ESKOM HOLDINGS SOC LTD

PROPOSED 132kV POWER LINE AND ASSOCIATED SUBSTATIONS BETWEEN TWEESPRUIT AND WELROUX FREE-STATE PROVINCE

Heritage Impact Assessment

Issue Date: 20 April 2015
Revision No.: 3
Project No.: 12747

Date:	20/04/2015
Document Title:	Proposed 132kv Power Line and Associated Substations Between Tweespruit and Welroux Free State Province – Heritage Impact Assessment
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Revision Number:	1
Checked by:	
For:	SiVEST Environmental Division

Declaration of Independence

The report has been completed by PGS Heritage an appointed Heritage Specialist for SiVest. The views stipulated in this report are purely objective and no other interests are displayed during the decision making processes discussed in the Heritage Impact Assessment Process that includes the Scoping as well as this final report

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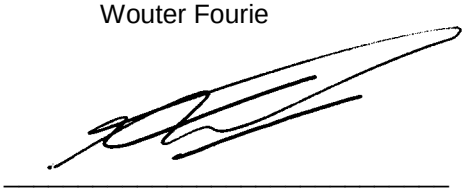
SIGNATURE: 

Executive Summary

PGS Heritage was appointed by SiVest Environmental Division to undertake a Heritage Impact Report that forms part of the Environmental Impact Assessment (EIA) for the Proposed 132kv Power Line and Associated Substations between Tweespruit and Welroux Free State Province.

The background research and fieldwork has shown that the Eastern Free State area between Tweespruit, Wepener and the Caledon valley has a rich history spanning a vast timeframe from the Later Stone Age to the South African War.

The survey yielded 35 heritage related sites:

- Thirteen (13) cemeteries of which twelve (12) is situated in the study area;
- Twenty-one (21) historical sites; and
- One provincial monument (**T 12)**.

Section 5.1 lists and describes all the sites in detail.

The following recommendations focussed on specific heritage find types must be implemented

Cemeteries

- Adjust the development layout and demarcate site with at least a 20-meter buffer. In the case of T12 this buffer must be made at least 100 meters to keep the development away from the provincial monument.
- In the event that the sites cannot be excluded from the development footprint a grave relocation process as described in Section 5 of this reports needs to be implemented.

Historical Structures

- Adjust Corridors and position of pylons to avoid these structures;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 100 meters from the site;
- **All** structure will require a destruction permit under Section 34 of the NHRA;
- The permit will entail initial documentation of the layout and condition of the structures and its structures with layout sketches and detailed photography, after which the destruction permit can be applied for with the backing of the documentary evidence;
- A qualified heritage practitioner must do this documentation.

Monument

- Adjust Corridors and position of pylons to avoid the site;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 100 meters from the site;
- **A buffer of at least 200 meters must be kept from the monument. This distance can however be negotiated with the Provincial Heritage Authority – Heritage Free State**

Palaeontology

An analysis of the SAHRIS palaeontological sensitivity map indicates that 90% of the study area is under lain by palaeontological sensitive geology. Interpreting this data according to the SAHRIS guidelines require that a field assessment and protocol for find will be required.

It is recommended that a full Palaeontological Impact Assessment (PIA) be initiated during the pre-construction phase when the heritage walkdown of the final alignment will be done.

Taking the findings of the field work in to consideration Table 15, gives a summary of the number of sites located in each of the Corridors and the projected possible impacts on heritage resources.

Table 1: Heritage Resources per Corridor

Alignment	**Tweespruit-Driedorp**		**Driedorp-Wepener**		**Driedorp - Welbedacht**		**Welbedacht Dam - Welroux**	
Alternative	***Alt1***	***Alt2***	***Alt1***	***Alt2***	***Alt1***	***Alt2***	***Alt1***	***Alt2***
Cemeteries	4	2	4	4		2		1
Structures	2	6	1	2	3	1	1	2
Provincial Heritage site			1	1				
Total count	***6***	***8***	***6***	***7***	***3***	***3***	***1***	***3***

Refer to **Appendix B** for positions of the heritage sites and find spots relative to the Corridors.

Through a comparative assessment of the alternatives and evaluation against the heritage resources identified it was possible to assign a rating of Preferred, Favourable, Not Preferred or No preference as described in Table 2 below.

The evaluation has shown that in all the alignment Alternative 1 is identified as the preferred alternative. However the 2nd Alternatives could be used with the implementation of the recommended management measures.

The comparative assessment of the substation alternatives (Table 3) at Driedorp, Wepener and Welroux has shown that the D**riedorp substation alternatives** have no clear preferred option. The site at Driedorp has already been changed due to the existence of a substation in the proposed area.

No heritage resources fall within the **Wepener substation alternative** buffer areas, however the 500 meter buffer of Alternative 1 almost touches to the cemetery identified at site **T14** and for that reason the site is classified as favourable with Alternative 2 being the preferred.

The Welroux substation Alternative options leans very strongly to Alternative 2 as being the preferred option with Alternative 1 not preferred due to its proximity to the farmstead within its 500 meter buffer.

Table 2: Comparative Assessment of Alternative Alignments

Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Alternative	Preference	Reasons
TWEESPRUIT-DRIEDORP		
Alternative 1	Preferred	Least amount of heritage resources identified
Alternative 2	Favourable	Although more heritage resources has been identified, with mitigation and alignment this alternative could be utilised
DRIEDORP-WEPENER		
Alternative 1	Not preferred	Least amount of cemeteries that could be impacted
Alternative 2	Favourable	Although more heritage resources has been identified, with mitigation and alignment this alternative could be utilised
DRIEDORP - WELBEDACHT		
Alternative 1	Preferred	Least amount of heritage resources identified
Alternative 2	Favourable	Although more heritage resources has been identified, with mitigation and alignment this alternative could be utilised
WELBEDACHT DAM - WELROUX		
Alternative 1	Preferred	Least amount of heritage resources identified
Alternative 2	Favourable	Although more heritage resources has been identified, with mitigation and alignment this alternative could be utilised

Table 3: Comparative Assessment of Substation Alternatives

DRIEDORP SUBSTATION		
Alternative 1	No preference	Both buffer zones contain the same functioning farmstead.
Alternative 2	No preference	Both buffer zones contain the same functioning farmstead.
WEPENER SUBSTATION		
Alternative 1	Favourable	Both substation positions contain no heritage resources. However Alternative 1 is the closest to a cemetery (**T14**)
Alternative 2	Preferred	Both substation positions contain no heritage resources. However Alternative 2 is further away from the cemetery at **T14**.
WELROUX SUBSTATION		
Alternative 1	Not preferred	This alternative is very close to an existing farmstead and will impact on the cultural landscape around the farmstead.
Alternative 2	Preferred	Contains no heritage resources and is removed from the farmstead located close to Alternative 1

The overall impact on identified heritage resources is rated as moderate to low. By designing the layout within the final corridor to avoid as far as possible the heritage resources identified; and then finally doing a heritage walkdown of the final alignment focussing on the pylon position and footprints of construction, the impact on heritage resources can be minimised to acceptable levels.

Further to these recommendations the general Heritage Management Guideline in Sections 7 needs to be incorporated in to the EMP for the project.

The overall impact of the development on heritage resources is seen as acceptably low and can impacts can be mitigated to acceptable levels.

The following general mitigation measures are recommended:

a. All the stakeholders must agree upon a monitoring plan for the different phases of the project focussing on the areas where earthmoving will occur.
b. If during construction any possible finds are made, the operations must be stopped and the qualified archaeologist be contacted for an assessment of the find.
c. Should substantial fossil remains (e.g. well-preserved fossil fish, reptiles or petrified wood) be exposed during construction, however, the ECO should carefully safeguard these,

preferably in situ, and alert SAHRA as soon as possible so that appropriate action (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.

d. A management plan must be developed for managing the heritage resources in the surface area impacted by operations during construction and operation of the development. This includes basic training for construction staff on possible finds, action steps for mitigation measures, surface collections, excavations, and communication routes to follow in the case of a discovery.

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HERITAGE IMPACT ASSESSMENT

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1 INTRODUCTION

PGS Heritage was appointed by SiVest Environmental Division to undertake a Heritage Impact Report that forms part of the Environmental Impact Assessment (EIA) for the Proposed 132kV Power Line and Associated Substations between Tweespruit and Welroux Free State Province.

1.1 Scope of the Study

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed development area. The Heritage Impact Assessment aims to inform the Environmental Impact Assessment in the development of a comprehensive Environmental Management Plan to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

PGS Heritage (PGS) compiled Heritage Impact Assessment.

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

Wouter Fourie, Project manager for this project, is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA) and has CRM accreditation within the said organisation, as well as being accredited as a Professional Heritage Practitioner with the Association of Professional Heritage Practitioners – Western Cape (APHP).

1.3 Assumptions and Limitations

Not subtracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist had been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development the procedures and requirements pertaining to graves and burials will apply as set out below.

The accessibility of the proposed alternative alignments was hampered by terrain and permissions to enter sections of the proposed alternatives. An effort was made to provide a good overview of the type of heritage resources that could be found in the study areas.

It must be stressed that a final walkdown will be required on the completion of the design of the final alignment.

1.4 Legislative Context

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

i. National Environmental Management Act (NEMA) Act 107 of 1998
ii. National Heritage Resources Act (NHRA) Act 25 of 1999
iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

i. National Environmental Management Act (NEMA) Act 107 of 1998
    a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
    b. Environmental Scoping Report (ESR) – Section (29)(1)(d)
    c. Environmental Impacts Assessment (EIA) – Section (32)(2)(d)
    d. Environmental Management Plan (EMP) – Section (34)(b)
ii. National Heritage Resources Act (NHRA) Act 25 of 1999
    a. Protection of Heritage resources – Sections 34 to 36; and
    b. Heritage Resources Management – Section 38
iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
    a. Section 39(3)

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, “no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…” The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, and MPRDA

legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008):

The NEMA 23(2)(b) states that an integrated environmental management plan should, "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage".

A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 of the regulations (Fourie, 2008).

Terminology and Abbreviations

Abbreviations	***Description***
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
PSSA	Palaeontological Society of South Africa
ROD	Record of Decision
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

- **Archaeological resources**

This includes:

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

- **Cultural significance**

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

- **Development**

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

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

- **Early Stone Age**

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

- **Fossil**

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

- **Heritage**

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

- **Heritage resources**

  This means any place or object of cultural significance

- **Holocene**

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

- **Late Stone Age**

  The archaeology of the last 20 000 years associated with fully modern people.

- **Late Iron Age (Early Farming Communities)**

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

- **Middle Stone Age**

  The archaeology of the Stone Age between 20-300 000 years ago, associated with early modern humans.

- **Palaeontology**

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

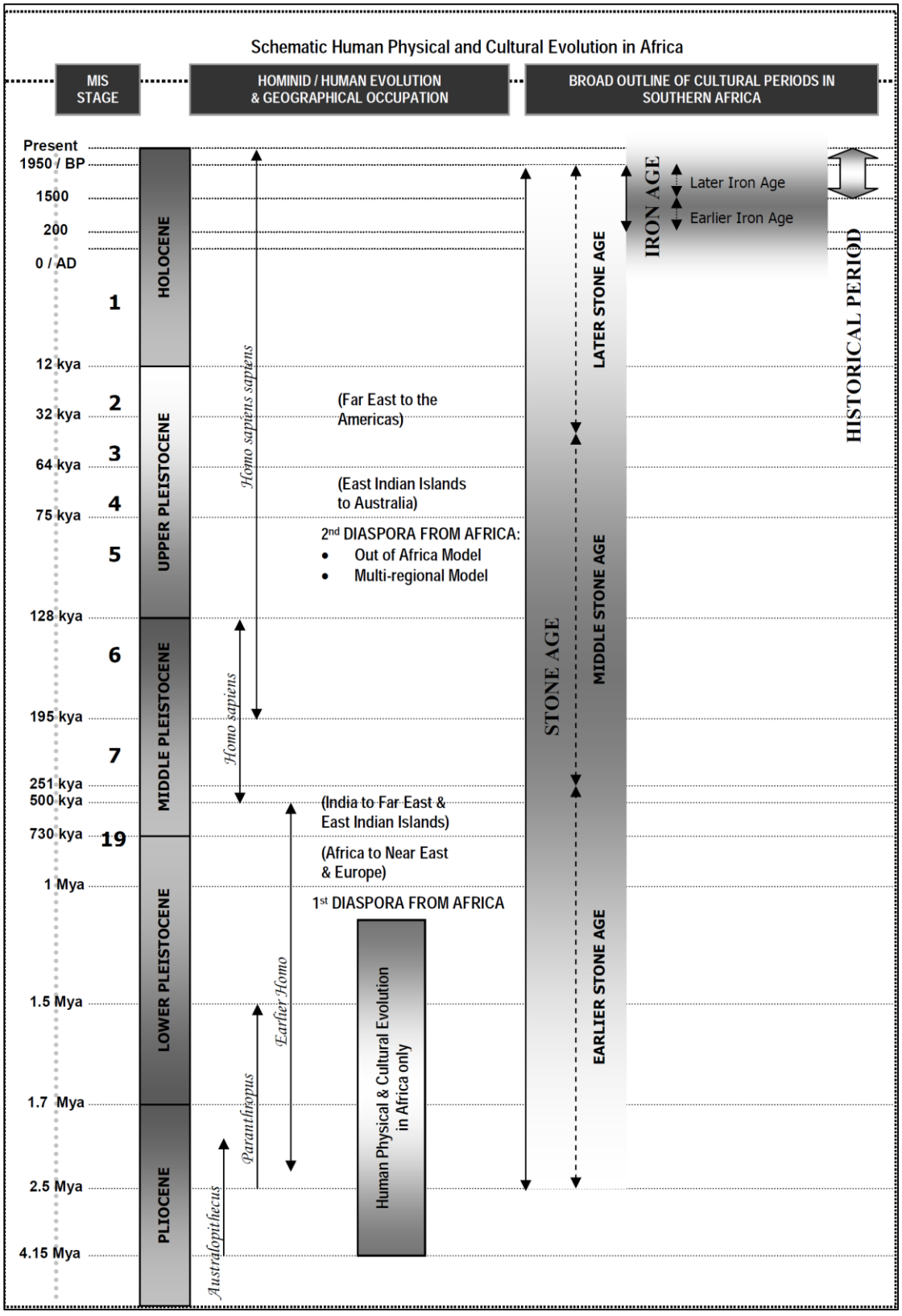

Figure 1: Human and Cultural Timeline in Africa (Morris, 2013)

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Background to the proposed development

Eskom, being responsible for the provision of reliable and affordable power to consumers in South Africa, has initiated the proposed development in order to improve the reliability of the network and create capacity for new customers in the greater Free State area. Presently there is one power line (88kV Rabbit line) from Tweespruit Substation to the Driedorp Substation, which runs for approximately 48km. The current power line supplies Driedorp (more than 1000 customers), Novo Pumps, Knelpoort and Welbedacht Dam.

