Appendix G.4

HERITAGE ASSESSMENT

Public

HERITAGE IMPACT ASSESSMENT

In terms of Section 38(8) of the NHRA for the

Proposed Development of the ABO Uvemvane Wind Energy Facility 1 near Balfour in Mpumalanga/ Gauteng Provinces

EIA Phase

Prepared by CTS Heritage

CTS HERITAGE

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For

ABO Energy South Africa (PTY) LTD

August 2026

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EXECUTIVE SUMMARY

1. Site Name:

ABO Uvemvane Wind Energy Facility 1

2. Location:

Table A: WEF 1 Property Information

Affected Property	SG Code
The Remaining Extent of Portion 2 of the Farm Lagerspoort Number 406	T0IR00000000040600002
Portion 17 (a Portion of Portion 3) of the Farm Lagerspoort Nr 406	T0IR00000000040600017
Remaining Extent of Portion 4 of the Farm De Hoek 411	T0IR00000000041100004
Portion 45 of the Farm Lagerspoort 406	T0IR00000000040600045
Portion 7 of the Farm Lagerspoort Number 406	T0IR00000000040600007
Portion 19 of the Farm De Hoek No 411	T0IR00000000041100019
Remaining Extent of Portion 2 of the Farm Modderfontein 410	T0IR00000000041000002
The Farm Orion No 413	T0IR00000000041300000
Remaining Extent of Portion 5 of the Farm Lagerspoort 406	T0IR00000000040600005
Portion 7 of the Farm Driefontein 405	T0IR00000000040500007
Remaining Extent of Portion 9 of the Farm Malanskraal No 407	T0IR00000000040700009
Remaining Extent of Portion 2 of the Farm Malanskraal 407	T0IR00000000040700002
Portion 12 (a Portion of Portion 2) of the Farm Malanskraal 407	T0IR00000000040700012
Remaining Extent of Portion 2 of the Farm Driefontein 405	T0IR00000000040500002
Remaining Extent of the Farm Driefontein 405	T0IR00000000040500000
Remainder of Portion 6 (Kingsmead) of the Farm Malanskraal 407	T0IR00000000040700006
Portion 17 (a Portion of Portion 8) of the Farm Malanskraal No 407	T0IR00000000040700017
Farm Bothas Spruit Nr. 404	T0IR00000000040400000
Portion 16 (a Portion of Portion 4) of the Farm Malanskraal No 407	T0IR00000000040700016
Remaining Extent of Portion 13 (a Portion of Portion 2) of the Farm Malanskraal 407	T0IR00000000040700013
Remainder of Portion 18 (a Portion of Portion 3) of the Farm Malanskraal 407	T0IR00000000040700018
Portion 1 of the Farm Weltevreden Nr. 449	T0IR00000000044900001

3. Locality Plan:

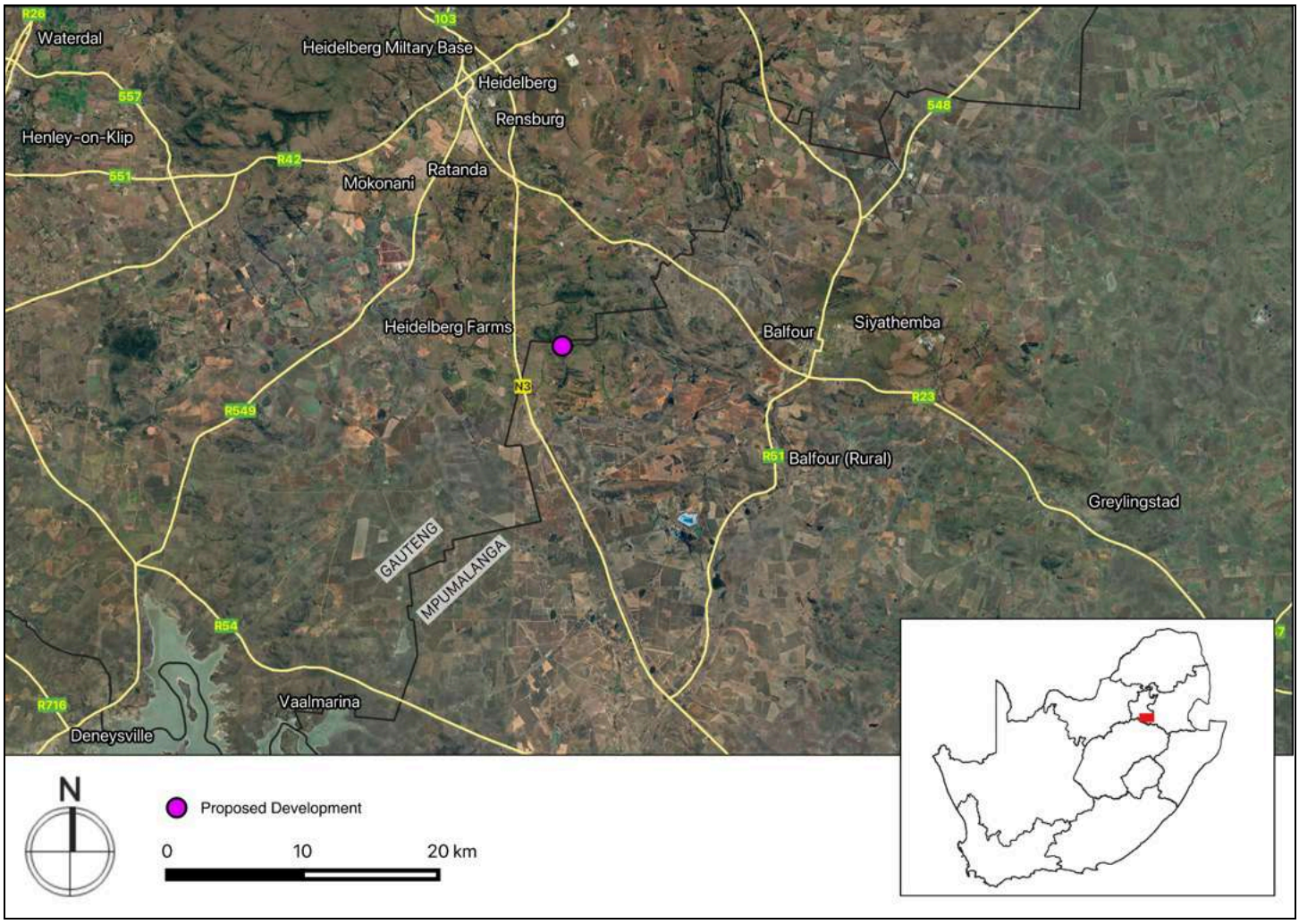

Figure A: Location of the proposed development area

4. Description of Proposed Development:

ABO Uvemvane Wind Energy Facility 1 (Pty) Ltd proposes the development of ABO Uvemvane Wind Energy Facility 1 (WEF 1), a commercial wind energy generation facility comprising up to 20 turbines and with a total generation capacity of up to 170 MWac in capacity, as well as associated infrastructure. The proposed WEF would be located approximately 9km west of the town of Balfour in the Mpumalanga Province in the Dipaleseng Local Municipality within the Gert Sibande District Municipality and approximately 14km south-east of the town Heidelberg in the Gauteng Province in the Lesedi & Midvaal Local Municipalities within the Sedibeng District Municipality. It is anticipated that the proposed WEF would have a total (permanent) development footprint of up to 67.2 ha, which is approximately 1.12% of the total site (i.e., affected properties) area.

5. Anticipated Impacts on Heritage Resources:

Based on the above findings, a sensitivity map of the development area has been drafted indicating areas that are appropriate for the WEF development within the identified development areas. Overall, however, it must be noted that the overall heritage sensitivity of the development areas for WEF 1 range from moderate to very high. The areas identified as having very high sensitivity should be considered as no-go for new infrastructure, areas of high heritage sensitivity should be considered as "tread-lightly" and the areas identified as having moderate sensitivity must be considered more closely for development activities.

As noted above, due to their landmark value within this cultivated landscape, it is recommended that the higher elevations of these mountains are not suitable for the construction of turbines, and more significantly, the construction of the large-scale roads required to construct these turbines. These areas must be considered as very high sensitivity in the sensitivity maps below. Due to the combined sensitivity from cultural landscape impacts and impacts to buried archaeology, development within this VERY HIGH sensitivity landscape will need to be limited to have minimal impact and align with visual impacts, and carefully considered in terms of micrositing to prevent impacts to burial archaeology. It is preferred if no new infrastructure development takes place within this very high sensitivity area.

Turbine Positions

All of the proposed turbine locations are acceptable from a heritage perspective as they are located outside of the recommended buffers and high sensitivity areas identified.

Substation Options

Based on the layout provided in July 2026 for the EIA Phase, the proposed positions of Substation 1, 2 and 3 are all acceptable as they are located outside of the recommended buffers and high sensitivity areas identified.

Temporary Laydown areas

Based on the layout provided in July 2026 for the EIA Phase, the proposed position of both temporary laydown areas is acceptable as they are located outside of the recommended buffers and high sensitivity areas identified.

Internal Roads

It is greatly appreciated that many of the internal proposed roads follow existing farm roads within the development area. This is commended.

Archaeological monitoring is recommended for all road construction that passes through the very high sensitivity area mapped in this report.

33kV OHL

This proposed alignment is positioned within the buffers recommended along the N3. However, as this infrastructure is only a 33kV line (and not a wind turbine), and as this infrastructure is a linear development aligned along an existing linear element in the landscape, the impact of the proposed 33kV line on the N3 is considered acceptable from a heritage perspective. The N3 alignment is preferred to the Alternative Route, discussed below.

The Alternative Route intersects with the recommended buffers for Sites 40, 41, 42 and 43, and passes the high sensitivity area to connect to WT8. While this Alternative Route follows existing farm roads, which is supported, this is not the case within the high sensitivity area. This is considered as less preferable from a heritage perspective.

As noted above, all of the proposed new infrastructure is located within areas of low and zero palaeontological sensitivity. As such, it is not anticipated that any significant fossil heritage is likely to be impacted by the proposed development based on the layout considered in this report.

6. Recommendations:

There is no objection to the proposed development from an archaeological perspective on condition that:

- The buffers recommended in Table 4 are adhered to
- The identified very high sensitivity archaeology areas are not impacted by the development of any new infrastructure.
- Archaeological monitoring takes place for all construction activities located within the very high sensitivity areas identified.
- The Chance Fossil Finds Procedure (Appendix 3) must be implemented throughout the construction phase, particularly in areas underlain by the Vryheid Formation.
- Existing gravel and access roads should be used as far as possible to minimise unnecessary ground disturbance in sensitive areas.
- If any archaeological resources or unmarked human remains are uncovered or exposed during construction operations these must immediately be reported to SAHRA.

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Details of Specialist who prepared the HIA

By Nicholas Wiltshire. Nic is the Director of CTS which was established in 2013. Nic has a MSc in Archaeology from the University of Cape Town and his archaeological expertise focuses on rock art, Stone Age and GIS studies. He has more than 20 years of experience in the heritage industry and has carried out a number of Heritage and Archaeological Impact Assessments as well as working as a senior heritage officer, archaeology at Heritage Western Cape from 2008 - 2010. Nic was the SAHRIS Project Manager and developer of SAHRIS from 2011 - 2013 before setting up CTS and OpenHeritage. Since then, he has rolled out similar national heritage systems in Namibia (2014-2017) and Kenya (2017 - 2019).

As part of the eastern Cederberg Rock Art Group, HWC and SAHRA, Nic has been closely involved in the compilation of a number of Heritage and Conservation Management Plans and various guidelines and policies related to minimum standards and best practice in conservation management. He was also responsible for the declaration of three Provincial Heritage Sites whilst working for HWC.
ASAPA Member No. 359, APHP Member No. 75

I hereby declare that CTS Heritage is an independent heritage consulting company on this project.

- CTS Heritage has performed the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the National Heritage Resources Act (Act 25 of 1999), Regulations and any guidelines that have relevance to the proposed activity;
- I have and will continue to comply with the National Heritage Resources Act (Act 25 of 1999), Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
- any decision to be taken with respect to the application by the competent authority; and;
- the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this report are true and correct.

Yours sincerely,

Nicholas Wiltshire, Director and Principle Heritage Specialist

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APPENDICES

1 Archaeological Impact Assessment 2025

2 Desktop Palaeontological Impact Assessment 2025

3 Chance Fossil Finds Procedure

1. INTRODUCTION

1.1 Background Information on Project

Project Name	Project Applicant	Generation Capacity
ABO Uvemvane Wind Energy Facility 1	ABO Uvemvane Wind Energy Facility 1 (Pty) Ltd	Up to 170 MWac

Infrastructure as per layout	WEF 1
MWac	Up to 170
Development Footprint	Approx. 67.2 ha
Access Points	Five existing access points
Access Routes	Five existing routes; four of these are off existing unnamed farm roads (originating from the D1220 and P243/1), and one is off Lagerspoort Road (R23). The Details of the access would be as per the recommendations in the Transport Impact Assessment.
Internal Road lengths	Up to 31km
Electrical Infrastructure Hub (with collector sub-station, sub-station, and BESS infrastructure)	3 x locations to be assessed as options, only 1 will be constructed (Up to 7ha)
Temporary Laydown Areas	4 totaling up to 15ha

Note that a separate application will be made for the grid connection options under consideration, however the impacts of the potential grid connection scenarios should be addressed in this process from a cumulative perspective (which also adopts a precautionary approach and considers all scenarios). There are several overhead lines (OHLs) in the vicinity. The grid connection for the project could occur at these via a new loop-in-loop-out connection or via a direct connection to a nearby substation.

The proposed grid connection is likely to consist of the components listed below. It is important to note at the outset that the exact specifications of the proposed EGI components will be determined during the detailed engineering design phase (subsequent to the issuing of an EA, should such an authorisation be granted for the proposed EGI), but that the information provided below is seen as the maximum development scenario for the EGI.

- Voltage of overhead transmission powerlines between the substation hubs and any powerline: up to 132 kV;
- Voltage of interlinking overhead transmission powerlines between the substation hubs in the case of multiple projects: up to 132kV;
- Up to 132 kV Pylon height: A maximum of 32 m;
- Pylon type: monopole carrying up to three separate powerlines/ lattice structure;
- 33kV Servitude width (per line): up to 22 m servitude, noting LiLos may have a wider servitude;

- Up to 132 kV Servitude width (per line): up to 36 m servitude, noting LiLos may have a wider servitude;
- Access: Lines would have an up to 4m wide jeep track beneath them where access is required.

Note that the EGI component of the WEF 1 will be subject to separate environmental impact assessments, following the current process.

A preferred study area with a total combined extent of approximately 8,200 ha was identified as a technically suitable project site for the development of the WEF project, within this an affected area of approximately 6000 ha has been assessed. A project description for WEF 1 is provided below.

Project Description - ABO Uvemvane Wind energy Facility 1 and Associated Infrastructure

ABO Uvemvane Wind Energy Facility 1 (Pty) Ltd proposes the development of ABO Uvemvane Wind Energy Facility 1 (WEF 1), a commercial wind energy generation facility comprising up to 20 turbines and with a total generation capacity of up to 170 MWac in capacity, as well as associated infrastructure. The proposed WEF would be located approximately 9km west of the town of Balfour in the Mpumalanga Province in the Dipaleseng Local Municipality within the Gert Sibande District Municipality and approximately 14km south-east of the town Heidelberg in the Gauteng Province in the Lesedi & Midvaal Local Municipalities within the Sedibeng District Municipality. It is anticipated that the proposed WEF would have a total (permanent) development footprint of up to 67.2 ha, which is approximately 1.12% of the total site (i.e., affected properties) area.

A development area (i.e., the full extent of the affected properties as well as beyond, where appropriate) has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected properties and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this S&EIA process (which includes the independent specialists' assessments undertaken hereunder) and assessed in terms of the suitability from an environmental and social perspective. The location of the proposed project and the siting of the project infrastructure within the assessed study area has been informed by the recommendations of the specialists following their field assessments, where relevant.

It is important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering design phase prior to construction (subsequent to the issuing of an EA, should such an authorisation be granted), but that the information provided below is seen as the maximum development scenario for the proposed development.

The proposed facility would comprise the following (to be located within the proposed development footprint):

- Up to 20 turbines with the following maximum specifications:
    - Maximum hub height 180 m;
    - Maximum blade length 100 m;

  - Maximum rotor diameter 200 m;
  - Maximum capacity per turbine 10 MW;
  - A transformer at the base of each turbine;
  - Concrete turbine foundations up to 1 ha each;
  - Turbine, crane, and blade hardstands (included in the abovementioned 1 ha).
- Primary/main access roads as well as internal road reticulation (note that existing roads/disturbed areas would be used as far as possible, and for the proposed roads, a corridor of up to 12 m wide may be temporarily impacted upon during construction and be rehabilitated to up to 10 m wide after construction), inclusive of stormwater infrastructure where relevant.
- 4 Temporary laydown areas/ construction compounds (includes concrete batching), totalling up to 15 ha, would be fenced with access control; and/or[KR3]
- Battery Energy Storage System (BESS) to be located within the electrical infrastructure hub described under "associated infrastructure" below.

Associated infrastructure would include the following (to be located within the proposed development footprint):

- Associated internal electrical reticulation/ cabling (i.e., low- and medium voltage powerlines), underground as far as is feasible, and to run within the proposed road footprint/route as far as possible;
- A 33kV overhead/underground line to connect the northern and southern portions of the facility; and
- On-site electrical infrastructure hub up to 7 ha in extent (note there are 3 locations to be assessed as options, however only 1 will be constructed) consisting of:
- On-site substation and associated infrastructure,
- Additional step-up/ transformation/ collector/switchyard infrastructure,
- Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) building/s, admin building/s, workshop/s, gatehouse/s, security building/s, control centre/s, office/s, visitor centre/s, warehouse/s, etc.),
- May include the installation of a communications tower and lighting mast on site with a maximum height of 32 m and 25m respectively, and/or
- BESS.

Five access points are proposed, four of these are off existing unnamed farm roads (originating from the D1220 and P243/1), and one is off Lagerspoort Road (R23). The details of the access would be as per the recommendations in the Transport Impact Assessment. Access roads would be developed both to the site and within the site (i.e., between project components).

The operations of the proposed facility would require some servicing, noting that the operational electrical requirements would be nominal and would be supplied by the facility on site. Water would be required for sanitation use by operational staff (drinking and washing hands, food, etc) as well as for cleaning of equipment, and scheduled

internal cleaning of building, and dust control on internal roads (where needed). Water would ideally be sourced from the local municipality, in terms of a Service Level Agreement established between the Municipality and the Proponent. If this is not possible, then further options, such as sourcing water from a private services provider, will be investigated. Where required, a storage tank (i.e., Jo-Jo tank) of up to approximately 10,000L may be used on site for temporary water storage. Sanitation requirements would be minimal, given that there would not be many operational staff. Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or have capacity for, such a connection, sewage would be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (Contractor) for treatment at a licensed disposal site. Alternatively, a standalone system would be used (i.e., porta-loos) which would be regularly serviced by an independent contractor. Note that it is **not** intended to make use of soakaways or on-site treatment solutions. Refuse/solid waste produced would also be nominal (approximately two wheelie bins per week) and would ideally be removed by the Municipality, however, if this is not possible, the Operator would employ private contractors to remove the refuse and dispose of it appropriately.

The construction phase would also require water and sanitation, with these aspects being the primary responsibility of the Contractor. However, it would be preferable for water to be sourced from the local Municipality (where available), with alternative arrangements (for example, bringing water in with trucks) being made where necessary. Solid waste would also be produced and would be managed in accordance with the requirements in the Environmental Management Programme (EMPr).

Stormwater drainage systems may be constructed on site to ensure that stormwater run-off from site is appropriately managed. Water from these systems is not likely to contain any chemicals or hazardous substances and would be released into the surrounding environment based on the natural drainage contours.

Temporary water pipelines may be installed on site during construction for water supply to *inter alia* the concrete batching plant and the O&M building complex for domestic use and sanitation. Possible groundwater abstraction on site for purposes of the batching plant could be considered, if required, considering any necessary and relevant legal requirements. There would be no other specific stormwater and/or landscaping initiatives undertaken as part of the proposed WEF, other than any interventions prescribed by the relevant specialist/s through the S&EIA process.

Blade patterning may be implemented as a recommended avian mitigation, in accordance with the Blade Patterning Guidelines (SAWEA & BirdLife South Africa, 2024).

The connection for the project within could occur via a new loop-in-loop-out connection or via a direct connection to one of the two nearby substations. Note that the EGI component of the WEFs will be subject to separate environmental impact assessments.

1.2 Description of Property and Affected Environment

The proposed ABO Uvemvane WEF Cluster lies southeast of Heidelberg and northwest of Balfour in Gauteng and Mpumalanga respectively. The properties inside the WEF study area span an area roughly measuring 12km from west to east and 14km from north to south. The R23 main road linking Balfour to Heidelberg runs along the eastern side of the WEF and the N3 highway linking Gauteng onto Durban runs more or less along the western end of the area.

The southern portion of the WEF lies on ground south of the Suikerbosrantrivier. The northern portion of the WEF lies on either side of the river. The centre of the overall WEF cluster consists of hilly to mountainous terrain that rises up from Laagerspoort, Malanskraal and Steynskraal farms. Several maize and soya farms have been cultivated in the wider valleys between the ridges and hilltops. Very large and flat agricultural land spreads out south of Malanskraal onto Kleinfontein and wraps around the mountainous core at Modderfontein as well as at Weltevreden farm to the southeast. Driefontein and Wildebeestfontein farms lie towards the eastern side of the WEF and are primarily hilly to mountainous with narrower valleys in between. In general, areas which are not suitable for maize farming have been used for large cattle ranches such as Malanskraal with an extensive network of jeep tracks between the camps. Leisure and tourism businesses are also a part of the WEF area such as the Wild game farm and Tuin van Eden campsite and accommodation establishment. Wild game animals were also seen at Driefontein farm.

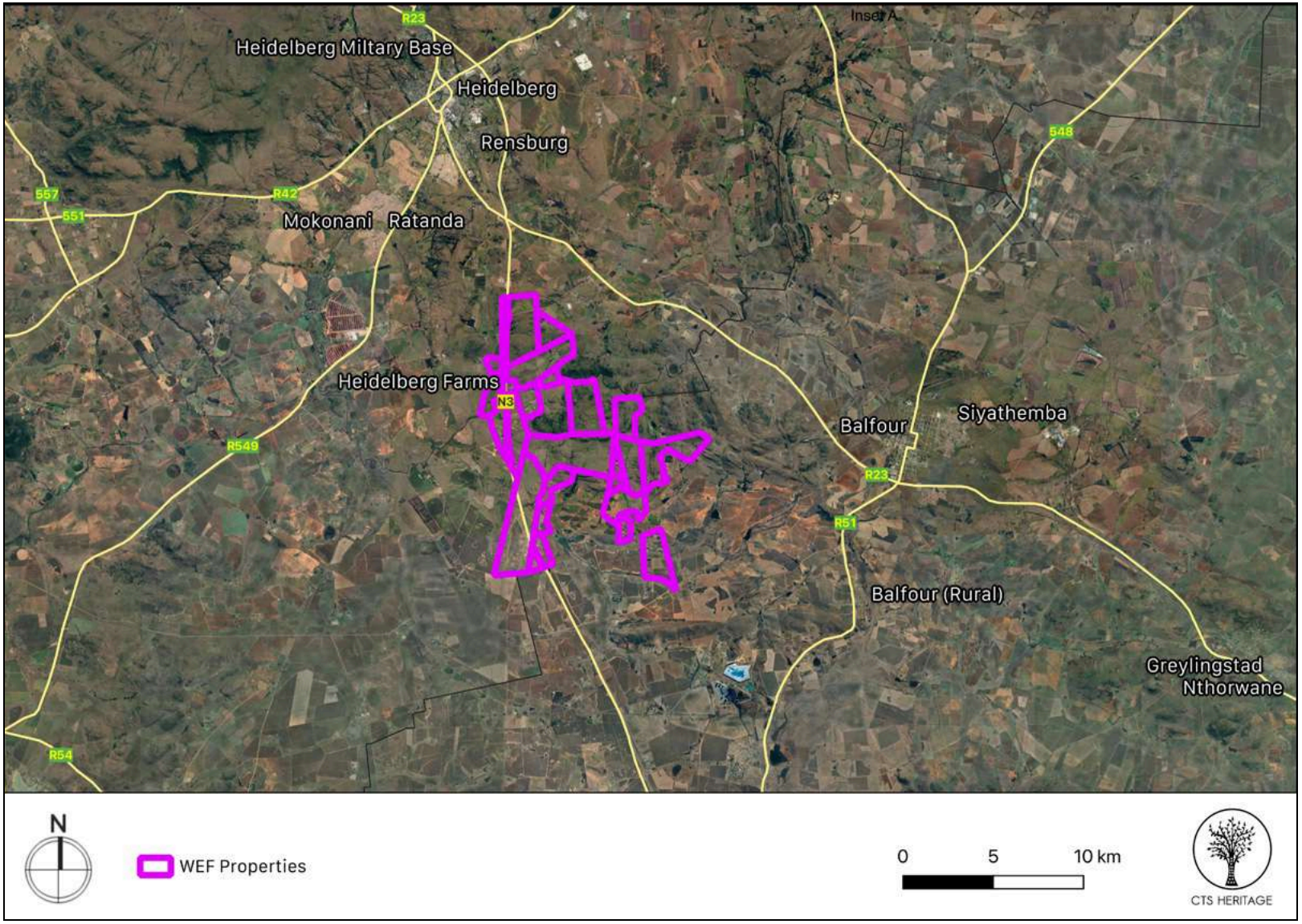

Figure 1.1 Overview Map. Satellite image (2026) indicating the proposed development area.

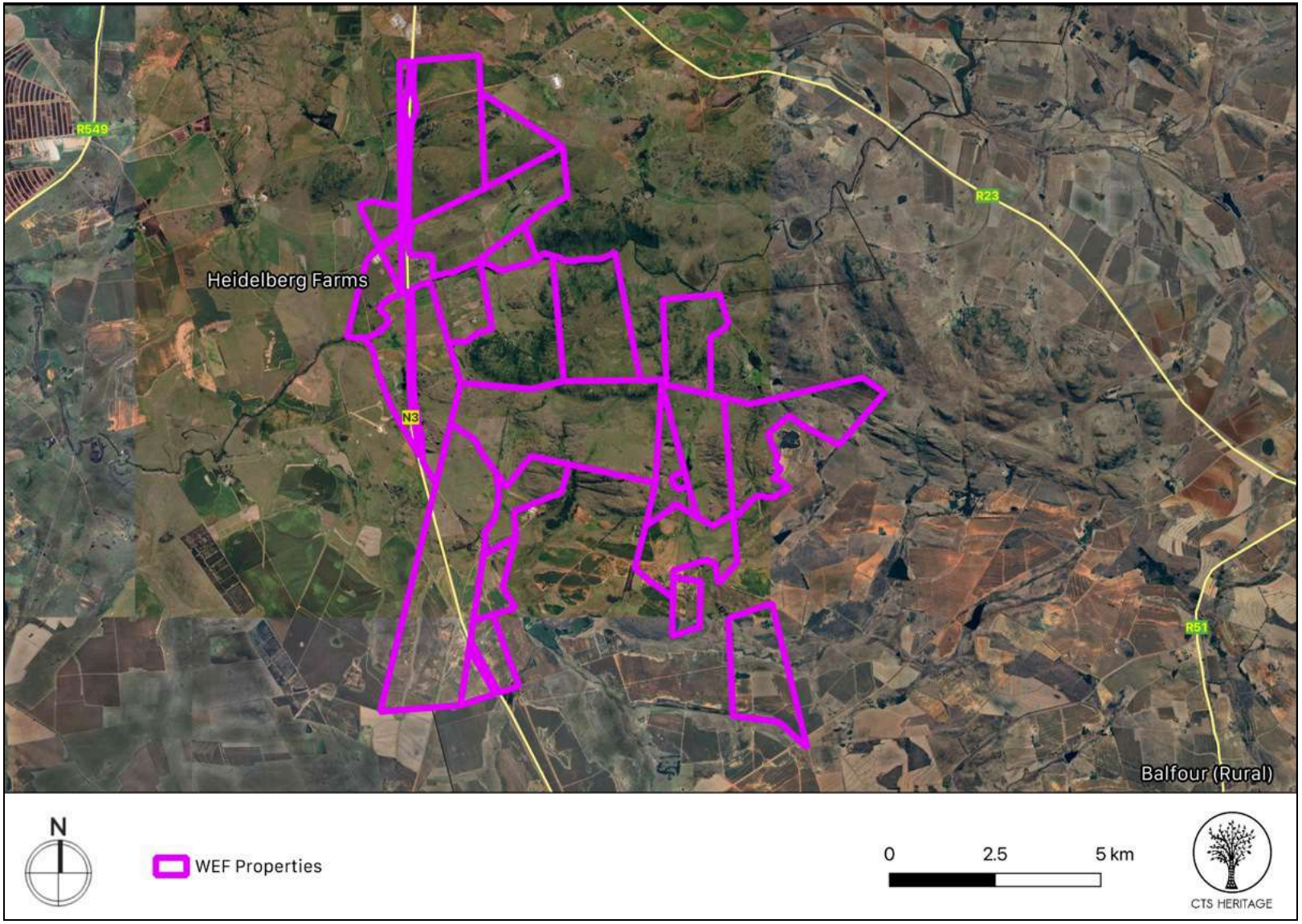

Figure 1.2 Overview Map. Satellite image (2026) indicating the proposed development area at closer range.

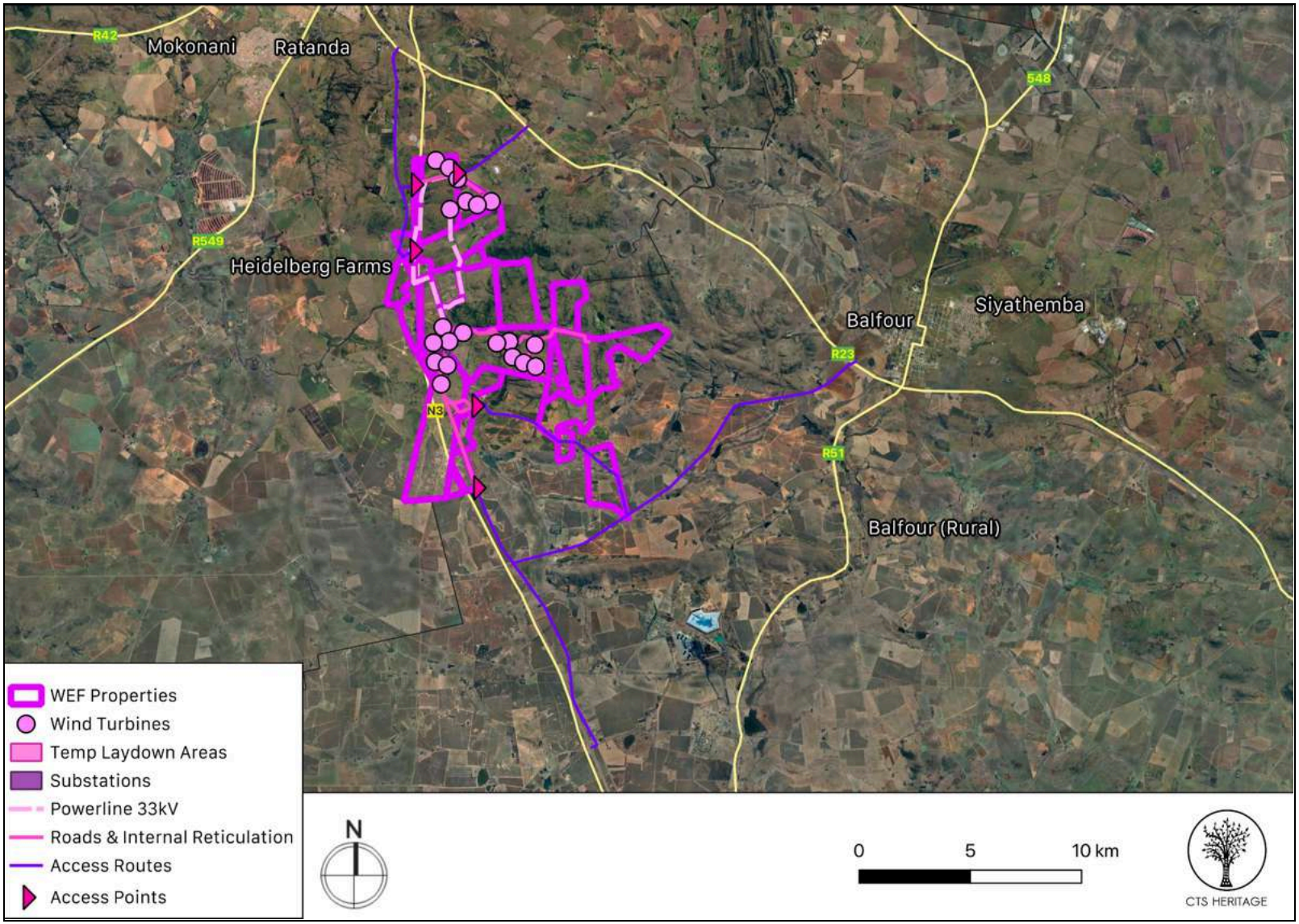

Figure 1.3 Overview Map. Satellite image (2026) indicating the more detailed proposed development layout.

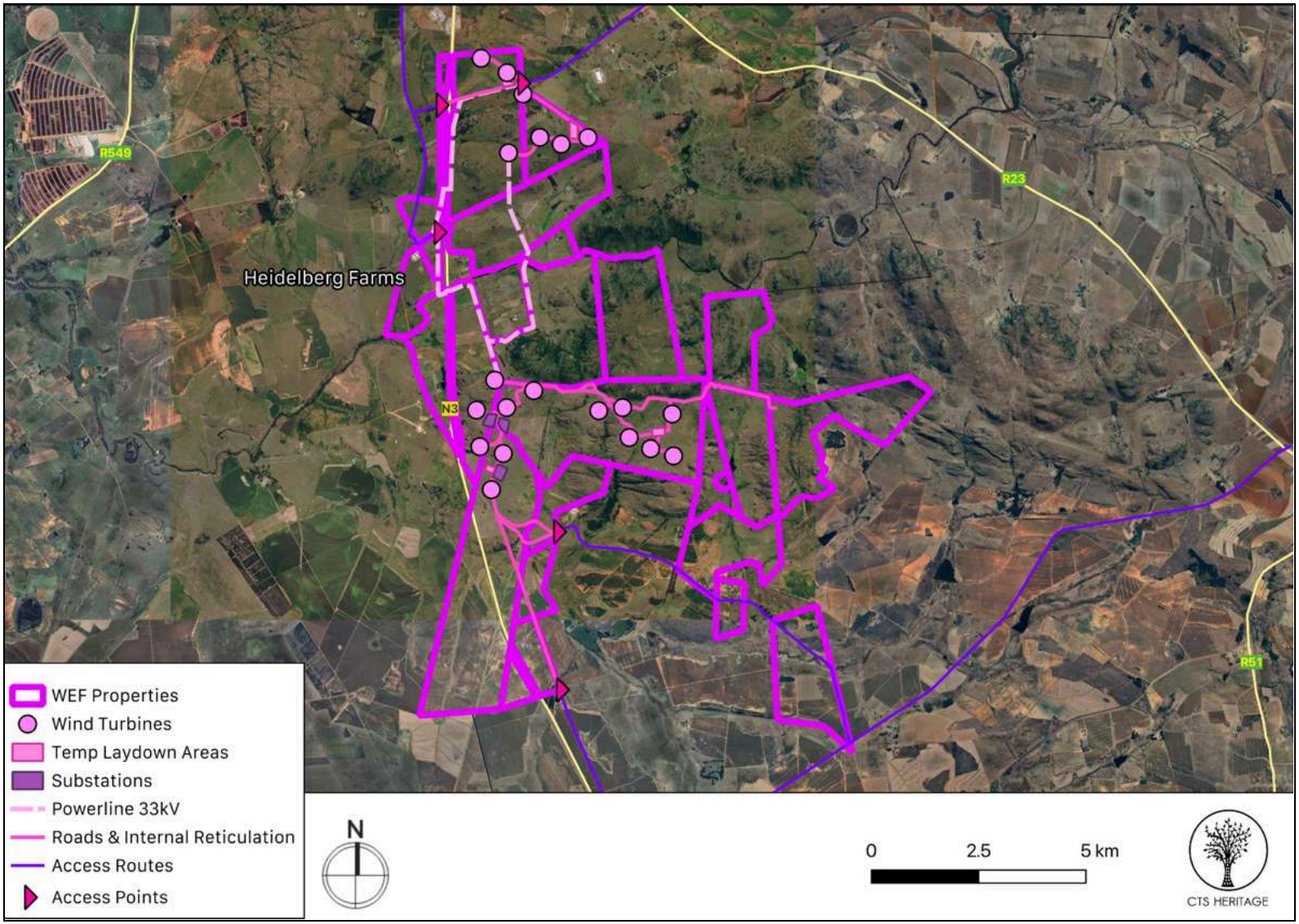

Figure 1.4 Overview Map. Satellite image (2026) indicating the more detailed proposed development layout at closer range.

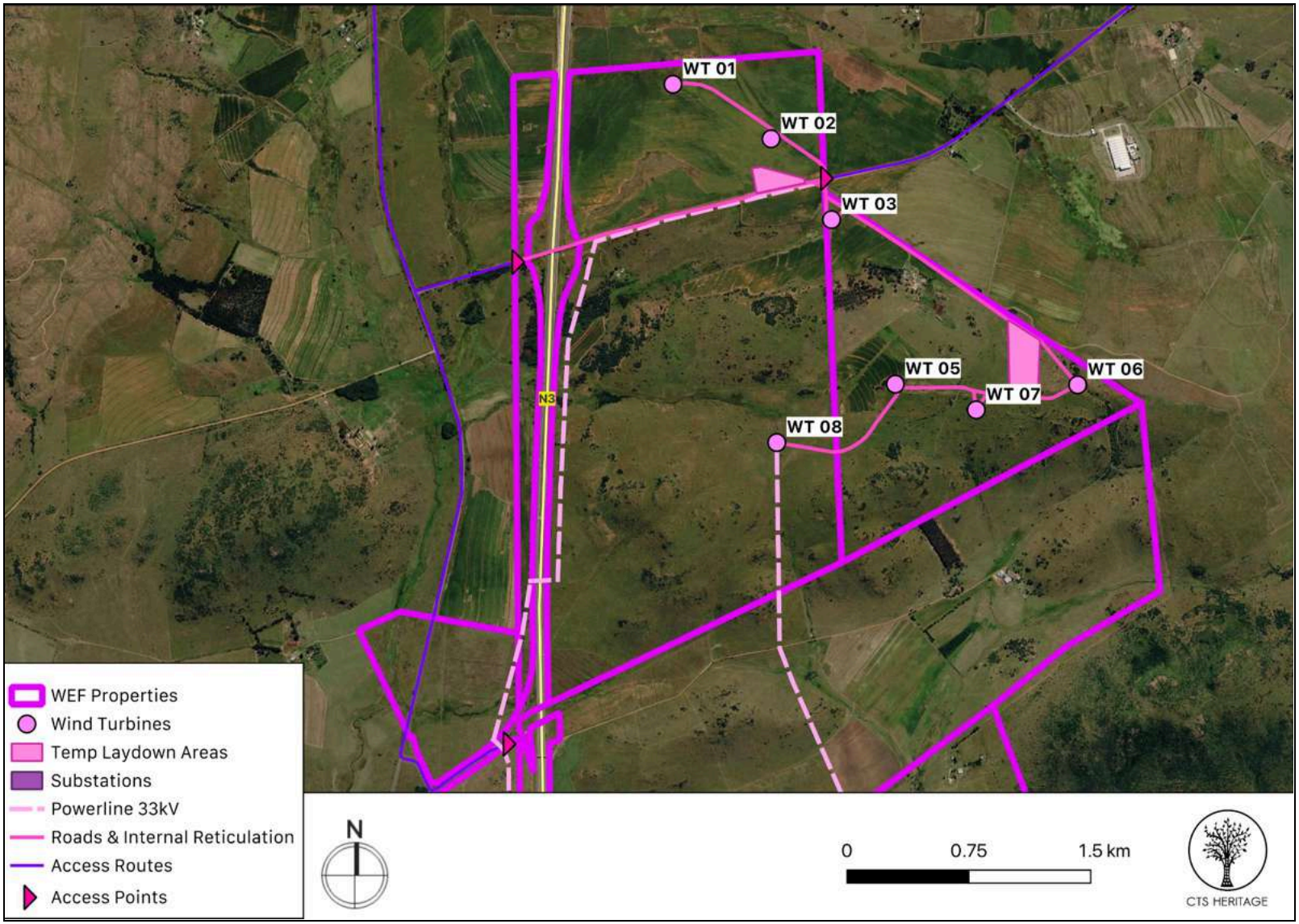

Figure 1.5 Overview Map. Satellite image (2026) showing proposed Wind Turbine Locations.

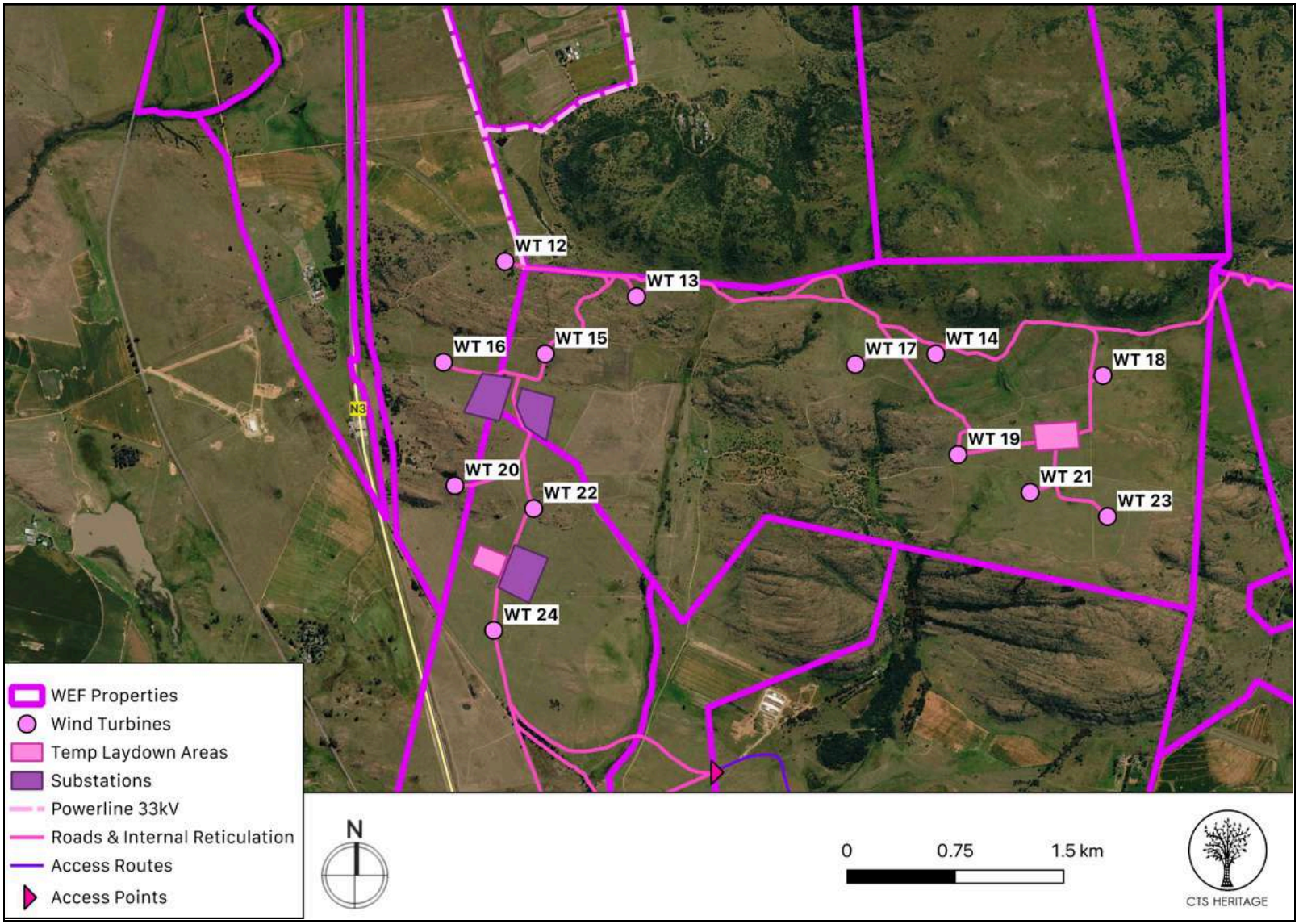

Figure 1.6 Overview Map. Satellite image (2026) showing proposed Wind Turbine Locations.

1.3. Legislative Framework

1.3.1 Relevant Acts, Ordinances and By-laws (National, Provincial and Municipal)

National Heritage Resources Act 25 of 1999

- to introduce an integrated and interactive system for the management of the national heritage resources;
- to promote good government at all levels, and empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations;
- to lay down general principles for governing heritage resources management throughout the Republic;
- to introduce an integrated system for the identification, assessment and management of the heritage resources of South Africa;
- to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources at national level;
- to set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance;
- to control the export of nationally significant heritage objects and the import into the Republic of cultural property illegally exported from foreign countries;
- to enable the provinces to establish heritage authorities which must adopt powers to protect and manage certain categories of heritage resources;
- to provide for the protection and management of conservation-worthy places and areas by local authorities;
- Section 7 provides a system for evaluating cultural significance - the grading system

Integrated Coastal Management Act 24 of 2008

- Integrated coastal and estuarine management, including heritage sites within 1km of the coastline

National Environmental Management Act 107 of 1998

- Management of all environmental resources including heritage through the linking clause of S. 38(8) of the NHRA
- There is no specialist specific protocol - so the general protocol is used for impacts to heritage resources

Table 1: National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) - Requirements for Specialist Reports (Appendix 6).

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	**Relevant section in report**
ai	Details of the specialist who prepared the report,	Page 3
aii	The expertise of that person to compile a specialist report including a curriculum vitae	Page 3
b	A declaration that the person is independent in a form as may be specified by the competent authority	Attached by EAP
c	An indication of the scope of, and the purpose for which, the report was prepared	Section 2.1
ci	An indication of the quality and age of the base data used for the specialist report: SAHRIS palaeosensitivity map accessed – date of this report	Section 2.1 and Section 9
cii	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 5.1
d	The date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 2.2
e	A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2
f	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 5
g	An identification of any areas to be avoided, including buffers	Section 5
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 5
i	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.3
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 5
k	Any mitigation measures for inclusion in the EMPr	Section 8
l	Any conditions for inclusion in the environmental authorisation	Section 8
m	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8
ni	A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Section 7

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	**Relevant section in report**
nii	If the opinion is that the proposed activity 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 8
o	A description of any consultation process that was undertaken during the course of carrying out the study	Section 6
p	A summary and copies of any comments that were received during any consultation process	N/A
q	Any other information requested by the competent authority.	N/A
2	Where a government notice gazetted 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.	N/A

NEMA: Protected Areas Act 57 of 2003

- Management of declared World Heritage Sites and buffer areas within South Africa
- The purpose of the National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEMPAA) is to, inter alia, provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. To this end, it provides for the declaration and management of various types of protected areas.
- Section 39 of NEM:PAA requires the preparation and submission of a management plan for a protected area declared in terms of the Act. The objective of a management plan, as stated in Section 41 of NEM:PAA, is to ensure the protection, conservation and management of the protected area concerned in a manner that is consistent with the objectives of NEMPAA and for the purpose it was declared.
- Section 50(5) of NEM:PAA states that "*no development, construction or farming may be permitted in a nature reserve or world heritage site without the prior written approval of the management authority*."
- The management authority for a WHS is established through a NEM:PAA process. The MA is located within and funded by the DFFE.
- The MA is tasked with ensuring that activities within the WHS and its buffer area comply with the approved Conservation Management Plan developed for the WHS.

