	Later Farmer Period (also Later Iron Age)
LIA	Later Iron Age (also Later Farmer Period)
LSA	Later Stone Age
MIA	Middle Iron Age (also Early later Farmer Period)
MSA	Middle Stone Age
NHRA	National Heritage Resources Act No.25 of 1999, Section 35
PFS	Pre-Feasibility Study
PHRA	Provincial Heritage Resources Authority
SAHRA	South African Heritage Resources Association
YCE	Years before Common Era (Present)

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1 BACKGROUND

1.1 Scope and Motivation

Exigo Sustainability (Pty) Ltd (Exigo) was commissioned by Savannah Environmental (Pty) Ltd to conduct an Archaeological Impact Assessment (AIA) study subject to an Environmental Basic Assessment (BA) process for the Nigel Gas Transmission Pipeline Project in the Ekurhuleni Metropolitan Municipality, Gauteng Province. The rationale of this AIA is to determine the presence of heritage resources such as archaeological and historical sites and features, graves and places of religious and cultural significance in previously unstudied areas; to consider the impact of the proposed project on such heritage resources; and to submit appropriate recommendations with regard to the cultural resources management measures that may be required at affected sites / features.

1.2 Project Direction

Exigo's expertise ensures that all projects be conducted to the highest international ethical and professional standards. As archaeological specialist for Exigo, Mr Nelius Kruger acted as field director for the project; responsible for the assimilation of all information, the compilation of the final consolidated AIA report and recommendations in terms of heritage resources on the demarcated project areas. Mr Kruger is an accredited archaeologist and Culture Resources Management (CRM) practitioner with the Association of South African Professional Archaeologists (ASAPA), a member of the Society for Africanist Archaeologists (SAFA) and the Pan African Archaeological Association (PAA) as well as a Master's Degree candidate in archaeology at the University of Pretoria.

1.3 Project Brief

The project entails the proposed development of a **10km** and **0.15m** wide gas transmission pipeline routing from the Consol Glass factory in Nigel to the Farm Grootfontein 165 Portion 44, located 8km to the north of the factory.

The pipeline originates at the Consol Glass factory west of Nigel and follows the M63 road north towards Dunnottar where it follows Annan and Chaplan Avenues. It then routes east to the Farm Grootfontein 165 Portion 44 along the M45 road. For the pipeline, a trench of **0.5m** wide and approximately **1.5-2.5m** deep will be excavated and the impact footprint of the project will not exceed **10m** where **5m** on either side of the pipeline alignment might maximally be impacted (it was indicated that the typical affected area will be 2.5m on either side of the pipeline alignment). The pipeline construction will occur along and within road reserves throughout the proposed alignment. For the purposes of this assessment, a survey area of 250m on either side of the proposed alignment was examined in order to create a heritage baseline of the immediate surroundings of the landscape surrounding the proposed route.

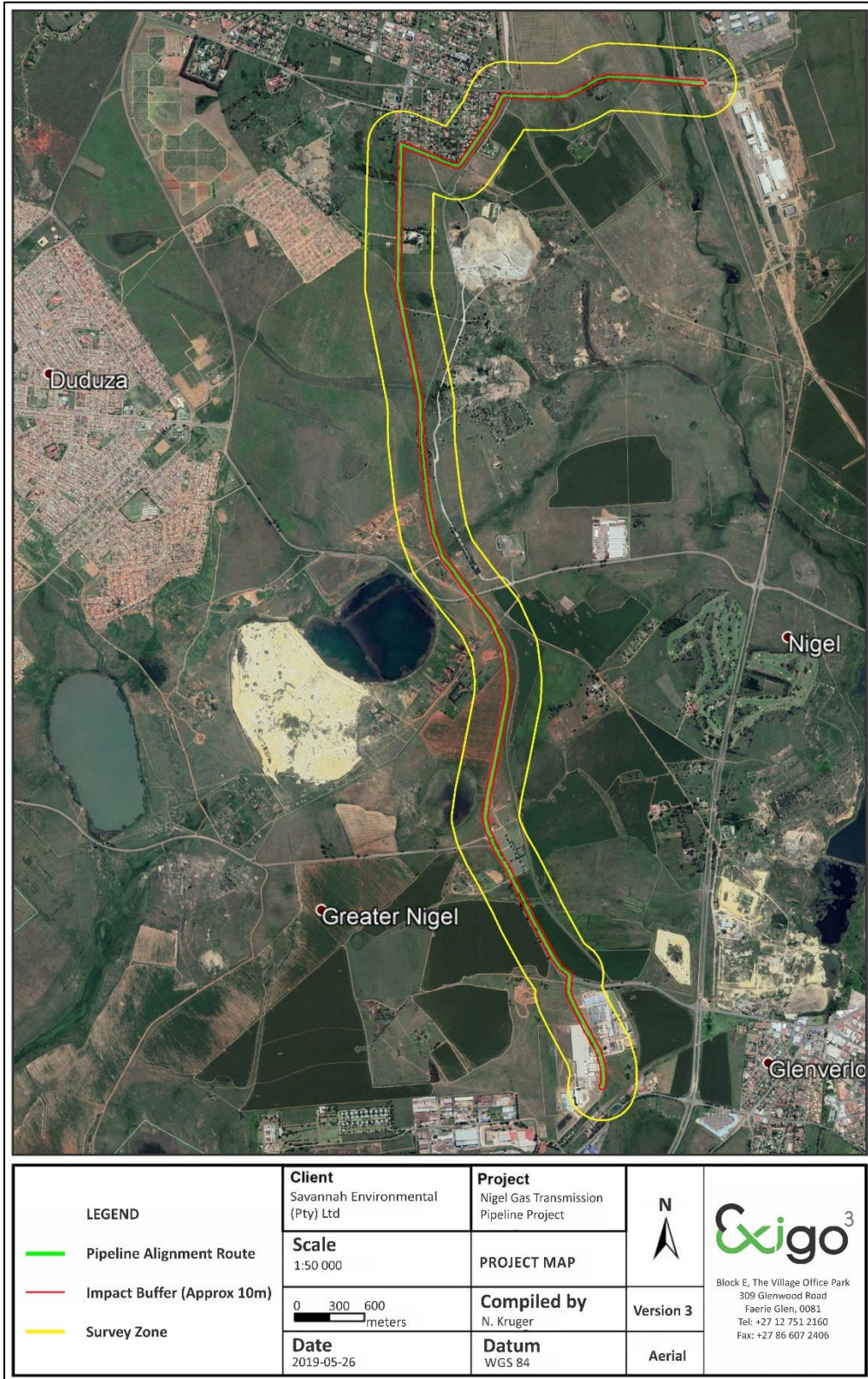


Figure 1-1: Project map indicating the extent of Nigel Gas Transmission Pipeline infrastructure components as discussed in the text.

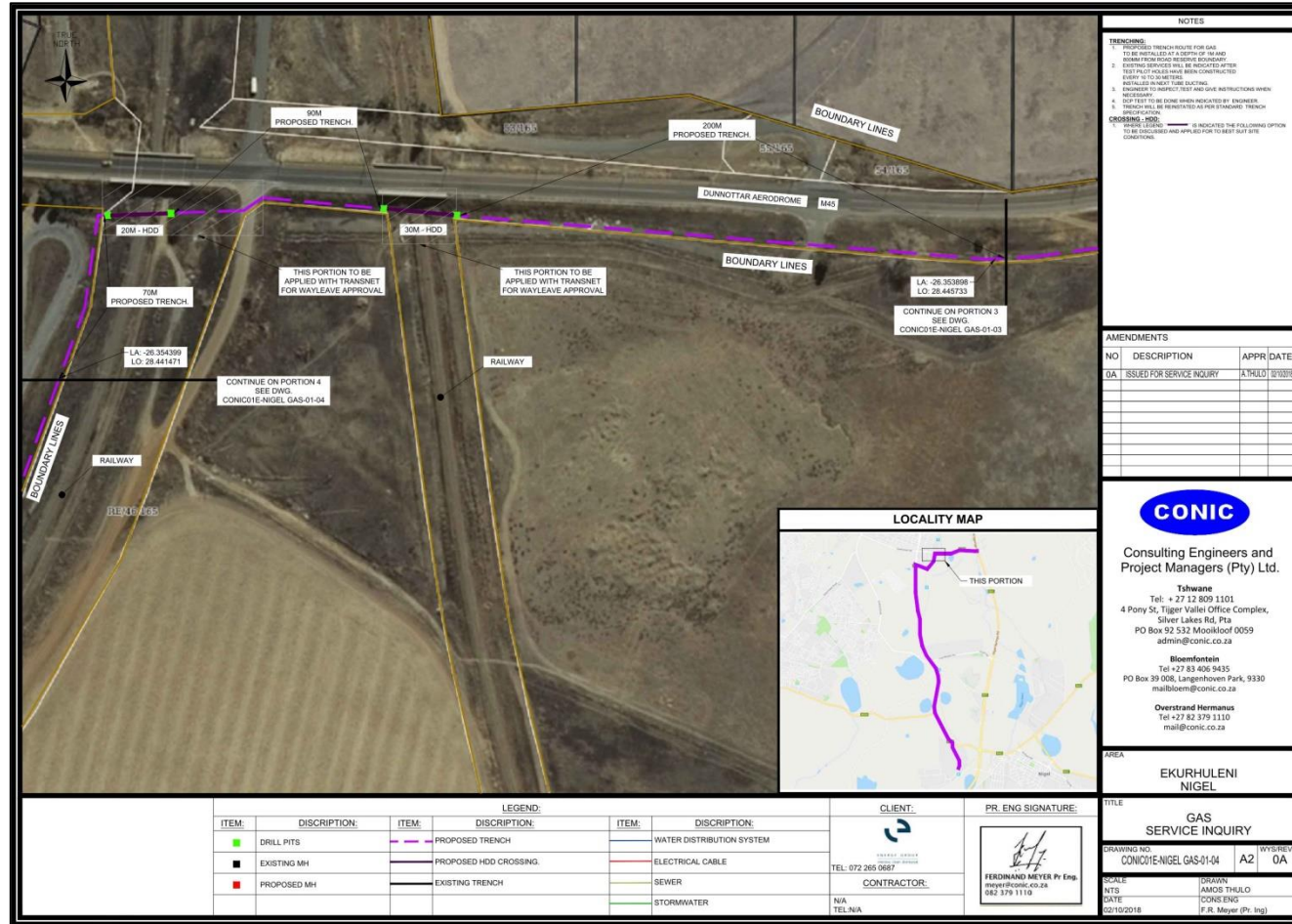


Figure 1-2: Aerial map detailing a northern section of the Nigel Gas Transmission Pipeline infrastructure east of Dunnottar.

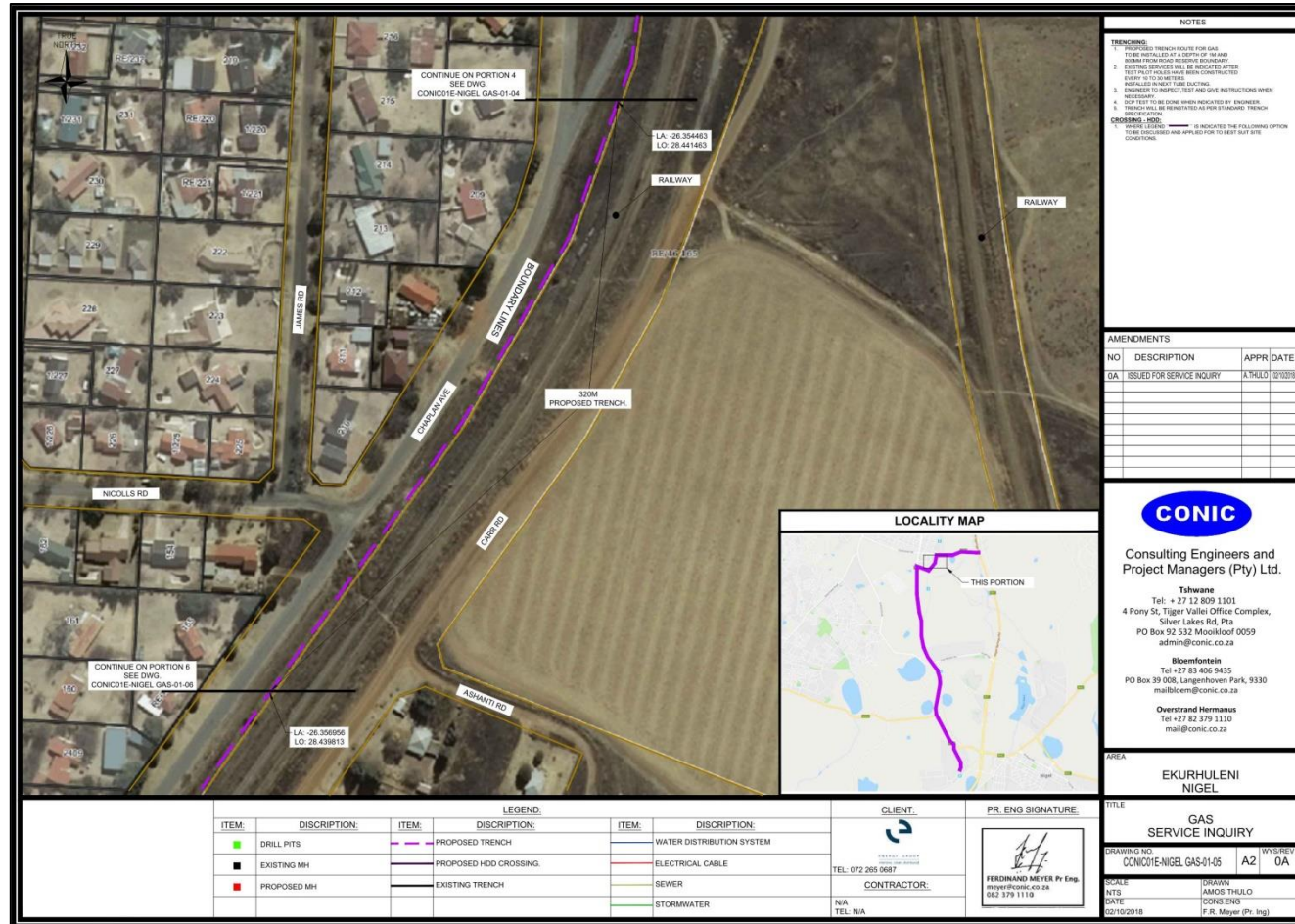


Figure 1-3: Aerial map detailing a northern section of the Nigel Gas Transmission Pipeline infrastructure east of Dunnottar.