The network is sitting with very low voltages and no spare capacity (all applications to increase supply have had to be rejected). This is due to the impact of future overloading conditions on the existing high voltage line between Tweespruit DS and Welbedacht Dam Substation and the effect that contingencies and demand increases will have on the network. Additionally, the network is not N-1 compliant (i.e. should the main line Tweespruit – Driedorp line come out, the whole 88kV network will have no supply). To avoid a shortage of water, Bloemwater needs to increase water supply to Boshabelo, Thaba-Nchu and Maselspoort areas.

The current 88kV line will however, not be able to accommodate the increase in notified demand. The interim agreement between Eskom and Bloemwater is to increase the transformer size at Novo Substation in order to increase the pumping capacity at Novo pump station. Bloemwater will also manage the electrical load on their side as a temporary solution until the construction of the additional second high voltage line between Tweespruit and DS Driedorp Substation is completed. The benefits of the upgrade would be creating capacity on the network, and ensuring security of supply by making the network N-1 compliant (i.e. if there is a challenge with one line, the other one will be available to ensure firm supply, and normalizing voltages on the network).

Rouxville currently has 1x10MVA supplying Smithfield and Zastron. Rouxville Substation has reached its maximum capacity and both MV lines (Smithfield and Zastron) are overloading. The new Welroux Substation will help de-load the Rouxville Substation. Welroux Substation will be an 88/22kV 1X10MV substation. This new substation will be fed from the strengthened Tweespruit-Driedorp network (of which Welbedachtdam is part of it).

The Eskom Network Engineering Design department (NED) suggested building a new Driedorp Substation with the main reason being all the equipment at Driedorp is old. It maintained that it would be better from a feasibility and practicality perspective to build a new Substation than to replace all the old equipment.

Finally, for the proposed new Wepener Substation: At Wepener municipality, the current load is at 1.5 MVA. By 2035 the expected load as per load forecast is projected to increase to 2 MVA. Therefore, if a new 88/11kV 10MVA substation can be built at Wepener, the possibility of deloading Driedorp substation and supply Wepener from the proposed new substation.

2.2 Project Description

The project is for the proposed construction of a 132kV double circuit power line that will be approximately 145km in total length from the Tweespruit Substation to the newly proposed construction of the Welroux substation. The proposed power line will consist of four sections of power line that will connect via the existing substations that will be refurbished (Tweespruit and Welbedachtdam Substation) as well as the three newly proposed substations (Driedorp, Wepener and Welroux Substations). The power lines therefore are not separate power lines but rather connecting lines between the existing substations that will be refurbished and those that are being proposed along the greater power line network. The registered servitude width is 31 metres (15.5 metres either side of the centre line). The four power line sections include the following:

- Proposed construction of a double circuit 132kV power line from the existing Tweespruit Substation that will be refurbished to the newly proposed Driedorp Substation (approximately 53km in length);
- Proposed construction of a double circuit 132kV power line from newly proposed Driedorp Rural Substation to existing Welbedachtdam Substation that will be refurbished (approximately 41km in length);
- Proposed construction of a 132kV power line from Driedorp Substation to the newly proposed Wepener Substation (approximately 22km in length);
- Proposed construction of the 132kV power line from the Welbedachtdam Substation to the newly proposed Welroux Substation (approximately 28km in length).

Additionally, Eskom proposes to refurbish the existing Tweespruit and Welbedachtdam Substations. Three new substations will also be built which includes:

- Construction of the new 88/22/11kV Driedorp Substation with 2x10MVA and 6 feeder bays on MV side and 2 feeder bays on the 88kV side;
- Construction of the new 132/11kV 1X10MVA Wepener Substation; and
- Construction of the new 88/22kV 1X10MVA Welroux Substation.

The new proposed substations will be 100m x 100m in extent each.

Access roads to the substations will also be included. These access roads will stay as close as possible to existing roads, remaining gravel with road widths of 4m to 6m, within a road reserve of 8m to 12m, respectively.

2.3 Project Location

The study area is located within the Free State Province within the Xhariep District Municipality. More specifically however, the proposed power line traverses the three local municipal areas and one metropolitan municipality. These include the Naledi, Mantsopa and Mohokare Local Municipalities and the Mangaung Metropolitan Municipality. The proposed power line originates from the town of Tweespruit and routes southwards towards the newly proposed Welroux Substation, located 6.36km southwest of Babel and 8.27km southeast of Bankkraal. The landscape is predominantly rural in character. Land uses for the greater part of the proposed power line encompass vacant land, agricultural farming activities and conservation area.

2.4 Proposed Alternatives

It is proposed that route and locality alternatives will be investigated for the proposed development. Two alternative corridor routes will be proposed for each section of the proposed power line. The corridors will be 1km wide (500m either side of the centre line). Two alternative locations will be proposed for the new substations. A 500m-assessment radius will also be investigated for placement of the new proposed substations. The proposed route and location alternatives are indicated on the locality map below (**Figure 2**).

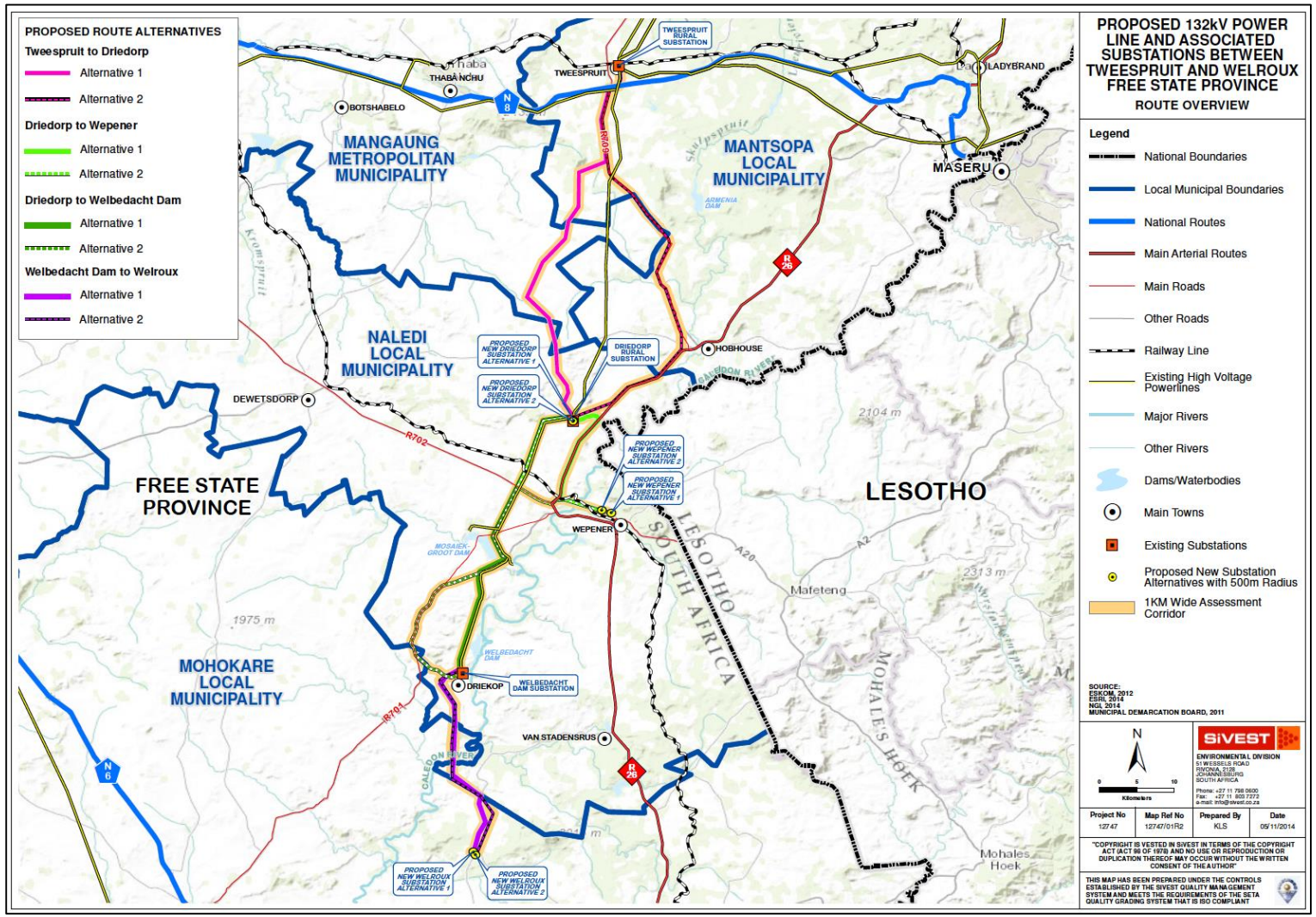

Figure 2: Locality map with proposed power line route alternatives and substation alternative locations

2.4.1 Tower Types

The tower types that are to be used will vary depending on the most appropriate structure, the terrain traversed, ground clearance requirements, geology, etc. The tower types may consist of the following:

- Mono-pole guyed intermediate suspension structures;
- Mono-pole self-supporting intermediate suspension structures;
- Mono-pole angle suspension structures;
- Mono-pole strain structures;
- H-Pole structures; and
- 3 Pole strain structures.

The final tower types that will be used for the proposed 132kV power line will be determined once the routing has been negotiated and a servitude has been secured.

The foundation depths will range between 1,5-2m. Spanning lengths between tower structures will be between 225-250m. The tower type structures will vary in length from 18-24m in height. Finally, a Kingbird conductor is likely to be used.

An illustration of an example of one of the proposed towers is provided in Figure 3 below.

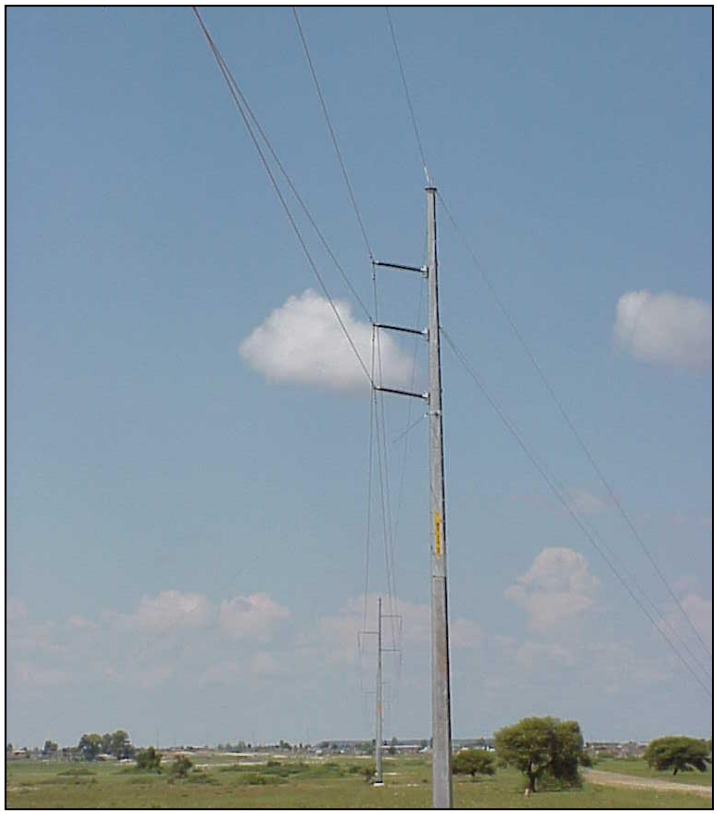

Figure 3: Proposed monopole tower type

3 ASSESSMENT METHODOLOGY

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

PGS Heritage (PGS) compiled this Heritage Impact Assessment (HIA) report for the proposed development. The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the National Environmental Management Act (NEMA) (no 107 of 1998) and the South African Heritage Resources (SAHRA) guidelines for Archaeological Impact Assessments (2007). The HIA process consisted of three steps:

- Step I – Literature Review: The background information to the field survey leans on information gathered for the larger study area.

- Step II – Physical Survey: A physical survey was conducted on foot and by vehicle through the proposed alignments by qualified archaeologists (February 2015), aimed at locating and documenting sites falling within and adjacent to the proposed development footprint. The fieldwork was based on an overall field visit and does not constitute a walk down of the final alignment.