World Heritage Convention Act 49 of 1999

- Provides for the incorporation of the World Heritage Convention into South African law;
- Provides for the enforcement and implementation of the World Heritage Convention in South Africa;
- Provides for the recognition and establishment of World Heritage Sites;

- Provides for the establishment of Authorities and the granting of additional powers to existing organs of state;
- Provides for the powers and duties of such Authorities, especially those safeguarding the integrity of World Heritage Sites;
- Provides for where appropriate, the establishment of Boards and Executive Staff Components of the Authorities;
- Provides for integrated management plans over World Heritage Sites;
- Provides for land matters in relation to World Heritage Sites;
- Provides for financial, auditing and reporting controls over the Authorities;
- Provides for the establishment of the World Heritage Convention Committee of South Africa which is responsible for liaison with the World Heritage Convention Committee of UNESCO
- Declared WHS within this assessment area - Richtersveld Cultural Landscape WHS

1.3.2 Relevant International Treaties and Conventions

Unesco Convention on the Protection of World Cultural and Natural Heritage, 1972

- Provides a system for the protection of natural and cultural heritage sites which demonstrate importance for all the peoples of the world
- Provides a system for the identification of Outstanding Universal Value (OUV)

Burra Charter or the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (1979)

- Defines the basic principles and procedures to be followed in the conservation of Australian heritage places but is widely used across the world and very much in South Africa today.
- Accepts the philosophy and concepts of the ICOMOS Venice Charter, but wrote them in a form which would be practical and useful in Australia. The Charter is periodically revised and updated (most recent, 2013)
- Recognised as having pioneered the understanding of cultural heritage as going beyond the mere preservation of the built environment.

NARA Document on Authenticity (1994)

- Addresses the need for a broader understanding of cultural diversity and cultural heritage in relation to conservation in order to evaluate the value and authenticity of cultural property more objectively.
- "authenticity is an essential element in defining, assessing, and monitoring cultural heritage."
- "authenticity" varies from culture to culture - when authenticity is being assessed for a particular cultural heritage, its underlying cultural context should be considered

Convention for the Safeguarding of Intangible Cultural Heritage (2003)

- Intangible Cultural Heritage means the practices, representations, expressions, knowledge, and skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage.
- This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity.
- For the purposes of this Convention, consideration will be given solely to such intangible cultural heritage as is compatible with existing international human rights instruments, as well as with the requirements of mutual respect among communities, groups and individuals, and of sustainable development

1.3.3 Relevant Guidelines (promulgated and proposed)

HWC Grading: Purpose and Management Implications (2016)

- Although emanating from the Western Cape, this document provides clarity on the grading system outlined in Sections 7 and 8 of the NHRA
- Provides the basis for grading recommendations for heritage resources and the outcomes thereof

SAHRA Minimum Standards: Archaeological And Palaeontological Components Of Impact Assessment Reports, 2007

- Outlines the minimum requirements for impact assessments submitted to SAHRA in terms of section 38 of the NHRA

SAHRA Minimum Standards: Palaeontological Component of Heritage Impact Assessment Reports, 2012

- Outlines the minimum requirements for palaeontological impact assessments submitted to SAHRA in terms of section 38 of the NHRA

1.3.4 Any discipline specific permitting requirements

The NHRA describes a number of general protections that apply to heritage resources including:

- Section 34 permit for impacts to structures older than 60 years
- Section 35 permit for impacts to archaeological heritage, palaeontological heritage and meteorites
- Section 36 permit for impacts to burial grounds and graves that fall outside of a municipal cemetery
- Section 38 HIA process for impacts resulting from developments

The NHRA also describes a number of formal protections that apply to heritage resources that have been protected through the placement of a notice in a National or Provincial gazette

- Section 27 permit for impacts to National and Provincial Heritage Sites
- Section 28 permit for impacts to a site that is provisionally protected

- Section 29 permit for impacts to a buffer area around a National or Provincial Heritage Site
- Section 30 and 31 permits for impacts to sites placed on the heritage register or heritage areas

1.3.5 Any relevant IFC, Equator Principles or World Bank requirements

IFC Performance Standard 7: Indigenous Peoples

Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalised and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded.

Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. As a consequence, Indigenous Peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities. This vulnerability may include loss of identity, culture, and natural resource-based livelihoods, as well as exposure to impoverishment and diseases. Private sector projects can create opportunities for Indigenous Peoples to participate in, and benefit from project-related activities that may help them fulfil their aspiration for economic and social development. Furthermore, Indigenous Peoples may play a role in sustainable development by promoting and managing activities and enterprises as partners in development. The government often plays a central role in the management of Indigenous Peoples' issues, and clients should collaborate with the responsible authorities in managing the risks and impacts of their activities.

The primary objectives of Performance Standard 7 are:

- To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples;
- To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts;
- To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner;
- To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life cycle.
- To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present;
- To respect and preserve the culture, knowledge, and practices of Indigenous Peoples; and
- There is no universally accepted definition of "Indigenous Peoples." Indigenous Peoples may be referred to in different countries by such terms as "Indigenous ethnic minorities," "aboriginals," "hill tribes," "minority nationalities," "scheduled tribes," "first nations," or "tribal groups."

The term "Indigenous Peoples" is used in a generic sense to refer to a distinct social and cultural group possessing the following characteristics in varying degrees:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture; or
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

Projects shall seek input from competent professionals to ascertain whether a particular group is considered as Indigenous Peoples.

IFC Performance Standard 8 - Cultural Heritage (2012)

This principle recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

The primary objectives of Performance Standard 8 are:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation; and
- To promote the equitable sharing of benefits from the use of cultural heritage. Cultural heritage refers to:
    - Tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values;
    - Unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and
    - Certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

1.3.6 Discussion

NATIONAL HERITAGE RESOURCES ACT (1999)

Heritage resources significant enough to be considered part of the national "estate" in Section 3(2) of the NHRA, and may include *inter alia:*

- 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 sites and objects;
- Graves and burial grounds;
- Sites of significance relating to the history of slavery in South Africa;
- Moveable objects including military objects, fine art, books records, documents, archaeological and paleontological objects, and materials.

Cultural heritage significance means aesthetic, historical, scientific, architectural, spiritual, technological or/and social significance. The process of deciding why a place is of heritage significance is called heritage assessment. Understanding heritage significance is essential to making sound decisions about the future of the heritage resource, to assess development proposals and to ensure the appropriate level of heritage management.

A culturally significant resource or site is considered part of the national estate if it has cultural significance or any other special values due to:

- Its importance in the community, or pattern of South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural history;
- Its potential to yield information that will contribute to an understanding of South Africa natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong and special association with the life or work of a person, group or organisation of importance in the history of South Africa;
- Sites of significance in relation to the history of slavery (Section 3[3] NHRA).

The National Heritage Resources Act (Act 25 of 1999) provides a mechanism for the management of heritage resources of cultural significance. The NHRA envisages a three tier system of management of heritage resources, namely National, Provincial and Local.

Specific management tools are available to Local Authorities for heritage resource management. In terms of section 8(4) of the National Heritage Resources Act, "A local authority is responsible for the identification and management of Grade III heritage resources and heritage resources which are deemed to fall within their competence in terms of this Act".

Registered Conservation Bodies play an extremely important role in assisting with the identification of heritage resources which are important to the community, and can provide local knowledge in determining their significance. The benefits to Local Authorities in implementing heritage management in terms of the NHRA include the protection of local resources, giving certainty to local property owners as to what is and is not protected, and enabling them to have their applications dealt with at a local level. The specific management tools provided for in the NHRA include:

- Grading (Sections 7 and 8 of the NHRA)
- Surveys (Section 30 of the NHRA)
- Heritage Registers (Section 30 of the NHRA)
- Heritage Areas (Section 31 of the NHRA)

Grading

The NHRA requires that all heritage resources be graded in order to assign the appropriate level of management responsibility (i.e. Local, Provincial or National spheres of governance) to a heritage resource and to indicate its significance. Significance is key to assessing grading and is the primary tool in defining heritage management.

The identification of significant heritage resources is a requirement of the National Heritage Resources Act, No 25 of 1999 (NHRA). NHRA Section 7 (1) makes provision for the establishment of a system of grading places and objects which form part of the national estate, and which distinguishes between at least the following categories:

- Grade 1: Heritage resources with qualities so exceptional that they are of special national significance and thus should be declared national heritage sites;
- Grade II: Heritage resources which although forming part of the national estate can be considered to have special qualities which make them significant within the context of a province or a region and thus should be declared provincial heritage sites; and
- Grade III: Other conservation-worthy heritage resources, which should be entered on the provincial heritage register and protected in terms of the local planning system.

This system needs to prescribe certain assessment criteria, consistent with the criteria set out in section 3(3) of the NHRA. These must be used to assess the intrinsic, comparative and contextual significance of a heritage resource and

the relative benefits and cost of its protection so that the appropriate level of grading of the resource and the consequent responsibility for its management may be allocated.

Grading is an important step in the process towards (but not necessarily leading to) the formal protection of a heritage resource, such as declaration as a National Heritage Site, Provincial Heritage Site, or, in the case of Grade III heritage resources, the placing of a heritage resource on the Heritage Register. It is not an end in itself, but a means of establishing an appropriate level of management to proceed with future formal protection.

In terms of grading, we will be following the recommended grading system included in the HWC Grading Policy document (2016).

Legislative Mandate

The National Heritage Resources Act (NHRA, Act 25 of 1999) primarily employs two mechanisms to ensure the effective conservation and management of significant heritage resources. These mechanisms are the Formal Protections detailed in Part I of Chapter II of the NHRA and the General Protections detailed in Part II of Chapter II of the NHRA. Formal Protections include the declaration of National and Provincial Heritage Sites, Heritage Areas as well as the establishment of the Heritage Register. The General Protections include permitting requirements for alterations to structures that are older than 60 years (Section 34) and permit requirements for impacts to archaeological and palaeontological heritage resources (Section 35), amongst others.

Applications for renewable energy developments, in general, fall under section 38 of the NHRA, a section that falls within Part II of Chapter II - the General Protections. This section of the heritage legislation is triggered by developments of a certain scale, size or nature such as the change of character to a site exceeding 5000m^2. Section 38(8) of the NHRA specifically deals with such developments that also trigger other legislation that requires an assessment of impacts, for example, in terms of NEMA.

Section 38(8) of the NHRA requires that any assessment of impacts from such developments also include an assessment of impacts to heritage resources that satisfies certain criteria detailed in section 38(3) of the NHRA. Section 38(8) also requires heritage authorities to comment on such heritage impact assessments, and that the relevant decision-making authorities (such as the DFFE) take this comment into consideration prior to issuing the authorisation (such as the Environmental Authorisation or equivalent). This is to ensure that any significant heritage resources that may be impacted by the proposed development are identified and appropriately managed or mitigated against impacts prior to authorisation.

In terms of section 38(3) of the NHRA, it is required that impacts to all heritage resources be assessed in an HIA. "All heritage resources" includes archaeological heritage, palaeontological heritage, the built environment as well as the cultural landscape more broadly. This HIA is drafted to satisfy this requirement.

2. METHODOLOGY

2.1 Purpose of HIA

The purpose of this Heritage Impact Assessment (HIA) is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999).

2.2 Summary of Steps Followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- An archaeologist conducted an assessment of archaeological resources likely to be disturbed by the proposed development. The archaeologists conducted their site visit from 12 to 18 November 2024
- A palaeontologist conducted a desktop assessment of palaeontological resources likely to be disturbed by the proposed development.
- The identified resources were assessed to evaluate their heritage significance and impacts to these resources were assessed.
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

2.3 Assumptions and Uncertainties

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

- It should be noted that archaeological and palaeontological deposits often occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted, and it would be required that the heritage consultants are notified for an investigation and evaluation of the find(s) to take place.

However, despite this, sufficient time and expertise was allocated to provide an accurate assessment of the heritage sensitivity of the area.

2.4 Constraints & Limitations

The terrain assessed in the WEF Cluster varies widely from flat, level terrain around the boundaries of the WEF's central area, to extremely rugged, mountainous terrain in the centre, especially either side of the valley cut by the Suikerbosrantrivier. The vegetation is well-established and dense in the mountainous areas as these have not previously been ploughed due to the rugged terrain. The lowlands also varied where cattle grazing had not recently taken place and surface visibility was low due to the dense grass cover. The survey relied heavily on the use of historical satellite imagery obtained from the NGI (NGI aerial photographs 1944) and the historic satellite imagery

from 2009 and 2011 from Google Earth to locate possible areas for Iron Age enclosures and historical settlements before returning to the field to verify these sites in the field. The combination of the two methods worked very well and a great number of sites were located using this method.

2.5 WSP Impact Assessment Methodology

Assessments of Impacts and Mitigation

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria presented in Table 1 below.

Impact Mitigation

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no

offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

Table 2: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria:	S=(E+D+R+M)xP Significance=(Extent+Duration+Reversibility+Magnitude) x Probability				

IMPACT SIGNIFICANCE RATING					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

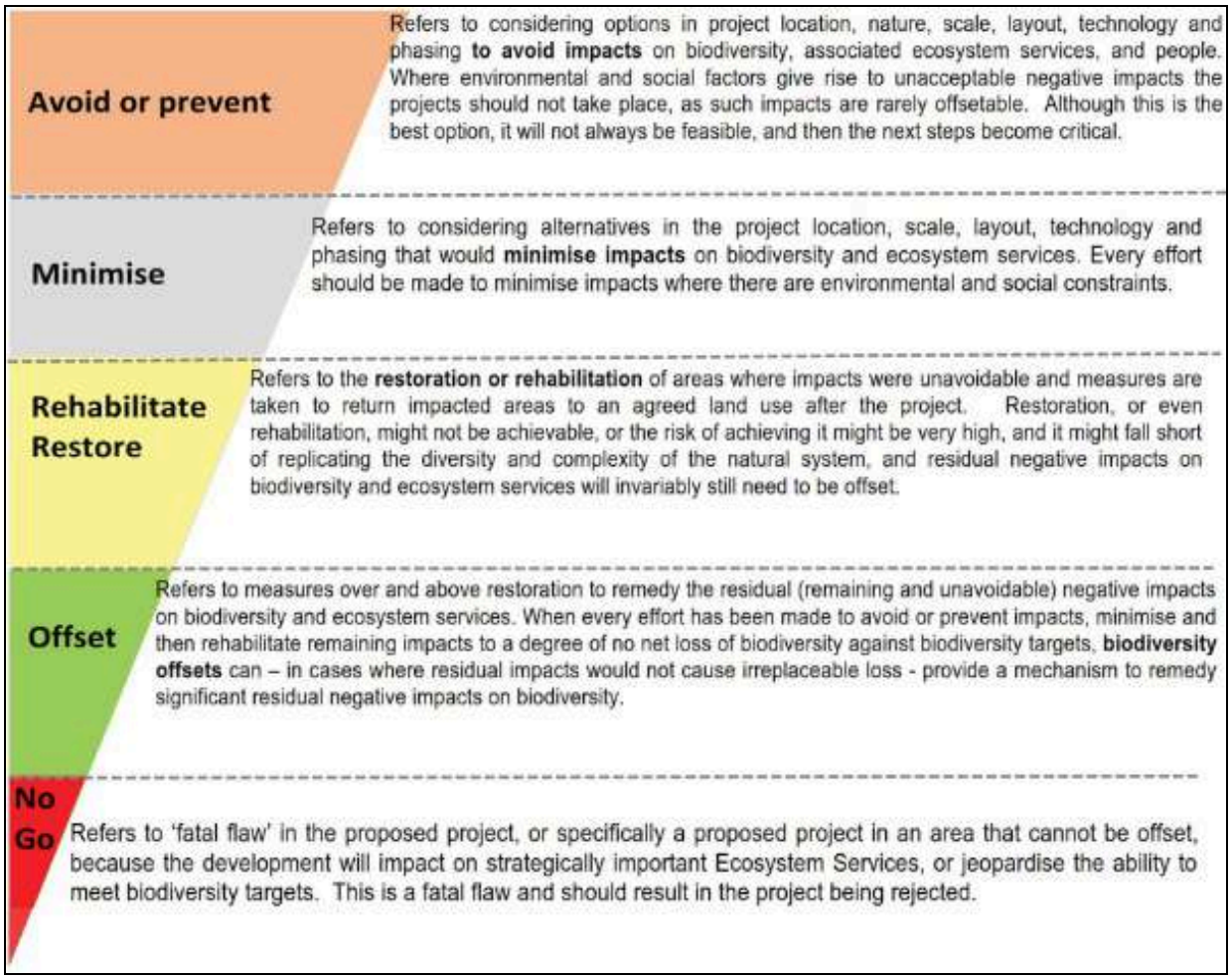

Figure 2: Mitigation Sequence Hierarchy

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

3.1.1 Background

This application is for the proposed development of the ABO Uvemvane Wind Energy Facility 1 located between Balfour in the Mpumalanga province and Heidelberg in Gauteng province. According to Raper et al (2018) in the Dictionary of Southern African Place Names, Balfour was "*established on the farms Vlakfontein No. 101 and No. 108 which belonged to Frederick Stuart McHattie, and named McHattiesburg after him in 1897. Proclaimed on 16 February 1898, it was renamed Balfour on 15 February 1905, after Arthur James Balfour, Prime Minister of Great Britain, 1902-1905, who visited South Africa in that year.*" Balfour's economy is mainly gold mining and maize farming.

Heidelberg was laid out on the farm Langlaagte and attained municipal status in 1903 (Raper, 2018). Heidelberg was founded in 1862 when H.J. Uckerman established a trading post at the foot of the Suikerboschrand. The town was planned in 1865, named after Uckerman's university in Germany. It was a key junction for wagon trails connecting settlements across the Transvaal. With the completion of the railway to Natal in 1895, Heidelberg became a hub for both rail and road transport. The station was later restored and now serves as the Heidelberg Motor Museum. During the Witwatersrand gold rush, the town thrived, with 18 hotels, though its boom has since passed. A monument commemorates P. Kruger, M. Pretorius, and P. Joubert for their role in the Boer struggle. Heidelberg briefly served as the provincial capital for the Boer government during the Anglo-Boer War (Pistorius, 2003, SAHRIS ID 5053). During the Second Anglo-Boer War, the British constructed a concentration camp.

3.1.2 Built Environment & Cultural Landscapes

The landscape in which the proposed development is located is mountainous with the Suikerbosrandrivier running through the middle. There are several farm werfs located within the proposed development area. Some of these have associated historical cemeteries indicated on the first edition 1:50 000 topo map (Figure 3.5). Although the N3 has diverged from historical routes, the R23 still follows along a historical route that might be impacted by the proposed development (Figure 3.4). These werfs and associated structures are older than 60 years, based on the First Edition 1:50 000 Topo Map, and further assessment is required to mitigate impact.

According to Doucakis (2021), one of the farms, Laagerspoort (also known as Lagerspoort) used to be known as Onderstepoort. This was the location of Voortrekker Hendrik Potgieter's lager during the three day campaign (28-30 November 1837). Further details of this conflict is found in Fourie (2016), "*A commando of 330 Voortrekkers and a small group of Barolong under the command of Andries Hendrik Potgieter and Piet Uys attacked the Khumalo Ndebele of Mzilikazi in the vicinity of the Marico River. Of interest for this study is that they departed Lagerspoort near present-day Heidelberg and travelled via the present-day farm of Deelkraal … to the Matabele settlements near the Marico River. During the attack some 500 Matabele were killed and 3000 cows taken by the Voortrekker commando. On their way back,*

the cows were divided amongst the members of the commando on the property today known as Deelkraal (Bergh, 1999).” The exact location of the lager could not be confirmed, but Doucakis quotes Reverend N. Roberts “ *Lat. 26 . 37’ 30” S. & Long. 28 . 25’E. on the farm LAGERSPOORT 310 [406 IR], situated at the foot of a steep and high mountain, on the right [north] bank of the Sugar Bush River where it emerges from the hills to the North-East of the Heidelberg-Villiers road. From information gathered on the spot it appears that the lager [sic] stood close to the house now occupied by Mr. van Breda.” (*This location has been marked on Figure 3.2).

Most of the nearby sites from SAHRIS are structures associated with the development of railway lines. They have been identified and recorded as part of a project called Footsteps Along the Tracks (FAT). This includes the site identification, documentation and assessment of extant built structures, originally constructed by the Netherlands South African Railway Company (Nederlandsche Zuid-Afrikaansche Spoorwegmaatschappij - NZASM). Although these sites have been graded as having very high levels of regional significance on SAHRIS (Grade II), none of these sites have been formally protected through the publication of a gazette notice in terms of section 27 of the NHRA. Furthermore, the actual cultural value of these sites is likely to be of high or moderate local significance (Grade IIIA or IIIB). Due to the location of these structures being located outside of the area proposed for development, no impact to these resources is anticipated from this proposed development.

Table 3: NZASM’s FAT project’s findings of structures in the vicinity of the project

SAHRIS ID **Line Name** **Site Name**	**Statement Of Significance**	**Grade** **Images**
105330 NZASM_SEL_076 Suikerbosrand cutting	Cutting; On the original trajectory, now defunct. This structure, being part of the larger NZASM endeavour, falls under the generic NZASM statement of significance, but specifically is also a good extant example of its type. Its importance lies in its associations with South Africa's community, heritage, and is considered uncommon, rare and endangered; it has the potential to yield information for understanding; as an object it demonstrates principal characteristics; has particular aesthetic characteristics; demonstrates a high degree of technical achievement; has strong and special associations with both historic and contemporaneous communities; has a special association with the life and work of an important organisation and its associated persons; and is significant in revealing labour practices of the time; all as they relate to the culture of South Africa and her international cultural historic affiliates. The NZASM South-Eastern Line cutting at the Suikerbosrand River has served local farmers and fishermen alike since the line trajectory was relocated.	Grade II
105331 NZASM_SEL_077 Suikerbosrand bridge	Bridge; On the original trajectory, now defunct. This structure, being part of the larger NZASM endeavour, falls under the generic NZASM statement of significance, but specifically is also a good extant example of its type. Its importance lies in its associations with South Africa's community, heritage, and is considered uncommon, rare and endangered; it has the potential to yield information for understanding; as an object it demonstrates principal characteristics; has particular aesthetic characteristics; demonstrates a high degree of technical achievement; has strong and special associations with both historic and contemporaneous communities; has a special association with the life and work of an important organisation and its associated persons; and is significant in revealing labour practices of the time; all as they relate to the culture of South Africa and her international cultural historic affiliates.	Grade II

105332 NZASM_SEL_078 Kraal Station	Station; Associated with other remaining built structures along the original trajectory and at the Kraal precinct; Important built residue, still in use. Should any development occur, cognisance should be given to their heritage importance. This structure, being part of the larger NZASM endeavour, falls under the generic NZASM statement of significance, but specifically is also a good extant example of its type. Its importance lies in its associations with South Africa's community, heritage, and is considered uncommon, rare and endangered; it has the potential to yield information for understanding; as an object it demonstrates principal characteristics; has particular aesthetic characteristics; demonstrates a high degree of technical achievement; has strong and special associations with both historic and contemporaneous communities; has a special association with the life and work of an important organisation and its associated persons; and is significant in revealing labour practices of the time; all as they relate to the culture of South Africa and her international cultural historic affiliates. It is a scarce and authentic example of its type.	Grade II
105333 NZASM_SEL_079 Kraal Station Water tank	Water tank stand; Associated with other remaining built structures along the original trajectory and at the Kraal precinct; Important built residue, still in use. Should any development occur, cognisance should be given to their heritage importance. This structure, being part of the larger NZASM endeavour, falls under the generic NZASM statement of significance, but specifically is also a good extant example of its type. Its importance lies in its associations with South Africa's community, heritage, and is considered uncommon, rare and endangered; it has the potential to yield information for understanding; as an object it demonstrates principal characteristics; has particular aesthetic characteristics; demonstrates a high degree of technical achievement; has strong and special associations with both historic and contemporaneous communities; has a special association with the life and work of an important organisation and its associated persons; and is significant in revealing labour practices of the time; all as they relate to the culture of South Africa and her international cultural historic affiliates. It is a scarce example of imported prefabricated cast iron water tanks installed by the NZASM.	Grade II

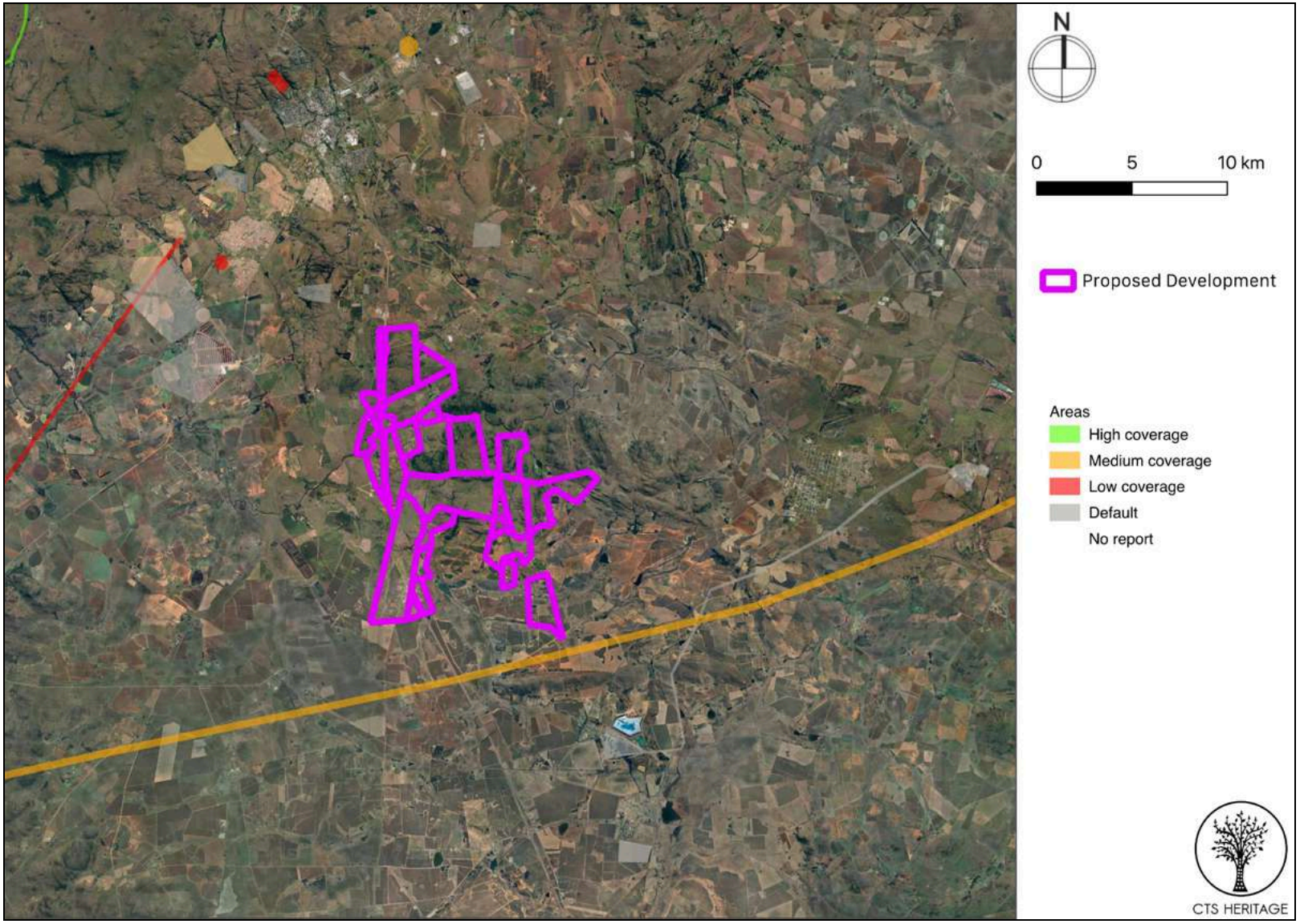

Figure 3: Spatialisation of heritage assessments conducted in proximity to the proposed development

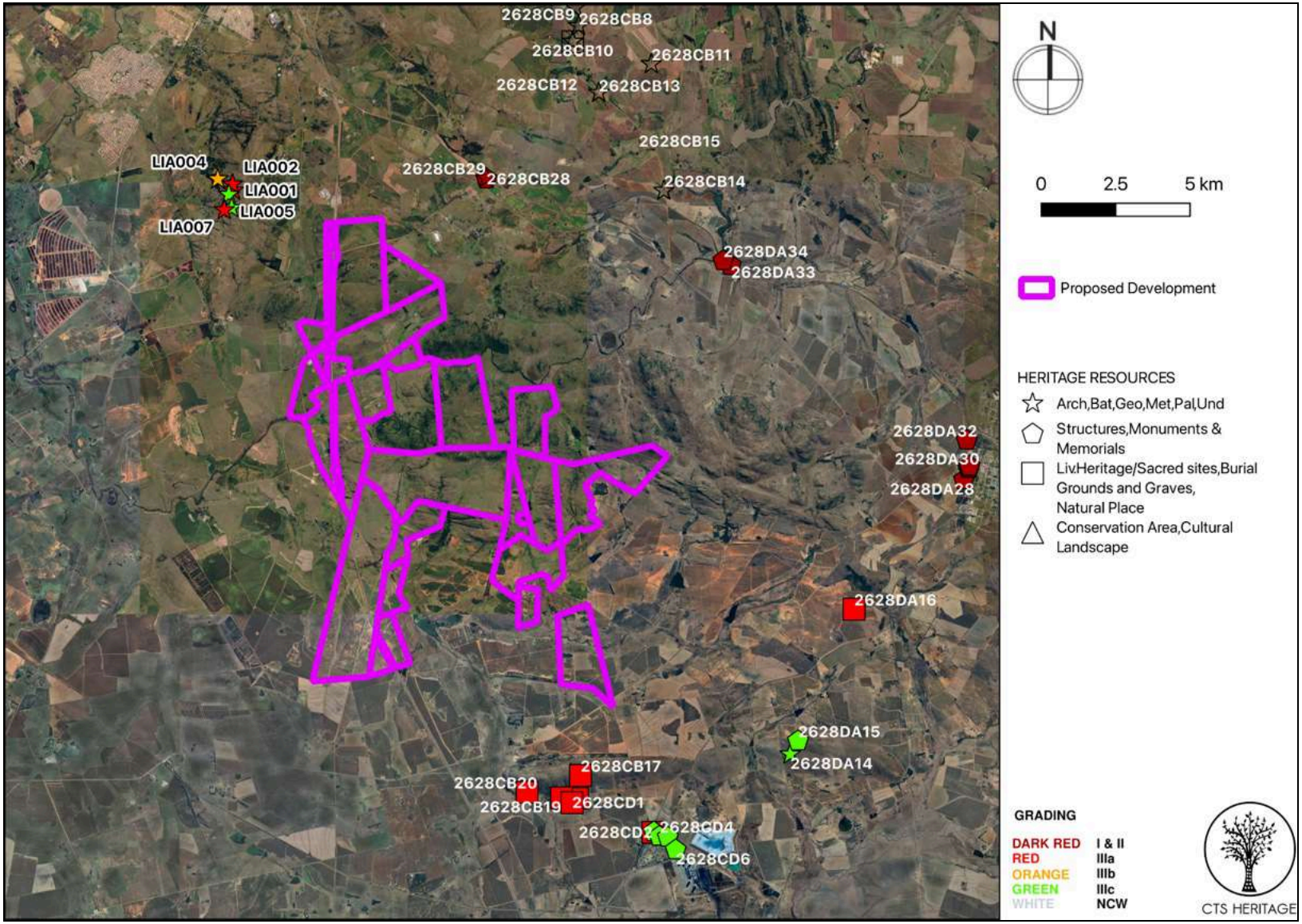

Figure 4.1 Heritage Resources Map. Heritage Resources previously identified in proximity to the study site, with SAHRIS Inv. Nos indicated.

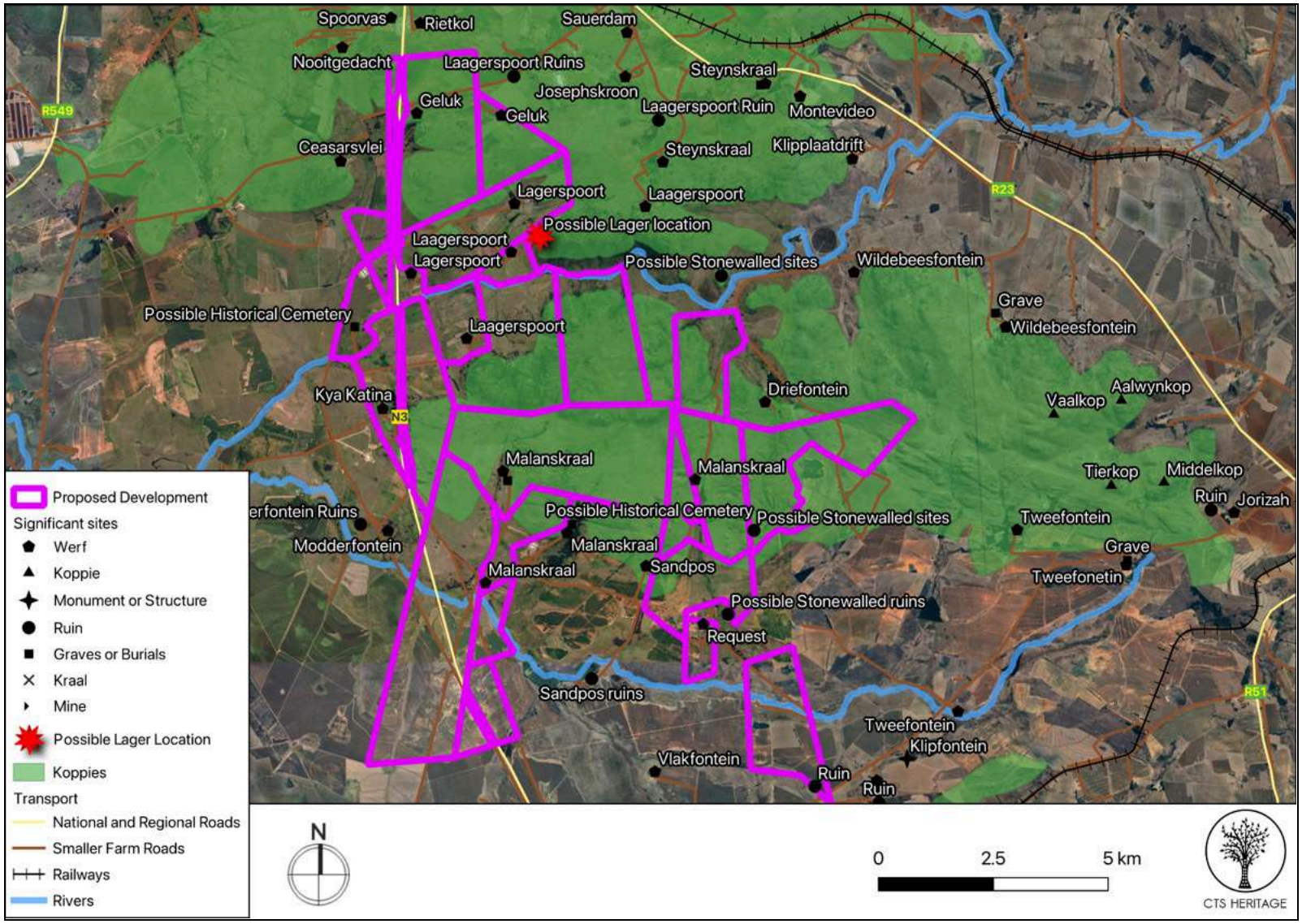

Figure 4.2 Cultural Landscape Map. Map indicating sensitive receptors near the proposed development, extracted from the Topo 1:50 000 map.

3.1.3 Archaeology

Very few archaeological impact studies have been conducted in the vicinity. Despite this, and the extensive agricultural transformation of the area, some archaeological sites spanning the Earlier, Middle and Later Stone Age have been found in the region. According to Pistorius (2003, SAHRIS ID 5053), the earliest remains in the area are stone-walled settlements built by Late Iron Age Sotho people, found primarily in the Suikerbosrand Nature Reserve. These sites were occupied from the 17th or 18th century well into the 19th century.

As noted by Coetzee (2015), *"The Late Iron Age (LIA) settlements are characterised by stone-walled enclosures situated on defensive hilltops c. AD 1640 - AD 1830). This occupation phase has been linked to the arrival of ancestral Northern Sotho, Tswana and Ndebele (Nguni–speakers) in the northern regions of South Africa with associated sites dating between the sixteenth and seventeenth centuries AD. The terminal LIA is represented by late 18th/early 19th century settlements with multichrome Moloko pottery commonly attributed to the Sotho-Tswana. These settlements can in many instances be correlated with oral traditions on population movements during which African farming communities sought refuge in mountainous regions during the processes of disruption in the northern interior of South Africa, resulting from the so-called difaqane (or mfecane)."*

In 2003, Pistorius (SAHRIS NID 5053) identified seven Late Iron Age Sites located on the lower foot slope of a mountain, approximately 4 km west of the proposed development (Figure 3.1). Site LIA001 is located at the base of a mountain and consists of a circular outer wall with inner enclosures, likely used for housing and livestock. It dates from the late 18th to early 19th century and is in excellent condition. Site LIA002, situated northwest of LIA001, is larger but shares a similar structure. A more recent brick building, now largely demolished, was built within the site. Though part of the archaeological surface was disturbed by this construction, much of the site remains intact. Site LIA003 is small, likely a single enclosure for small livestock, and is in pristine condition, dating to the same period as LIA001 and LIA002. Site LIA004, once a large settlement near an Eskom structure, was mostly destroyed by a bulldozer. It may have been the main village of the area, also dating to the late 18th to early 19th century. Site LIA005 consists of a single stone wall, possibly a retaining wall or part of a larger site that was destroyed. It dates from the Late Iron Age, with a nearby brick-paved area of a later date. Site LIA006, west of LIA005, has been mostly destroyed by a bulldozer, leaving little information about its structure. Site LIA007, located further west, has low outer walls and central enclosures. Its features are not well defined, and it also dates from the Late Iron Age. It appears, based on satellite imagery, that there are several possible stonewalled sites located in the proposed area for development.

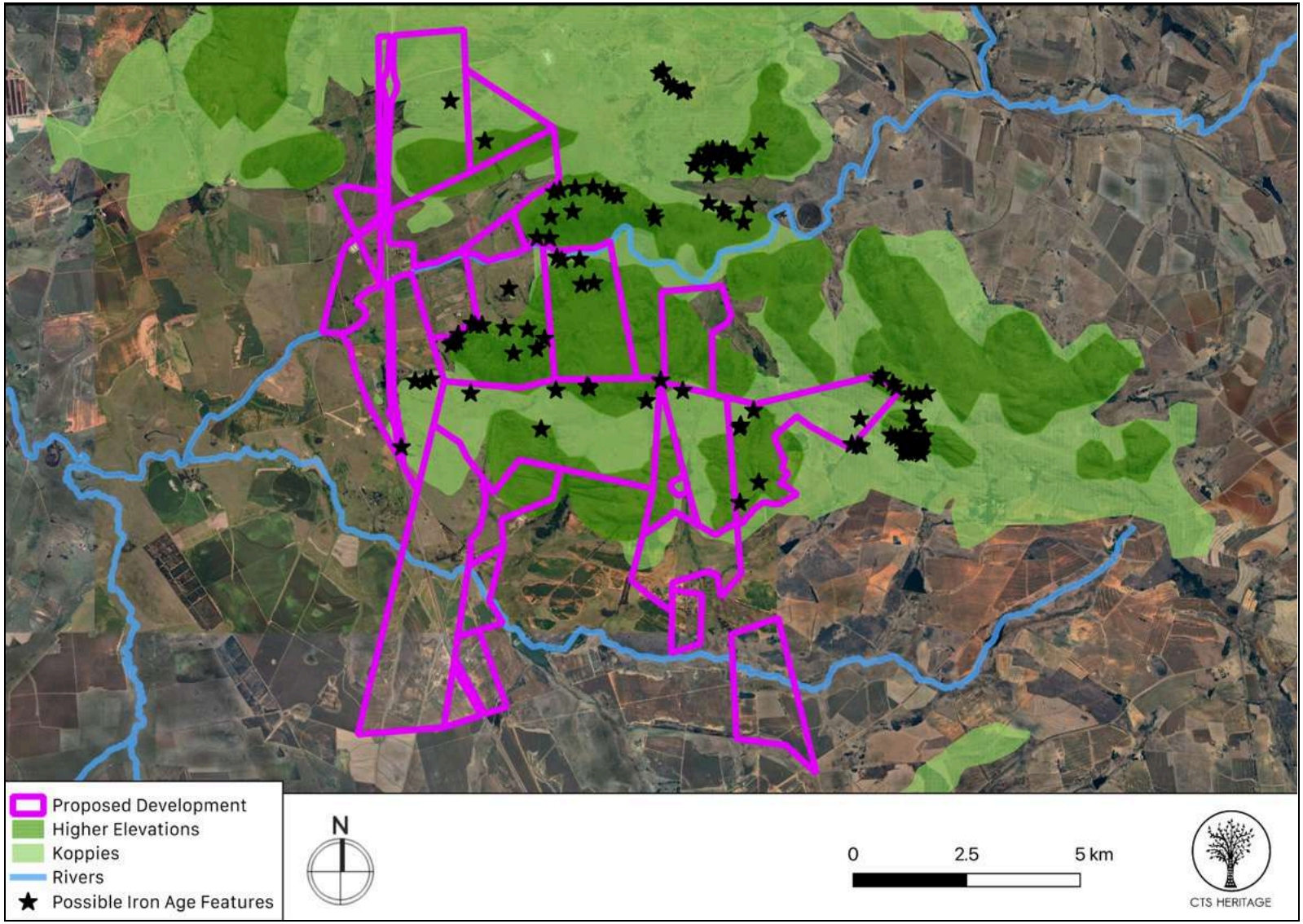

Figure 4.3 Cultural Landscape Map. Map indicating possible stonewalled ruins inside the proposed development, extracted from the historic aerial photography

Figure 4.4 Cultural Landscape Map. Map indicating possible stonewalled ruins inside the proposed development, extracted from the Topo 1:50 000 map.

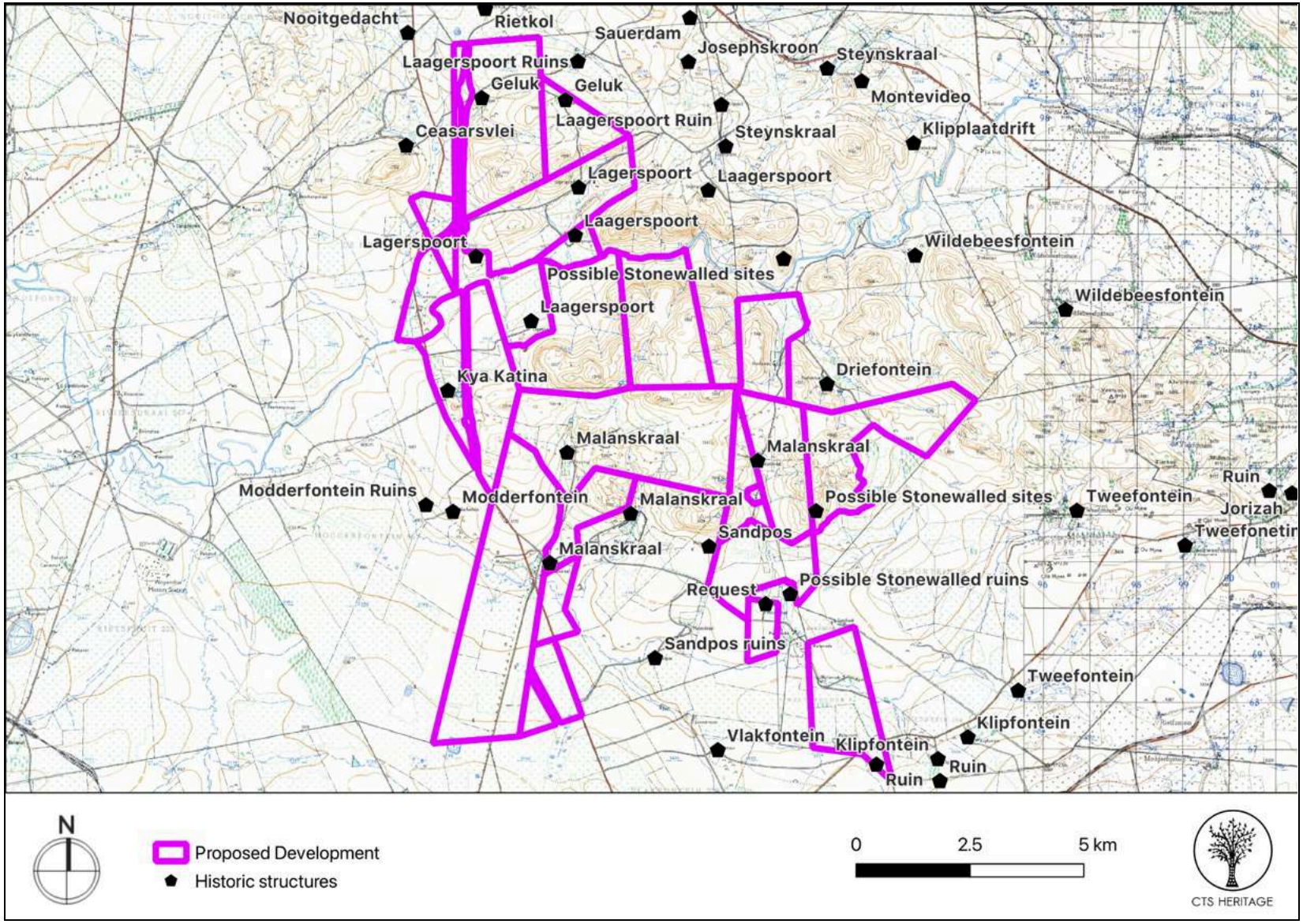

Figure 4.5 First Edition Topo Map. First Edition Topo Map indicating historical farm werfs that still exist.