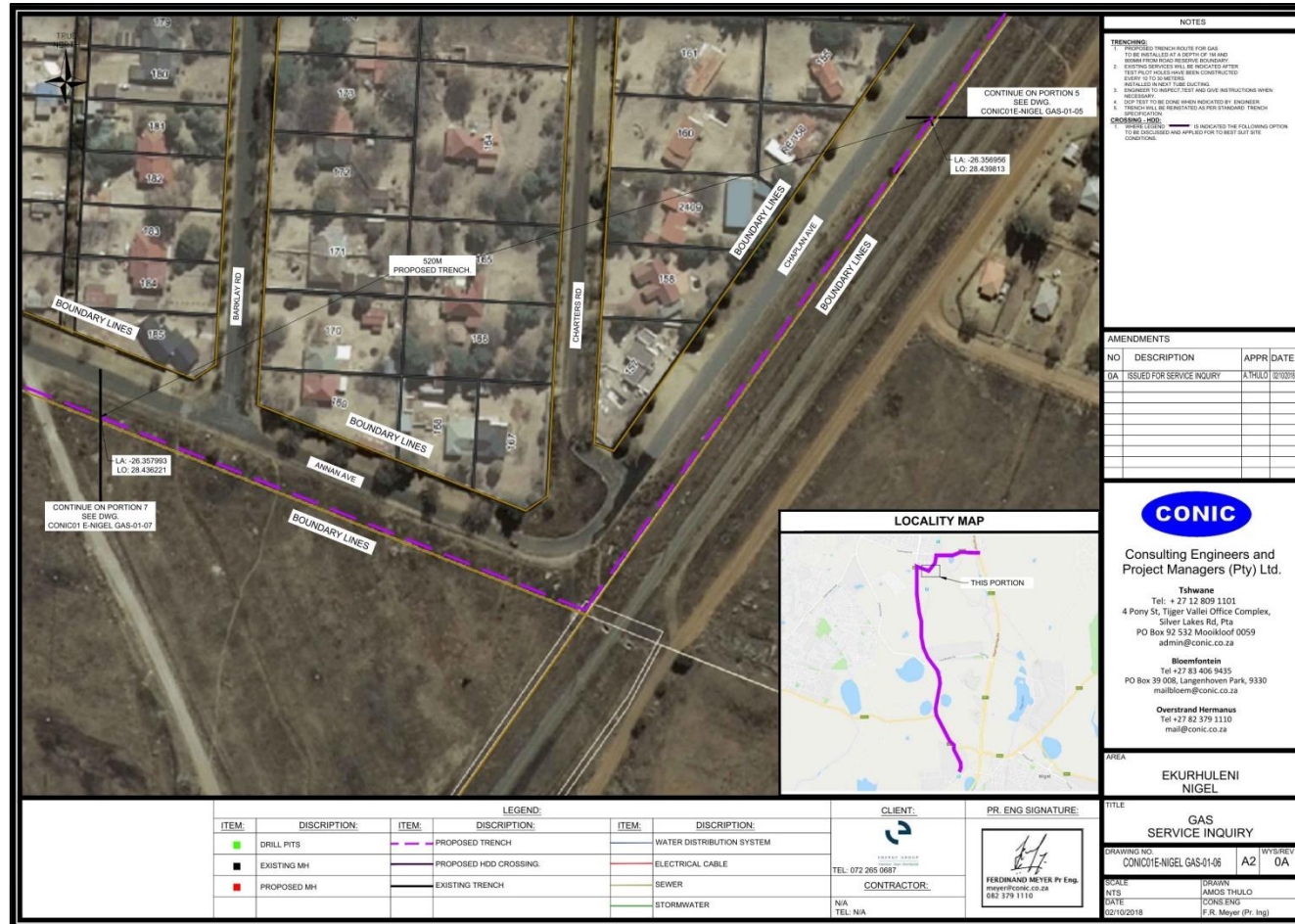


Figure 1-4: Aerial map detailing a northern section of the Nigel Gas Transmission Pipeline infrastructure east and south of Dunnottar.

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Archaeological Impact Assessment Report

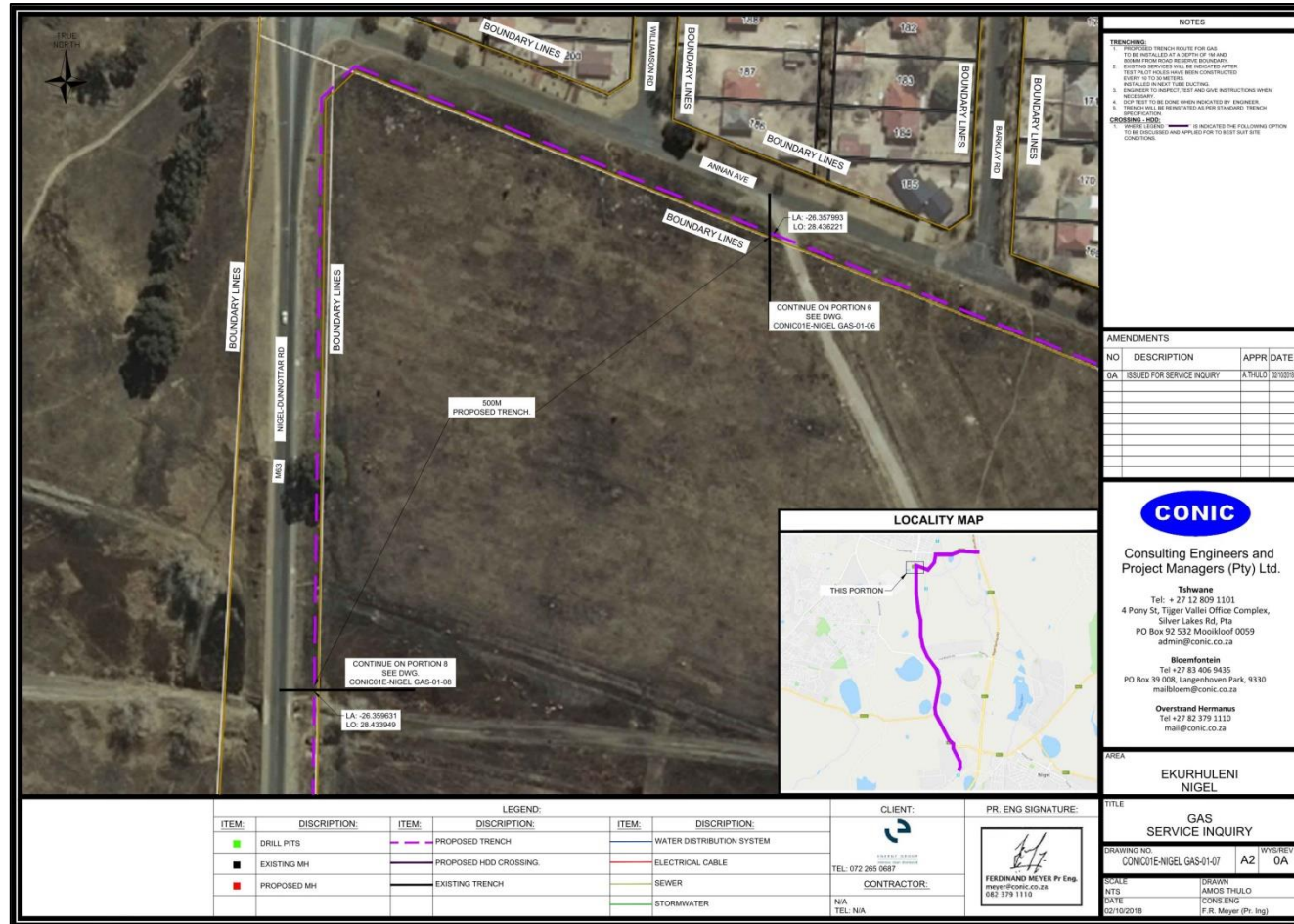


Figure 1-5: Aerial map detailing a northern section of the Nigel Gas Transmission Pipeline infrastructure directly south of Dunnottar.

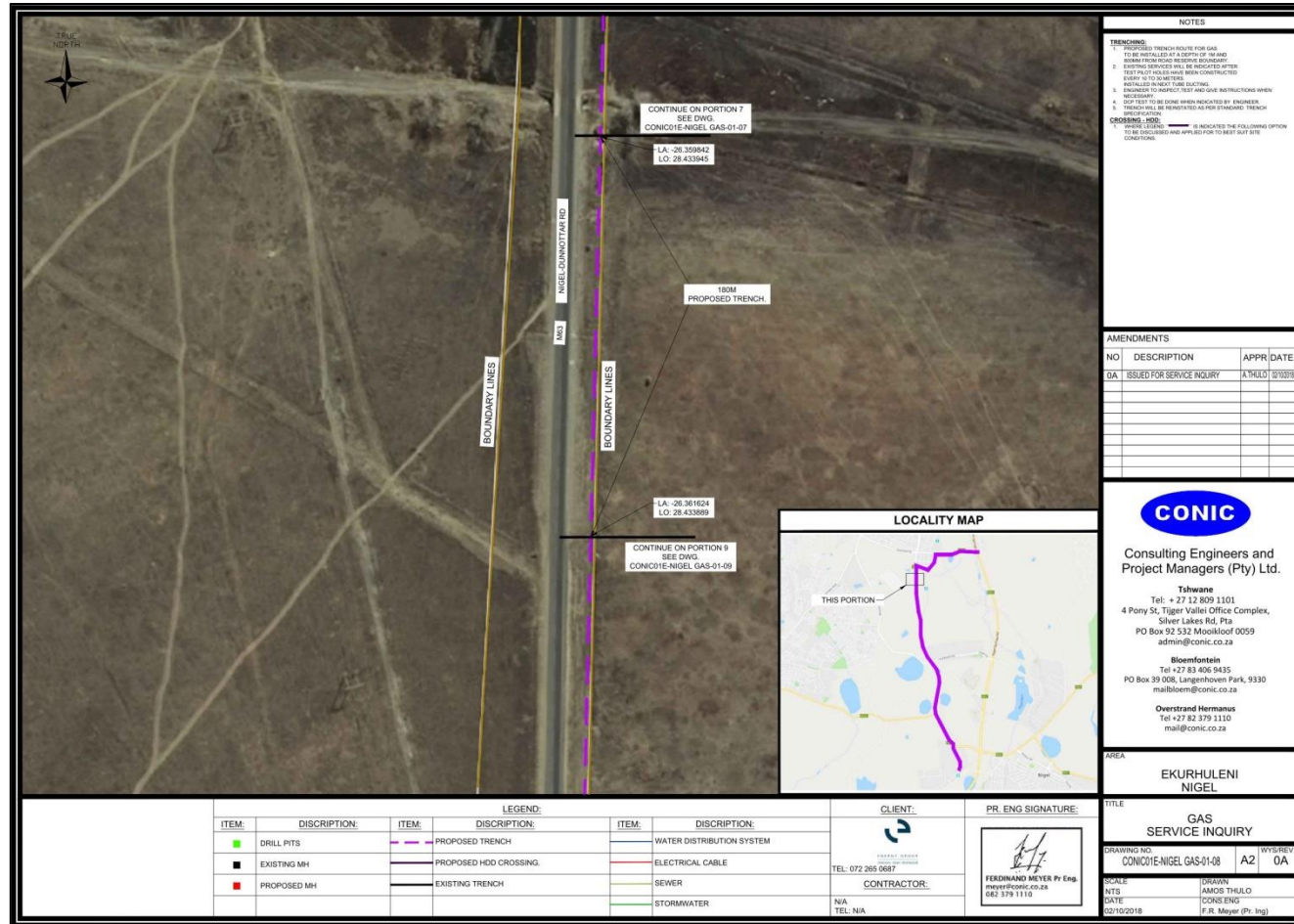


Figure 1-6: Aerial map detailing a northern section of the Nigel Gas Transmission Pipeline infrastructure south of Dunnottar.

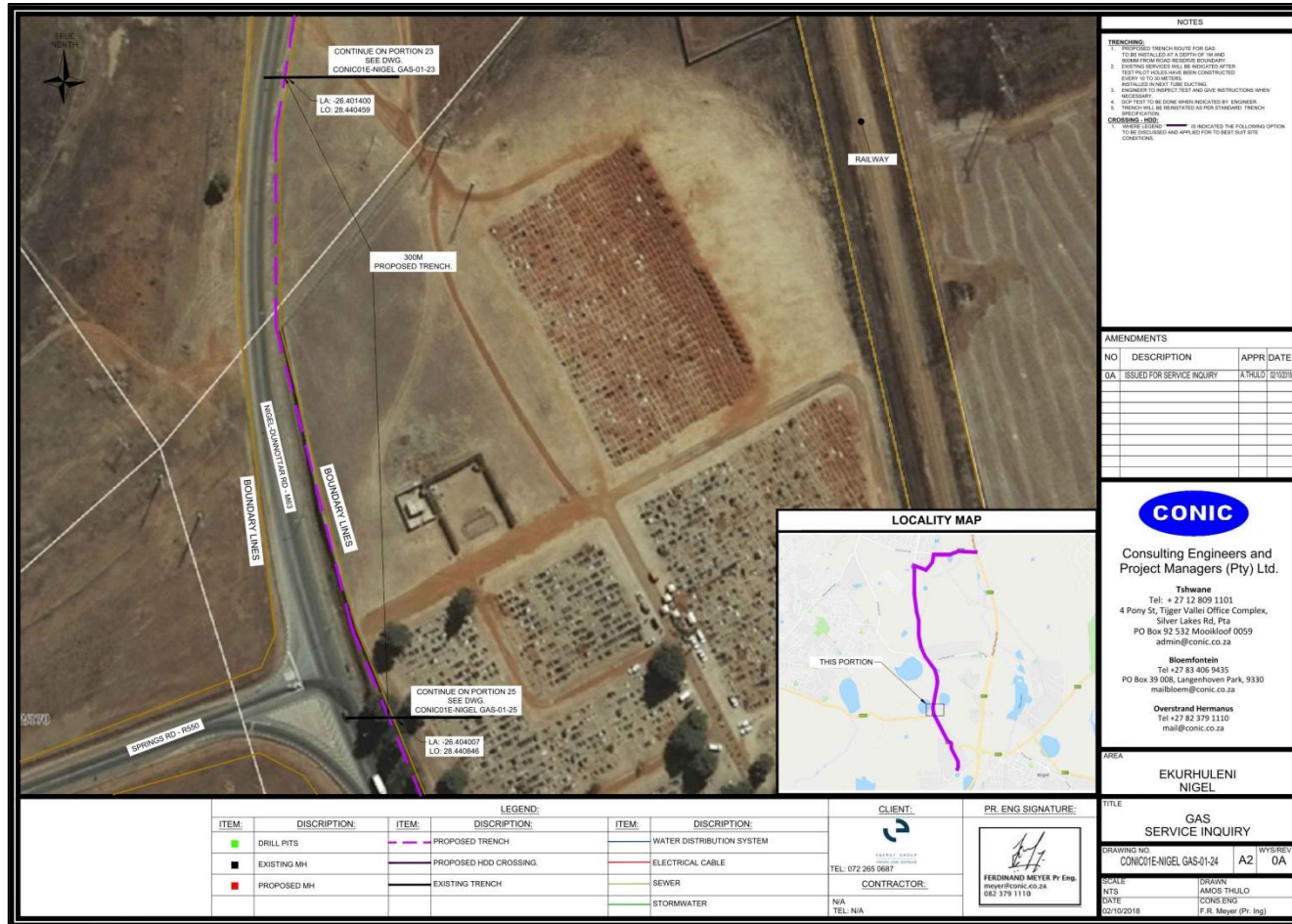


Figure 1-7: Aerial map detailing a central section of the Nigel Gas Transmission Pipeline infrastructure in the vicinity of the Nigel Cemetery.

Savannah: Nigel Gas Transmission Pipeline Project

Archaeological Impact Assessment Report

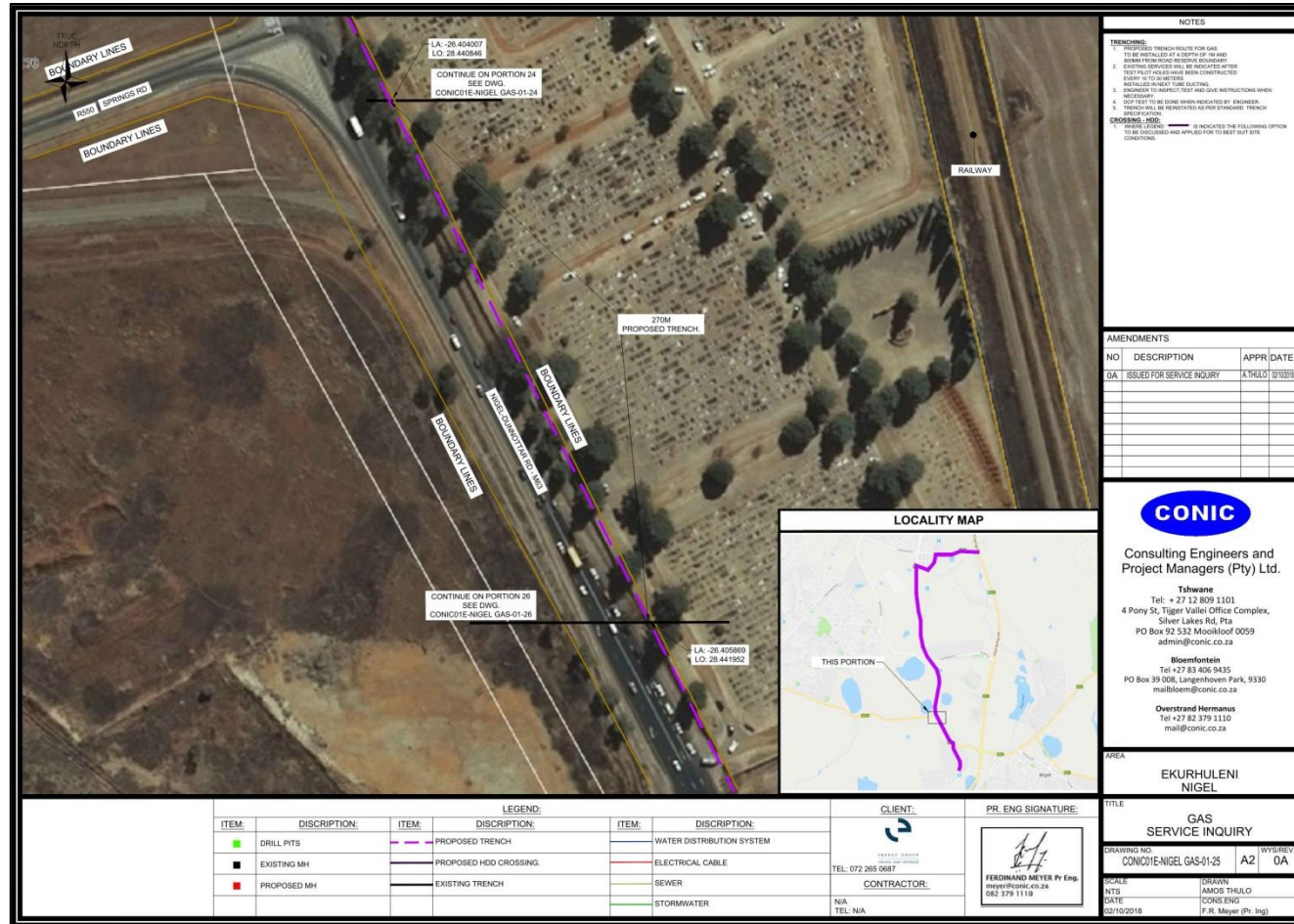


Figure 1-8: Aerial map detailing a central section of the Nigel Gas Transmission Pipeline infrastructure in the vicinity of the Nigel Cemetery.