- Step III – The final step involved the recording and documentation of relevant archaeological resources, as well as the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and constructive recommendations

The significance of heritage sites was based on four main criteria:

- **site integrity** (i.e. primary vs. secondary context),
- **amount of deposit, range of features** (e.g., stonewalling, stone tools and enclosures),
    - Density of scatter (dispersed scatter)
        - Low - <10/50m^2
        - Medium - 10-50/50m^2
        - High - >50/50m^2
- **uniqueness** and
- **potential** to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

A - No further action necessary;
B - Mapping of the site and controlled sampling required;
C - No-go or relocate pylon position
D - Preserve site, or extensive data collection and mapping of the site; and
E - Preserve site

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

Site Significance

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report.

Table 4: Site significance classification standards as prescribed by SAHRA

FIELD RATING	**GRADE**	**SIGNIFICANCE**	**RECOMMENDED MITIGATION**
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	Grade 4A	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	Grade 4C	Low Significance	Destruction

3.1 Methodology for Impact Assessment

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment. The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

3.1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics, which include context, and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas Intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 5**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

3.1.2 Impact Rating System

Impact assessment must take account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

- Rating System Used To Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 5: Description

NATURE
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.
GEOGRAPHICAL EXTENT
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required.

This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.

DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).

CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect, which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY/ MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.

2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic, which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.

29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

4 CURRENT STATUS QUO

4.1 Previous Heritage studies in the study area

A search of the South African Heritage Resources Information System (SAHRIS) produced 11 studies conducted in the vicinity of the study area, with only one study falling in the 1000 corridor of the alternative alignments.

The following studies are listed.

1. Dreyer, C. 2005. First Phase Archaeological and Historical Investigation of the Proposed Residential Developments at Moroka Extension 22, Thaba Nchu, Free State
2. Dreyer, C. 2006. Archaeological and Cultural Heritage Assessment of the Proposed Water Reservoir and Pipeline Installation at Van Stadensrus, Free State
3. Dreyer, C. 2006. Archaeological and Cultural Heritage Assessment of the Proposed Landfill Site at Wepener, Free State
4. Dreyer, C. 2006. First Phase Archaeological and Historical Investigation of the Proposed Cemetery Development at Ratau, Thaba Nchu, Free State
5. Dreyer, C. 2006. Archaeological and Historical Assessment of the Farm Adelaide 154, Thaba Nchu, Free State
6. Dreyer, C. 2006. Archaeological and Cultural Heritage Assessment of the Proposed Leisure Residential Developments at Annex Elderslea "A" 433, Wepener, Free State
7. Dreyer, C. 2006. Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at Wepener (Kanana), Free State
8. Dreyer, C. 2006. First Phase Archaeological and Cultural Heritage Assessment of the Proposed Township Developments at (Dipelanang) Hobhouse, Free State
9. Dreyer, C. 2008. First Phase Archaeological and Cultural Heritage Investigation of the Proposed New Solid Waste Treatment System at Hobhouse, Free State

10. Nel. J. 2007. Letter of Exemption - Recommendation of Exemption: Above Ground Sasol Fuel Storage Tanks Located at Grain Silos in Localities in the Eastern Free State
11. Van Ryneveld, K. 2007. Phase 1 Archaeological Impact Assessment: Upgrading of the Waste Water Treatment Works, Wepener, FS.

Most of the studies lacked any background research, and did not provide any further information.

4.2 Background history

The aim of the archival background research is to identify possible heritage resources that could be encountered during the fieldwork. The archival research focused on available information sources, which were used to compile a background history of the study area and surrounds, as summarised in Table 6. This data then informed the possible heritage resources to be expected during field surveying.

Table 6: Summary of historical background of the area

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The Earlier Stone Age - No information on recorded sites in the immediate study area was located during the desktop study.
250 000 to 40 000 years ago	The Middle Stone Age - No information on recorded sites in the immediate study area was located during the desktop study.
40 000 years ago to the historic past	The Later Stone Age The existence of numerous rock art sites in the study area and specifically the Caledon River Valley provides the background for the settlement of the San as hunter-gatherers during the Later Stone Age (LSA). Most of the LSA finds are then also associated with rock shelters in the area (Loubser, et al, 1994).
Rock Art	Areas to the north east of Wepener and the Caledon River Nature reserve to the south west of Wepener are know for its rock art sites. Most of these rock art sites occur close to or in the Caledon valley due to the geology of the Beaufort series that does not make for good surfaces for rock paintings (Loubser, et al, 1994). The rock paintings of the Caledon valley depict human figures with bows and arrows, eland, small antelope, feline and rain animals.

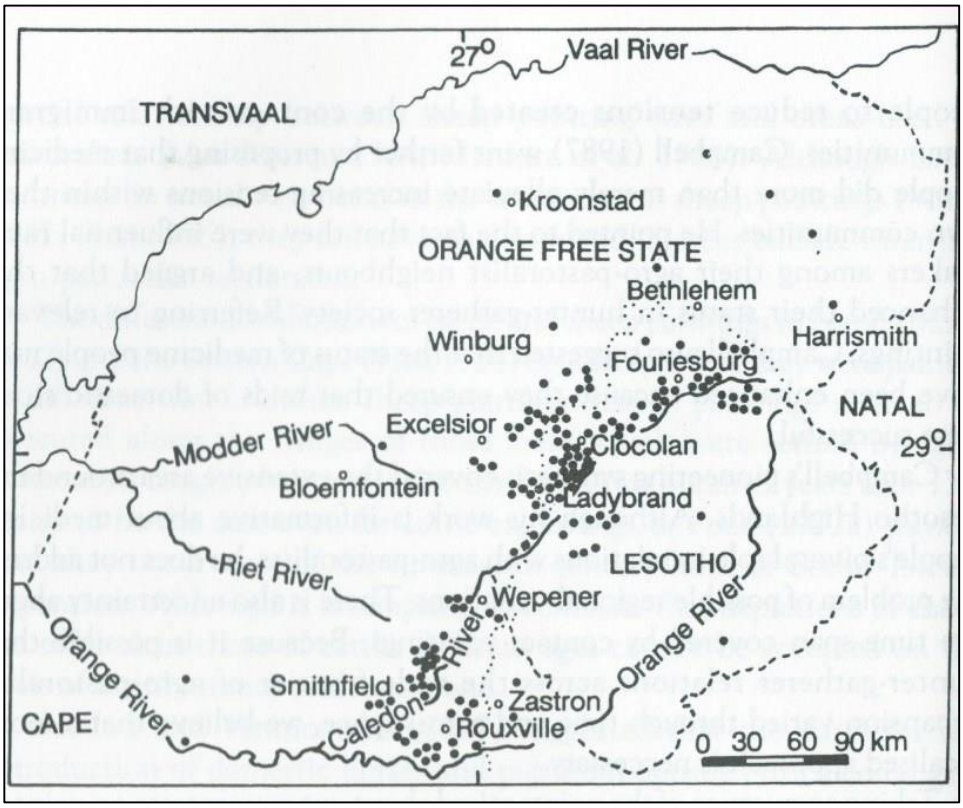

Figure 4: Rock art distribution in the Eastern Free State (study area in red)

	 **Figure 5: Rock art panel close to Wepener (Hampson, 2014)**
AD 200 - 900	Early Iron Age – No information on recorded sites was located in the immediate study area was located during the desktop study.
AD 900 - 1300	Middle Iron Age – No information on recorded sites was located in the immediate study area was located during the desktop study.
AD 1300 - 1840	Late Iron Age – Evidence for the settlement of the southern reaches of the Caledon valley are linked to the Natal Nguni such as the Phuti. No major stone walled site is found in this area, with the southern most distribution of large stone walled sites being around Excelsior and Clocolan.
AD 1840 and onwards	*Basotho Wars* By 1824 Moshoeshoe and his followers settled at their mountain fortress of Thaba Bosiu, due to the pressures asserted by the Korana and a general competition for resources with other tribes in the Eastern Free State. The Great trek of 1820 brought Boer settlers in to the area and was initially seen by Moshoeshoe as a buffer between them and the Korana. By 1845 a settlement treaty was signed between the settlers and Moshoeshoe, however the treaty lacked definite borders, which led to clashes. To address this situation the colonial powers under the British demarcated a border line known as the Warden line (after Major warden). This border was unacceptable to Moshoeshoe as it removed the fertile Caledon Valley from the Basotho territory, and led to conflict between the British and Basotho. Moshoeshoe defeated the British at the battle of Viervoet in 1851 (Close to Ladybrand). Moshoeshoe subsequently also defeated the British forces at the Berea Plateau in 1852.

By 1854 the British handed over the territory to the Boers through the San River Convention, and claimed the land t the north of the Caledon River and named it The Republic of the Orange Free State.

Further conflict then continued between the Boer and Basotho nations resulting in:
The First Basotho War – 19 March to 15 October 1858 - (War of Senekal);
The Second Basotho War – 1865-1866 (Seqiti War); and
The Third Basotho War – 1867 – 1869.

Basotholand was officially annexed on 12 March 1868 after negotiations with Moshoeshoe and the Basotho Kingdom was officially declared a British protectorate. In February 1869 the boundaries of the present day Lesotho were drawn up according to the Convention of Aliwal-North (http://www.sahistory.org.za/south-africa-1806-1899/basotho-wars-1858-1868)

Wepener

The town was named after Louw Wepener that lead the Boers against the Basotho in 1865. The town of Wepener was established around 1870 to prevent the Basotho resettling the land taken from them during the 1865 war (Walter, et al. 2014).

Hobhouse

The town of Hobhouse was laid out on the farm Poortjie in 1912 and attained municipal status in 1913. The town was named after Emily Hobhouse, know for her tireless work bringing notice to the conditions and abuses in the concentration scams during the South African War.

Tweespruit

After the end of the South African War, Lord Milner proposed and initiated a settlement scheme between Thaba Nchu and Wepener. The settlers were mainly ex-soldiers that were given land, and some equipment to start their own farms (Bottomley, 1987). The region between Thaba Nchu and Wepener was known as the “conquered territory” and seen as an ideal area for the settlement for European settlers (Creswicke, 1902). Tweespruit the town started as part of this proposed regional farming development and was setup around the train station that serviced the original British garrison.

Tweespruit is also known as the residence of the well-known South African artist Farther Frans Claerhout that resided at the Tweespruit mission.

Siege of Jammerbergdrift – South African War (Anglo-Boer War)

	At the beginning of April 1900, the command of the Boer forces made a decision to change the tactics used up to then. Under the command of General Christiaan de Wet, Boer forces first attached and defeated British forces on 31 March 1900 at Sanna's Post, some 15 kilometres to the west of Tweespruit. On the 4th of April he captured a detachment of Imperial Yeomanry at Mostershoek near Reddersburg (80 kilometres to the west of the study area) (Breytenbach, 1978; Wessels, 1985). De Wet ascertained that a contingent of Colonial troops of the Cape Mounted Rifles and the Brabant's Horse under the command of Colonel E.H. Dalgety has taken position at Jammerbergdrift just 5 kilometres west of Wepener. Dalgety moved with his forces to Wepener on request of the local commander at Wepener, who saw the massing of Boer commando's near Ladybrand as a potential threat. Reinforcements started arriving from Aliwal North by the 29th of March and by 5 April the garrison consisted of almost 2000 men. The force took up position 2 kilometres north of Wepener, however by 3 April they moved and decided to setup position at Jammerbergdrift and the surrounding ridges. De Wet arrived to join the commando of General J.B. Wessels, amassing a total Boer force of about 5000 men. On 8 and 9 April, the Boer forces attacked the well-entrenched British lines but were driven back. The Boer forces tried numerous times to take the British lines but were driven back each time. De Wet then decided to surround and lay siege to the Jammerbergdrift garrison and kept the siege up for 16 days until they had to retreat north, due to the immanent arrival of relive forces from the 11th Division, under Major Gen. Pole-Carew was on it's way to Jammerbergdrift, Lt Gen Leslie Runcle was leading the 8th Division from Edenburg, while Colonial forces under Brabant himself was coming from Aliwal North (Breytenbach, 1978; Wessels, 1985).

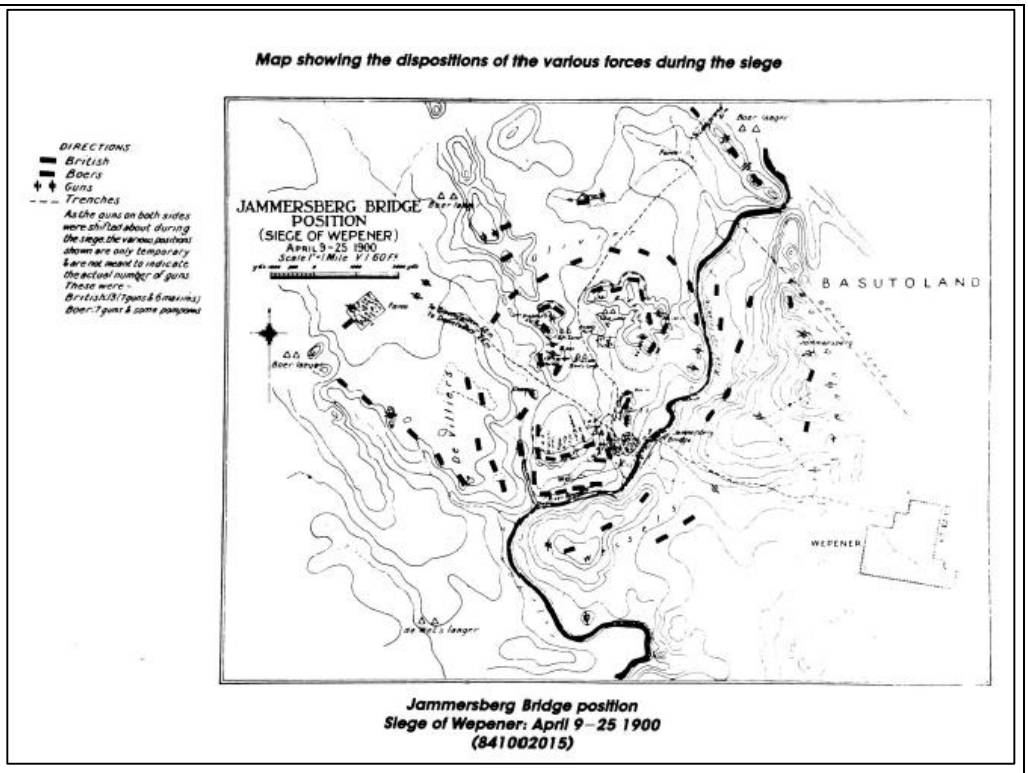

Figure 6: Jammerbergdrift Siege layout

4.3 Palaeontology

An analysis of the SAHRIS palaeontological sensitivity map (**Figure 7**) indicates that 90% of the study area is under lain by palaeontological sensitive geology. Interpreting this data according to the SAHRIS guidelines (Table 7) indicates that a field assessment and protocol for finds will be required.