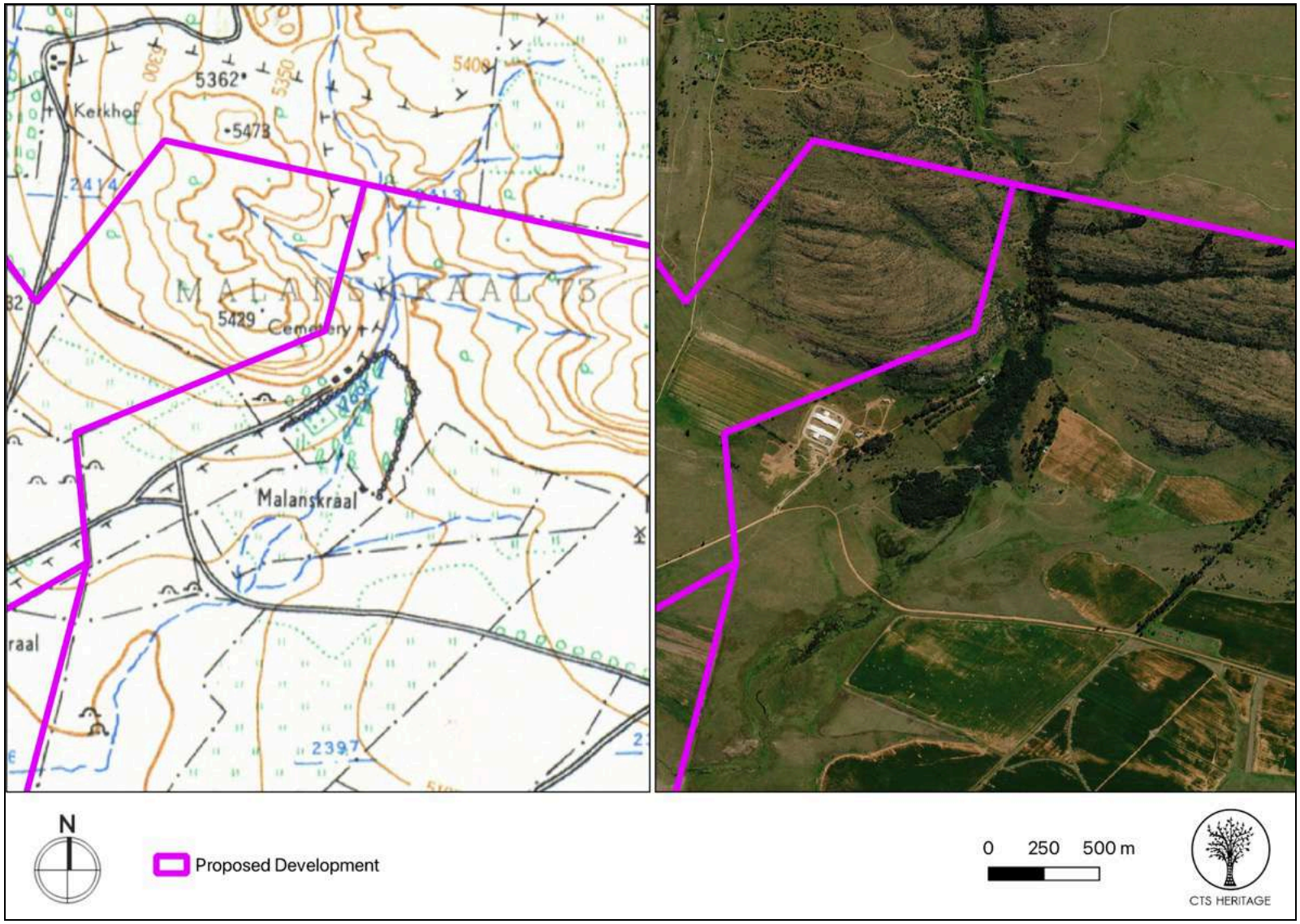

Figure 4.6 First Edition Topo Inset Map A. First Edition Topo Map indicating historical Malanskraal farm werf that still exists, and has an associated historical cemetery.

3.1.4 Palaeontology

According to the SAHRIS Palaeosensitivity Map, the proposed development is mostly underlain by sediments of Low palaeontological sensitivity, with some small areas underlain with Moderate to Very High fossil sensitivity (Figure 4.1). According to the extract from the Council of GeoScience Map CGS 2628 East Rand Geology Map the development area is underlain by sediments from Pv: Vryheid Formation in the Ecca Group, Ra: Alberton, and Rw: Westonaria, both in the Rk: Klipriviersberg Group, Rb: Booysens, Rjo: Johannesburg, and Rt: Turffontein Formations in the Central Rand Group, Rg: Government, and Rj: Jeppestown Formations in the West Rand Group, Q-a: Quaternary Alluvium and V-di: Diabase (Figure 4.2).

Most of the proposed development is underlain by the Klipriviersberg Group (Rk), and the Turffontein Formation (Rt) in the Central Rand Group. According to the Palaeotechnic report of Gauteng (Groenewald and Groenewald, 2014), the **Klipriviersberg Group,** which also contains the **Ra: Alberton, and Rw: Westonaria Formations,** has **Low** palaeontological sensitivity, with no fossils recorded. **Turffontein Formation** (Rt) in the Central Rand Group falls in the Witwatersrand Supergroup Which, according to the SAHRIS Fossil Heritage Browser, has **Insignificant or Zero** palaeontological sensitivity.

Other underlying sediments with **Insignificant/ Zero** palaeontological sensitivity, belong to the Witwatersrand SuperGroup: Rb: Booysens, and Rjo: Johannesburg Formations in the Central Rand Group, Rg: Government, and Rj: Jeppestown Formations in the West Rand Group.

The sediments marked as having Moderate sensitivity on the SAHRIS Palaeosensitivity Map, are **Quaternary Alluvium**. Groenewald and Groenewald (2014) note that "*Superficial deposits of Quaternary and Tertiary age can contain important fossils. Most notable are fossils associated with, for example, the Tswaing Impact Crater north of Pretoria (Johnson et al, 2006). The superficial deposits are allocated a moderate palaeontological sensitivity due to the fact that many fossiliferous rocks might be covered in a thin layer of soil, where fossils are only found where the topsoil has been removed by erosion.*" The Alluvial deposits, however, have **Low** palaeontological sensitivity, being "*Recent sandy and clayey deposits along water courses*" These sediments are known to contain a "*wide range of fossils possible, including mammalian bones and teeth, tortoise remains, ostrich egg etc.*"

The **Vryheid Formation** in the Ecca Group is the formation that has **Very High** palaeontological sensitivity. These deltaic sandstones, shales and coals, with minor conglomerates date to the Early to Middle Permian. It is known for its rich assemblages of plant fossils (Glossopteris Flora), including tree trunks, stumps and roots, palynomorphs, rare insects, conchostracans, and low diversity trace fossil assemblages. There are very rich and historically important plant fossil collections from the Vryheid Formation at Vereeniging. In a desktop PIA by Groenewald located approximately 15 km southeast of the proposed development (2014, SAHRIS NID 164647) the following was noted regarding the Vryheid Formation: "*The Vryheid Formation is well-known for the occurrence of coal beds that resulted*

from the accumulation of plant material over long periods of time. Plant fossils described by Bamford (2011) from the Vryheid Formation are; Azaniodendron fertile, Cyclodendron leslii, Sphenophyllum hammanskraalensis, Annularia sp., Raniganjia sp., Asterotheca spp., Liknopetalon enigmata, Glossopteris > 20 species, Hirsutum 4 spp., Scutum 4 spp., Ottokaria 3 spp., Estcourtia sp., Arberia 4 spp., Lidgetonnia sp., Noeggerathiopsis sp. And Podocarpidites sp.

According to Bamford (2011), little data has been published on these potentially fossiliferous deposits. Good fossil material is likely around the coal mines and yet in other areas the exposures may be too poor to be of interest. When they do occur fossil plants are usually abundant and it would not be feasible to preserve and maintain all the sites. In the interests of heritage and science, however, such sites should be well recorded, sampled and the fossils kept in a suitable institution.

Although no vertebrate fossils have been recorded from the Vryheid Formation, invertebrate trace fossils have been described in some detail by Mason and Christie (1986). It should be noted, however, that the aquatic reptile, Mesosaurus, which is the earliest known reptile from the Karoo Basin, as well as fish (Palaeoniscus capensis), have been recorded in equivalent aged strata in the Whitehill Formation in the southern part of the basin (MacRae, 1999). Indications are that the Whitehill Formation in the main basin might be correlated with the mid-Vryheid Formation. If this assumption proves correct, there is a possibility that Mesosaurus could be found in the Vryheid Formation.

The late Carboniferous to early Jurassic Karoo Supergroup of South Africa includes economically important coal deposits within the Vryheid Formation. The Karoo sediments are almost entirely lacking in body fossils but ichnofossils (trace fossils) are locally abundant. Modern sedimentological and ichnofaunal studies suggest that the north-eastern part of the Karoo basin was marine. In KwaZulu-Natal a shallow basin margin accommodated a prograding fluviodeltaic complex forming a broad sandy platform on which coal-bearing sediments were deposited. Ichnofossils include U-burrows (formerly Corophioides) which are assigned to ichnogenus Diplocraterion (Mason and Christie, 1986)….

The Permian aged Vryheid Formation contains significant fossils of plants belonging to the Glossopteris assemblage. It is therefore likely that fossils will be present in all outcrops on the sites of the development."

All of the proposed new infrastructure is located within areas of low and zero palaeontological sensitivity.

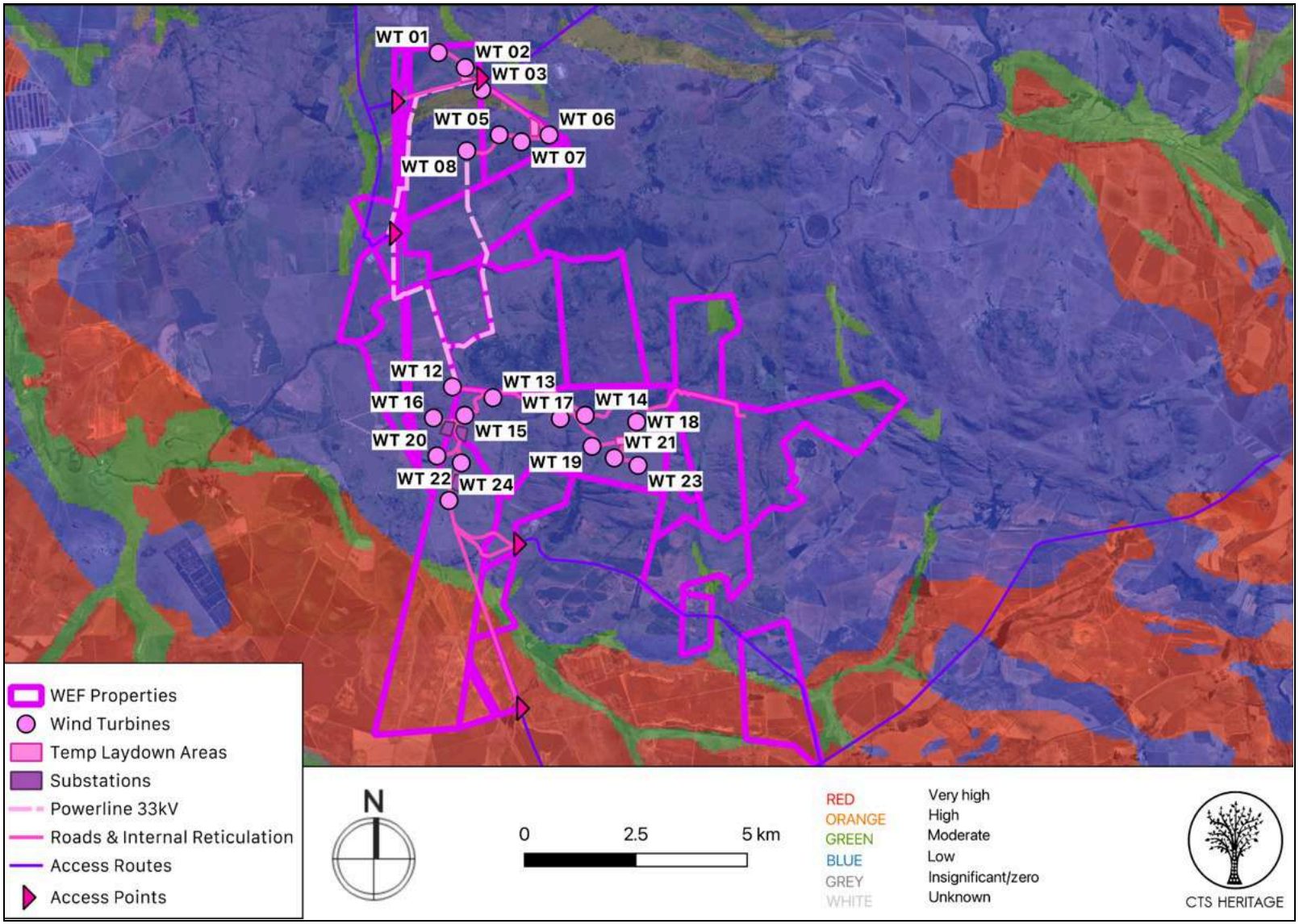

Figure 5.1 Palaeontological sensitivity of the proposed development area

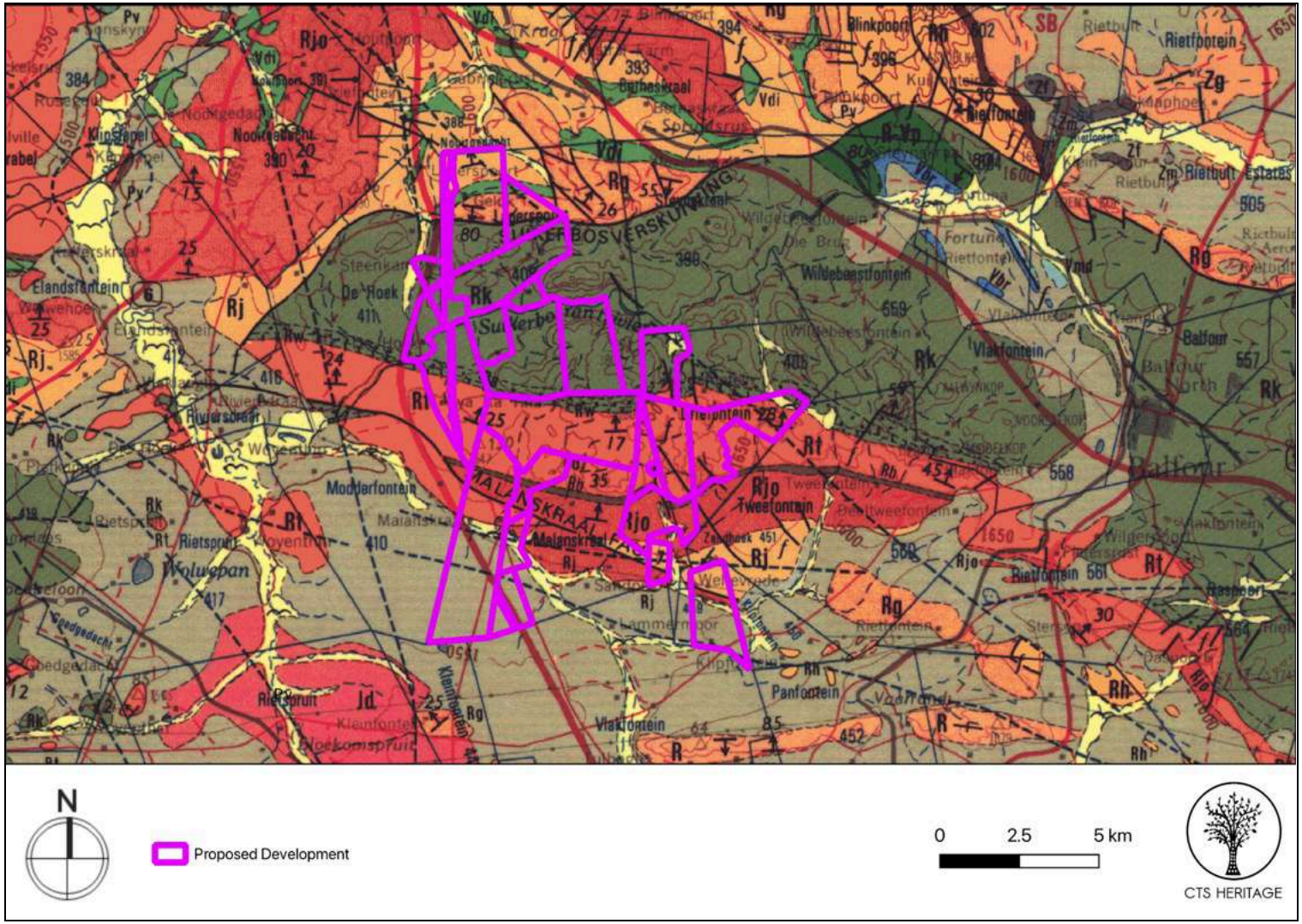

Figure 5.2 Extract from the CGS 2628 East Rand Geology Map indicating that the development area is underlain by Pv: Vryheid Formation in the Ecca Group, Ra: Alberton, and Rw: Westonaria, both in the Rk: Klipriviersberg Group, Rb: Booysens, Rjo: Johannesburg, and Rt: Turffontein Formations in the Central Rand Group, Rg: Government, and Rj: Jeppestown Formations in the West Rand Group, Q-a: Quaternary Alluvium and V-di: Diabase.

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of Findings of Specialist Reports

4.1.1 Archaeology (Appendix 1)

Over a hundred recordings were made in the field which primarily relate to the extensive Iron Age occupation history of the WEF area. Sites were located across a diverse topographic area, from the lowlands where maize cultivation had not obliterated the archaeological record, to the hilltops where enough ground was available to build Iron Age settlements with good visibility of the surrounding area. Historical werfs have been juxtaposed with the Iron Age settlements and the oldest historical kraals still feature at various places such as Steynskraal, Driefontein, Malanskraal and Laagerspoort. Many of the Iron Age enclosures had stone cairns in the centre of the kraals which are likely graves and Driefontein had a particularly extensive settlement cluster on the hills overlooking Vaalkop and Wildebeesfontein. The location of historical to modern graves in the 20th century near some of these sites attests to the largely unbroken oral history that has been retained by the farmworkers families descended from the Iron Age communities in the area.

The study area also has a South African War (2nd Boer War) site on a small koppie in the northeastern end of the WEF just south of the R23 main road. The site consists of small stone packed fortifications with another ruined werf at the base of the hill which may be contemporaneous with the fortifications. A number of historical and 20th century graveyards were recorded on several of the farms with some of the largest of these at Steynskraal and Malanskraal. One old gold mining shaft which had been hand-dug was also found south of Driefontein.

The Stone Age artefacts are primarily manufactured using local and abundant quartz and quartzites and the Iron Age sites also had a number of cores, flakes and debitage. It is possible that some mixing of occupation between Later Stone Age and Iron Age sites has taken place which is unsurprising given the nature of the terrain.

4.1.2 Palaeontology (Appendix 2)

According to the Palaeontological Sensitivity Map, the palaeontological sensitivities correspond to the underlying geological units. The Quaternary deposits (Alluvium) are classified as having **Low** palaeontological sensitivity, while the Vryheid Formation (Pv) is rated as having **Very High** palaeontological sensitivity. Units from the Witwatersrand and Ventersdorp Supergroups, along with diabase intrusions, are classified as having **Low** to **Zero/Insignificant** palaeontological sensitivity.

Witwatersrand Supergroup

The Witwatersrand Supergroup represents one of the most geologically significant sequences in South Africa, known primarily for its rich gold-bearing deposits. This supergroup comprises units such as the Turffontein Subgroup, Johannesburg Subgroup, Booysens Formation, Jeppestown Subgroup, and Government Subgroup. These formations

are predominantly composed of quartzites, shales, and conglomerates, which formed in ancient fluvial and shallow marine environments approximately 2.9 to 2.7 billion years ago during the Archean Eon.

Despite their importance in mineralogical studies, the Witwatersrand Supergroup has no recorded fossils due to the extreme age of these rocks, which predates the evolution of multicellular life. The palaeontological sensitivity of these formations is rated as **Low/Insignificant**, as they do not contain fossilized remains of organisms. Any potential fossils should be reported by the developer.

Ventersdorp Supergroup

The Ventersdorp Supergroup is a predominantly volcanic sequence, formed approximately 2.7 billion years ago, which includes the Klipriviersberg Group and its subdivisions, the Alberton Formation and the Westonaria Formation. These formations are composed of basaltic and andesitic volcanic rocks, interbedded with minor sedimentary layers.

Due to their volcanic nature, these units are completely incompatible with fossil preservation. Fossilization requires the presence of sediments to entomb and preserve organic material, which is absent in these formations. Additionally, the extreme heat and pressure during volcanic activity would have obliterated any organic material present. As a result, the palaeontological sensitivity of the Ventersdorp Supergroup is classified as **Zero/Insignificant**, with no fossils recorded in these formations. No specific mitigation measures are required however Any potential fossils should be reported by the developer.

Diabase Intrusions

Diabase intrusions are igneous rocks that formed as magma intruded into the surrounding strata. These rocks are typically dark and fine-grained, composed mainly of plagioclase and pyroxene minerals. The intense heat and molten nature of the diabase at the time of emplacement rendered these rocks incapable of preserving fossils. Although these intrusions are geologically significant as they provide insights into the tectonic history of the region, they have **Zero** palaeontological sensitivity because no organic material could survive the extreme conditions of their formation. No mitigation measures are required for these units.

Karoo Supergroup: Vryheid Formation (Pv)

The Vryheid Formation was formed during the Permian period, approximately 299 to 251 million years ago. It consists of deltaic sandstones, shales, and coal beds, reflecting ancient swampy, deltaic, and nearshore environments, making it an important formation to study the Permian ecosystems and depositional settings.

The Vryheid Formation hosts a diverse array of fossils, including plant remains from the *Glossopteris* flora (tree trunks, stumps, roots, and leaves), fertile organs, lycopods, rare ferns such as *Asterotheca hammanskraalensis*, horsetails like *Annularia*, cordaitales, conifers, ginkgoales, and fossil wood (Kovacs-Endrooy, 1991). Plant fossils described by Bamford (2011) from the Vryheid Formation include *Azaniodendron fertile*, *Cyclodendron leslii*, *Sphenophyllum*

hammanskraalensis, *Annularia sp.*, *Raniganjia sp.*, *Asterotheca spp.*, *Liknopetalon enigmata*, *Glossopteris* (>20 species), *Hirsutum* (4 spp.), *Scutum* (4 spp.), *Ottokaria* (3 spp.), *Estcourtia sp.*, *Arberia* (4 spp.), *Lidgetonnia sp.*, *Noeggerathiopsis sp.*, and *Podocarpidites sp.* According to Bamford (2011), little data has been published on these potentially fossiliferous deposits. While fossil plants are often abundant, particularly around coal mines, exposures in other areas may be too poor to be of significant interest. In the interests of heritage and science, sites with abundant fossil material should be well recorded, sampled, and the fossils preserved in suitable institutions.

The Vryheid Formation also preserves abundant trace fossils, including *Diplocraterion*, *Skolithos*, *Helminthopsis*, and *Planolites* (Turner et al., 1981; Mason & Christie, 1986), as well as palynomorphs (pollen and spores) (Millsteed, 1994), and rare invertebrates such as insects, possible conchostracans, non-marine bivalves, and fish scales. Mason and Christie (1986) noted invertebrate trace fossils in some detail. Although no vertebrate fossils have been recorded directly from the Vryheid Formation, *Mesosaurus* and fish (*Palaeoniscus capensis*) have been documented in equivalent-aged strata in the Whitehill Formation in the southern part of the basin (MacRae, 1999). Indications are that the Whitehill Formation in the main basin may correlate with the mid-Vryheid Formation. If this assumption proves correct, there is a possibility that *Mesosaurus* could be discovered in the Vryheid Formation (Groenewald, 2014).

These fossils provide critical insights into Permian biodiversity, depositional environments, and the ecological interactions of ancient swampy and deltaic ecosystems. The coal seams, classified as compaction fossils, further reflect the unique conditions and significance of this geological unit (Cairncross, 1989).

Due to its significant fossil content, the palaeontological sensitivity of the Vryheid Formation is classified as **Very High.** This classification underscores the importance of protecting and studying the formation to enhance our understanding of ancient ecosystems and the evolution of plant and animal life during the Permian.

Quaternary Deposits (Alluvium)

The Quaternary deposits, composed of unconsolidated clay, silt, sand, and gravel, were formed during the last 2.6 million years. These deposits are typically found in association with modern riverbeds, floodplains, and other low-lying areas, reflecting the dynamic processes of recent geological history.

Occasionally, fossils are discovered within these deposits, offering insights into past environments and ecosystems. Common finds include calcretised insect burrows, which provide valuable information about paleoenvironmental conditions. Ostrich eggshells are another typical discovery in Quaternary sediments, while rare vertebrate remains, such as bones of mammals and reptiles, are occasionally uncovered, although these are often fragmentary.

Despite their palaeontological significance, the potential for intact fossil discoveries in the project area is **Low** due to previous disturbances, and the narrow occurrence in the project area. As a result, the palaeontological sensitivity of

the Quaternary deposits is rated as **Low**. No specific mitigation measures are, however any fossils found must be reported by the developer. While these deposits are important for understanding recent palaeoenvironments and climate, they do not necessitate significant fossil monitoring during development activities.

4.2 Heritage Resources Identified

In terms of the heritage resources identified in the archaeological field assessment, see Table 4 below and Appendix 1 for full descriptions and images.

Table 4: Artefacts identified during the field assessment development area

POINT ID	Description	Type	Period	Density	Co-ordinates		Grading	Mitigation
003	Geluk graves, 20th c. Marked by stone cairns, one headstone. About 20 graves	Graves/ Burial Grounds	Modern	n/a	-26.604938	28.410406	IIIA	100m Buffer
004	Well built stone walled kraal, and modern ruin	Structure, Ruin	Historic	n/a	-26.604957	28.409422	IIIC	50m Buffer
006	Iron Age stone walled kraals hidden under trees	Ruin	Iron Age	n/a	-26.612174	28.407944	IIIA	100m Buffer
008	Lagerspoort sandstone ruins as well as more modern 20th c ruin	Ruin	Historic, Modern	n/a	-26.596735	28.411351	IIIC	50m Buffer
010	Steynskraal werf, sandstone walls and corrugated iron roofs, early 20th c or earlier	Structure	Historic, Modern	n/a	-26.598903	28.460894	IIIC	500m Buffer
011	Strydom family graves, 1907, 1923. About 20 graves under trees with large stone walling	Graves/ Burial Grounds	Historic	n/a	-26.598675	28.459969	IIIA	100m Buffer
012	Farmworkers' graves under gum trees marked by stone cairns and some modern headstones, up to 50 graves here	Graves/ Burial Grounds	Modern, Historic	n/a	-26.600095	28.459435	IIIA	100m Buffer
013	Local stone built ruin with internal plastering, 20th c, 3c	Ruin	Historic	n/a	-26.601053	28.453526	IIIC	50m Buffer
014	Stone walled fort on top of small koppie, SA War/2nd Boer War	Ruin	Historic	n/a	-26.600908	28.455007	IIIA	100m Buffer
015	IA stone walled kraals	Ruin	Iron Age	n/a	-26.603862	28.44707	IIIA	100m Buffer
016	IA stone walled kraals	Ruin	Iron Age	n/a	-26.608417	28.452028	IIIA	100m Buffer
017	Long rectangular stone kraal	Structure	Historic	n/a	-26.609132	28.451527	IIIC	50m Buffer
018	Historical rectangular stone kraal under trees, well packed walls. Brick ruin at foundation level	Ruin	Historic	n/a	-26.613101	28.450916	IIIC	50m Buffer
019	Historical stone walled kraals	Structure	Historic	n/a	-26.615298	28.449083	IIIC	50m Buffer

020	Small rectangular stone building inside ephemeral kraal, historical	Structure	Historic	n/a	-26.616839	28.44956	IIIC	50m Buffer
021	Large IA enclosures with stone cairn marked grave in the centre	Ruin, Grave	Iron Age	n/a	-26.614058	28.453236	IIIA	100m Buffer
022	Another large Iron Age enclosure on hill slope	Ruin	Iron Age	n/a	-26.618461	28.450536	IIIA	100m Buffer
023	Mid 20th century farmworkers' graves marked by stone cairns, some headstones, around 20 graves	Graves/ Burial Grounds	Historic	n/a	-26.612991	28.455453	IIIA	100m Buffer
024	Klipplaat koppie, very prominent landmark koppie	CL Feature		n/a	-26.612212	28.465427		Avoid Impact
025	Historical stock loading platform in IA enclosures	Ruin	Iron Age, Historic	n/a	-26.615071	28.457722	IIIA	100m Buffer
026	Klipplaatdrift werf 20th century buildings with green corrugated iron roofs	Structure	Modern, Historic	n/a	-26.612356	28.478097	IIIC	500m Buffer
027	IA enclosures	Ruin	Iron Age	n/a	-26.623757	28.460306	IIIA	100m Buffer
028	IA enclosures	Ruin	Iron Age	n/a	-26.627548	28.459616	IIIA	100m Buffer
029	20th century werf, white walls and red roof	Structure	Modern, Historic	n/a	-26.626428	28.467488	IIIC	500m Buffer
031	Prominent koppies, cl features and IA sites	Ruin, CL Feature	Iron Age	n/a	-26.631492	28.451111	IIIA	100m Buffer
032	IA enclosures	Ruin	Iron Age	n/a	-26.624678	28.455262	IIIA	100m Buffer
036	Ruined historical kraal, ruined werf and brick building. Marked as cemetery on old topo map but no graves seen	Graves/ Burial Grounds	Historic	n/a	-26.640902	28.381378	IIIA	100m Buffer
040	IA enclosure under trees	Ruin	Iron Age	n/a	-26.646802	28.402908	IIIA	100m Buffer
041	Laagerspoort werf, stone buildings, late 19th century	Structure	Historic	n/a	-26.646211	28.403572	IIIC	500m Buffer
042	IA enclosures	Ruin	Iron Age	n/a	-26.644855	28.405545	IIIA	100m Buffer
043	Laagerspoort werf, early 20th century buildings and some older fabric	Structure	Historic	n/a	-26.643009	28.402389	IIIC	500m Buffer
044	IA walling, linear	Ruin	Iron Age	n/a	-26.645379	28.415182	IIIA	100m Buffer
045	IA enclosure	Ruin	Iron Age	n/a	-26.643796	28.417387	IIIA	100m Buffer
047	Steynskraal werf, stone walled kraals, late 19th and early 20th c buildings	Structure	Modern, Historic	n/a	-26.612115	28.440795	IIIC	500m Buffer
048	Stone walled kraal	Structure	Historic	n/a	-26.614207	28.43744	IIIC	50m Buffer
049	Tuin van Eden campsite and Laagerspoort werf, sandstone building, and 20th c buildings	Structure	Historic, Modern	n/a	-26.619911	28.437361	IIIC	500m Buffer
050	IA enclosures	Ruin	Iron Age	n/a	-26.623305	28.440868	IIIA	100m Buffer
051	Large rectangular stone kraal	Ruin	Historic	n/a	-26.625262	28.441559	IIIA	100m Buffer

	with ruined building, also local stone, in centre, historical							
052	IA enclosures	Ruin	Iron Age	n/a	-26.621244	28.432372	IIIA	100m Buffer
055	IA and historical enclosures, late IA	Ruin	Iron Age	n/a	-26.625007	28.425538	IIIA	100m Buffer
056	Jacobs family graves surrounded by agricultural fields, 1908, at least 10 graves	Graves/ Burial Grounds	Historic	n/a	-26.612566	28.438267	IIIA	100m Buffer
061	IA enclosures	Ruin	Iron Age	n/a	-26.633665	28.423343	IIIA	100m Buffer
062	Large historical stone walled kraal	Ruin	Historic	n/a	-26.629315	28.415407	IIIA	100m Buffer
063	IA enclosures	Ruin	Iron Age	n/a	-26.656076	28.392988	IIIA	100m Buffer
065	Malanskraal werf, green corrugated iron roofs, early 20th and late 19th c.	Structure	Historic	n/a	-26.685623	28.403859	IIIB	500m Buffer
066	About 30 farmworkers' graves, circa 1970s	Graves/Burial Grounds	Modern	n/a	-26.68306	28.407224	IIIA	100m Buffer
067	Historical cemetery, late 19th and early 20th century, Gouws, Bekker, about 16 graves	Graves/ Burial Grounds	Historic	n/a	-26.6679	28.410266	IIIA	100m Buffer
068	IA enclosures on hill	Ruin	Iron Age	n/a	-26.662643	28.413806	IIIA	100m Buffer
069	IA enclosures	Ruin	Iron Age	n/a	-26.657033	28.405666	IIIA	100m Buffer
070	IA enclosures	Ruin	Iron Age	n/a	-26.655986	28.42854	IIIA	100m Buffer
071	Ruined historical werf, sandstone foundations	Ruin	Historic	n/a	-26.668156	28.419551	IIIC	50m Buffer
072	IA enclosure	Ruin	Iron Age	n/a	-26.668928	28.419409	IIIA	100m Buffer
075	Modipa family graves, 1990s to present, stone cairns and headstones, partially broken fence. Around 30 graves	Graves/ Burial Grounds	Modern	n/a	-26.634941	28.45496	IIIA	100m Buffer
076	Ruined hut foundations lined with stone	Ruin	Historic	n/a	-26.635024	28.455275	IIIC	50m Buffer
078	Driefontein ruins, historical	Ruin	Historic	n/a	-26.653229	28.4591	IIIC	50m Buffer
079	Driefontein werf, mostly modern buildings, some older stone walled kraals	Structure	Historic, Modern	n/a	-26.654118	28.460801	IIIC	500m Buffer
080	IA enclosure	Ruin	Iron Age	n/a	-26.655754	28.453869	IIIA	100m Buffer
081	IA enclosures	Ruin	Iron Age	n/a	-26.662841	28.458797	IIIA	100m Buffer
083	IA enclosure	Ruin	Iron Age	n/a	-26.672937	28.462625	IIIA	100m Buffer
084	Old gold mining shaft, historical	Ruin	Historic	n/a	-26.674611	28.462071	IIIA	100m Buffer
085	IA enclosures	Ruin	Iron Age	n/a	-26.676558	28.458638	IIIA	100m Buffer
086	Wildebeestfontein farmworkers' graves, about 40 marked by stone cairns, 20th c	Graves/ Burial Grounds	Historic, Modern	n/a	-26.630372	28.478703	IIIA	100m Buffer
087	IA enclosures	Ruin	Iron Age	n/a	-26.65463	28.486046	IIIA	100m Buffer
088	About 25 farmworkers' graves marked by stone cairns, 20th c.	Graves/ Burial	Modern, Historic	n/a	-26.658761	28.481473	IIIA	100m Buffer

		Grounds						
089	Ruined sandstone historical buildings and kraal	Ruin	Historic	n/a	-26.659982	28.479951	IIIC	50m Buffer
091	Ephemeral remains of hut floors and possible grave	Ruin	Iron Age	n/a	-26.661748	28.482403	IIIA	100m Buffer
092	IA enclosures	Ruin	Iron Age	n/a	-26.666569	28.482643	IIIA	100m Buffer
094	Ntaopane family graves early 20th c. 14 graves	Graves/Burial Grounds	Historic	n/a	-26.689895	28.455334	IIIA	100m Buffer
096	Zandhoek ruins, werf, kraals, later brick ruins too	Ruin	Historic	n/a	-26.698223	28.454265	IIIC	50m Buffer
097	Zandhoek ruins, early 20th c corrugated iron roof ruin, sandstone ruins	Ruin	Historic	n/a	-26.700918	28.455601	IIIC	50m Buffer
098	Ruined sandstone building	Ruin	Historic	n/a	-26.70596	28.464307	IIIC	50m Buffer
099	Ruined werf with mostly 20th c brick buildings, one sandstone building	Ruin	Historic, Modern	n/a	-26.715055	28.471408	IIIC	50m Buffer
100	Weltevreden farm cemetery, werf 20th century	Graves/Burial Grounds	Modern, Historic	n/a	-26.701417	28.456496	IIIA	100m Buffer
102	Goosen family graves, 1890s, at least 5 graves	Graves/Burial Grounds	Historic	n/a	-26.674524	28.447016	IIIA	100m Buffer
103	Malanskraal, historical kraal. 2 sandstone ruins	Ruin	Historic	n/a	-26.672805	28.447128	IIIC	50m Buffer
104	Malanskraal historical werf, stone walled kraals, silos, Cape Revival gables on main farmhouse, corrugated iron roof	Structure	Historic, Modern	n/a	-26.667854	28.446656	IIIC	500m Buffer
105	Sandstone ruins, historical near clump of gum trees	Ruin	Historic	n/a	-26.661011	28.449313	IIIC	50m Buffer
106	Historical stone walling against outcrop	Ruin	Historic	n/a	-26.659722	28.449971	IIIC	50m Buffer
107	IA enclosures	Ruin	Iron Age	n/a	-26.658518	28.44011	IIIA	100m Buffer
108	Farmworkers' graves, over 60 here. 20th c. 1960s, 1980s	Graves/Burial Grounds	Modern, Historic	n/a	-26.67873	28.396049	IIIA	100m Buffer
109	Farmworker's grave, 1972, in road reserve	Graves/Burial Grounds	Modern	n/a	-26.719862	28.472479	IIIA	100m Buffer
110	Burial Site identified by a landowner	Graves/Burial Grounds	Historic	n/a	-26.662178	28.395526	IIIA	100m Buffer

4.3 Mapping and Spatialisation of Heritage Resources

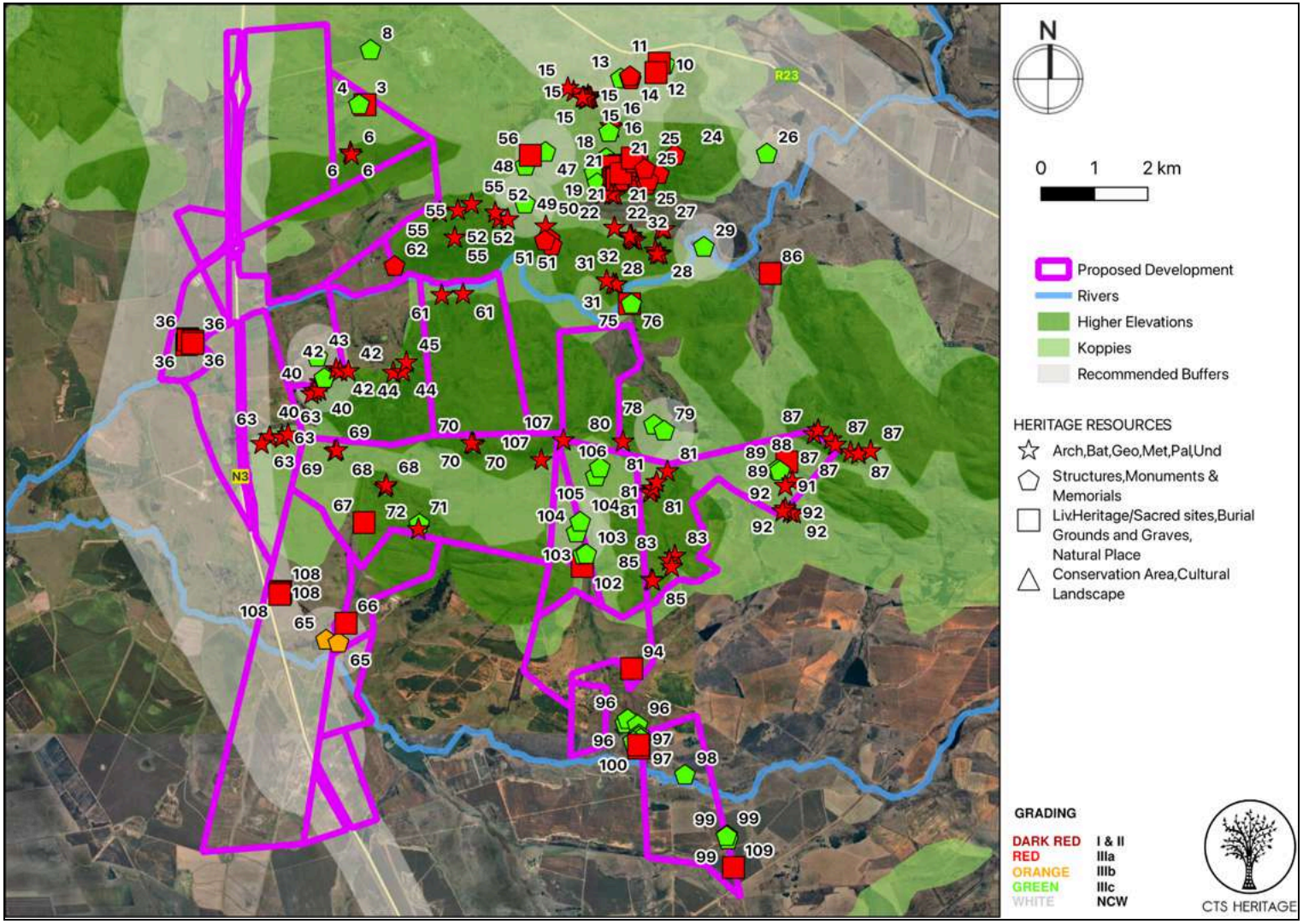

Figure 6.1 All heritage resources within proximity to the development area

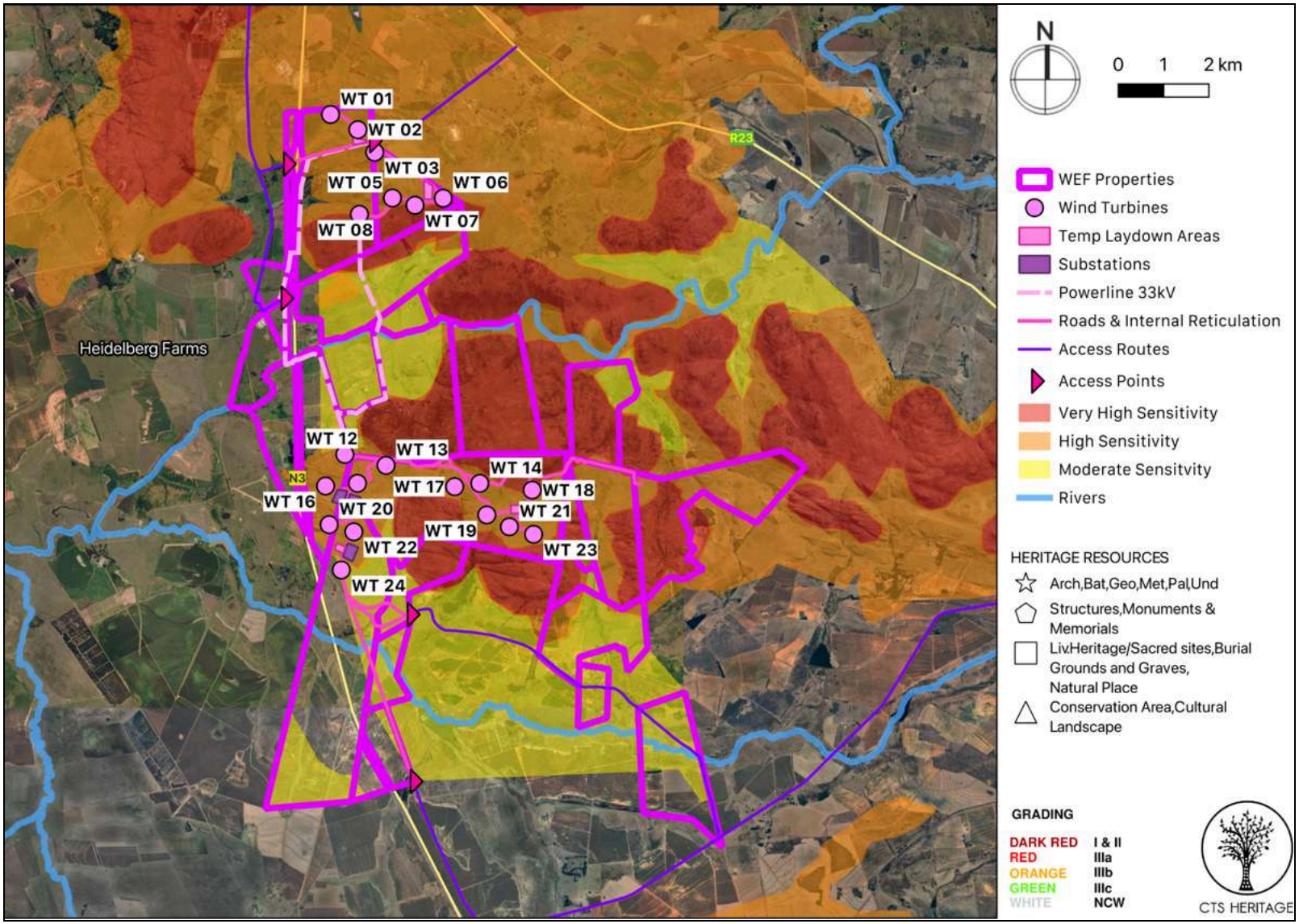

Figure 6.2 Heritage sensitivity map of WEF 1 based on the findings of the cultural heritage and archaeology assessment

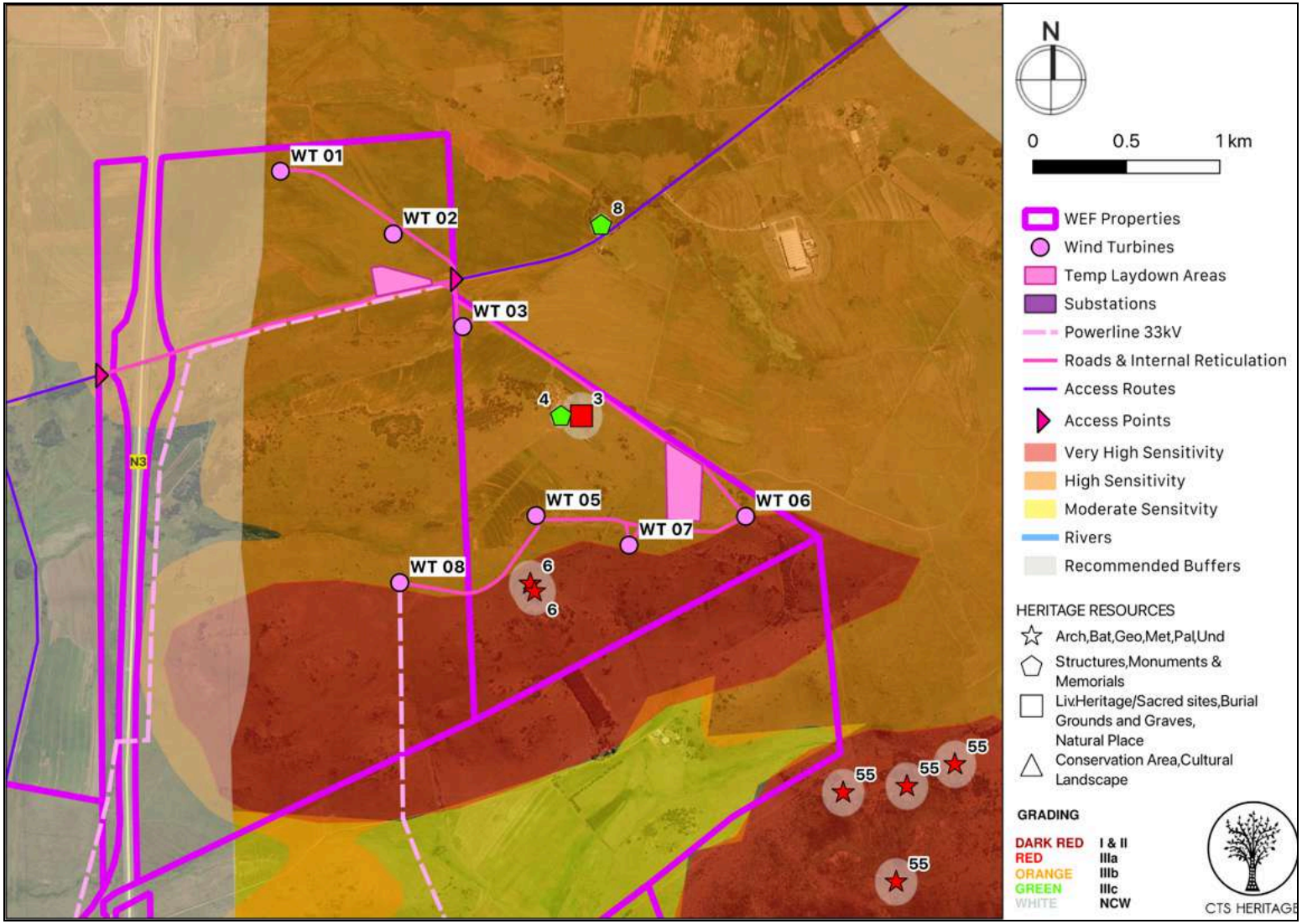

Figure 6.3 Heritage sensitivity map of WEF 1 based on the findings of the cultural heritage and archaeology assessment with the proposed layout