Savannah: Nigel Gas Transmission Pipeline Project

Archaeological Impact Assessment Report

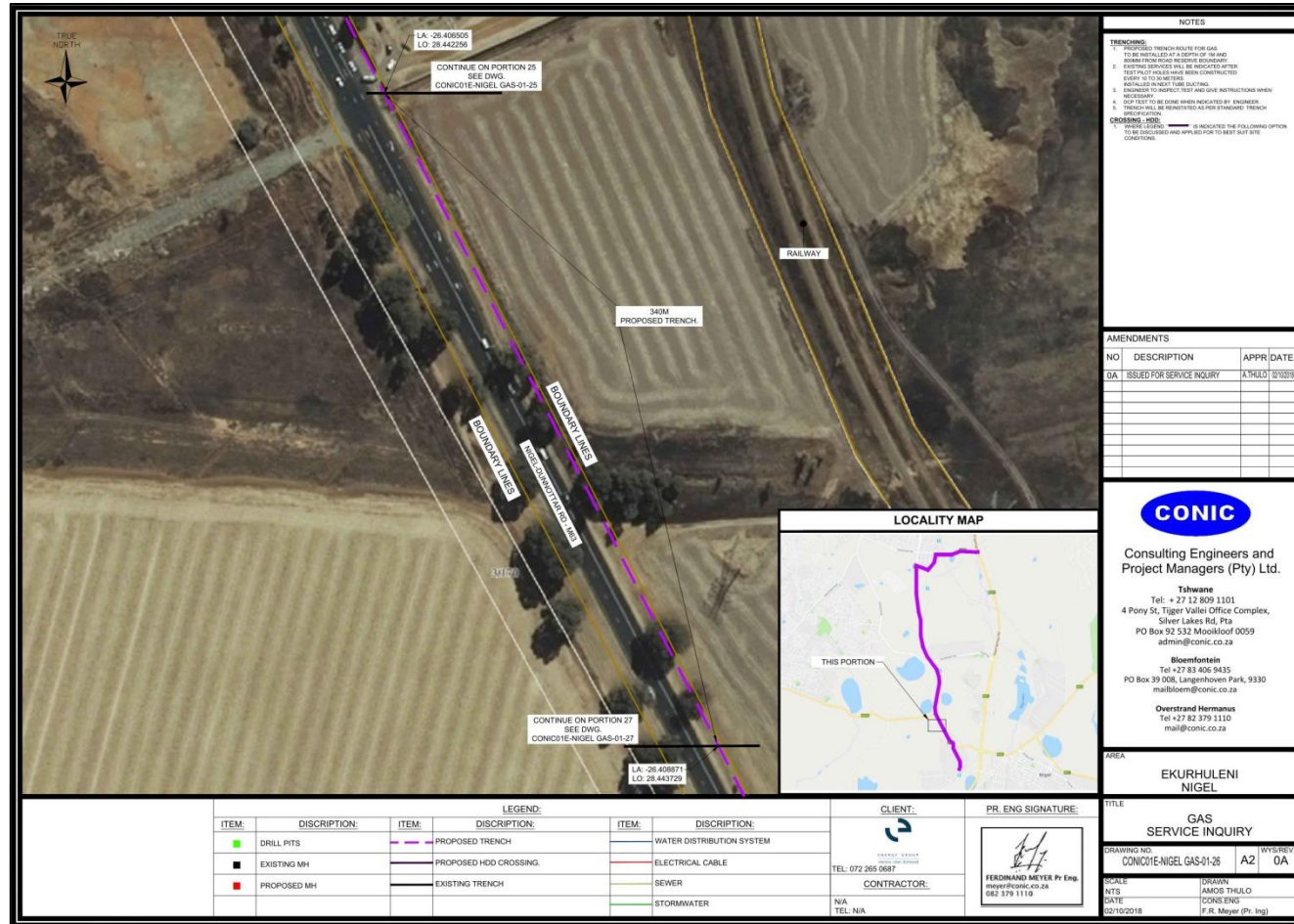


Figure 1-9: Aerial map detailing a southern section of the Nigel Gas Transmission Pipeline infrastructure directly south of the Nigel Cemetery.

1.4 Terms of Reference

Heritage specialist input into the Environmental Impact Assessment (EIA) process is essential to ensure that, through the management of change, developments still conserve our heritage resources. Heritage specialist input in EIA processes can play a positive role in the development process by enriching an understanding of the past and its contribution to the present. It is also a legal requirement for certain development categories which may have an impact on heritage resources (Refer to Section 2.5.2).

Thus, EIAs should always include an assessment of heritage resources. The heritage component of the EIA is provided for in the **National Environmental Management Act, (Act 107 of 1998)** and endorsed by section 38 of the **National Heritage Resources Act (NHRA - Act 25 of 1999)**. In addition, the NHRA protects all structures and features older than 60 years, archaeological sites and material and graves as well as burial sites. The objective of this legislation is to ensure that developers implement measures to limit the potentially negative effects that the development could have on heritage resources. Based hereon, this project functioned according to the following **terms of reference for heritage specialist input**:

- *Provide a detailed description of all archaeological artefacts, structures (including graves) and settlements which may be affected, if any.*
- *Assess the nature and degree of significance of such resources within the area.*
- *Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;*
- *Assess and rate any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.*
- *Propose possible heritage management measures provided that such action is necessitated by the development.*
- *Liaise and consult with the South African Heritage Resources Agency (SAHRA)*

1.5 CRM: Legislation, Conservation and Heritage Management

The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

1.5.1 Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and its provincial offices aim to conserve and control the management, research, alteration and destruction of cultural resources of South Africa. It is therefore vitally important to adhere to heritage resource legislation at all times.

a. National Heritage Resources Act No 25 of 1999, section 35

According to the National Heritage Resources Act No 25 of 1999 (section 35) the following features are protected as cultural heritage resources:

- a. Archaeological artifacts, structures and sites older than 100 years

- b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
- c. Objects of decorative and visual arts
- d. Military objects, structures and sites older than 75 years
- e. Historical objects, structures and sites older than 60 years
- f. Proclaimed heritage sites
- g. Grave yards and graves older than 60 years
- h. Meteorites and fossils
- i. Objects, structures and sites of scientific or technological value.

In addition, the national estate includes the following:

- a. Places, buildings, structures and equipment of cultural significance
- b. Places to which oral traditions are attached or which are associated with living heritage
- c. Historical settlements and townscapes
- d. Landscapes and features of cultural significance
- e. Geological sites of scientific or cultural importance
- f. Archaeological and paleontological importance
- g. Graves and burial grounds
- h. Sites of significance relating to the history of slavery
- i. Movable objects (e.g. archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

With regards to activities and work on archaeological and heritage sites this Act states that:

“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority.” (34. [1] 1999:58)

and

“No person may, without a permit issued by the responsible heritage resources authority-

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58).”*

and

“No person may, without a permit issued by SAHRA or a provincial heritage resources agency-

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60).”*

b. Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925

Graves and burial grounds are commonly divided into the following subsets:

- a. ancestral graves
- b. royal graves and graves of traditional leaders
- c. graves of victims of conflict
- d. graves designated by the Minister
- e. historical graves and cemeteries
- f. human remains

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and Ordinance on Excavations (Ordinance no. 12 of 1980) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial MEC as well as the relevant local authorities.

c. National Heritage Resources Act No 25 of 1999, section 35

This Act (Act 107 of 1998) states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made. Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation’s cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

1.5.2 Background to HIA and AIA Studies

South Africa’s unique and non-renewable archaeological and palaeontological heritage sites are ‘generally’ protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact assessments (HIAs & AIAs) that identify all heritage resources in areas to be developed. Particularly, these assessments are required to make recommendations for protection or mitigation of the impact of the sites. HIAs

and AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and palaeontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact on the sites.

A detailed guideline of statutory terms and requirements is supplied in Addendum 1.

2 REGIONAL CONTEXT

2.1 Area Location

The alignment proposed for the Nigel Gas Transmission Pipeline Project route occurs the vicinity of the M63 and R42 roads in Dunnottar and Nigel in the Ekurhuleni Metropolitan Municipality, Gauteng Province. The project area appears on 1:50000 map sheet 2628AD (see Figure 2-1) and coordinates for the proposed project are as follows:

- **S26.35302° E28.45662° (Northern Dunnottar offset)**
- **S26.42050° E28.44910° (Southern Nigel offset)**

2.2 Area Description: Receiving Environment

The development site lies within the Grassland biome. It is characterized by a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs). Even though the area has been completely urbanized, the original vegetation in the larger landscape is classified as Tsakane Clay Grassland (Mucina & Rutherford 2006). The general landscape is characterised by undulating grassland that is drained by the Blesbokspruit. The Vaal River flows approximately 20km south of the study area. The Nigel area is situated approximately 1 500m above sea level. It has an annual summer rainfall of approximately 650 mm per annum.

2.3 Site Description

The project area is situated in the vicinity of the M63 and R42 roads along open fields and road servitudes. Large portions of the proposed impact footprint for these routes are situated in areas that have been transformed and developed.

The pipeline originates at the Consol Glass factory west of Nigel and follows the M63 road north towards Dunnottar where it follows Annan and Chaplan Avenues. This section follows farmlands and open fields traversing a number of small drainage lines and transformed landscapes. It then routes east to the Farm Grootfontein 165 Portion 44 along the M45 road.

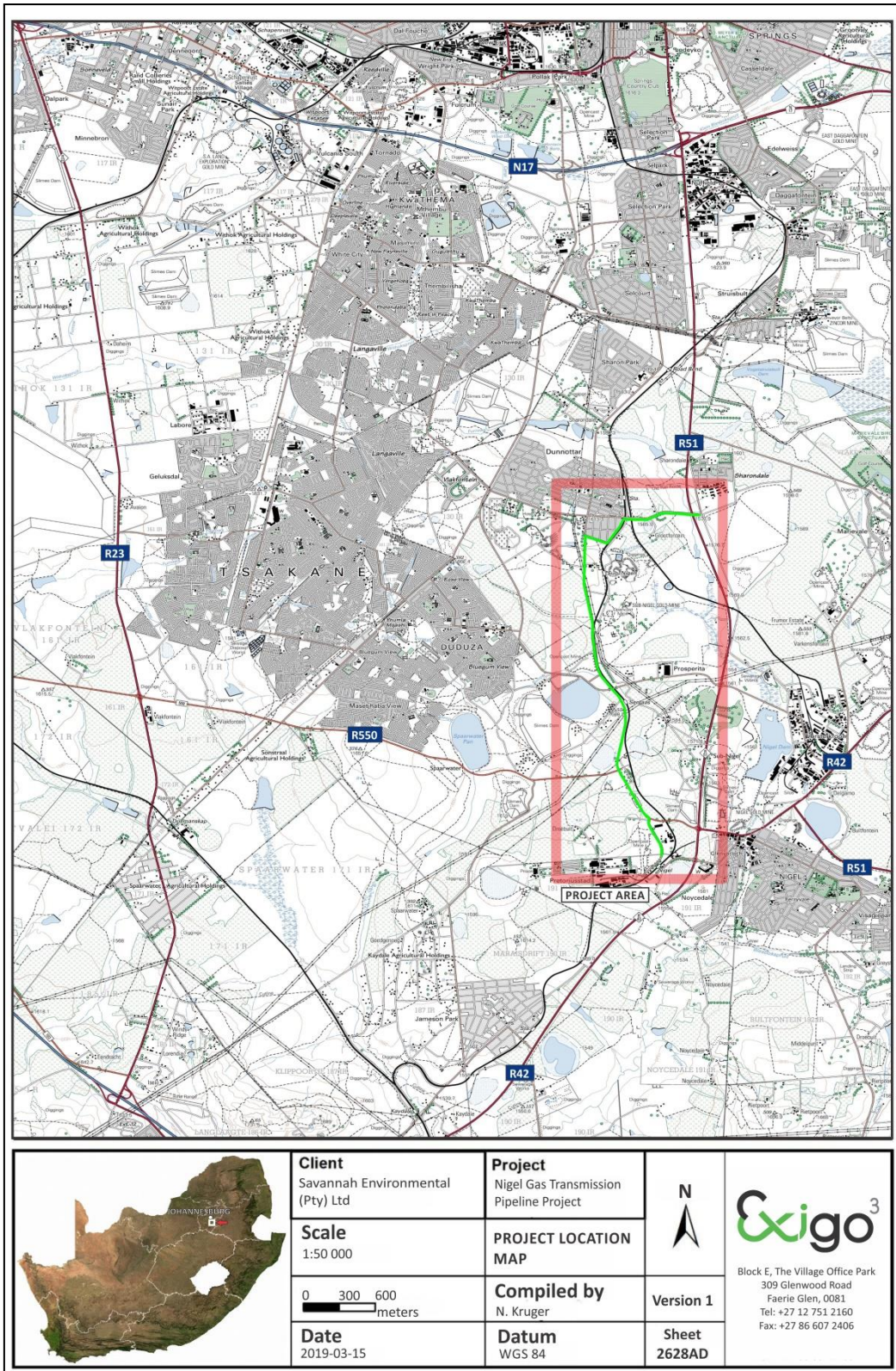


Figure 2-1: 1:50 00 Map representation of the location of the proposed Nigel Gas Transmission Pipeline Project (sheet 2628AD).

