



PGS HERITAGE

Tetra4 PR extension

On 79 farm portions near the towns of Theunissen and Winburg in the south and Odendaalsrus and Allanridge in the north. within the Lejweleputswa District Municipality, Free State Province.

Heritage Impact Assessment

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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page ii

REVISION HISTORY

Version	Issue Date	Description of Changes
01	09/07/2024	First draft

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page iii

Declaration of Independence

- I, Jessica Angel, declare that –
- General declaration:
- I act as the independent heritage practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting heritage impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page iv

ACKNOWLEDGEMENT OF RECEIPT

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CLIENT: Environmental Impact Management Services (Pty) Ltd

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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page v

The Heritage Impact Assessment Report has been compiled considering the National Environmental Management Act (Act No. 107 of 1998) (NEMA): Appendix 6 of the Environmental Impact Assessment (EIA) Regulations of 2014 (as amended, 2017) requirements for specialist reports as indicated in the table below.

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii of Report – Contact details and company
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 1.2 – refer to Appendix C
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1
(cA) An indication of the quality and age of base data used for the specialist report	N/A
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 5
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 4.4
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Appendix A and B
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 4
(g) An identification of any areas to be avoided, including buffers	Section 4
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 4.3
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.3
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 4
(k) Any mitigation measures for inclusion in the EMPr	Section 6
(l) Any conditions for inclusion in the environmental authorization	Section 6
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorization	Section 6
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 6 and 7
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 6
(o) A description of any consultation process that was undertaken during the course of carrying out the study	Informal consultation in fieldwork.
(p) A summary and copies if any comments that were received during any consultation process	Not applicable. To date no comments regarding heritage resources that require input from a specialist have been raised.
(q) Any other information requested by the competent authority.	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	No protocols or minimum standards for HIAs or PIAs

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page vi

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by Environmental Impact Management Services (Pty) Ltd (EIMS) to undertake a Heritage Impact Assessment (HIA) for the proposed Tetra 4 PR Extension for the Exploration Rights within the Production Right (12/4/1/07/2/2) for Tetra 4. On 79 farm portions near the towns of Theunissen and Winburg in the south and Odendaalsrus and Allanridge in the north. within the Lejweleputswa District Municipality, Free State Province.

During the fieldwork a total of **eight** heritage features and resources were identified (**Figure 32** and **Figure 33**). These consist of four cemeteries or possible grave sites (**T4-002, T4-007 and T4-008 with a possible grave at T4-004**), and **five** foundation remains of historical homesteads/kraals (**T4-001, T4-003, T4-004, T4-005 and T4-006**). See **Figure 34 - Figure 37** and the individual site descriptions as contained in **Appendix B** The field description forms were collected with ArcGIS Survey123 in field software.

Historical Structures

The stone built remains of structures **T4-001, T4-003, and T4-004**, are related to the depicted structures on the 1947 maps and most likely older than 77 years (Section 4.2.1). The remains of structures **T4-005 and T4-006** are not depicted on any maps and likely more recent. The structure remains themselves are not conservation worthy. However, it is associated with an earlier 20th century farm worker settlement and the possibility of stillborn burials around the structures must be considered. As per African custom stillborn children are buried against the outside wall/foundation or inside the house. The structures (**T4-001, T4-003, T4-004, T4-005 and T4-006**) must then provisionally grade as Grade IIIA. All burial grounds and graves should be retained and avoided with a buffer zone of 30m as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of s36 of the NHRA and its regulations as well as the National Health Act and its regulations. As structures **T4-001, T4-003, and T4-004** are older than 77 years, historical or Iron Age sites are protected under S34 and S35 of the NHRA and must be avoided with a buffer of 30m. If this is not possible, an application for a mitigation permit must be obtained from SAHRA. Phase 2

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page vii

test excavations with the backing of a s34 permit from SAHRA will be required before an application for destruction can be lodged with SAHRA. They are given a heritage significance sensitivity category as HIGH (**T4-003**) and MEDIUM (**T4-001, T4-005, T4-004, T4-005** and **T4006**), with an Impact sensitivity of HIGH and MEDIUM before mitigation and LOW after mitigation.

Burial grounds and graves

T4-002 is a possible burial ground which occurs 16 m from the proposed drilling collar V7 P006 and associated with sites **T4-001, T4-003** and **T4-005**. This site will need to be avoided with a 30 m buffer or an application for a mitigation permit must be obtained from SAHRA. Phase 2 test excavations to confirm whether or not graves do occur at this site with the backing of a s36 permit from SAHRA will be required before an application for destruction or exhumation can be lodged with SAHRA. , **T4-007** is located between drilling collars V7 P002 and V7 P004 and should not be impacted by drilling activities, it is however alongside the current road and should be noted to avoid possible damage during activities. and **T4-008** occurs approximately 145 m from drilling collar V7 P008 and should not impact drilling activities but should be demarcated and avoided. The possible grave at **T4-004** occurs approximately 200 m from drilling collar V7 P006 and should not be impacted. Burial grounds and graves are protected under s36 of the NHRA and must be demarcated with a 30m buffer and avoided. If this is not possible, a grave relocation process must be followed. They are given a heritage significance sensitivity category as HIGH, with an Impact sensitivity of HIGH (**T4-002**) and MEDIUM (**T4-004, T4-007** and **T4-008**) before mitigation and LOW after mitigation.

Conclusion

It is the considered opinion of the heritage specialists that the proposed project **will** have a direct impact on the identified heritage resources, rated as being of MEDIUM to HIGH heritage significance.

ER94 drilling collar V7 P006 will have the greatest impact on heritage resources rated as being of MEDIUM to HIGH heritage significance. Drilling collars V7 P002 and V7 P008 are near heritage resources, however if mitigation measures are implemented, it is unlikely the sites will be impacted directly. With the implementation of recommended mitigation

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page viii

measures the impacts will be reduced to LOW. All other drilling collars are considered acceptable from a heritage perspective.

ER32 drilling collars are all acceptable from a heritage perspective.

With the implementation of recommended mitigation measures, the overall impact on heritage resources will be reduced to acceptable positive levels during the project activities.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page ix

TABLE OF CONTENT

1	INTRODUCTION.....	1
1.1	Scope of the Study	1
1.2	Specialist Qualifications	1
1.3	Assumptions and Limitations	2
1.4	Legislative Context	3
1.4.1	<i>Notice 320 of the Government Gazette 45421</i>	3
1.4.2	<i>Requirements of Appendix 6 of the NEMA EIA Regulations (as amended)</i>	4
1.4.3	<i>The National Heritage Resources Act</i>	4
2	TECHNICAL DETAILS OF THE PROJECT	5
2.1	Locality	5
2.1.1	<i>Site Description</i>	5
2.2	Technical Project Description	6
2.2.1	<i>Project description</i>	6
2.2.2	<i>Scope of Work</i>	10
3	ASSESSMENT METHODOLOGY	10
3.1	Methodology for Assessing Heritage Site Significance.	10
3.1.1	<i>Site Significance</i>	11
3.2	Methodology used in determining the significance of environmental impacts	15
4	CURRENT STATUS QUO.....	16
4.1	Site Description	16
4.2	Overview of the study area and surrounding landscape	17
4.2.1	<i>Archival and historical maps</i>	41
4.2.2	<i>Previous heritage impact assessment reports from the study area and surroundings</i>	43
4.2.3	<i>Heritage screening</i>	46
4.2.4	<i>Heritage sensitivity</i>	48
4.3	Fieldwork findings	49
5	IMPACT ASSESSMENT	55
5.1	Details of all alternatives considered.	55
5.1.1	<i>Historical Structures</i>	55
5.1.2	<i>Burial grounds and graves</i>	56
5.2	Impact assessment summary table	57
6	MANAGEMENT RECOMMENDATIONS AND GUIDELINES.....	59

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page x

6.1	Construction and operational phases	59
6.2	Chance finds procedure	59
6.3	Possible finds during construction	60
6.4	Timeframes	60
6.5	Heritage Management Plan for EMPr implementation	62
7	CONCLUSIONS AND RECOMMENDATIONS	63
7.1	Historical Structures	63
7.2	Burial grounds and graves	64
7.3	Mitigation measures	65
7.4	General	65
8	REFERENCES.....	66
8.1	Published Sources	66
8.2	Unpublished Sources	69
8.3	Historical Topographic Maps	70
8.4	Internet	71
8.5	Google Earth	71

List of Figures

<i>Figure 1 – Human and Cultural Timeline in Africa.....</i>	<i>xix</i>
<i>Figure 2 – Project history and mineral tenure.....</i>	<i>8</i>
<i>Figure 3– Production Right Extension study area</i>	<i>9</i>
<i>Figure 4 – View of the grasslands at ER95 V7 P006.....</i>	<i>17</i>
<i>Figure 5 – View of the general vegetation at ER94 V7 P002</i>	<i>17</i>
<i>Figure 6 – View of recently harvested crops at ER32 V2 P002.....</i>	<i>17</i>
<i>Figure 7 – View of the general environment at ER32 V2 P008.....</i>	<i>17</i>
<i>Figure 8 – Example of Early Stone Age Later Acheulian handaxes. These handaxes were identified at Blaaubank near Rooiberg. Cropped section of an illustration published in Mason (1962:199).</i>	<i>19</i>
<i>Figure 9 – Photograph of the archaeological field survey as published in De Ruiter et. al. (2011).....</i>	<i>20</i>
<i>Figure 10 - This plan depicts the settlement layout of a typical Type Z site, and was recorded at site OXF 1 (Maggs, 1976:233).</i>	<i>22</i>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page xi

<i>Figure 11 – Artist’s impression of a bilobial dwelling at site OXF 1. These bilobial dwellings represent a characteristic element of Type Z settlements (Maggs, 1976:241).</i>	<i>22</i>
<i>Figure 12 – Corbelled stone huts associated with a Type V settlement (Huffman, 2007:39).</i>	<i>23</i>
<i>Figure 13 – Layout of a Type V Settlement (Huffman, 2007:38).</i>	<i>24</i>
<i>Figure 14 – King Mzilikazi of the Matabele. This illustration was made by Captain Cornwallis Harris in c. 1838 (www.sahistory.org.za).....</i>	<i>25</i>
<i>Figure 15 – Depiction of an ox wagon crossing a river during the Great Trek (Reader’s Digest, 1994:116).</i>	<i>26</i>
<i>Figure 16 – Lord Frederick Sleigh Roberts (left) and General Louis Botha (right). These two officers commanded the opposing forces at the Battle of Zand River (Changuion, 2001:77 & 117).</i>	<i>30</i>
<i>Figure 17 – Lord Roberts’s infantry crossing the Zand River at the conclusion of the Battle of Zand River. This photograph was in all likelihood taken during the afternoon of 10 May 1900, after all the significant drifts across the river had been cleared by the cavalry and other units. The crossing and surrounding landscape are monitored by an observation balloon (see top right). It is not possible to identify the exact drift where this crossing took place, although the remnants of a bridge foundation structure can be seen in the river bed (Raath, 2007:351).....</i>	<i>32</i>
<i>Figure 18 - Two of the British officers at the Battle of the Zand River who were closely associated with the events within the study area, namely the occupation of the Du Preez Leger Drift on 9 May 1900 as well as the crossing of the drift on the morning of 10 May 1900. General John French (left) (Changuion, 2001:77) and Colonel Thomas William Porter (www.nzetc.victoria.ac.nz).</i>	<i>33</i>
<i>Figure 19 – Sir Thomas Major Cullinan was one of the founding directors of the Driekopjes Diamond Mining Company, which acquired an interest in the farm Welgegund in 1894. In the historic photograph on the left he is shown shortly after the discovery of the Cullinan diamond (which is held by F. Wells) at the Premier Diamond Mining Company, of which he was the chairman. The photograph on the right depicts Cullinan in 1929 (Helme, 1974: 75 & 146).</i>	<i>34</i>
<i>Figure 20 – Archibald Megson standing in the prospecting trench on the farm Aandenk (Felstar Publications, 1968).</i>	<i>35</i>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page xii

<i>Figure 21 –The hardships experienced by General C.R. de Wet during the rebellion can be seen on these photographs. The one on the left shows De Wet shortly after the South African War (Van Schoor, 2007) with the image on the right depicting the general in the Bloemfontein prison after his capture late in 1914 (Langner & Raath, 2014:119).</i>	<i>36</i>
<i>Figure 22 - The first gold prospecting borehole in the Free State was sunk on the farm Aandenk between October 1933 and February 1935. The arrows indicate the positions of Allan Roberts and his wife (Felstar Publications, 1968:11).....</i>	<i>38</i>
<i>Figure 23 –The famous geologist Dr. Hans Merensky, who had his role to play in the discovery of the Free State goldfields (Machens, 2009).</i>	<i>38</i>
<i>Figure 24 –The first mine shaft ever sunk along the Free State goldfields, namely the No. 3 Incline Shaft at the St. Helena Gold Mine (Felstar Publishers, 1968:151).</i>	<i>39</i>
<i>Figure 25–This photograph of Welkom was taken during the 1960s, roughly ten years after its establishment (Felstar Publications, 1968:171).</i>	<i>40</i>
<i>Figure 26 - First edition map showing heritage sensitive areas within ER32</i>	<i>42</i>
<i>Figure 27 – First edition map showing heritage sensitive areas within ER94</i>	<i>42</i>
<i>Figure 28 - Screening tool map indicating a high sensitivity rating for archaeology and heritage surrounding the ER32 study area.....</i>	<i>47</i>
<i>Figure 29 – Screening tool map indicating a high sensitivity rating for archaeology and heritage surrounding the ER94 study area.....</i>	<i>48</i>
<i>Figure 30 - Fieldwork tracklogs for ER32 (track in orange, study area in red).....</i>	<i>50</i>
<i>Figure 31 – Fieldwork tracklogs for ER94 (track in orange, study area in red)</i>	<i>51</i>
<i>Figure 32 - Identified heritage resources within ER94.</i>	<i>52</i>
<i>Figure 33 – Heritage site extent and associated buffers in relation to drilling collars</i>	<i>53</i>
<i>Figure 34 - View of possible graves at T4-002</i>	<i>54</i>
<i>Figure 35 – View of stone walls at T4-003</i>	<i>54</i>
<i>Figure 36 – Foundation remains at T4-006</i>	<i>54</i>
<i>Figure 37 – Burial ground at T4-008.....</i>	<i>54</i>

List of Tables

<i>Table 1: Reporting Requirements for GN 320</i>	<i>3</i>
<i>Table 2: Rating system for archaeological resources</i>	<i>12</i>
<i>Table 3: Rating system for built environment resources.....</i>	<i>14</i>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page xiii

<i>Table 4: Archaeological and Historical Overview of the Study Area and Surrounding Landscape</i>	<i>18</i>
<i>Table 5: Tangible heritage site in the study area.</i>	<i>48</i>
<i>Table 6: Landform type to heritage find matrix.....</i>	<i>48</i>
<i>Table 7: Impact Table.....</i>	<i>58</i>
<i>Table 8: Lead times for permitting and mobilisation.....</i>	<i>60</i>
<i>Table 9: Heritage Management Plan for EMPr implementation</i>	<i>62</i>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page xiv

List of Appendices

- A Environmental Impact Assessment Methodology*
- B Site description forms*
- C Project team CV's*

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page xv

TERMINOLOGY AND ABBREVIATIONS

Archaeological resources

This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page xvi

- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

Early Stone Age

The archaeology of the Stone Age between 700 000 and 2 500 000 years ago.

Fossil

Mineralised remains of plants, animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

Heritage resources

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa;

Holocene

The most recent geological time period which commenced 10 000 years ago.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page xvii

Late Stone Age

The archaeology of the last 30 000 years associated with fully modern people.

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age between 30 000-300 000 years ago, associated with early modern humans.

Palaeontology

Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page xviii

Abbreviations	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
ECO	Environmental Control Officer
EAP	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
FSPHRA	Free State Provincial Heritage Resources Authority
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHS	Provincial Heritage Site
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page xix

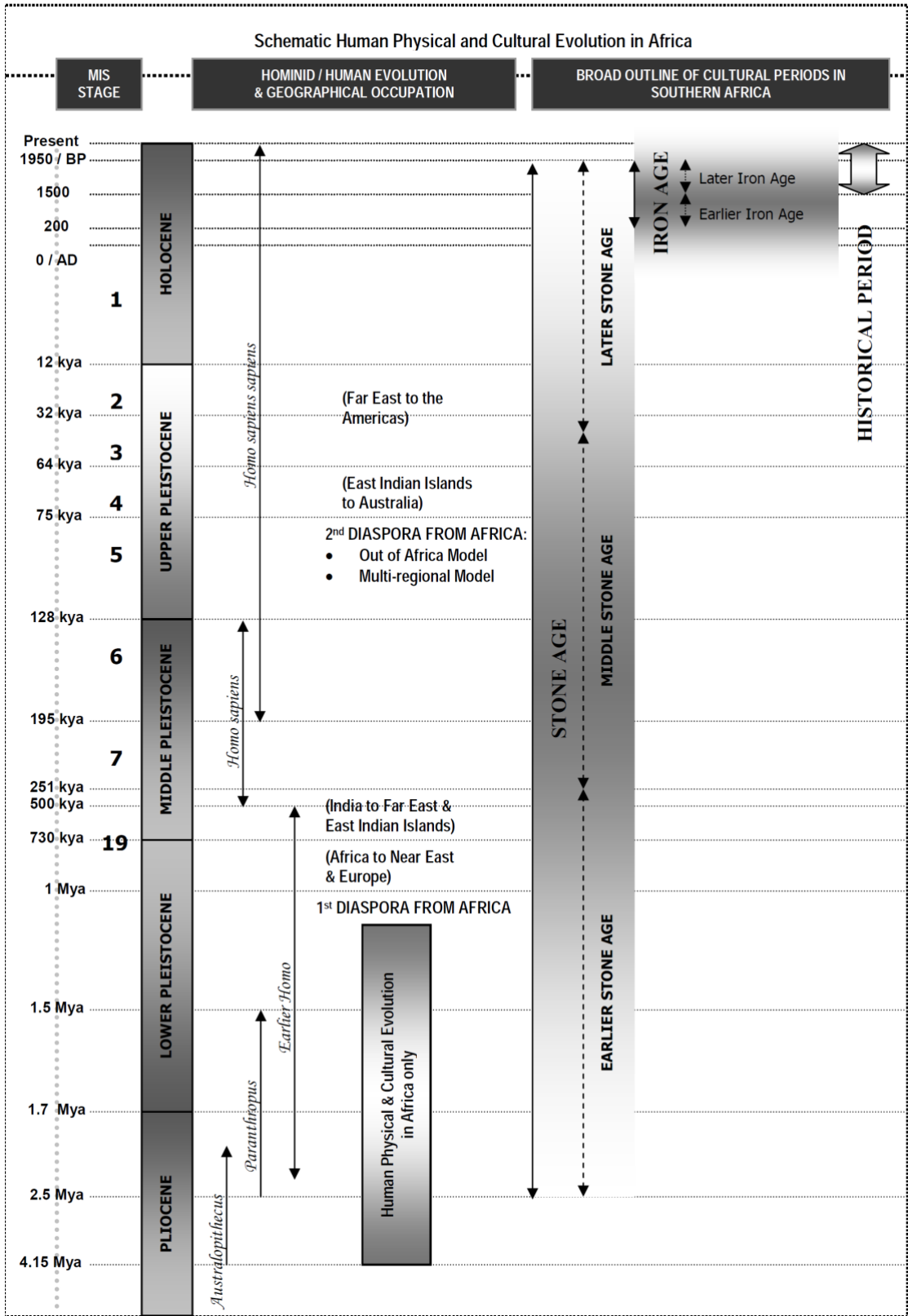


Figure 1 – Human and Cultural Timeline in Africa

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 1

1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by Environmental Impact Management Services (Pty) Ltd (EIMS) to undertake a Heritage Impact Assessment (HIA) for the proposed Tetra 4 PR Extension for the Exploration Rights within the Production Right (12/4/1/07/2/2) for Tetra 4. On 79 farm portions near the towns of Theunissen and Winburg in the south and Odendaalsrus and Allanridge in the north. within the Lejweleputswa District Municipality, Free State Province.