It is recommended that a full Palaeontological Impact Assessment (PIA) be initiated during the pre-construction phase when the heritage walkdown of the final alignment will be done.

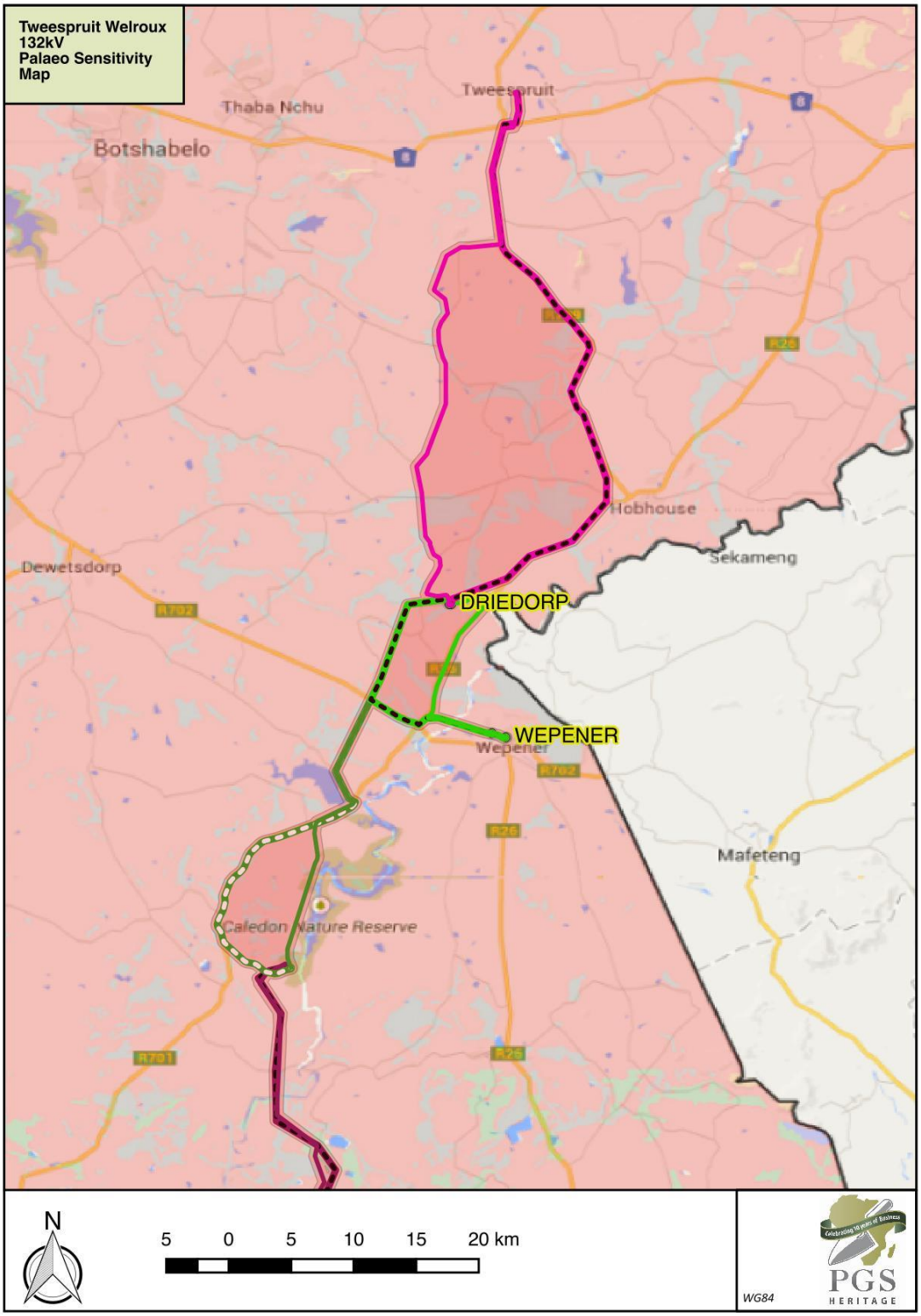

Figure 7: Palaeontological sensitivity map for the project area (SAHRIS, 2015)

Table 7: Interpretation table for palaeontological sensitivity (SAHRIS, 2015)

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

5 POSSIBLE HERITAGE FINDS

Evaluation of aerial photography has indicated areas in the Corridor region that may be sensitive from a heritage resources perspective (Refer to **Appendix A**). Archaeological surveys and studies in the region have shown rocky outcrops, riverbanks, foot of koppies and confluence to be prime localities for heritage finds.

The aerial photography has reference the following as of possible heritage sensitivity:

Farmsteads

Most of the farmsteads in the study area date from the mid to late 1800's and are of great historical and significance.

Structures

Numerous structures and outlines of man mad structures have been identified and rated as possible sensitive heritage resources from the aerial survey. Some of the early settler farmsteads have been abandoned for close to 100 years and only the remnants of the walling, middens and paddocks remain.

Ridges

Numerous ridges, koppies and mountains have been identified in the study area and are associated with human settlement and activity. Stonewalling from herders, rock engravings and knapping sites associated with Later Stone Age manufacturing technology is known to occur in these areas.

South African War

The archival research has shown that the Wepener and Thaba Nchu saw military activity. Notable areas area Jammerbergdrift (Wepener) and Sannaspost (just to the west of the study area in the Tweespruit area).

5.1 Field work findings

A site visit and screening survey of the Corridor alternatives provided for the study was conducted in February 2015. Due to the nature of cultural remains, with the majority of artefacts occurring below surface.

The site is predominantly covered in grassland with the southern sections of the study area dominated by ridges and low mountains.

Figure 8: View of study area in the Tweespruit area

Figure 9: Mountainous terrain in the southern section of the study area

Figure 10: General view of study area towards Wepener

5.2 Heritage Sites

The survey yielded 34 sites of which 2 falls outside the study area but does provide additional information on the types of sites inside the study corridor. A total of 13 cemeteries were identified, with 21 farmsteads and homestead were identified all of them ruined or unoccupied and falling in to ruin.

Just to the west of Wepener a provincial monument and cemetery (**T12**) associated with the battle and siege at Jammerbergdrift is situated inside the study area. Other interesting features found are a lane of oak trees stretching for approximately 200 meters, planted to the entrance of the Heathfield farm (**T2**).

Refer to **Appendix B** for the positions of the heritage sites relative to the Corridors.

5.2.1 Cemeteries

During the field work 32 cemeteries (Table 8**)** were identified**.** 12 of the cemeteries are situated in the study area.

Table 8: Cemeteries

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
T 1	Cemetery	27.029117	-29.204229	A large cemetery was identified at this location. This is the cemetery used by the informal settlement at the town of Tweespruit. The cemetery is fenced and contains approximately 750 graves.	Grade 3A	Outside
T 3	Cemetery	27.023703	-29.291358	An informal cemetery was identified at this location. The cemetery is situated near the corner of the R709 tar road and the S1446 gravel road. The cemetery has approximately 80 graves and the graves were placed in six unequal lines.	Grade 3A	Tweespruit-Driedorp – Alt1 and 2
T 5	Cemetery	26.978594	-29.374371	A small, informal cemetery was identified at this location. The cemetery is fenced and it has nine graves. The graves were placed in two unequal lines and all of the graves are orientated from west to east.	Grade 3A	Tweespruit-Driedorp – Alt1
T 9	Historic ruin - farmstead	27.116012	-29.508996	A small, informal cemetery with 15 graves was identified to the east of the stone walled cattle enclosure. The graves were placed in three unequal lines and all of the graves are orientated from west to east. Some of the graves are		

				damaged. The graves date from around 1890 to 1908 and most probably belonged to the family who occupied the farmstead.		
T 11	Cemetery	26.924154	-29.665906	Two graves were identified at this location.	Grade 3A	Driedorp-Wepener – Alt2
T 12	Jammerbergdrift War Memorial and Cemetery	26.980372	-29.711293	The Jammerbergdrift War Memorial and Cemetery were identified at this location. A thick wall walls the War Memorial and Cemetery in. Approximately 50 graves are within the walled cemetery.	Grade 2	Driedorp-Wepener – Alt1 and 2
T 14	Cemetery	27.021542	-29.722629	A large cemetery was identified at this location. The cemetery is situated next to the road from the township to the town of Wepener. The cemetery is fenced and is a municipal cemetery.	Grade 3A	Driedorp - Wepener – Alt1 and 2
T 16	Cemetery	26.901980	-29.717242	A small walled cemetery was identified at this location. One large double grave is situated within the walls of the cemetery.	Grade 3A	Driedorp - Welbedacht Dam Alt1 and 2
T 19	Cemetery	26.812882	-29.909902	A small, informal cemetery was identified at this location. The cemetery has a stone built wall, which measures approximately 1.2m high. The cemetery is approximately 20m x 20m in size and it has 19 graves.	Grade 3A	Driedorp - Welbedacht Dam Alt1
T 22	Cemetery	26.823245	-29.814677	A small fenced cemetery was identified at this location. The cemetery is situated approximately 220m to the northeast of the farmstead identified at	Grade 3A	Driedorp - Welbedacht Dam Alt1

				site TW 21. The cemetery has 19 graves and they were placed in two unequal lines next to each other.		
T 25	Cemetery	26.882713	-30.089395	A small, informal cemetery was identified at this location. The cemetery has a brick built wall, which measures approximately 1.4m high. The cemetery is approximately 30m x 25m in size and it has 10 graves.	Grade 3A	Welbedacht Dam - Welroux Alt 2
T 31	Cemetery	26.963199	-29.490810	A small informal cemetery was identified at this location. The cemetery is situated alongside a fence and it has 21 graves.	Grade 3A	Tweespruit-Driedorp – Alt1
T 32	Cemetery	26.976913	-29.456382	A large informal cemetery with approximately 75 graves was identified at this location. The graves were placed in a haphazard fashion with families placing their graves together.	Grade 3A	Tweespruit-Driedorp – Alt1

Mitigation:

- Adjust the development layout and demarcate site with at least a 20-meter buffer. In the case of T12 this buffer must be made at least 100 meters to keep the development away from the provincial monument.
- In the event that the sites cannot be excluded from the development footprint a grave relocation process as described in Section 5 of this reports needs to be implemented.

Figure 11: View of site T 3

Figure 12: View of cemetery at site T 9

Figure 13: Graves at site T 19

Figure 14: View of cemetery at Site T 22

5.2.2 Historical Structures

Table 9: Heritage Structures

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
T 2	Tree lane	27.019095	-29.235605	A line of Oak trees was identified at this location. The Oak tree lines the access road to the farmstead of the farm Heathfield. The Oak trees are on both sides of the access road and follow the road for approximately 200m. Mr. Johan Gelderbloem, the owner of the farm, suggested that the line of trees is at least 60 to 70 years old.	Grade 4B	Tweespruit-Driedorp – Alt1 and 2
T 4	Historic ruin - farmstead	26.978877	-29.361583	The remains of a homestead and a stone walled cattle enclosure were identified at this location. The settlement is situated at the foot of a small hill. The homestead consists of a number of structures, which are in a very dilapidated state.	Grade 4A	Tweespruit-Driedorp – Alt1
T 6	Historic ruin - homestead	26.973283	-29.378542	The remains of a series of homesteads and stone walled cattle enclosures were identified at this location. The abandoned homesteads and cattle enclosures are situated at the foot of an elongated hill.	Grade 4A	Tweespruit-Driedorp – Alt1

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
T 7	Historic ruin - homestead	26.974439	-29.406509	The remains of a homestead and a stone walled cattle enclosure were identified at this location. The homestead consists of four separate structures. The structures have stone built foundations on which the walls were constructed. The remains of a farmstead and its associated structures were identified at this location. The farmstead is in a dilapidated state and is a multi-roomed rectangular structure.	Grade 4A	Tweespruit-Driedorp – Alt1
T 8	Historic ruin - farmstead	26.961801	-29.597856	The remains of a farmstead and its associated structures were identified at this location. The farmstead is in a dilapidated state and is a multi-roomed rectangular structure.	Grade 4A	Tweespruit-Driedorp – Alt1
T 9	Historic ruin - farmstead	27.116012	-29.508996	The remains of a farmstead and its associated structures and features were identified at this location. The farmstead was demolished and it consisted of a sandstone built foundation with clay brick walls on top of the foundations.	Grade 4A	Tweespruit-Driedorp – Alt2
T 10	Historic ruin - farmstead	26.953573	-29.618565	The remains of another farmstead and its associated structures were identified at this location. The farmstead has sandstone foundations on which the clay brick walls were built. Some of the interior walls were constructed with mud brick and all of the exterior walls were constructed with clay bricks.	Grade 4A	Driedorp-Wepener – Alt2