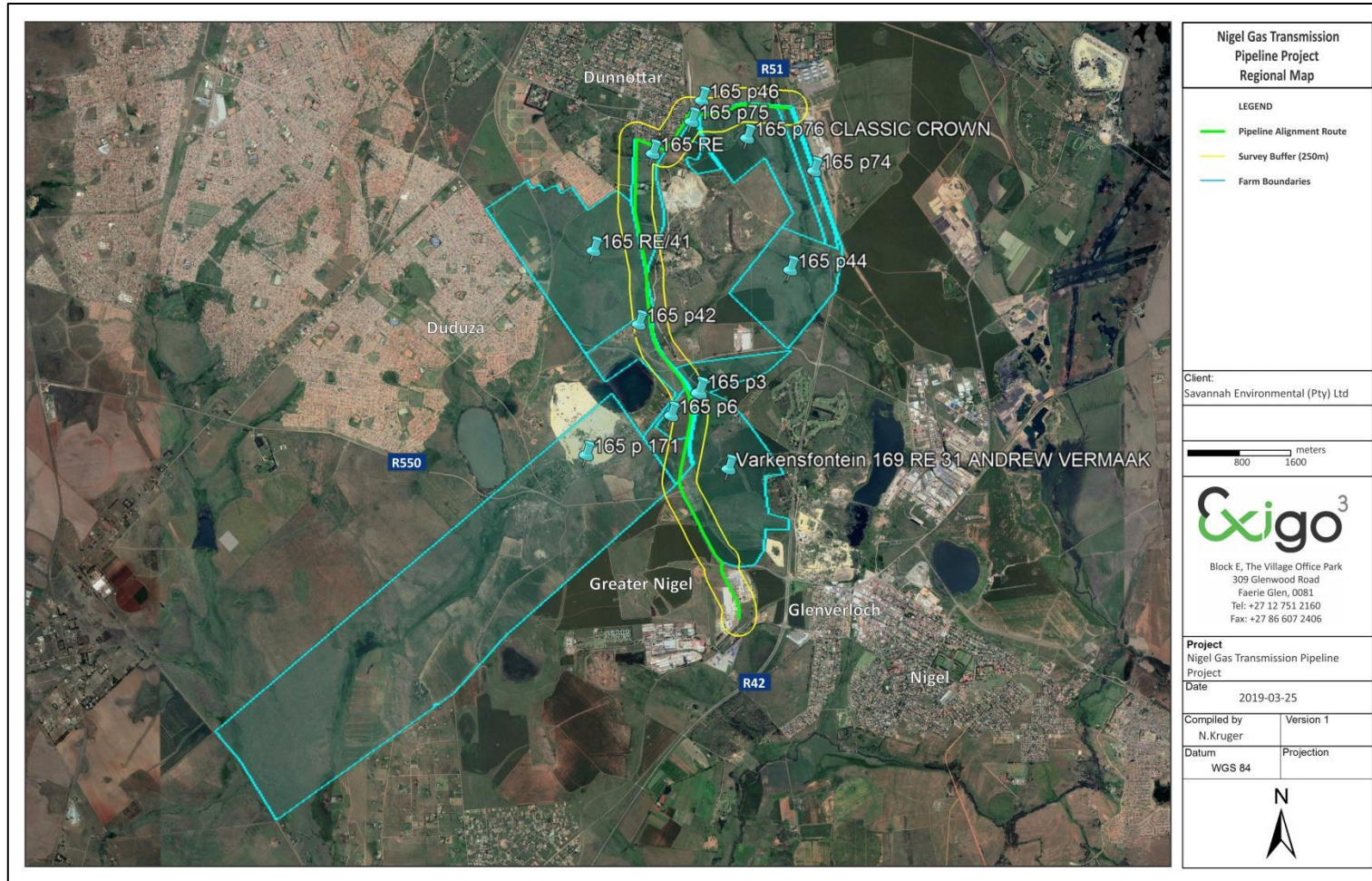


Figure 2-2: Aerial map providing a regional setting for the Nigel Gas Transmission Pipeline Project locality.

3 METHOD OF ENQUIRY

3.1 Sources of Information

Data from detailed desktop, aerial and field studies were employed in order to sample surface areas systematically and to ensure a high probability of heritage sites recording.

3.1.1 Desktop Study

A desktop study was prepared in order to contextualize the proposed project within a larger historical milieu. The study focused on relevant previous studies, archaeological and archival sources, aerial photographs, historical maps and local histories, all pertaining to the Southern Highveld area and the larger landscape of this section of the Gauteng Province. Specifically, the desktop study examined a number of archaeological and historical impact assessments conducted in the region:

- Tomose, N.G. 2014. A Heritage Impact Assessment Study for the Proposed Fortune Metaliks South Africa Nigel Steel Processing Plant, Pretoriusstad, Nigel, Ekurhuleni Metropolitan Municipality, Gauteng Province, South Africa.
- Van Der Walt, J. 2008. Archaeological Impact Assessment: Sluice Gate Upgrade at the Marrievale Nature Reserve, Nigel, Gauteng.
- Fourie, W. 2003. Van Ryn Open Cape Archaeological Survey CCT: Project: Nigel Gold Mining Company Pty Ltd: Cultural Heritage Survey
- Van Schalkwyk, J. & Pelsler, A. 2000. A Survey of Cultural Resources on the Farm Winterhoek 314 IR Nigel District, Gauteng. Previous Studies in the Springs Area:
- Van Der Walt, J. 2008. Archaeological Impact Assessment for the Chief Albert Luthuli Primary School, Springs, Gauteng Province
- Van Vollenhoven, A. 2012. A Report on a Heritage Impact Assessment for the Steynol Umthombo Project near Springs in the Gauteng Province.
- Van Vollenhoven, A. 2013. A Report on a Cultural Impact Assessment for a Proposed Shopping Mall Development close to Springs, Gauteng Province.
- Van Vollenhoven, A. 2012. A Report on a Cultural Heritage Impact Assessment for the Proposed Return Water Dam at the New Kleinfontein Gold Mine close to Springs, Gauteng Province.
- Van Der Walt, J. 2008. Archaeological Impact Assessment: Daggafontein Extension 6, Portions 107 of the Farm Daggafontein 125 IR, Springs, Gauteng Province.
- Van Schalkwyk, J. 2010. Heritage Impact Assessment for the Proposed Payneville Extension 1 Development, Springs Magisterial District, Gauteng Province.
- Van Vollenhoven, A. 2011. A Report on a Cultural Heritage Baseline Study and Impact Assessment for the Proposed New Kleinfontein Goldmine (Modder East Operations) close to Springs, Gauteng Province.
- Kruger, 2016. Heritage Impact Assessment for the proposed Nigel Diesel depot, Nigel, Ekurhuleni. Exigo: Pretoria
- Pelsler, A & Van Vollenhoven, A. 2008. A Report on a Basic Archaeological Assessment for Apollo Bricks on the Farm Grootvaly 124 JR near Springs, Gauteng.
- Van Schalkwyk, J. & Mith, S. 1997. A Survey of Cultural Resources in the Proposed Erwat Sewer Outfall Route, North of Springs, Gauteng Province.
- Gaigher S. 2014. Heritage Impact Assessment for the Proposed Ergo Road Residential Development, Springs, Ekurhuleni.
- Van Der Walt, J. 2008. Archeological Impact Assessment for the Proposed Tsakane Primary School, Tsakane Extension 9, Gauteng Province.

- Kusel, U. 2007. Cultural Heritage Resources Impact Assessment of the Farm Vlaklaagte 161 Tsakane Benoni Gauteng.

3.1.2 Aerial Representations and Survey

Aerial photography is employed to locate and study archaeological sites, particularly where larger scale area surveys are performed. This method was applied to assist the vehicular and foot site survey where depressions, variation in vegetation, soil marks and landmarks were examined. Specific attention was given to shadow sites (shadows of walls or earthworks which are visible early or late in the day), crop mark sites (crop mark sites are visible because disturbances beneath crops cause variations in their height, vigour and type) and soil marks (e.g. differently coloured or textured soil (soil marks) might indicate ploughed-out burial mounds). Attention was also given to moisture differences, as prolonged dampening of soil as a result of precipitation frequently occurs over walls or embankments. By superimposing high frequency aerial photographs with images generated with Google Earth, potential sensitive areas were subsequently identified, geo-referenced and transferred to a handheld GPS device. These areas served as referenced points from where further vehicular and pedestrian surveys were carried out.

The aerial survey suggested a landscape that has been transformed over the past decades by human activity relating to agriculture, settlement and mining with more recent urban developments in Nigel and Dunnottar (see Figure 3-1).

3.1.3 Mapping of sites

Historical and current maps of the project area were examined. By merging data obtained from the desktop study and the aerial survey, sites and areas of possible heritage potential were plotted on these maps of the Greater Nigel area using GIS software. These maps were then superimposed on high definition aerial representations in order to graphically demonstrate the geographical locations and distribution of potentially sensitive landscapes. Historical maps of the project area indicate the presence of man-made features such as mining infrastructure, towns, roads and railway lines from at least the 1940's (see Figure 3-2).

3.1.4 Field Survey

Archaeological survey implies the systematic procedure of the identification of archaeological sites. Archaeological surveys of the alignments and routes subject to this study were conducted in March 2019. The survey process encompassed field surveys in accordance with standard archaeological practice by which heritage resources are observed and documented. In order to sample surface areas systematically and to ensure a high probability of site recording the pipeline alignment and a projected impact buffer of between 20m and 10m around the route were carefully inspected on foot and in a motor vehicle. In addition, an arbitrary 250m zone around the pipeline alignments was also observed during the survey in order to establish a heritage baseline for the project landscape. GPS reference points identified during the aerial and mapping surveys were also visited and random spot checks were made (see detail in previous section). Using a Garmin E-trex Montana GPS, the site was geo-referenced and photographed with a Samsung Digital camera. Real time aerial mapping and positioning by means of a hand-held tablet-based Google Earth application was also employed on site to investigate possible disturbed areas during the survey.



Figure 3-1: Historical aerial images dating to 1938 (left) and 1955 (right) indicating the proposed pipeline route (green line) within the historical landscape.

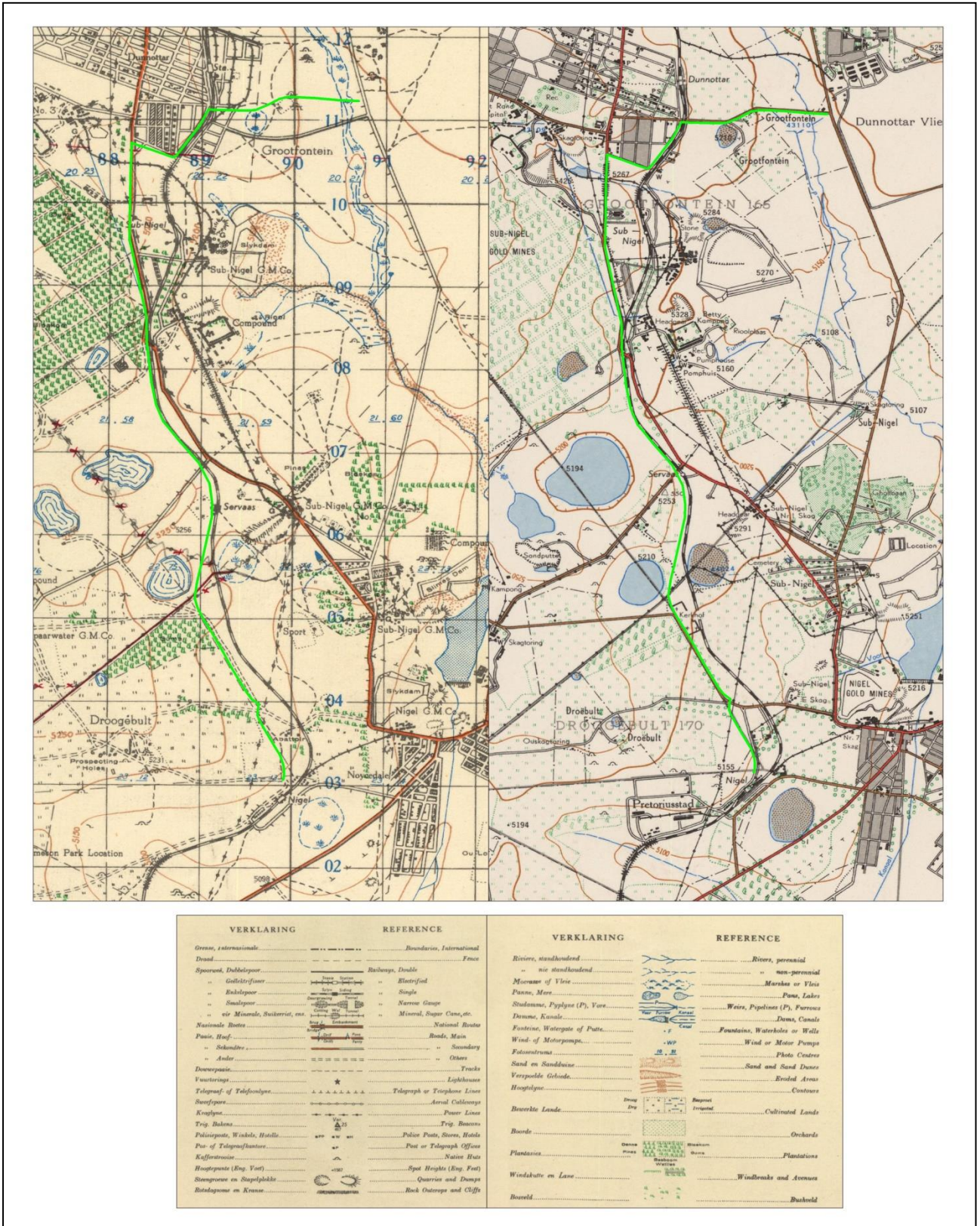


Figure 3-2: Historical topographic maps dating to 1944 (left) and 1965 (right) indicating the proposed pipeline route (green line) within the historical landscape.

3.2 Limitations

3.2.1 Access

The project areas are accessed directly via the M63, the R42 and regional roads as well as smaller rural roads. Access control is not applied to the area relevant to this assessment and no access restrictions were encountered during the site visit.

3.2.2 Visibility

The surrounding vegetation in the study area is mostly comprised out of mixed grasslands and trees with wetland vegetation in places. Generally, the visibility at the time of the AIA site inspections (March 2019) was moderate to high (see Figures 3-3 to 3-12). In single cases during the survey sub-surface inspection was possible. Where applied, this revealed no archaeological deposits.



Figure 3-3: View of the southern offset of the pipeline route west of the Nigel CBD.



Figure 3-4: View of general surroundings in a transformed field along the pipeline route.



Figure 3-5: View of an open field along the M63 road in the project area.



Figure 3-6: The M63 road intersection with Annan Avenue in Dunnottar in the project area.



Figure 3-7: View of an open field in the project area south of Dunnottar.



Figure 3-8: The Transnet railway line near the Sub-Nigel Mine along the the project area.



Figure 3-9: View of vegetation in open fields along the project alignment east of Dunnottar.



Figure 3-10: View of an old agricultural field east of Dunnottar in the project area.



Figure 3-11: Trees and surface grass cover in the project area, looking west towards Dunnotar.



Figure 3-12: View of the northern offset of the proposed pipeline route east of Dunnotar.

3.2.3 Limitations and Constraints Summary

The foot and vehicular site survey for the Nigel Gas Transmission Pipeline Project primarily focused around areas of potential heritage sensitivity as well as areas of high human settlement catchment probability (for example, in association with vegetation changes or around soil disturbances).

- **Visibility** proved to be a minor constraint where denser surface cover obscured surface occurrences.

Even though it might be assumed that survey findings are representative of the heritage landscape of the project area for the Nigel Bulk Water Pipeline Phase Project, it should be stated that the possibility exists that individual sites could be missed due to the localised nature of some heritage remains as well as the possible presence of sub-surface archaeology. Therefore, maintaining due cognisance of the integrity and accuracy of the archaeological survey, it should be stated that the heritage resources identified during the study do not necessarily represent all the heritage resources present in the project area. The subterranean nature of some archaeological sites, dense vegetation cover and visibility constraints sometimes distort

heritage representations and any additional heritage resources located during consequent development phases must be reported to the Heritage Resources Authority or an archaeological specialist.

3.3 Impact Assessment

For consistency among specialists, impact assessment ratings by Exigo Specialists are generally done using the Plomp¹ impact assessment matrix scale supplied by Exigo. According to this matrix scale, each heritage receptor in the project area is given an impact assessment. An assessment of potential heritage impacts for the proposed project is included in this report (see Section 6).

4 ARCHAEO-HISTORICAL CONTEXT

4.1 The archaeology of Southern Africa

Archaeology in Southern Africa is typically divided into two main fields of study, the **Stone Age** and the **Iron Age** or **Farmer Period**. The following table provides a concise outline of the chronological sequence of periods, events, cultural groups and material expressions in Southern African pre-history and history.