1.1 Scope of the Study

The aim of the study is to identify heritage sites and finds that may occur in the proposed project area and propose the appropriate management measures based on their heritage significance and project impacts. The HIA informs the BA to assist the project in managing the discovered heritage resources responsibly, to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

PGS compiled this HIA Report.

The staff at PGS has a combined experience of nearly 70 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Jessica Angel, the author of this report, is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA). She has 10 years of experience in the heritage assessment field and holds a Master's degree (MSc) in Archaeology from the University of the Witwatersrand.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 2

Wouter Fourie, the Project Coordinator and Archaeologist is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP).

1.3 Assumptions and Limitations

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and existing vegetation cover. It should be noted most of the study area was accessible for the fieldwork survey.

Fieldwork was also focussed on area that was not previously ploughed or disturbed by farming activity, thus focussing on areas with the highest potential to yield heritage resources.

Therefore, should any additional heritage features and/or objects be located or observed outside the identified heritage sensitive areas during the project activities, a heritage specialist must be contacted immediately. Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assess as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. If any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 3

1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- Government Notice (GN) 320 of the Government Gazette 45421- Procedures for assessment and minimum criteria for reporting on identified environmental themes when applying for environmental authorisation (20 March 2020);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), with specific reference to Appendix 6 of the EIA Regulations (2014, as amended); and
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).

1.4.1 Notice 320 of the Government Gazette 45421

Although minimum standards for archaeological (2007) and palaeontological (2012) assessments were published by the South African Heritage Resources Agency (SAHRA), GN 320 requires sensitivity verification for a site selected on the national web based environmental screening tool for which no specific assessment protocol related to any theme has been identified. The requirements for this GN are listed in **Table 1** and the applicable section in this report noted.

Table 1: Reporting Requirements for GN 320

GN 320	Relevant section in report	Where not applicable in this report
1.2 (a) a desktop analysis, using satellite imagery;	Section 4.3	-
1.2 (b) a preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity as identified on the national web-based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.	Section 4.1	-

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 4

GN 320	Relevant section in report	Where not applicable in this report
1.3 (a) confirms or disputes the current use of the land and environmental sensitivity as identified by the national web-based environmental screening tool;	Section 4.2.3	-
1.3 (b) contains motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity;	Section 4.1	-

1.4.2 Requirements of Appendix 6 of the NEMA EIA Regulations (as amended)

The HIA process considers the NEMA EIA Regulations (as amended) Appendix 6 requirements for specialist reports, as indicated in the table on page v of this report.

1.4.3 The National Heritage Resources Act

- Applicable sections of the NHRA include:
 - The Protection of Heritage Resources – Sections 34 to 36; and
 - Heritage Resources Management – Section 38.

The NHRA is utilised as the basis for the identification, evaluation, and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of the NHRA. This study falls under Section 38(8) and requires comment from the relevant heritage resources authority.

Section 24(2) of the NEMA requires environmental authorisation from the environmental authority for certain activities that have been identified and must undergo an EIA or Basic Assessment (BA) process. Similarly, Section 38 of the NHRA lists specific development activities that require notice to the heritage resources authority to determine if an HIA process is necessary. Approval from the heritage authority is mandatory before proceeding with the development activities.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 5

To avoid redundancy and facilitate coordination between NEMA and NHRA requirements, Section 38(8) of the NHRA states that if the development activities listed in Section 38(1) require an EIA under NEMA, a separate HIA and approval from the heritage resources authority are unnecessary. However, the environmental authority must ensure that the heritage resources authority's requirements for HIA are fulfilled and that its comments and recommendations are considered before granting environmental authorisation.

Therefore, if a NEMA EIA is required for the development activities listed under Section 38 of the NHRA, separate HIA and EIA processes may not be followed, and different decisions may not be issued under NHRA and NEMA. The EIA process will be followed, and if the heritage resources authority requires HIA, it must be conducted as one of the EIA specialist studies.

The environmental authority must ensure that the heritage resources authority's requirements for the assessment are met. A separate heritage approval may not be issued, but the environmental authority must consider the heritage resources authority's comments and recommendations before granting or refusing environmental authorisation.

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Locality

The proposed project is located within the Lejweleputswa District Municipality, Free State Province. Near the towns of Theunissen and Winburg in the south (ER94) and Odendaalsrus and Allanridge in the north (ER32) (Error! Reference source not found. and **Figure 3**).

2.1.1 Site Description

Tetra4 was granted two Exploration Rights (ER32 and ER94) in 2015/2016 which span combined area of approximately 18 700 hectares for the development of natural gas (Helium and Methane) exploration operations near the towns of

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 6

Theunissen / Winburg and Odendaalsrus / Allanridge in the Free State Province. Further to the above project history and resource tenure background, Tetra4 now wishes to consolidate the two ERs into the greater PR area. The consolidation of the ERs into the PR area will include the drilling of up to 18 exploration wells. This consolidation will incorporate ~78 farm portions near the towns of Theunissen and Winburg in the south of the PR area and Odendaalsrus and Allanridge in the north of the PR area (comprising the Exploration Rights) into the Production Right (**Figure 2** and **Figure 3**). The ER32 located north of the Production Right is approximately 7.2 km Northwest of Welkom and the ER94 to the south of the Production Right is approximately 19.2 km South of Virginia. The Production Right Extension study area and associated infrastructure is presented in Figure 3. An MPRDA Section 102 application shall be lodged to consolidate ER 32 and ER 94 (with associated exploration activities) into the Production Right and this process will also require an Environmental Authorisation application in terms of the National Environmental Management Act (Act 107 of 1998).

2.2 Technical Project Description

2.2.1 Project description

Exploration wells will be drilled and, if successful, converted into production wells. The proposed locations of exploration well drilling are presented in Figure 3. It must however be noted that these locations are not final and may need to be revised to avoid environmental sensitivities and accommodate landowner requirements. This study has followed the approach of assessing 100m buffers around the proposed well locations. Exploration drilling entails the use of a truck, trailer or skid mounted percussion or diamond drill rig to drill to varying depths (~380m to ~880m) along known fault lines in order to strike the gas reserve.

Percussion and diamond drills typically require temporary clearance of an area of 50 m x 50 m in order to set up the rig and begin drilling activities. All exploration boreholes must be drilled and cased in accordance with applicable international standards and best practice guidelines¹, and will be sealed with a combination of

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 7

casing and grouting to ensure vertical isolation of the gas from both the surrounding geology and hydrological regime. In addition to the drill rig, lined sumps or storage tanks will be required to store and recirculate water for the drilling process. A maximum of 3000 litres per day is required for drilling purposes and will be sourced from the municipality.

In the event that an exploration borehole proves unsuccessful it will be sealed and cased (in accordance with the EMPr) and the area rehabilitated. In the event that an exploration borehole proves successful it will be converted into a production well (following a separate EA process to connect via gas gathering pipelines). The drilling of exploration boreholes is a temporary and short-lived activity and the equipment to be used during drilling activities includes a truck/trailer or skid mounted diamond drill rig, excavator, dozer, grader water cart, light motor vehicle for transport of personnel and chemical toilets.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 8

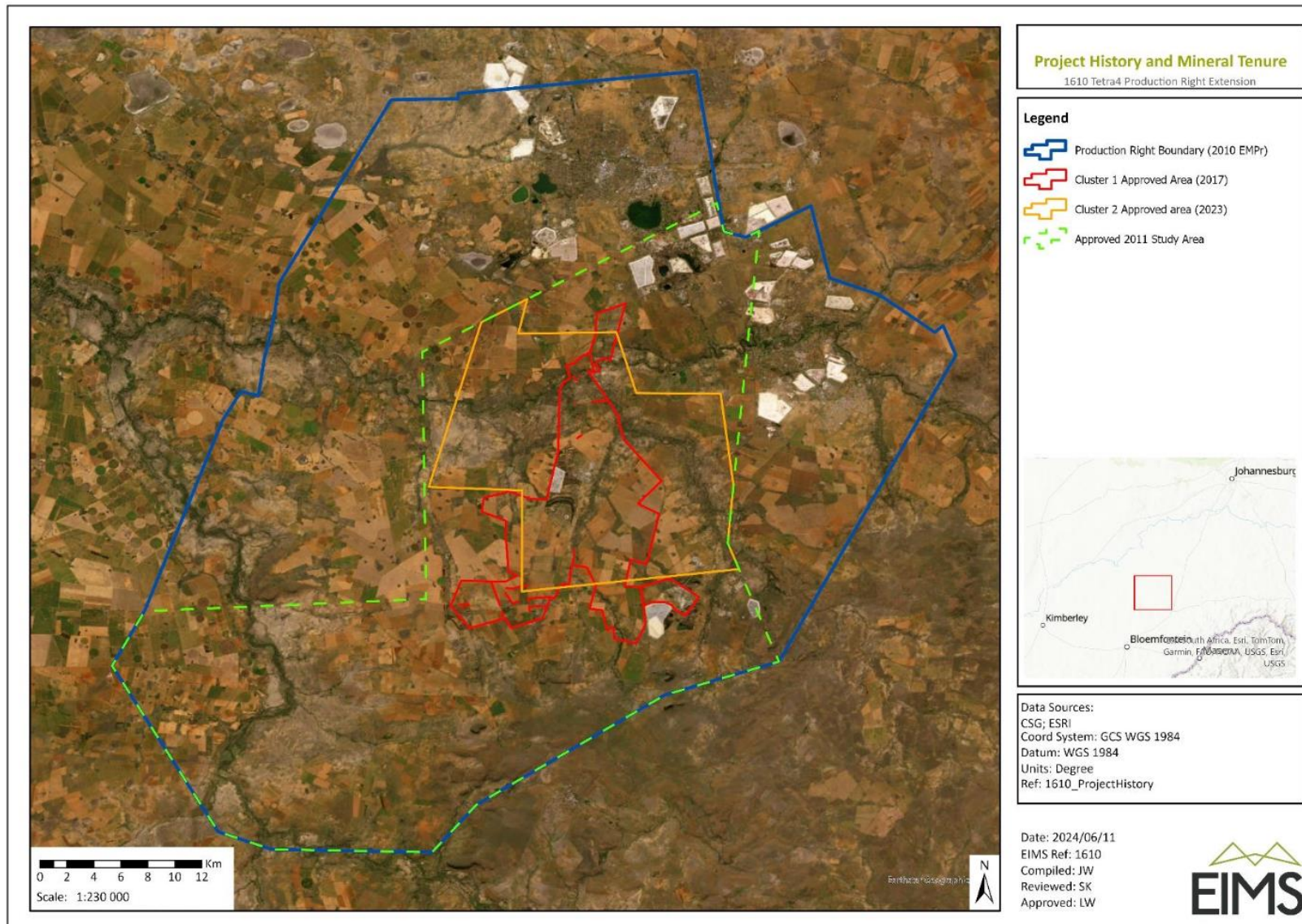
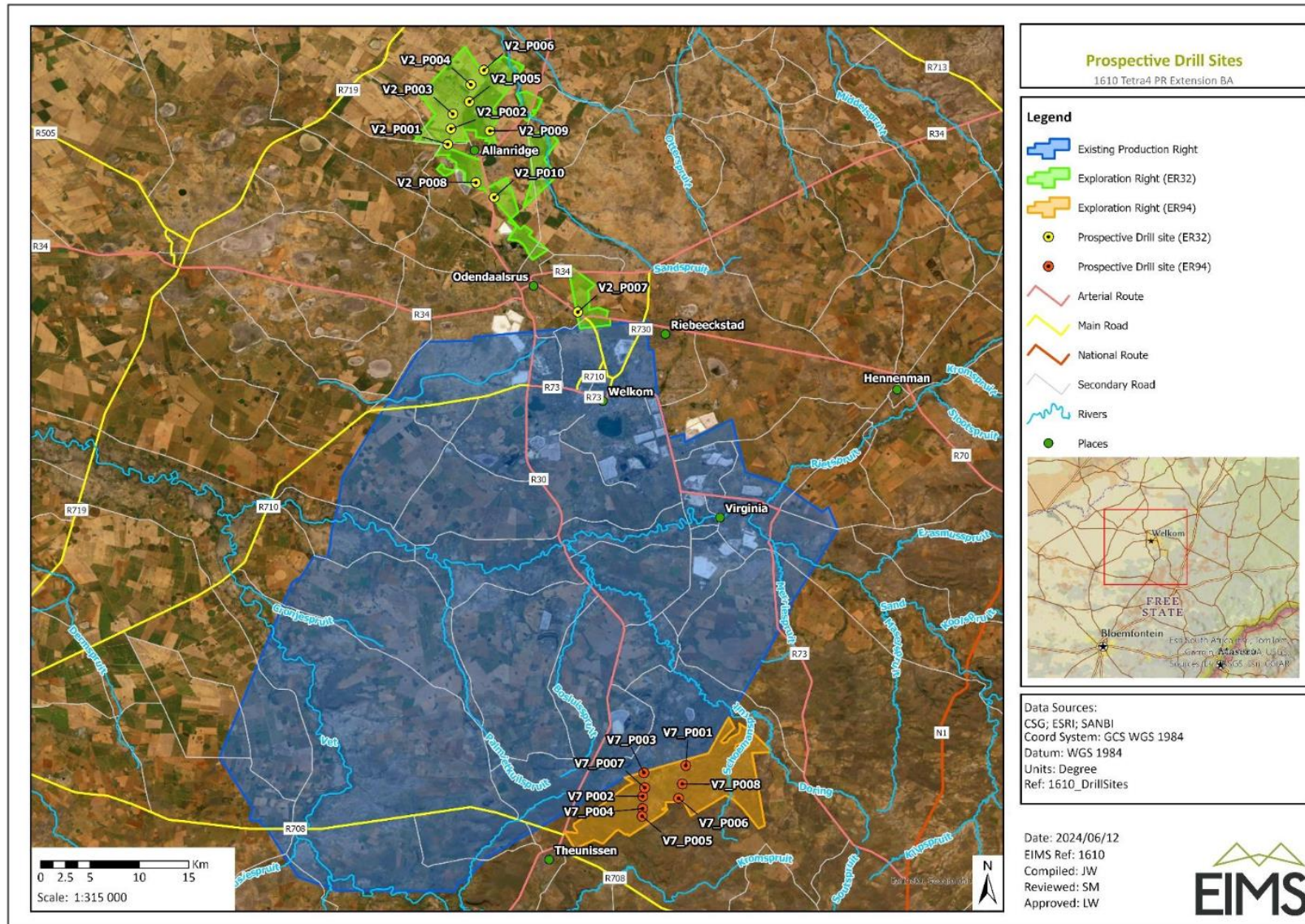


Figure 2 – Project history and mineral tenure.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 9



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 10

2.2.2 Scope of Work

The aims of the HIA are to firstly outline the findings of the desktop studies in relation to the overall exploration right area and secondly to identify heritage sites and finds that occur in the drilling areas currently proposed. The HIA informs the EIA in the development of a comprehensive EMPr to assist the development process in responsibly managing the identified heritage resources, to protect, preserve and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

3 ASSESSMENT METHODOLOGY

The section below outlines the assessment methodologies utilised in the study.

3.1 Methodology for Assessing Heritage Site Significance.

This HIA report was compiled by PGS for the proposed Tetra 4 PR Extension for the Exploration Rights within the Production Right (12/4/1/07/2/2) for Tetra 4. The applicable maps, tables and figures are included, as stipulated in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (No. 107 of 1998). The HIA process consists of three steps:

Step I – Literature Review and initial site analysis: The background information to the field survey relies greatly on the Heritage Background Research which was undertaken through archival research and evaluation of satellite imagery and topographical maps of the study area.

Step II – Physical Survey: A physical survey was conducted by vehicle and pedestrian access through the proposed project area by two qualified heritage specialists (4th – 6th June 2024), aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

Step III – The final step involved the recording and documentation of relevant heritage resources identified in the physical survey, the assessment of these

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 11

resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites is based on four 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)
 - Low - <10/50m²
 - Medium - 10-50/50m²
 - High - >50/50m²
- Uniqueness; and
- Potential to answer present research questions.

Impacts on these sites by the development will be evaluated as follows:

3.1.1 Site Significance

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation, considering the grading system approved by SAHRA for archaeological impact assessments. The updated classification and rating system, as developed by Heritage Western Cape (2016), is implemented in this report.

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (**Table 2** and

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 12

Table 3).

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 13

Table 2: Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an	Low Significance

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 14

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
		HIA or permit application) is not sufficient, further recording or even mitigation may be required.	
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 15

Table 3: Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less	Medium Significance

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 16

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
	significant in the context of a townscape, neighbourhood, settlement or community.	stringent protection than Grade IIIA buildings and sites at local level.	
IIIC	Such a resource is of contributing significance to the environs. These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by HWC for structures in this category if they are older than 60 years.	No research potential or other cultural significance

3.2 Methodology used in determining the significance of environmental impacts

The methodology used to determine the environmental impact significance was provided by EIMS and is explained in **Appendix A**.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 17

4 CURRENT STATUS QUO

4.1 Site Description

The study area's vegetation is characterised by agricultural activity and open grasslands.

In terms of region's vegetation for ER94, the study area is characterised by patches of Winburg Grassy shrubland and Bloemfontein Karroid Shrubland, but the area is predominantly the Central Freestate Grassland. With undulating plains supporting short grassland, in natural condition dominated by *Themeda triandra* while *Eragrostis curvula* and *e. chloromelas* become dominant in degraded habitats. Dwarf karoo bushes established in severely degraded clayey bottomlands. Overgrazed and trampled low-lying areas with heavy clayey soils are prone to *Acacia karroo* encroachment (Mucina and Rutherford, 2006).

In terms of region's vegetation for ER94, the study area is characterised by patches of Highveld Alluvial Vegetation and Western Freestate Clay Grassland, but is predominantly Vaal-Vet Sandy Grassland. With plains-dominated landscape with some scattered, slightly irregular undulating plains and hills. Mainly low-tussock grasslands with and abundant karroid element. Dominance of *Themeda triandra* is an important feature of this vegetation unit. Locally low cover of *T. triandra* and the associated increase in *Eilonurus muticus*, *Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and erratic rainfall (Mucina and Rutherford, 2006).

Overall, the accessibility of the project footprint area was possible. Some areas were fenced off with limited access. These areas were generally in ER32 in areas which were ploughed with no heritage features depicted on the first edition maps. Several photographs below provide general views of the study area and the landscape within which it is located.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 18



Figure 4 – View of the grasslands at ER95 V7 P006



Figure 5 – View of the general vegetation at ER94 V7 P002



Figure 6 – View of recently harvested crops at ER32 V2 P002



Figure 7 – View of the general environment at ER32 V2 P008

4.2 Overview of the study area and surrounding landscape

The high-level archival research focused on available information sources that were used to compile a general background history of the study area and surrounds.

The Free State has a rich archaeological and historical history going back millions of years and includes significant aspects such as Later Stone Age rock art, Battlefields and Iron Age stonewalled enclosures. The general surroundings of the study area became a melting pot of contact and conflict as it represents one of many frontiers where San hunter-gatherers, Nguni and Sotho-Tswana agro-pastoralists, Dutch Voortrekkers and British Colonists all came together. The

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 19

ravages of war also swept across these plains, and in particular the South African War (1899-1902) as well as the Boer Rebellion (1914-1915).

The archaeological history of the area can broadly be divided into a Stone Age, Iron Age and Historic Period. Both the Stone and Iron Ages form part of what is referred to as the Pre-Colonial Period (Prehistoric Period) whereas the Historic Period is referred to as the Colonial Period (Historic Period) (refer Figure 1).

In the table below a detailed archaeological and historical overview of the study area and surrounding landscape is presented in a chronological manner. This overview is based on intensive archival and literature research and whenever possible, the relative distances between the study area and mentioned sites, features and events are provided.

It must be noted that such an overview, which is based on available literature and archival research, would necessarily reflect a bias toward a traditional white history of the region as this would have been the focus of publications and archival documents during the last 150 years.