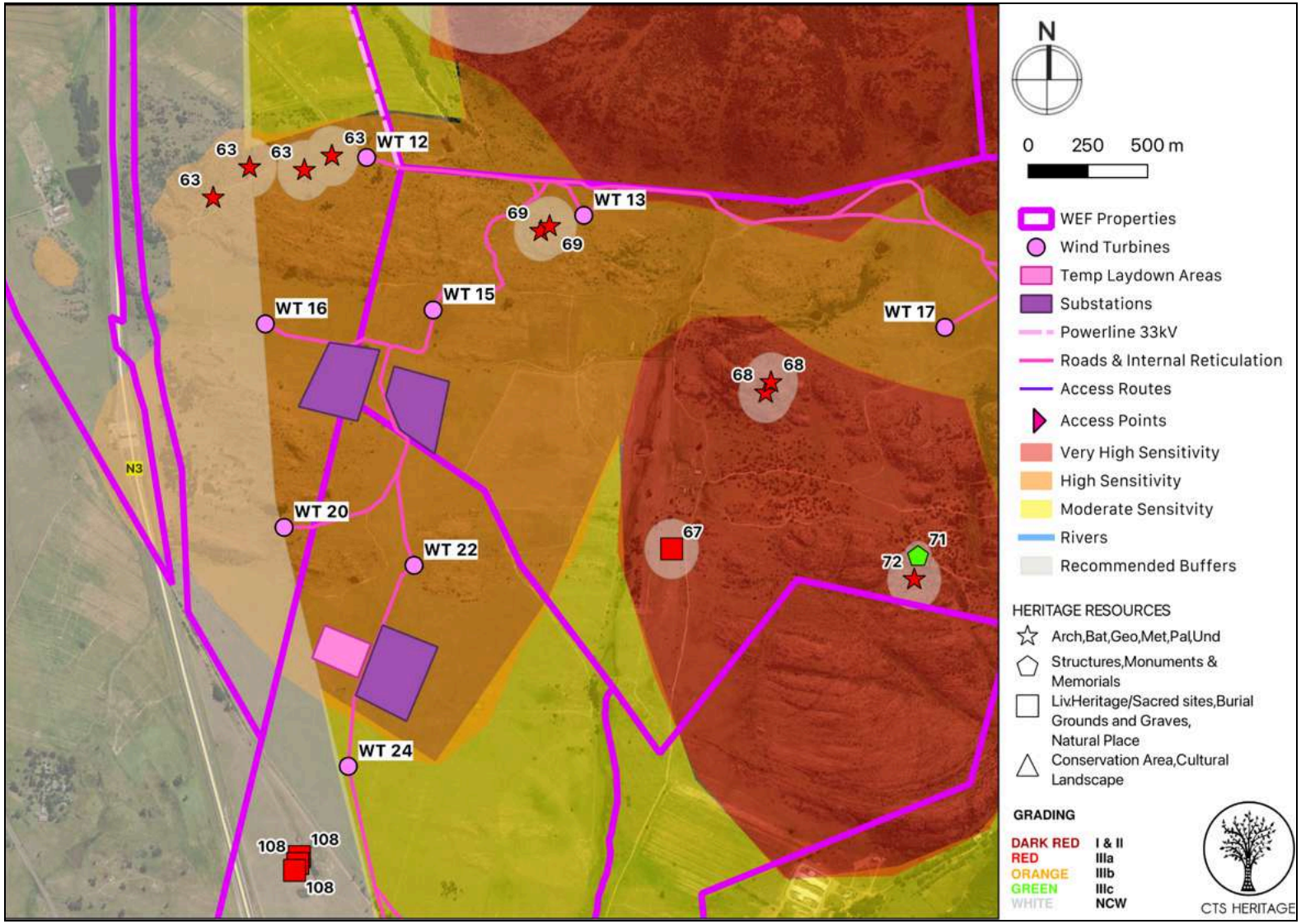

Figure 6.4 Heritage sensitivity map of WEF 1 based on the findings of the cultural heritage and archaeology assessment with the proposed layout

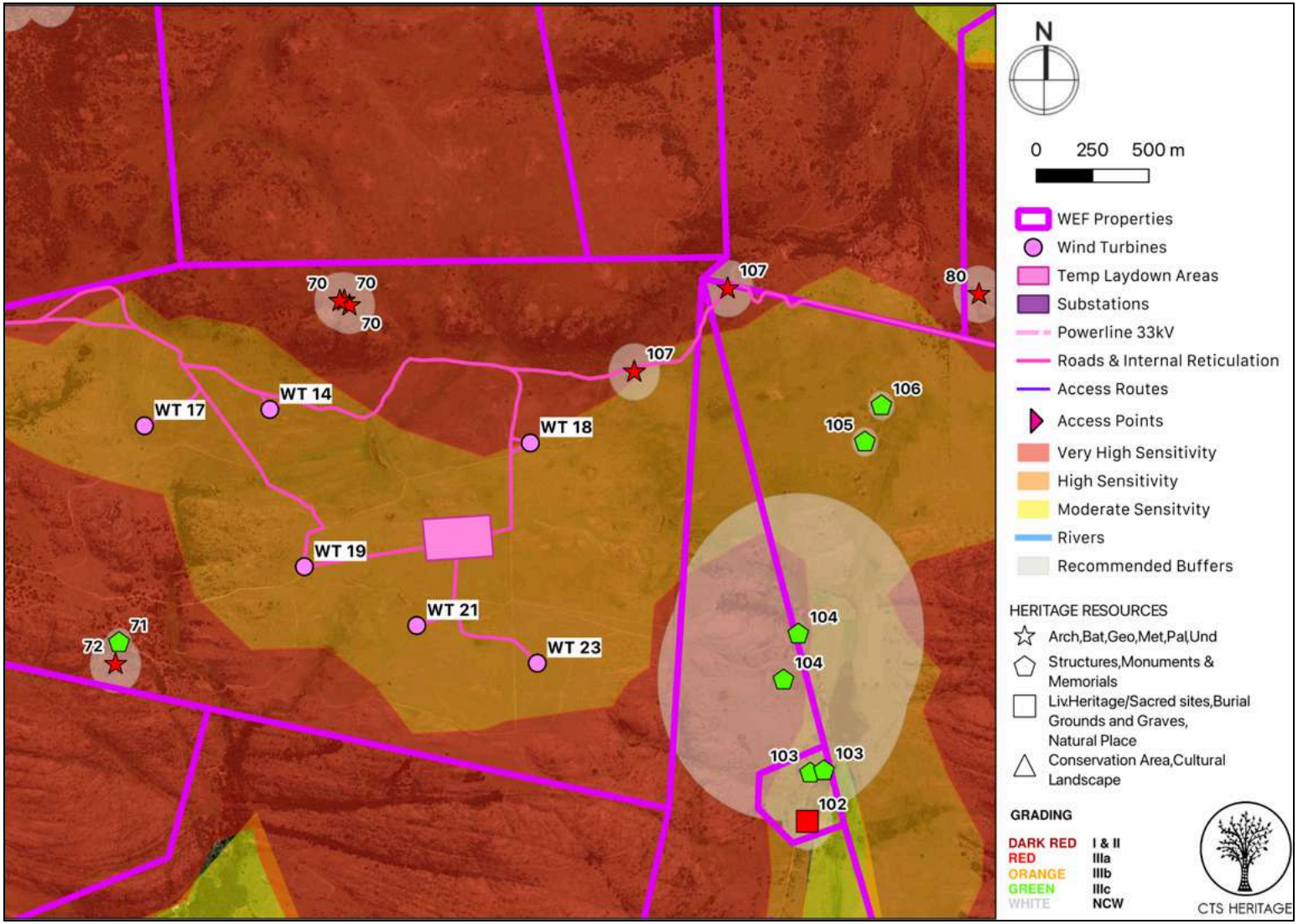

Figure 6.5 Heritage sensitivity map of WEF 1 based on the findings of the cultural heritage and archaeology assessment with the proposed layout

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of Impact to Heritage Resources

5.1.1 Cultural Landscape and VIA

The landscape in which the proposed development is located is mountainous with the Suikerbosrandrivier running through the middle. There are several farm werfs located within the proposed development area. Some of these have associated historical cemeteries indicated on the first edition 1:50 000 topo map. Although the N3 has diverged from historical routes, the R23 still follows along a historical route that might be impacted by the proposed development.

According to Doucakis (2021), one of the farms, Laagerspoort (also known as Lagerspoort) used to be known as Onderstepoort. This was the location of Voortrekker Hendrik Potgieter's lager during the three day campaign (28-30 November 1837). Further details of this conflict is found in Fourie (2016), "*A commando of 330 Voortrekkers and a small group of Barolong under the command of Andries Hendrik Potgieter and Piet Uys attacked the Khumalo Ndebele of Mzilikazi in the vicinity of the Marico River. Of interest for this study is that they departed Lagerspoort near present-day Heidelberg and travelled via the present-day farm of Deelkraal … to the Matabele settlements near the Marico River. During the attack some 500 Matabele were killed and 3000 cows taken by the Voortrekker commando. On their way back, the cows were divided amongst the members of the commando on the property today known as Deelkraal (Bergh, 1999).*" The exact location of the lager could not be confirmed, but Doucakis quotes Reverend N. Roberts " *Lat. 26 . 37' 30" S. & Long. 28 . 25'E. on the farm LAGERSPOORT 310 [406 IR], situated at the foot of a steep and high mountain, on the right [north] bank of the Sugar Bush River where it emerges from the hills to the North-East of the Heidelberg-Villiers road. From information gathered on the spot it appears that the lager [sic] stood close to the house now occupied by Mr. van Breda.*"

Most of the nearby sites from SAHRIS are structures associated with the development of railway lines. They have been identified and recorded as part of a project called Footsteps Along the Tracks (FAT). This includes the site identification, documentation and assessment of extant built structures, originally constructed by the Netherlands South African Railway Company (Nederlandsche Zuid-Afrikaansche Spoorwegmaatschappij - NZASM). Although these sites have been graded as having very high levels of regional significance on SAHRIS (Grade II), none of these sites have been formally protected through the publication of a gazette notice in terms of section 27 of the NHRA. Furthermore, the actual cultural value of these sites is likely to be of high or moderate local significance (Grade IIIA or IIIB). Due to the location of these structures being located outside of the area proposed for development, no impact to these resources is anticipated from this proposed development.

Although the N3 has diverged from historical routes, the R23 still follows a historical route. The field assessment noted the scenic and historic value of the R23 and the R103 and as such, a no development buffer of 1km is recommended on either side of these historic scenic routes for turbines, and a 500m buffer on either side for associated WEF infrastructure. Unlike the R23 and the R103, the N3 has lower levels of scenic and historic value and

as such, a no development buffer of 500m is recommended on either side of the N3 for turbines and a 250m buffer on either side for associated WEF infrastructure.

Further, in order to avoid a canyon effect, it is recommended that turbines are proposed for only one side of the R103 and N3. It is therefore recommended that turbines are therefore limited to the eastern side of these roads.

Lessons from existing WEFs in similar contexts have revealed that, while the impact of the turbines themselves on the landscape is significant, far more significant is the impact resulting from the associated logistical infrastructure for development in these contexts. This includes the blasting associated with the creation of turbine platforms and the construction of access roads between the turbines. Based on the current information available about how wind farms and their associated infrastructure are constructed, these impacts cannot be mitigated and cannot be rehabilitated once the life of the project is over. These impacts will permanently scar the significant mountain landscape which has existed in its current state for millions of years. As per the SEA Guidelines published by the CSIR (2018), no WEF development is supported on slopes exceeding 1:10.

Principles

These principles are derived from international best practice as contained in various International Charters on Conservation and a number of local adaptations, and apply to this cultural landscape assessment.

- Landscape significance - acknowledge the overall natural and cultural landscape, and the layered pattern of settlements in response to the natural landscape over time.
- Landscape integrity – retain the essential character and intactness of wilderness, rural and urban areas in the face of fragmentation through unstructured urbanisation and commercial agriculture.
- Landscape connectivity – retain the continuity and interconnectedness of wilderness and agricultural landscapes, including ecological corridors and green linkages.
- Landscape setting – maintain the role of the natural landscape as a "container" within which settlements are embedded, the landscape providing the dominant setting or backdrop.
- The logic of landscape – recognise the intrinsic characteristics and suitability of the landscape and its influence on land use, settlement and movement patterns, in response to geology, topography, water, soil types and microclimate.

Principles applied to the proposed development site:

1. Although the proposed site is located within a RED Zone. To address concerns about the cumulative impact of RE facilities within the greater Karoo region, a cautious approach is required in terms of assessing the desirability of such development from a cultural landscape perspective.
2. The proposed site is located adjacent to an existing infrastructural corridor associated with the national grid, which suggests a level of suitability of RE facilities which can link in with the grid. As such, new grid connection

infrastructure should cluster with the existing alignments and not form new linear elements within the landscape.

3. Notwithstanding the existing infrastructure, the placement of WE turbines must take cognisance of the very high visual impact on a relatively intact and representative cultural landscape, and the extremely limited ability to visually screen this infrastructural development, particularly in the case of the wind turbines.

WEF Turbine placement - position ("where"):

The indicators are to be aligned with the visual sensitivity analysis and to include the following:

- Setback from transport corridors by at least 1000m on either side.
- Avoid steep or elevated topography, ridgelines or koppies.
- Setback from graded resources and farmstead settlements IIIA, IIIB (by 1000m) and IIIC (by 500m).
- Setback from farmsteads forming part of the settlement pattern by at least 500m
- Prioritise placement on the slopes of ridges and low-lying areas
- Concentrate placement in proximity to the existing infrastructure.

Turbine placement - principles ("how"):

The following general principles apply to the turbine layout:

- Avoid an orthogonal pattern in favour or a more organic pattern.
- Turbines should be clustered or read as single elements in the landscape, as opposed to being aligned in a row in visual spatial proximity of each other.
- Avoid continuous or unbroken swathes of infrastructural interventions
- Avoid a stacking effect of the alignment of turbines. A staggered setback line is preferable.

Table 5: Best Practice Cultural Landscape Sensitivities (Winter, 2025)

Heritage Resource	Very High Visual Sensitivity	High Visual Sensitivity	Medium Sensitivity
Prominent topographic feature (scarps, peaks and ridges)	within 200 m	within 300 m	within 400 m
Minor topographic feature (ridges, scarps and outcrops)	within 100 m	within 200 m	-
Minor topographic feature (ridges, scarps and outcrops)	Slopes > 1:10	-	1:10 - 1:20
Water Features (major rivers and dams) Minor water features	within 200 m within 100 m	within 400 m within 200 m	within 600 m within 400 m
National Parks	within 5 km	within 10 km	within 15 km
Proclaimed Nature Reserves	within 3 km	within 5 km	within 10 km
Cultural landscapes incl. scenic valleys worthy of protection	-	Feature	-
Protected Environment	-	Feature	-
Heritage sites Grade I, II, IIIA Grade IIIB and IIIC	within 1,5 km within 500 m	within 3 km within 1 km	within 5 km within 2 km
Graves and cemeteries	100m	-	-
Settlements, towns, villages	within 2 km	within 4 km	within 6 km
Farmsteads	within 1 km	within 1,5 km	within 2 km
Scenic routes, passes, poorts	within 1,5 km	within 3 km	within 5 km
National routes	within 1 km	within 2 km	within 3 km
Provincial / arterial routes	within 500 m	within 1 km	within 2 km
Main district roads (rural)	within 250 m	within 500 m	within 1 km

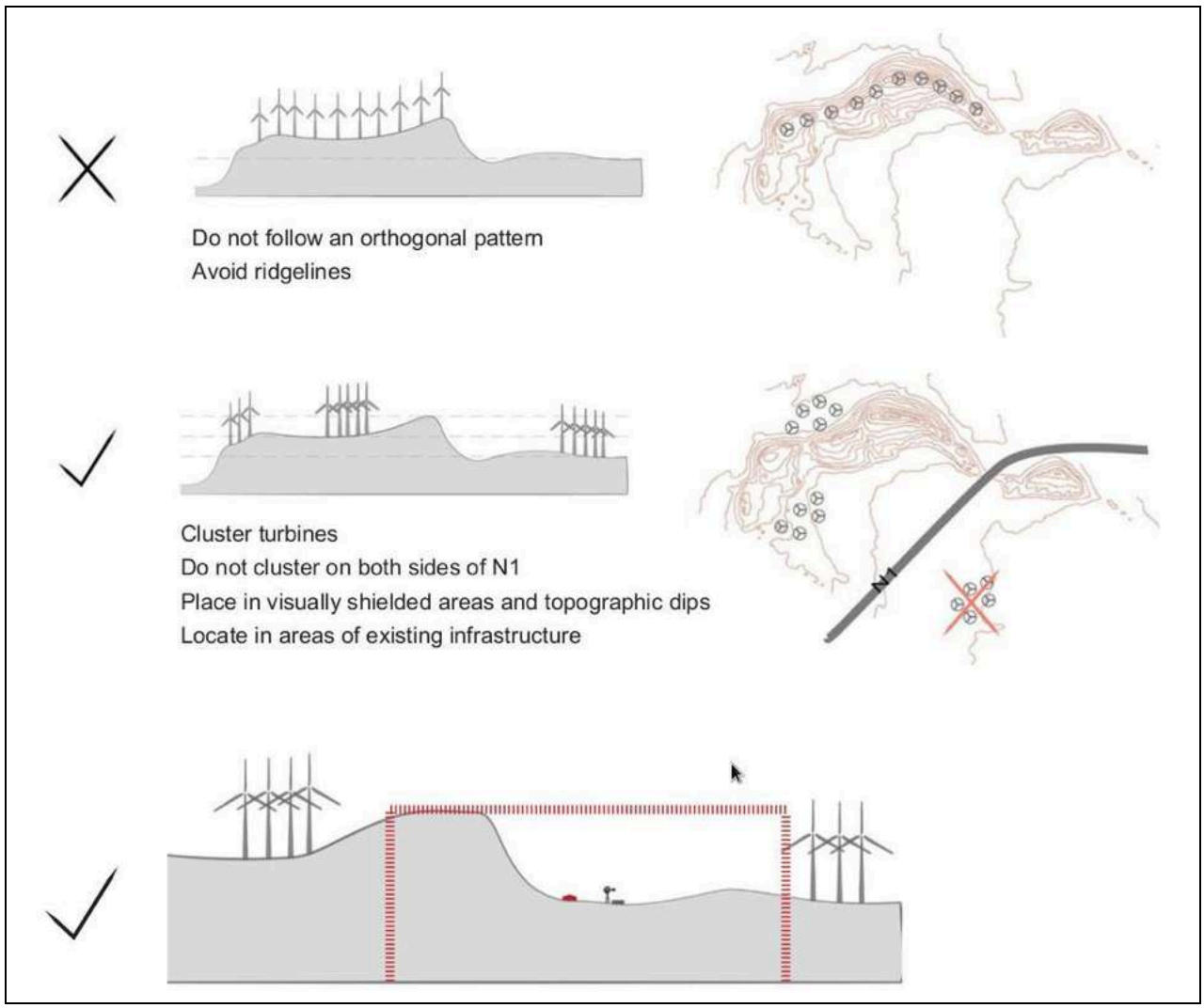

Figure 7: Image indicating appropriate layout approaches (Winter and Wilson, 2021)

5.1.2 Archaeology

Previous archaeological assessments completed in the area, and referenced above, have identified the archaeological sensitivity of the area proposed for development. This very high archaeological sensitivity was verified by the archaeological field assessment completed for this project. This field assessment identified a number of different kinds of heritage resources located within the area proposed for development, ranging from Early Stone Age artefacts dated to more than 200 000 years ago through to the ruins of historic farm werfs and farmworkers cottages from the recent past.

The most dominant archaeological signature within this landscape (over 100 observations noted) relates to the Iron Age occupation of this landscape and the remnants of Iron Age settlements. These sites represent the ruins of stone-walled structures and central kraals that conform to a particular pattern of Iron Age settlement. While the sites mapped in this report reflect the visible evidence of these settlements on the landscape, it is certain that these observations are not discrete but are related and as such, it is very likely that there is buried archaeology associated with these settlements throughout this landscape. The age of these settlements is unknown at this stage, however the scientific value of the buried archaeological material associated with these settlements is high and is therefore graded IIIA. As such, a no development buffer of 100m is recommended around each observed feature. Most of these Iron Age settlement observations are associated with the mountains located within the development area. This association is likely due to the landmark significance of these topographic features in the landscape. Also, due to the steep topography associated with these mountainous areas, these areas have not been subjected to cultivation activities associated with the historic agricultural occupation of the area. While it is possible that iron age settlements extended across the agricultural land in the past, this signature has been disrupted by agricultural activities. This signature remains clear within the mountainous areas.

Due to their landmark value within this cultivated landscape, it is recommended that the higher elevations of these mountains are not suitable for the construction of turbines, and more significantly, the construction of the large-scale roads required to construct these turbines. These areas must be considered as very high sensitivity in the sensitivity maps below. Due to the combined sensitivity from cultural landscape impacts and impacts to buried archaeology, development within this VERY HIGH sensitivity landscape will need to be limited to have minimal impact and align with visual impacts, and carefully considered in terms of micrositing to prevent impacts to burial archaeology. It is preferred if no new infrastructure development takes place within this very high sensitivity area.

The field assessment identified a significant number of burial grounds and graves located within the area proposed for development. Some of these burials are more formal whereas others are marked only by sandstone cairns or are associated with the Iron Age settlement observations described above. Due to their high local levels of social and spiritual value, these sites are graded IIIA. A no development buffer of 100m is recommended around each of these

sites in order to ensure that the sense of place associated with these burials is retained, and to ensure that no nearby unmarked burials are accidentally impacted by excavations associated with this proposed development.

A number of modern agricultural structures were identified along with the ruins of some historic structures. These sites have no cultural value and as such are determined to be Not Conservation-Worthy (NCW). No further mitigation is recommended for these observations.

The field assessment identified a number of 20th Century farm werfs that have historic contextual value and are graded IIIC. These sites include the Steynskraal farm werf, the Klipplaatdrift farm werf, the Laagerspoort farm werf (see the background section for more information) and the Driefontein farm werf. The Malanskraal farm werf is represented by two site recordings. The Malanskraal structures located at Site 065 have higher levels of historic value and as such are graded IIIB. In order to retain the sense of place associated with these historic farm werfs, a no development buffer of 500m is recommended around each of these sites.

The field assessment also identified a number of historic structures and ruins of structures that have been determined to have lower levels of historic contextual value. These observations include the ruins of historical farm werfs and a number of stone kraals. All of these sites with contextual historic value are graded IIIC and as such, a no development buffer of 50m is recommended around each of these sites. This buffer is recommended in order to ensure that no buried archaeology associated with these resources are accidentally impacted by construction activities associated with this proposed development.

Recommendations for impacts to Cultural Heritage and Archaeology

Based on the above findings, a sensitivity map of the development area has been drafted indicating areas that are appropriate for the WEF development within the identified development areas. Overall, however, it must be noted that the overall heritage sensitivity of the development areas for WEF 1 range from moderate to very high. The areas identified as having high heritage sensitivity should be considered as "tread-lightly" and the areas identified as having moderate sensitivity must be considered more closely for development activities.

As noted above, due to their landmark value within this cultivated landscape, it is recommended that the higher elevations of these mountains are not suitable for the construction of turbines, and more significantly, the construction of the large-scale roads required to construct these turbines. These areas must be considered as very high sensitivity in the sensitivity maps below.

Due to the combined sensitivity from cultural landscape impacts and impacts to buried archaeology, development within this VERY HIGH sensitivity landscape will need to be limited to have minimal impact and align with visual impacts, and carefully considered in terms of micrositing to prevent impacts to burial archaeology. It is preferred if no new infrastructure development takes place within this very high sensitivity area. The details of the proposed layout against the identified sensitivities is included below.

Turbine Positions

All of the proposed turbine locations are acceptable from a heritage perspective as they are located outside of the recommended buffers and high sensitivity areas identified.

Substation Options

Based on the layout provided in July 2026 for the EIA Phase, the proposed positions of Substation 1, 2 and 3 are all acceptable as they are located outside of the recommended buffers and high sensitivity areas identified.

Temporary Laydown areas

Based on the layout provided in July 2026 for the EIA Phase, the proposed position of both temporary laydown areas is acceptable as they are located outside of the recommended buffers and high sensitivity areas identified.

Internal Roads

It is greatly appreciated that many of the internal proposed roads follow existing farm roads within the development area. This is commended.

Archaeological monitoring is recommended for all road construction that passes through the very high sensitivity area mapped in this report.

33kV OHL

This proposed alignment is positioned within the buffers recommended along the N3. However, as this infrastructure is only a 33kV line (and not a wind turbine), and as this infrastructure is a linear development aligned along an existing linear element in the landscape, the impact of the proposed 33kV line on the N3 is considered acceptable from a heritage perspective. The N3 alignment is preferred to the Alternative Route, discussed below.

The Alternative Route intersects with the recommended buffers for Sites 40, 41, 42 and 43, and passes the high sensitivity area to connect to WT8. While this Alternative Route follows existing farm roads, which is supported, this is not the case within the high sensitivity area. This is considered as less preferable from a heritage perspective.

Table 6.1: Impacts of the proposed development to archaeological resources – EIA Phasec (July 2026)

CRITERIA	Without Mitigation	With Mitigation
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	3	1
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	1	1

Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	5	5
Impact Duration (D) The length of permanence of the impact on the environmental receptor	5	5
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	3	1
Significance (S) is determined by combining the above criteria: S=(E+D+R+M)xP	**42**	**12**
Mitigation Recommendations	• The buffers recommended in Table 4 are adhered to • The identified very high sensitivity archaeology areas are not impacted by the development of any new infrastructure. • Archaeological monitoring takes place for all construction activities located within the very high sensitivity areas identified. • If any archaeological resources or unmarked human remains are uncovered or exposed during construction operations these must immediately be reported to SAHRA.	

5.1.3 Palaeontology

The assessment evaluates the potential impact of the proposed grid connection infrastructure for the ABO Uvemvane Wind Energy Facility on fossil heritage resources in the Balfour area. The development entails excavation and site preparation for wind energy infrastructure spanning Mpumalanga and Gauteng Provinces. These activities may disturb fossil heritage by damaging or permanently sealing fossils, making them inaccessible for research or public benefit. The primary impact on fossil resources is expected during the construction phase, while no significant impacts are anticipated during the operational or decommissioning phases.

The geological units underlying the project area exhibit varying levels of palaeontological sensitivity. The development will not disturb areas with low palaeontological sensitivity, which includes the Witwatersrand Supergroup, Ventersdorp Supergroup, and diabase intrusions. No mitigation measures are required for these formations. However, caution is required for the Vryheid Formation, as excavation activities have the potential to disturb or permanently damage significant fossil material. All forms of excavation within this formation could impact highly significant fossils, necessitating careful mitigation measures.

As noted above, all of the proposed new infrastructure is located within areas of low and zero palaeontological sensitivity. As such, it is not anticipated that any significant fossil heritage is likely to be impacted by the proposed development based on the layout considered in this report.

Table 6.2: Impacts of the proposed development to palaeontological resources

CRITERIA	Without Mitigation	With Mitigation
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	2	1
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	1	1
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	5	5
Impact Duration (D) The length of permanence of the impact on the environmental receptor	5	5
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	2	1
Significance (S) is determined by combining the above criteria: S=(E+D+R+M)xP	**26**	**12**
Mitigation Recommendations	• The Chance Fossil Finds Procedure (Appendix 3) must be implemented throughout the construction phase, particularly in areas underlain by the Vryheid Formation. • Existing gravel and access roads should be used as far as possible to minimise unnecessary ground disturbance in sensitive areas.	

5.2 Sustainable Social and Economic Benefit

Based on the SIA completed for the project, "*Increased expenditure during the construction of the proposed facility will contribute to the local economy. The workers' income will likely increase spending in the local community, thereby stimulating the formal and informal sectors and secondary industries, with a positive multiplier effect.*"
. More specifically, this power plant will contribute to the following positive outcomes:

- Job creation
- Enterprise growth
- Socio-economic development
- Local economic growth through enterprise development

Based on the outcomes of this heritage assessment, the anticipated socio-economic benefits to be derived from the project outweigh any anticipated negative impacts to heritage resources.

5.3 Proposed Development Alternatives

The proposed development as described above has been assessed with the following alternatives:

1. 33kV overhead/underground line to connect northern and southern parts of the facility:
    - A 100 m assessment corridor should be assessed; the actual servitude width would only be 22m.
    - The line is approximately 8km long and a conservative average span length of approximately 100 m can be assumed for assessment purposes, although actual spans may be longer (depending on final engineering design and terrain).
    - Two route alternatives to assess.
2. BESS Technology: With regard to the proposed BESS, the technology thereof is dynamic and so the specific type/technology to be developed would be selected based on market demands and technology availability at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technology alternatives, with Lithium-ion being the current preferred technology.
3. The No-go alternative has also been assessed, noting that the property does hold existing development rights (i.e., Agriculture) and so, not developing the proposed development does not necessarily mean that there would be no changes or impacts on the site.

There is no preferred BESS Technology alternative from a heritage perspective. However, regarding the 33kV line, there is a clear preference from a heritage perspective. As discussed above, the Alternative Route intersects recommended buffers and passes through the high sensitivity area. It is not advisable that any new infrastructure be developed in this high sensitivity area and, as such, **the proposed alignment that runs along the N3 is the preferred option.**

5.4 Site Verification Statement

Table 7: SSVR

Theme	DFFE Screening Tool Report Sensitivity	Specialist Sensitivity	Rating Confirmed/ disputed and Reasons	Compliance Statement or Full Assessment
Cultural Heritage	VERY HIGH	VERY HIGH	***Confirmed*** The cultural value of the broader area has significance in terms of its settler and agricultural history, with intact cultural landscape resources located within the development area	Full Assessment
Archaeology	VERY HIGH	VERY HIGH	***Confirmed*** Significant Iron Age archaeological heritage was identified within the development area	Full Assessment
Palaeontology	VERY HIGH	MEDIUM	***Disputed*** It is anticipated that the impact of the development will mainly be LOW to MODERATE as only small sections of the development area are underlain by the sensitive Vryheid Formation.	Full Assessment

5.5 Cumulative Impacts

The cumulative impact of a development is the impact that development will have when its impact is added to the incremental impacts of other past, present or reasonably foreseeable future activities that will affect the same environment. It is important to note that the cumulative impact assessment for a particular project, like what is being done here, is not the same as an assessment of the impact of all surrounding projects. The cumulative assessment for this project is an assessment only of the impacts associated with this project, but seen in the context of all surrounding impacts. It is concerned with this project's contribution to the overall impact, within the context of the overall impact. But it is not simply the overall impact itself.

The most important concept related to a cumulative impact is that of an acceptable level of change to an environment. A cumulative impact only becomes relevant when the impact of the proposed development will lead directly to the sum of impacts of all developments causing an acceptable level of change to be exceeded in the surrounding area. If the impact of the development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant.

In terms of cumulative impacts to heritage resources, impacts to archaeological and palaeontological resources are sufficiently dealt with on a case by case basis. The primary concern from a cumulative impact perspective would be to the cultural landscape. The cultural landscape is defined as the interaction between people and the places that they

have occupied and impacted. In some places in South Africa, the cultural landscape can be more than 1 million years old where we find evidence of Early Stone Age archaeology (up to 2 million years old), Middle Stone Age archaeology (up to 200 000 years old), Later Stone Age archaeology (up to 20 000 years old), evidence of indigenous herder populations (up to 2000 years old) as well as evidence of colonial frontier settlement (up to 300 years old) and more recent agricultural layers.

Modern interventions into such landscapes, such as renewable energy development and its associated grid connection infrastructure, constitutes an additional layer onto the cultural landscape which must be acceptable in REDZ areas and in Strategic Transmission Corridors. The primary risk in terms of negative impact to the cultural landscape resulting from renewable energy development lies in the eradication of older layers that make up the cultural landscape. There are various ways that such impact can be mitigated.

The area proposed for development is presently dominated by agricultural activities and as such, the pattern of settlement within this landscape reflects this. At this stage, there is the potential for the cumulative impact of proposed renewable energy facilities and its associated grid infrastructure to negatively impact the cultural landscape due to a change in the landscape character from rural to semi-industrial.

However, as the proposed layout of the project avoids impacts to areas of very high heritage sensitivity, and adheres to existing road alignments as far as possible, the anticipated cumulative impact expected from this project is acceptable.

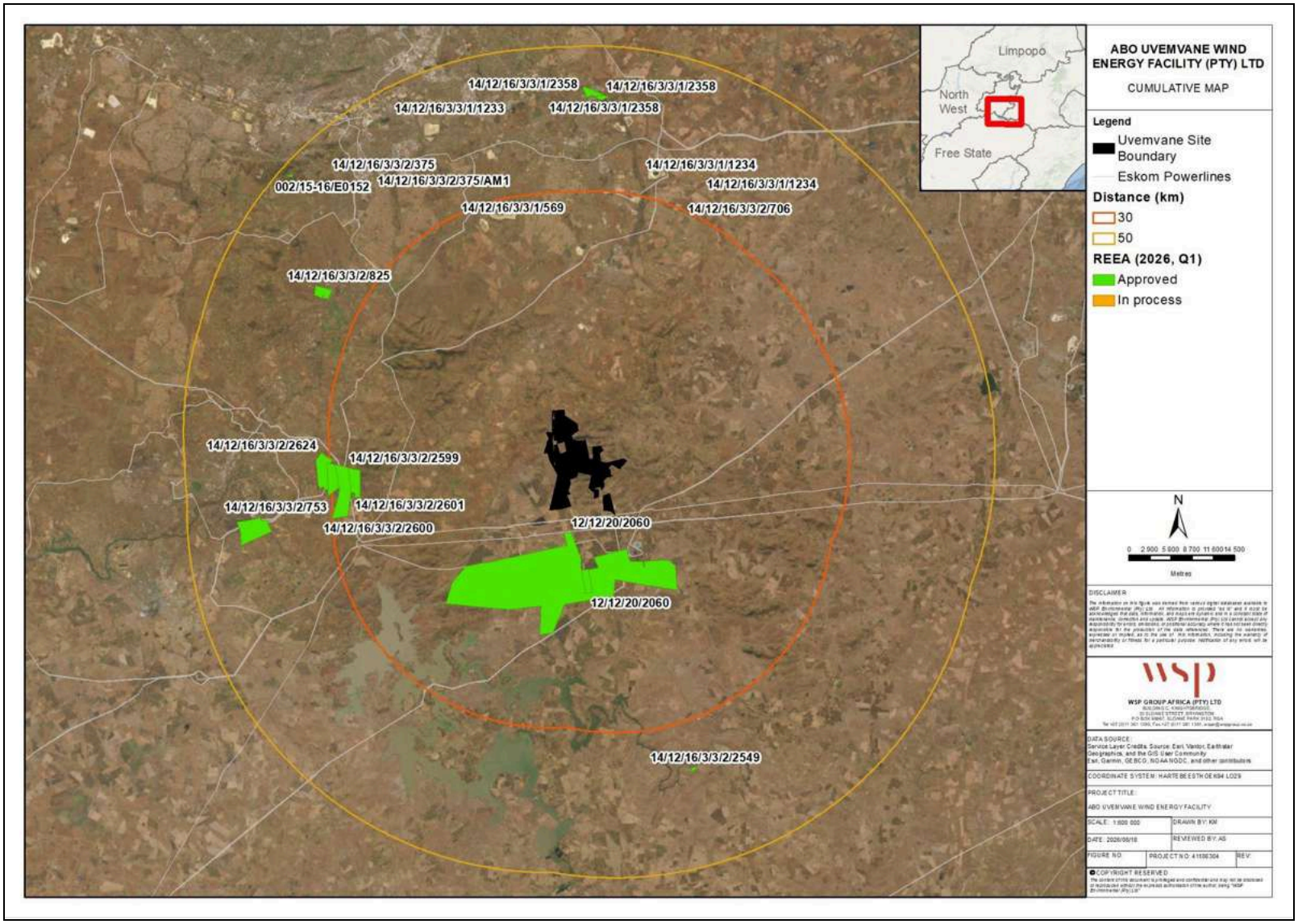

Figure 8 Approved REF projects within 50km of the proposed development area

6. RESULTS OF PUBLIC CONSULTATION

As this application is made in terms of NEMA, the public consultation on the HIA will take place with the broader public consultation process required for the Environmental Impact Assessment process and will be managed by the lead environmental consultants on the project.

7. PLAN FOR THE EIA

The layout provided in July 2026 for the EIA Reporting Phase avoids the heritage sensitivities that were identified in the field for this project. No further heritage studies are required during the EIA phase of the NEMA process as the recommendations made in this report pertain to the EMPr and the construction phase of the proposed development.

8. CONCLUSION

Based on the above findings, a sensitivity map of the development area has been drafted indicating areas that are appropriate for the WEF development within the identified development areas. Overall, however, it must be noted that the overall heritage sensitivity of the development areas for WEF 1 range from moderate to very high. The areas identified as having very high sensitivity should be considered as no-go for new infrastructure, areas of high heritage sensitivity should be considered as "tread-lightly" and the areas identified as having moderate sensitivity must be considered more closely for development activities.

As noted above, due to their landmark value within this cultivated landscape, it is recommended that the higher elevations of these mountains are not suitable for the construction of turbines, and more significantly, the construction of the large-scale roads required to construct these turbines. These areas must be considered as very high sensitivity in the sensitivity maps below. Due to the combined sensitivity from cultural landscape impacts and impacts to buried archaeology, development within this VERY HIGH sensitivity landscape will need to be limited to have minimal impact and align with visual impacts, and carefully considered in terms of micrositing to prevent impacts to burial archaeology. It is preferred if no new infrastructure development takes place within this very high sensitivity area.

Turbine Positions

All of the proposed turbine locations are acceptable from a heritage perspective as they are located outside of the recommended buffers and high sensitivity areas identified.

Substation Options

Based on the layout provided in July 2026 for the EIA Phase, the proposed positions of Substation 1, 2 and 3 are all acceptable as they are located outside of the recommended buffers and high sensitivity areas identified.

Temporary Laydown areas

Based on the layout provided in July 2026 for the EIA Phase, the proposed position of both temporary laydown areas is acceptable as they are located outside of the recommended buffers and high sensitivity areas identified.

Internal Roads

It is greatly appreciated that many of the internal proposed roads follow existing farm roads within the development area. This is commended.

Archaeological monitoring is recommended for all road construction that passes through the very high sensitivity area mapped in this report.

33kV OHL

This proposed alignment is positioned within the buffers recommended along the N3. However, as this infrastructure is only a 33kV line (and not a wind turbine), and as this infrastructure is a linear development aligned along an existing linear element in the landscape, the impact of the proposed 33kV line on the N3 is considered acceptable from a heritage perspective. The N3 alignment is preferred to the Alternative Route, discussed below.

The Alternative Route intersects with the recommended buffers for Sites 40, 41, 42 and 43, and passes the high sensitivity area to connect to WT8. While this Alternative Route follows existing farm roads, which is commendable, this is not the case within the high sensitivity area. This is considered as less preferable from a heritage perspective.

As noted above, all of the proposed new infrastructure is located within areas of low and zero palaeontological sensitivity. As such, it is not anticipated that any significant fossil heritage is likely to be impacted by the proposed development based on the layout considered in this report.

9. RECOMMENDATIONS

There is no objection to the proposed development from an archaeological perspective on condition that:

- The buffers recommended in Table 4 are adhered to
- The identified very high sensitivity archaeology areas are not impacted by the development of any new infrastructure.
- Archaeological monitoring takes place for all construction activities located within the very high sensitivity areas identified.
- The Chance Fossil Finds Procedure (Appendix 3) must be implemented throughout the construction phase, particularly in areas underlain by the Vryheid Formation.
- Existing gravel and access roads should be used as far as possible to minimise unnecessary ground disturbance in sensitive areas.
- If any archaeological resources or unmarked human remains are uncovered or exposed during construction operations these must immediately be reported to SAHRA.

10. REFERENCES

Heritage Impact Assessments				
NID	**Author(s)**	**Date**	**Type**	**Title**
4892	Jaco van der Walt	02/06/2008	AIA Phase 1	Heritage Impact Assessment: Application for Mining Permits for the Arup Transnet Nmpp Alliance Borrow-Pits, Gauteng
5051	Johnny Van Schalkwyk, J van den Bos	01/12/1999	AIA Phase 1	Scoping Report on Cultural Resources for the Proposed Clarens to Suikerbosrand Pipeline
5053	Julius CC Pistorius	01/03/2003	AIA Phase 1	A Heritage Impact Assessment (HIA) of a Portion of the Farm Nooitgedacht 390 IR in the Heidelberg District of Gauteng
5055	Francois P Coetzee	01/09/2003	AIA Phase 1	Archaeological Investigation of the Proposed Heidelberg Kloof Estate Development, Heidelberg, Gauteng
5056	Cobus Dreyer	03/07/2006	AIA Phase 1	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Feedlot Extensions at Elandsfontein 412 IR, Heidelberg, Gauteng Province
6369	Thomas Huffman	01/05/2005	AIA Phase 1	Archaeological Assessment of the Burnstone Gold Mine, Mpumalanga
6784	Francois P Coetzee	01/09/2008	AIA Phase 1	Cultural Heritage Survey of the Proposed Development at Floracadia North and Floracadia South, Heidelberg, Gauteng
6877	Thomas Huffman	01/08/2007	AIA Phase 1	Archaeological Impact Assessment for the Grootvlei-Balfour Powerline, Mpumalanga
7753	Thomas Huffman	31/12/1999	AIA Phase 1	Archaeological Survey of Ratunda Extension 8, Heidelberg
7870	Julius CC Pistorius	01/07/2008	AIA Phase 1	A Phase I Heritage Impact Assessment Study for Sasol's Proposed New Gas and Liquid Pipelines (Along a Corridor) from Sasol Synfuels in Secunda (Mpumalanga) to Sasol Infrachem and Natref in Sasolburg (Free State) on the Highveld in the Republic of South Af
8155	Anton Pelser	01/05/2007	AIA Phase 1	A Report on a Cultural Heritage Impact Assessment on Portion 19 of the Farm Vaaldam Settlement 1777, Vaaldam, near Deneysville, Free State Province.
49825	Anton Pelser, Jaco van der Walt	01/11/2010	AIA Phase 1	A Report on A Heritage Impact Assessment (HIA) for the proposed Sedaven Development of Portions 8 & 25 of the Farm Boschoek 385 IR, Heidelberg, Gauteng
73258	Wouter Fourie	28/08/2012	Heritage Scoping	Heritage Scoping for the proposed mining permit application on a portion of Portion 19 of the farm Kafferskraal 381 IR, Heidelberg, Gauteng Province.

145862	Makhosazana Mngomezulu	25/11/2013	HIA Phase 1	Phase1 Heritage Impact Assessment for the Proposed Further Education Training (FET) College in Balfour.
155254	Wouter Fourie	15/10/2012	Heritage Impact Assessment Specialist Reports	Eskom Groovlei PV HIA
164647	Gideon Groenewald	01/03/2014	Palaeontological Specialist Reports	Grootvlei paleo desktop
186082	Gavin Anderson, Louise Anderson	06/11/2012	HIA	The Mitigation Of All Heritage Sites Affected By The NMPP
304130	Gavin Anderson	09/07/2010	HIA Phase 1	SUMMARY OF THE HERITAGE SITES DAMAGED ALONG THE TRANSNET NMPP

Additional References

Raper, P.E., Moller, L.A. and Plessis, T. (2018) Dictionary of Southern African Place Names. Jeppestown: Jonathan Ball.

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APPENDICES

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APPENDIX 1: Archaeological Assessment (2025)

ARCHAEOLOGICAL SPECIALIST STUDY

In terms of Section 38(8) of the NHRA for a

Proposed Development of the ABO Uvemvane Wind Energy Facilities near Balfour in Mpumalanga/ Gauteng Provinces

Prepared by

CTS HERITAGE

Jenna Lavin
Nic Wiltshire
Mabeth Crafford

In Association with

ABO Energy South Africa (PTY) LTD

November 2024

Updated May 2025

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EXECUTIVE SUMMARY

The ABO Uvemvane project cluster comprises 2 x Wind Energy Facilities (WEFs), and associated grid connection. Each of the above two (2) WEFs will require a stand-alone Environmental Authorisation (EA), thus requiring separate application and reporting.

It is intended to submit two separate applications, but to combine the reporting and public participation process (PPP) for the statutory S&EIA process required to obtain the EAs. A summary of key infrastructure is provided below to assist with final reporting quality control to ensure that the nuances across the facilities are reflected in the respective reports.

The survey proceeded with some constraints and limitations, yet the project area was comprehensively surveyed for heritage resources. Previous archaeological assessments completed in the area, and referenced above, have identified the archaeological sensitivity of the area proposed for development. This very high archaeological sensitivity was verified by the archaeological field assessment completed for this project. This field assessment identified a number of different kinds of heritage resources located within the area proposed for development, ranging from Early Stone Age artefacts (Site 033) dated to more than 200 000 years ago through to the ruins of historic farm werfs and farmworkers cottages from the recent past.

The most dominant archaeological signature within this landscape (over 100 observations noted) relates to the Iron Age occupation of this landscape and the remnants of Iron Age settlements. Most of these Iron Age settlement observations are associated with the mountains located within the development area. This association is likely due to the landmark significance of these topographic features in the landscape.

Based on the above findings, a sensitivity map of the development area has been drafted indicating areas that are and are not appropriate for the WEF development within the identified development areas (Figures 9.1 and 9.2). Overall, however, it must be noted that the overall heritage sensitivity of the development areas for WEF 1 and WEF2 range from moderate to very high. The areas identified as having high heritage sensitivity should be considered as “tread-lightly” and the areas identified as having moderate sensitivity must be considered more closely for development activities.

As noted above, due to their landmark value within this cultivated landscape, it is recommended that the higher elevations of these mountains are not suitable for the construction of turbines, and more significantly, the construction of the large-scale roads required to construct these turbines. These areas must be considered as very high sensitivity in the sensitivity maps below. Due to the combined sensitivity from cultural landscape impacts and impacts to buried archaeology, development within this VERY HIGH sensitivity landscape will need to be limited to have minimal impact and align with visual impacts, and carefully considered in terms of micrositing to prevent impacts to burial archaeology. It is preferred if no new infrastructure development takes place within this very high sensitivity area.

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In order to ensure that no impact to the identified resources occurs during the construction or operational phases of the development, a number of recommendations are made below.