Table 1 Chronological Periods across Southern Africa

Period	Epoch	Associated cultural groups	Typical Material Expressions
Early Stone Age 2.5m – 250 000 YCE	Pleistocene	Early Hominins: <i>Australopithecines</i> <i>Homo habilis</i> <i>Homo erectus</i>	Typically large stone tools such as hand axes, choppers and cleavers.
Middle Stone Age 250 000 – 25 000 YCE	Pleistocene	First <i>Homo sapiens</i> species	Typically smaller stone tools such as scrapers, blades and points.
Late Stone Age 20 000 BC – present	Pleistocene / Holocene	<i>Homo sapiens sapiens</i> including San people	Typically small to minute stone tools such as arrow heads, points and bladelets.
Early Iron Age / Early Farmer Period 300 – 900 AD	Holocene	First Bantu-speaking groups	Typically distinct ceramics, bead ware, iron objects, grinding stones.
Middle Iron Age (Mapungubwe / K2) / early Later Farmer Period 900 – 1350 AD	Holocene	Bantu-speaking groups, ancestors of present-day groups	Typically distinct ceramics, bead ware and iron / gold / copper objects, trade goods and grinding stones.
Late Iron Age / Later Farmer Period 1400 AD -1850 AD	Holocene	Various Bantu-speaking groups including Venda, Thonga, Sotho-Tswana and Zulu	Distinct ceramics, grinding stones, iron objects, trade objects, remains of iron smelting activities including iron smelting furnace, iron slag and residue as well as iron ore.
Historical / Colonial Period ±1850 AD – present	Holocene	Various Bantu-speaking groups as well as European farmers, settlers and explorers	Remains of historical structures e.g. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

¹ Plomp, H.,2004

4.2 The Southern Gauteng Landscape: Specific Themes.

A number of Archaeological Impact Assessments (e.g. van Schalkwyk 2000, Gaiger 2015, Coetzee 2003, Roodt 2008, Van Schalkwyk 2010 and Pistorius 2007) have been conducted in the south-eastern highveld area. Generally, sites documenting Earlier, Middle and Later Stone Age habitation occur across the Highveld, mostly in open air locales or in sediments alongside rivers or pans. Sites dating to the Iron Age occur on the Highveld where environmental factors and population density delegated the spread of Iron Age farming. Moving into recent times, the archaeological record reflects the development of a rich colonial frontier, characterised by, amongst others, a complex industrial archaeological landscape such as mining developments and war events, which herald the modern era in South African history.

4.2.1 The Stone Ages

According to archaeological research, the earliest ancestors of modern humans emerged some two to three million years ago. The remains of Australopithecine and *Homo habilis* have been found in dolomite caves and underground dwellings in the Bankeveld at places such as Sterkfontein and Swartkrans near Krugersdorp. *Homo habilis*, one of the Early Stone Age hominids, is associated with Oldowan artefacts, which include crude implements manufactured from large pebbles. The Acheulian industrial complex replaced the Oldowan industrial complex during the Early Stone Age. This phase of human existence was widely distributed across South Africa and is associated with *Homo erectus*, who manufactured hand axes and cleavers from as early as one and a half million years ago. Oldowan and Acheulian artefacts were also found four to five decades ago in some of the older gravels (ancient river beds and terraces) of the Vaal River and the Klip River in Vereeniging. The earliest ancestors of modern man may therefore have roamed the Vaal valley at the same time that their contemporaries occupied some of the dolomite caves near Krugersdorp.

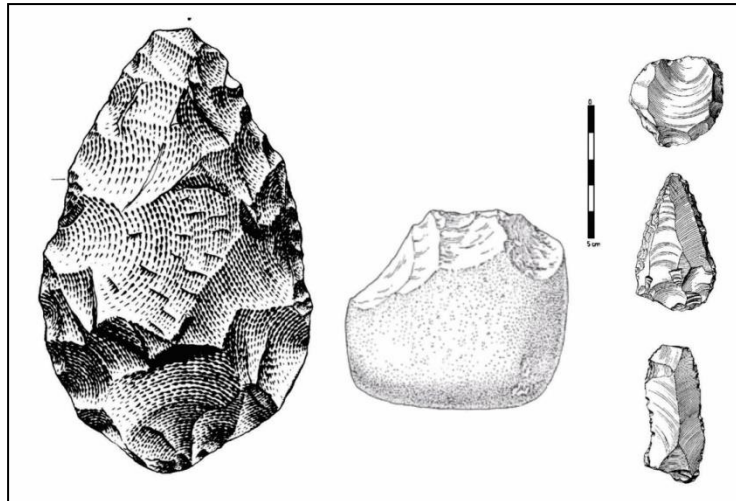


Figure 4-1: Typical ESA handaxe (left) and cleaver (center). To the right is a MSA scraper (right, top), point (right, middle) and blade (right, bottom).

Middle Stone Age sites dating from as early as two hundred thousand years ago have been found all over South Africa. Middle Stone Age hunter-gatherer bands also lived and hunted in the Orange and Vaal River valleys. These people, who probably looked like modern humans, occupied campsites near water but also used caves as dwellings. They manufactured a wide range of stone tools, including blades and points that may have had long wooden sticks as hafts and were used as spears. The Late Stone Age commenced twenty thousand years ago or somewhat earlier. The various types of Later Stone Age industries scattered across the country are associated with the historical San and Khoi-Khoi people. The San were renowned as formidable hunter-gatherers, while the Khoi-Khoi herded cattle and small stock during the last two thousand

years. Late Stone Age people manufactured tools that were small but highly effective, such as arrow heads and knives.

Two Middle Stone Age sites at the Withoek Spruit (Brakpan) were researched 17 years ago, but no information on this discovery has been published. San hunter-gatherer bands with their small (microlithic) stone tools may have lived in Eastern Gauteng, as a magnificent engraving site near Duncanville attests to their presence in Vereeniging, south of, but close to Ekurhuleni. Stone Age hunter-gatherers lived well into the 19th century in some places in SA, but may not have been present in this area when the first European colonists crossed the Vaal River during the early part of the 19th century. Stone Age sites may occur all over the area where an unknown number may have been obliterated by mining activities, urbanization, industrialization, agriculture and other development activities during the past decades (Morris 2004).

4.2.2 The Iron Age Farmer Period

The beginnings of the Iron Age (Farmer Period) in Southern Africa are associated with the arrival of a new Bantu speaking population group at around the third century AD. These newcomers introduced a new way of life into areas that were occupied by Later Stone Age hunter-gatherers and Khoekhoe herders. Distinctive features of the Iron Age are a settled village life, food production (agriculture and animal husbandry), metallurgy (the mining, smelting and working of iron, copper and gold) and the manufacture of pottery. Iron Age people moved into Southern Africa by c. AD 200, entering the area either by moving down the coastal plains, or by using a more central route. From the coast they followed the various rivers inland. Being cultivators, they preferred rich alluvial soils. The Iron Age can be divided into three phases. The Early Iron Age includes the majority of the first millennium AD and is characterised by traditions such as Happy Rest and Silver Leaves. The Middle Iron Age spans the 10th to the 13th Centuries AD and includes such well known cultures as those at K2 and Mapungubwe. The Late Iron Age is taken to stretch from the 14th Century up to the colonial period and includes traditions such as Icon and Letaba.

Complex stone wall clusters are scattered across the landscapes of the Southern Highveld and the Free State. These stone structures, commonly associated with Bantu speaking farming communities, are the remnants of a complex 500 year old sequence of stone wall building in the central interior of South Africa. Tim Maggs, noted archaeologist of the later Farmer Period in southern Africa, named the first phase in this sequence "Type N" walling, dating to the 15th to 17th centuries AD (Maggs 1976). This phase, which mostly developed in the Free State, was characterised by central cattle kraals linked by outer walls, while the whole settlement was surrounded by a perimeter wall which also incorporated small stock enclosures. After the 17th century, the "Type N" style of building spread across the Vaal River in consecutive phases where it later became known as "Klipriviersberg" type walling (Taylor 1979a). These settlements typically displayed outer scalloped walls that demarcated back courtyards, a large number of small stock kraals and straight walls which separated household units in the domestic zone. Beehive huts would have housed communities on these sites. The Klipriviersberg walling type dates to the 18th and 19th centuries and are associated with the Fokeng cluster of the Sotho-Tswana speaker group. Knowledge of the early history of the Fokeng is limited but we do know that a group of Fokeng predecessors settled in the Free State by the 14th century. Later, two Fokeng groups detached from the main entity and settled near Broederstroom at the foot of the Magaliesberg, and near the Vaal River respectively. The latter yet again divided and one of these divisions settled over a large area in the northern Free State and the southern Highveld. No evidence for Iron Age settlement occurs in the Nigel area. It is doubtful whether Iron Age people would've settled in the area, as there is not ample building material (stone) for the construction of their huts and cattle enclosures. The fact that large portions of the landscape around Nigel are marshy, and unfertile and therefore not suitable for agriculture, would also have deterred their settling in the area



Figure 4-2: Characteristic Klipriviersberg-type stone walled settlements east of Vereeniging on the Highveld (after Huffman [2007]).

4.2.3 Historical and Colonial Times and Recent History

Nigel, a small town in Gauteng Province, came about as a result of rich gold deposits along the Witwatersrand. A certain prospector, Mr Johnstone discovered gold on the farm Varkensfontein in 1882. He obtained permission from the farm owner, Petrus Johannes Marais (nicknamed Oom Lang Piet) to prospect for gold on the farm. Mr Johnstone's prospecting operations continued for a considerable time shrouded in secrecy. After a random offer to purchase the farm by a stranger, Mr Marais - who was incidentally reading "The Fortunes of Nigel" by Sir Walter Scott at the time – became suspicious and he decided to visit his farm. At the farm his suspicions were confirmed and, determined not to allow himself to be cheated by cunning fortune seekers, he established the Nigel Gold Mining Company in July 1888, two years after the discovery of gold on the Witwatersrand. Mr Marais attributed his luck to the novel he had been reading and, therefore, called his company Nigel, also giving rise to the town of Nigel. In 1888 the State President Paul Kruger declared Nigel a "public digging" under Notice No. 331 and since then the history and development of Nigel are inseparable from those of the gold mines. The town was little more than a mining camp until 1923, when the control of the town was passed into the hands of a Dorpvillage. The Sub Nigel Mine was opened and proved to be a lucrative operation. As a result a great influx of people occurred. Within 7 years the local authority's status was increased to Town Council in 1930. C.L. Mackle was elected as the first Mayor. In these 5 years (hampered only by the outbreak of World War II), 5 new suburbs were proclaimed. A railway line between Springs, Nigel and Heidelberg was opened in October of 1935. It was the discriminatory racial segregation (*apartheid*) legislation, enacted by the Nationalist Party (after coming to power in 1948) that extensively transformed the land-use. Citizens were separated into different townships according to their race with buffer strips of at least 100m wide or by environmental buffer zones. Nigel, with most of the East Rand, became part of the Ekurhuleni Metropolitan Municipality following the creation of the new local government structures in 2000. Today the town is focused primarily on mining and also has various heavy industries.



Figure 4-3: Archive photo of Nigel taken at the turn of the 19th century.



Figure 4-4: Aerial photo of the Nigel CBD dating to 1934.

5 RESULTS: ARCHAEOLOGICAL SURVEY

In terms of heritage resources, the landscape around the project area is primarily well known for the occurrence of Iron Age Farmer and Historical Period sites. The landscape around the proposed Nigel Gas Transmission Pipeline alignments remains pristine in places with the regular occurrence of transformed zones as a result of agriculture, urbanisation and mining. The project area follows road servitudes but occurrences of heritage potential were identified in the impact area for the project. These sites were coded “**Exigo-NGP-HP**” (Exigo Nigel Gas Pipeline Historical Period) and “**Exigo-NGP-BP**” (Exigo Nigel Gas Pipeline Burial Place).

5.1 The Stone Age

Stone Age remains associated with caves, outcrops/hills and river courses are known to exist in the larger Gauteng landscape. However, no stone tools or associated material culture or evidence of any factory or workshop site were found in the project areas.

5.2 The Iron Age Farmer Period

A frontier zone between the east and the west, the Gauteng province is rich in precolonial Iron Age Farmer Period remnants. However, the site inspection identified no Iron Age farmer sites.

5.3 Colonial / Historical Period Sites

European and local farming communities settled in the Highveld region during the Colonial Period in the last centuries. The project area remained rural for the largest part of the previous century but aerial imagery dating to the first part of the 20th century as well as similar topographic maps indicate the occurrence of Historical Period sites and structures - notably mines and towns. Locally, Historical Period buildings at the old East Rand Chamber of Commerce and Industry complex, the old Nigel Railway Station, the old Nigel Abattoir, the Pieter Wessels Frail Care and Community Centre as well as Historical houses and buildings in Dunnottar were noted to be present in the larger surrounding landscape outside of the project area. One site of heritage potential was noted within the project impact zone.

- **Site Exigo-NGP-HP01: Historical / Colonial Period Buildings**
S26.35371° E28.44821°

The poorly preserved foundation remains of a farming compound occur along the M45 road east of Dunnottar and approximately 20m from the proposed pipe alignment. Here, the foundation structures of a brick and concrete building and a cement floor were noted. Material culture such as glass, metal, wire and

plastic were noted in association with the structures. The site and associated structures are clearly visible on early aerial photographs and topographic maps indicating that the site is older than 60 years - and generally protected under the National Heritage Resource Act (NHRA 1999). However, the structures at the site are poorly preserved and consequently rated as low significance. ***The site is approximately 20m to the south of the pipe alignment and it would be advisable to monitor the site during construction on order to avoid the destruction or previously undetected heritage remains.***



Figure 5-1: A concrete floor structure dating to the Historical Period at Site Exigo-NGP-HP01.



Figure 5-2: View of the densely overgrown Historical Period building ruin at Site Exigo-NGP-HP01.

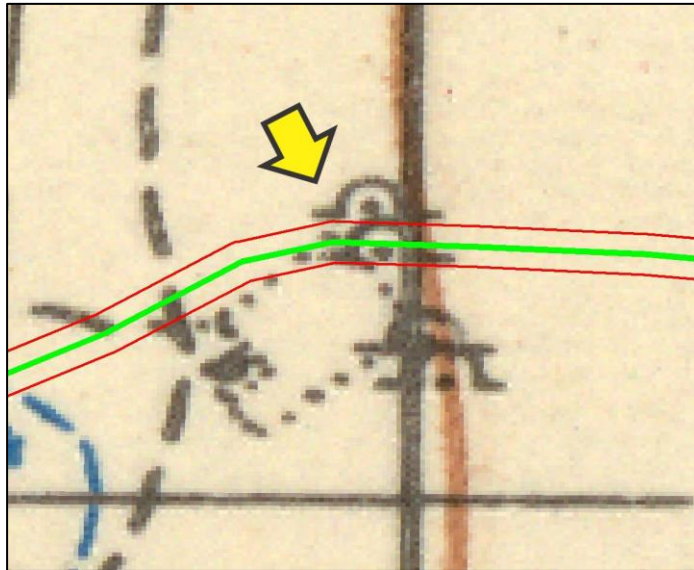


Figure 5-3: Topographic map dating to 1945 indicating the presence of a building compound at Site Exigo-NGP-HP01 during the early 20th century (yellow arrow). The proposed pipeline alignment is indicated by the green line and the 250m survey buffer is indicated in red.

5.4 Graves / Human Burial Sites.

- Site Exigo-NGP-BP01: Burial Site
S26.40559° E28.44252°

The Nigel Municipal Cemetery containing a large number of burials occurs towards the western outskirts of Nigel east of the M63 road in close proximity of the proposed pipe alignment. The graveyard is fenced off and access control is applied. The cemetery, which is highly significant in terms of its heritage and social value, contains graves which seem to be older than 60 years and thus protected by the National Heritage Resource Act (NHRA 1999). ***The proposed pipeline alignment runs within the road reserve approximately 20m west of the nearest graves in the cemetery and 10m from the cemetery fence. The road reserved had previously been impacted on by the establishment and construction of municipal services (water and electricity lines) along alignments similar to the route assessed in this report (see Figure 5-5) and impact on the site or human burials in the cemetery is unlikely. Any activities in this area should be closely monitored during construction in order to ensure conservation of the cemetery and all burial sites, features and structures at all times.***



Figure 5-4: View of the informal burial site at Site Exigo-NBP-BP01.



Figure 5-5: Google Earth image of the burial site at Site Exigo-NGP-BP01. The proposed pipeline alignment is indicated by the green line and the 20m impact buffer is indicated in yellow.



Figure 5-6: Google Earth image of existing municipal services present in the servitude of the M63 road in the vicinity of the municipal cemetery at Site Exigo-NGP-BP01 (image provided by client).