Table 4: Archaeological and Historical Overview of the Study Area and Surrounding Landscape

DATE	DESCRIPTION
The Study Area during the Stone Age	
Very little is known about the Stone Age archaeology of the study area and its immediate surroundings. In the wider surroundings, probably the most significant Stone Age is at Florisbad, located roughly 78 km south-west of the present study area. Closer to the study area, a number of Middle and Later Stone Age material in associated with mammal fossil remains have been identified in erosion gulleys along the Sand, Doring and Vet Rivers between Virginia and Theunissen (De Ruiter <i>et. al.</i> 2011).	
2.5 million to 250 000 years ago	The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 20

	No information regarding ESA sites from the study area and surroundings was found.
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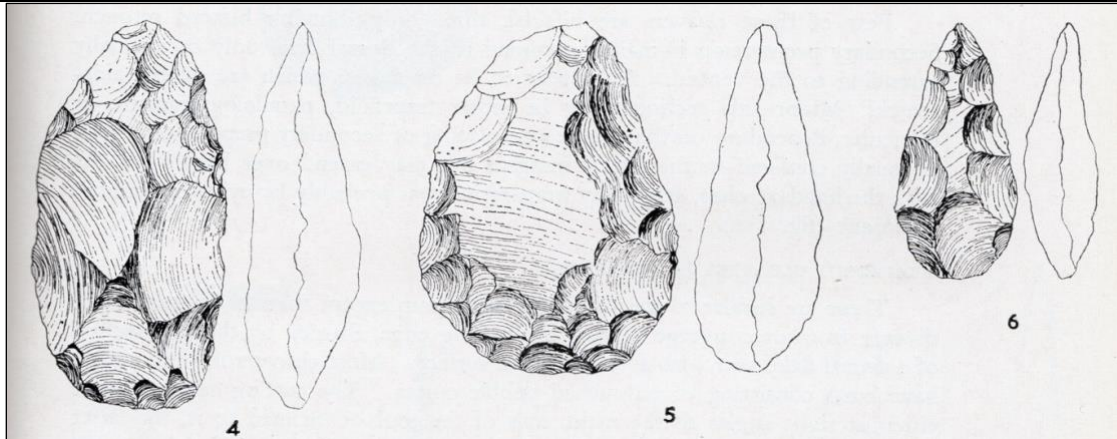


Figure 8 – Example of Early Stone Age Later Acheulian handaxes. These handaxes were identified at Blaaubank near Rooiberg. Cropped section of an illustration published in Mason (1962:199).

>250 000 to 40 000 years ago	<p>The Middle Stone Age (MSA) is associated with flakes, points and blades manufactured by means of the prepared core technique. This phase is furthermore associated with modern humans and complex cognition (Wadley, 2013).</p> <p>During research fieldwork by the National Museum in Bloemfontein, ten sites were recorded where Middle Stone Age and/or Later Stone Age lithics were identified in association with mammal fossil remains from erosion gulleys along the Sand, Vet and Doring Rivers (De Ruiter <i>et. al.</i> 2011). While almost all of these sites are located within a distance of 20 km of the present study area, one site is located immediately adjacent to the study area. This site is named Kalkoenkrans 225 and is located no more than 500 m north-east of the study area.</p> <p>During the fieldwork undertaken by Birkholtz (2017) a Middle Stone Age site was identified on the northern bank of the Sand River.</p>
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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 21



Figure 9 – Photograph of the archaeological field survey as published in De Ruiter et. al. (2011).

40 000 years ago to c. 1800s	<p>The Later Stone Age (LSA) is the third archaeological phase identified and is characterised by an abundance of very small stone tools known as microliths as well many rock art sites across the country. This period is associated with hunter-gatherers (San) as well as early pastoralists (Khoekhoe) and lasted up until - and in many cases a considerable number of years after – the arrival of Iron Age and European communities.</p> <p>Apart from the occurrence of Later Stone Age lithics along the Sand, Vet and Doring Rivers (see above), no other Later Stone Age sites are known from the surroundings of the study area. Similarly, no known rock art sites are known from the study area or its wider surroundings.</p>
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The Study Area during the Iron Age

The arrival of early farming communities during the first millennium, heralded in the start of the Iron Age for South Africa. The Iron Age is that period in South Africa's archaeological history associated with pre-colonial farming communities associated with agricultural and pastoralist farming activities, metal working, cultural customs such as lobola as well as the tangible representation of the significance of cattle imprinted on their settlement layouts (known as the Central Cattle Pattern) (Huffman, 2007).

According to the distribution map for Iron Age settlements on the Southern Highveld as published in Maggs (1976), the study area is located to the west of the known distribution of such Late Iron Age sites. It is therefore unlikely for any Late Iron Age sites to be located within the study area or its immediate surroundings. This surmise is largely supported by the distribution maps as published by Huffman (2007), albeit these latter distribution maps (which are based on known archaeological information) indicate that the study area is located very close to the periphery of two Iron Age facies. For the sake of completeness, these two Iron Age facies, known as Thabeng and Makgwareng, will be presented here.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 22

AD 1700 – AD 1840	<p>The Thabeng facies of the Moloko Branch of the Urewe Tradition is one of the facies identified within the study area. The decoration on the ceramics associated with this facies is characterised by incised triangles, coloured chevrons and arcades. The Tlhaping at Dithakong, Rolong at Platberg and the Kubung from the Free State form a Southwestern Sotho-Tswana cluster that is associated with this Thabeng facies pottery and Type Z settlement layouts (Huffman, 2007).</p> <p>The Type Z settlements are one of the Late Iron Age stonewalled settlement types identified by Tim Maggs during his extensive archaeological research project on the Iron Age of the southern Highveld, which includes the present study area (Maggs, 1976). These sites are characterised by large primary enclosures enclosed by a 'discontinuous ring' of characteristic bilobial dwellings. Each of these bilobial dwellings comprises a hut at its front with a semicircular courtyard at the back. With the area in front of the hut enclosed by a low stone wall and the courtyard at the back similarly enclosed by a smaller enclosure, the layout plan of these huts comprise two lobes, one larger than the other. The huts are defined by a ring of upright stones and are usually paved with flat stones. Unlike Type V settlements (see below), corbelled hut are rarely associated with these Type Z settlements, and appear to be the result of contact with the Type V settlements located to the east. While a number of Type Z sites are located within the study area, one of the more prominent ones is OXF1, located roughly 34.7 km east-by-northeast of the present study area and a short distance north-west of the town of Ventersburg. This site was excavated by Tim Maggs during the 1970s as part of his overall research project alluded to above (Maggs, 1976).</p> <p>In his conclusions on the history of his entire study area, Maggs (1976:317) states that “...the conclusion seems inescapable that the Kubung were the builders of Type Z. This conclusion could be put forward on the typological evidence alone, for the Kubung are the only known off-shoot of the Rolong to have settled in our area, and the Type Z industry was clearly the work of a group related to the Rolong.”</p>
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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 23

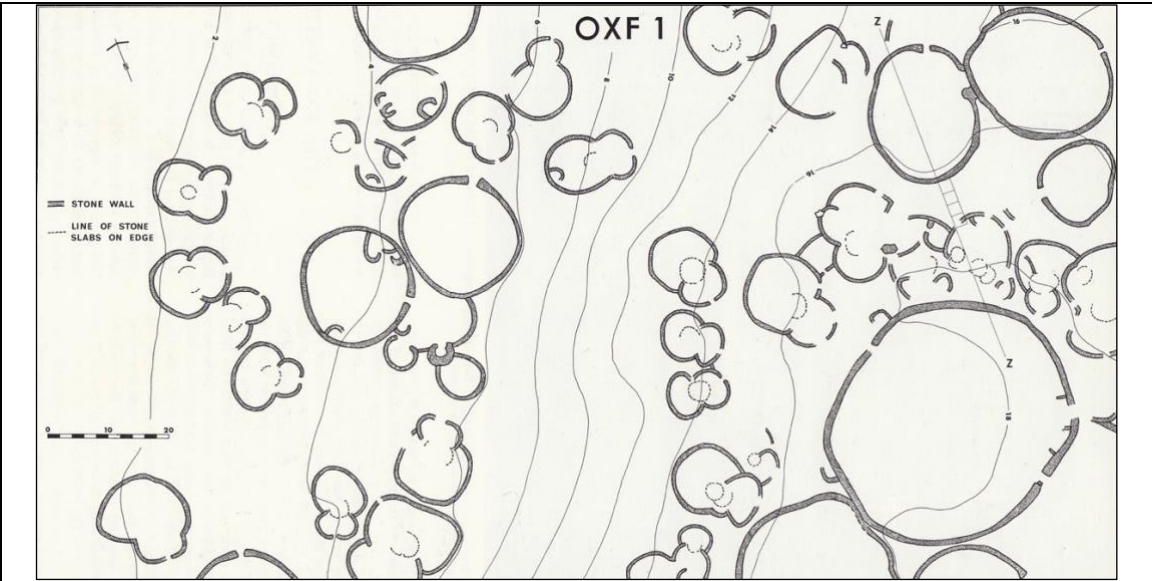


Figure 10 - This plan depicts the settlement layout of a typical Type Z site, and was recorded at site OXF 1 (Maggs, 1976:233).

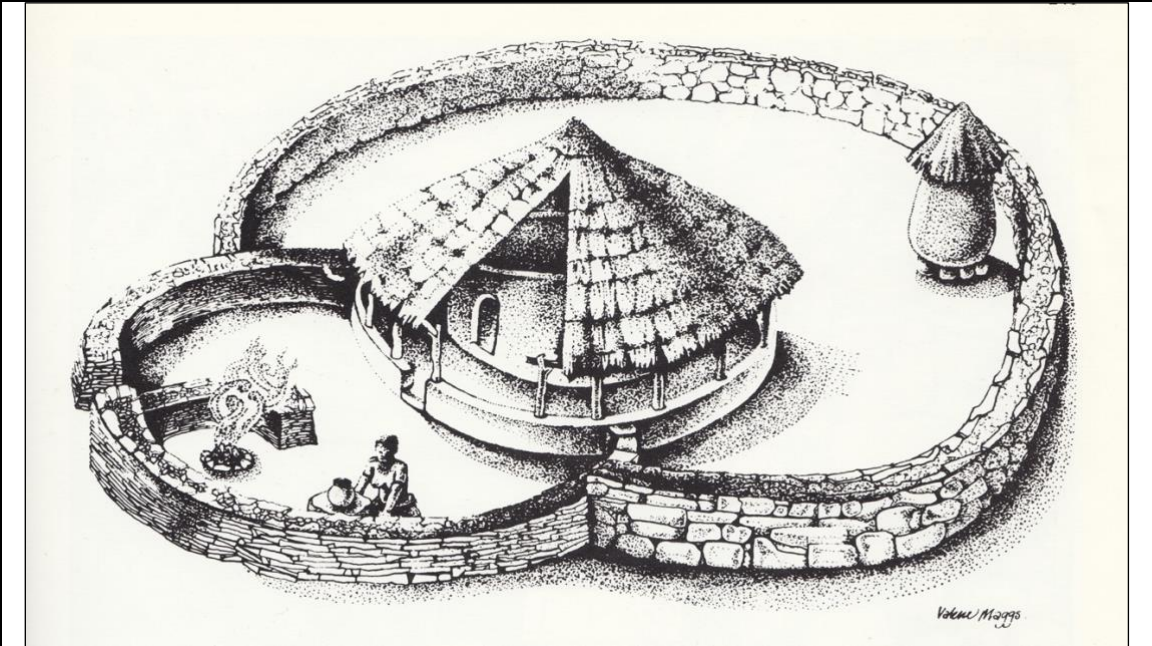


Figure 11 – Artist's impression of a bilobial dwelling at site OXF 1. These bilobial dwellings represent a characteristic element of Type Z settlements (Maggs, 1976:241).

AD 1700 – AD 1820	<p>The Makgwareng facies of the Blackburn Branch of the Urewe Ceramic Tradition represents the next known Iron Age period within the surroundings of the study area. The decoration on the ceramics from this facies is characterised by finely stamped triangles, rim notching and appliqué (Huffman, 2007).</p> <p>This facies developed from Ntsuanatsatsi south of the Vaal River and can be associated with the Type V stone walling settlement type (Huffman, 2007), the name of which is derived from Vegkop (Maggs, 1976). Van Riet Lowe (1927) was one of the first to record these</p>
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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 24

structures. Dreyer (1990) also conducted excavations on Type V Late Iron Age stonewalled settlements located a short distance south-west of Winburg.

The Type V settlements comprise a core of cattle enclosures surrounded by beehive huts. Corbelled stone huts are associated with this walling type, and can be seen as characteristic. They are low stone huts located at the edge of the cattle enclosures and were where the boys herding the cattle often lived (Huffman 2007). As suggested by Huffman (2007), the corbelled huts were in fact beehive huts made of stone rather than grass and reeds. Furthermore, the presence of beehive huts at these sites necessarily indicates a Nguni association or origin with these settlements.

Based in information presently available, the best known site of this type found within the surroundings of the study area, comprises a so-called “Early Sotho Settlement, Waterval, Sandrivierhoogte” that was originally declared a National Monument and which is now registered as a Provincial Heritage Site. The site is located 27.3 km north east of the present study area (ER94) and 58 km south east from ER 32. The site was proclaimed a national monument by virtue of a notice in the Government Gazette on 17 December 1982. In the declaration, the site is described as a ‘Leghoya Village’ comprising corbelled huts and stonewalls. The site has since been declared a Provincial Heritage Site in terms of the National Heritage Resources Act (www.sahra.org.za).

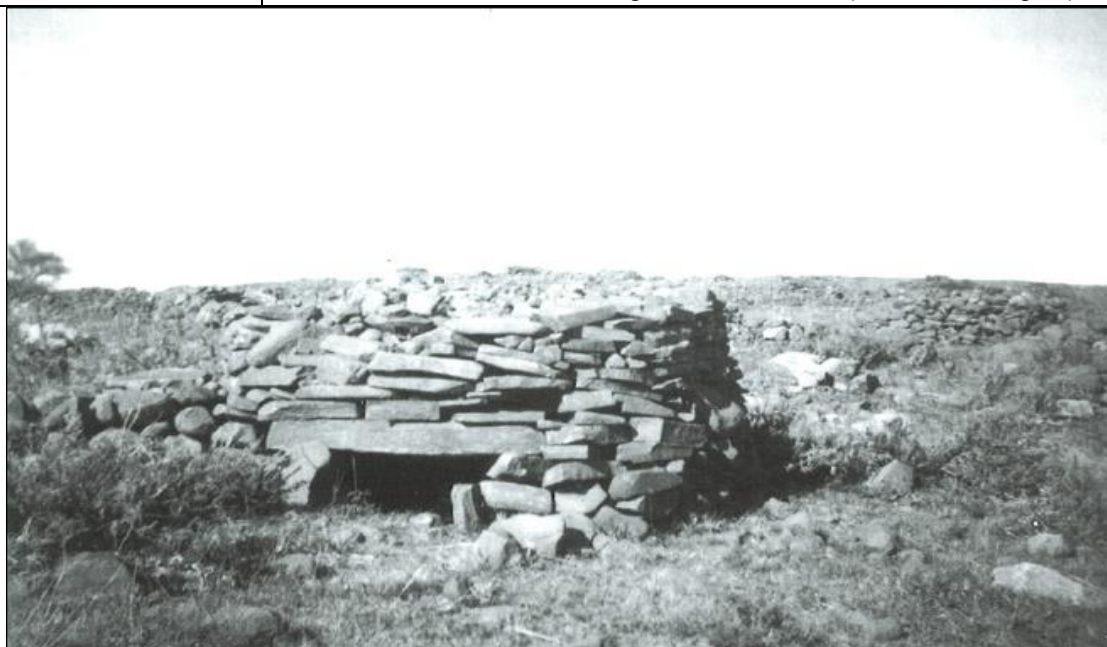


Figure 12 – Corbelled stone huts associated with a Type V settlement (Huffman, 2007:39).

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 25

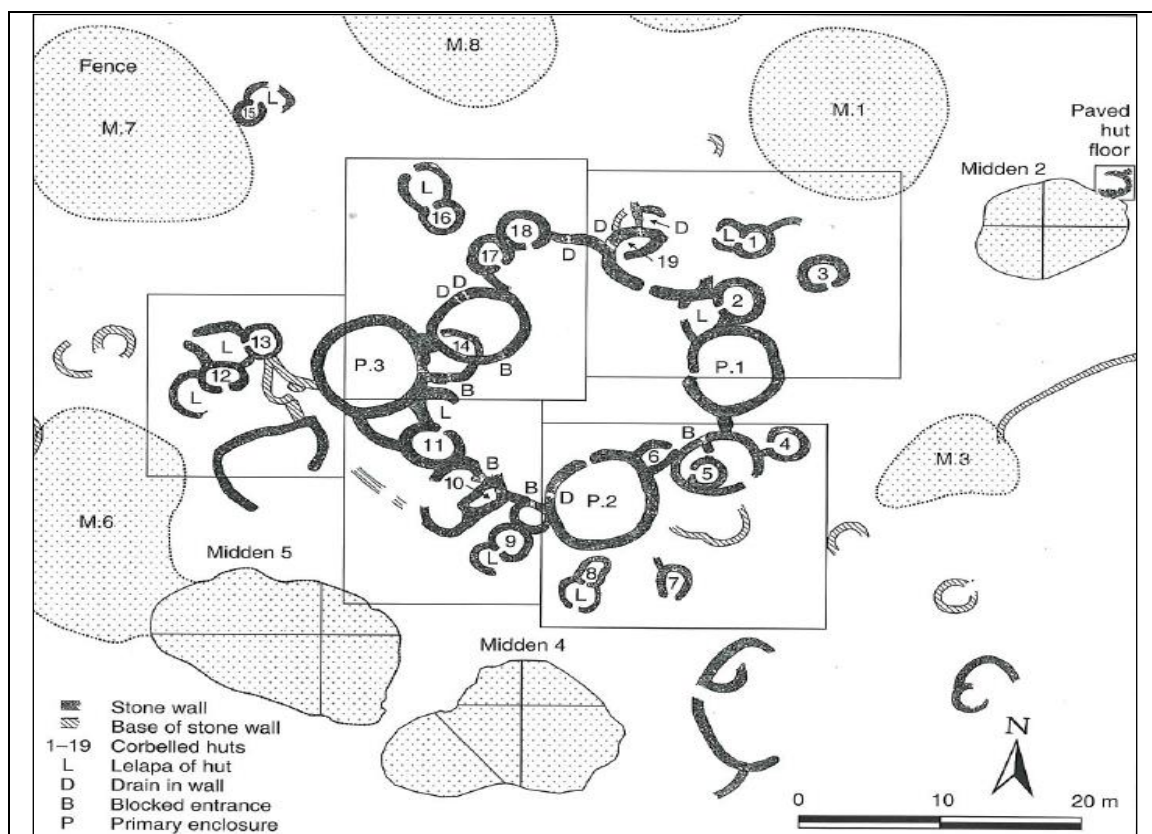


Figure 13 – Layout of a Type V Settlement (Huffman, 2007:38).

1820s

Across the Southern Highveld, this period was characterised by warfare and unrest. Known as the Mfecane, these years of upheaval originated primarily in the migration of three Nguni groups from present day Kwazulu-Natal into the present day Free State as a result of the conquests of the Zulu under King Shaka. The three Nguni groups were the Hlubi of Mpangazitha, the Ngwane of Matiwane and the Khumalo Ndebele (Matabele) of Mzilikazi.

In c. 1821, the Hlubi migrated across the Drakensberg Mountains in a westerly direction (Maggs, 1976) and attacked the Tlokwa of MaNthatisi along the banks of the Wilge River. This river has its source near Harrismith and flows into the Vaal River where the Vaal Dam is located today. While it is not exactly certain where MaNthatisi's settlements would have been located (in all likelihood further south), the Tlokwa fled westward as a result of the Hlubi attack and in turn attacked other groups in its path. This started a period of unrest and warfare, which rippled across the Highveld on both sides of the Vaal River (Legassick, 2010) (Lye and Murray, 1980).

The Ngwane followed closely on the Hlubi and further augmented the unrest and warfare along the southern Highveld (Legassick, 2010).