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
T 13	Historic ruin - farmstead	26.980397	-29.712912	An old farmstead and its associated structures were identified at this location. The farmstead was constructed with sandstone blocks for the exterior walls and it has clay brick walls on the inside.	Grade 4A	Driedorp-Wepener – Alt1 and 2
T 15	Historic - farmstead	26.900168	-29.715715	The old Leeuwfontein farmstead was identified at this location. The farmstead has a sandstone built foundation with clay brick walls built on top of the foundations. The house has a pitched corrugated iron roof with a wooden front door and frame. The other door and window frames are metal with metal doors at the back. The house was recently repainted and is in a decent shape. External water and electrical systems were added to the original house. An inscribed corner stone stated that the house originated from 1925.	Grade 4A	Driedorp - Welbedacht Dam Alt1 and 2
T 17	Historic ruin - farmstead	26.869320	-29.797807	An old farmstead was identified at this location. The farmstead has a sandstone built foundation with clay brick walls built on top of the foundations.	Grade 4A	Driedorp - Welbedacht Dam Alt1

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
T 18	Historic ruin - homestead	26.869800	-29.801077	The remains of a farmworker homestead were identified at this location. The homestead consists of a number of structures, which are in a dilapidated state. The structures have stone built foundations with stone built walls on top. The walls were plastered with mud and mortar	Grade 4A	Driedorp - Welbedacht Dam Alt1
T 20	Historic ruin - farmstead	26.850047	-29.892629	The remains of an old farmstead and its associated outbuildings were identified at this location. The farmstead has a sandstone built foundation with exterior sandstone walls. Some of the interior walls and the walls of later additions to the house was brick built and plastered. The house is in a derelict state of preservation.	Grade 4A	Driedorp - Welbedacht Dam Alt1
T 21	Historic ruin - farmstead	26.821373	-29.815576	An old farmstead was identified at this location. The farmstead has a sandstone built foundation with clay brick walls built on top of the foundations. The house has a pitched corrugated iron roof with a wooden front door and frame. Some of the window frames are still from wood, but other window frames have been replaced with metal frames. External water and electrical systems were added to the original house.	Grade 4A	Driedorp - Welbedacht Dam Alt2
T 23	Historic bridge	26.858166	-29.998463	An old, historic steel bridge was identified at this location. A small plague on the bridge dated it from 1926 and it originated from England.	Grade 4A	Outside

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
T 24	Historic - farmstead	26.881646	-30.090840	A farmstead and its associated structures were identified at this location. The farmstead is in the process of being restored. It has sandstone foundations on which the clay brick walls were built. The farmstead has a pitched corrugated iron roof and wooden door and window frames on the original part of the house. Additions at the back of the house have sloping roofs with metal door and window frames.	Grade 4A	Welbedacht Dam - Welroux Alt 2
T 26	Historic ruin - homestead	27.089502	-29.550988	An extended farmworkers homestead complex was identified at this location. This abandoned homestead complex consists of 9 separate homesteads, which are grouped together in an area.	Grade 4A	Tweespruit-Driedorp – Alt2
T 27	Historic ruin	27.090440	-29.548649	An old sandstone built shed was identified at this location. The shed has sandstone built foundations with sandstone walls on top. The shed has no roof and has a cement floor.	Grade 4A	Tweespruit-Driedorp – Alt2
T 28	Historic building	27.085198	-29.384805	An old shop with its associated structures was identified at this location. The shop is known as “Glenrock” and is still in operation. The building has sandstone blocks as foundations with clay brick walls built on top. The original building has a pitched corrugated iron roof with metal door and window frames	Grade 4A	Tweespruit-Driedorp – Alt2

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
T 29	Historic ruin - homestead	27.084525	-29.383697	The foundations and remains of a homestead were identified at this location. The foundations of the homestead consist of sandstone blocks, but the rest of the building was demolished.	Grade 4A	Tweespruit-Driedorp – Alt2
T 30	Historic ruin - homestead	26.959119	-29.492281	The remains of a homestead and a stone walled cattle enclosure were identified at this location. The homestead consists of three rectangular shaped structures or rooms and one cooking hut.	Grade 4A	Tweespruit-Driedorp – Alt1
T 33	Historic ruin - homestead	26.976354	-29.454590	The remains of a series of homesteads and stone walled cattle enclosures were identified at this location. The abandoned homesteads and cattle enclosures are situated along a ridge.	Grade 4A	Tweespruit-Driedorp – Alt1
T 34	Historic ruin - farmstead	26.988026	-29.428595	The remains of an old farmstead and its associated structures and features were identified at this location. The farmstead has sandstone foundations with clay brick walls built on top. The house has a pitched corrugated roof with metal door and window frames. The house is in a derelict state of preservation.	Grade 4A	Tweespruit-Driedorp – Alt1
T 35	Historic ruin - farmstead	26.8357	-30.03502	The remains of an old farmstead and a stone walled kraal were identified at this location. The house has a pitched corrugated roof with metal door and window frames. The house is in a derelict state of preservation.	Grade 4A	Welbedacht Dam - Welroux Alt 1 and 2

Figure 15: Ruined house at site T 6

Figure 16: Walling of stock enclosure at site T 7

Figure 17: Main dwelling at site T 13

Figure 18: Main house at site T 24

All the heritage structure identified, except for **T 28**, are unoccupied and in ruin. The best option in all the cases will be to take note of the position of these sites and leave at least a 200-meter buffer between the site and the final alignment. All the sites are protected under Section 34 of the NHRA.

Mitigation:

- Adjust Corridors and position of pylons to avoid these structures;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 100 meters from the site;
- **All** structure will require a destruction permit under Section 34 of the NHRA;
- The permit will entail initial documentation of the layout and condition of the structures and its structures with layout sketches and detailed photography, after which the destruction permit can be applied for with the backing of the documentary evidence;
- A qualified heritage practitioner must do this documentation.

5.2.3 Monuments

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
T 12	Jammerbergdrift War Memorial and Cemetery	26.980372	-29.711293	The Jammerbergdrift War Memorial and Cemetery were identified at this location. A thick wall walls the War Memorial and Cemetery in. The War Memorial and Cemetery also have an extended walled access route on the western side, which opens up at the War Memorial and Cemetery. The walled in area measures approximately 50m x 60m in size and contains a memorial and the graves of British soldiers who died during the siege of Jammerbergdrift during the Anglo-Boer War as well as graves of other soldiers who died during the War in the nearby region. Other graves from civilian people are also situated within the cemetery. Approximately 50 graves are within the walled cemetery. A small church building is also situated within the walled area and was most probably used during memorial services and/or later funerals. Most of the graves are overgrown with grass and other vegetation.	Grade 2	Driedorp-Wepener – Alt1 and 2

Figure 19: Chapel at monument site T 12

Figure 20: Main memorial obelisk at monument site T 12

This provincial monument is protected under Section 3 and 34 of the NHRA, will need to be avoided and preserved.

Mitigation:

- Adjust Corridors and position of pylons to avoid the site;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 100 meters from the site;
- **A buffer of at least 200 meters must be kept from the monument. This distance can however be negotiated with the Provincial Heritage Authority – Heritage Free State**

5.3 Summary of field work findings

The survey yielded 35 heritage related sites:

- Thirteen (13) cemeteries of which twelve (12) is situated in the study area;
- Twenty historical sites; and
- One provincial monument (**T 12)**.

Taking the findings of the field work in to consideration Table 10, gives a summary of the number of sites located in each of the Corridors and the projected possible impacts on heritage resources.

Table 10: Heritage Resources per Corridor

Alignment	**Tweespruit-Driedorp**		**Driedorp-Wepener**		**Driedorp - Welbedacht**		**Welbedacht Dam - Welroux**	
Alternative	***Alt1***	***Alt2***	***Alt1***	***Alt2***	***Alt1***	***Alt2***	***Alt1***	***Alt2***
Cemeteries	4	2	4	4		2		1
Structures	2	6	1	2	3	1		1
Provincial Heritage site			1	1				
Total count	***6***	***8***	***7***	***7***	***3***	***3***	***0***	***2***

Refer to **Appendix B** for positions of the heritage sites and find spots relative to the Corridors.

6 IMPACT ASSESSMENT

6.1 Impact Matrix

Table 11: Rating Matrix for impacts in the Construction phase

Chance finds

IMPACT TABLE FORMAT		
Environmental Parameter	*Discovery of previously unidentified heritage sites (archaeological, historical or grave sites)*	
Issue/Impact/Environmental Effect/Nature	*During construction activity and earthmoving archaeological material could be unearthed that was previously unidentified due to its position.*	
Extent	*In most cases confined to small areas on the site*	
Probability	*Due to the close proximity to water course, localised archaeological finds may possibly occur*	
Reversibility	*In most cases where such finds are made damaged is irreversible*	
Irreplaceable loss of resources	*Significant loss but in most cases the scientific data recovered will mitigate such losses*	
Duration	*Permanent*	
Cumulative effect	*Low cumulative impact*	
Intensity/magnitude	*Medium*	
Significance Rating	*The impact is anticipated as being low and localised but will vary due to type of heritage find that could be made*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	4	2
Irreplaceable loss	4	3
Duration	4	4
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	-34(Medium negative)	-12 (low negative)
Mitigation measures	*A heritage monitoring program that will identify finds during construction will be able to mitigate the impact on the finds through scientific documentation of finds and provide valuable data on any finds made.*	

Known Heritage Sites

IMPACT TABLE FORMAT		
Environmental Parameter	*Identified heritage sites and areas*	
Issue/Impact/Environmental Effect/Nature	*Due to the nature of the development it is possible that some sites will be impacted and impossible to avoid in the layout plan of the project*	
Extent	*In most cases confined to small areas on the site*	
Probability	*Possible impact on the identified sites*	
Reversibility	*In most cases where a site cannot be excluded and needs to be destructed the impact is irreversible*	
Irreplaceable loss of resources	*Significant loss but in most cases the scientific data mitigate such losses*	
Duration	*Permanent*	
Cumulative effect	*Low cumulative impact*	
Intensity/magnitude	*Medium*	
Significance Rating	*The impact is anticipated as being low and localised but will vary due to type of heritage find that could be made*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	4	2
Irreplaceable loss	4	3
Duration	4	4
Cumulative effect	3	2
Intensity/magnitude	2	1
Significance rating	-36 (Medium negative)	-13 (low negative)
Mitigation measures	*Mitigation measures as recommended with each identified site and,* *A heritage monitoring program that will identify finds during construction will be able to mitigate the impact on the finds through scientific documentation of finds and provide valuable data on any finds made.*	

Cemeteries

IMPACT TABLE FORMAT		
Environmental Parameter	Destruction of Cemeteries	
Issue/Impact/Environmental Effect/Nature	Destruction of cemeteries during construction	
Extent	Limited to the site where the cemetery occurs on Option 1_A	
Probability	Possible if no mitigation measures have been applied	
Reversibility	Only reversible through avoidance of cemetery or relocation as last option	
Irreplaceable loss of resources	Cultural resources are irreplaceable	
Duration	If the cemetery is not avoided and destroyed without mitigation measures the loss will be permanent	
Cumulative effect	Low impact is expected	
Intensity/magnitude	A brief description of whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily	
Significance Rating	*The impact is anticipated as being high and localised but can be mitigated to low if the Corridor is designed to exclude the graves from any infrastructure development*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	3	1
Reversibility	4	1
Irreplaceable loss	4	1
Duration	4	4
Cumulative effect	2	2
Intensity/magnitude	4	2
Significance rating	-72 (high negative)	-20 (low negative)
Mitigation measures	*Adjust the Corridor layout and demarcate site with at least a 10-meter buffer.* *In the event that the sites cannot be excluded from the Corridor, a pylon placement and a grave relocation process as described in Section 5 of this reports needs to be implemented.*	

Table 12: Rating Matrix for impacts on decommissioning phase

IMPACT TABLE FORMAT		
Environmental Parameter	*Discovery of previously unidentified heritage sites (archaeological, historical or grave sites)*	
Issue/Impact/Environmental Effect/Nature	*During decommissioning activity and earthmoving archaeological material could be unearthed that was previously unidentified due to its position.*	
Extent	*In most cases confined to small areas on the site*	
Probability	*Due to the close proximity to water course, localised archaeological finds may possibly occur*	
Reversibility	*In most cases where such finds are made damaged is irreversible*	
Irreplaceable loss of resources	*Significant loss but in most cases the scientific data recovered will mitigate such losses*	
Duration	*Permanent*	
Cumulative effect	*Low cumulative impact*	
Intensity/magnitude	*Magnitude dependent on type of finds made – however in most cases Medium*	
Significance Rating	*The impact is anticipated as being low and localised but will vary due to type of heritage find that could be made*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	4	2
Irreplaceable loss	4	3
Duration	4	4
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	-34 (Medium negative)	-12 (low negative)
Mitigation measures	*A heritage monitoring program that will identify finds during decommissioning will be able to mitigate the impact on the finds through scientific documentation of finds and provide valuable data on any finds made.*	

6.2 Confidence in Impact Assessment

It is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some heritage sites.

The impact assessment conducted for heritage sites assumes the possibility of finding heritage resources during the project life and has been conducted as such.

6.3 Cumulative Impacts

None foreseen

6.4 Reversibility of Impacts

Although heritage resources are seen as non-renewable the mitigation of impacts on possible finds through scientific documentation will provided sufficient mitigation on the impacts on possible heritage resources.

6.5 Comparative Assessment of Alternatives

The comparative assessment of the alternatives has shown that an overall low to medium impact on heritage is foreseen.