Recommendations

There is no objection to the proposed development from an archaeological perspective on condition that:

- The no-development buffer recommendations indicated in Table 3 must be implemented
- The no-go areas identified in Figures 9.1 and 9.2 are adhered to for all associated development activities.
- The high sensitivity areas identified in Figures 9.1 and 9.2 are considered as "tread-lightly" areas with limited infrastructure considered for these areas
- Ongoing community access to the identified burials, as well as their conservation, and the conservation of the significant Iron Age resources into the future, must be ensured. This can be managed through the development of a Heritage Management Plan for the Iron Age resources and burials to be implemented for the duration of the project. This plan can be drafted as a condition of the granting of the EA.
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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1. INTRODUCTION

1.1 Background Information on Project

ABO Uvemvane Wind Energy Facility 1 (Pty) Ltd proposes the development of ABO Uvemvane Wind Energy Facility 1 (WEF 1), a commercial wind energy generation facility comprising up to 30 turbines and with a total generation capacity of up to 240 MWac in capacity, as well as associated infrastructure. The proposed WEF would be located approximately 9km west of the town of Balfour in the Mpumalanga Province in the Dipaleseng Local Municipality within the Gert Sibande District Municipality and approximately 14km south-east of the town Heidelberg in the Gauteng Province in the Lesedi Local Municipality within the Sedibeng District Municipality. It is anticipated that the proposed WEF would have a total (permanent) development footprint of up to 128 ha, which is approximately 1.56 % of the total site (i.e., affected properties) area[1].

1.2 Description of Property and Affected Environment

The proposed ABO Uvemvane WEF Cluster lies southeast of Heidelberg and northwest of Balfour in Gauteng and Mpumalanga respectively. The properties inside the WEF study area span an area roughly measuring 12km from west to east and 14km from north to south. The R23 main road linking Balfour to Heidelberg runs along the eastern side of the WEF and the N3 highway linking Gauteng onto Durban runs more or less along the western end of the area.

The southern portion of the WEF lies on ground south of the Suikerbosrantrivier. The northern portion of the WEF lies on either side of the river. The centre of the overall WEF cluster consists of hilly to mountainous terrain that rises up from Laagerspoort, Malanskraal and Steynskraal farms. Several maize and soya farms have been cultivated in the wider valleys between the ridges and hilltops. Very large and flat agricultural land spreads out south of Malanskraal onto Kleinfontein and wraps around the mountainous core at Modderfontein as well as at Weltevreden farm to the southeast. Driefontein and Wildebeestfontein farms lie towards the eastern side of the WEF and are primarily hilly to mountainous with narrower valleys in between. In general, areas which are not suitable for maize farming have been used for large cattle ranches such as Malanskraal with an extensive network of jeep tracks between the camps. Leisure and tourism businesses are also a part of the WEF area such as the Wild game farm and Tuin van Eden campsite and accommodation establishment. Wild game animals were also seen at Driefontein farm.

[1] *Note regarding proposed facility capacity, footprint, turbine number and maximum turbine capacity: Note that the proposed development entails a proposed maximum development footprint for a combination of factors, namely facility capacity in terms of overall MWac, development footprint in terms of extent turbine numbers which caps the proposed number of turbines that could be developed within the facility as well as maximum turbine capacity for any given turbine, whereby any given aspect has maximum development parameters that has been assessed and the first lowest parameter achieved in this regard would determine the remaining specifications within the said maximum limits (i.e. all maximum parameters could not be achieved simultaneously).*

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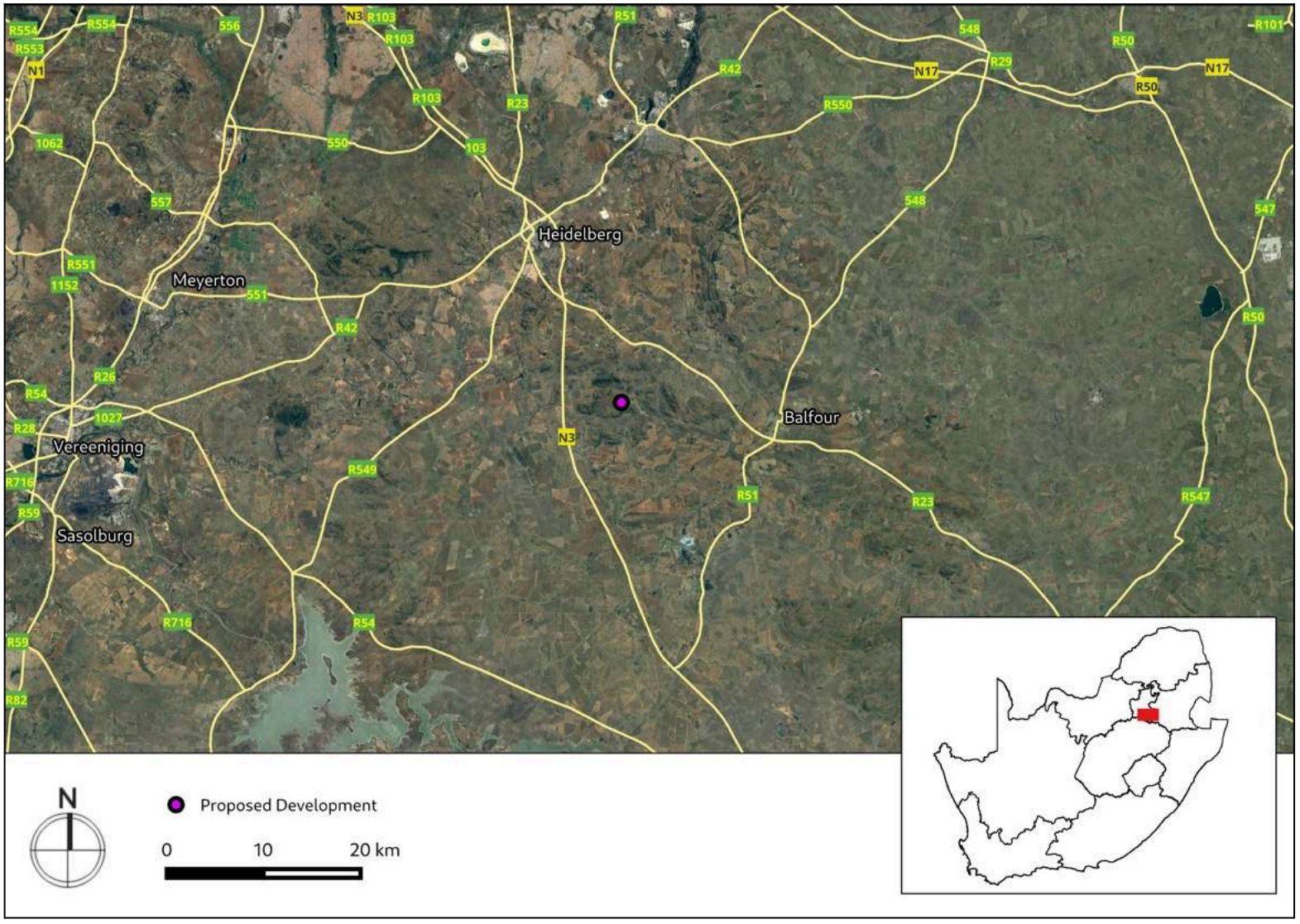

Figure 1.1: Satellite image indicating proposed location of development

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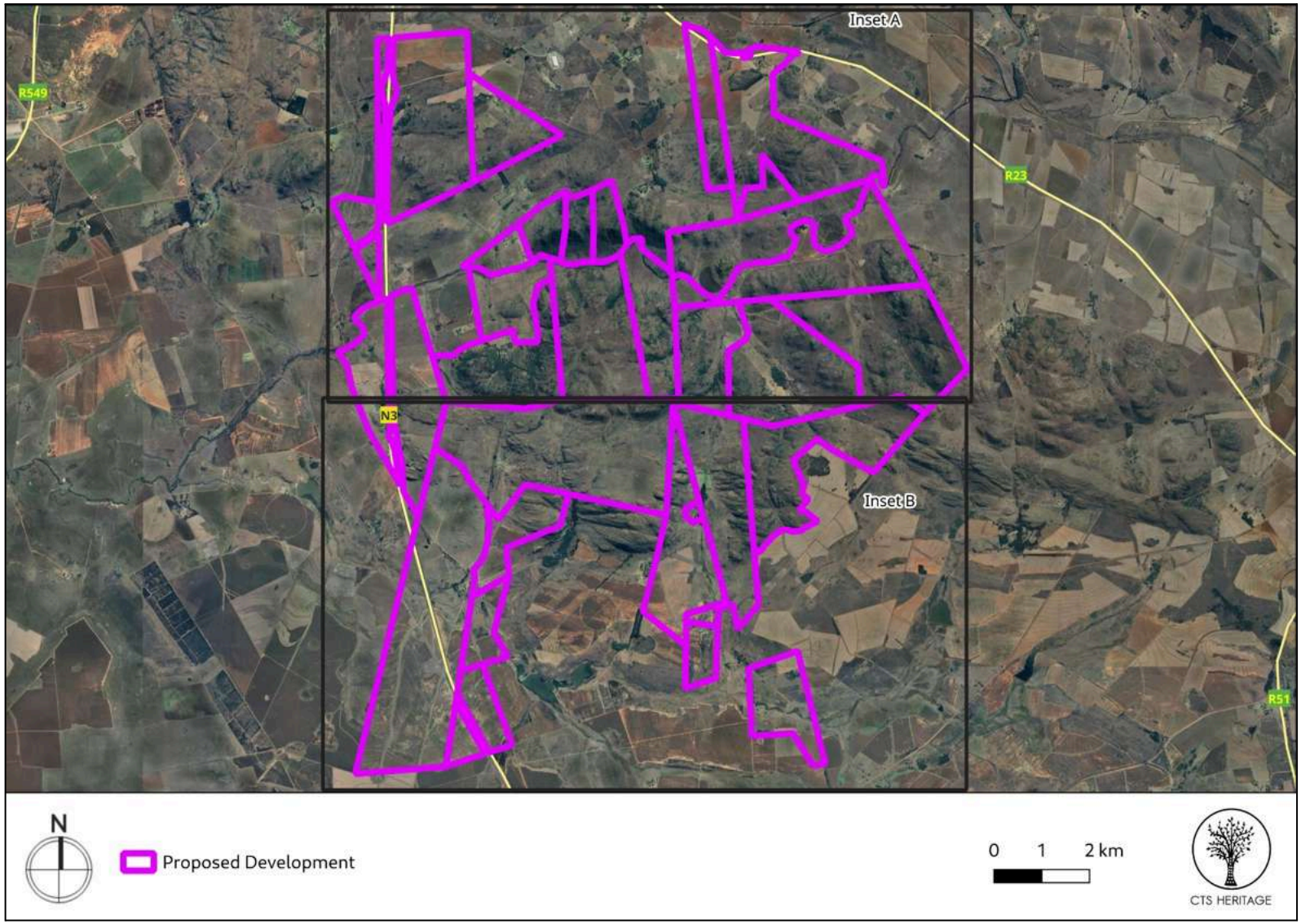

Figure 1.2: Proposed project boundary

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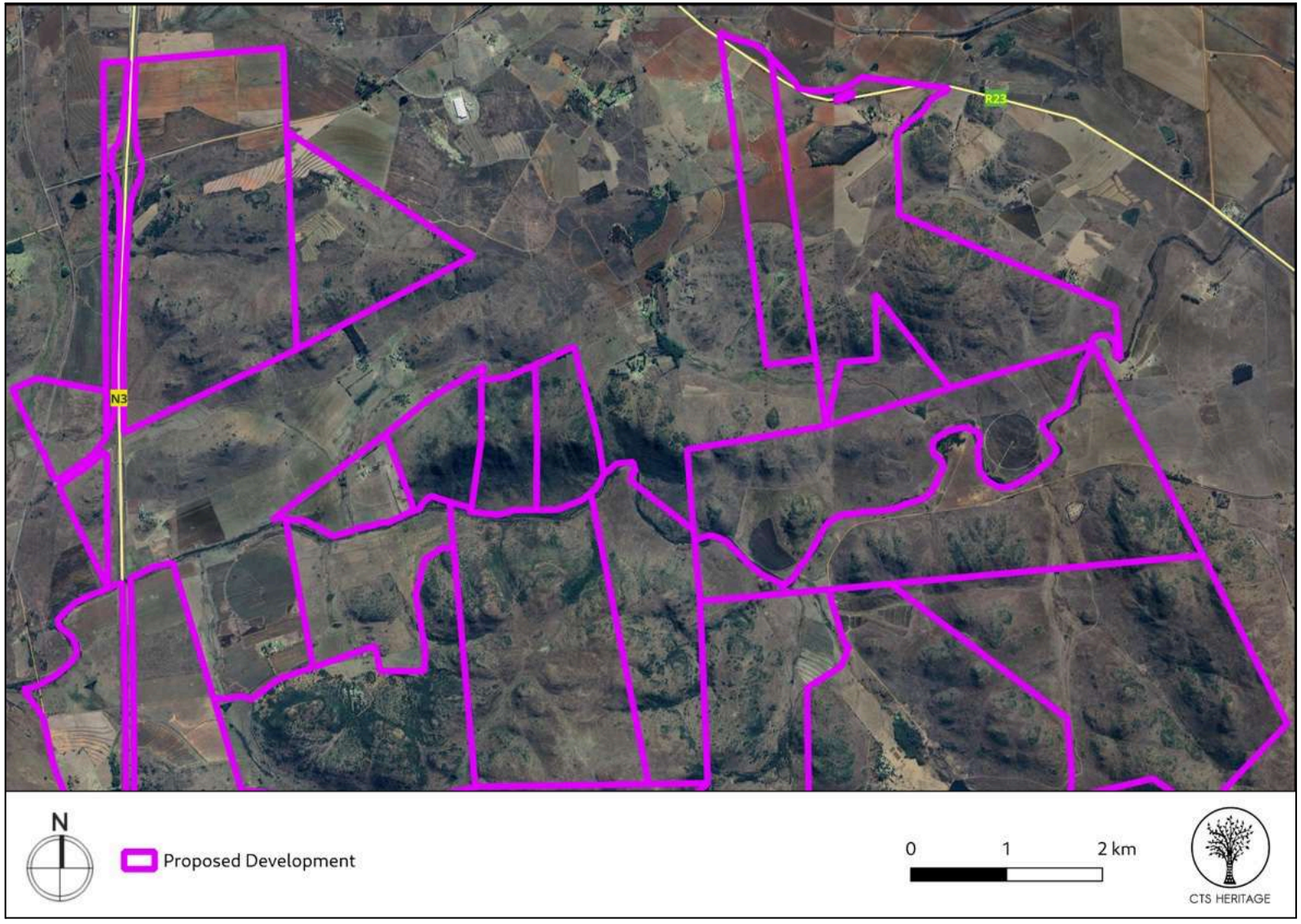

Figure 1.3: Proposed project boundary (Inset A)

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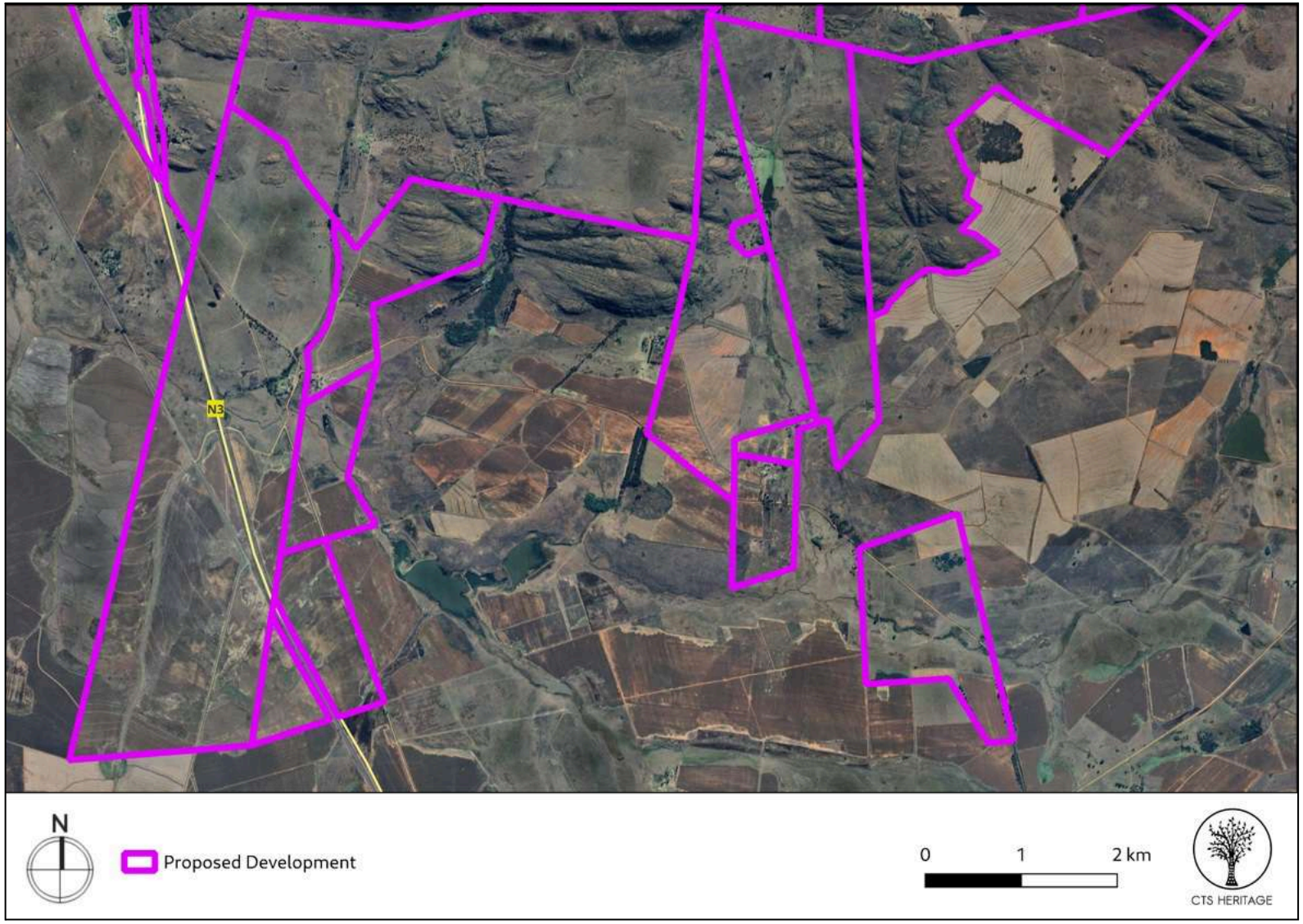

Figure 1.4: Proposed project boundary (Inset B)

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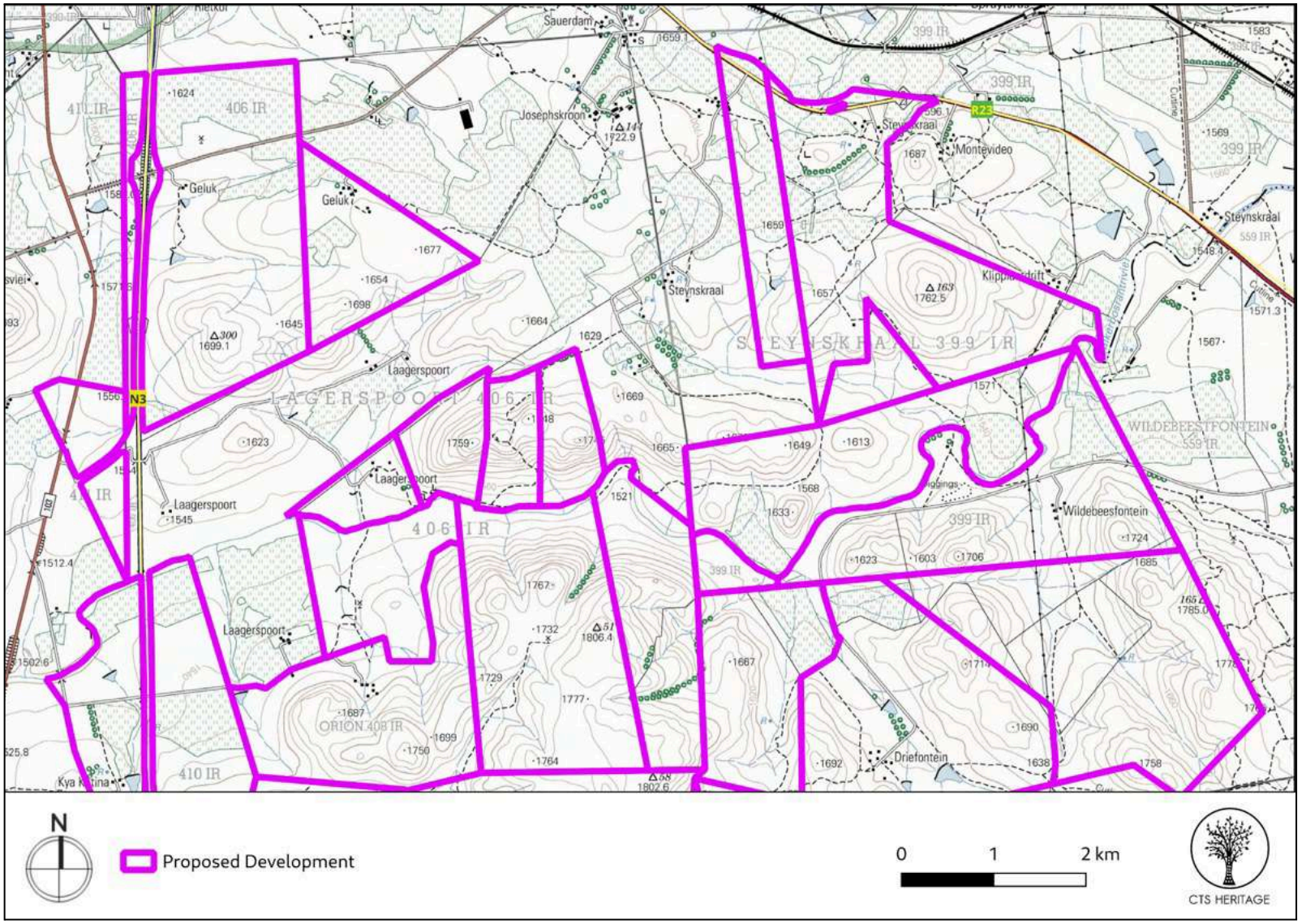

Figure 1.5: Proposed project boundary indicated on the 1:50 000 Topo Inset Map A

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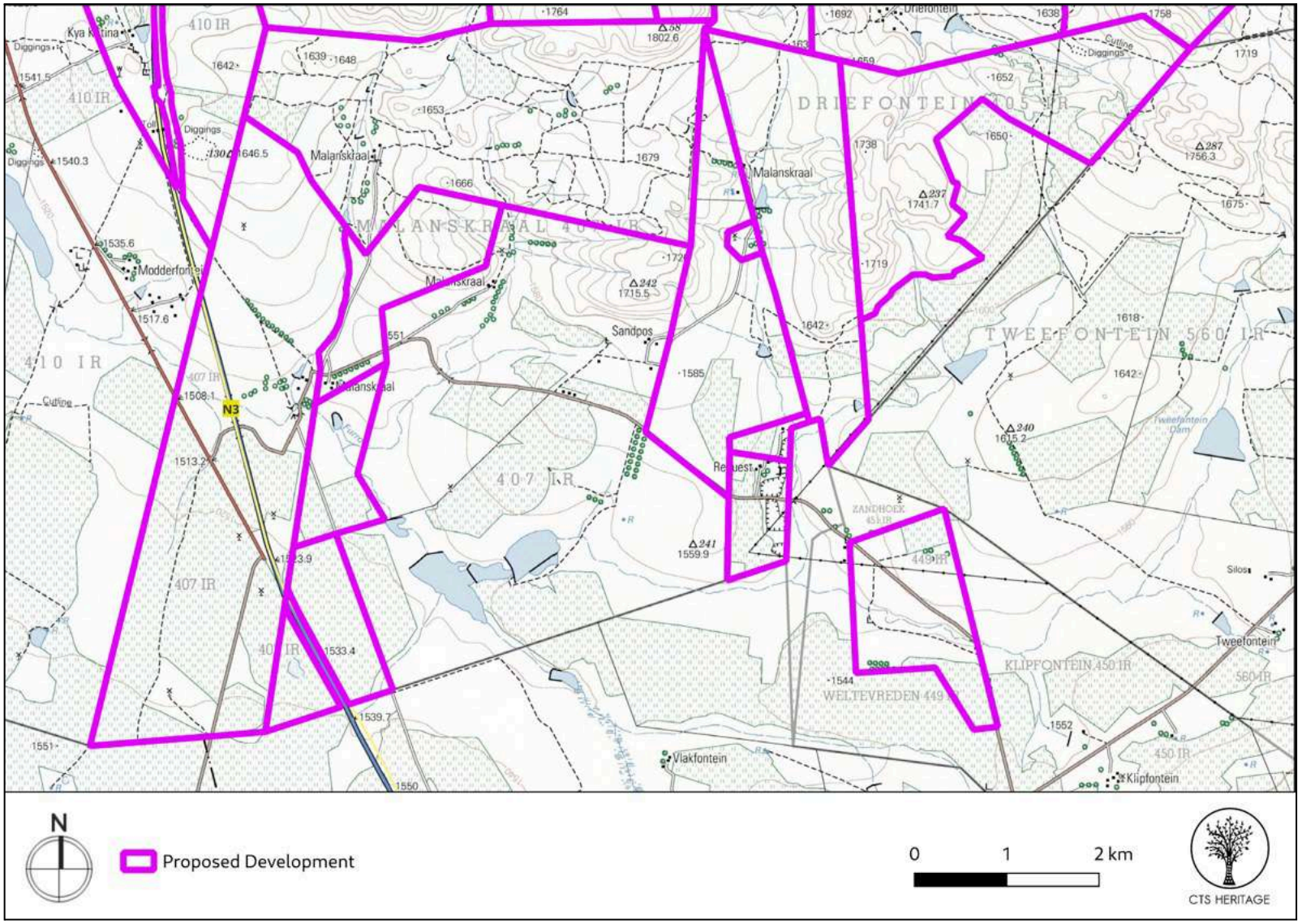

Figure 1.6: Proposed project boundary indicated on the 1:50 000 Topo Inset Map B

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2. METHODOLOGY

2.1 Purpose of Archaeological Study

The purpose of this archaeological study is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999) in terms of impacts to archaeological resources.

2.2 Summary of Steps Followed

- An archaeologist conducted a survey of the site and its environs from 12 to 18 November 2024 to determine what archaeological resources are likely to be impacted by the proposed development of the PV facility and grid connection.
- The area proposed for development was assessed on foot, photographs of the context and finds were taken, and tracks were recorded using a GPS.
- The identified resources were assessed to evaluate their heritage significance in terms of the grading system outlined in section 3 of the NHRA (Act 25 of 1999).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner.
- No-development buffers are recommended. In the context of this report, no-development means no disturbance of that area whatsoever including disturbance associated with road upgrades and grid infrastructure unless otherwise specified.

2.3 Constraints & Limitations

The terrain assessed in the WEF Cluster varies widely from flat, level terrain around the boundaries of the WEF's central area, to extremely rugged, mountainous terrain in the centre, especially either side of the valley cut by the Suikerbosrantrivier. The vegetation is well-established and dense in the mountainous areas as these have not previously been ploughed due to the rugged terrain. The lowlands also varied where cattle grazing had not recently taken place and surface visibility was low due to the dense grass cover. The survey relied heavily on the use of historical satellite imagery obtained from the NGI (NGI aerial photographs 1944) and the historic satellite imagery from 2009 and 2011 from GoogleEarth to locate possible areas for Iron Age enclosures and historical settlements before returning to the field to verify these sites in the field. The combination of the two methods worked very well and a great number of sites were located using this method.

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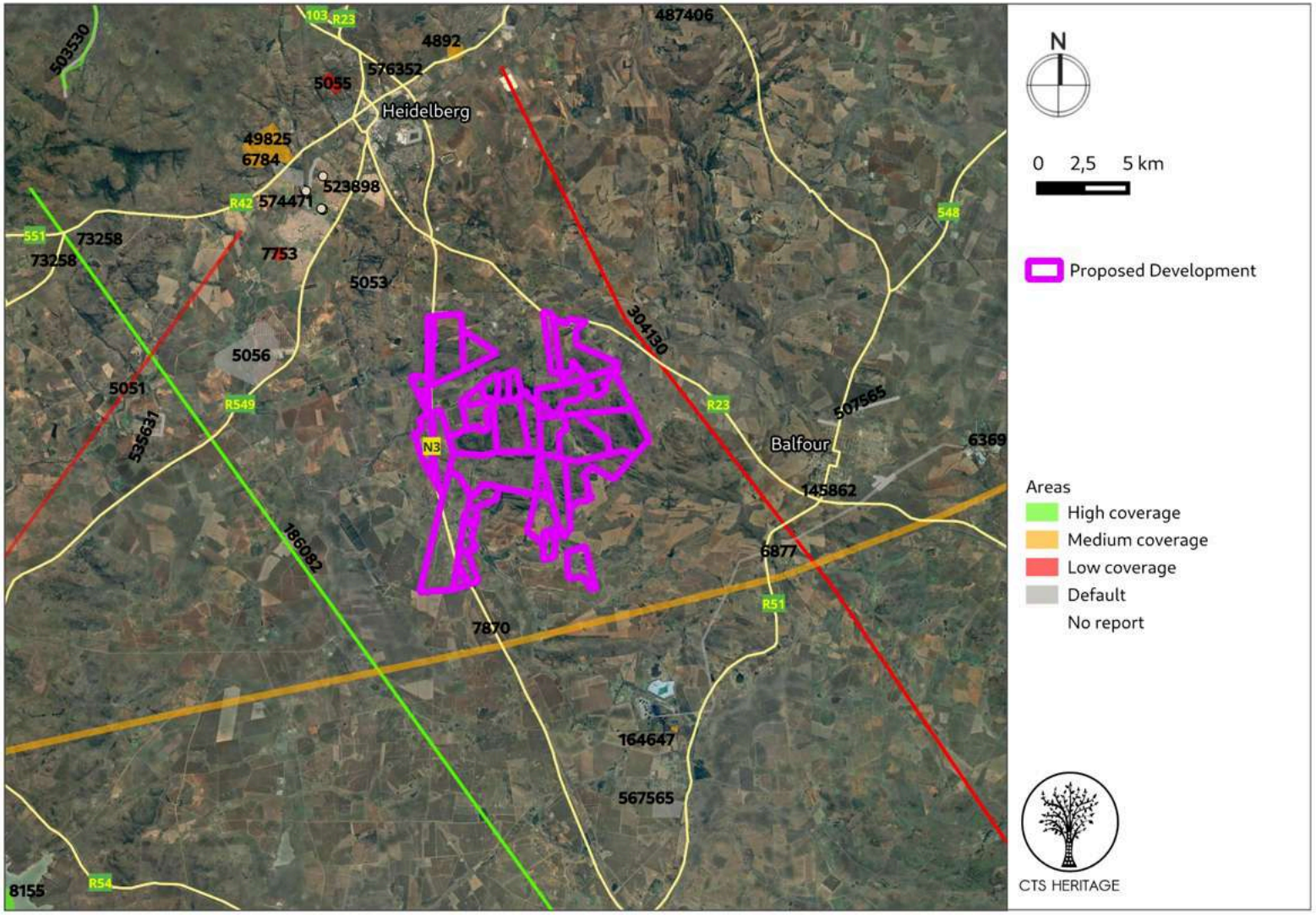

Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Background

This application is for the proposed development of the ABO Uvemvane Wind Energy Facilities located between Balfour in the Mpumalanga province and Heidelberg in Gauteng province. According to Raper et al (2018) in the Dictionary of Southern African Place Names, Balfour was "*established on the farms Vlakfontein No. 101 and No. 108 which belonged to Frederick Stuart McHattie, and named McHattiesburg after him in 1897. Proclaimed on 16 February 1898, it was renamed Balfour on 15 February 1905, after Arthur James Balfour, Prime Minister of Great Britain, 1902-1905, who visited South Africa in that year."* Balfour's economy is mainly gold mining and maize farming.

Heidelberg was laid out on the farm Langlaagte and attained municipal status in 1903 (Raper, 2018). Heidelberg was founded in 1862 when H.J. Uckerman established a trading post at the foot of the Suikerboschrand. The town was planned in 1865, named after Uckerman's university in Germany. It was a key junction for wagon trails connecting settlements across the Transvaal. With the completion of the railway to Natal in 1895, Heidelberg became a hub for both rail and road transport. The station was later restored and now serves as the Heidelberg Motor Museum. During the Witwatersrand gold rush, the town thrived, with 18 hotels, though its boom has since passed. A monument commemorates P. Kruger, M. Pretorius, and P. Joubert for their role in the Boer struggle. Heidelberg briefly served as the provincial capital for the Boer government during the Anglo-Boer War (Pistorius, 2003, SAHRIS ID 5053). During the Second Anglo-Boer War, the British constructed a concentration camp.

3.2 Cultural Landscape and Built Environment

The landscape in which the proposed development is located is mountainous with the Suikerbosrandrivier running through the middle. There are several farm werfs located within the proposed development area. Some of these have associated historical cemeteries indicated on the first edition 1:50 000 topo map (Figure 3.5). Although the N3 has diverged from historical routes, the R23 still follows along a historical route that might be impacted by the proposed development (Figure 3.4).

According to Doucakis (2021), one of the farms, Laagerspoort (also known as Lagerspoort) used to be known as Onderstepoort. This was the location of Voortrekker Hendrik Potgieter's lager during the three day campaign (28-30 November 1837). Further details of this conflict is found in Fourie (2016), "*A commando of 330 Voortrekkers and a small group of Barolong under the command of Andries Hendrik Potgieter and Piet Uys attacked the Khumalo Ndebele of Mzilikazi in the vicinity of the Marico River. Of interest for this study is that they departed Lagerspoort near present-day Heidelberg and travelled via the present-day farm of Deelkraal … to the Matabele settlements near the Marico River. During the attack some 500 Matabele were killed and 3000 cows taken by the Voortrekker commando. On their way back, the cows were divided amongst the members of the commando on the property today known as Deelkraal (Bergh, 1999)."* The exact location of the lager could not be confirmed, but Doucakis quotes Reverend N. Roberts " *Lat. 26 . 37' 30" S. & Long. 28 . 25'E. on the farm LAGERSPOORT 310 [406 IR], situated at the foot of a steep and high mountain, on the right [north] bank of the Sugar Bush River where it emerges from the hills to the North-East of the Heidelberg-Villiers road. From information gathered on the spot it appears that the lager [sic] stood close to the house now occupied by Mr. van Breda." (*This location has been marked on Figure 3.2).

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Most of the nearby sites from SAHRIS are structures associated with the development of railway lines. They have been identified and recorded as part of a project called Footsteps Along the Tracks (FAT). This includes the site identification, documentation and assessment of extant built structures, originally constructed by the Netherlands South African Railway Company (Nederlandsche Zuid-Afrikaansche Spoorwegmaatschappij - NZASM). Although these sites have been graded as having very high levels of regional significance on SAHRIS (Grade II), none of these sites have been formally protected through the publication of a gazette notice in terms of section 27 of the NHRA. Furthermore, the actual cultural value of these sites is likely to be of high or moderate local significance (Grade IIIA or IIIB). Due to the location of these structures being located outside of the area proposed for development, no impact to these resources is anticipated from this proposed development.

3.3 Archaeology

Very few archaeological impact studies have been conducted in the vicinity. Despite this, and the extensive agricultural transformation of the area, some archaeological sites spanning the Earlier, Middle and Later Stone Age have been found in the region. According to Pistorius (2003, SAHRIS ID 5053), the earliest remains in the area are stone-walled settlements built by Late Iron Age Sotho people, found primarily in the Suikerbosrand Nature Reserve. These sites were occupied from the 17th or 18th century well into the 19th century.

As noted by Coetzee (2015), "The Late Iron Age (LIA) settlements are characterised by stone-walled enclosures situated on defensive hilltops c. AD 1640 - AD 1830). This occupation phase has been linked to the arrival of ancestral Northern Sotho, Tswana and Ndebele (Nguni–speakers) in the northern regions of South Africa with associated sites dating between the sixteenth and seventeenth centuries AD. The terminal LIA is represented by late 18th/early 19th century settlements with multichrome Moloko pottery commonly attributed to the Sotho-Tswana. These settlements can in many instances be correlated with oral traditions on population movements during which African farming communities sought refuge in mountainous regions during the processes of disruption in the northern interior of South Africa, resulting from the so-called difaqane (or mfecane)."

In 2003, Pistorius (SAHRIS NID 5053) identified seven Late Iron Age Sites located on the lower foot slope of a mountain, approximately 4 km west of the proposed development (Figure 3.1). Site LIA001 is located at the base of a mountain and consists of a circular outer wall with inner enclosures, likely used for housing and livestock. It dates from the late 18th to early 19th century and is in excellent condition. Site LIA002, situated northwest of LIA001, is larger but shares a similar structure. A more recent brick building, now largely demolished, was built within the site. Though part of the archaeological surface was disturbed by this construction, much of the site remains intact. Site LIA003 is small, likely a single enclosure for small livestock, and is in pristine condition, dating to the same period as LIA001 and LIA002. Site LIA004, once a large settlement near an Eskom structure, was mostly destroyed by a bulldozer. It may have been the main village of the area, also dating to the late 18th to early 19th century. Site LIA005 consists of a single stone wall, possibly a retaining wall or part of a larger site that was destroyed. It dates from the Late Iron Age, with a nearby brick-paved area of a later date. Site LIA006, west of LIA005, has been mostly destroyed by a bulldozer, leaving little information about its structure. Site LIA007, located further west, has low outer walls and central enclosures. Its features are not well defined, and it also dates from the Late Iron Age.

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Table 2: NZASM's FAT project's findings of structures in the vicinity of the project

SAHRIS ID	Line and Site Name	Statement Of Significance	Grade	Images
105330	NZASM_SEL_076; Suikerbosrand cutting	Cutting; On the original trajectory, now defunct. This structure, being part of the larger NZASM endeavour, falls under the generic NZASM statement of significance, but specifically is also a good extant example of its type. Its importance lies in its associations with South Africa's community, heritage, and is considered uncommon, rare and endangered; it has the potential to yield information for understanding; as an object it demonstrates principal characteristics; has particular aesthetic characteristics; demonstrates a high degree of technical achievement; has strong and special associations with both historic and contemporaneous communities; has a special association with the life and work of an important organisation and its associated persons; and is significant in revealing labour practices of the time; all as they relate to the culture of South Africa and her international cultural historic affiliates. The NZASM South-Eastern Line cutting at the Suikerbosrand River has served local farmers and fishermen alike since the line trajectory was relocated.	II	
105331	NZASM_SEL_077; Suikerbosrand bridge	Bridge; On the original trajectory, now defunct. This structure, being part of the larger NZASM endeavour, falls under the generic NZASM statement of significance, but specifically is also a good extant example of its type. Its importance lies in its associations with South Africa's community, heritage, and is considered uncommon, rare and endangered; it has the potential to yield information for understanding; as an object it demonstrates principal characteristics; has particular aesthetic characteristics; demonstrates a high degree of technical achievement; has strong and special associations with both historic and contemporaneous communities; has a special association with the life and work of an important organisation and its associated persons; and is significant in revealing labour practices of the time; all as they relate to the culture of South Africa and her international cultural historic affiliates.	II	
105332	NZASM_SEL_078; Kraal Station	Station; Associated with other remaining built structures along the original trajectory and at the Kraal precinct; Important built residue, still in use. Should any development occur, cognisance should be given to their heritage importance. This structure, being part of the larger NZASM endeavour, falls under the generic NZASM statement of significance, but specifically is also a good extant example of its type. Its importance lies in its associations with South Africa's community, heritage, and is considered uncommon, rare and endangered; it has the potential to yield information for understanding; as an object it demonstrates principal characteristics; has particular aesthetic characteristics; demonstrates a high degree of technical achievement; has strong and special associations with both historic and contemporaneous communities; has a special association with the life and work of an important organisation and its associated persons; and is significant in revealing labour practices of the time; all as they relate to the culture of South Africa and her international cultural historic affiliates. It is a scarce and authentic example of its type.	II	
105333	NZASM_SEL_079; Kraal Station Water tank	Water tank stand; Associated with other remaining built structures along the original trajectory and at the Kraal precinct; Important built residue, still in use. Should any development occur, cognisance should be given to their heritage importance. This structure, being part of the larger NZASM endeavour, falls under the generic NZASM statement of significance, but specifically is also a good extant example of its type. Its importance lies in its associations with South Africa's community, heritage, and is considered uncommon, rare and endangered; it has the potential to yield information for understanding; as an object it demonstrates principal characteristics; has particular aesthetic characteristics; demonstrates a high degree of technical achievement; has strong and special associations with both historic and contemporaneous communities; has a special association with the life and work of an important organisation and its associated persons; and is significant in revealing labour practices of the time; all as they relate to the culture of South Africa and her international cultural historic affiliates. It is a scarce example of imported prefabricated cast iron water tanks installed by the NZASM.	II	

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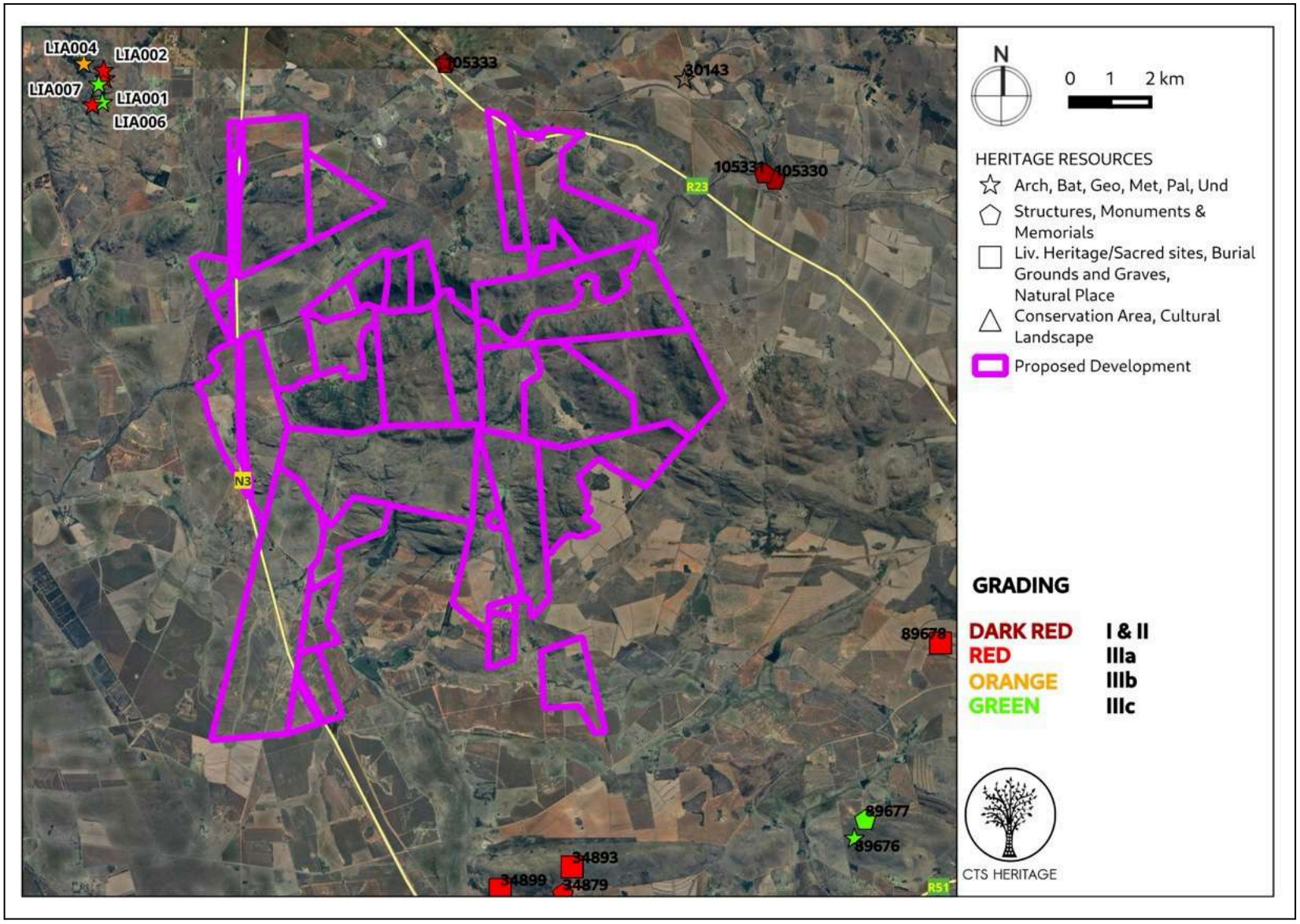

Figure 3.1 Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated.

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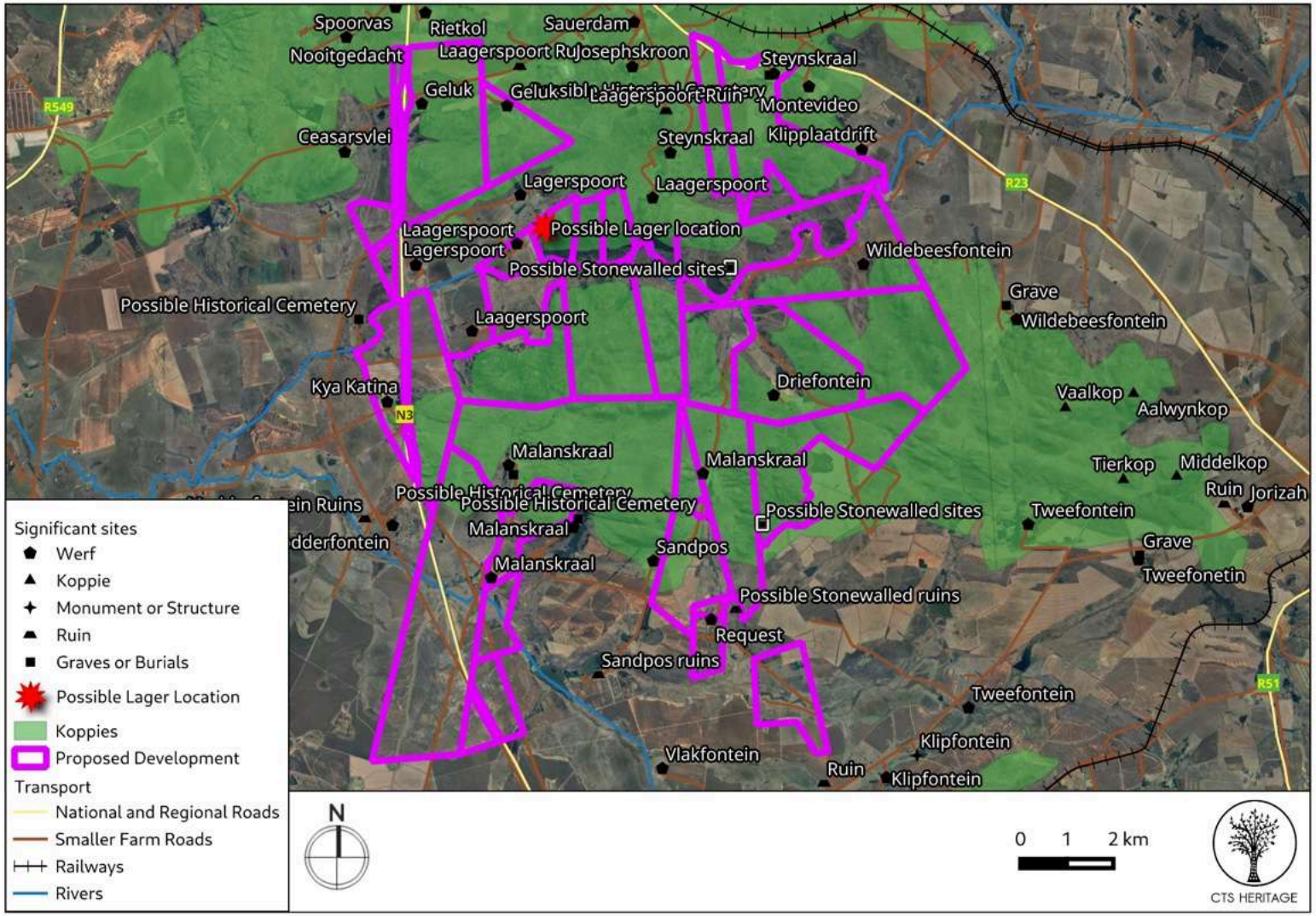

Figure 3.2 Cultural Landscape Map. Map indication sensitive receptors near the proposed development, extracted from the Topo 1:50 000 map.