Although the effects of the migrations of the Hlubi and Ngwane would certainly have had a profound impact on the northern Free State, this was also the case

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 26

	<p>in terms of the Khumalo Ndebele who would have played a significant role in the surroundings of the study area during this time.</p> <p>The Khumalo Ndebele (also known as the Matabele) were also forced to leave Kwazulu-Natal and between 1823 and 1827 settled along the central Vaal River (Bergh, 1999). Mzilikazi attacked a number of Sotho-Tswana groups and settlements and incorporated them into his kingdom. As a result, his activities would have had a definite impact on the northern Free State at the time.</p>
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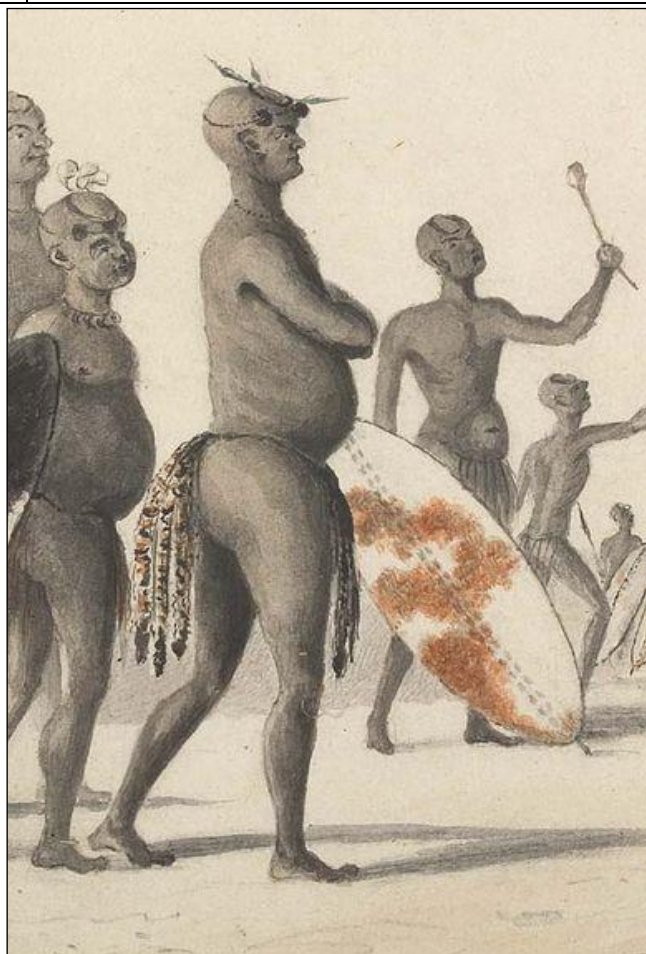


Figure 14 – King Mzilikazi of the Matabele. This illustration was made by Captain Cornwallis Harris in c. 1838 (www.sahistory.org.za).

The Early Colonial Period

The early Colonial Period within the study area and surroundings was characterised by the arrival of newcomers to the Transoraniga. The first arrivals were the Griqua followed by white Trekboers, who for the most part practiced a nomadic pastoralist way of life and were small in number. During the 1830s a mass migration of roughly 2 540 Afrikaner families (comprising approximately 12 000 individuals) from the frontier zone of the Cape Colony to the interior of Southern Africa took place. The people who took part in this Great Trek were later to be known as Voortrekkers (Visagie, 2011).

1804	The Griqua were of European and Khoikhoi descent, and although they had been present on the Orange River for some time, they only
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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 27

	established themselves permanently north of the river in 1804 when they settled near present-day Danielskuil (Reader's Digest, 1994).
Early 1800s	During the early 1800s, frequent droughts forced white farmers from the Cape Colony to move with their livestock across the Orange River to look for better grazing. Initially, these Trekboers first obtained permission from the Cape authorities before departing across the frontier, however with time, increasing numbers of Trekboers moved across this river into the Transorangia (as it became known) without any prior permission (Schoeman, 1980).
Early 1836	The first Voortrekker party of some 70 wagons crossed over the Orange River during early 1836. More groups followed and in terms of the surroundings of the study area, established themselves along the Vet River (Schoeman, 1980). Meintjies (1973) mentions that a Voortrekker party under Hendrik Potgieter arrived along the Vet River during this time. The grazing around the Vet River was not enough for all the livestock and animals of the Voortrekkers, so they split into smaller groups with one group establishing itself in May 1836 at Blaauwdrift, on the Zand River. This farm is located within the study area. Apart from this historic event, the closest known tangible evidence for the Voortrekkers to the study area was a fort which they built on the northern bank of the Zand River on the farm Du Preez Leger. The farm Du Preez Leger is located 1.7 km east of the present study area.
1837 - 1843	<p>In 1841 the town of Winburg was established on the banks of the Vet river. After the annexation of Natal by the British in 1843 and the subsequent dissolution of the Voortrekker Republic of Natalia, Winburg became the capital of the Voortrekkers in what is today known as the Free State (Erasmus, 2004). Winburg is located 34 km south-east of the study area.</p> <p>On 10 October 1968, an extensive Voortrekker Monument was opened near Winburg (www.artefacts.co.za).</p>



Figure 15 – Depiction of an ox wagon crossing a river during the Great Trek (Reader's Digest, 1994:116).

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 28

The Mid to Late Nineteenth Century	
3 February 1848	<p>The Orange River Sovereignty was proclaimed over the Transorangia by Great Britain and had its capital at the newly established town of Bloemfontein (www.wikipedia.org).</p> <p>The sovereignty came about after one-sided agreements that favoured the British Government had been reached between Great Britain on the one hand and King Moshoeshoe of the Basotho and Adam Kok III of the Griqua on the other.</p> <p>Those Voortrekkers present in the Transorangia were completely bypassed by these agreements, which led to serious dismay and disappointment amongst them. In terms of the surroundings of the study area, the response of the Voortrekkers was to force the British magistrate at Winburg, one Thomas Biddulph, out of town and proclaim the Republic of Winburg (Reader's Digest, 1994).</p>
16 January 1852	<p>On 16 January 1852 the Sand River Convention was signed between the British Government and the Transvaal Boers. The British Government was represented by British Assistant Commissioners W.S. Hogge and C.M. Owen, whereas the Transvaal Boers were under the leadership of the Voortrekker hero of Blood/Ncome River, General Andries Pretorius. This convention formally recognised the existence and independence of the Boer Republic north of the Vaal River by the British Government. As a result, this agreement allowed for the creation of a Boer Republic, namely the <i>Zuid-Afrikaansche Republiek</i> (South African Republic) (Oberholster, 1972). The <i>Zuid-Afrikaansche Republiek</i> remained in existence until the end of the South African War in 1902.</p> <p>The site where the signing of the convention took place, was declared a monument and for many years was marked by a stone cairn and plaque (Oberholster, 1972). The present condition of the monument is not known.</p> <p>The site is located near the bridge where the N1 highway passes over the Sand River.</p>
23 February 1854	<p>The Orange River Convention was signed by representatives of Great Britain and the Boers, and resulted in the proclamation of the Boer Republic of the Orange Free State. The convention was signed at Bloemfontein (www.wikipedia.org).</p> <p>As with the proclamation of the Sovereignty, the Orange River Convention was again one-sided and did not obtain the blessing or inputs of all the major role-players in the Free State. While the Voortrekkers were excluded in 1848, the signing of the Orange River Convention in 1854 did the same to the Basotho and Griqua.</p> <p>For the next 48 years, the study area fell within the boundaries of the Boer Republic of the Orange Free State.</p>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 29

	Incidentally, the Orange River Convention is sometimes referred to as the Bloemfontein Convention.
1872	<p>The town of Ventersburg was laid out on the farm Kromfontein in 1872. Kromfontein had originally belonged to one of the early Voortrekker leaders, namely Field-Cornet P.A. Venter. After his death in 1857, his son B.G. Venter allowed church services to be held in his father's homestead. The second Gereformeerde (Dopper) church north of the Orange River was also established at Kromfontein in 1859.</p> <p>The use of the farm for church services led to the establishment of a town. The new town was named after Field-Cornet P.A. Venter, and formal proclamation for Ventersburg took place in 1876 (Erasmus, 2004). Ventersburg is located BETWEEN ER32 AND ER94.</p>
1890	<p>Erasmus (2004) states that two American engineers were responsible for the original survey of sections of the proposed railway line between Bloemfontein and Johannesburg. On the farm Merriespruit they chiselled the name 'Virginia' on a boulder, presumably in honour of the American State of Virginia. When the railway line was built a few years later, the nearby railway siding was named Virginia and some years later, in 1954, the town of Virginia was also established.</p> <p>The Virginia railway siding is located 13.5 km east of the present study area. The exact position of the chiselled boulder, if it still exists today, is not presently known.</p>
Early 1890s	The railway line between Bloemfontein and Johannesburg was built during the early 1890s, and eventually reached Johannesburg during September 1891 and Pretoria in January 1892 (Schoeman, 1980). In terms of the study area, this railway line passed to its east and in this area was built from Smaldeel (present day Theunissen) to Theron, Welgelegen and Virginia.
9 November 1892 – 1899	<p>The Driekopjes Diamond Mining Company was registered. One of the founding directors of the company was the man who would become synonymous with South African diamond mining and diamonds, Sir Thomas Major Cullinan.</p> <p>The "Driekopjes" in the name of the company referred to a farm of that name north-west of Kroonstad, where diamond mining was taking place. In June 1894 the Driekopjes Diamond Mining Company also acquired an interest in the farm Welgegund from the Van Rensburg Diamond Mining Syndicate. The farm Welgegund was located NEAR the study area, and is presently known as the farm Driekoppies 422. No information could be found on this syndicate. However, the fact that the Driekopjes Company acquired an interest from the Van Rensburg syndicate, suggests that diamond prospecting and possibly mining activities had taken place within the study area before this transfer took place.</p>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 30

	A large number of diamonds were subsequently recovered from Welgegund. However all mining activities came to a halt with the South African War (1899 – 1902) (Helme, 1974).
Mid 1890s	<p>During the mid 1890s two men arrived on the farm Aandenk to undertake prospecting work. Alexander Edward King Donaldson was a prospector and his associate Herbert Hinds an engineer. They excavated an 18-meter-deep shaft and took samples from their excavations for further testing and analysis. On their return journey to England, both men died when their ship, the Drummond Castle, wrecked at Ushant off France, and with it the samples they had brought from the Free State (www.sahra.org.za) (Felstar Publishers, 1968).</p> <p>The activities of these two men laid the foundation for the discovery and development of the Free State Goldfields. The farm Aandenk is located immediately south of Allanridge today, IMMEDIATELY ADJACENT TO ER32 BOUNDARIES OF FARM KROMDRAAI 386.</p>
1899	The town of Odendaalsrust was officially established in 1899 when the Dutch Reformed Church chose the farm Kalkkuil for its new parish. The town was proclaimed a municipality in 1912. At the time, it only had about 40 houses, three shops and a hotel (Mayhew, 1982).
The South African War (1899 – 1902)	
<p>The South African War was fought between the Boer Republics of the Transvaal and Free State on the one side and Great Britain on the other, but is referred to as the South African War as the victims and participants of the war were not excluded to Britain or Boer alone.</p> <p>As will be discussed in more detail below, the march of Lord Roberts from Bloemfontein to Pretoria in May and June 1900 was especially significant in terms of the study area. In particular, the so-called Battle of Zand River (7 – 10 May 1900) was fought very close to the study area, with at least the movement of troops during the battle taking place across the study area.</p>	
13 March 1900 – 6 May 1900	<p>Bloemfontein, the capital of the Boer Republic of the Orange Free, was occupied by the British Army under Lord Roberts on 13 March 1900. The Boer Republic of the Orange Free State was renamed the Orange River Colony.</p> <p>With the Republican forces of the Transvaal and Free State retreating northwards from Bloemfontein, Lord Roberts's eyes drifted further north, where the greatest prize of the war lay waiting, Pretoria. Lord Roberts and his staff strongly believed that once the capital of the <i>Zuid-Afrikaansche Republiek</i> fell, the war would be over.</p> <p>However, the success of the British Army required all focus on the immediate front, as the land between Bloemfontein and Pretoria was bisected by a myriad of rivers, dongas and hills, all strategically significant obstacles from where the Boer forces could implement a solid defence. The Boer forces standing between Lord Roberts and Transvaal capital were estimated by British Intelligence to comprise two main groups namely a force of between 5 000 to 6 000 burghers with 18 guns</p>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 31

	<p>under General Louis Botha and a similarly large force in the surroundings of Kroonstad (Maurice & Grant, 1906).</p> <p>After departing from Bloemfontein, Lord Roberts's force was involved in a couple of successful actions on their way to Pretoria, including Brandfort (3 May 1900) and Vet River (4 - 6 May 1900). With the successful conclusion of the battle of Vet River, Lord Roberts and almost his entire army crossed over the river successfully, and by the evening of 6 May 1900 bivouacked at the small railway siding known as Smaldeel. The town of Theunissen is located here today and is roughly 12 km south of the present study area (Maurice & Grant, 1906).</p> <p>A short distance to the north lay the next, and far more daunting, obstacle on Lord Roberts's march to Pretoria, the Zand (or Sand) River. It was here, at this river, that General Louis Botha, the commanders-in-chief of the Transvaal republican forces, was determined to halt Lord Roberts's march on Pretoria.</p>
	<div data-bbox="335 846 858 1525" data-label="Image"> </div> <div data-bbox="863 846 1356 1525" data-label="Image"> </div> <p><i>Figure 16 – Lord Frederick Sleigh Roberts (left) and General Louis Botha (right). These two officers commanded the opposing forces at the Battle of Zand River (Changuion, 2001:77 & 117).</i></p>
7 – 10 May 1900	<p>On 7 May 1900 a reconnaissance of the Zand River by General Edward Hutton indicated that the northern bank of the river was held by a force of roughly 6 000 Boers supported by two heavy and eight light pieces of artillery. These estimates provided by General Hutton allowed Lord Roberts to draw up a battle plan (Maurice & Grant, 1906).</p> <p>On the 9th of May 1900, Lord Roberts moved his army forward and established his headquarters at the Welgelegen Station. The movement of the British Army under Lord Roberts from a position a short distance of the study area at Smaldeel to a position a short distance east of it, suggests</p>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 32

	<p>that the main component of Lord Roberts's force followed the railway line and in this way skirted around the study area.</p> <p>Lord Roberts's battle plan focussed on securing significant drifts that provides safe crossing of his infantry over the Zand River, and especially so Junction Drift, Merriespruit, Du Preez Leger Drift (located where the bridge on the road between Theunissen and Welkom crosses the river) and De Klerks Kraal Drift. For the purposes of this discussion, the events associated with the latter two of these drifts will be discussed in more detail below.</p> <p>On the morning of 9 May 1900, Lieutenant-Colonel Thomas William Porter with the 1s Cavalry Brigade departed from Smaldeel to reconnoitre the two drifts at Du Preez Leger and De Klerks Kraal. They were assisted in this task by Major-General J.B.B. Dickson with the 4th Cavalry Brigade. Meanwhile, at 11 am, Major-General John French with his advance guard reached Kalkoenkrans, a section of which farm is located within the present study area. At Kalkoenrkans, French received word from the reconnaissance units on the river that the Du Preez Leger Drift was not held by the enemy. Seizing the opportunity to outflank the Boer positions, French immediately ordered a squadron of the Scots Greys forward to take possession of the drift, and ordered the remainder of the 1st Cavalry Brigade to follow and assist in this task. The 4th Cavalry Brigade was left at Kalkoenkrans in support. By 15h30 that afternoon the Du Preez Leger Drift was occupied by the British force, with the De Klerks Kraal Drift was taken shortly thereafter. Incidentally, the other significant drifts on the river had also been taken with similar ease.</p> <p>On the morning of 10 May 1900, Lord Roberts's army advanced on the river. On its left flank (and the side closest to the study area) General French with the 1st Cavalry Brigade, the 4th Cavalry Brigade as well as Hutton's Mounted Infantry, crossed over the Du Preez Leger Drift from where they moved in a north-eastern direction.</p> <p>On the left centre of the front, the 3rd Cavalry Brigade and Henry's Mounted Infantry crossed over the drift at the railway line in proximity to present-day Virginia. The northern bank was occupied by 8 am that same morning.</p> <p>The crossing of the drifts further to the east was achieved with more difficulty, but the northern banks were also occupied a mere half an hour after the crossing over the Merriespruit Drift near the railway line. This meant that Lord Roberts's front comprising cavalry and mounted infantry units had successfully crossed over the Zand River early on the morning of 10 May 1900, without meeting any significant resistance. However, the fortunes of war were about to change for Lord Roberts. A patrol sent out by General French ran into a large Boer force of between 2 000 and 3 000 burghers moving down onto the centre of Lord Roberts's front at the Virginia Station. French ordered an attack by one squadron each from the 6th Inniskilling Dragoons, Scots Greys and Australian Horse</p>
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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 33

and two troops from the 6th Dragoon Guards (Carabiniers). Their attack was focussed on the centre of the advancing Boer force on a ridge located on the farm Vredes Verdrag. Suffice to say that the battle raged for some time and the outcome was not at all clear until 14h00 that afternoon when the Boers abandoned the field of battle, allowing the British to occupy the ridge and proceed forward (Maurice & Grant, 1906).

Further battles and actions took place to the east, near Junction Drift. However, by the afternoon of 10 May 1900, all the drifts had been successfully cleared and occupied to allow for the crossing of the Zand River by Lord Roberts's infantry (Maurice & Grant, 1906).



Figure 17 – Lord Roberts's infantry crossing the Zand River at the conclusion of the Battle of Zand River. This photograph was in all likelihood taken during the afternoon of 10 May 1900, after all the significant drifts across the river had been cleared by the cavalry and other units. The crossing and surrounding landscape are monitored by an observation balloon (see top right). It is not possible to identify the exact drift where this crossing took place, although the remnants of a bridge foundation structure can be seen in the river bed (Raath, 2007:351).

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 34

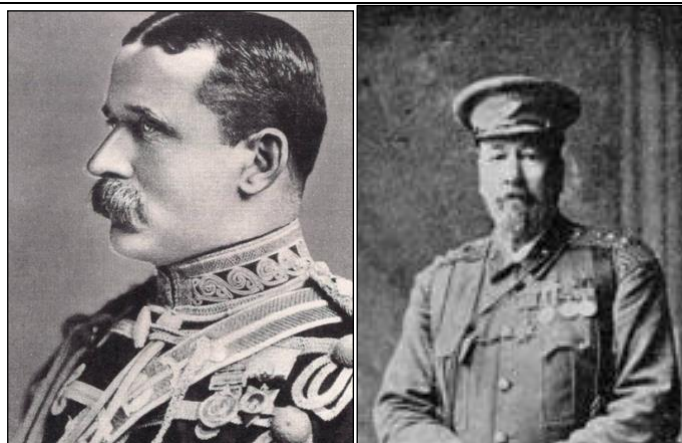


Figure 18 - Two of the British officers at the Battle of the Zand River who were closely associated with the events within the study area, namely the occupation of the Du Preez Leger Drift on 9 May 1900 as well as the crossing of the drift on the morning of 10 May 1900. General John French (left) (Changuion, 2001:77) and Colonel Thomas William Porter (www.nzetc.victoria.ac.nz).

After the fall of Pretoria on 5 June 1900 and the subsequent battles of Diamond Hill (11-12 June 1900) and Bergendal (21-27 August 1900), the Boer generals decided that the only way to proceed with the war would be the implementation of a completely different strategy, a strategy based on mobility by using smaller commandos to attack and harass the British on all fronts in what was to become known as guerrilla warfare. This style of warfare had significant successes, and extended the war for nearly another two years. However, these successes also came with significant losses as the war increasingly dragged the civilian population of the Boer Republics into the carnage of war.

No skirmishes or battles associated with the guerrilla war are known from within the study area or its immediate surroundings. This said, the study area and surroundings, as with almost the entire South Africa, experienced the effects of guerrilla warfare.