- **Site Exigo-NGP-BP02: Burial Site**
S26.36081° E28.43306°

An informal cemetery was documented in an open field directly west of the M63 road and south of Dunnotar and approximately 100m from the proposed pipe alignment. The informal cemetery contains a number of graves which are indicated by rectangular stone cairns filled in with soil. Some of the stone cairns bear rocks as headstones to one side. The burials are arranged in consistent rows and they are placed in a relative east-west orientation (known as the “Christian-Western style”), which is a common feature of formal and informal burial sites dating to the 19th and 20th centuries (post contact to Europeans). The cemetery is highly significant in terms of its heritage value and it might contain graves which are older than 60 years. The site is protected by the National Heritage Resource Act (NHRA 1999). ***The site occurs approximately 100 meters to the west of the proposed pipeline alignment and impact on the site seems improbable. However, all burials at the site should be monitored during construction in this area and a conservation buffer should be observed at all times.***



Figure 5-7: View of the informal burial site at Site Exigo-NBP-BP02.



Figure 5-8: Detail of burials arranged in consistent rows (white ovals) with headstones visible (yellow arrows).



Figure 5-9: Google Earth image of the burial site at Site Exigo-NGP-BP02. The proposed pipeline alignment is indicated by the green line and the 20m impact buffer is indicated in yellow.



Figure 5-10: Aerial map indicating the locations of occurrences of heritage potential in the project area, discussed in the text.

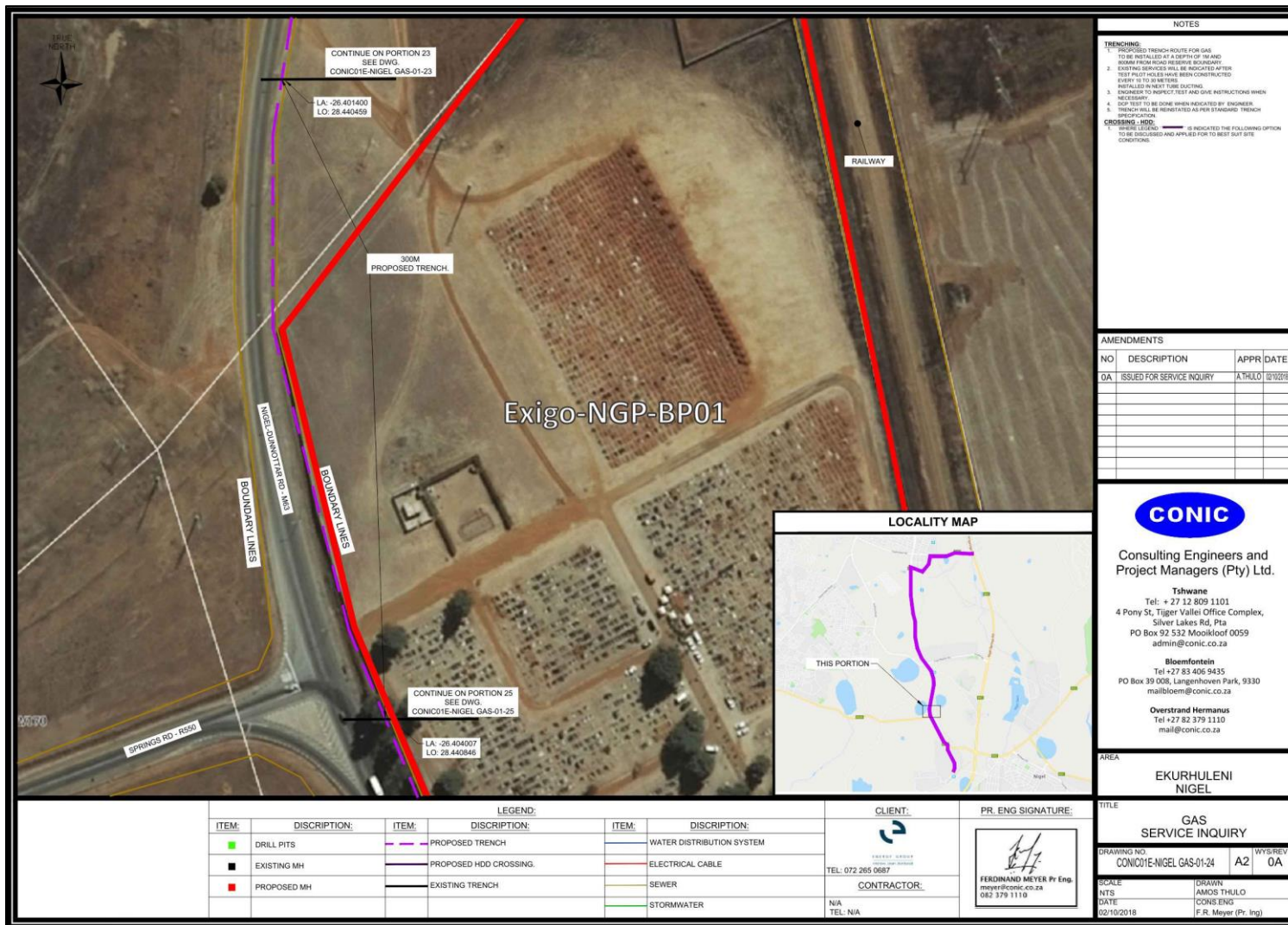


Figure 5-11: Project map of the proposed pipeline alignment (dashed purple line) in relation to the fence line of the northern section of the cemetery at Site Exigo-NGP-BP01 (red outline).

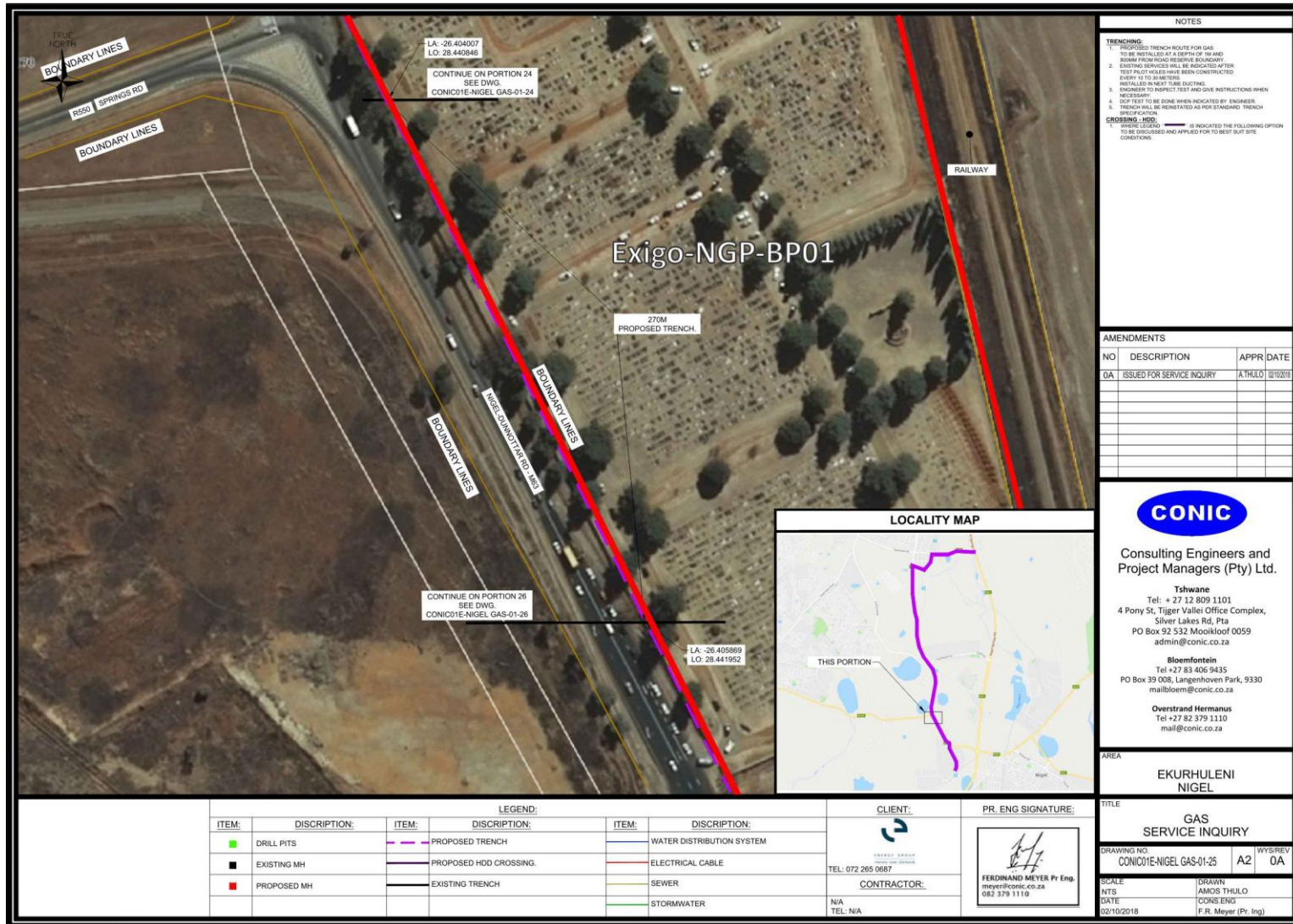


Figure 5-12: Project map of the proposed pipeline alignment (dashed purple line) in relation to the fence line of the southern section of the cemetery at Site Exigo-NGP-BP01 (red outline).

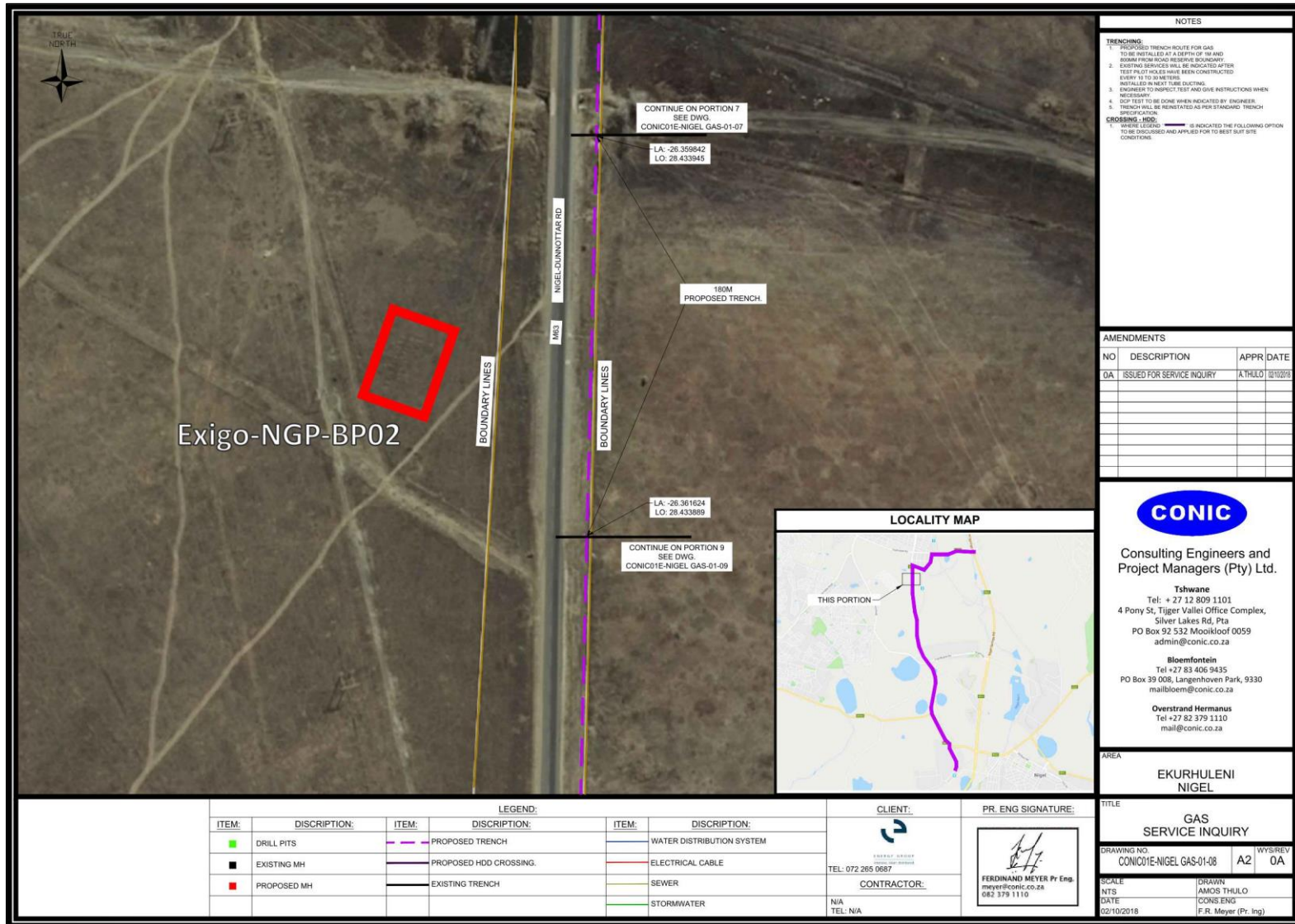


Figure 5-13: Project map of the proposed pipeline alignment (dashed purple line) in relation to Site Exigo-NGP-BP01 (red outline).

6 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING

6.1 Potential Impacts and Significance Ratings²

The following section provides a background to the identification and assessment of possible impacts and alternatives, as well as a range of risk situations and scenarios commonly associated with heritage resources management. A guideline for the rating of impacts and recommendation of management actions for areas of heritage potential within the project area is supplied in Section 10.2 of the Addendum.

6.1.1 General assessment of impacts on resources

Generally, the value and significance of archaeological and other heritage sites might be impacted on by any activity that would result immediately or in the future in the destruction, damage, excavation, alteration, removal or collection from its original position, any archaeological material or object (as indicated in the National Heritage Resources Act (No 25 of 1999)). Thus, the destructive impacts that are possible in terms of heritage resources would tend to be direct, once-off events occurring during the initial construction period. However, in the long run, the proximity of operations in any given area could result in secondary indirect impacts. The EIA process therefore specifies impact assessment criteria which can be utilised from the perspective of a heritage specialist study which elucidates the overall extent of impacts.

6.1.2 Direct impact rating

Direct or primary effects on heritage resources occur at the same time and in the same space as the activity, e.g. loss of historical fabric through demolition work. **Indirect effects or secondary effects** on heritage resources occur later in time or at a different place from the causal activity, or as a result of a complex pathway, e.g. restriction of access to a heritage resource resulting in the gradual erosion of its significance, which is dependent on ritual patterns of access (refer to Section 10.3 in the Addendum for an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected). The significance of the impacts were determined through a synthesis of the criteria below:

Probability: This describes the likelihood of the impact actually occurring.	
Improbable:	The possibility of the impact occurring is very low, due to the circumstances, design or experience.
Probable:	There is a probability that the impact will occur to the extent that provision must be made therefore.
Highly Probable	It is most likely that the impact will occur at some stage of the development.
Definite:	The impact will take place regardless of any prevention plans, and there can only be relied on mitigatory actions or contingency plans to contain the effect.
Duration: The lifetime of the impact	
Short term:	The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
Medium term:	The impact will last up to the end of the phases, where after it will be negated.
Long term:	The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
Permanent:	Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.
Scale: The physical and spatial size of the impact	

² Based on: Winter, S. & Baumann, N. 2005. *Guideline for involving heritage specialists in EIA processes: Edition 1.*

Local:	The impacted area extends only as far as the activity, e.g. footprint
Site:	The impact could affect the whole, or a measurable portion of the above mentioned properties.
Regional:	The impact could affect the area including the neighbouring residential areas.
Magnitude/ Severity: Does the impact destroy the environment, or alter its function.	
Low:	The impact alters the affected environment in such a way that natural processes are not affected.
Medium:	The affected environment is altered, but functions and processes continue in a modified way.
High:	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
Significance: This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.	
Negligible:	The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
Low:	The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
Moderate:	The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.
High:	The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

The following weights were assigned to each attribute:

Aspect	Description	Weight
Probability	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude/Severity	Low	2
	Medium	6
	High	8
Significance	Sum (Duration, Scale, Magnitude) x Probability	
	Negligible	<20
	Low	<40
	Moderate	<60
	High	>60

The significance of each activity is rated without mitigation measures and with mitigation measures for both construction and operational phases of the development.

The mitigation effect of each impact will be indicated without and with mitigation measures as follows:

- Can be reversed
- Can be avoided, managed or mitigated
- May cause irreplaceable loss of resources

Heritage receptors were found in the **Nigel Gas Transmission Pipeline Project** and potential impacts to heritage resources is foreseen.