Through a comparative assessment of the alternatives and evaluation against the heritage resources identified it was possible to assign a rating of Preferred, Favourable, Not Preferred or No preference as described in Table 13 below.

The evaluation has shown that in all the alignment Alternative 1 is identified as the preferred alternative. However the 2nd Alternatives could be used with the implementation of the recommended management measures.

The comparative assessment of the substation alternatives at Driedorp, Wepener and Welroux has shown that the D**riedorp substation alternatives** have no clear preferred option. The site at Driedorp has already been changed due to the existence of a substation in the proposed area.

Table 13: Comparative Assessment of Alternatives

Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Alternative	Preference	Reasons
TWEESPRUIT-DRIEDORP		
Alternative 1	Preferred	Least amount of heritage resources identified
Alternative 2	Favourable	Although more heritage resources has been identified, with mitigation and alignment this alternative could be utilised
DRIEDORP-WEPENER		
Alternative 1	Preferred	Least amount of cemeteries that could be impacted
Alternative 2	Favourable	Although more heritage resources has been identified, with mitigation and alignment this alternative could be utilised
DRIEDORP - WELBEDACHT		
Alternative 1	Preferred	Least amount of heritage resources identified
Alternative 2	Favourable	Although more heritage resources has been identified, with mitigation and alignment this alternative could be utilised
WELBEDACHT DAM - WELROUX		
Alternative 1	Preferred	Least amount of heritage resources identified
Alternative 2	Favourable	Although more heritage resources has been identified, with mitigation and alignment this alternative could be utilised
DRIEDORP SUBSTATION		
Alternative 1	No preference	Both buffer zones contain the same functioning farmstead.

Alternative	Preference	Reasons
Alternative 2	No preference	Both buffer zones contain the same functioning farmstead.
WEPENER SUBSTATION		
Alternative 1	Favourable	Both substation positions contain no heritage resources. However Alternative 1 is the closest to a cemetery (**T14**)
Alternative 2	Preferred	Both substation positions contain no heritage resources. However Alternative 2 is further away from the cemetery at **T14**.
WELROUX SUBSTATION		
Alternative 1	Not preferred	This alternative is very close to an existing farmstead and will impact on the cultural landscape around the farmstead.
Alternative 2	Preferred	Contains no heritage resources and is removed from the farmstead located close to Alternative 1

7 MITIGATION MEASURES

7.1 Management Guidelines

1. The National Heritage Resources Act (Act 25 of 1999) states that, any person who intends to undertake a development categorised as-

(a) the construction of a road, wall, transmission line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site-

  (i) exceeding 5 000 m^2 in extent; or

  (ii) involving three or more existing erven or subdivisions thereof; or

  (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

  (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

In the event that an area previously not included in an archaeological or cultural resources survey is to be disturbed, the South African Heritage Resources Agency (SAHRA) needs to be contacted. An enquiry must be lodged with them into the necessity for a Heritage Impact Assessment.

2. In the event that a further heritage assessment is required it is advisable to utilise a qualified heritage practitioner preferably registered with the Cultural Resources Management Section (CRM) of the Association of Southern African Professional Archaeologists (ASAPA).

   This survey and evaluation must include:

   (a) The identification and mapping of all heritage resources in the area affected;

   (b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6 (2) or prescribed under section 7 of the National Cultural Resources Act;

   (c) An assessment of the impact of the development on such heritage resources;

   (d) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;

   (e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;

   (f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and

   (g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.

3. It is advisable that an information section on cultural resources be included in the SHEQ training given to contractors involved in surface earthmoving activities. These sections must include basic information on:

   a. Heritage;

   b. Graves;

   c. Archaeological finds; and

   d. Historical Structures.

   This module must be tailor made to include all possible finds that could be expected in that area of construction.

4. In the event that a possible find is discovered during construction, all activities must be halted in the area of the discovery and a qualified archaeologist contacted.

5. The archaeologist needs to evaluate the finds on site and make recommendations towards possible mitigation measures.

6. If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA.

7. After mitigation an application must be lodged with SAHRA for a destruction permit. This application must be supported by the mitigation report generated during the rescue excavation. Only after the permit is issued may such a site be destroyed.

8. If during the initial survey sites of cultural significance is discovered, it will be necessary to develop a management plan for the preservation, documentation or destruction of such a site. Such a program must include an archaeological/palaeontological

monitoring programme, timeframe and agreed upon schedule of actions between the company and the archaeologist.

9. In the event that human remains are uncovered or previously unknown graves are discovered a qualified archaeologist needs to be contacted and an evaluation of the finds made.
10. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.

The definition of an archaeological/palaeontological monitoring programme is a formal program of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

The purpose of an archaeological/palaeontological monitoring programme is:

- To allow, within the resources available, the preservation by record of archaeological/palaeontological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works.
- To provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological/palaeontological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.
- A monitoring is not intended to reduce the requirement for excavation or preservation of known or inferred deposits, and it is intended to guide, not replace, any requirement for contingent excavation or preservation of possible deposits.
- The objective of the monitoring is to establish and make available information about the archaeological resource existing on a site.

Table 14: Roles and responsibilities of archaeological and heritage management

ROLE	RESPONSIBILITY	IMPLEMENTATION
A responsible specialist needs to be allocated and should sit in at all relevant meetings, especially when changes in design are discussed, and liaise with SAHRA.	The client	Archaeologist and a competent archaeology supportive team
If chance finds and/or graves or burial grounds are identified during construction or operational phases, a specialist must be contacted in due course for evaluation.	The client	Archaeologist and a competent archaeology supportive team
Comply with defined national and local cultural heritage regulations on management plans for identified sites.	The client	Environmental Consultancy and the Archaeologist

Consult the managers, local communities and other key stakeholders on mitigation of archaeological sites.	The client	Environmental Consultancy and the Archaeologist
Implement additional programs, as appropriate, to promote the safeguarding of our cultural heritage. (i.e. integrate the archaeological components into employee induction course).	The client	Environmental Consultancy and the Archaeologist,
If required, conservation or relocation of burial grounds and/or graves according to the applicable regulations and legislation.	The client	Archaeologist, and/or competent authority for relocation services
Ensure that recommendations made in the Heritage Report are adhered to.	The client	The client
Provision of services and activities related to the management and monitoring of significant archaeological sites.	The client	Environmental Consultancy and the Archaeologist
After the specialist/archaeologist has been appointed, comprehensive feedback reports should be submitted to relevant authorities during each phase of development.	Client and Archaeologist	Archaeologist

7.2 All phases of the project

7.2.1 Archaeology

Based on the findings of the HIA, all stakeholders and key personnel should undergo an archaeological induction course during this phase. Induction courses generally form part of the employees' overall training and the archaeological component can easily be integrated into these training sessions. Two courses should be organised – one aimed more at managers and supervisors, highlighting the value of this exercise and the appropriate communication channels that should be followed after chance finds, and the second targeting the actual workers and getting them to recognize artefacts, features and significant sites. This needs to be supervised by a qualified archaeologist. Posters reminding operators of the possibility of finding archaeological/palaeontological sites should reinforce this course.

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camps area and small-scale infrastructure development associated with the project.

It is possible that cultural material will be exposed during operations and may be recoverable, but this is the high-cost front of the operation, and so any delays should be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, but construction trenches do offer a window into the past and it thus may be

possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure is often changed or added to the subsequent history of the project. In general these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction phase, it is important to recognize any significant material being unearthed, making and to make the correct judgment on which actions should be taken. A responsible archaeologist/palaeontologist must be appointed for this commission. This person does not have to be a permanent employee, but needs to sit in at relevant meetings, for example when changes in design are discussed, and notify SAHRA of these changes. The archaeologist would inspect the site and any development recurrently, with more frequent visits to the actual workface and operational areas.

In addition, the archaeologist to the client and SAHRA to ensure effective monitoring can submit feedback reports. This archaeological monitoring and feedback strategy should be incorporated into the Environmental Management Plan (EMP) of the project. Should an archaeological/palaeontological site or cultural material be discovered during construction (or operation), such as burials or grave sites, the project needs to be able to call on a qualified expert to make a decision on what is required and if it is necessary to carry out emergency recovery. SAHRA would need to be informed and may give advice on procedure. The developers therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered. The project thus needs to have an archaeologist/palaeontologist available to do such work. This provision can be made in an archaeological/palaeontological monitoring programme.

7.2.2 Graves

In the case where a grave is identified during construction the following measures must be taken.

Mitigation of graves will require a fence around the cemetery with a buffer of at least 20 meters.

If graves are accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find. To remove the remains a rescue permit must be applied for with SAHRA and the local South African Police Services must be notified of the find.

Where it is then recommended that the graves be relocated a full grave relocation process that includes comprehensive social consultation must be followed.

The grave relocation process must include:

i. A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, that will be at least 60 days in length;

ii. Site notices indicating the intent of the relocation
iii. Newspaper Notice indicating the intent of the relocation
iv. A permit from the local authority;
v. A permit from the Provincial Department of health;
vi. A permit from the South African Heritage Resources Agency if the graves are older than 60 years or unidentified and thus presumed older than 60 years;
vii. An exhumation process that keeps the dignity of the remains intact;
viii. An exhumation process that will safeguard the legal implications towards the developing company;
ix. The whole process must be done by a reputable company that are well versed in relocations;
x. The process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the developing company.

8 CONCLUSIONS AND RECOMMENDATIONS

The background research and fieldwork has shown that the Eastern Free State area between Tweespruit, Wepener and the Caledon valley has a rich history spanning a vast timeframe from the Later Stone Age to the South African War.

The survey yielded 35 heritage related sites:

- Thirteen (13) cemeteries of which twelve (12) is situated in the study area.;
- Twenty-one (21) historical sites; and
- One (1) provincial monument (**T 12)**.

Section 5.1 lists and describes all the sites in detail.

The following recommendation focussed on specific heritage finds types must be implemented

Cemeteries

- Adjust the development layout and demarcate site with at least a 20-meter buffer. In the case of T12 this buffer must be made at least 100 meters to keep the development away from the provincial monument.
- In the event that the sites cannot be excluded from the development footprint a grave relocation process as described in Section 5 of this reports needs to be implemented.

Historical Structures

- Adjust Corridors and position of pylons to avoid these structures;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 100 meters from the site;
- **All** structure will require a destruction permit under Section 34 of the NHRA;

- The permit will entail initial documentation of the layout and condition of the structures and its structures with layout sketches and detailed photography, after which the destruction permit can be applied for with the backing of the documentary evidence;
- A qualified heritage practitioner must do this documentation.

Monument

- Adjust Corridors and position of pylons to avoid the site;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 100 meters from the site;
- **A buffer of at least 200 meters must be kept from the monument. This distance can however be negotiated with the Provincial Heritage Authority – Heritage Free State**

Palaeontology

An analysis of the SAHRIS palaeontological sensitivity map indicates that 90% of the study area is under lain by palaeontological sensitive geology. Interpreting this data according to the SAHRIS guidelines require that a field assessment and protocol for finds will be required.

It is recommended that a full Palaeontological Impact Assessment (PIA) be initiated during the pre-construction phase when the heritage walkdown of the final alignment will be done.

Taking the findings of the field work in to consideration Table 15, gives a summary of the number of sites located in each of the Corridors and the projected possible impacts on heritage resources.

Table 15: Heritage Resources per Corridor

Alignment	**Tweespruit-Driedorp**		**Driedorp-Wepener**		**Driedorp - Welbedacht**		**Welbedacht Dam - Welroux**	
Alternative	***Alt1***	***Alt2***	***Alt1***	***Alt2***	***Alt1***	***Alt2***	***Alt1***	***Alt2***
Cemeteries	4	2	4	4		2		1
Structures	2	6	1	2	3	1	1	2
Provincial Heritage site			1	1				
Total count	***6***	***8***	***6***	***7***	***3***	***3***	***1***	***3***

Refer to **Appendix B** for positions of the heritage sites and find spots relative to the Corridors.

Through a comparative assessment of the alternatives and evaluation against the heritage resources identified it was possible to assign a rating of Preferred, Favourable, Not Preferred or No preference as described in Table 2 above.

The evaluation has shown that in all the alignment Alternative 1 is identified as the preferred alternative. However the 2nd Alternatives could be used with the implementation of the recommended management measures.

The comparative assessment of the substation alternatives at Driedorp, Wepener and Welroux has shown that the D**riedorp substation alternatives** have no clear preferred option. The site at Driedorp has already been changed due to the existence of a substation in the proposed area.

The overall impact on identified heritage resources is rated as moderate to low. By designing the layout within the final corridor to avoid as far as possible the heritage resources identified; and then finally doing a heritage walkdown of the final alignment focussing on the pylon position and footprints of construction, the impact on heritage resources can be minimised to acceptable levels.

Further to these recommendations the general Heritage Management Guideline in Sections 7 needs to be incorporated in to the EMP for the project.

The overall impact of the development on heritage resources is seen as acceptably low and can impacts can be mitigated to acceptable levels.

The following general mitigation measures are recommended:

a. All the stakeholders must agree upon a monitoring plan for the different phases of the project focussing on the areas where earthmoving will occur.
b. If during construction any possible finds are made, the operations must be stopped and the qualified archaeologist be contacted for an assessment of the find.
c. Should substantial fossil remains (e.g. well-preserved fossil fish, reptiles or petrified wood) be exposed during construction, however, the ECO should carefully safeguard these, preferably in situ, and alert SAHRA as soon as possible so that appropriate action (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.
d. A management plan must be developed for managing the heritage resources in the surface area impacted by operations during construction and operation of the development. This includes basic training for construction staff on possible finds, action steps for mitigation measures, surface collections, excavations, and communication routes to follow in the case of a discovery.