In retaliation to the new form of warfare, the British High Command devised a strategy of building extensive blockhouse lines across the country as a way of hindering the mobility of the Boer commandoes. By December 1900, points along the railway line north of Bloemfontein had been fortified with hastily constructed trenches shaded by roofs and defended by razor wire. The closest of these defensive works to the present study area was at Virginia,. Shortly thereafter, a number of key positions along the railway line north of Bloemfontein were significantly strengthened with the construction of multi-storey blockhouses.

At Virginia, for example, a double storey stone blockhouse as well as one corrugated iron blockhouse were built (Hattingh & Wessels, 1997). Lord Kitchener, in particular, also implemented a strategy that was to become known as scorched earth whereby the Boer farms were burnt to the ground and the civilian population (both white and black) remaining on

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 35

	<p>these farms forced into concentration camps. No details regarding the destruction of farms from within the study area are presently known. However, the destruction of farms during the guerrilla phase of the war would certainly have taken place within the study area as well.</p> <p>While no concentration camps existed within the study area, a surprising large number of such camps were located in the surroundings of the study area. Black concentration camps were located at Smaldeel, Virginia, Welgelegen and Winburg (Warwick, 1983). The closest white concentration camp to the study area was at Winburg, (www.angloboerwar.com).</p> <p>Untold hardship ensued in these concentration camps, and many women and children died as a result of exposure, inadequate nutrition and poor medical facilities. These camps resulted in the deaths of 27 926 white and 14 154 black people (www.sahistory.org.za).</p>
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The Early Twentieth Century (1902 – 1913)

October 1902 – November 1904	<p>In October 1902, some months after the end of the South African War, the name of the Driekopjes Diamond Mining Company was changed to the New Driekopjes Diamond Mining Company, which still had Thomas Major Cullinan as one of its directors.</p> <p>Although work at the Driekopjes Mine north-west of Kroonstad resumed on a small scale during 1903 (in all likelihood work at Welgegund also continued), all work at the mine was permanently halted by November 1904. This was due to disappointing yields and as a result the company was liquidated shortly thereafter (Helme, 1974).</p>
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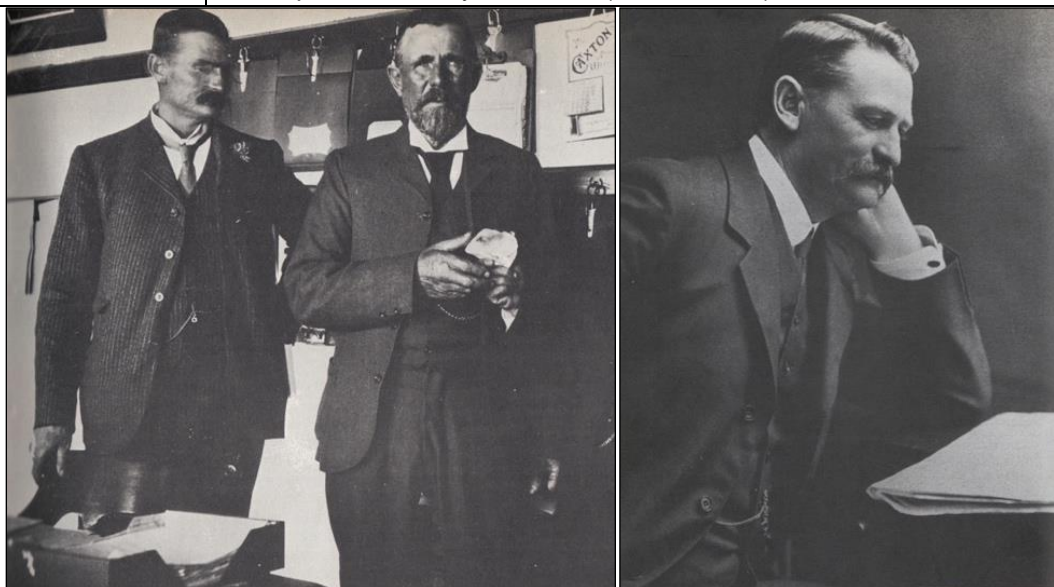



Figure 19 – Sir Thomas Major Cullinan was one of the founding directors of the Driekopjes Diamond Mining Company, which acquired an interest in the farm Welgegund in 1894. In the historic photograph on the left he is shown shortly after the discovery of the Cullinan diamond (which is held by F. Wells) at the Premier Diamond Mining Company, of which he was the chairman. The photograph on the right depicts Cullinan in 1929 (Helme, 1974: 75 & 146).

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 36

1904	<p>After the South African War, renewed efforts were made to carry out gold prospecting work in the area.</p> <p>In 1904, a prospector named Archibald Megson arrived on the farm Aandenk, and the farmer showed him the trench where Alexander Edward King Donaldson and Herbert Hinds had looked for gold. It had been more than a decade since these two pioneers had prospected the same farm. Megson opened up the old trench and continued with the excavations. At a depth of 30 meters, he found indications of gold and took a number of samples.</p> <p>Megson returned to Johannesburg with his samples and attempted to gain the interest of various mining houses and investors on the rand. However, with the rapid development and expansion of the Witwatersrand gold mining industry attracting all of the attention, no one seemed interested in possible gold discoveries so far away from Johannesburg (www.sahra.org.za).</p>
	 <p><i>Figure 20 – Archibald Megson standing in the prospecting trench on the farm Aandenk (Felstar Publications, 1968).</i></p>
August 1907	<p>In August 1907, the town of Theunissen was proclaimed. This proclamation followed on a petition by farmers living in proximity to Smaldeel Siding. The town was named in honour of Commandant Helgaardt Theunissen, who led the petition and had also been the leader of the local commando during the South African War. The town of Theunissen became a municipality in 1912 (Erasmus, 2004).</p>
1910	<p>At the time, the Driekoppies Diamond Mine at Welgegund comprised 50 claims (Johnson, 1910). Although no detailed information on these syndicates and companies could be obtained, it would appear that by this time the farm was prospected and mined by at least the Magnus Diamond Syndicate Limited as well as the Triumph Diamond Mining Company Limited. Based on this information, it would appear that the Magnus and Triumph entities in all likelihood took over at Welgegund after the liquidation of the New Driekopjes Mining Company in 1904.</p>
25 November 1911	<p>The Drie Koppie Diamond Mine Limited was formed on 25 November 1911 by W.G. Griffiths to acquire from the Magnus Diamond Syndicate Limited</p>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 37

	and the Triumph Diamond Mining Company Limited the farm Welgegund in the Winburg District (The Mining Manual and Mining Year Book, 1914). The later history of the diamond mine and mining activities at Welgegund could not be revealed by way of the desktop study.
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The Boer Rebellion (1914 – 1918)

At the end of the South African War (1899 – 1902), the Transvaal and Orange Free State republics lost their independence to the British Empire. In 1910, the Union of South Africa was established consisting of the Cape Colony, Natal, the Transvaal Colony and the Orange River Colony. General Louis Botha was appointed the Union's first prime minister and believed that South Africa's future would be best served as part of the British Commonwealth. In 1914, the South African government under General Louis Botha decided to assist Great Britain in its war with Germany. A number of Boer leaders were not happy about this turn of events, and when General Koos de la Rey was killed at a roadblock in Johannesburg, emotions reached a boiling point and rebellion broke out across the former Boer republics. This rebellion saw more than 11 000 Boer men under the leadership of some of the former Boer War generals such as De Wet, Maritz, Kemp and Beyers rebelling against the South African government and its armed forces under the leadership of former Boer War generals Louis Botha and Jan Smuts.

16 November 1914	In terms of the study area, the most notable event relating to the Boer Rebellion was the battle that occurred between the commando of General De Wet and the Government forces under the command of Colonel Enslin at the Virginia railway station on 16 November 1914. This battle followed on the defeat of De Wet's rebels at Mushroom Valley, south-east of Winburg, at the hands of General Louis Botha. De Wet and 2 000 rebels managed to escape from Mushroom Valley and followed the railway line north-eastwards towards the Virginia Station on the Zand River. De Wet wanted to cross over the railway line, and as a result, a fight ensued with Colonel Enslin's forces stationed at Virginia Station. General De Wet suffered a number of casualties and 50 of his men were also taken prisoner. After the battle, De Wet and his men followed the Zand River in a western direction and crossed over the river into the Transvaal Colony in proximity to Hoopstad (Union of South Africa, 1916).
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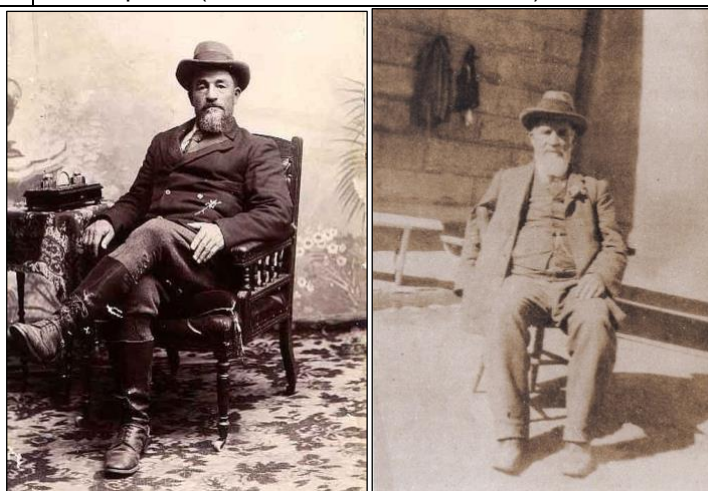


Figure 21 – The hardships experienced by General C.R. de Wet during the rebellion can be seen on these photographs. The one on the left shows De Wet shortly after the South African

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 38

War (Van Schoor, 2007) with the image on the right depicting the general in the Bloemfontein prison after his capture late in 1914 (Langner & Raath, 2014:119).

The Remainder of the Twentieth Century (1915 – Present Day)

1929 - 1933

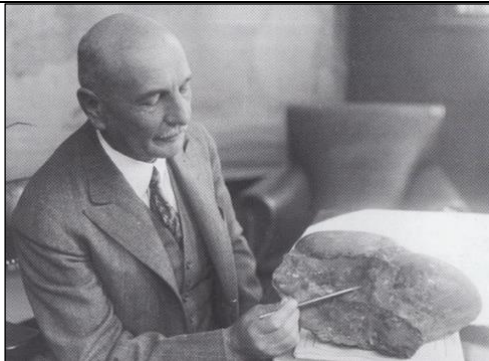
Nearly 25 years after finding the first indications of gold on the farm Aandenk, Archibald Megson finally managed to raise the interests of possible investors in Johannesburg. In 1929, during a chance encounter with Joseph Freedman, Megson found a more welcoming response. Freedman introduced the prospector to Johannesburg attorney, Emmanuel Jacobson, and his friend Allan Roberts, a dental technician. Despite being interested in what the prospector had to say, it took almost four years before Jacobson, Roberts and Megson travelled to the Free State (Shorten, 1970). Allan Roberts, who was an amateur prospector, was able to trace a conglomerate outcrop all along the farm Aandenk, and incorrectly identified it as part of the Upper Witwatersrand series. The two friends returned to Johannesburg and formed a syndicate comprising themselves, F.L. Marx, Dr. E.B. Woolf, Samuel Potter and Joseph Freedman. Freedman represented the interests of the old prospector Archibald Megson in the syndicate (Shorten, 1970).

The syndicate acquired prospecting options on 31 farms in the area and the company Wit. Extensions Limited was established by the syndicate. On 23 October 1933, drilling commenced at a point roughly 80 m from Megson's trench on the same farm Aandenk. However, by February 1935 the drilling work had to be halted due to a lack of funds without any evidence for gold-bearing reefs identified. Many years later, it was estimated that if the two friends had only managed to deepen the hole by another 400 feet, they would have become very rich men and the discoverers of the Free State goldfields. Sadly, this was not to be their fate. Allan Roberts died in such poverty in 1939 and his friends had to pay for his funeral whereas Emmanuel Jacobson had to sell all his assets to survive (Shorten, 1970). Today, the town of Allanridge (named after Allan Roberts) and a monument to the west of the road between Welkom and Bothaville are all that is left of the dreams and expectations of these two mining pioneers.




Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 39

Figure 22 - The first gold prospecting borehole in the Free State was sunk on the farm Aandenk between October 1933 and February 1935. The arrows indicate the positions of Allan Roberts and his wife (Felstar Publications, 1968:11).

1935	<p>After the failure of Wit. Extensions Limited, an agreement was reached with the Anglo-French Exploration Company to continue prospecting work at Aandenk. However, instead of continuing deeper on the same borehole, the Anglo-French Exploration Company decided to rather deflect the borehole and no results were achieved. It was later estimated that if either one of these companies had deepened the borehole by only another 400 feet, payable gold would have been discovered (Shorten, 1970).</p> <p>The agreement between Wit. Extensions Limited and Anglo-French Exploration Company came to an end and the famous geologist Dr. Hans Merensky acquired an interest in Wit. Extensions Limited. He subsequently carried out extensive prospecting work including the drilling of further boreholes. However, even these more extensive attempts by Merensky to find the Free State goldfields also failed (Shorten, 1970). Machens (2009) indicates that when news broke that the famous discoverer of inter alia South Africa's platinum reserves owned options in a company working on the Free State goldfields, the interest from investors and mining companies to this part of the Free State was further awakened.</p>
	 <p><i>Figure 23 – The famous geologist Dr. Hans Merensky, who had his role to play in the discovery of the Free State goldfields (Machens, 2009).</i></p>
1 February 1937 – April 1939	<p>After failing to discover any payable gold, Merensky sold his shares in Wit. Extensions to the Anglo American Corporation, who on 1 February 1937 established the West Rand Investment Trust. The trust also carried out an extensive drilling operation. The activities and interest of the Anglo American Corporation in this part of the Free State attracted the interest of other mining houses and investment companies, and prospecting options were taken out on a large number of farms from this area (Shorten, 1970).</p>
	<p>Despite all this interest, the first payable gold in the Free state was only identified in March 1939 during drilling operations by the African and European Investment Company on the farm Uitsig at a depth of 2 701 feet (Felstar Publishers, 1968). One month later, during April 1939, another discovery of payable gold was made on the farm St. Helena at a depth of 1 143 feet (Shorten, 1970).</p> <p>The discoveries of payable gold at Uitsig and St. Helena created significant excitement amongst mining companies and investors, and increasing</p>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 40

	numbers of prospecting options and eventually mines were acquired and developed. The Free State gold rush had begun.
1941	The first gold mining lease in the Free State was granted by the government of the Union of South Africa for the farm St. Helena in 1941, and the St. Helena Gold Mining Company was established to mine and develop the property (Felstar Publishers, 1968). A number of other gold mining companies were also established in a relatively short spate of time, including the Welkom Gold Mining Company, President Steyn Gold Mining Company and the President Brand Gold Mining Company.
	
<p><i>Figure 24 – The first mine shaft ever sunk along the Free State goldfields, namely the No. 3 Incline Shaft at the St. Helena Gold Mine (Felstar Publishers, 1968:151).</i></p>	
16 April 1946	The borehole of the Blinkpoort Gold Syndicate Limited on the boundary of the farms Geduld and Friedenheim, reached payable gold in 1946. On 16 April 1946 it was announced that the gold-bearing material retrieved at a depth of 3 922 feet from this borehole assayed at an impressive 1 252 dwts per ton which was unique in the history of golf prospecting and mining in South Africa, with averages usually in the region of 250 dwts per ton. This discovery led to further interest in the Free State goldfields (Felstar Publishers, 1968).
11 July 1946 – 15 April 1947	<p>On 11 July 1946 an application was made by the land company of Sir Ernest Oppenheimer's Anglo American Corporation, namely the South African Township and Mining and Finance Corporation, for the establishment of a new town called Welkom. After some legal and procedural processes and debate between the township applicants and its opponents (including the Odendaalsrus Town Council), the application for the establishment of the town of Welkom was approved on 15 April 1947 (Felstar Publishers, 1968).</p> <p>William Backhouse designed the town as a garden city with a commercial centre built around a town square and traffic circles rather than stop streets or traffic lights. More than a million trees were also planted (Erasmus 2004).</p>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 41



Figure 25 – This photograph of Welkom was taken during the 1960s, roughly ten years after its establishment (Felstar Publications, 1968:171).

1953	After gold was discovered in the area, Odendaalsrus became a prominent town in the Free State. A railway line was built from Allanridge to Odendaalsrus in 1953 and served the two Freddie's mines (Nienaber et al. 1982).
1954	<p>Three of the six mines surrounding Welkom had reached production stage by 1954. These were the Welkom, Western Holdings and St. Helena Mines.</p> <p>During the same year, the town of Virginia was laid out on the banks of the Zand River. As indicated elsewhere, the name of this town was derived from the nearby railway station, which in turn was named this after two American engineers working on the line in 1890 had carved the name "Virginia" on a boulder from a nearby hill (Erasmus 2004).</p>
1981 - 1987	<p>Beisa Shaft (now the Beatrix West Section) was commissioned in 1981 to exploit uranium. The sinking of Beatrix 1 and 2 Shafts (now the Beatrix South Section) were also started at the time (www.sibanyegold.co.za).</p> <p>In 1984, the Beisa Uranium Mine was closed due to the low price of uranium at the time. In 1985 the Beatrix 1 and 2 Shafts were commissioned and exploration work commenced in proximity to the Beisa Mine on the farm Kalkoenkrans (www.sibanyegold.co.za).</p> <p>The sinking of two sub-vertical shafts and a ventilation shaft commenced at the Beisa Mine in 1987. During the same year this mine was renamed the Oryx Mine (www.sibanyegold.co.za).</p>

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 42

4.2.1 *Archival and historical maps*

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were studied to identify structures, possible burial grounds or archaeological sites present in the footprint area.

Historical topographic maps (1:50 000) for various years were available for utilisation in the background study. These maps were assessed to observe the area's development and the location of possible historical structures and burial grounds. The study area was overlain on the map sheets to identify structures or graves situated within or immediately adjacent to the study area that could possibly be older than 60 years and thus protected under Section 34 and 36 of the NHRA.

For ER32: The 2726DA Skoonspruit first edition map sheet was surveyed in 1946 and drawn by the Trigonometrical Survey Office, 1947 and the 2726DC Odendaalsrus first edition was surveyed in 1954 and drawn by the Trigonometrical Survey Office, 1955

For ER94: The 2826BD Theronoskop first edition map sheet was surveyed in 1947 and drawn by the Trigonometrical Survey Office, 1951.