The following table summarizes impacts to **Exigo-NGP-HP01** of **low** significance located within the larger project area.

NATURE OF IMPACT: Impacts could involve displacement or destruction of heritage structures or features in the project area.		
	Without mitigation	With mitigation
EXTENT	Regional	Local
DURATION	Permanent	Permanent
MAGINITUDE	Minor	Minor
PROBABILITY	Improbable	Negligible
SIGNIFICANCE	Medium	Low
STATUS	Negative	Neutral
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	Yes	No
CAN IMPACTS BE MITIGATED?	N.A	
MITIGATION: Site monitoring by ECO, alteration / destruction permitting if impact is to occur.		
CUMULATIVE IMPACTS: No cumulative impact is anticipated.		
RESIDUAL IMPACTS: n/a		

The following table summarizes impacts to **Exigo-NGPBP01 and Exigo-NGPBP02** of **high** significance located within the project area.

NATURE OF IMPACT: Impacts could involve displacement or destruction of human remains an burials in the project area.		
	Without mitigation	With mitigation
EXTENT	Local	Local
DURATION	Permanent	Permanent
MAGINITUDE	Major	Minor
PROBABILITY	Improbable	Negligible
SIGNIFICANCE	High	Low
STATUS	Negative	Neutral
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	Yes	No

CAN IMPACTS BE MITIGATED?	N.A
MITIGATION: Avoidance, close site monitoring by ECO, site management plan.	
CUMULATIVE IMPACTS: No cumulative impact is anticipated.	
RESIDUAL IMPACTS: n/a	

6.2 Evaluation Impacts

Previous studies conducted in the larger Gauteng landscape around the project area suggest a rich and diverse archaeological landscape. The Nigel and Dunnottar landscape has been intensively inhabited and developed during historical times where large portions of land have been transformed for mining and agriculture. Cognisance should be taken of archaeological material that might be present in surface and sub-surface deposits.

6.2.1 Archaeology

The study did not identify any archaeological receptors which will be directly impacted by the proposed project and no impact on archaeological sites or features is anticipated.

6.2.2 Built Environment

A number of Historical Period buildings and the remains of buildings relating to urban development and mining occur in the general landscape which implies that the project area bears significance in terms of the built environment. Only one occurs in the vicinity of the project alignment but impact on the feature seems improbable, provided that proposed mitigation be implemented (site monitoring).

6.2.3 Cultural Landscape

The larger area comprises a rich cultural horizon and the natural landscape surrounding the proposed project encompasses open grasslands typical of the southern Highveld of Gauteng. The cultural landscape holds Iron Age farmer and Colonial Period farmsteads and Historical towns. The proposed project is unlikely to result in a significant impact on the cultural landscape of this area.

6.2.4 Graves / Human Burials Sites

Two burial sites were noted in the study area and impact on human burials might occur. **The receptors are of high significance in terms of social and cultural meaning and the implementation of mitigation measures (avoidance, site management, site monitoring) is required.** In the rural areas of the Gauteng, graves and cemeteries sometimes occur within settlements or around homesteads but they are also randomly scattered around archaeological and historical settlements. The probability of additional and informal human burials encountered during development should thus not be excluded. In addition, human remains and burials are commonly found close to archaeological sites; they may be found in "lost" graveyards, or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Human remains are usually observed when they are exposed through erosion. In some instances, packed stones or rocks may indicate the presence of informal pre-colonial burials. Should any unmarked human burials/remains be found during the course of construction, work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or the South African Heritage Resources Agency (SAHRA). Where human remains are part of a burial they would need to be exhumed under a permit from SAHRA (for pre-colonial burials as well as burials later than about AD 1500).

Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met.

Heritage resources occur in close proximity of the Nigel Gas Transmission Pipeline Project pipeline alignment and potential impacts to these heritage receptors are foreseen. However, these impacts can be mitigated and in the opinion of the author of this AIA study the proposed Nigel Gas Transmission Pipeline Project may proceed from a culture resources management perspective on the condition that mitigation measures are implemented where applicable, and provided that no subsurface heritage remains are encountered during construction.

6.3 Management actions

Recommendations for relevant heritage resources management actions are vital to the conservation of heritage resources. A general guideline for recommended management actions is included in Section 10.4 of the Addendum. The following management measures should be considered during implementation of the proposed Nigel Gas Transmission Pipeline Project.

OBJECTIVE: prevent unnecessary disturbance and/or destruction of previously undetected heritage receptors.

- *For the poorly preserved remains of a Historical period settlement (Exigo-NGP-HP01) occurring along the project footprint, the following are required in terms of heritage management and mitigation.*

PROJECT COMPONENT/S	All phases of construction and operation.		
POTENTIAL IMPACT	Damage/destruction of sites.		
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.		
MITIGATION: TARGET/OBJECTIVE	To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME	
Fixed Mitigation Procedure (required)			
Site Monitoring: Regular examination of trenches and excavations. Alteration Permitting: The site is older than 60 years and generally protected under the NHRA. Application for an alteration permit should be made with relevant heritage authorities (SAHRA, SAHRA Built Environment) should the site be alteration at any stage.	ECO HERITAGE PRACTITIONER	Monitor as frequently as practically possible.	
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		
MONITORING	Successful location of sites by person/s monitoring.		

- *For the highly significant burial site (Exigo-NGP-BP01) in the project area, the following are required in terms of heritage management and mitigation:*

PROJECT COMPONENT/S	All phases of construction and operation.		
POTENTIAL IMPACT	Damage/disturbance to subsurface burials and surface burial features.		
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.		

MITIGATION: TARGET/OBJECTIVE	To locate human burials as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME	
Preferred Mitigation Procedure			
Avoidance: Implement a heritage conservation buffer of at least 10m from the nearest graves in the cemetery. Implement a conservation buffer of 3m from the cemetery fence to the periphery of the impact buffer of construction activities but where unfeasible, erect a temporary construction barricade along areas where construction might encroach on the 3m buffer. Implement a site management plan detailing strict site management conservation measures.	QUALIFIED SPECIALIST DEVELOPER	HERITAGE	Avoidance: Prior to the commencement of construction and earth-moving.
Site Monitoring: The project site in the vicinity of this receptor should be monitored bi-weekly by the heritage consultant or an ECO familiar with the heritage occurrences of the site: regular examination of trenches and excavations and site clearing in order to detect and preserve previously undocumented heritage receptors.	QUALIFIED SPECIALIST ECO	HERITAGE	Monitor monthly.
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		
MONITORING	Successful location of sites by person/s monitoring.		

- For the highly significant burial sites (**Exigo-NGP-BP02**) in the project area, the following are required in terms of heritage management and mitigation:

PROJECT COMPONENT/S	All phases of construction and operation.		
POTENTIAL IMPACT	Damage/disturbance to subsurface burials and surface burial features.		
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.		
MITIGATION: TARGET/OBJECTIVE	To locate human burials as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME	
Preferred Mitigation Procedure			
Avoidance: Implement a heritage conservation buffer of 50m around the graves / cemetery. If possible, fence burial place and apply access control. Implement a site management plan detailing strict site management conservation measures.	QUALIFIED SPECIALIST DEVELOPER	HERITAGE	Avoidance: Prior to the commencement of construction and earth-moving.
Site Monitoring: The project site in the vicinity of this receptor should be monitored on a frequent basis by the heritage consultant of an ECO familiar with the heritage occurrences of the site: regular examination of trenches and excavations and site clearing in order to detect and preserve previously undocumented heritage receptors.	QUALIFIED SPECIALIST ECO	HERITAGE	Monitor monthly.
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		
MONITORING	Successful location of sites by person/s monitoring.		

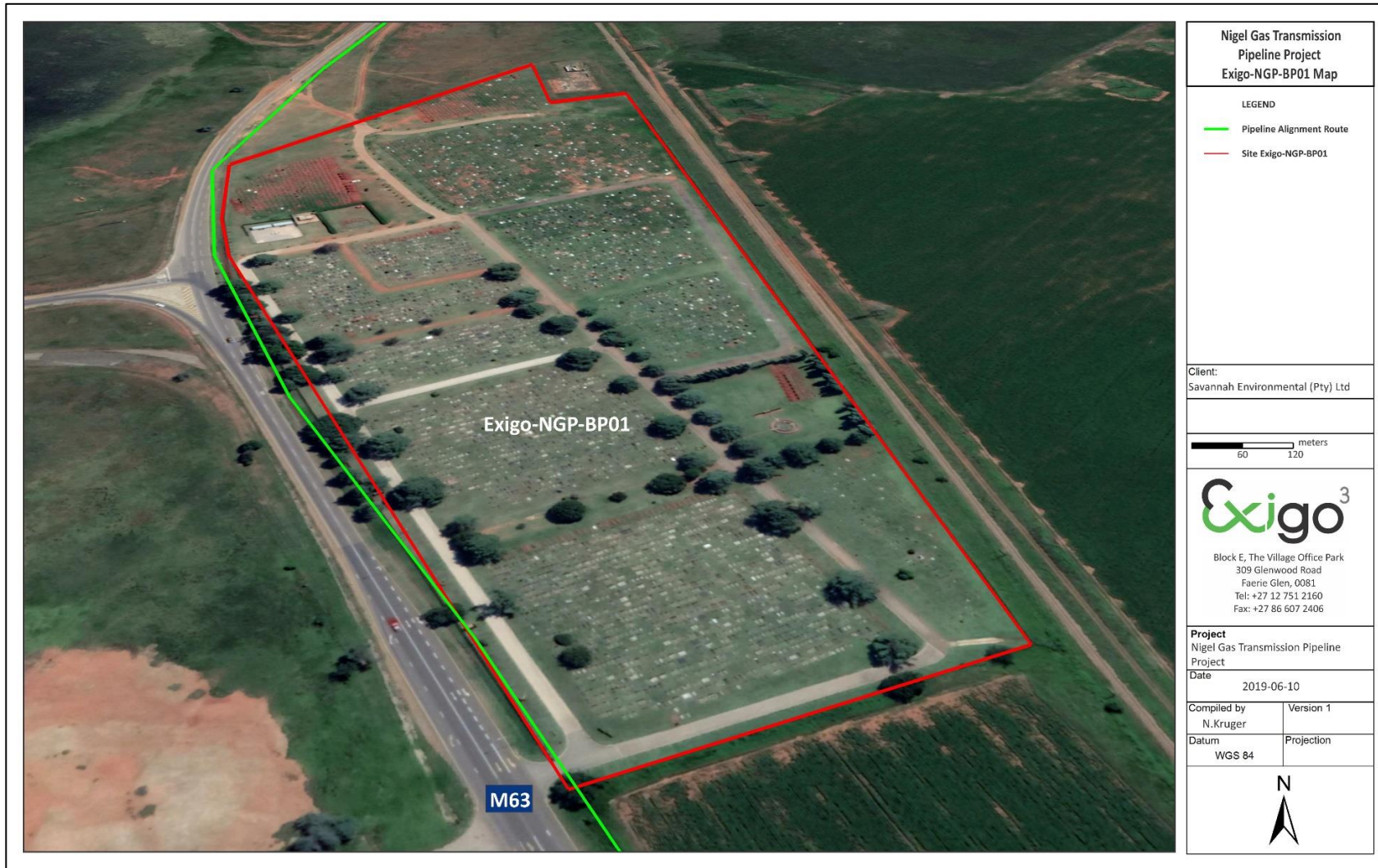


Figure 6-1: Aerial image indicating the fence (red line) of the Nigel Cemetery (Site Exigo-NGP-BP01) in relation to the proposed pipeline alignment (green line). Note that the proposed pipeline aligns in close proximity of the fence in places.



Figure 6-2: Aerial image indicating the 50m conservation buffer required for Site Exigo-NGP-BP02 in relation to the proposed pipeline alignment (green line).

7 RECOMMENDATIONS

In terms of heritage resources, the landscape around the project area is primarily well known for the occurrence of Iron Age farmer sites and a Colonial frontier denoting industrial expansion in Gauteng. The landscape around Nigel has been inhabited, developed and exploited continuously for centuries, the remnants of which are visible in transformed agriculture and rural settlement as well as mining areas. The following recommendations are made based on general observations in the proposed Nigel Gas Transmission Pipeline Project area pertaining to a number of identified occurrences of heritage potential:

- The poorly preserved remains of a Historical Period settlement area occur along a northern section of the project footprint south of the M45 road (**Site EXIGO-NGP-HP01**). The site is rated as low heritage significance and impact seems unlikely but legislation requires that an alteration / destruction permit be obtained from the relevant heritage resources authority (SAHRA, SAHRA Built Environment Unit) should the site be altered at any stage. It is recommended that the site and its surrounds be closely monitored by an informed ECO during development in order to avoid the destruction of previously undetected heritage remains.
- Two burial sites occur in the project area and these highly significant heritage resources are protected in terms of heritage and social by the National Heritage Resource Act (NHRA 1999). It is essential that the long-term conservation of the sites is ensured. The Nigel Municipal Cemetery (**Site EXIGO-NGP-BP01**) occurs east of the M63 road and approximately 10m east from the proposed pipeline alignment. The pipeline alignment runs within the road reserve which had previously been impacted on by the establishment and construction of municipal services (water and electricity lines) and impact on the adjacent cemetery is unlikely. It is primarily recommended that a heritage conservation buffer of at least 10m be implemented from the nearest graves in the cemetery, to the periphery of the impact buffer of construction activities. It is further recommended that a conservation buffer of 3m from the cemetery fence to the periphery of the impact buffer of construction activities be observed. A temporary construction barricade should be erected along areas where this measure proves unfeasible, i.e. in areas where construction activities might encroach on the 3m buffer. A site management plan detailing strict site management conservation measures should be compiled for the cemetery. The cemetery and burials at the site should be monitored on a bi-weekly basis by an informed ECO or by the heritage Specialist in order to detect any impact on the resource at the earliest opportunity. Should the developer not be able to uphold the recommendations stated above, it is then recommended that the proposed alignment be rerouted along the road servitude west of the M63 in order avoid construction encroaching on the conservation buffer for the cemetery. An additional informal cemetery was documented in an open field directly west of the M63 road and south of Dunnotar, approximately 100m west of the proposed pipe alignment (**Site Exigo-NGP-BP02**). Even though impact on the site seems improbable it is recommended that a conservation buffer of at least 50m be implemented around the site. The developer should consider fencing off the burial site in order to clearly demarcate the presence and extent of this sensitive heritage resource in the larger development landscape. The cemetery and burials at the site should be monitored on a frequent basis by an informed ECO or by the heritage Specialist in order to detect any impact on the resource at the earliest opportunity.
- **Should impact on any burial or cemetery in the project area prove inevitable at any stage of development, full grave relocation processes should be effected. This measure should be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions, laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials (see Addendum B).**

- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO is recommended during the construction phase of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.
- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that the possibility of undetected archaeological remains occurring elsewhere in the project area should not be excluded. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development.

In addition to these site-specific recommendations, careful cognizance should be taken of the following:

- As Palaeontological remains occur where bedrock has been exposed, all geological features should be regarded as sensitive.
- Water sources such as drainage lines, fountains and pans would often have attracted human activity in the past. The larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits (see Section 8).

8 GENERAL COMMENTS AND CONDITIONS

This AIA report serves to confirm the extent and significance of the heritage landscape of the proposed Nigal Gas Transmission Pipeline Project area. The larger heritage horizon encompasses rich and diverse archaeological landscapes and cognisance should be taken of heritage resources and archaeological material that might be present in surface and sub-surface deposits. If, during construction, any possible archaeological material culture discoveries are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find. Such material culture might include:

- Formal Earlier Stone Age stone tools;
- Formal MSA stone tools;
- Formal LSA stone tools;
- Potsherds;
- Iron objects;
- Beads made from ostrich eggshell and glass;
- Ash middens and cattle dung deposits and accumulations;
- Faunal remains;
- Human remains/graves;
- Stone walling or any sub-surface structures;
- Historical glass, tin or ceramics; and
- Fossils.