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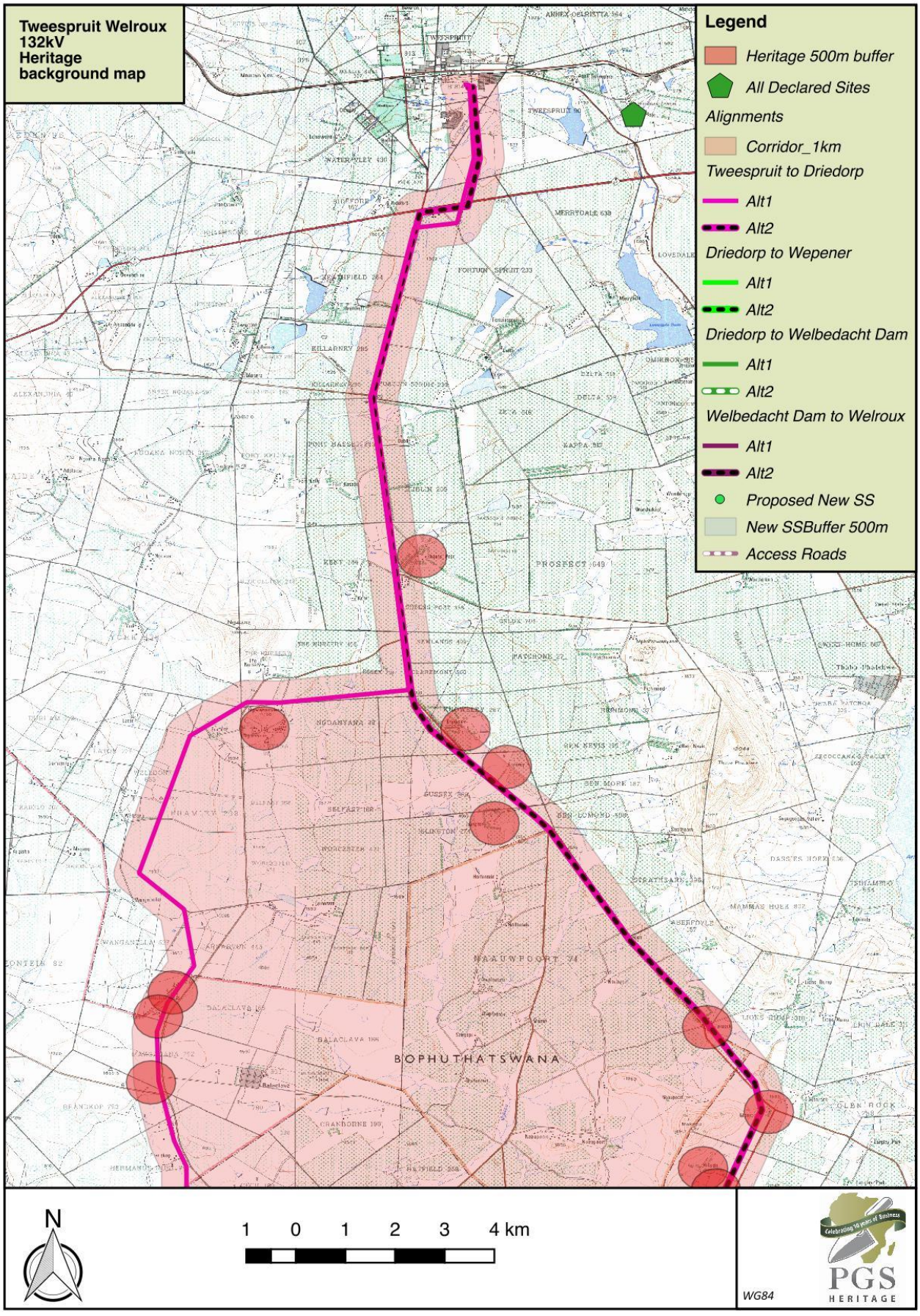
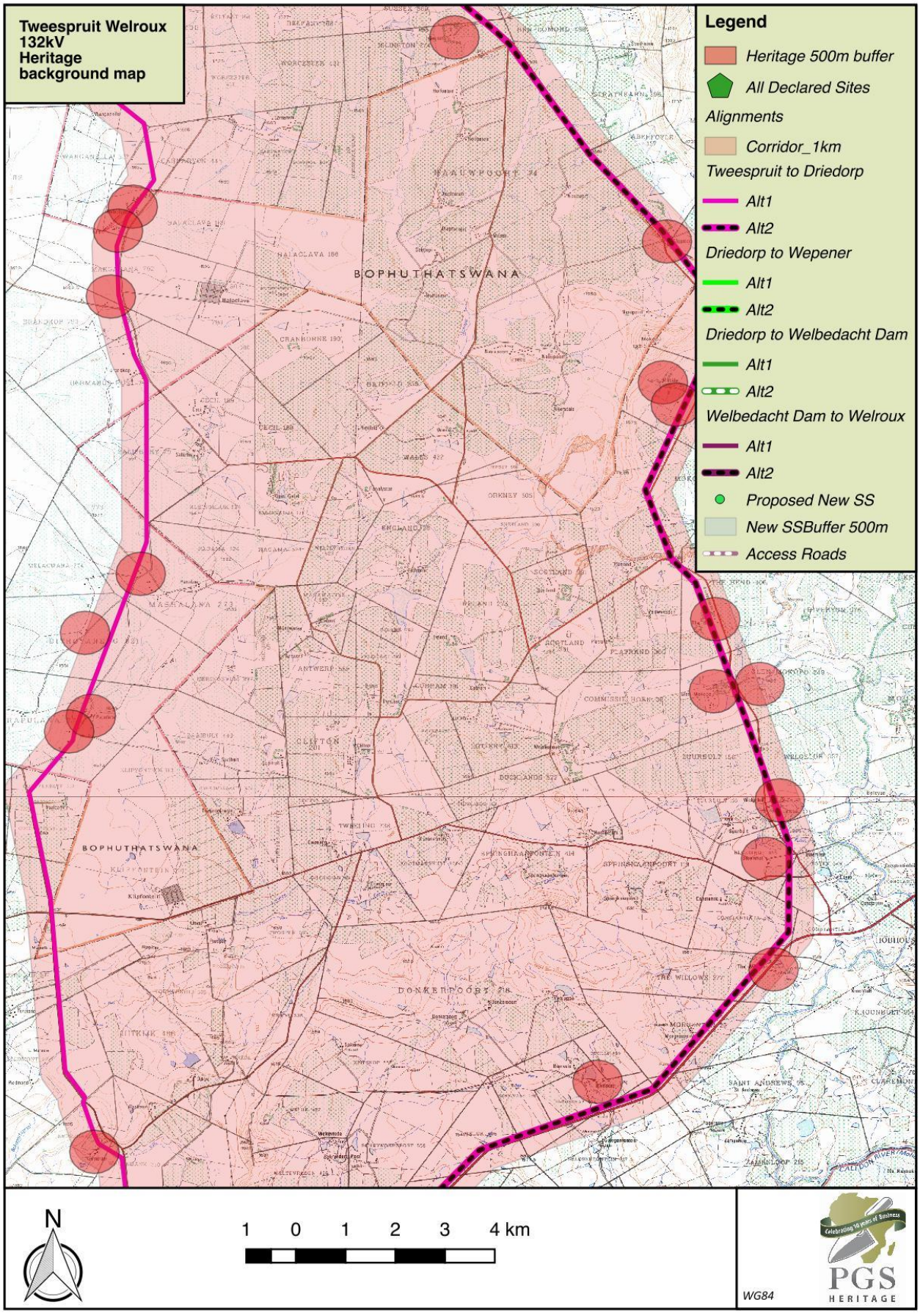
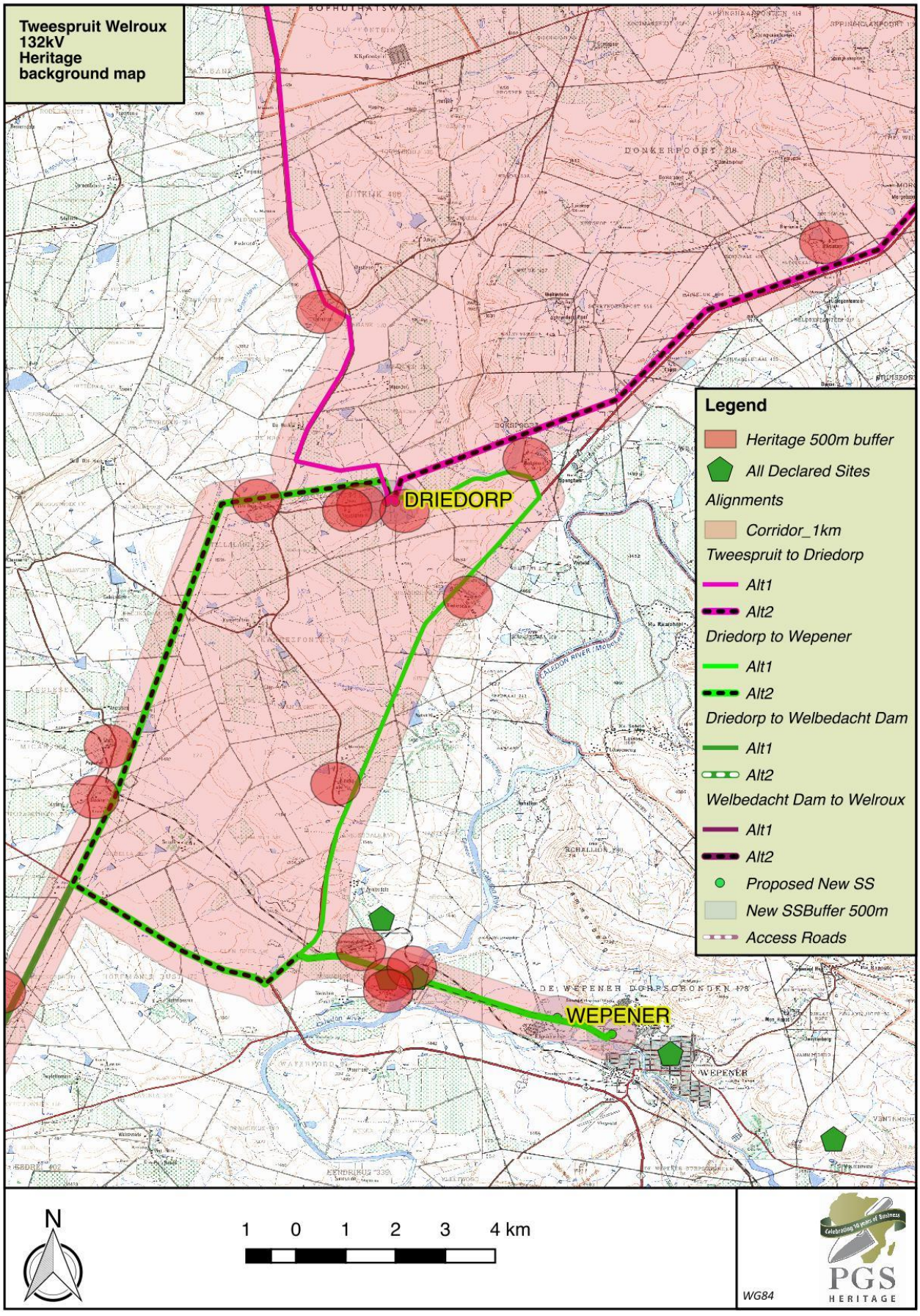
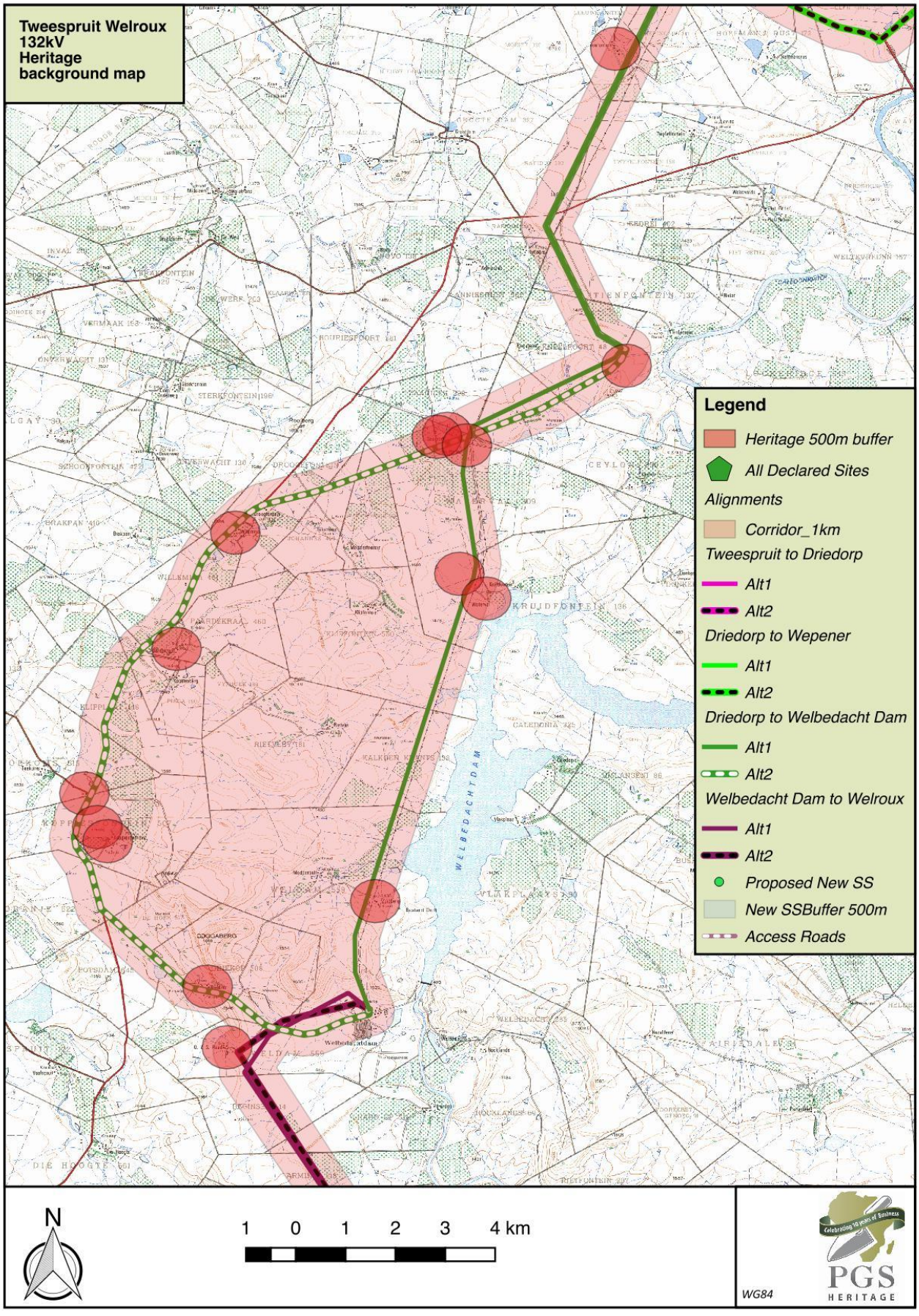
Appendix A