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Figure 3.3 Cultural Landscape Map. Map indicating possible stonewalled ruins inside the proposed development, extracted from the Topo 1:50 000 map.

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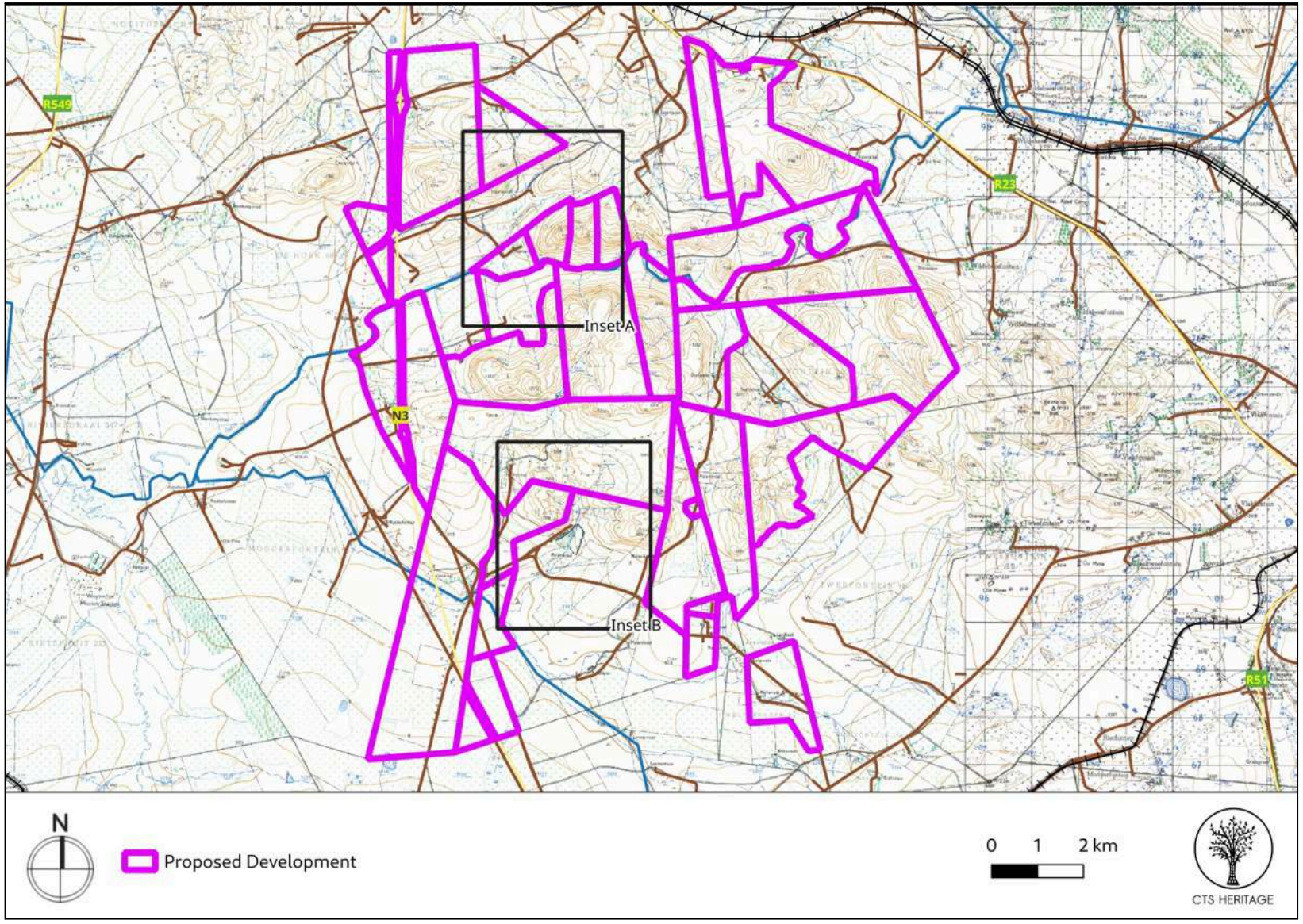

Figure 3.4 First Edition Topo Map. First Edition Topo Map indicating historical farm werfs that still exist

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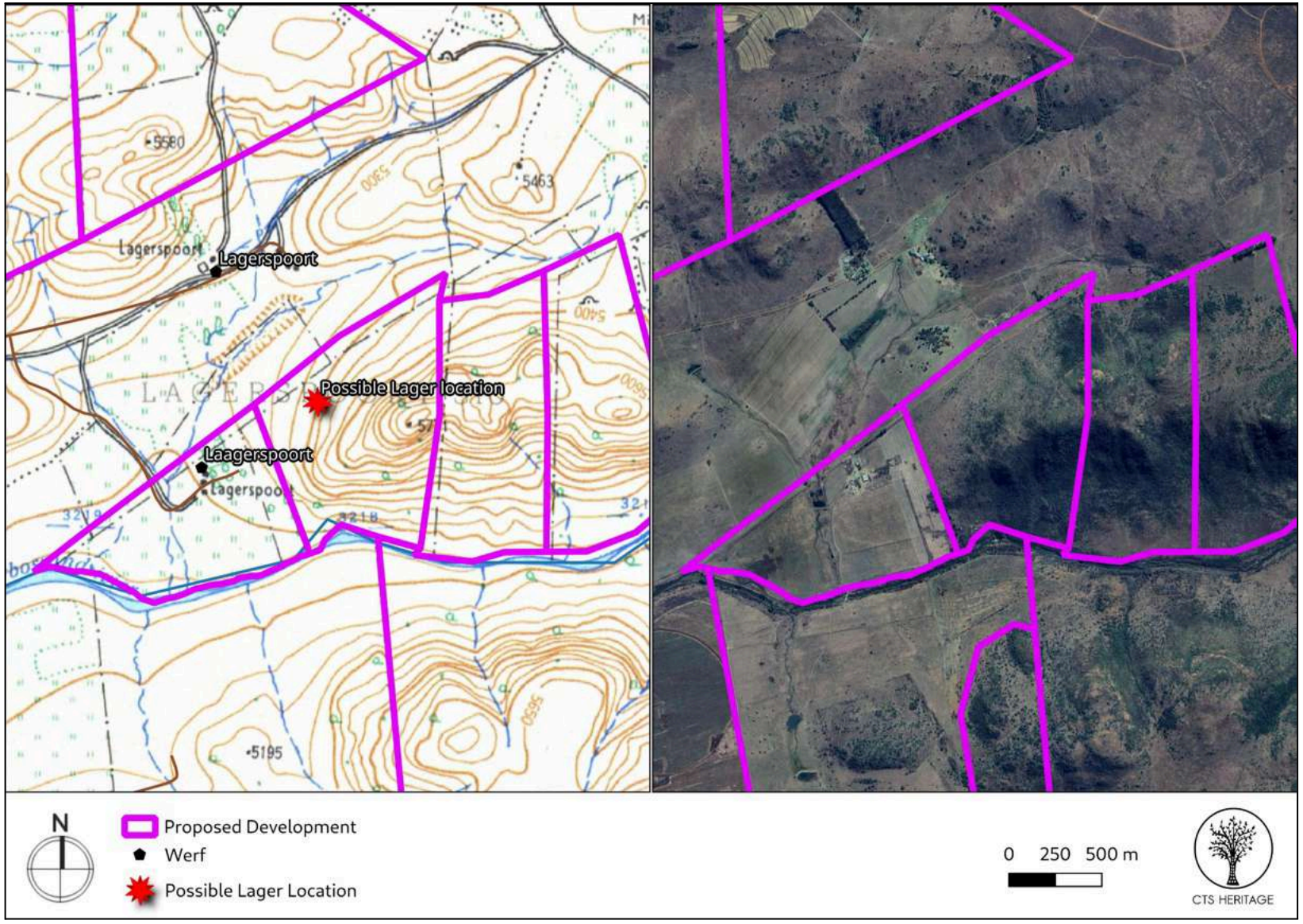

Figure 3.5 First Edition Topo Inset Map A. First Edition Topo Map indicating historical farm werf that still exists, and possible location of lager.

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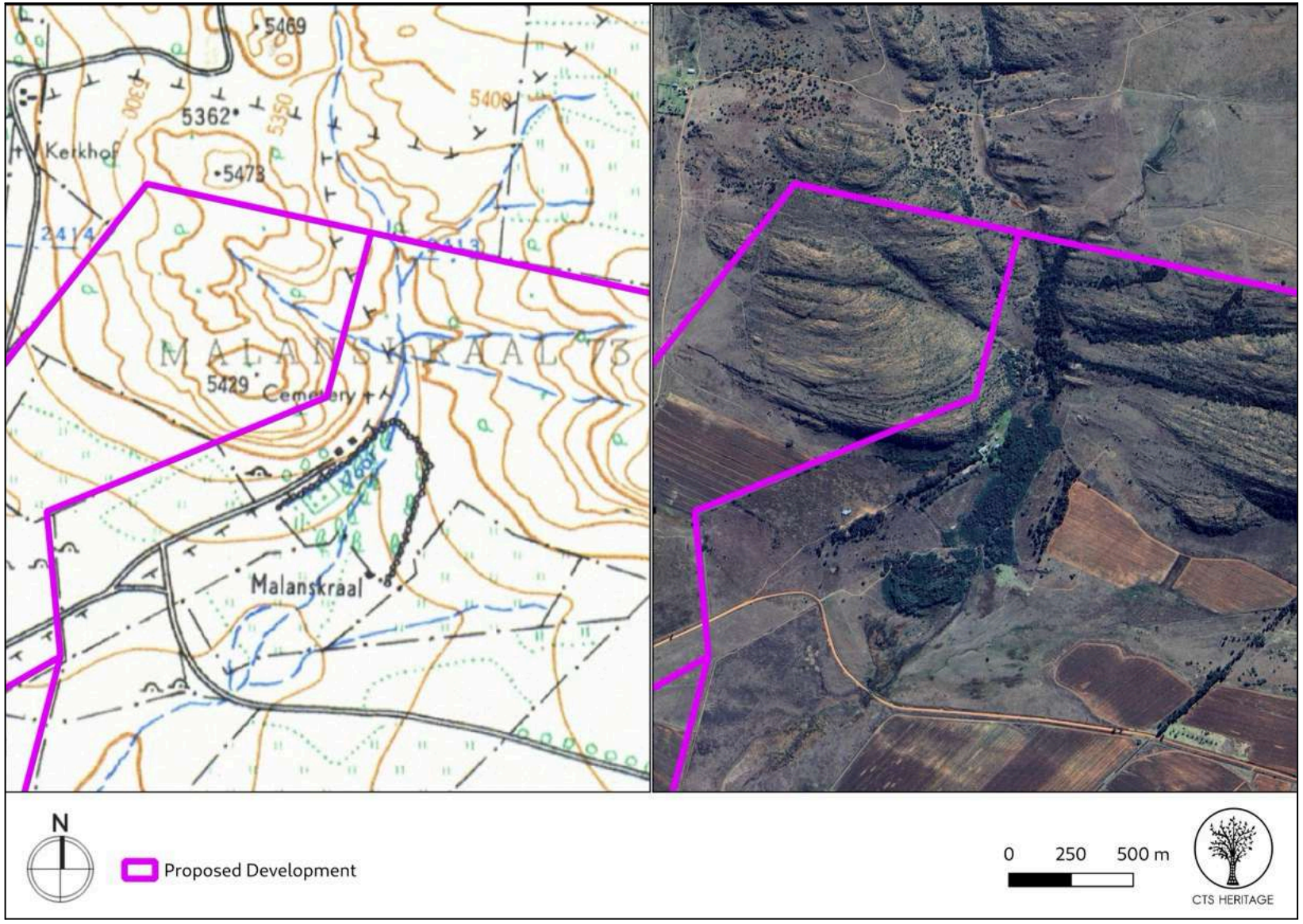

Figure 3.6 First Edition Topo Inset Map b. First Edition Topo Map indicating historical Malanskraal farm werf that still exists, and has an associated historical cemetery.

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

Over a hundred recordings were made in the field which primarily relate to the extensive Iron Age occupation history of the WEF area. Sites were located across a diverse topographic area, from the lowlands where maize cultivation had not obliterated the archaeological record, to the hilltops where enough ground was available to build Iron Age settlements with good visibility of the surrounding area. Historical werfs have been juxtaposed with the Iron Age settlements and the oldest historical kraals still feature at various places such as Steynskraal, Driefontein, Malanskraal and Laagerspoort. Many of the Iron Age enclosures had stone cairns in the centre of the kraals which are likely graves and Driefontein had a particularly extensive settlement cluster on the hills overlooking Vaalkop and Wildebeesfontein. The location of historical to modern graves in the 20th century near some of these sites attests to the largely unbroken oral history that has been retained by the farmworkers families descended from the Iron Age communities in the area.

The study area also has a South African War (2nd Boer War) site on a small koppie in the northeastern end of the WEF just south of the R23 main road. The site consists of small stone packed fortifications with another ruined werf at the base of the hill which may be contemporaneous with the fortifications. A number of historical and 20th century graveyards were recorded on several of the farms with some of the largest of these at Steynskraal and Malanskraal. One old gold mining shaft which had been hand-dug was also found south of Driefontein.

The Stone Age artefacts are primarily manufactured using local and abundant quartz and quartzites and the Iron Age sites also had a number of cores, flakes and debitage. It is possible that some mixing of occupation between Later Stone Age and Iron Age sites has taken place which is unsurprising given the nature of the terrain.

Figure 4.1: View from the R103 main road looking south over the hills in the WEF area.

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Figure 4.2: View from Geluk farm towards the hills in the WEF area.

Figure 4.3: Typical veld cover en route to one of the Iron Age settlements on the hillslope.

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Figure 4.4: Boulder field of quartzitic rocks ubiquitous in the area.

Figure 4.5: View from one the higher ridges looking southwest into the WEF central area (note the rugged terrain).

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Figure 4.6: View of relatively flat cultivated fields which form the eastern fringes of the WEF area.

Figure 4.7: Small dam with disturbed ESA material dug up to create the sand banks.

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Figure 4.8: Flat terrain at Laagerspoort in the maize producing valley. The Wild game lodge is behind this photograph.

Figure 4.9: View of large hills rising up above Laagerspoort.

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Figure 4.10: View from the top of the ridges above Orion and Laagerspoort farms.

Figure 4.11: Some flatter high ground breaks out in the game farm.

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Figure 4.12: Avenue of gum trees lining the maize fields at Steynskraal.

Figure 4.13: Rocky koppie with Iron Age sites at the base near Steynskraal.

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Figure 4.14: Eroded and overgrazed valley on the southern banks of the Suikerbosrantrivier.

Figure 4.15: Typical veld grass and bushveld away from the agricultural areas.

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Figure 4.16: View from an Iron Age enclosure looking down onto Laagerspoort.

Figure 4.17: Cattle watering reservoirs on Malanskraal near the quartzitic outcrops.

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Figure 4.18: Flat maize fields towards the southern end of the study site - viewing the mountainous area on the horizon.

Figure 4.19: View of the WEF area in the southern section looking northeast.

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Figure 4.20: View of the area near the historical ruins at Driefontein.

Figure 4.21: View from the ridgelines at Driefontein.

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Figure 4.22: View down the kloof which leads to the mining shaft.

Figure 4.23: View of the maize fields at Request and Weltevreden in the southeastern side of the WEF.

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Figure 4.24: Recently burnt veld that was returning after recent rains at Wildebeesfontein.

Figure 4.25: View from the Iron Age cluster between Wildebeesfontein and Driefontein.

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Figure 4.26: VIew of the large maize fields bordering Driefontein.

Figure 4.27: Cattle ranching at Malanskraal.

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Figure 4.28: View at Weltrevreden along the gravel road.

Figure 4.29: View of the large graveyard at Malanskraal looking north.

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Figure 4.30: View near the N3 highway at Malanskraal.

Figure 4.31: View of the N3 highway at Malanskraal.

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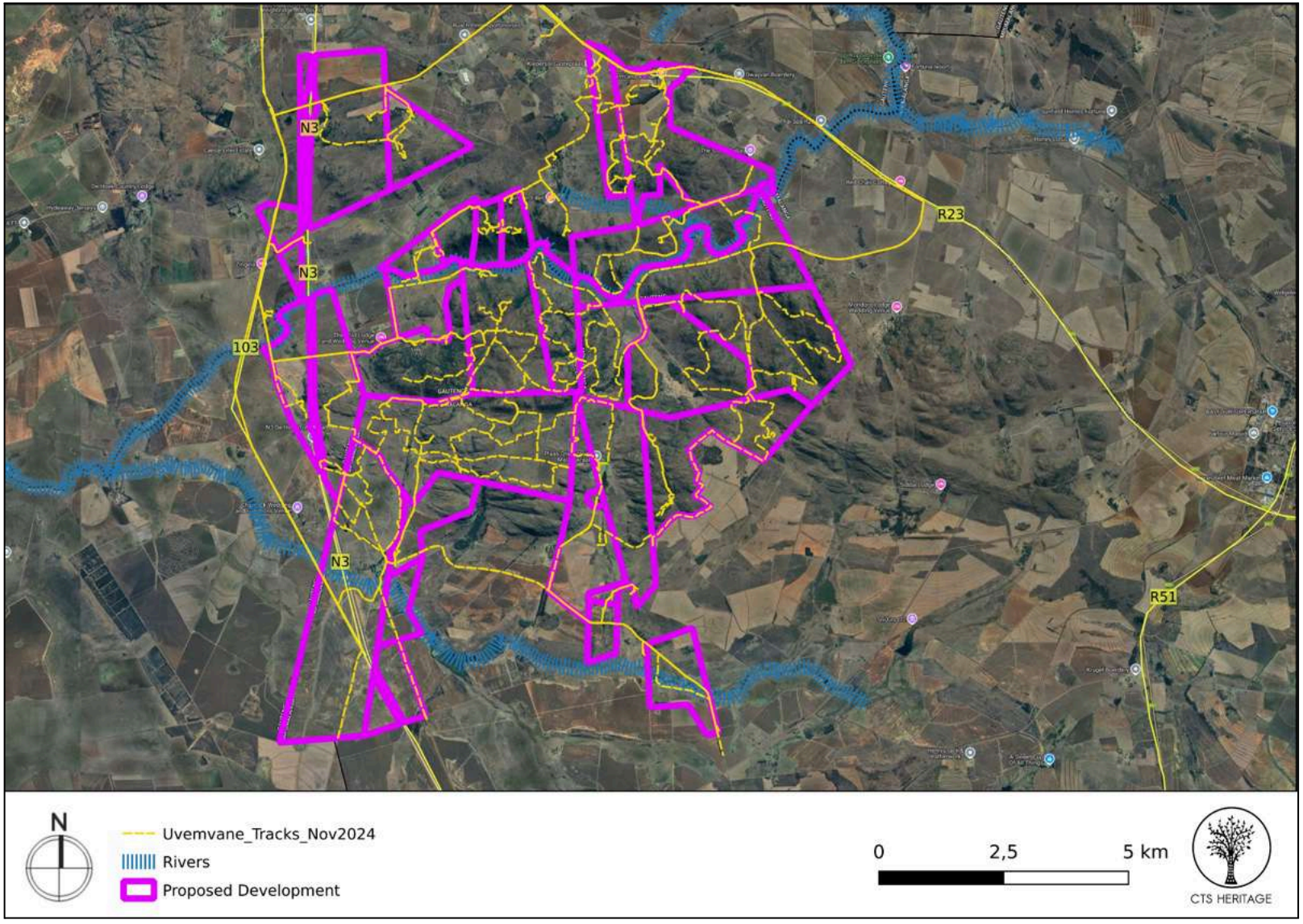

Figure 5. Track paths of archaeological field assessment - see Constraints and Limitations

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4.2 Archaeological Resources Identified

Table 3: Observations noted during the field assessment - the coloured rows denote the recommended grading

POINT ID	Description	Type	Period	Density	Co-ordinates		Grading	Mitigation
001	Geluk werf, modern 20th c buildings	Structure	Modern	n/a	-26.603791	28.39293	NCW	NA
002	Geluk werf, 20th c buildings	Structure	Modern	n/a	-26.604249	28.409336	NCW	NA
003	Geluk graves, 20th c. Marked by stone cairns, one headstone. About 20 graves	Graves/ Burial Grounds	Modern	n/a	-26.604938	28.410406	IIIA	100m Buffer
004	Well built stone walled kraal, and modern ruin	Structure , Ruin	Historic	n/a	-26.604957	28.409422	IIIC	50m Buffer
005	Dark brick farm outbuilding and concrete tank	Structure	Modern	n/a	-26.609039	28.406083	NCW	NA
006	Iron Age stone walled kraals hidden under trees	Ruin	Iron Age	n/a	-26.612174	28.407944	IIIA	100m Buffer
007	Brick ruin on edge of fields	Ruin	Modern	n/a	-26.599578	28.408191	NCW	NA
008	Lagerspoort sandstone ruins as well as more modern 20th c ruin	Ruin	Historic, Modern	n/a	-26.596735	28.411351	IIIC	50m Buffer
009	Modern industrial farm complex, EMS	Structure	Modern	n/a	-26.596344	28.445299	NCW	NA
010	Steynskraal werf, sandstone walls and corrugated iron roofs, early 20th c or earlier	Structure	Historic, Modern	n/a	-26.598903	28.460894	IIIC	500m Buffer
011	Strydom family graves, 1907, 1923. About 20 graves under trees with large stone walling	Graves/ Burial Grounds	Historic	n/a	-26.598675	28.459969	IIIA	100m Buffer
012	Farmworkers' graves under gum trees marked by stone cairns and some modern headstones, up to 50 graves here	Graves/ Burial Grounds	Modern, Historic	n/a	-26.600095	28.459435	IIIA	100m Buffer
013	Local stone built ruin with internal plastering, 20th c, 3c	Ruin	Historic	n/a	-26.601053	28.453526	IIIC	50m Buffer
014	Stone walled fort on top of small koppie, SA War/2nd Boer War	Ruin	Historic	n/a	-26.600908	28.455007	IIIA	100m Buffer
015	IA stone walled kraals	Ruin	Iron Age	n/a	-26.603862	28.44707	IIIA	100m Buffer
016	IA stone walled kraals	Ruin	Iron Age	n/a	-26.608417	28.452028	IIIA	100m Buffer
017	Long rectangular stone kraal	Structure	Historic	n/a	-26.609132	28.451527	IIIC	50m Buffer
018	Historical rectangular stone kraal under trees, well packed walls. Brick ruin at foundation level	Ruin	Historic	n/a	-26.613101	28.450916	IIIC	50m Buffer
019	Historical stone walled kraals	Structure	Historic	n/a	-26.615298	28.449083	IIIC	50m Buffer
020	Small rectangular stone building inside ephemeral kraal, historical	Structure	Historic	n/a	-26.616839	28.44956	IIIC	50m Buffer
021	Large IA enclosures with stone cairn marked grave in the centre	Ruin, Grave	Iron Age	n/a	-26.614058	28.453236	IIIA	100m Buffer
022	Another large Iron Age enclosure on hill slope	Ruin	Iron Age	n/a	-26.618461	28.450536	IIIA	100m Buffer
023	Mid 20th century farmworkers' graves marked by stone cairns, some headstones, around 20 graves	Graves/ Burial Grounds	Historic	n/a	-26.612991	28.455453	IIIA	100m Buffer
024	Klipplaat koppie, very prominent landmark koppie	CL Feature		n/a	-26.612212	28.465427		Avoid Impact

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025	Historical stock loading platform in IA enclosures	Ruin	Iron Age, Historic	n/a	-26.615071	28.457722	IIIA	100m Buffer
026	Klipplaatdrift werf 20th century buildings with green corrugated iron roofs	Structure	Modern, Historic	n/a	-26.612356	28.478097	IIIC	500m Buffer
027	IA enclosures	Ruin	Iron Age	n/a	-26.623757	28.460306	IIIA	100m Buffer
028	IA enclosures	Ruin	Iron Age	n/a	-26.627548	28.459616	IIIA	100m Buffer
029	20th century werf, white walls and red roof	Structure	Modern, Historic	n/a	-26.626428	28.467488	IIIC	500m Buffer
030	Prominent koppies, cl features	CL Feature		n/a	-26.635618	28.462023		Avoid Impact
031	Prominent koppies, cl features and IA sites	Ruin, CL Feature	Iron Age	n/a	-26.631492	28.451111	IIIA	100m Buffer
032	IA enclosures	Ruin	Iron Age	n/a	-26.624678	28.455262	IIIA	100m Buffer
033	ESA quartzite flake dug up into earthen bank of dam	Artefacts	ESA	0-5	-26.623714	28.464374	NCW	NA
034	Small stone walled pump station on stream bed	Structure	Historic	n/a	-26.600517	28.460833	NCW	NA
035	Prominent koppies, cl features	CL Feature		n/a	-26.615366	28.39429		Avoid Impact
036	Ruined historical kraal, ruined werf and brick building. Marked as cemetery on old topo map but no graves seen	Graves/ Burial Grounds, Ruin	Historic	n/a	-26.640902	28.381378	IIIA	100m Buffer
037	Farmworkers' ruined cottages x 4	Ruin	Modern	n/a	-26.659157	28.388282	NCW	NA
038	Kya Katina werf, mostly modern buildings but older stone walled kraals in the fabric of the alterations	Structure	Modern, Historic	n/a	-26.656355	28.387072	NCW	NA
039	Prominent koppie, Orion farm, cl feature	CL Feature		n/a	-26.650021	28.405493		Avoid Impact
040	IA enclosure under trees	Ruin	Iron Age	n/a	-26.646802	28.402908	IIIA	100m Buffer
041	Laagerspoort werf, stone buildings, late 19th century	Structure	Historic	n/a	-26.646211	28.403572	IIIC	500m Buffer
042	IA enclosures	Ruin	Iron Age	n/a	-26.644855	28.405545	IIIA	100m Buffer
043	Laagerspoort werf, early 20th century buildings and some older fabric	Structure	Historic	n/a	-26.643009	28.402389	IIIC	500m Buffer
044	IA walling, linear	Ruin	Iron Age	n/a	-26.645379	28.415182	IIIA	100m Buffer
045	IA enclosure	Ruin	Iron Age	n/a	-26.643796	28.417387	IIIA	100m Buffer
046	Wild game lodge, modern facilities	Structure	Modern	n/a	-26.647301	28.410768	NCW	NA
047	Steynskraal werf, stone walled kraals, late 19th and early 20th c buildings	Structure	Modern, Historic	n/a	-26.612115	28.440795	IIIC	500m Buffer
048	Stone walled kraal	Structure	Historic	n/a	-26.614207	28.43744	IIIC	50m Buffer
049	Tuin van Eden campsite and Laagerspoort werf, sandstone building, and 20th c buildings	Structure	Historic, Modern	n/a	-26.619911	28.437361	IIIC	500m Buffer
050	IA enclosures	Ruin	Iron Age	n/a	-26.623305	28.440868	IIIA	100m Buffer

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051	Large rectangular stone kraal with ruined building, also local stone, in centre, historical	Ruin	Historic	n/a	-26.625262	28.441559	IIIA	100m Buffer
052	IA enclosures	Ruin	Iron Age	n/a	-26.621244	28.432372	IIIA	100m Buffer
053	Prominent koppies, cl features	CL Feature		n/a	-26.625616	28.427287		Avoid Impact
054	Stone walling, large rectangular platform with inner kraals, historical	CL Feature		n/a	-26.620717	28.429547		Avoid Impact
055	IA and historical enclosures, late IA	Ruin	Iron Age	n/a	-26.625007	28.425538	IIIA	100m Buffer
056	Jacobs family graves surrounded by agricultural fields, 1908, at least 10 graves	Graves/ Burial Grounds	Historic	n/a	-26.612566	28.438267	IIIA	100m Buffer
057	Ruined farmworkers' cottages	Ruin	Modern	n/a	-26.628814	28.386226	NCW	NA
058	Laagerspoort werf, 20th c	Structure	Modern	n/a	-26.628295	28.411747	NCW	NA
059	Ruined farmworkers' cottages	Ruin	Modern	n/a	-26.630517	28.41718	NCW	NA
060	Retouched quartzite flake in jeep track	Artefacts	MSA	0-5	-26.633	28.425523	NCW	NA
061	IA enclosures	Ruin	Iron Age	n/a	-26.633665	28.423343	IIIA	100m Buffer
062	Large historical stone walled kraal	Ruin	Historic	n/a	-26.629315	28.415407	IIIA	100m Buffer
063	IA enclosures	Ruin	Iron Age	n/a	-26.656076	28.392988	IIIA	100m Buffer
064	Farmworkers' ruined cottages	Ruin	Modern	n/a	-26.683397	28.39311	NCW	NA
065	Malanskraal werf, green corrugated iron roofs, early 20th and late 19th c.	Structure	Historic	n/a	-26.685623	28.403859	IIIB	500m Buffer
066	About 30 farmworkers' graves, circa 1970s	Graves/ Burial Grounds	Modern	n/a	-26.68306	28.407224	IIIA	100m Buffer
067	Historical cemetery, late 19th and early 20th century, Gouws, Bekker, about 16 graves	Graves/ Burial Grounds	Historic	n/a	-26.6679	28.410266	IIIA	100m Buffer
068	IA enclosures on hill	Ruin	Iron Age	n/a	-26.662643	28.413806	IIIA	100m Buffer
069	IA enclosures	Ruin	Iron Age	n/a	-26.657033	28.405666	IIIA	100m Buffer
070	IA enclosures	Ruin	Iron Age	n/a	-26.655986	28.42854	IIIA	100m Buffer
071	Ruined historical werf, sandstone foundations	Ruin	Historic	n/a	-26.668156	28.419551	IIIC	50m Buffer
072	IA enclosure	Ruin	Iron Age	n/a	-26.668928	28.419409	IIIA	100m Buffer
073	Prominent koppies, cl features	CL Feature		n/a	-26.639561	28.492604		Avoid Impact
074	Wildebeesfontein settlement, farmworkers cottages, modern	Structure	Modern	n/a	-26.631426	28.478191	NCW	NA
075	Modipa family graves, 1990s to present, stone cairns and headstones, partially broken fence. Around 30 graves	Graves/ Burial Grounds	Modern	n/a	-26.634941	28.45496	IIIA	100m Buffer
076	Ruined hut foundations lined with stone	Ruin	Historic	n/a	-26.635024	28.455275	IIIC	50m Buffer
077	Prominent koppies, cl features	CL Feature		n/a	-26.646467	28.445717		Avoid Impact

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078	Driefontein ruins, historical	Ruin	Historic	n/a	-26.653229	28.4591	IIIC	50m Buffer
079	Driefontein werf, mostly modern buildings, some older stone walled kraals	Structure	Historic, Modern	n/a	-26.654118	28.460801	IIIC	500m Buffer
080	IA enclosure	Ruin	Iron Age	n/a	-26.655754	28.453869	IIIA	100m Buffer
081	IA enclosures	Ruin	Iron Age	n/a	-26.662841	28.458797	IIIA	100m Buffer
082	Stone walling at head of gully, historical	Ruin	Historic	n/a	-26.671487	28.461	NCW	NA
083	IA enclosure	Ruin	Iron Age	n/a	-26.672937	28.462625	IIIA	100m Buffer
084	Old gold mining shaft, historical	Ruin	Historic	n/a	-26.674611	28.462071	IIIA	100m Buffer
085	IA enclosures	Ruin	Iron Age	n/a	-26.676558	28.458638	IIIA	100m Buffer
086	Wildebeestfontein farmworkers' graves, about 40 marked by stone cairns, 20th c	Graves/ Burial Grounds	Historic, Modern	n/a	-26.630372	28.478703	IIIA	100m Buffer
087	IA enclosures	Ruin	Iron Age	n/a	-26.65463	28.486046	IIIA	100m Buffer
088	About 25 farmworkers' graves marked by stone cairns, 20th c.	Graves/ Burial Grounds	Modern, Historic	n/a	-26.658761	28.481473	IIIA	100m Buffer
089	Ruined sandstone historical buildings and kraal	Ruin	Historic	n/a	-26.659982	28.479951	IIIC	50m Buffer
090	Quartzite flake	Artefacts	MSA	0-5	-26.660154	28.480237	NCW	NA
091	Ephemeral remains of hut floors and possible grave	Ruin	Iron Age	n/a	-26.661748	28.482403	IIIA	100m Buffer
092	IA enclosures	Ruin	Iron Age	n/a	-26.666569	28.482643	IIIA	100m Buffer
093	Malanskraal 20th century ruins, werf	Ruin	Modern	n/a	-26.689994	28.450431	NCW	NA
094	Ntaopane family graves early 20th c. 14 graves	Graves/ Burial Grounds	Historic	n/a	-26.689895	28.455334	IIIA	100m Buffer
095	Malanskraal modern werf	Structure	Modern	n/a	-26.693302	28.448383	NCW	NA
096	Zandhoek ruins, werf, kraals, later brick ruins too	Ruin	Historic	n/a	-26.698223	28.454265	IIIC	50m Buffer
097	Zandhoek ruins, early 20th c corrugated iron roof ruin, sandstone ruins	Ruin	Historic	n/a	-26.700918	28.455601	IIIC	50m Buffer
098	Ruined sandstone building	Ruin	Historic	n/a	-26.70596	28.464307	IIIC	50m Buffer
099	Ruined werf with mostly 20th c brick buildings, one sandstone building	Ruin	Historic, Modern	n/a	-26.715055	28.471408	IIIC	50m Buffer
100	Weltevreden farm cemetery, werf 20th century	Graves/ Burial Grounds	Modern, Historic	n/a	-26.701417	28.456496	IIIA	100m Buffer
101	Sandpos werf, 20th c.	Structure	Modern	n/a	-26.682445	28.43744	NCW	NA
102	Goosen family graves, 1890s, at least 5 graves	Graves/ Burial Grounds	Historic	n/a	-26.674524	28.447016	IIIA	100m Buffer
103	Malanskraal, historical kraal. 2 sandstone ruins	Ruin	Historic	n/a	-26.672805	28.447128	IIIC	50m Buffer
104	Malanskraal historical werf, stone walled	Structure	Historic,	n/a	-26.667854	28.446656	IIIC	500m

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	kraals, silos, Cape Revival gables on main farmhouse, corrugated iron roof		Modern					Buffer
105	Sandstone ruins, historical near clump of gum trees	Ruin	Historic	n/a	-26.661011	28.449313	IIIC	50m Buffer
106	Historical stone walling against outcrop	Ruin	Historic	n/a	-26.659722	28.449971	IIIC	50m Buffer
107	IA enclosures	Ruin	Iron Age	n/a	-26.658518	28.44011	IIIA	100m Buffer
108	Farmworkers' graves, over 60 here. 20th c. 1960s, 1980s	Graves/ Burial Grounds	Modern, Historic	n/a	-26.67873	28.396049	IIIA	100m Buffer
109	Farmworker's grave, 1972, in road reserve	Graves/ Burial Grounds	Modern	n/a	-26.719862	28.472479	IIIA	100m Buffer
110	Burial Site identified by a landowner	Graves/ Burial Grounds	Historic	n/a	-26.662178	28.395526	IIIA	100m Buffer

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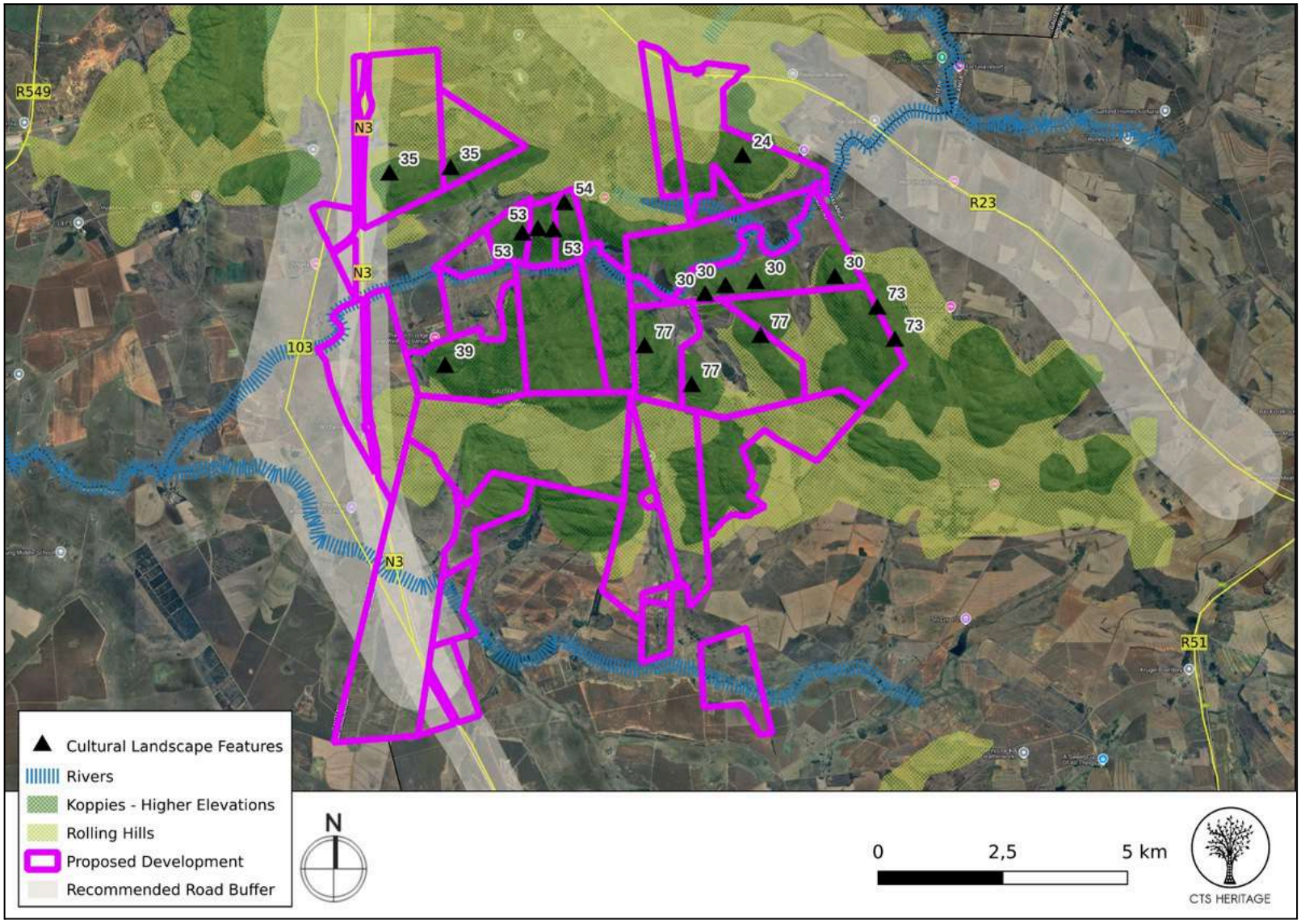

Figure 6.1: Map of all cultural landscape features noted within the development area

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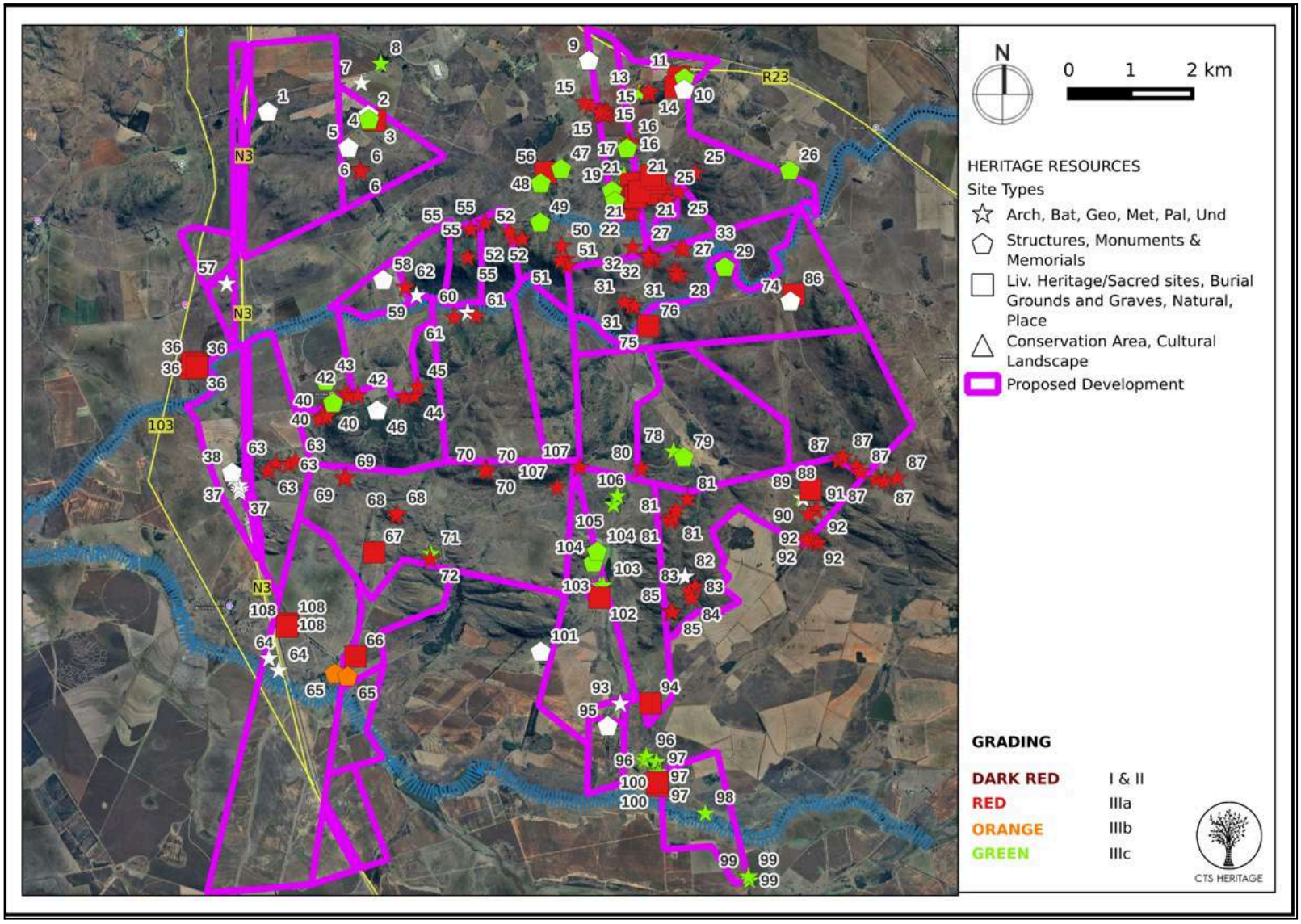

Figure 6.2: Map of all sites and observations noted within the development area

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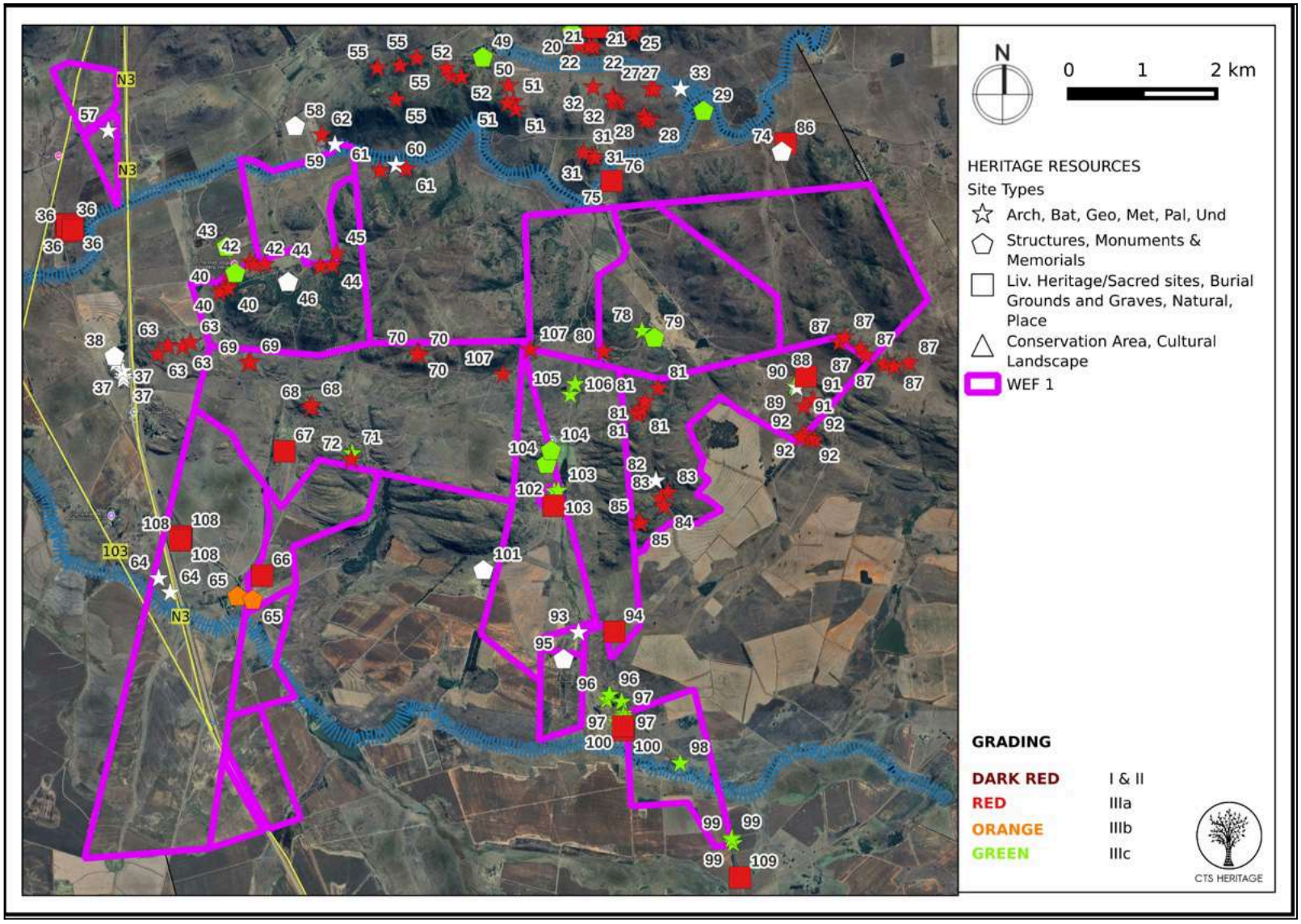