The Maps showed several areas of potential sensitivity, including “hut features” or homesteads, ruins and structures.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 43

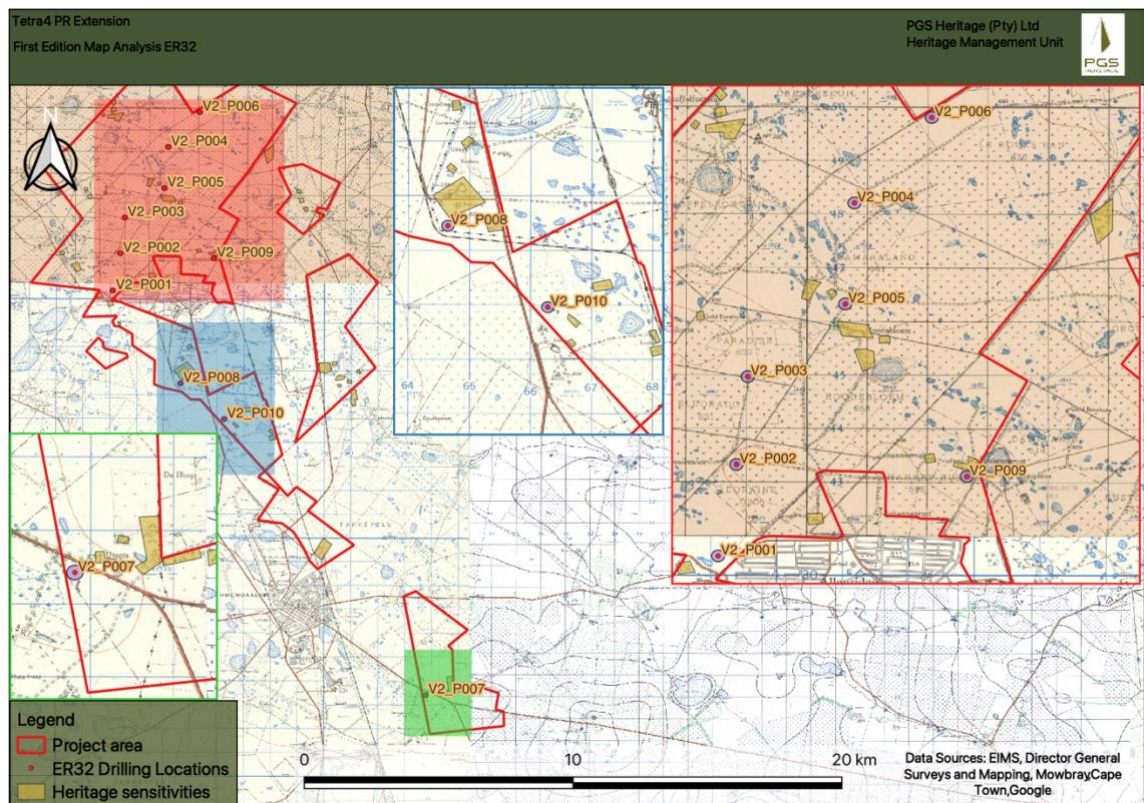


Figure 26 - First edition map showing heritage sensitive areas within ER32

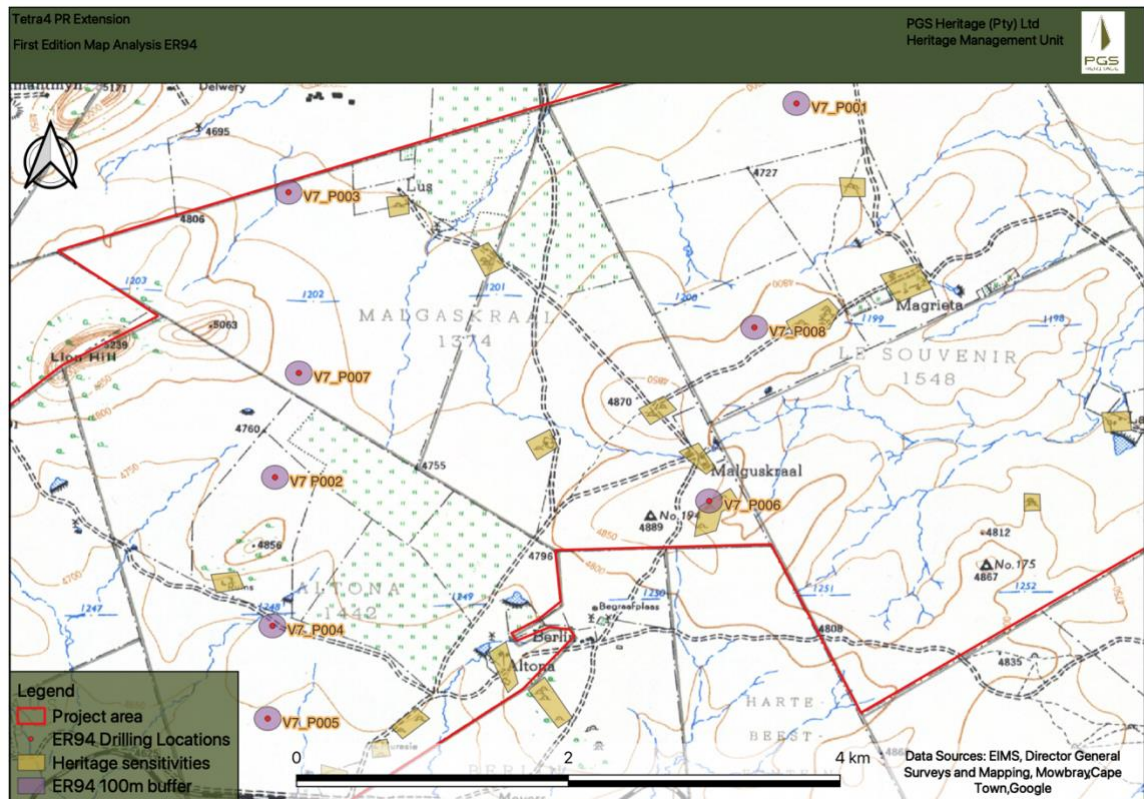


Figure 27 – First edition map showing heritage sensitive areas within ER94

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 44

4.2.2 Previous heritage impact assessment reports from the study area and surroundings

A search of the South African Heritage Resources Information System (SAHRIS) database revealed that several previous archaeological and heritage impact assessments had been undertaken within the surroundings of the study area. In each case, the results of each study are shown in bold. These previous studies are listed below in ascending chronological order:

- Birkholtz, P.D. 2017a. Heritage Impact Assessment for the Proposed Tetra4 Cluster 1 Gas Production Project. Prepared for EIMS. **The identified sites comprise the following: cemeteries, Stone Age sites, historic structures believed to be older than 100 years, historic structures believed to be older than 60 years, historical buildings of low significance, historic to recent sites with possible stillborn baby graves, possible grave sites and a site comprising a single lower grinder.**

- Birkholtz, P.D. 2017b. Heritage Audit Report for the Beatrix Mining Areas of Sibanye Gold, Between Welkom and Theunissen, Lejweleputswa District, Orange Free State Province. Prepared for Sibanye Gold (Pty Ltd). **A total of 66 heritage sites. These identified heritage sites comprise 9 graves or burial grounds, 30 historical structures believed to be older than 60 years, of which 11 are believed to be older than 100 years, and 12 archaeological (Stone Age) sites. Sites where possible unmarked (infant) graves could occur were also identified (15). These sites include the remains of black homesteads. In terms of black African tradition, stillborn babies were often buried in unmarked graves underneath or adjacent to the homesteads of their parents.**

- Dreyer, C. 2004a. First Phase Heritage/Archaeological Assessment of the Proposed Powerline Route at Phakisa Mine, Welkom, Free State. **No**

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 45

archaeological, cultural, or historical material was identified during the survey.

- Dreyer, C. 2004b. Archaeological and Historical Investigation of the Graves at the Proposed Housing Developments near Thabong, Welkom, Free State. **One grave and several other stones protruding from the ground suggested that it was an old graveyard.**

- Dreyer, C. 2005. Archaeological and Historical Investigation of the Proposed New Filling Station at Virginia, Free State. **No archaeological, cultural, or historical material was identified during the survey.**

- Dreyer, C. 2007. First Phase Archaeological and Cultural Heritage Assessment of the Proposed New MTN Cell Phone Mast at Pumlani Cemetery, Thabong, Welkom, Free State. **No archaeological, cultural or historical material was identified during the survey.**

- Coetzee, F. 2008. Cultural Heritage Survey of the Proposed Phakisa Housing Development, Welkom, Free State. **No Stone Age or Iron Age settlements, structures, features, or artefacts were recorded during the survey. One site that consisted of a mine shaft and various associated buildings and structures that probably older than 60 years were identified. No impact on the site was envisaged.**

- Dreyer, C. 2008. First Phase Archaeological and Heritage Investigation of the proposed Oppenheimer Park Golf Estate, Welkom, Free State. **No archaeological, cultural, or historical material was identified during the survey due to the surface disturbance.**

- Dreyer, C. 2011. First Phase Archaeological and Heritage Investigation of the proposed Chicken Egg Production Developments at Mooidoorns 319, Welkom, Free State. **No archaeological, cultural, or historical material**

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 46

was identified during the survey due to the surface disturbance (ploughed fields).

- Van Ryneveld, K. 2013. Phase 1 Archaeological Impact Assessment for the Lebone Solar Farm, Onviewag RE/728 and Vaalkranz 2/220, Welkom, Free State, South Africa. Prepared for Enviroworks. **The report identified five sites: colonial period farming infrastructure, farmstead, cultural landscape, structure remains and railway bridge.**

- van Schalkwyk, J. 2014. Cultural Heritage Impact Assessment Report for the Proposed SANRAL Thabong Interchange Development, Welkom Region, Free State Province. **No archaeological, cultural, or historical material was identified during the survey.**

- Fourie, W. 2021. Heritage Impact Assessment for The Proposed Harmony FSS6 Reclamation Pipeline, Welkom, Free State Province. **No archaeological, cultural, or historical material was identified during the survey.**

- Kruger, N. 2021a. Archaeological Impact Assessment (AIA) On Portions Of The Farms Bloemhoek 509, Welgelegen 382, Mooi Uitzig 352, Florida 633, Le Roux 717 And Detente 744 For The Proposed Virginia Solar Park Power Lines Ba Project, Lejweleputswa District Municipality, Free State Province. **The study noted the remains of a later Historical Period settlement (possibly a farmworkers compound of houses). The site was poorly preserved and of medium to low significance.**

- Kruger, N. 2021b. Archaeological Impact Assessment (AIA) On Portions Of The Farm Blomskraal 216 For The Proposed Virginia 1, 2 & 3 Solar Parks Eia Project, Lejweleputswa District Municipality, Free State Province. **The survey was conducted approximately 20km east of the current study area. The study noted the remains of a large Iron Age occupation,**

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 47

several Historical Period settlements, and farmsteads, and three burial sites.

- Van der Walt, J. 2013a. Archaeological Scoping Report for the Proposed Oryx Solar Energy Facility. Prepared for Savannah Environmental (Pty) Ltd. The study was conducted on Portion 2 of the farm Kalkoenkrans 225.
- Van der Walt, J. 2013b. Archaeological Impact Assessment for the Proposed Oryx Solar Energy Facility. Prepared for Savannah Environmental (Pty) Ltd. The survey was conducted on Portion 2 of the farm Kalkoenkrans 225. **The report identified three sites: informal cemetery and two derelict structures younger than 60 years and of little architectural value.**

4.2.3 Heritage screening

A heritage screening report was compiled by the Department of Environmental Affairs National Web-based Environmental Screening Tool as required by Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended. According to the heritage screening report, the ER32 project area has a Low Heritage Sensitivity with two provincial heritage sites which buffers are included within the study area. (**Figure 28**). These include the above mentioned Aandenk prospecting borehole (no drilling collars are within this buffer), and a second site which could not be identified (no drilling collars occur within this buffer). The fieldwork has confirmed the lack of heritage sites within the project area. Therefore, the screening report was accurate.

The heritage screening report, the ER32 project area has a Low Heritage sensitivity with two Provincial Heritage sites located approximately 9 km to the south of the mining rights area. These include the Preekstoelrots and an old farmhouse. The fieldwork has confirmed the location of eight Grade 3 sites within the project area. Therefore, the screening report was lacking with some sites

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 48

recovered in the area, this is in part due to the low resolution of the available data that the screening data is based on.

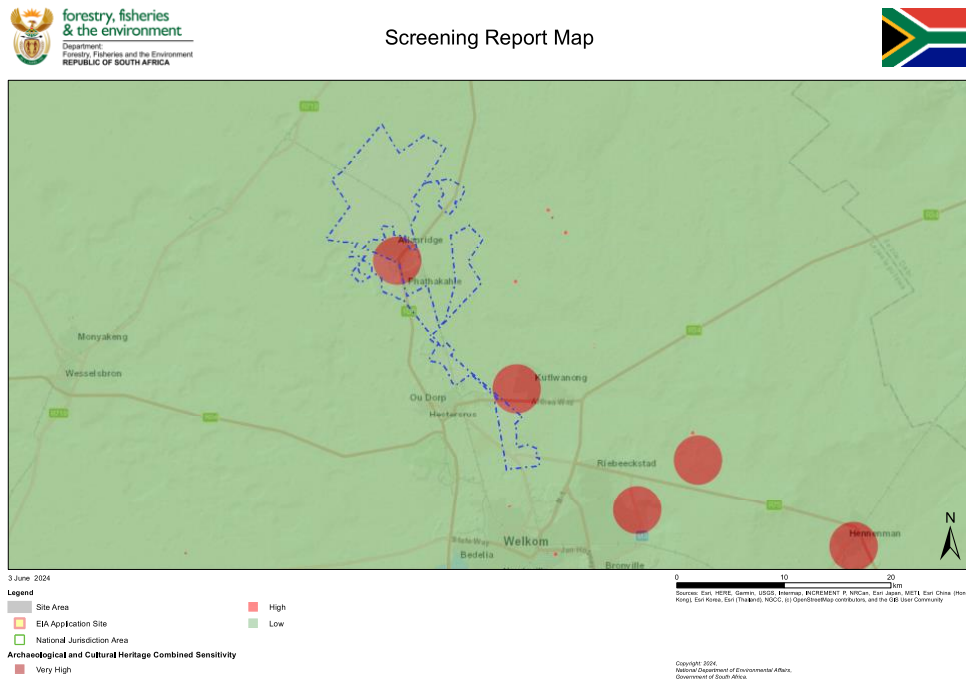
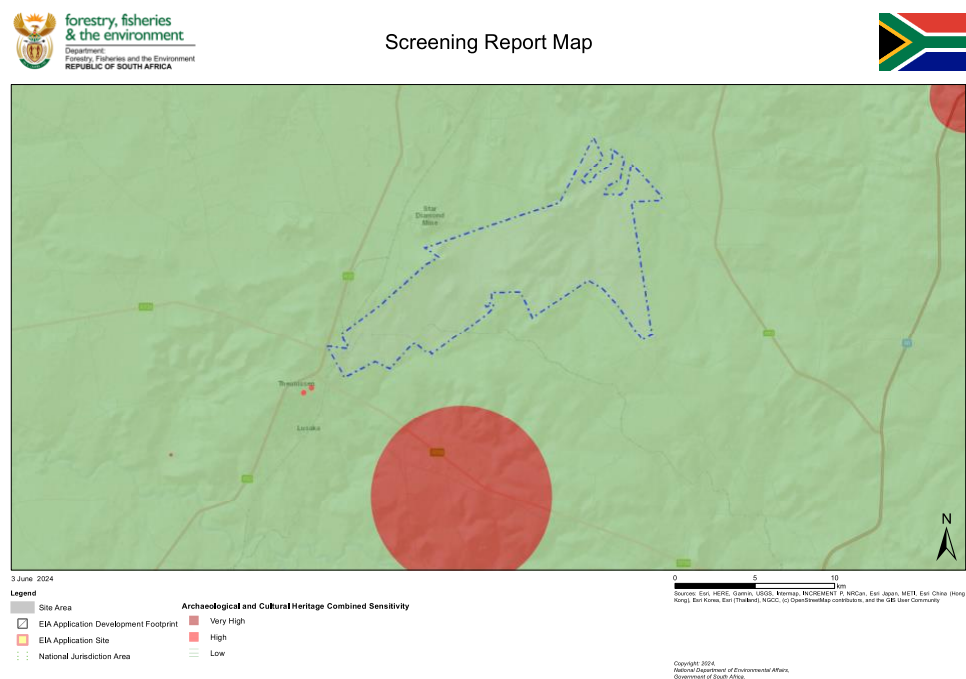


Figure 28 - Screening tool map indicating a high sensitivity rating for archaeology and heritage surrounding the ER32 study area.



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 49

Figure 29 – Screening tool map indicating a high sensitivity rating for archaeology and heritage surrounding the ER94 study area

4.2.4 Heritage sensitivity

Analysis of maps and satellite imagery enabled the identification of possible heritage sensitive areas. By superimposition and analysis, it was possible to rate these structures according to age and thus their level of protection under NHRA.

Table 5 lists the possible tangible heritage sites identified in the vicinity of the study area and the relevant legislative protection.

Table 5: Tangible heritage site in the study area.

Name	Description	Legislative protection
Archaeology	Older than 100 years	NHRA Sections 3 and 35
Structures	Possibly older than 60 years	NHRA Sections 3 and 34
Burial grounds	Graves	NHRA Sections 3 and 36 and MP Graves Act

Additionally, evaluation of satellite imagery has indicated the following areas that may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the following landform type to heritage find matrix (**Table 6**).

Table 6: Landform type to heritage find matrix

LANDFORM TYPE	HERITAGE TYPE
Crest and foot hill	LSA and MSA scatters, LIA settlements
Crest of small hills	Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads
Water holes/pans/rivers	MSA and LSA sites, LIA settlements
Farmsteads	Historical archaeological material
Ridges and drainage lines	LSA sites, LIA settlements

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 50

4.3 Fieldwork findings¹

The fieldwork was conducted on the 4th – 6th of June 2024 by a field team of PGS heritage. Their movement on site was tracked by GPS and a tracklog map can be seen in **Figure 30**.

During the fieldwork a total of **eight** heritage features and resources were identified (**Figure 32** and **Figure 33**). These consist of four cemeteries or possible grave sites (**T4-002, T4-007 and T4-008 with a possible grave at T4-004**), and **five** foundation remains of historical homesteads/kraals (**T4-001, T4-003, T4-004, T4-005 and T4-006**). See **Figure 34 - Figure 37** and the individual site descriptions as contained in **Appendix B** The field description forms were collected with ArcGIS Survey123 in field software.

Historical Structures

The stone built remains of structures **T4-001, T4-003, and T4-004**, are related to the depicted structures on the 1947 maps and most likely older than 77 years (Section 4.2.1). The remains of structures **T4-005 and T4-006** are not depicted on any maps and likely more recent.

Burial grounds and graves

T4-002 is a possible burial ground which occurs 16 m from the proposed drilling collar V7 P006 and associated with sites **T4-001, T4-003 and T4-005**. **T4-007** is located between drilling collars V7 P002 and V7 P004 and should not be impacted by drilling activities. **T4-008** occurs approximately 145 m from drilling collar V7 P008 and should not impact drilling activities. The possible grave at **T4-004** occurs approximately 200 m from drilling collar V7 P006 and should not be impacted.