If such sites were to be encountered or impacted by any proposed developments, recommendations contained in this report, as well as endorsement of mitigation measures as set out by Gauteng-PHRA, SAHRA, the National Resources Act and the CRM section of ASAPA will be required. It must be emphasised that the conclusions and recommendations expressed in this archaeological heritage sensitivity investigation are based on the visibility of archaeological sites/features and may not therefore, represent the area's complete archaeological legacy. Many sites/features may be covered by soil and vegetation and might only be located during sub-surface investigations. If subsurface archaeological deposits, artefacts or skeletal material were to be recovered in the area during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately (*cf. NHRA (Act No. 25 of 1999), Section 36 (6)*). It must also be clear that Archaeological Specialist Reports will be assessed by the relevant heritage resources authority (SAHRA).

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10 ADDENDUM 1: HERITAGE LEGISLATION BACKGROUND

10.1 CRM: Legislation, Conservation and Heritage Management

The broad generic term Cultural Heritage Resources refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

10.1.1 Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and their provincial offices aim to conserve and control the management, research, alteration and destruction of cultural resources of South Africa. It is therefore vitally important to adhere to heritage resource legislation at all times.

d. National Heritage Resources Act No 25 of 1999, section 35

According to the National Heritage Resources Act of 1999 a historical site is any identifiable building or part thereof, marker, milestone, gravestone, landmark or tell older than 60 years. This clause is commonly known as the "60-years clause". Buildings are amongst the most enduring features of human occupation, and this definition therefore includes all buildings older than 60 years, modern architecture as well as ruins, fortifications and Iron Age settlements. "Tell" refers to the evidence of human existence which is no longer above ground level, such as building foundations and buried remains of settlements (including artefacts).

The Act identifies heritage objects as:

- objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects, meteorites and rare geological specimens
- visual art objects
- military objects
- numismatic objects
- objects of cultural and historical significance
- objects to which oral traditions are attached and which are associated with living heritage
- objects of scientific or technological interest
- any other prescribed category

With regards to activities and work on archaeological and heritage sites this Act states that:

"No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority." (34. [1] 1999:58)

and

"No person may, without a permit issued by the responsible heritage resources authority-

- (d) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (e) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*

- (f) *trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (g) *bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58)."*

and

"No person may, without a permit issued by SAHRA or a provincial heritage resources agency-

- (h) *destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (i) *destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (j) *bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."*

e. Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and the Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial MEC as well as the relevant Local Authorities.

10.1.2 Background to HIA and AIA Studies

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact assessments (HIAs & AIAs) that identify all heritage resources in areas to be developed. Particularly, these assessments are required to make recommendations for protection or mitigation of the impact of the sites. HIAs and AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and palaeontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact on the sites.

The National Heritage Resources Act (Act No. 25 of 1999, section 38) provides guidelines for Cultural Resources Management and prospective developments:

"38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a

development categorised as:

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) the construction of a bridge or similar structure exceeding 50m in length;*
- (c) any development or other activity which will change the character of a site:*
 - (i) exceeding 5 000 m² in extent; or*
 - (ii) involving three or more existing erven or subdivisions thereof; or*
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- (d) the re-zoning of a site exceeding 10 000 m² in extent; or*
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,*

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.”

And:

“The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:

- (k) The identification and mapping of all heritage resources in the area affected;*
- (l) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
- (m) an assessment of the impact of the development on such heritage resources;*
- (n) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
- (o) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
- (p) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (q) plans for mitigation of any adverse effects during and after the completion of the proposed development (38. [3] 1999:64).”*

Consequently, section 35 of the Act requires Heritage Impact Assessments (HIAs) or Archaeological Impact Assessments (AIAs) to be done for such developments in order for all heritage resources, that is, all places or objects of aesthetics, architectural, historic, scientific, social, spiritual, linguistic or technological value or significance to be protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, shipwrecks, battlefields, graves, and structures older than 60

years, living heritage, historical settlements, landscapes, geological sites, palaeontological sites and objects. Heritage resources management and conservation.

10.2 Assessing the Significance of Heritage Resources

Archaeological sites, as previously defined in the National Heritage Resources Act (Act 25 of 1999) are places in the landscape where people have lived in the past – generally more than 60 years ago – and have left traces of their presence behind. In South Africa, archaeological sites include hominid fossil sites, places where people of the Earlier, Middle and Later Stone Age lived in open sites, river gravels, rock shelters and caves, Iron Age sites, graves, and a variety of historical sites and structures in rural areas, towns and cities. Palaeontological sites are those with fossil remains of plants and animals where people were not involved in the accumulation of the deposits. The basic principle of cultural heritage conservation is that archaeological and other heritage sites are valuable, scarce and *non-renewable*. Many such sites are unfortunately lost on a daily basis through development for housing, roads and infrastructure and once archaeological sites are damaged, they cannot be re-created as site integrity and authenticity is permanently lost. Archaeological sites have the potential to contribute to our understanding of the history of the region and of our country and continent. By preserving links with our past, we may not be able to revive lost cultural traditions, but it enables us to appreciate the role they have played in the history of our country.

- Categories of significance

Rating the significance of archaeological sites, and consequently grading the potential impact on the resources is linked to the significance of the site itself. The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences. The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3 are used when determining the cultural significance or other special value of archaeological or historical sites. In addition, ICOMOS (the Australian Committee of the International Council on Monuments and Sites) highlights four cultural attributes, which are valuable to any given culture:

- *Aesthetic value:*

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria include consideration of the form, scale, colour, texture and material of the fabric, the general atmosphere associated with the place and its uses and also the aesthetic values commonly assessed in the analysis of landscapes and townscape.

- *Historic value:*

Historic value encompasses the history of aesthetics, science and society and therefore to a large extent underlies all of the attributes discussed here. Usually a place has historical value because of some kind of influence by an event, person, phase or activity.

- *Scientific value:*

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality and on the degree to which the place may contribute further substantial information.

- *Social value:*

Social value includes the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a certain group.

It is important for heritage specialist input in the EIA process to take into account the heritage management structure set up by the NHR Act. It makes provision for a 3-tier system of management including the South Africa Heritage Resources Agency (SAHRA) at a national level, Provincial Heritage Resources Authorities (PHRAs) at a provincial and the local authority. The Act makes provision for two types or forms of protection of heritage resources; i.e. formally protected and generally protected sites:

Formally protected sites:

- Grade 1 or national heritage sites, which are managed by SAHRA
- Grade 2 or provincial heritage sites, which are managed by the provincial HRA (MP-PHRA).
- Grade 3 or local heritage sites.

Generally protected sites:

- Human burials older than 60 years.
- Archaeological and palaeontological sites.
- Shipwrecks and associated remains older than 60 years.
- Structures older than 60 years.

With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise and if the significance of the site is rated high, the significance of the impact will also result in a high rating. The same rule applies if the significance rating of the site is low. The significance of archaeological sites is generally ranked into the following categories.

Significance	Rating Action
No significance: sites that do not require mitigation.	None
Low significance: sites, which may require mitigation.	2a. Recording and documentation (Phase 1) of site; no further action required 2b. Controlled sampling (shovel test pits, auguring), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction
Medium significance: sites, which require mitigation.	3. Excavation of representative sample, C14 dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]
High significance: sites, where disturbance should be avoided.	4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site management plan; permit required if utilised for education or tourism
High significance: Graves and burial places	4b. Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinternment [including 2a, 2b & 3]

Furthermore, the significance of archaeological sites was based on six main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter),
- Social value,
- Uniqueness, and
- Potential to answer current and future research questions.

A fundamental aspect in assessing the significance and protection status of a heritage resource is often

whether or not the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and mitigated in order to gain data / information, which would otherwise be lost.

11 ADDENDUM 2: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE

11.1 Site Significance Matrix

According to the NHRA, Section 2(vi) the **significance** of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these. The following matrix is used for assessing the significance of each identified site/feature.

2. SITE EVALUATION			
2.1 Heritage Value (NHRA, section 2 [3])	High	Medium	Low
It has importance to the community or pattern of South Africa's history or pre-colonial history.			
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.			
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.			
It is of importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.			
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.			
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.			
It has marked or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).			
It has strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.			
It has significance through contributing towards the promotion of a local sociocultural identity and can be developed as a tourist destination.			
It has significance relating to the history of slavery in South Africa.			
It has importance to the wider understanding of temporal changes within cultural landscapes, settlement patterns and human occupation.			
2.2 Field Register Rating			
National/Grade 1 [should be registered, retained]			
Provincial/Grade 2 [should be registered, retained]			
Local/Grade 3A [should be registered, mitigation not advised]			
Local/Grade 3B [High significance; mitigation, partly retained]			
Generally Protected A [High/Medium significance, mitigation]			
Generally protected B [Medium significance, to be recorded]			
Generally Protected C [Low significance, no further action]			
2.3 Sphere of Significance	High	Medium	Low
International			
National			
Provincial			
Local			
Specific community			

11.2 Impact Assessment Criteria

The following table provides a guideline for the rating of impacts and recommendation of management actions for sites of heritage potential.

Significance of the heritage resource

This is a statement of the nature and degree of significance of the heritage resource being affected by the activity. From a heritage management perspective, it is useful to distinguish between whether the significance is embedded in the physical fabric or in associations with events or persons or in the experience of a place; i.e. its visual and non-visual qualities. This statement is a primary informant to the nature and degree of significance of an impact and thus needs to be thoroughly considered. Consideration needs to be given to the significance of a heritage resource at different scales (i.e. site-specific, local, regional, national or international) and the relationship between the heritage resource, its setting and its associations.

Nature of the impact

This is an assessment of the nature of the impact of the activity on a heritage resource, with some indication of its positive and/or negative effect/s. It is strongly informed by the statement of resource significance. In other words, the nature of the impact may be historical, aesthetic, social, scientific, linguistic or architectural, intrinsic, associational or contextual (visual or non-visual). In many cases, the nature of the impact will include more than one value.

Extent

Here it should be indicated whether the impact will be experienced:

- On a site scale, i.e. extend only as far as the activity;
- Within the immediate context of a heritage resource;
- On a local scale, e.g. town or suburb
- On a metropolitan or regional scale; or
- On a national/international scale.

Duration

Here it should be indicated whether the lifespan of the impact will be:

- Short term, (needs to be defined in context)
- Medium term, (needs to be defined in context)
- Long term where the impact will persist indefinitely, possibly beyond the operational life of the activity, either because of natural processes or by human intervention; or
- Permanent where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Of relevance to the duration of an impact are the following considerations:

- Reversibility of the impact; and
- Renewability of the heritage resource.

Intensity

Here it should be established whether the impact should be indicated as:

- Low, where the impact affects the resource in such a way that its heritage value is not affected;
- Medium, where the affected resource is altered but its heritage value continues to exist albeit in a modified way; and
- High, where heritage value is altered to the extent that it will temporarily or permanently be damaged or destroyed.

Probability

This should describe the likelihood of the impact actually occurring indicated as:

- Improbable, where the possibility of the impact to materialize is very low either because of design or historic experience;
- Probable, where there is a distinct possibility that the impact will occur;
- Highly probable, where it is most likely that the impact will occur; or
- Definite, where the impact will definitely occur regardless of any mitigation measures

Confidence

This should relate to the level of confidence that the specialist has in establishing the nature and degree of impacts. It relates to the level and reliability of information, the nature and degree of consultation with I&AP's and the dynamic of the broader socio-political context.

- High, where the information is comprehensive and accurate, where there has been a high degree of consultation and the socio-political context is relatively stable.
- Medium, where the information is sufficient but is based mainly on secondary sources, where there has been a limited targeted consultation and socio-political context is fluid.
- Low, where the information is poor, a high degree of contestation is evident and there is a state of socio-political flux.

Impact Significance

The significance of impacts can be determined through a synthesis of the aspects produced in terms of the nature and degree of heritage significance and the nature, duration, intensity, extent, probability and confidence of impacts and can be described as:

- Low; where it would have a negligible effect on heritage and on the decision
- Medium, where it would have a moderate effect on heritage and should influence the decision.
- High, where it would have, or there would be a high risk of, a big effect on heritage. Impacts of high significance should have a major influence on the decision;
- Very high, where it would have, or there would be high risk of, an irreversible and possibly irreplaceable negative impact on heritage. Impacts of very high significance should be a central factor in decision-making.

11.3 Direct Impact Assessment Criteria

The following table provides an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected

HERITAGE CONTEXT	TYPE OF DEVELOPMENT			
	CATEGORY A	CATEGORY B	CATEGORY C	CATEGORY D
CONTEXT 1 High heritage Value	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected	Very high heritage impact expected
CONTEXT 2 Medium to high heritage value	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected
CONTEXT 3 Medium to low heritage value	Little or no heritage impact expected	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected
CONTEXT 4 Low to no heritage value	Little or no heritage impact expected	Little or no heritage impact expected	Minimal heritage value expected	Moderate heritage impact expected
NOTE: A DEFAULT "LITTLE OR NO HERITAGE IMPACT EXPECTED" VALUE APPLIES WHERE A HERITAGE RESOURCE OCCURS OUTSIDE THE IMPACT ZONE OF THE DEVELOPMENT.				
HERITAGE CONTEXTS		CATEGORIES OF DEVELOPMENT		
<p>Context 1: Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2 or 3A heritage resources</p> <p>Context 2: Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.</p> <p>Context 3: Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources</p>		<p>Category A: Minimal intensity development</p> <ul style="list-style-type: none"> - No rezoning involved; within existing use rights. - No subdivision involved. - Upgrading of existing infrastructure within existing envelopes - Minor internal changes to existing structures - New building footprints limited to less than 1000m2. <p>Category B: Low-key intensity development</p> <ul style="list-style-type: none"> - Spot rezoning with no change to overall zoning of a site. - Linear development less than 100m - Building footprints between 1000m2-2000m2 		

<p>Context 4: Of little or no intrinsic, associational or contextual heritage value due to disturbed, degraded conditions or extent of irreversible damage.</p>	<ul style="list-style-type: none"> - Minor changes to external envelop of existing structures (less than 25%) - Minor changes in relation to bulk and height of immediately adjacent structures (less than 25%). <p>Category C: Moderate intensity development</p> <ul style="list-style-type: none"> - Rezoning of a site between 5000m2-10 000m2. - Linear development between 100m and 300m. - Building footprints between 2000m2 and 5000m2 - Substantial changes to external envelop of existing structures (more than 50%) - Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 50%) <p>Category D: High intensity development</p> <ul style="list-style-type: none"> - Rezoning of a site in excess of 10 000m2 - Linear development in excess of 300m. - Any development changing the character of a site exceeding 5000m2 or involving the subdivision of a site into three or more erven. - Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 100%)
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11.4 Management and Mitigation Actions

The following table provides a guideline of relevant heritage resources management actions is vital to the conservation of heritage resources.

<p>No further action / Monitoring</p> <p>Where no heritage resources have been documented, heritage resources occur well outside the impact zone of any development or the primary context of the surroundings at a development footprint has been largely destroyed or altered, no further immediate action is required. Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage\ remains are destroyed.</p> <p>Avoidance</p> <p>This is appropriate where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. Mitigation is not acceptable or not possible. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.</p> <p>Mitigation</p> <p>This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated to a degree of medium to low significance, e.g. the high to medium impact of a development on an archaeological site could be mitigated through sampling/excavation of the remains. Not all negative impacts can be mitigated.</p> <p>Compensation</p> <p>Compensation is generally not an appropriate heritage management action. The main function of management actions should be to conserve the resource for the benefit of future generations. Once lost it cannot be renewed. The circumstances around the potential public or heritage benefits would need to be exceptional to warrant this type of action, especially in the case of where the impact was high.</p> <p>Rehabilitation</p> <p>Rehabilitation is considered in heritage management terms as a intervention typically involving the adding of a new heritage layer to enable a new sustainable use. It is not appropriate when the process necessitates the removal of previous historical layers, i.e. restoration of a building or place to the previous state/period. It is an appropriate heritage management action in the following cases:</p> <ul style="list-style-type: none"> - The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation. - Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric. - Where the rehabilitation process will not result in a negative impact on the intrinsic value of the resource. <p>Enhancement</p> <p>Enhancement is appropriate where the overall heritage significance and its public appreciation value are improved. It does not imply creation of a condition that might never have occurred during the evolution of a place, e.g. the tendency to sanitize the past. This</p>

management action might result from the removal of previous layers where these layers are culturally of low significance and detract from the significance of the resource. It would be appropriate in a range of heritage contexts and applicable to a range of resources. In the case of formally protected or significant resources, appropriate enhancement action should be encouraged. Care should, however, be taken to ensure that the process does not have a negative impact on the character and context of the resource. It would thus have to be carefully monitored