Figure 6.3: Map of all sites and observations noted within the development area for WEF1

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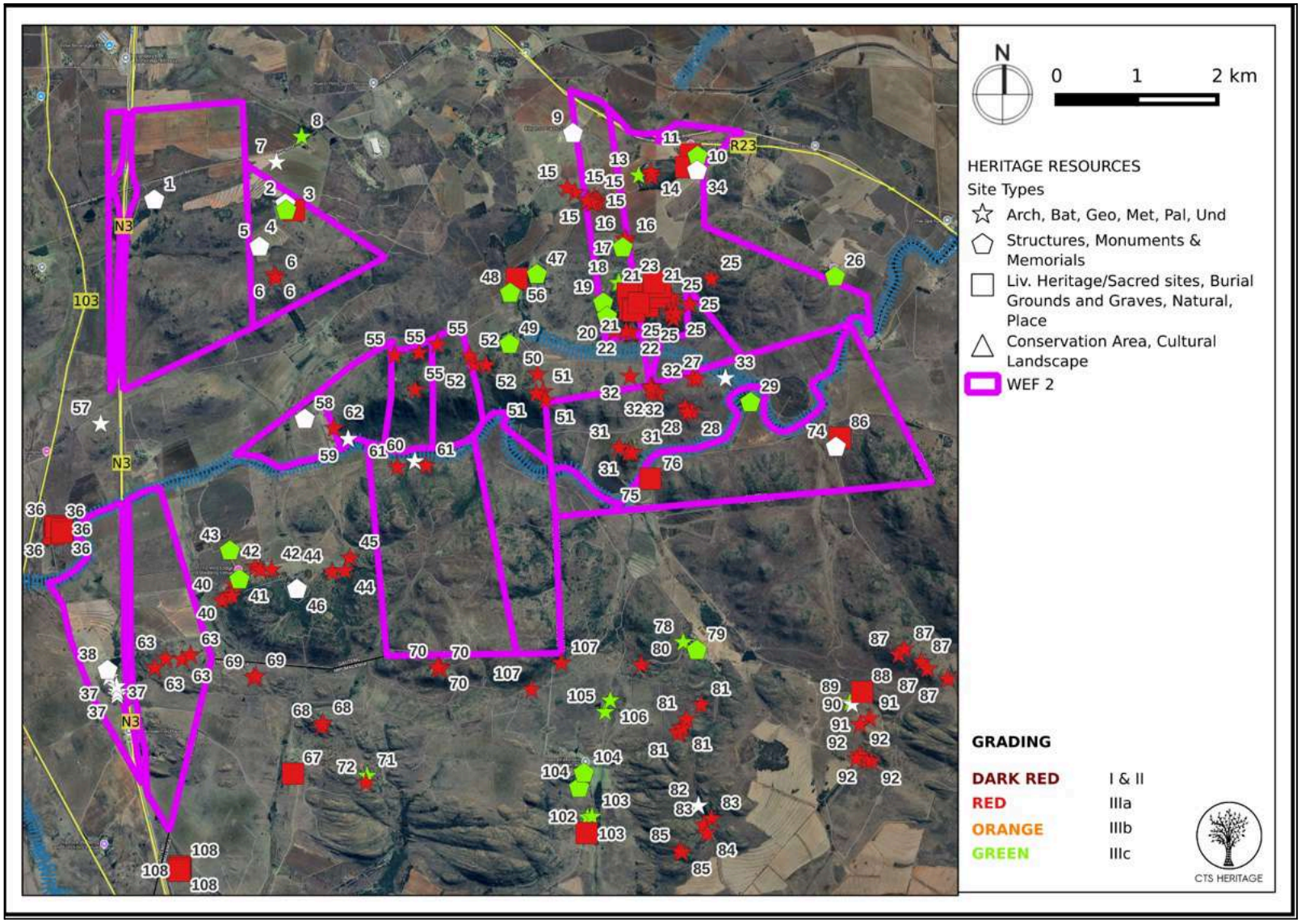

Figure 6.4: Map of all sites and observations noted within the development area for WEF 2

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4.3 Selected Photographic Record

(a full photographic record is available upon request)

Figure 7.1: Observation 003

Figure 7.2: Observation 004

Figure 7.3: Observation 006

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Figure 7.4: Observation 008

Figure 7.5: Observation 010

Figure 7.6: Observation 011

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Figure 7.7: Observation 012

Figure 7.8: Observation 013

Figure 7.9: Observation 014

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Figure 7.10: Observation 015

Figure 7.11: Observation 016

Figure 7.12: Observation 017 and 018

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Figure 7.13: Observation 019

Figure 7.14: Observation 020

Figure 7.15: Observation 021

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Figure 7.16: Observation 022

Figure 7.17: Observation 023

Figure 7.18: Observation 024

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Figure 7.19: Observation 025

Figure 7.20: Observation 026

Figure 7.21: Observation 027

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Figure 7.22: Observation 028

Figure 7.23: Observation 029

Figure 7.24: Observation 030

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Figure 7.25: Observation 031

Figure 7.26: Observation 032

Figure 7.27: Observation 035

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Figure 7.28: Observation 036

Figure 7.29: Observations 039 and 040

Figure 7.30: Observation 041

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Figure 7.31: Observation 042

Figure 7.32: Observation 043

Figure 7.33: Observation 044

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Figure 7.34: Observation 045

Figure 7.35: Observations 047 and 048

Figure 7.36: Observation 049

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Figure 7.37: Observation 050

Figure 7.38: Observation 051

Figure 7.39: Observation 052

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Figure 7.40: Observation 053

Figure 7.41: Observation 054

Figure 7.42: Observation 055

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Figure 7.43: Observation 056

Figure 7.44: Observation 061

Figure 7.45: Observation 062

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Figure 7.46: Observation 063

Figure 7.47: Observation 065

Figure 7.48: Observation 066

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Figure 7.49: Observation 067

Figure 7.50: Observation 068

Figure 7.51: Observation 069

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Figure 7.52: Observation 070

Figure 7.53: Observation 071

Figure 7.54: Observation 072

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Figure 7.55: Observation 073

Figure 7.56: Observation 075

Figure 7.57: Observation 076

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Figure 7.58: Observation 077

Figure 7.59: Observation 078

Figure 7.60: Observation 079

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Figure 7.61: Observation 080

Figure 7.62: Observation 081

Figure 7.63: Observation 083

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Figure 7.64: Observation 084

Figure 7.65: Observation 085

Figure 7.66: Observation 086

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Figure 7.67: Observation 087

Figure 7.68: Observation 088

Figure 7.69: Observation 089

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Figure 7.70: Observation 091

Figure 7.71: Observation 092

Figure 7.72: Observation 094

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Figure 7.73: Observation 096

Figure 7.74: Observation 097

Figure 7.75: Observation 098 and 099

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Figure 7.76: Observation 100

Figure 7.77: Observation 102

Figure 7.78: Observation 103

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Figure 7.79: Observation 104

Figure 7.80: Observation 105

Figure 7.81: Observation 106

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Figure 7.82: Observation 107

Figure 7.83: Observation 108

Figure 7.84: Observation 109

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of Impact to Archaeological Resources

Previous archaeological assessments completed in the area, and referenced above, have identified the archaeological sensitivity of the area proposed for development. This very high archaeological sensitivity was verified by the archaeological field assessment completed for this project. This field assessment identified a number of different kinds of heritage resources located within the area proposed for development, ranging from Early Stone Age artefacts (Site 033) dated to more than 200 000 years ago through to the ruins of historic farm werfs and farmworkers cottages from the recent past.

The most dominant archaeological signature within this landscape (over 100 observations noted) relates to the Iron Age occupation of this landscape and the remnants of Iron Age settlements. These sites represent the ruins of stone-walled structures and central kraals that conform to a particular pattern of Iron Age settlement. While the sites mapped in this report reflect the visible evidence of these settlements on the landscape, it is certain that these observations are not discrete but are related and as such, it is very likely that there is buried archaeology associated with these settlements throughout this landscape. The age of these settlements is unknown at this stage, however the scientific value of the buried archaeological material associated with these settlements is high and is therefore graded IIIA. As such, a no development buffer of 100m is recommended around each observed feature. Most of these Iron Age settlement observations are associated with the mountains located within the development area. This association is likely due to the landmark significance of these topographic features in the landscape. Also, due to the steep topography associated with these mountainous areas, these areas have not been subjected to cultivation activities associated with the historic agricultural occupation of the area. While it is possible that iron age settlements extended across the agricultural land in the past, this signature has been disrupted by agricultural activities. This signature remains clear within the mountainous areas.

Due to their landmark value within this cultivated landscape, it is recommended that the higher elevations of these mountains are not suitable for the construction of turbines, and more significantly, the construction of the large-scale roads required to construct these turbines. These areas must be considered as very high sensitivity in the sensitivity maps below. Due to the combined sensitivity from cultural landscape impacts and impacts to buried archaeology, development within this VERY HIGH sensitivity landscape will need to be limited to have minimal impact and align with visual impacts, and carefully considered in terms of micrositing to prevent impacts to burial archaeology. It is preferred if no new infrastructure development takes place within this very high sensitivity area.

The field assessment identified a significant number of burial grounds and graves located within the area proposed for development. Some of these burials are more formal whereas others are marked only by sandstone cairns or are associated with the Iron Age settlement observations described above. Due to their high local levels of social and spiritual value, these sites are graded IIIA. A no development buffer of 100m is recommended around each of these sites in order to ensure that the sense of place associated with these burials is retained, and to ensure that no nearby unmarked burials are accidentally impacted by excavations associated with this proposed development.

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A number of modern agricultural structures were identified along with the ruins of some historic structures. These sites have no cultural value and as such are determined to be Not Conservation-Worthy (NCW). No further mitigation is recommended for these observations. These include observations 001, 002, 005, 007, 009, 037, 038, 046, 057, 058, 059, 060, 064, 074, 082, 090, 095 and 101.

The field assessment identified a number of 20th Century farm werfs that have historic contextual value and are graded IIIC. These sites include the Steynskraal farm werf (Site 010 and 047), the Klipplaatdrift farm werf (Site 026), the Laagerspoort farm werf (Site 041, 043 and 049 - see the background section for more information) and the Driefontein farm werf (Site 079). The Malanskraal farm werf is represented by two site recordings (Site 065 and 104). The structures located at Site 065 have higher levels of historic value and as such are graded IIIB. In order to retain the sense of place associated with these historic farm werfs, a no development buffer of 500m is recommended around each of these sites.

The field assessment also identified a number of historic structures and ruins of structures that have been determined to have lower levels of historic contextual value. These observations include the ruins of historical farm werfs (Site 008, 013, 071, 076, 078, 096, 097, 103 and 105) and a number of stone kraals (Sites 018, 089 and 106). All of these sites with contextual historic value are graded IIIC and as such, a no development buffer of 50m is recommended around each of these sites. This buffer is recommended in order to ensure that no buried archaeology associated with these resources are accidentally impacted by construction activities associated with this proposed development.

As noted in the desktop assessment, although the N3 has diverged from historical routes, the R23 still follows along a historical route. The field assessment noted the scenic and historic value of the R23 and the R103 and as such, a no development buffer of 1km is recommended on either side of these historic scenic routes for turbines, and a 500m buffer on either side for associated WEF infrastructure. Unlike the R23 and the R103, the N3 has lower levels of scenic and historic value and as such, a no development buffer of 500m is recommended on either side of the N3 for turbines and a 250m buffer on either side for associated WEF infrastructure.

Further, in order to avoid a canyon effect, it is recommended that turbines are proposed for only one side of the R103 and N3. It is therefore recommended that turbines are therefore limited to the eastern side of these roads.

Based on the above findings, a sensitivity map of the development area has been drafted indicating areas that are and are not appropriate for the WEF development within the identified development areas (Figures 9.1 and 9.2). Overall, however, it must be noted that the overall heritage sensitivity of the development areas for WEF 1 and WEF2 range from moderate to very high. The areas identified as having high heritage sensitivity should be considered as “tread-lightly” and the areas identified as having moderate sensitivity must be considered more closely for development activities.

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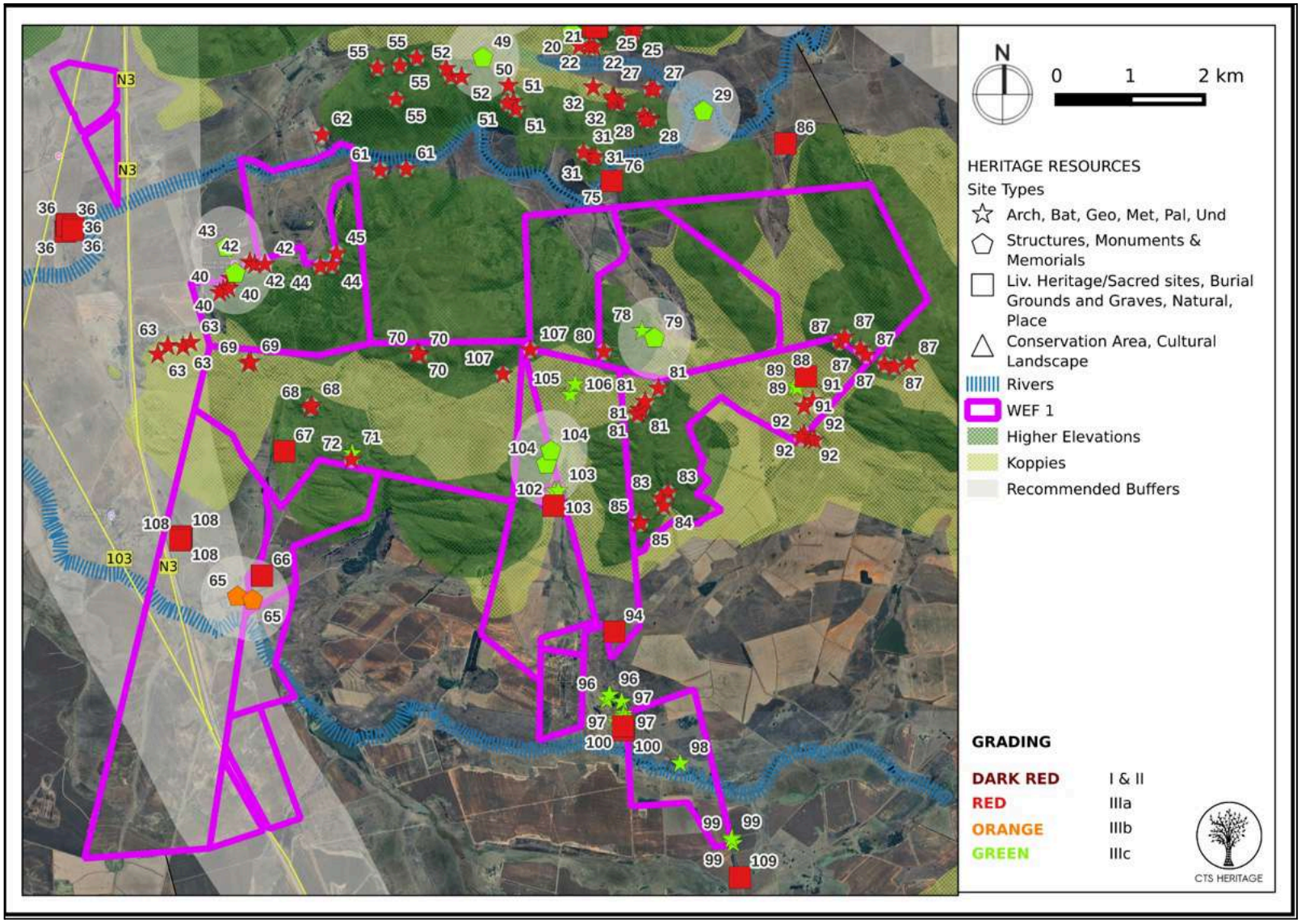

Figure 8.1: Map of all sites and observations noted within the development area as well as proposed mitigation measures for WEF1

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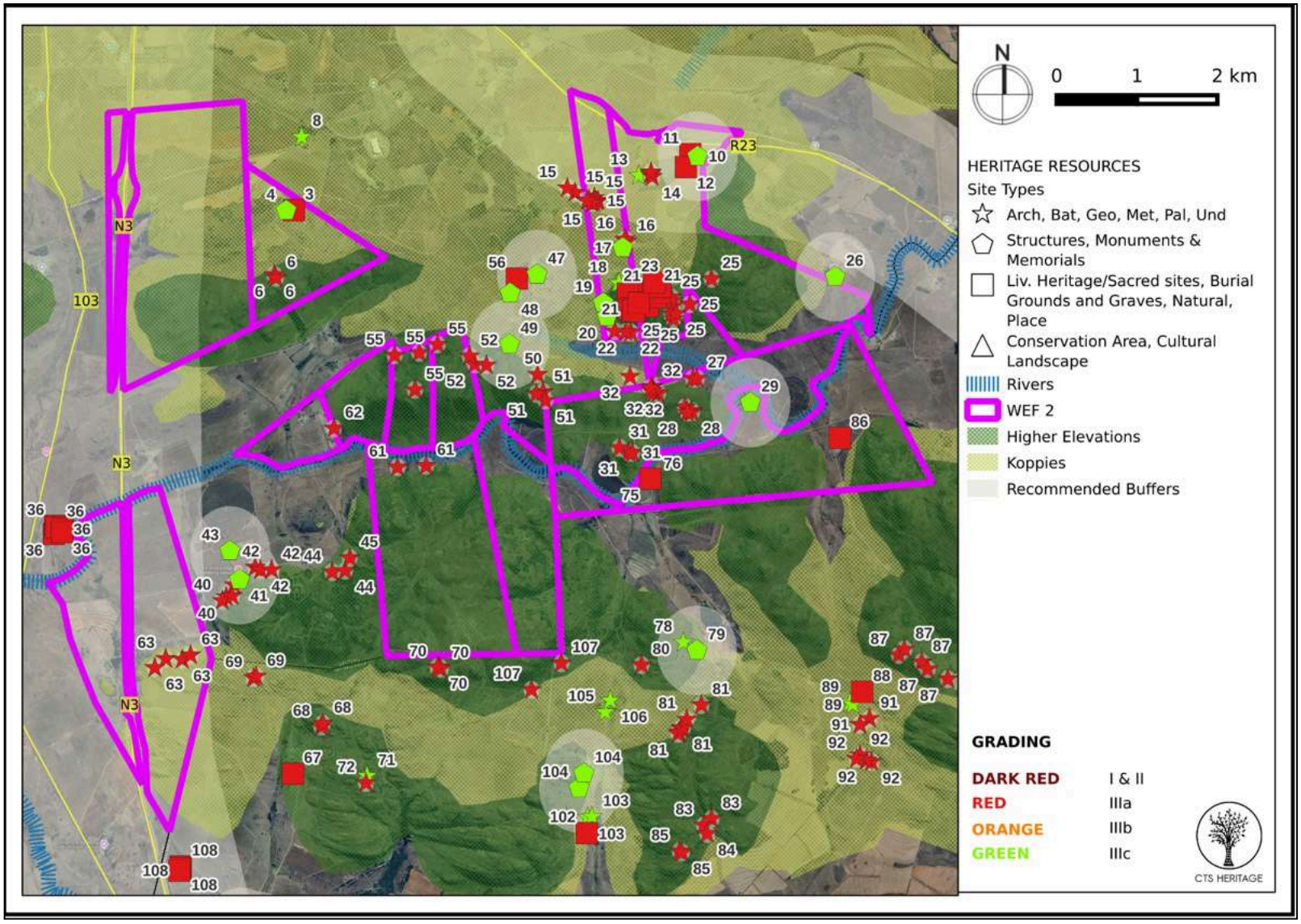

Figure 8.2: Map of all sites and observations noted within the development area as well as proposed mitigation measures for WEF2

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6. CONCLUSION AND RECOMMENDATIONS

The survey proceeded with some constraints and limitations, yet the project area was comprehensively surveyed for heritage resources. Previous archaeological assessments completed in the area, and referenced above, have identified the archaeological sensitivity of the area proposed for development. This very high archaeological sensitivity was verified by the archaeological field assessment completed for this project. This field assessment identified a number of different kinds of heritage resources located within the area proposed for development, ranging from Early Stone Age artefacts (Site 033) dated to more than 200 000 years ago through to the ruins of historic farm werfs and farmworkers cottages from the recent past.

The most dominant archaeological signature within this landscape (over 100 observations noted) relates to the Iron Age occupation of this landscape and the remnants of Iron Age settlements. Most of these Iron Age settlement observations are associated with the mountains located within the development area. This association is likely due to the landmark significance of these topographic features in the landscape.

Based on the above findings, a sensitivity map of the development area has been drafted indicating areas that are and are not appropriate for the WEF development within the identified development areas (Figures 9.1 and 9.2). Overall, however, it must be noted that the overall heritage sensitivity of the development areas for WEF 1 and WEF2 range from moderate to very high. The areas identified as having high heritage sensitivity should be considered as "tread-lightly" and the areas identified as having moderate sensitivity must be considered more closely for development activities.

As noted above, due to their landmark value within this cultivated landscape, it is recommended that the higher elevations of these mountains are not suitable for the construction of turbines, and more significantly, the construction of the large-scale roads required to construct these turbines. These areas must be considered as very high sensitivity in the sensitivity maps below. Due to the combined sensitivity from cultural landscape impacts and impacts to buried archaeology, development within this VERY HIGH sensitivity landscape will need to be limited to have minimal impact and align with visual impacts, and carefully considered in terms of micrositing to prevent impacts to burial archaeology. It is preferred if no new infrastructure development takes place within this very high sensitivity area.

In order to ensure that no impact to the identified resources occurs during the construction or operational phases of the development, a number of recommendations are made below.

Recommendations

There is no objection to the proposed development from an archaeological perspective on condition that:

- The no-development buffer recommendations indicated in Table 3 must be implemented
- The no-go areas identified in Figures 9.1 and 9.2 are adhered to for all associated development activities.
- The high sensitivity areas identified in Figures 9.1 and 9.2 are considered as "tread-lightly" areas with limited infrastructure considered for these areas

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- Ongoing community access to the identified burials, as well as their conservation, and the conservation of the significant Iron Age resources into the future, must be ensured. This can be managed through the development of a Heritage Management Plan for the Iron Age resources and burials to be implemented for the duration of the project. This plan can be drafted as a condition of the granting of the EA.
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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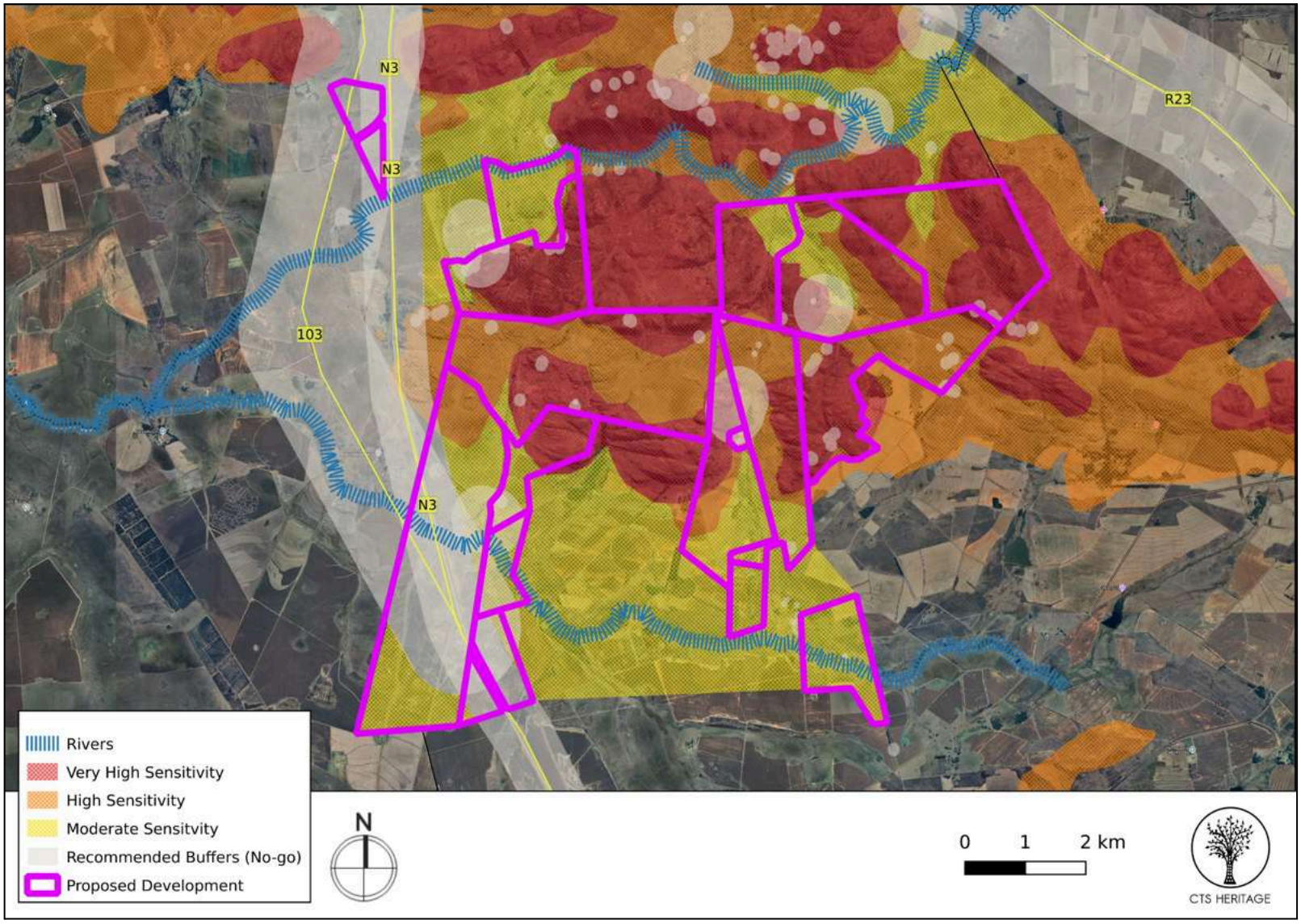

Figure 9.1: Heritage Sensitivity map for WEF1

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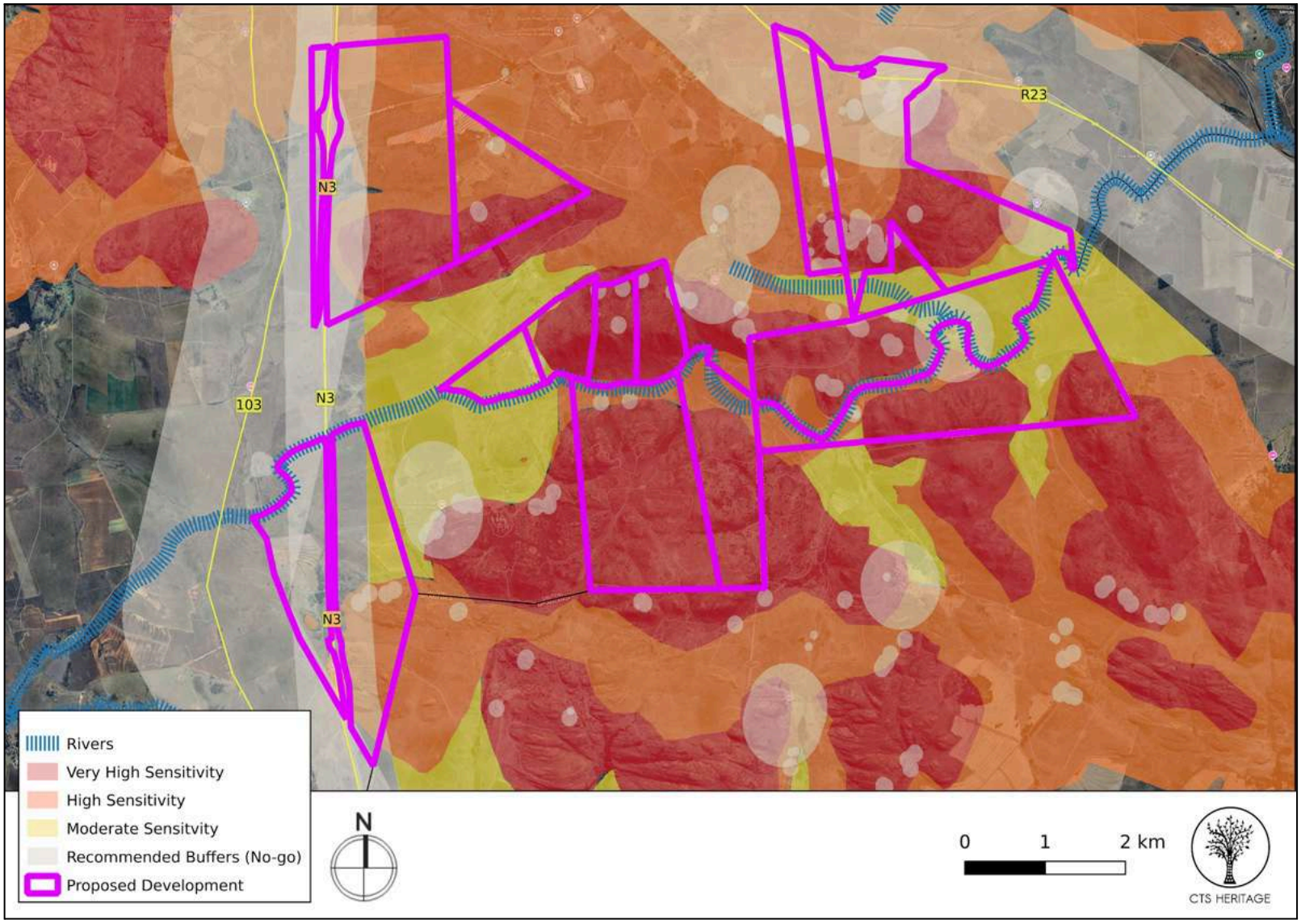

Figure 9.2: Heritage Sensitivity map for WEF2

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7. REFERENCES

Heritage Impact Assessments				
NID	**Author(s)**	**Date**	**Type**	**Title**
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5051	Johnny Van Schalkwyk, J van den Bos	01/12/1999	AIA Phase 1	Scoping Report on Cultural Resources for the Proposed Clarens to Suikerbosrand Pipeline
5053	**Julius CC Pistorius**	**01/03/2003**	**AIA Phase 1**	**A Heritage Impact Assessment (HIA) of a Portion of the Farm Nooitgedacht 390 IR in the Heidelberg District of Gauteng**
5055	Francois P Coetzee	01/09/2003	AIA Phase 1	Archaeological Investigation of the Proposed Heidelberg Kloof Estate Development, Heidelberg, Gauteng
5056	Cobus Dreyer	03/07/2006	AIA Phase 1	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Feedlot Extensions at Elandsfontein 412 IR, Heidelberg, Gauteng Province
6369	Thomas Huffman	01/05/2005	AIA Phase 1	Archaeological Assessment of the Burnstone Gold Mine, Mpumalanga
6784	Francois P Coetzee	01/09/2008	AIA Phase 1	Cultural Heritage Survey of the Proposed Development at Floracadia North and Floracadia South, Heidelberg, Gauteng
6877	Thomas Huffman	01/08/2007	AIA Phase 1	Archaeological Impact Assessment for the Grootvlei-Balfour Powerline, Mpumalanga
7753	Thomas Huffman	31/12/1999	AIA Phase 1	Archaeological Survey of Ratunda Extension 8, Heidelberg
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8155	Anton Pelser	01/05/2007	AIA Phase 1	A Report on a Cultural Heritage Impact Assessment on Portion 19 of the Farm Vaaldam Settlement 1777, Vaaldam, near Deneysville, Free State Province.
49825	Anton Pelser, Jaco van der Walt	01/11/2010	AIA Phase 1	A Report on A Heritage Impact Assessment (HIA) for the proposed Sedaven Development of Portions 8 & 25 of the Farm Boschoek 385 IR, Heidelberg, Gauteng
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145862	Makhosazana Mngomezulu	25/11/2013	HIA Phase 1	Phase 1 Heritage Impact Assessment for the Proposed Further Education Training (FET) College in Balfour.
155254	Wouter Fourie	15/10/2012	Heritage Impact Assessment Specialist Reports	Eskom Groovlei PV HIA
164647	**Gideon Groenewald**	**01/03/2014**	**Palaeontological Specialist Reports**	**Grootvlei paleo desktop**

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304130	Gavin Anderson	09/07/2010	HIA Phase 1	SUMMARY OF THE HERITAGE SITES DAMAGED ALONG THE TRANSNET NMPP

Additional References

Raper, P.E., Moller, L.A. and Plessis, T. (2018) Dictionary of Southern African Place Names. Jeppestown: Jonathan Ball.

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APPENDIX 2: Desktop Palaeontological Assessment (2025)

PALAEONTOLOGICAL SPECIALIST STUDY

In terms of Section 38(8) of the NHRA for the

Proposed Development of the ABO Uvemvane Wind Energy Facility near Balfour in Mpumalanga/ Gauteng Provinces

Prepared by

CTS HERITAGE

And

Ryan Nel

In Association with

ABO Wind Renewable Energies (PTY) LTD

January 2025

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EXECUTIVE SUMMARY

The ABO Uvemvane Wind Energy Facility (WEF) project consists of two wind energy facilities and associated grid connections, located near Balfour in Mpumalanga/Gauteng Provinces. The study area covers approximately 8,300 ha, encompassing both agricultural lands and developed urban centers. The project involves infrastructure such as wind turbines, access roads, substations, and transmission lines.

The study area contains geological formations with varying palaeontological sensitivities. The Vryheid Formation (Ecca Group, Karoo Supergroup) has very high sensitivity due to the presence of plant fossils. Quaternary Alluvium has moderate sensitivity with potential for vertebrate remains. The Witwatersrand and Ventersdorp Supergroups, including diabase intrusions, have low to insignificant palaeontological sensitivity due to the predominance of igneous and metamorphic rocks.

Potential impacts on palaeontological resources are primarily associated with excavation during the construction phase. These include possible disturbance or destruction of fossiliferous deposits within the Vryheid Formation and limited impact on Quaternary deposits due to prior disturbances. No significant impacts are expected on formations with low or insignificant palaeontological sensitivity, such as the Witwatersrand and Ventersdorp Supergroups. The proposed development is unlikely to significantly impact palaeontological heritage, except in areas underlain by the Vryheid Formation.

The following measures are recommended:

- Implementation of a Fossil Chance Find Protocol
- No additional mitigation measures are required for geological formations with low or insignificant sensitivity.
- Any fossils uncovered during construction should be reported to heritage authorities for evaluation and preservation.

Overall, while the project overlaps with a formation of high palaeontological sensitivity, proper management and adherence to protocols will ensure the protection of significant fossil resources. No negative impacts are expected on palaeontological heritage unless unexpected discoveries occur.

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1. INTRODUCTION

1.1 Background Information on Project

ABO Uvemvane Wind Energy Facility 1 (Pty) Ltd proposes the development of ABO Uvemvane Wind Energy Facility 1 (WEF 1), a commercial wind energy generation facility comprising up to 30 turbines and with a total generation capacity of up to 240 MWac in capacity, as well as associated infrastructure. The proposed WEF would be located approximately 9km west of the town of Balfour in the Mpumalanga Province in the Dipaleseng Local Municipality within the Gert Sibande District Municipality and approximately 14km south-east of the town Heidelberg in the Gauteng Province in the Lesedi Local Municipality within the Sedibeng District Municipality. It is anticipated that the proposed WEF would have a total (permanent) development footprint of up to 128 ha, which is approximately 1.56 % of the total site (i.e., affected properties) area[1].

1.2 Description of Property and Affected Environment

The proposed development area is located on the border of Gauteng and Mpumalanga provinces. The topography of the site is moderately undulating, characterized by small hills and gentle slopes. Surrounding the area, there is a mix of agricultural lands and developed urban centers. Balfour lies to the east, while Heidelberg is situated to the northwest.

The development area is intersected by major roads, including the R23, which runs along its eastern boundary, connecting Balfour to Heidelberg (Figure 1.1 and Figure 1.2). The N3 highway passes through the western portion of the project area, providing connectivity between Gauteng and Mpumalanga (Figure 1.1 and Figure 1.3). Additional local roads, such as the Heidelberg-Balfour Road, further traverse the region, linking smaller settlements and agricultural properties.

The land use within the proposed area predominantly comprises agricultural fields, with visible patterns of cultivated lands and associated farming infrastructure (Figure 1.4 -Figure 1.5).

[1] *Note regarding proposed facility capacity, footprint, turbine number and maximum turbine capacity: Note that the proposed development entails a proposed maximum development footprint for a combination of factors, namely facility capacity in terms of overall MWac, development footprint in terms of extent turbine numbers which caps the proposed number of turbines that could be developed within the facility as well as maximum turbine capacity for any given turbine, whereby any given aspect has maximum development parameters that has been assessed and the first lowest parameter achieved in this regard would determine the remaining specifications within the said maximum limits (i.e. all maximum parameters could not be achieved simultaneously).*

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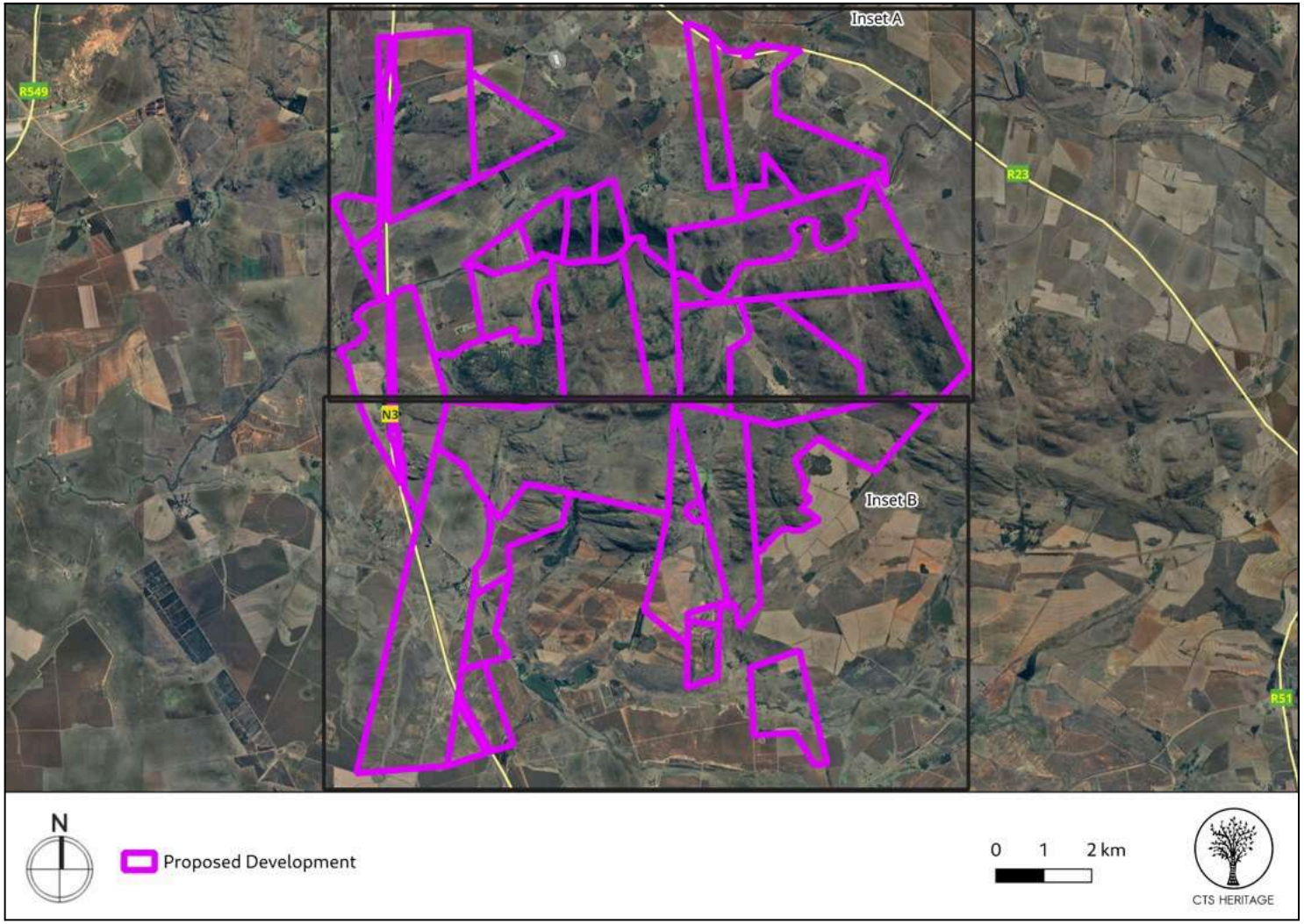

Figure 1.1 Overview Map. Satellite image (2024) indicating the proposed development area at closer range.

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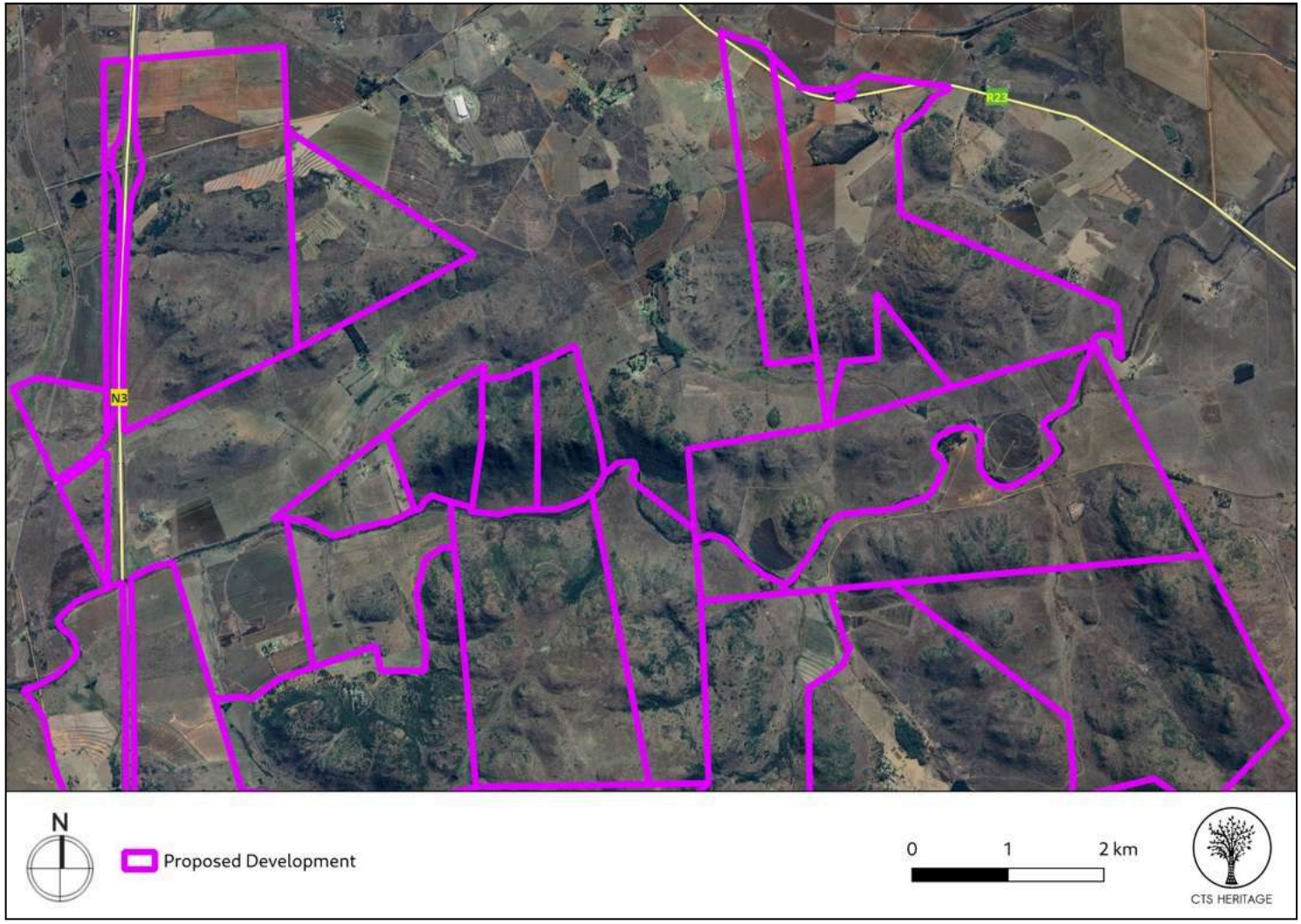

Figure 1.2 Overview Inset Map A. Satellite image (2024) indicating the proposed development at closer range.

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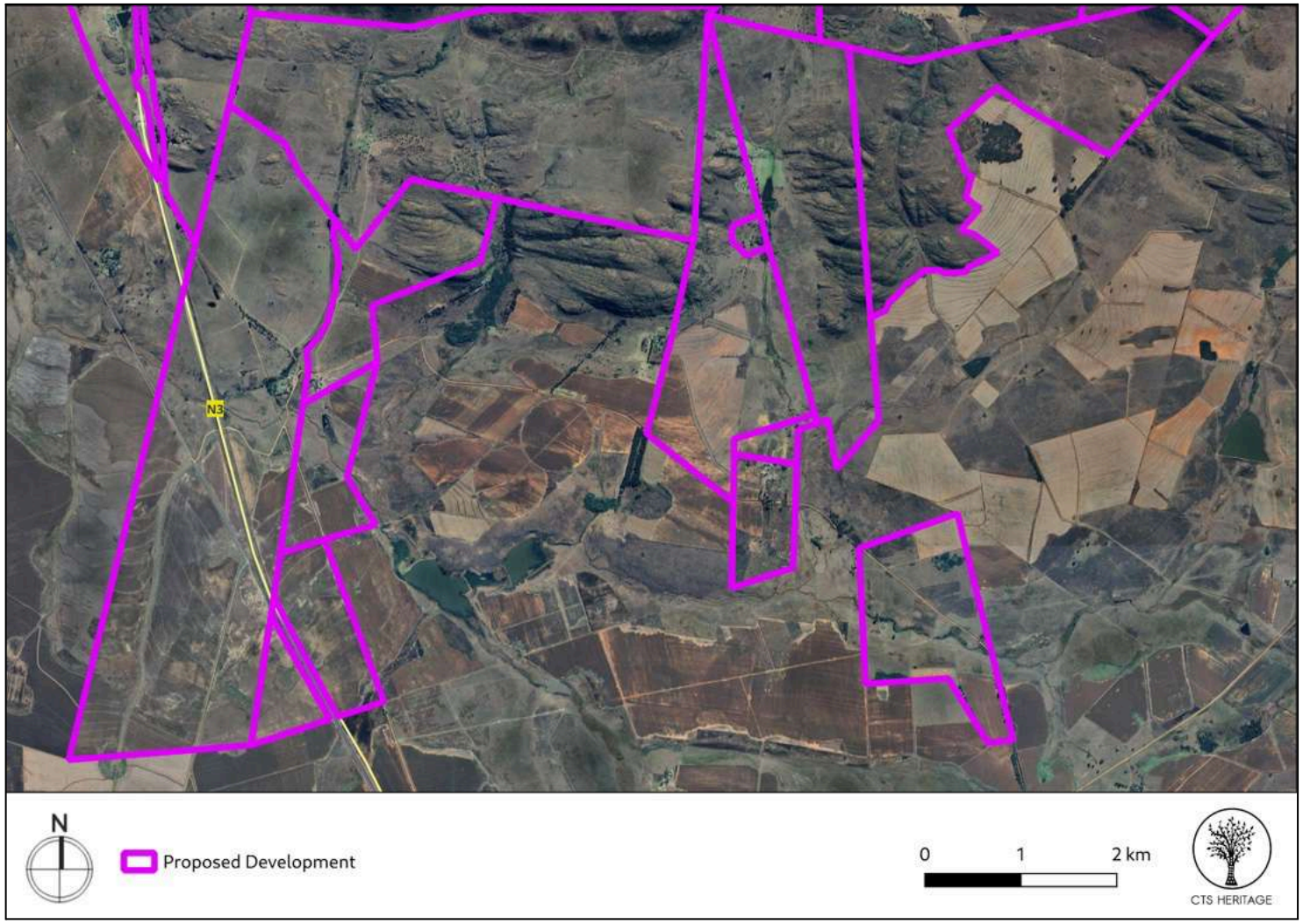

Figure 1.3 Overview Inset Map B. Satellite image (2024) indicating the proposed development at closer range.