¹ Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 51

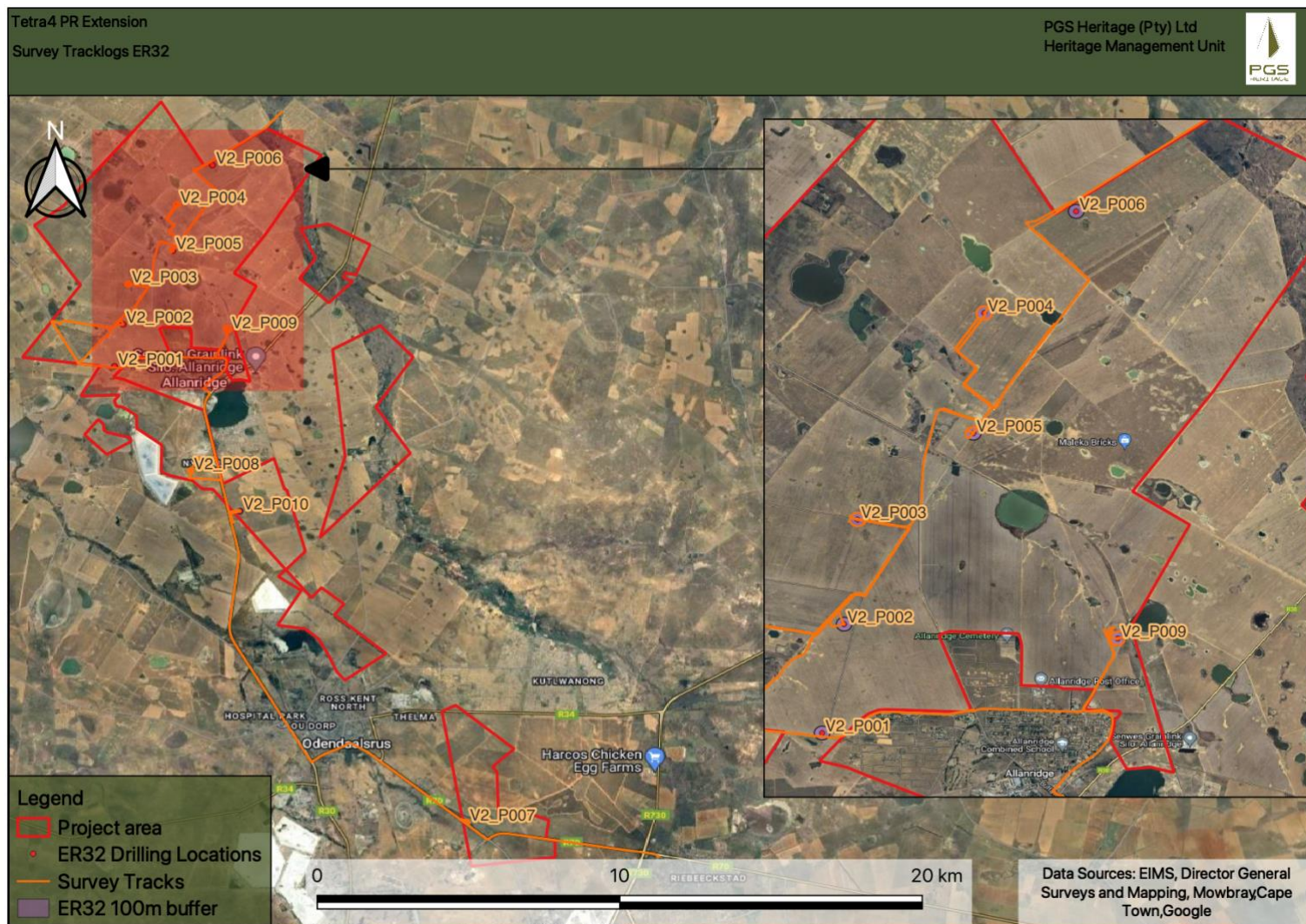


Figure 30 - Fieldwork tracklogs for ER32 (track in orange, study area in red)

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 52

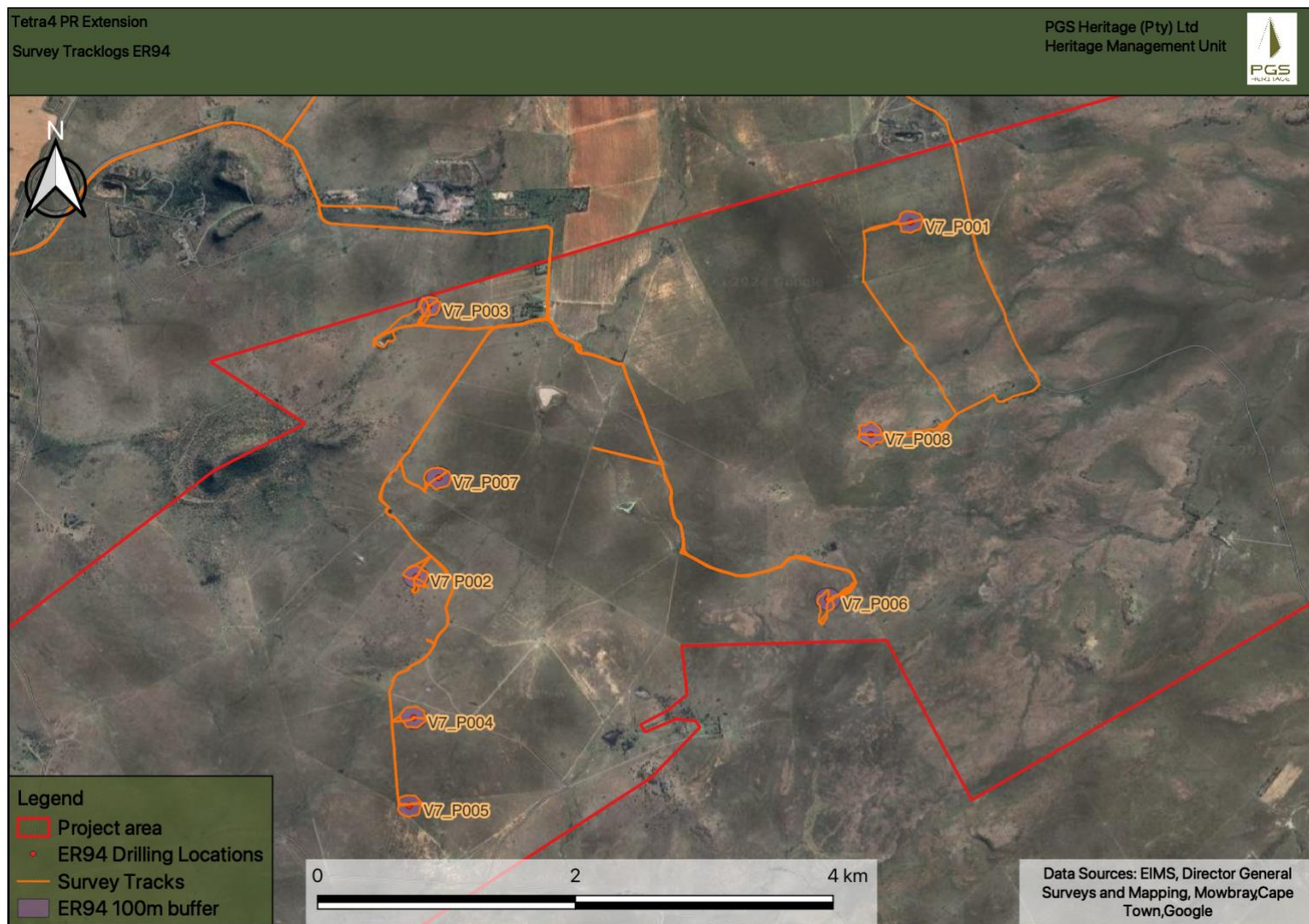


Figure 31 – Fieldwork tracklogs for ER94 (track in orange, study area in red)

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 53

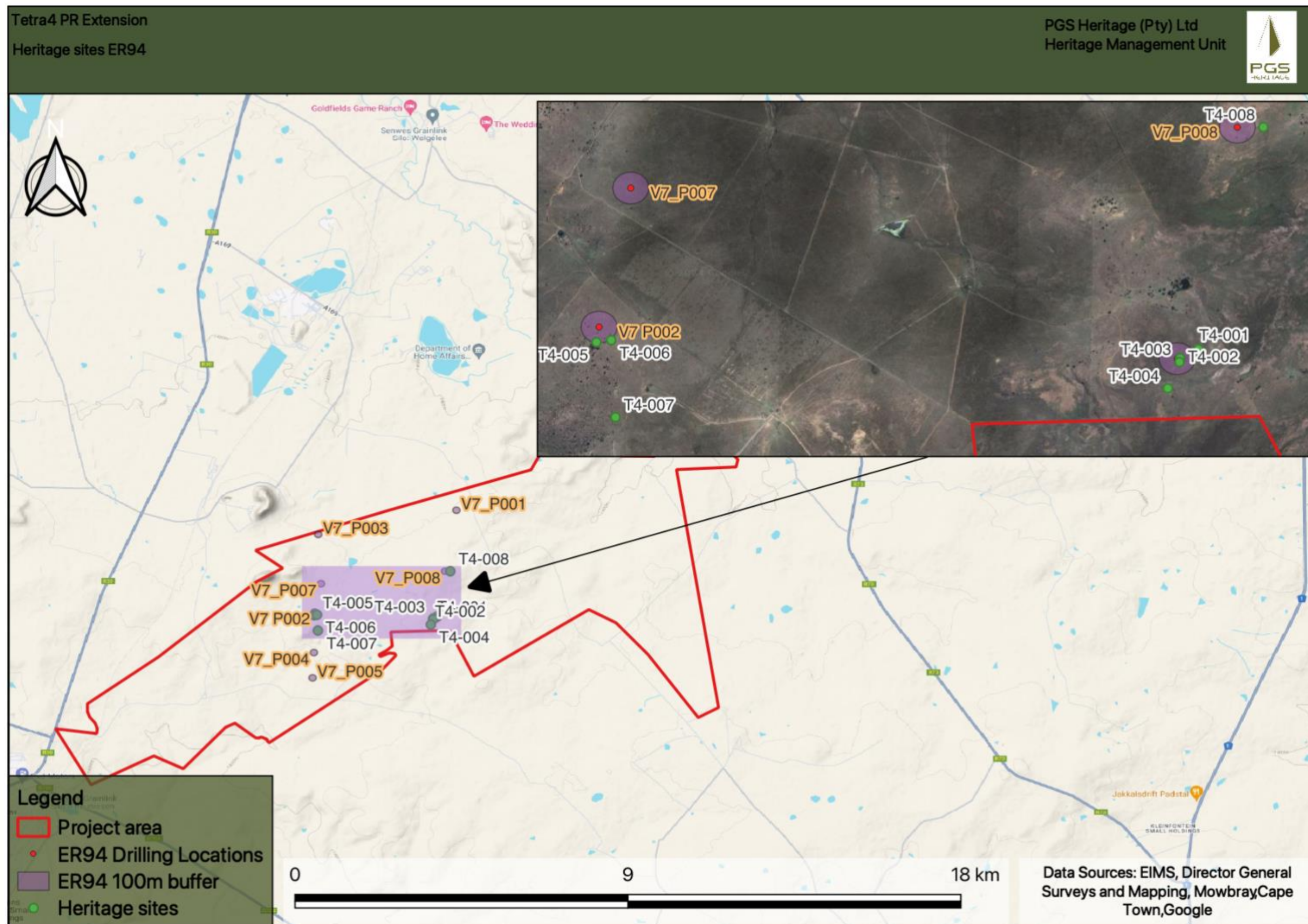


Figure 32 - Identified heritage resources within ER94.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 54

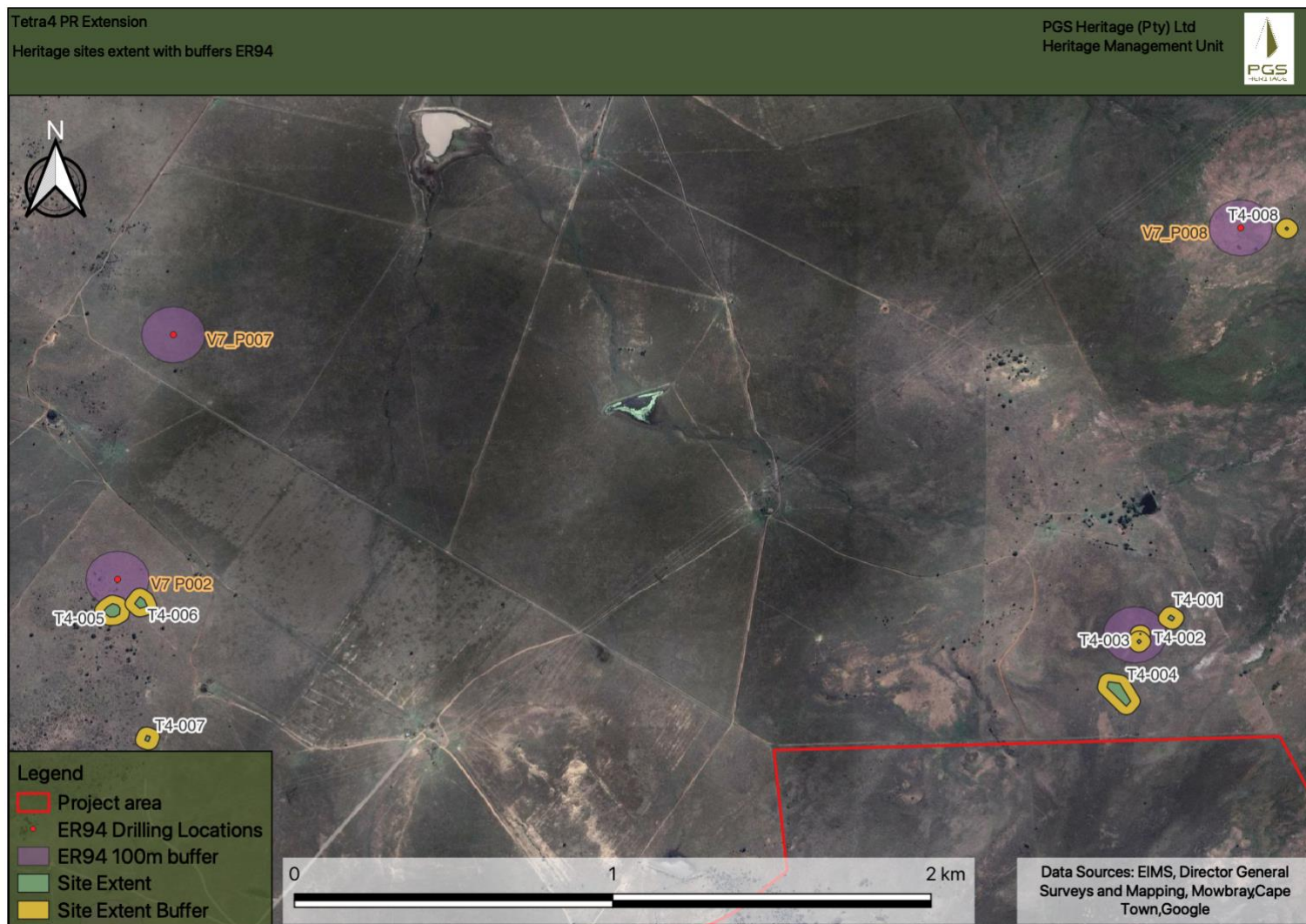


Figure 33 – Heritage site extent and associated buffers in relation to drilling collars

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 55



Figure 34 - View of possible graves at T4-002



Figure 35 – View of stone walls at T4-003



Figure 36 – Foundation remains at T4-006



Figure 37 – Burial ground at T4-008

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 56

5 IMPACT ASSESSMENT

The impact assessment rating is based on the rating scale as contained in **Appendix A**.

The following section provides an analysis of the impact of the proposed project area on heritage resources identified within the Tetra 4 PR Extension area.

5.1 Details of all alternatives considered.

This section describes alternative means of carrying out the operation and the consequences of not proceeding with the proposed project.

No alternatives are considered. The application area of interest is suitable from a heritage perspective.

The “no-go” alternative refers to the option of not going ahead with the proposed project. This will entail maintaining the current status quo with no impact from the project.

5.1.1 Historical Structures

The stone built remains of structures **T4-001, T4-003, and T4-004**, are related to the depicted structures on the 1947 maps and most likely older than 77 years (Section 4.2.1). The remains of structures **T4-005 and T4-006** are not depicted on any maps and likely more recent. The structure remains themselves are not conservation worthy. However, it is associated with an earlier 20th century farm worker settlement and the possibility of stillborn burials around the structures must be considered. As per African custom stillborn children are buried against the outside wall/foundation or inside the house. The structures (**T4-001, T4-003, T4-004, T4-005 and T4-006**) must then provisionally grade as Grade IIIA. All burial grounds and graves should be retained and avoided with a buffer zone of 30m as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 57

stakeholder engagement component, adhering to the requirements of s36 of the NHRA and its regulations as well as the National Health Act and its regulations. As structures **T4-001, T4-003, and T4-004** are older than 77 years, historical or Iron Age sites are protected under S34 and S35 of the NHRA and must be avoided with a buffer of 30m. If this is not possible, an application for a mitigation permit must be obtained from SAHRA. Phase 2 test excavations with the backing of a s34 permit from SAHRA will be required before an application for destruction can be lodged with SAHRA. They are given a heritage significance sensitivity category as HIGH (**T4-003**) and MEDIUM (**T4-001, T4-005, T4-004, T4-005** and **T4006**), with an Impact sensitivity of HIGH and MEDIUM before mitigation and LOW after mitigation.

5.1.2 Burial grounds and graves

T4-002 is a possible burial ground which occurs 16 m from the proposed drilling collar V7 P006 and associated with sites **T4-001, T4-003** and **T4-005**. This site will need to be avoided with a 30 m buffer or have an application for a mitigation permit must be obtained from SAHRA. Phase 2 test excavations to confirm whether or not graves do occur at this site with the backing of a s36 permit from SAHRA will be required before an application for destruction or exhumation can be lodged with SAHRA. **T4-007** is located between drilling collars V7 P002 and V7 P004 and should not be impacted by drilling activities, it is however alongside the current road and should be noted to avoid possible damage during activities. and **T4-008** occurs approximately 145 m from drilling collar V7 P008 and should not impact drilling activities but should be demarcated and avoided. The possible grave at **T4-004** occurs approximately 200 m from drilling collar V7 P006 and should not be impacted. Burial grounds and graves are protected under s36 of the NHRA and must be demarcated with a 30m buffer and avoided. If this is not possible, a grave relocation process must be followed. They are given a heritage significance sensitivity category as HIGH, with an Impact sensitivity of HIGH (**T4-002**) and MEDIUM (**T4-004, T4-007** and **T4-008**) before mitigation and LOW after mitigation

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 58

5.2 Impact assessment summary table

Implementing the impact assessment methodology as supplied by the EIMS. **Table 7** provides a quantitative assessment of the impacts of the proposed drilling options.

The pre-mitigation impact on the identified historical sites located within the application area is calculated as HIGH negative (**T4-003**) and MEDIUM negative (**T4-001, T4-005, T4-004, T4-005** and **T4006**), and only focused during the drilling phase. Implementation of the recommended mitigation measures will reduce the impact to LOW positive.

The pre-mitigation impact on the identified Burial grounds located within the footprint of the exploration area is calculated as HIGH negative (**T4-002**) and MEDIUM negative (**T4-004, T4-007** and **T4-008**) and only focused during the drilling phase. Implementation of the recommended mitigation measures will reduce the impact to LOW positive.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 59

Table 7: Impact Table

IMPACT DESCRIPTION				Pre-Mitigation							Post Mitigation								Priority Factor Criteria			
Identifier	Impact	Alternative	Phase	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Pre-mitigation ER	Nature	Extent	Duration	Magnitude	Reversibility	Probability	Post-mitigation ER	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score
10.1.1	Burial Grounds T4-002	Alternative 1	Operation	-1	3	5	4	5	5	21.25	1	3	5	2	5	2	7.5	High	2	3	1.38	10.3125
10.1.2	Burial Grounds T4-004,T4-007, T4-008	Alternative 1	Operation	-1	3	5	4	5	3	12.75	1	3	5	2	5	1	3.75	High	1	3	1.25	4.6875
10.1.3	Structures/homesteads T4-003	Alternative 1	Operation	-1	3	5	4	5	5	21.25	1	3	5	2	5	2	7.5	High	2	3	1.38	10.3125
10.1.4	Structures/homesteads T4-001, T4-004, T4-005, T4-006	Alternative 1	Operation	-1	3	5	4	5	3	12.75	1	3	5	2	5	1	3.75	High	1	2	1.13	4.21875

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 60

6 MANAGEMENT RECOMMENDATIONS AND GUIDELINES

The following section must be read with **Table 9** of this report.

6.1 Construction and operational phases

Tetra4 intends to consolidate the Exploration Rights (including the activities such as drilling of up to 18 wells) within the Production Right (12/4/1/07/2/2). Exploration wells will be drilled and, if successful, converted into production wells.

It is possible that cultural material will be exposed during the drilling phase and may be recoverable, keeping in mind delays can be costly during project timelines, and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however foundation holes do offer a window into the past and it thus may be possible to rescue some of the data and materials.

Temporary infrastructure developments around the drill rigs typically require temporary clearance or disturbance of an area of 50 m x 50 m to set up the rig and begin drilling activities, such activities are often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the drilling phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure should be implemented.

6.2 Chance finds procedure

- A heritage practitioner / archaeologist should be appointed to develop a heritage induction program and conduct training for the ECO as well as team leaders in the identification of heritage resources and artefacts **during the implementation of the EMPr.**

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 61

- An appropriately qualified heritage practitioner / archaeologist must be identified to be called upon if any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities halted.
- The qualified heritage practitioner / archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner / archaeologist.

6.3 Possible finds during construction

The study area occurs within a greater historical and archaeological site as identified during the desktop and fieldwork phase. Soil clearance for infrastructure as well as the proposed reclamation activities, could uncover the following:

- Historical structures and foundations
- unmarked burial grounds and graves
- Archaeological features (Iron Age or Stone Age)

6.4 Timeframes

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead times must be worked into the construction time frames. **Table 8** gives guidelines for lead times on permitting.

Table 8: Lead times for permitting and mobilisation

Action	Responsibility	Timeframe
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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 62

Preparation for field monitoring and finalisation of contracts	The contractor and service provider	1 month
Application for permits to do necessary mitigation work	Service provider – Archaeologist and SAHRA	3 months
Documentation, excavation and archaeological report on the relevant site	Service provider – Archaeologist	3 months
Handling of chance finds – Graves/Human Remains	Service provider – Archaeologist and SAHRA	2 weeks
Relocation of burial grounds or graves in the way of the development	Service provider – Archaeologist, SAHRA, local government and provincial government	6 months

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 63

6.5 Heritage Management Plan for EMPr implementation

Table 9: Heritage Management Plan for EMPr implementation

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
General project area	Implement a chance to find procedures in case where possible heritage finds are uncovered.	Planning/ Construction	During construction/ drilling	Applicant ECO Heritage Specialist	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report
Historical Structures	<p>As the structures are associated with an earlier 20th century farm worker settlement, the possibility of stillborn burials around the structure must be considered. All burial grounds and graves should be retained and avoided with a buffer zone of 30m as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of s36 of the NHRA and its regulations as well as the National Health Act and its regulations.</p> <p>Mitigation measures would include applying for the test excavation and/or GPR permit to determine if the site contains graves (if construction activities are to occur on or within close proximity to these sites).</p>	Planning	Planning	Applicant Environmental Control Officer (ECO) Heritage specialist	During survey. Monthly	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 36 and 38 of NHRA	ECO Monthly Checklist/Report
Burial grounds and graves	All burial grounds and graves should be retained and avoided with a buffer zone of 30m as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of s36 of the NHRA and its regulations as well as the National Health Act and its regulations.	Planning/ Construction	During Construction/ drilling	Applicant Environmental Control Officer (ECO) Heritage specialist	During survey. Monthly	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 64

7 CONCLUSIONS AND RECOMMENDATIONS

PGS Heritage (Pty) Ltd (PGS) was appointed by Environmental Impact Management Services (Pty) Ltd (EIMS) to undertake a Heritage Impact Assessment (HIA) for the proposed Tetra 4 PR Extension for the Exploration Rights within the Production Right (12/4/1/07/2/2) for Tetra 4. On 79 farm portions near the towns of Theunissen and Winburg in the south and Odendaalsrus and Allanridge in the north. within the Lejweleputswa District Municipality, Free State Province.

During the fieldwork a total of **eight** heritage features and resources were identified (**Figure 32** and **Figure 33**). These consist of four cemeteries or possible grave sites (**T4-002, T4-007 and T4-008 with a possible grave at T4-004**), and **five** foundation remains of historical homesteads/kraals (**T4-001, T4-003, T4-004, T4-005 and T4-006**). See **Figure 34 - Figure 37** and the individual site descriptions as contained in **Appendix B** The field description forms were collected with ArcGIS Survey123 in field software.

7.1 Historical Structures

The stone built remains of structures **T4-001, T4-003, and T4-004**, are related to the depicted structures on the 1947 maps and most likely older than 77 years (Section 4.2.1). The remains of structures **T4-005 and T4-006** are not depicted on any maps and likely more recent. The structure remains themselves are not conservation worthy. However, it is associated with an earlier 20th century farm worker settlement and the possibility of stillborn burials around the structures must be considered. As per African custom stillborn children are buried against the outside wall/foundation or inside the house. The structures (**T4-001, T4-003, T4-004, T4-005 and T4-006**) must then provisionally grade as Grade IIIA. All burial grounds and graves should be retained and avoided with a buffer zone of 30m as per SAHRA guidelines. If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of s36 of the

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 65

NHRA and its regulations as well as the National Health Act and its regulations. As structures **T4-001, T4-003, and T4-004** are older than 77 years, historical or Iron Age sites are protected under S34 and S35 of the NHRA and must be avoided with a buffer of 30m. If this is not possible, an application for a mitigation permit must be obtained from SAHRA. Phase 2 test excavations with the backing of a s34 permit from SAHRA will be required before an application for destruction can be lodged with SAHRA. They are given a heritage significance sensitivity category as HIGH (**T4-003**) and MEDIUM (**T4-001, T4-005, T4-004, T4-005** and **T4006**), with an Impact sensitivity of HIGH and MEDIUM before mitigation and LOW after mitigation.

7.2 Burial grounds and graves

T4-002 is a possible burial ground which occurs 16 m from the proposed drilling collar V7 P006 and associated with sites **T4-001, T4-003** and **T4-005**. This site will need to be avoided with a 30 m buffer or have an application for a mitigation permit must be obtained from SAHRA. Phase 2 test excavations to confirm whether or not graves do occur at this site with the backing of a s36 permit from SAHRA will be required before an application for destruction or exhumation can be lodged with SAHRA. , **T4-007** is located between drilling collars V7 P002 and V7 P004 and should not be impacted by drilling activities, it is however alongside the current road and should be noted to avoid possible damage during activities. and **T4-008** occurs approximately 145 m from drilling collar V7 P008 and should not impact drilling activities but should be demarcated and avoided. The possible grave at **T4-004** occurs approximately 200 m from drilling collar V7 P006 and should not be impacted. Burial grounds and graves are protected under s36 of the NHRA and must be demarcated with a 30m buffer and avoided. If this is not possible, a grave relocation process must be followed. They are given a heritage significance sensitivity category as HIGH, with an Impact sensitivity of HIGH (**T4-002**) and MEDIUM (**T4-004, T4-007** and **T4-008**) before mitigation and LOW after mitigation.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 66

7.3 Mitigation measures

Mitigation measures are described in **Table 9** of this report.

7.4 General

It is the considered opinion of the heritage specialists that the proposed project **will** have a direct impact on the identified heritage resources, rated as being of MEDIUM to HIGH heritage significance.

ER94 drilling collar V7 P006 will have the greatest impact on heritage resources rated as being of MEDIUM to HIGH heritage significance. Drilling collars V7 P002 and V7 P008 are near heritage resources, however if mitigation measures are implemented, it is unlikely the sites will be impacted directly. With the implementation of recommended mitigation measures the impacts will be reduced to LOW. All other drilling collars are considered acceptable from a heritage perspective.

ER32 drilling collars are all acceptable from a heritage perspective.

With the implementation of recommended mitigation measures, the overall impact on heritage resources will be reduced to acceptable positive levels during the project activities.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 67

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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 68

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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 69

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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 70

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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 71

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8.3 Historical Topographic Maps

All the historic topographical maps used in this report were obtained from the Directorate: National Geo-spatial Information of the Department of Rural Development and Land Reform in Cape Town.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 72

8.4 Internet

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www.sanbi.org

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www.mk.org.za

8.5 Google Earth

All the aerial depictions and overlays used in this report are from Google Earth.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 73

APPENDIX A

ENVIRONMENTAL IMPACT METHODOLOGY

ENVIRONMENTAL IMPACT MANAGEMENT SERVICES (EIMS): IMPACT ASSESSMENT METHODOLOGY

TITLE:	ENVIRONMENTAL IMPACT ASSESSMENT RATING PROCEDURE	DOC No:	PRO 106	REV:	00	Page 2 of 7
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1. Purpose

The purpose of this procedure is to guide the undertaking of an impact and risk assessment process, as required under the regulations promulgated under the National Environmental Management Act (Act 107 of 1998 - NEMA).

2. Scope

This procedure provides the methodology to be applied to environmental impacts and risks identified during the Environmental Impact Assessment Process. The methodology ensures that consistent impact assessment rating is carried out that is legally compliant and aligned with EIMS's objective of providing a quality service.

3. References

GNR. 982 National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations, 2014 – hereafter referred to as the Regulations.

4. Additional Guidelines and References

Guidelines and Reference Docs (not exhaustive – please verify with the applicable competent authority).	
Compulsory Compliance: GNR. 982 National Environmental Management Act (Act No. 107 of 1998 - NEMA): Environmental Impact Assessment Regulations, 2014.	National
Companion Guideline for Implementation: Environmental Management Assessment Regulations, 2010 - GN 805/2012 (NEMA)	National
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5. Definitions and Abbreviations

Refer to Chapter 1 of the Regulations.

6. Procedure

The impact significance rating methodology, as presented herein and utilised for all EIMS Impact Assessment Projects, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. The ER is determined for the pre- and post-mitigation scenario. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S). The impact assessment will be applied to all identified alternatives.

a. Determination of Environmental Risk

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER). The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E + D + M + R) * N}{4}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 1 below.

Table 1: Criteria for Determining Impact Consequence

Aspect	Score	Definition
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Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 74

TITLE:	ENVIRONMENTAL IMPACT ASSESSMENT RATING PROCEDURE	DOC No:	PRO 106	REV:	00	Page 3 of 7
---------------	---	----------------	----------------	-------------	-----------	--------------------

Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary)
	3	Local (i.e. the area within 5 km of the site)
	4	Regional (i.e. extends between 5 and 50 km from the site)
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years)
	3	Medium term (6-15 years)
	4	Long term (15-65 years, the impact will cease after the operational life span of the project)
	5	Permanent (>65 years, no mitigation measure of natural process will reduce the impact after construction)
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way, moderate improvement for +ve impacts)
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease, high improvement for +ve impacts)
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts)
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring prohibitively high time and cost.
	5	Irreversible impact.

Once the C has been determined, the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per Table 2.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 75

TITLE:	ENVIRONMENTAL IMPACT ASSESSMENT RATING PROCEDURE	DOC No:	PRO 106	REV:	00	Page 4 of 7
--------	--	---------	---------	------	----	-------------

Table 2: Probability Scoring

Probability	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur),

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

$$ER = C \times P$$

Table 3: Determination of Environmental Risk

Consequence	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
	1	1	2	3	4	5
Probability						

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 4.

Table 4: Environmental Risk Scores

ER Score	Description
<9	Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward).
≥9 ≤17	Medium (i.e. where the impact could have a significant environmental risk/ reward),
>17	High (i.e. where the impact will have a significant environmental risk/ reward).

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

b. Impact Prioritisation

Further to the assessment criteria presented in the section above, it is necessary to assess each potentially significant impact in terms of:

1. Cumulative impacts; and
2. The degree to which the impact may cause irreplaceable loss of resources.

To ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 76

TITLE:	ENVIRONMENTAL IMPACT ASSESSMENT RATING PROCEDURE	DOC No:	PRO 106	REV:	00	Page 5 of 7
--------	--	---------	---------	------	----	-------------

decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 5: Criteria for Determining Prioritisation

Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable Loss of Resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 5. The impact priority is therefore determined as follows:

$$Priority = CI + LR$$

The result is a priority score which ranges from 2 to 6 and a consequent PF ranging from 1 to 1.5 (Refer to Table 6).

Table 6: Determination of Prioritisation Factor

Priority	Prioritisation Factor
2	1
3	1.125
4	1.25
5	1.375
6	1.5

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a factor of 0.5, if all the priority attributes are high (i.e. if an impact comes out with a high medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 77

TITLE:	ENVIRONMENTAL IMPACT ASSESSMENT RATING PROCEDURE	DOC No:	PRO 106	REV:	00	Page 6 of 7
---------------	---	----------------	---------	-------------	----	-------------

Table 7: Final Environmental Significance Rating

Significance Rating	Description
<-17	High negative (i.e. where the impact must have an influence on the decision process to develop in the area).
≥-17, ≤-9	Medium negative (i.e. where the impact could influence the decision to develop in the area).
>-9, < 0	Low negative (i.e. where this impact would not have a direct influence on the decision to develop in the area).
0	No impact
>0, <9	Low positive (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥9, ≤17	Medium positive (i.e. where the impact could influence the decision to develop in the area).
>17	High positive (i.e. where the impact must have an influence on the decision process to develop in the area).

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

7. Responsibilities

It is the responsibility of each EIMS employee and each external Specialist appointed by EIMS to ensure that this procedure is carried out as described. All the personnel within the organization have the responsibility to report any deviations/changes from the procedures to management. This is to ensure that the necessary changes are documented after approval.

It is the responsibility of the senior/ junior consultant (as applicable) assigned with the task of report compilation to ensure that this methodology/ procedure is strictly applied. It is the responsibility of the assigned Senior Consultant or Quality Reviewer to review and verify that the procedure has been complied with, and such documented at the specified quality check intervals.

8. Records

RECORD	STORAGE LOCATION	STORAGE SYSTEM	RESPONSIBLE PERSON	RETENTION PERIOD
Significance Rating Input Spreadsheet	Project File - /Server/assignments/ Job#/Records	Electronic- Scanned PDF	Project Manager	10 Years

9. Record of Changes, Revisions and Cancellations

RECORD OF CHANGES, REVISIONS AND CANCELLATIONS		
DATE	NATURE / DETAIL OF CHANGE	REV No.

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 78

APPENDIX B

SITE DESCRIPTION FORMS

Site coordinates		
site_nr	X	Y
T4-001	26.8264	-28.3489
T4-002	26.82536	-28.3494
T4-003	26.82533	-28.3496
T4-004	26.82467	-28.3511
T4-005	26.79244	-28.3485
T4-006	26.79328	-28.3483
T4-007	26.79351	-28.3527
T4-008	26.83005	-28.3363

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 79

Site Number	X	Y	Brief Site Description	Significance	Heritage Rating
T4-001	- 28.34885	26.8264	Rectangular stone walled enclosure. Which is subdivided into two main sections. The state of preservation is poor with the lower wall sections still in situ. The site occurs on the 1947 first edition maps and therefore at least 77 years old. Occurs 133m NE from drilling collar V7_006	Medium	Grade 3 - A (IIIA)

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 80



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 81



Site Number	X	Y	Brief Site Description	Significance	Heritage Rating
T4-002	- 28.34937	26.82536	4 possible graves. Stone packed. Located between structures. North to south orientation although it is unclear as the stone packed features are very disturbed. The features are aligned alongside each other in a single row. Occurs 15m East from the drilling collar V7_P006	High	Grade 3 - A (IIIA)

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 82



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 83



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 84



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 85

Site Number	X	Y	Brief Site Description	Significance	Heritage Rating
T4-003	- 28.34958	26.82533	Two small stone built rectangular structures adjacent to the possible graves. As with site T4-001, this occurs on the 1947 maps and older than 77 years. 24m SE of drilling collar V7_006	Medium	Grade 3 - A (IIIA)

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 86



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 87



Site Number	X	Y	Brief Site Description	Significance	Heritage Rating
T4-004	-28.35106	26.82467	Stone walled ruins. 5rooms/structures. Mostly collapsed. Out of the 100m buffer. Kraal behind the main structure. With a single possible stone packed grave. 190m SSW of drilling collar V7_P006	High	Grade 3 - A (IIIA)

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 88



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 89



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 90



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 91



Site Number	X	Y	Brief Site Description	Significance	Heritage Rating
T4-005	-28.34846	26.79244	Stone wall kraal (two) and two hut remains. Stone walled foundations. 100m South of V7_P002	Medium	Grade 3 - A (IIIA)

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 92



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 93



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 94



Site Number	X	Y	Brief Site Description	Significance	Heritage Rating
T4-006	-28.34835	26.79328	Several stone walled foundation remains. 3 definite. 96m SE of V7_P002. Not depicted on the first ed or second ed maps	Medium	Grade 3 - A (IIIA)

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 95



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 96



Site Number	X	Y	Brief Site Description	Significance	Heritage Rating
T4-007	-28.35269	26.79351	Approximately 9 graves. One formal, one with demarcation, 7 stone packed or stone marked. Not near points.	High	Grade 3 - A (IIIA)

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 97



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 98



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 99



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 100

Site Number	X	Y	Brief Site Description	Significance	Heritage Rating
T4-008	-28.33635	26.83005	Three graves with formal dressings and a collapsed outer stone wall. SW-NE orientation. Approximately 145m East from V7_P008	High	Grade 3 - A (IIIA)

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 101



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 102



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 103



Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 104

APPENDIX C
PGS TEAM CVS

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 105



JESSICA ANGEL

Professional Heritage Practitioner

PROFILE

Senior Heritage Specialist with an MSc degree in Archaeology and Geography. I am accredited as a Professional Archaeologist by the Association of Southern African Professional Archaeologists and as a Field Supervisor for Colonial Period, Iron Age, and Stone Age archaeology. My primary focus is on heritage management, which includes conducting Heritage Impact Assessments, managing heritage mitigation, and overseeing lab operations.

I have successfully managed various aspects of large-scale mitigation projects in South Africa and Lesotho. My responsibilities included conducting archaeological research, documentation, GIS, artefact photography, and archaeological illustration. I also managed archaeological assemblage storage and curation, as well as specialist analysis.

CONTACT

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EMAIL ADDRESS:

jessica@pgsheritage.co.za



EDUCATION

University of the Witwatersrand

2003-2005

BA Degree - Majors in Archaeology and Geography

University of the Witwatersrand

2006

BSc Hon Geography, with further specialisation in Environmental Management, Advanced GIS, Palaeogeomorphology and Globalisation and Agro Food restructuring.

University of the Witwatersrand

2010 - 2013

MSc Archaeology and Geography

WORK EXPERIENCE

PGS Heritage – Heritage Specialist/Senior Archaeologist

2023- present

Working in the Heritage Unit, managing Heritage Impact Assessments. Training of interns and Junior archaeologists

PGS Heritage, Lesotho– Senior Archaeologist

2018-2023

Laboratory and collections manager for the Heritage Mitigation of Polihali Dam Project. The Polihali Dam Project was a 2nd Phase CRM operation to mitigate the total inundation of various cultural sites.

PGS Heritage – Junior Archaeologist

2015-2018

Heritage Impact Assessments, Second Phase Heritage Mitigation on the Raising of the Clanwilliam Dam Wall.

PGS Heritage – Internship

2012 – 2014

My duties included gaining familiarity with gathering relevant background data, field surveys, exhumations, and report writing.

NGT Projects and Heritage Consultants

2013

Heritage Impact Assessments - Background research, report writing and ground surveys

Department of Geography, Archaeology and Environmental Science (University of the Witwatersrand)

2011

Research Assistant

PROFESSIONAL AFFILIATION

Accredited Professional Archaeologist

Association of Southern African Professional Archaeologists (ASAPA)– Since 2015

Document	Project	Revision	Date	Page Number
806HIA-001	Tetra4 PR Extension	1.0	09/07/2024	Page 106



WOUTER FOURIE

Professional Heritage Practitioner

PROFILE

Project Manager and Principal Heritage Specialist holds a post-graduate degree in Archaeology and is registered with the Association of Southern African Professional Archaeologists as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners in South Africa.

My work focuses on heritage management through Heritage Impact Assessments, implementation of recommendations and large-scale heritage mitigation projects. I have worked, completed and implemented heritage projects in South Africa, Botswana, Mozambique, Mauritius, Zambia, Lesotho, and the Democratic Republic of the Congo.

CONTACT

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EDUCATION

University of Pretoria

1993-1996

BA Degree - Majors in Archaeology, Anthropology and Geography

University of Pretoria

1997

BA Hon Archaeology, with further specialisation in environmental management.

University of Cape Town

2016 – present

MPhil Conservation of the Built Environment

WORK EXPERIENCE

PGS Heritage Group of Companies

(South Africa, Lesotho, Mozambique, and Portugal)

Director – Heritage Specialist

2003- present

I am actively involved in the management of the business and focus on marketing and new business for PGS, specifically the broader SADC region. Acting as heritage specialist in multidisciplinary teams

The University of the Witwatersrand - Project Manager – Archaeological Contracts Unit

2007-2008

Responsible for conducting heritage and archaeological impact studies, archaeological excavations and general management of the unit

Matakoma Consultants – Director – Heritage Specialist

2000 – 2008

Heritage specialist and Director responsible for heritage and archaeological impact studies

Randfontein Estate Gold Mine – Environmental Coordinator

Oct 1998- Feb 2000

Coordinating all environmental Rehabilitation work

Department of Minerals and Energy Environmental Officer

Oct 1997 – Sept 1998

PROFESSIONAL AFFILIATION

Accredited Professional Heritage Practitioner

Association of Professional Heritage Practitioners
Since 2014

Accredited Professional Archaeologist

Association of Southern African Professional Archaeologists –
Since 2001