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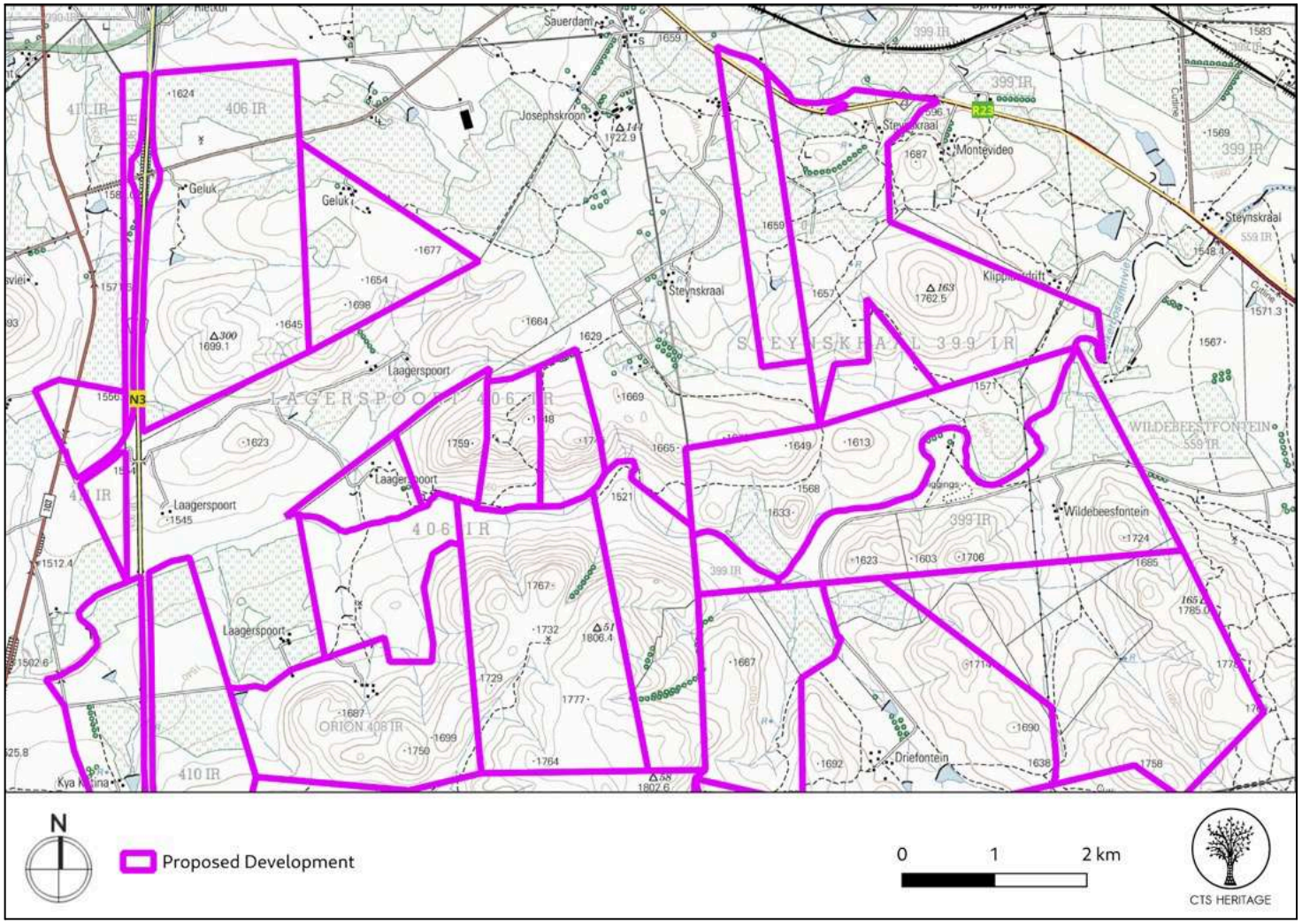

Figure 1.4 Overview Inset Map A. 1:50 000 Topo Map for the development area

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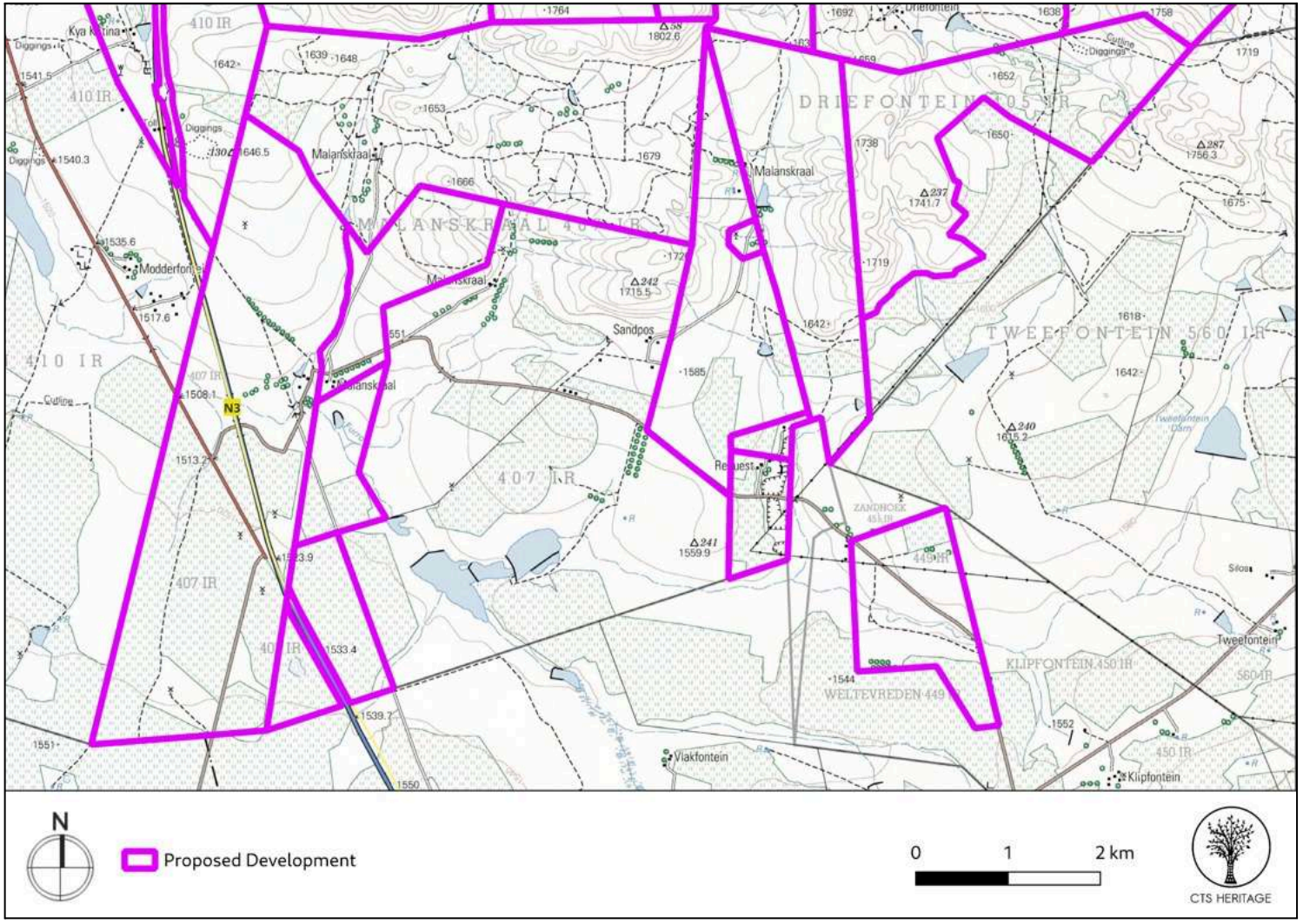

Figure 1.5 Overview Inset Map B. 1:50 000 Topo Map for the development area

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2. METHODOLOGY

2.1 Purpose of Palaeontological Study

According to the SAHRIS Palaeosensitivity Map (Figure 2), the area proposed for development is underlain by sediments of low sensitivity with some areas of moderate and very high paleontological sensitivity. The purpose of this desktop palaeontological study is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999) in terms of impacts to archaeological resources.

2.2 Summary of Steps Followed

- Primary research literature was consulted for detailed accounts of the geology and palaeontological representation across the study area. References of these primary research articles are provided.
- Geological maps (provided at various scales by CTS Heritage and the South African Council for Geosciences) were consulted to identify represented geological contexts within the study area.
- Where possible, other PIAs were consulted to provide additional information on local geomorphological, geological and palaeontological contexts. These often provide valuable additional information to primary research publications and formal geological maps, which can lack resolution at a local scale and it is important that discussions regarding alternative stratigraphic attributions of exposed rocks are noted and considered.

2.3 Constraints and Limitations

- Constraints: The desktop component of a Palaeontological Impact Assessment (PIA) involves extrapolating fossil data from analogous rock units in other regions, as most areas in South Africa have limited palaeontological studies. This approach is constrained by several factors:
    - Comparable rock units outside the project site, such as riverbanks, gullies, and burrowing pits, can offer insights into the underlying strata but are not always accessible.
    - Many fossils are preserved in subsurface strata, often concealed by overlying deposits of soil, vegetation, or other surface materials. This obscures their presence and limits direct observation.
    - Data from distant exposures may be required, reducing the resolution of site-specific interpretations..
- Limitations: There are several factors limit the effectiveness of Palaeontological Impact Assessments, particularly during desktop studies:
    - The absence of a comprehensive South African fossil heritage database.
    - Varying accuracy levels in geological maps, affecting the reliability and precision of desktop studies.
    - Insufficient explanations accompanying geological maps and availability of published palaeontological materials.
    - Neglecting on-site walkovers during PIA desktop studies, can undermine the reliability and precision.
    - Limited palaeontological studies conducted in most regions of South Africa, leading to reliance on extrapolation from other locations.

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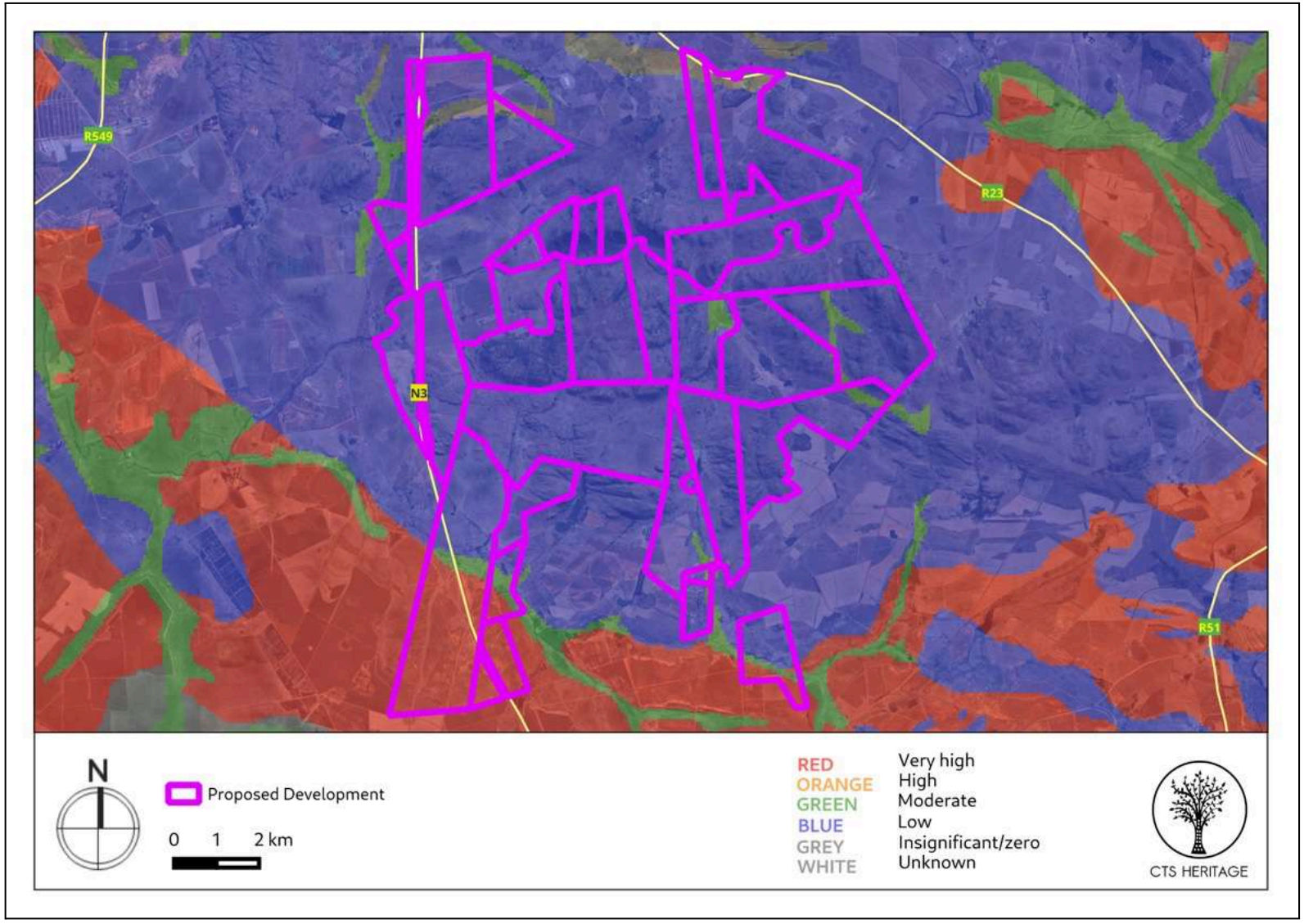

Figure 2: Palaeontological sensitivity of the development area from the SAHRIS PalaeoMap

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3. SITE SENSITIVITY

According to the SAHRIS Palaeosensitivity Map, the proposed development is mostly underlain by sediments of Low palaeontological sensitivity, with some small areas underlain with Moderate to Very High fossil sensitivity (Figure 2). According to the extract from the Council of GeoScience Map CGS 2628 East Rand Geology Map the development area is underlain by sediments from Pv: Vryheid Formation in the Ecca Group, Ra: Alberton, and Rw: Westonaria, both in the Rk: Klipriviersberg Group, Rb: Booysens, Rjo: Johannesburg, and Rt: Turffontein Formations in the Central Rand Group, Rg: Government, and Rj: Jeppestown Formations in the West Rand Group, Q-a: Quaternary Alluvium and V-di: Diabase (Figure 2).

Most of the proposed development is underlain by the Klipriviersberg Group (Rk), and the Turffontein Formation (Rt) in the Central Rand Group. According to the Palaeotechnic report of Gauteng (Groenewald and Groenewald, 2014), the **Klipriviersberg Group,** which also contains the **Ra: Alberton, and Rw: Westonaria Formations,** has **Low** palaeontological sensitivity, with no fossils recorded. **Turffontein Formation** (Rt) in the Central Rand Group falls in the Witwatersrand Supergroup Which, according to the SAHRIS Fossil Heritage Browser, has **Insignificant or Zero** palaeontological sensitivity.

Other underlying sediments with **Insignificant/ Zero** palaeontological sensitivity, belong to the Witwatersrand SuperGroup: Rb: Booysens, and Rjo: Johannesburg Formations in the Central Rand Group, Rg: Government, and Rj: Jeppestown Formations in the West Rand Group.

The sediments marked as having Moderate sensitivity on the SAHRIS Palaeosensitivity Map, are **Quaternary Alluvium**. Groenewald and Groenewald (2014) note that "*Superficial deposits of Quaternary and Tertiary age can contain important fossils. Most notable are fossils associated with, for example, the Tswaing Impact Crater north of Pretoria (Johnson et al, 2006). The superficial deposits are allocated a moderate palaeontological sensitivity due to the fact that many fossiliferous rocks might be covered in a thin layer of soil, where fossils are only found where the topsoil has been removed by erosion."* The Alluvial deposits, however, have **Low** palaeontological sensitivity, being "*Recent sandy and clayey deposits along water courses"* These sediments are known to contain a "*wide range of fossils possible, including mammalian bones and teeth, tortoise remains, ostrich egg etc."*

The **Vryheid Formation** in the Ecca Group is the formation that has **Very High** palaeontological sensitivity. These deltaic sandstones, shales and coals, with minor conglomerates date to the Early to Middle Permian. It is known for its rich assemblages of plant fossils (Glossopteris Flora), including tree trunks, stumps and roots, palynomorphs, rare insects, conchostracans, and low diversity trace fossil assemblages. There are very rich and historically important plant fossil collections from the Vryheid Formation at Vereeniging. In a desktop PIA by Groenewald located approximately 15 km southeast of the proposed development (2014, SAHRIS NID 164647) the following was noted regarding the Vryheid Formation: "*The Vryheid Formation is well-known for the occurrence of coal beds that resulted from the accumulation of plant material over long periods of time. Plant fossils described by Bamford (2011) from the Vryheid Formation are; Azaniodendron fertile, Cyclodendron leslii, Sphenophyllum hammanskraalensis, Annularia sp., Raniganjia sp.,*

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Asterotheca spp., Liknopetalon enigmata, Glossopteris > 20 species, Hirsutum 4 spp., Scutum 4 spp., Ottokaria 3 spp., Estcourtia sp., Arberia 4 spp., Lidgetonnia sp., Noeggerathiopsis sp. And Podocarpidites sp.

According to Bamford (2011), little data has been published on these potentially fossiliferous deposits. Good fossil material is likely around the coal mines and yet in other areas the exposures may be too poor to be of interest. When they do occur fossil plants are usually abundant and it would not be feasible to preserve and maintain all the sites. In the interests of heritage and science, however, such sites should be well recorded, sampled and the fossils kept in a suitable institution.

Although no vertebrate fossils have been recorded from the Vryheid Formation, invertebrate trace fossils have been described in some detail by Mason and Christie (1986). It should be noted, however, that the aquatic reptile, Mesosaurus, which is the earliest known reptile from the Karoo Basin, as well as fish (Palaeoniscus capensis), have been recorded in equivalentaged strata in the Whitehill Formation in the southern part of the basin (MacRae, 1999). Indications are that the Whitehill Formation in the main basin might be correlated with the mid-Vryheid Formation. If this assumption proves correct, there is a possibility that Mesosaurus could be found in the Vryheid Formation.

The late Carboniferous to early Jurassic Karoo Supergroup of South Africa includes economically important coal deposits within the Vryheid Formation. The Karoo sediments are almost entirely lacking in body fossils but ichnofossils (trace fossils) are locally abundant. Modern sedimentological and ichnofaunal studies suggest that the north-eastern part of the Karoo basin was marine. In KwaZulu-Natal a shallow basin margin accommodated a prograding fluviodeltaic complex forming a broad sandy platform on which coal-bearing sediments were deposited. Ichnofossils include U-burrows (formerly Corophioides) which are assigned to ichnogenus Diplocraterion (Mason and Christie, 1986)….

The Permian aged Vryheid Formation contains significant fossils of plants belonging to the Glossopteris assemblage. It is therefore likely that fossils will be present in all outcrops on the sites of the development."

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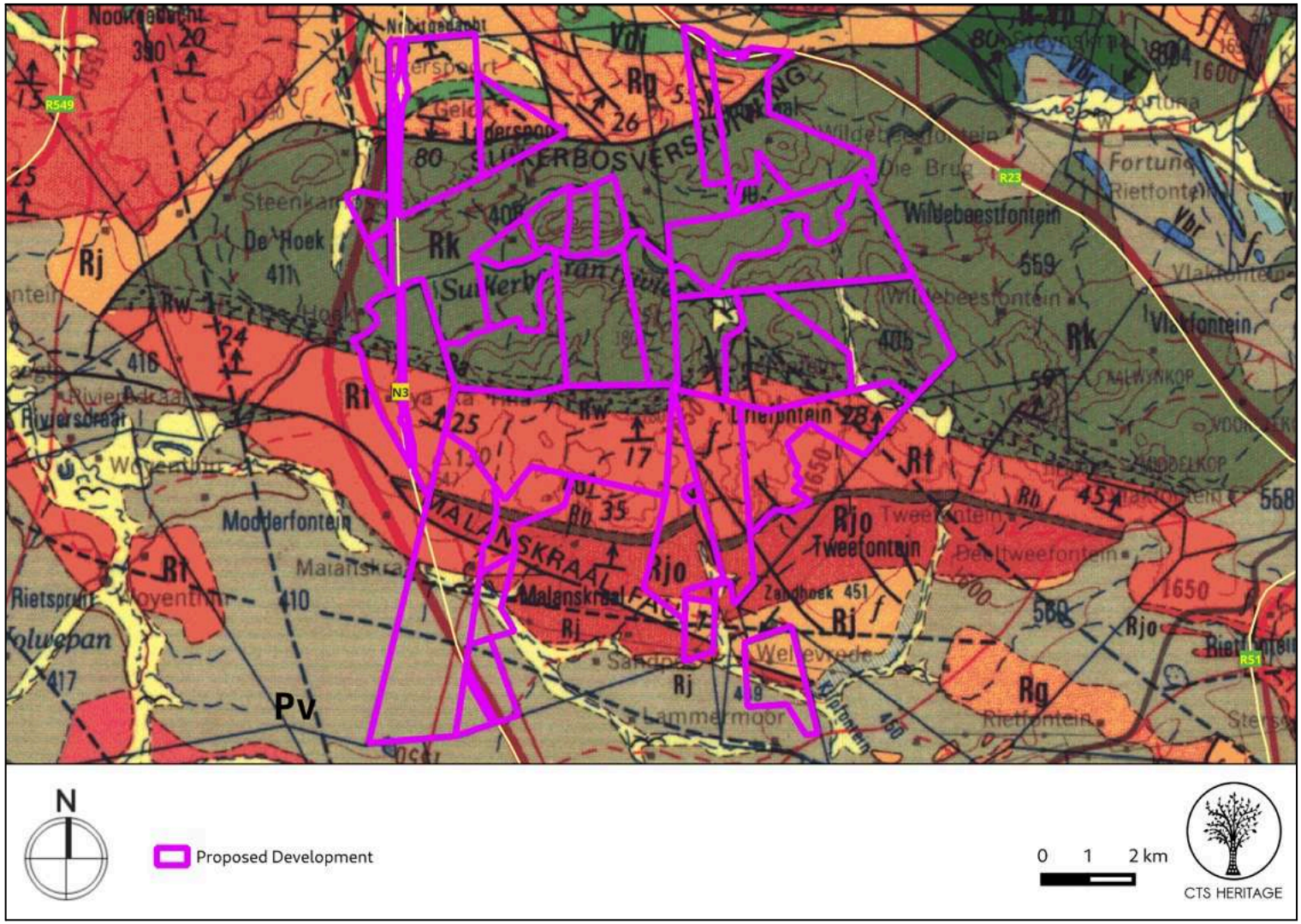

Figure 3. Geology Map. Extract from the CGS 2628 East Rand Geology Map indicating that the development area is underlain by Pv: Vryheid Formation in the Ecca Group, Ra: Alberton, and Rw: Westonaria, both in the Rk: Klipriviersberg Group, Rb: Booysens, Rjo: Johannesburg, and Rt: Turffontein Formations in the Central Rand Group, Rg: Government, and Rj: Jeppestown Formations in the West Rand Group, Q-a: Quaternary Alluvium and V-di: Diabase.

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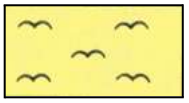
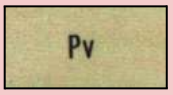
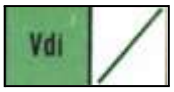
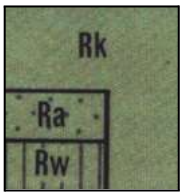
Table 2: Geological Summary Table

Geological unit	Age	Lithology	Symbol on figure 3	Fossil heritage	Palaeontological sensitivity
Quaternary	Quaternary 2.58 mya to 0 mya	Alluvium		Calcretised insect burrows (including termites) and root casts (rhizoliths), rare vertebrate remains (e.g. tortoise, mammal), ostrich eggshells (*Struthio*), shells of land snails (e.g. *Trigonephrus*), bivalves and gastropods (e.g. *Corbula*, *unio*) and ostracods (seed shrimps), charophytes (stonewort algae), diatoms, stromatolites, mammalian ichnofossils	Moderate (SAHRIS PalaeoMap Low (Groenwald and Groenewald, 2014) Low for the current report
Karoo Supergroup, Ecca Group, Vryheid Formation	Permian	Sandstone, shale, coal beds		Rich assemblages of plant fossils (*Glossopteris*, Flora), including tree trunks, stumps and roots, palynomorphs, rare insects, conchostracans, low diversity trace fossil assemblages. Very. rich and historically important plant fossil collections from Vryheid Formation at Vereeniging (Groenewald and Groenewald, 2014)	Very High
Intrusion	Vaalian	Diabase		None	Zero
Ventersdorp Supergroup, Klipriviersberg Group (Rk), Alberton Formation (Ra) and Westonaria Formation (Rw)	Randian	Tuff and lava (Rw), Feldspar porphyry (Ra) Basaltic lava, agglomerate, tuff (Rk)		None recorded	Low
Witwatersrand Supergroup, Central Rand Group, Turffontein Subgroup	Randian	Quartzite, conglomerate, sandy shale		None recorded	Low
Witwatersrand Supergroup, Central Rand Group, Johannesburg Subgroup (Rjo), Booysens Formation (Rb)	Randian	Shale (Rb) Quartzite, conglomerate (Rjo)		None recorded	Low
Witwatersrand Supergroup, West Rand Group, Jeppestown Subgroup	Randian	Shale, quartzite, conglomerate, amygdaloidal lava		None recorded	Low
Witwatersrand Supergroup, West Rand Group, Government Subgroup	Randian	Quartzite, greywacke, conglomerate, shale, tillite		None recorded	Low

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Underlying geology of development area

According to the 2628 East Rand Geological Map (Figure 3), the proposed development area is underlain by various geological formations ranging from the Randian to the Quaternary Periods. Alluvial deposits (bird-like symbols), occur in the southernmost part of the development area along a small northwest-southeast strip and within sections of the central and eastern areas (Figure 3). The Vryheid Formation (Pvo) of the Ecca Group, within the Karoo Supergroup, is present in the southernmost portion of the project area (Figure 3), while diabase intrusions are restricted to the northernmost part.

A significant portion of the project area is underlain by formations from the Ventersdorp and Witwatersrand Supergroups. Ventersdorp Supergroup rocks are divided into three units: the Klipriviersberg Group (Rk), the Alberton Formation (Ra), and the Westonaria Formation (Rw) (Table 1, Figure 3). The Klipriviersberg Group (Rk) dominates the northern part of the area, extending in an east-west orientation. This group is bordered to the south by a narrow band of the Alberton Formation (Ra) and Westonaria Formation (Rw), which separate the Klipriviersberg Group (Rk) from the Turffontein Subgroup (Rt) (Figure 3).

The Witwatersrand Supergroup in the area is subdivided into the following units: the Turffontein Subgroup (Rt), Booysens Formation (Rb), Johannesburg Subgroup (Rjo), Jeppestown Subgroup (Rj), and Government Subgroup (Rg) (Table 1, Figure 3). The Turffontein Subgroup (Rt) is the most extensive unit, dominating the central portion of the project area and extending in an east-west direction. It is bordered by Johannesburg Subgroup rocks (Rjo and Rb) towards the southeast. Limited exposures of the Jeppestown Subgroup (Rj) and Government Subgroup (Rg) occur in the northernmost and southeasternmost parts of the project area (Figure 3).

Structural features, such as faults, are abundant throughout the area. The two primary faults, the Suikerbos Fault in the north and the Malanskraal Fault in the south, exhibit an east-west orientation and form distinct contacts between different geological formations. Smaller faults, with a northwest-southeast orientation, also crosscut various formations in the area.

Detailed geological review:

Witwatersrand Supergroup

The Witwatersrand Basin is one of four basins that developed on the Kaapvaal Craton. Its stratigraphy is divided into the lower **West Rand Group** and the overlying **Central Rand Group**, representing a transition from marine-dominated to fluvial-dominated environments.

West Rand Group

The West Rand Group predominantly consists of quartzites and shales, interpreted as shelf sand bodies (Pretorius, 1976; Winter and Brink, 1991; Beukes and Nelson, 1995). It also contains several basin-wide diamictite units (Johnson et al.,

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2006) and is subdivided into the **Hospital Hill**, **Government**, and **Jeppestown Subgroups**, with the latter two discussed here.

Early deposition in the West Rand Group reflects a major marine transgression over the Kaapvaal Craton, followed by shoreline progradation. Sediments document episodes of instability, with rapid transgressions and regressions, and glacial deposits indicating sea-level fluctuations influenced by glaciation. Later stages of deposition are characterized by stable conditions and dominant shallow marine sedimentation (Johnson et al., 2006).

- ***Government Subgroup (Rg):*** The Government Subgroup consists of interbedded conglomerates, gritty to coarse-grained argillaceous quartzites, quartz wackes, and argillites, with three prominent, laterally continuous diamictite beds. Many quartzite units display sharp erosional bases and poor sorting, while orthoquartzite is relatively minor. Some shale layers exhibit magnetic properties, and the subgroup includes finely laminated iron formations (Beukes et al., 2024).

  Deposition in the Government Subgroup coincided with significant fluvial progradation, during which braided river systems formed extensive alluvial plains and fan deltas. Sediment transport along a uniformly southward-dipping palaeoslope created a shallow shelf environment with minimal tidal influence. This period represents the Witwatersrand Basin's evolution into an inland sea, with a marked decrease in depositional energy compared to the Hospital Hill Subgroup (Tainton and Meyer, 1990).
- ***Jeppestown Subgroup (Rj):*** The Jeppestown Subgroup comprises slightly argillaceous quartzites interbedded with shale, along with minor orthoquartzite and magnetic mudstone. Quartzites are medium-grained, exhibiting a striped appearance due to very fine-grained quartz wackes. A distinctive marker bed, the Crown amygdaloidal lava, has been dated to 2,914 ± 8 Ma (Armstrong et al., 1991). The minimum age of the West Rand Group is determined to be 2,902 ± 13 Ma, based on the youngest detrital zircon from the Johannesburg Subgroup (Kositcin and Krapez, 2004).

Central Rand Group

The Central Rand Group unconformably overlies the West Rand Group and forms the base of the Ventersdorp Supergroup. It primarily consists of quartzites and conglomerates (Pretorius, 1976; Johnson et al., 2006) and is subdivided into the **Johannesburg** and **Turffontein Subgroups**.

- ***Johannesburg Subgroup (Rjo):*** This subgroup is dominated by quartzites deposited in braided fluvial environments. Sediments exhibit evidence of fluviatile deposition, with localized marine incursions and sub-aerial exposure. Significant conglomerate reefs are relatively thin and sheet-like, likely formed by marine reworking of fluvial deposits in distal settings (Tucker et al., 2016).
- ***Turffontein Subgroup (Rt):*** The Turffontein Subgroup is fluvial in origin, with quartzites characterized by well-defined channels and sedimentary structures. Diamictites and quartz wackes containing polymictic clasts were deposited during periods of rapid sediment influx, often lacking clear sedimentary structures such as bedding planes or cross-bedding. Fluvial channels exhibit features typical of Witwatersrand quartz-pebble

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conglomerates, with the Kimberley and Elsburg conglomerates being particularly well-developed examples (Tucker et al., 2016).

Ventersdorp Supergroup

Following the deposition of the Witwatersrand Supergroup, the Ventersdorp Supergroup developed in a basin on the stabilized Kaapvaal Craton (Johnson et al., 2006). This supergroup is divided into the **Klipriviersberg Group (Rk)** and the Platberg Group, though the latter is not present in the area.

Klipriviersberg Group (Rk):

The Klipriviersberg Group includes the **Westonaria Formation (Rw)** and the **Alberton Formation (Ra)**.

- ***Westonaria Formation (Rw):*** Preserved only in deeper parts of the basin, this formation consists of volcanic assemblages with komatiitic affinities (McIver et al., 1982; Johnson et al., 2006).
- ***Alberton Formation (Ra):*** Composed of a variety of volcanic rocks, representing a significant volcanic episode (Johnson et al., 2006).

Karoo Supergroup: Ecca Group

The proposed development area lies within the northern section of the Karoo Supergroup, specifically within the Ecca Group's **Vryheid Formation (Pv)**. The Ecca Group, part of five depositional sequences within the Karoo Basin, dates to the Permian Period. It overlies the glacial to subglacial Dwyka Group (Late Carboniferous to Early Permian) and reflects significant lateral facies changes (Smith et al., 1993; Veevers et al., 1994; Catuneanu et al., 2002, 2005; Johnson et al., 2006; Belica et al., 2017; Hasterok et al., 2019).

- ***Vryheid Formation (Pv):*** The Vryheid Formation, of Permian age, represents a stratigraphic component of the northeastern Karoo Basin. It is characterized by clastic deposits arranged in upward-coarsening cycles, primarily of deltaic origin, with contributions from fluvial environments. The formation shows reduced thicknesses in northern regions due to lateral facies changes (Johnson et al., 2006).

Alluvium Deposits (Quaternary)

Alluvium deposits, consisting of unconsolidated clay, silt, sand, and gravel, occur in riverbeds, floodplains, and deltas. These deposits, primarily Quaternary in age, were formed during the last 2.5 million years, encompassing the Pleistocene and Holocene epochs. Some deposits may be much younger, resulting from ongoing river and stream activity.

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4.2 Palaeontological Sensitivity of the Development Area

According to the Palaeontological Sensitivity Map (Figure 2), the palaeontological sensitivities correspond to the underlying geological units. The Quaternary deposits (Alluvium) are classified as having **Low** palaeontological sensitivity, while the Vryheid Formation (Pv) is rated as having **Very High** palaeontological sensitivity. Units from the Witwatersrand and Ventersdorp Supergroups, along with diabase intrusions, are classified as having **Low** to **Zero/Insignificant** palaeontological sensitivity.

Witwatersrand Supergroup

The Witwatersrand Supergroup represents one of the most geologically significant sequences in South Africa, known primarily for its rich gold-bearing deposits. This supergroup comprises units such as the Turffontein Subgroup, Johannesburg Subgroup, Booysens Formation, Jeppestown Subgroup, and Government Subgroup. These formations are predominantly composed of quartzites, shales, and conglomerates, which formed in ancient fluvial and shallow marine environments approximately 2.9 to 2.7 billion years ago during the Archean Eon.

Despite their importance in mineralogical studies, the Witwatersrand Supergroup has no recorded fossils due to the extreme age of these rocks, which predates the evolution of multicellular life. The palaeontological sensitivity of these formations is rated as **Low/Insignificant**, as they do not contain fossilized remains of organisms. Any potential fossils should be reported by the developer.

Ventersdorp Supergroup

The Ventersdorp Supergroup is a predominantly volcanic sequence, formed approximately 2.7 billion years ago, which includes the Klipriviersberg Group and its subdivisions, the Alberton Formation and the Westonaria Formation. These formations are composed of basaltic and andesitic volcanic rocks, interbedded with minor sedimentary layers.

Due to their volcanic nature, these units are completely incompatible with fossil preservation. Fossilization requires the presence of sediments to entomb and preserve organic material, which is absent in these formations. Additionally, the extreme heat and pressure during volcanic activity would have obliterated any organic material present. As a result, the palaeontological sensitivity of the Ventersdorp Supergroup is classified as **Zero/Insignificant**, with no fossils recorded in these formations. No specific mitigation measures are required however Any potential fossils should be reported by the developer.

Diabase Intrusions

Diabase intrusions are igneous rocks that formed as magma intruded into the surrounding strata. These rocks are typically dark and fine-grained, composed mainly of plagioclase and pyroxene minerals. The intense heat and molten nature of the diabase at the time of emplacement rendered these rocks incapable of preserving fossils. Although these intrusions are geologically significant as they provide insights into the tectonic history of the region, they have **Zero** palaeontological sensitivity because no organic material could survive the extreme conditions of their formation. No mitigation measures are required for these units.

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Karoo Supergroup: Vryheid Formation (Pv)

The Vryheid Formation was formed during the Permian period, approximately 299 to 251 million years ago. It consists of deltaic sandstones, shales, and coal beds, reflecting ancient swampy, deltaic, and nearshore environments, making it an important formation to study the Permian ecosystems and depositional settings.

The Vryheid Formation hosts a diverse array of fossils, including plant remains from the *Glossopteris* flora (tree trunks, stumps, roots, and leaves), fertile organs, lycopods, rare ferns such as *Asterotheca hammanskraalensis*, horsetails like *Annularia*, cordaitales, conifers, ginkgoales, and fossil wood (Kovacs-Endrooy, 1991). Plant fossils described by Bamford (2011) from the Vryheid Formation include *Azaniodendron fertile*, *Cyclodendron leslii*, *Sphenophyllum hammanskraalensis*, *Annularia sp.*, *Raniganjia sp.*, *Asterotheca spp.*, *Liknopetalon enigmata*, *Glossopteris* (>20 species), *Hirsutum* (4 spp.), *Scutum* (4 spp.), *Ottokaria* (3 spp.), *Estcourtia sp.*, *Arberia* (4 spp.), *Lidgetonnia sp.*, *Noeggerathiopsis sp.*, and *Podocarpidites sp.* According to Bamford (2011), little data has been published on these potentially fossiliferous deposits. While fossil plants are often abundant, particularly around coal mines, exposures in other areas may be too poor to be of significant interest. In the interests of heritage and science, sites with abundant fossil material should be well recorded, sampled, and the fossils preserved in suitable institutions.

The Vryheid Formation also preserves abundant trace fossils, including *Diplocraterion*, *Skolithos*, *Helminthopsis*, and *Planolites* (Turner et al., 1981; Mason & Christie, 1986), as well as palynomorphs (pollen and spores) (Millsteed, 1994), and rare invertebrates such as insects, possible conchostracans, non-marine bivalves, and fish scales. Mason and Christie (1986) noted invertebrate trace fossils in some detail. Although no vertebrate fossils have been recorded directly from the Vryheid Formation, *Mesosaurus* and fish (*Palaeoniscus capensis*) have been documented in equivalent-aged strata in the Whitehill Formation in the southern part of the basin (MacRae, 1999). Indications are that the Whitehill Formation in the main basin may correlate with the mid-Vryheid Formation. If this assumption proves correct, there is a possibility that *Mesosaurus* could be discovered in the Vryheid Formation (Groenewald, 2014).

These fossils provide critical insights into Permian biodiversity, depositional environments, and the ecological interactions of ancient swampy and deltaic ecosystems. The coal seams, classified as compaction fossils, further reflect the unique conditions and significance of this geological unit (Cairncross, 1989).

Due to its significant fossil content, the palaeontological sensitivity of the Vryheid Formation is classified as **Very High.** This classification underscores the importance of protecting and studying the formation to enhance our understanding of ancient ecosystems and the evolution of plant and animal life during the Permian.

Quaternary Deposits (Alluvium)

The Quaternary deposits, composed of unconsolidated clay, silt, sand, and gravel, were formed during the last 2.6 million years. These deposits are typically found in association with modern riverbeds, floodplains, and other low-lying areas, reflecting the dynamic processes of recent geological history.

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Occasionally, fossils are discovered within these deposits, offering insights into past environments and ecosystems. Common finds include calcretised insect burrows, which provide valuable information about paleoenvironmental conditions. Ostrich eggshells are another typical discovery in Quaternary sediments, while rare vertebrate remains, such as bones of mammals and reptiles, are occasionally uncovered, although these are often fragmentary.

Despite their palaeontological significance, the potential for intact fossil discoveries in the project area is **Low** due to previous disturbances, and the narrow occurrence in the project area. As a result, the palaeontological sensitivity of the Quaternary deposits is rated as **Low**. No specific mitigation measures are, however any fossils found must be reported by the developer. While these deposits are important for understanding recent palaeoenvironments and climate, they do not necessitate significant fossil monitoring during development activities.

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Palaeontological Resources

The assessment evaluates the potential impact of the proposed grid connection infrastructure for the ABO Uvemvane Wind Energy Facility on fossil heritage resources in the Balfour area. The development entails excavation and site preparation for wind energy infrastructure spanning Mpumalanga and Gauteng Provinces. These activities may disturb fossil heritage by damaging or permanently sealing fossils, making them inaccessible for research or public benefit. The primary impact on fossil resources is expected during the construction phase, while no significant impacts are anticipated during the operational or decommissioning phases.

The geological units underlying the project area exhibit varying levels of palaeontological sensitivity. The development will not disturb areas with low palaeontological sensitivity, which includes the Witwatersrand Supergroup, Ventersdorp Supergroup, and diabase intrusions. No mitigation measures are required for these formations. However, caution is required for the Vryheid Formation, as excavation activities have the potential to disturb or permanently damage significant fossil material. All forms of excavation within this formation could impact highly significant fossils, necessitating careful mitigation measures.

As the final layout of the wind energy facility has not yet been determined, this assessment provides an initial evaluation of the area's palaeontological sensitivity. Potential impacts will be confined to the eventual development footprint and will be most pronounced during excavation and site preparation. Any disturbance to fossil heritage within these geological units will be permanent, highlighting the need for proactive management where required.

6. CONCLUSION AND RECOMMENDATIONS

The palaeontological assessment of the proposed ABO Uvemvane Wind Energy Facility (WEF) has identified varying levels of palaeontological sensitivity within the development area. While formations from the Witwatersrand and Ventersdorp Supergroups, as well as diabase intrusions, exhibit low to insignificant palaeontological sensitivity, the Vryheid Formation within the Karoo Supergroup has very high palaeontological significance due to its rich fossil assemblages. Quaternary alluvial deposits also exhibit moderate sensitivity however herein classified as having a low sensitivity, with potential for fossil discoveries, although the likelihood of significant finds is limited due to prior disturbances.

Recommendations

1. **Fossil Chance Find Protocol** - To prevent the loss of valuable fossils, particularly those in the Vryheid Formation, a Fossil Chance Find Protocol should be implemented, No additional mitigation is required for geological units with Low or Insignificant/Zero sensitivity.
2. **Reporting by developer:** Although highly unlikely, any fossil finds made within the geological formations must be reported to the appropriate authority by the developer.

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APPENDIX 3: Chance Fossil Finds Procedure

(Adopted from the HWC Chance Fossils Finds Procedure: June 2016)

Introduction

This document is aimed to inform workmen and foremen working on a construction and/or mining site. It describes the procedure to follow in instances of accidental discovery of palaeontological material (please see attached poster with descriptions of palaeontological material) during construction/mining activities. This protocol does not apply to resources already identified under an assessment undertaken under S38 of the National Heritage Resources Act (no 25 of 1999).

Fossils are rare and irreplaceable. Fossils tell us about the environmental conditions that existed in a specific geographical area millions of years ago. As heritage resources that inform us of the history of a place, fossils are public property that the State is required to manage and conserve on behalf of all the citizens of South Africa. Fossils are therefore protected by the National Heritage Resources Act and are the property of the State. Ideally, a qualified person should be responsible for the recovery of fossils noticed during construction/mining to ensure that all relevant contextual information is recorded.

Heritage Authorities often rely on workmen and foremen to report finds, and thereby contribute to our knowledge of South Africa's past and contribute to its conservation for future generations.

Training

Workmen and foremen need to be trained in the procedure to follow in instances of accidental discovery of fossil material, in a similar way to the Health and Safety protocol. A brief introduction to the process to follow in the event of possible accidental discovery of fossils should be conducted by the designated Environmental Control Officer (ECO) for the project, or the foreman or site agent in the absence of the ECO. It is recommended that copies of the attached poster and procedure are printed out and displayed at the site office so that workmen may familiarise themselves with them and are thereby prepared in the event that accidental discovery of fossil material takes place.

Actions to be taken

One person in the staff must be identified and appointed as responsible for the implementation of the attached protocol in instances of accidental fossil discovery and must report to the ECO or site agent. If the ECO or site agent is not present on site, then the responsible person on site should follow the protocol correctly in order to not jeopardize the conservation and well-being of the fossil material.

Once a workman notices possible fossil material, he/she should report this to the ECO or site agent. Procedure to follow if it is likely that the material identified is a fossil: - The ECO or site agent must ensure that all work ceases

immediately in the vicinity of the area where the fossil or fossils have been found;

- The ECO or site agent must inform SAHRA of the find immediately. This information must include photographs of the findings and GPS co-ordinates;
- The ECO or site agent must compile a Preliminary Report and fill in the attached Fossil Discoveries: Preliminary Record Form within 24 hours without removing the fossil from its original position. The Preliminary Report records basic information about the find, including:
    - The date
    - A description of the discovery
    - A description of the fossil and its context (e.g. position and depth of find) - Where and how the find has been stored
    - Photographs to accompany the preliminary report (the more the better):
        - A scale must be used
        - Photos of location from several angles
        - Photos of vertical section should be provided
        - Digital images of hole showing vertical section (side);
        - Digital images of fossil or fossils.

Upon receipt of this Preliminary Report, SAHRA will inform the ECO or site agent whether or not a rescue excavation or rescue collection by a palaeontologist is necessary.

- Exposed finds must be stabilised where they are unstable and the site capped, e.g. with a plastic sheet or sandbags. This protection should allow for the later excavation of the finds with due scientific care and diligence. SAHRA can advise on the most appropriate method for stabilisation.
- If the find cannot be stabilised, the fossil may be collected with extreme care by the ECO or the site agent and put aside and protected until SAHRA advises on further action. Finds collected in this way must be safely and securely stored in tissue paper and an appropriate box. Care must be taken to remove all fossil material, and any breakage of fossil material must be avoided at all costs.

No work may continue in the vicinity of the find (within 10m) until SAHRA has indicated, in writing, that it is appropriate to proceed.

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FOSSIL DISCOVERIES: PRELIMINARY RECORDING FORM		
Name of project:		
Name of fossil location:		
Date of discovery:		
Description of situation in which the fossil was found:		
Description of context in which the fossil was found:		
Description and condition of fossil identified:		
GPS coordinates:	Lat:	Long:
If no co-ordinates available, then please describe the location:		
Time of discovery:		
Depth of find in hole		
Photographs (tick as appropriate and indicate number of the photograph)	Digital image of vertical section (side)	
	Fossil from different angles	
	Wider context of the find	
Temporary storage (where it is located and how it is conserved)		
Person identifying the fossil		
Name:		
Contact:		
Recorder Name:		
Contact:		
Photographer Name:		
Contact:		