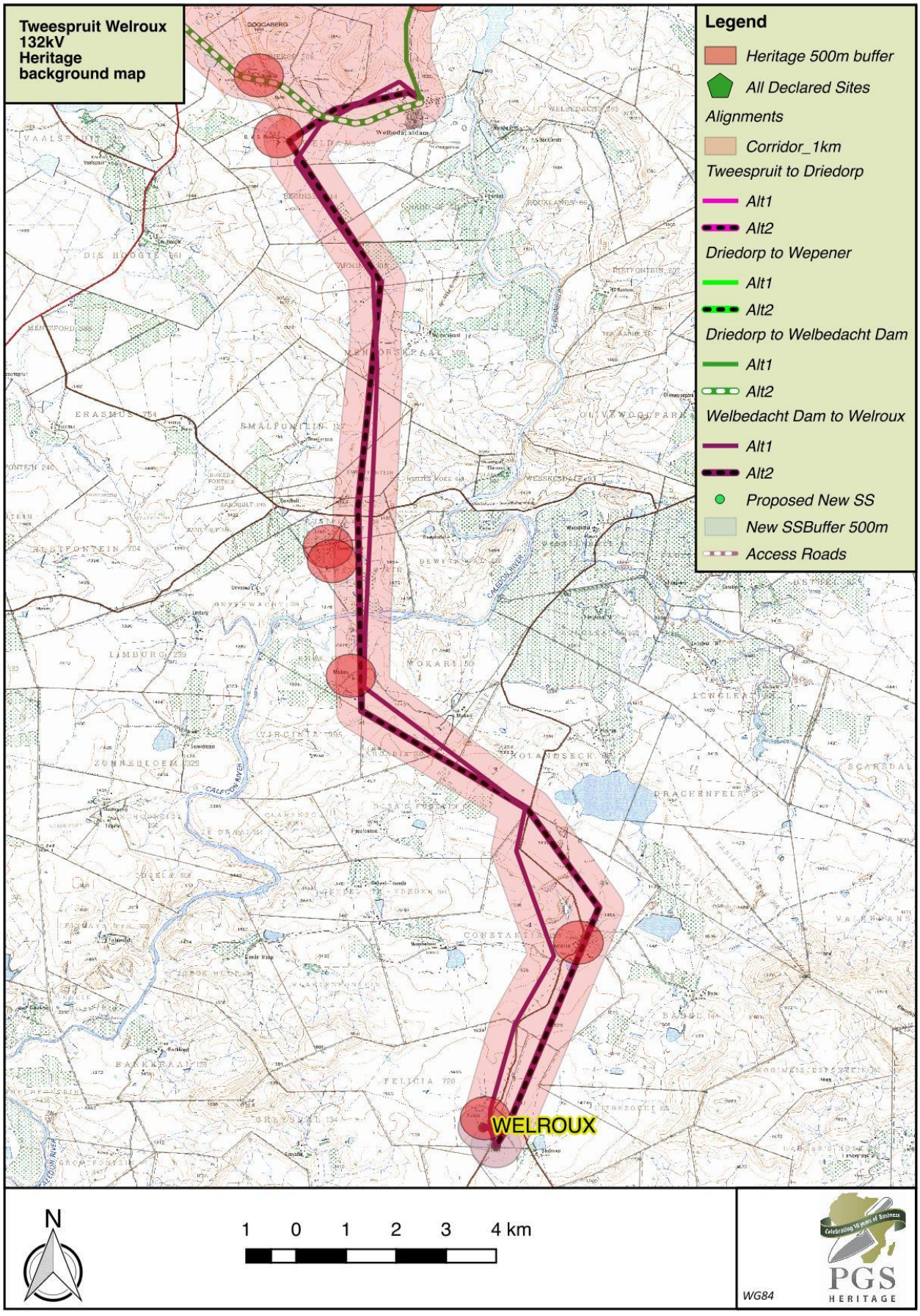
MAP OF HERITAGE SENSITIVE AREAS


Tweespruit Welroux
132kV
Heritage
background map
Legend
Heritage 500m buffer
All Declared Sites
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
BOPHUTHATSWANA
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE


Tweespruit Welroux
132kV
Heritage
background map
Legend
Heritage 500m buffer
All Declared Sites
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
BOPHUTHATSWANA
BOPHUTHATSWANA
DONKERHOEK
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE

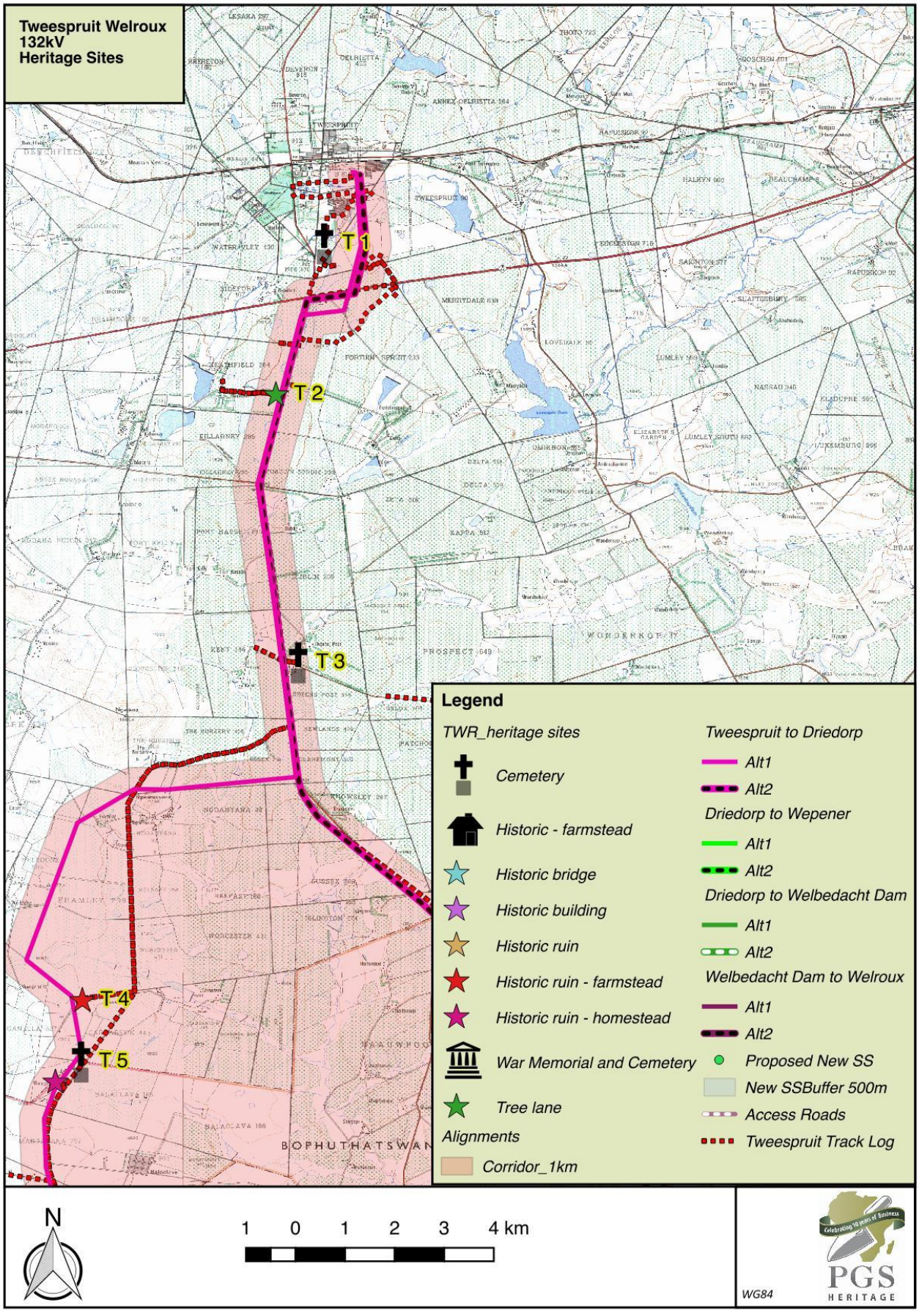

Tweespruit Welroux
132kV
Heritage
background map
DRIEDORP
WEPENER
Legend
Heritage 500m buffer
All Declared Sites
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE

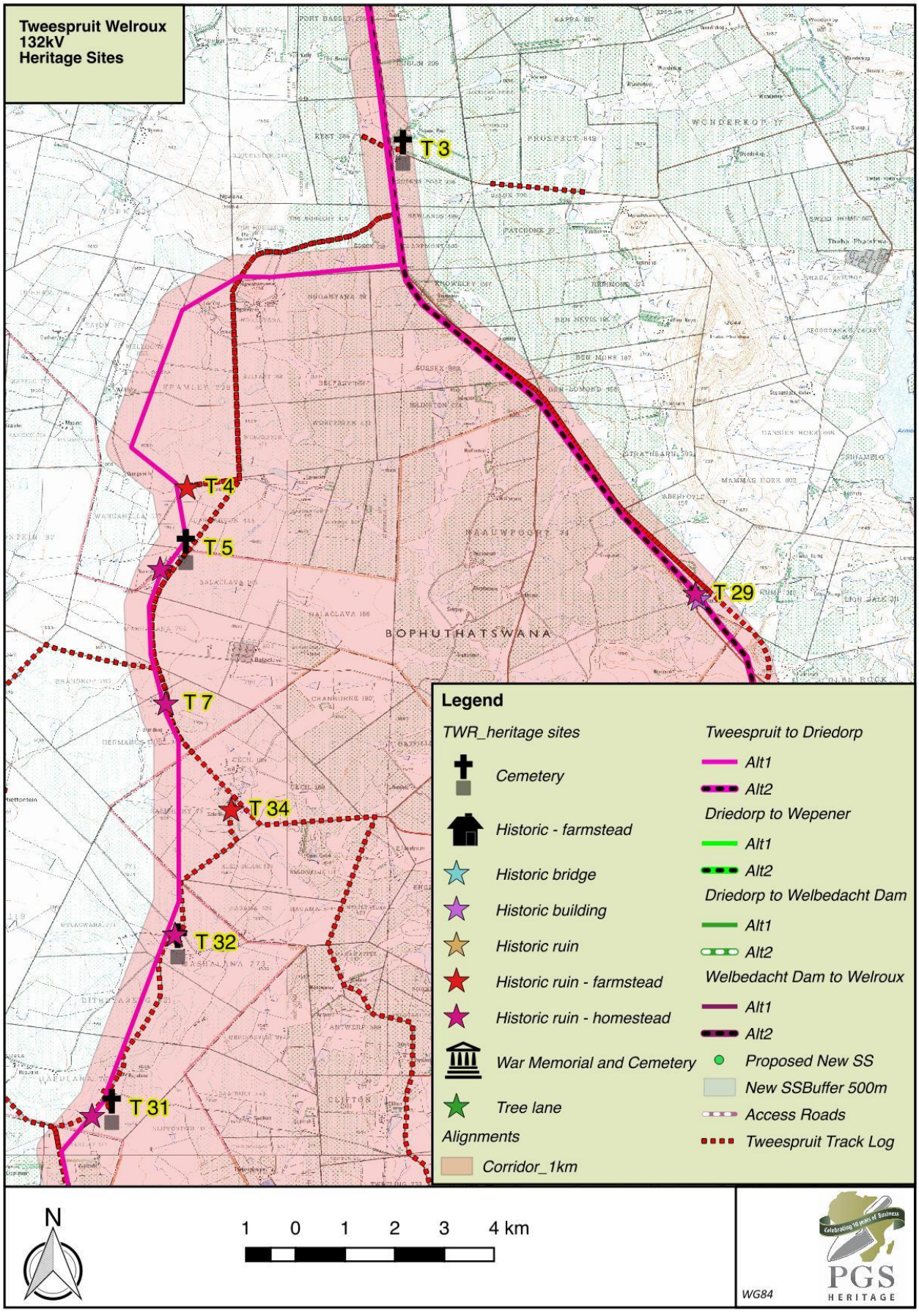

Tweespruit Welroux
132kV
Heritage
background map
Legend
Heritage 500m buffer
All Declared Sites
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
WELBEDACHTDAM
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE

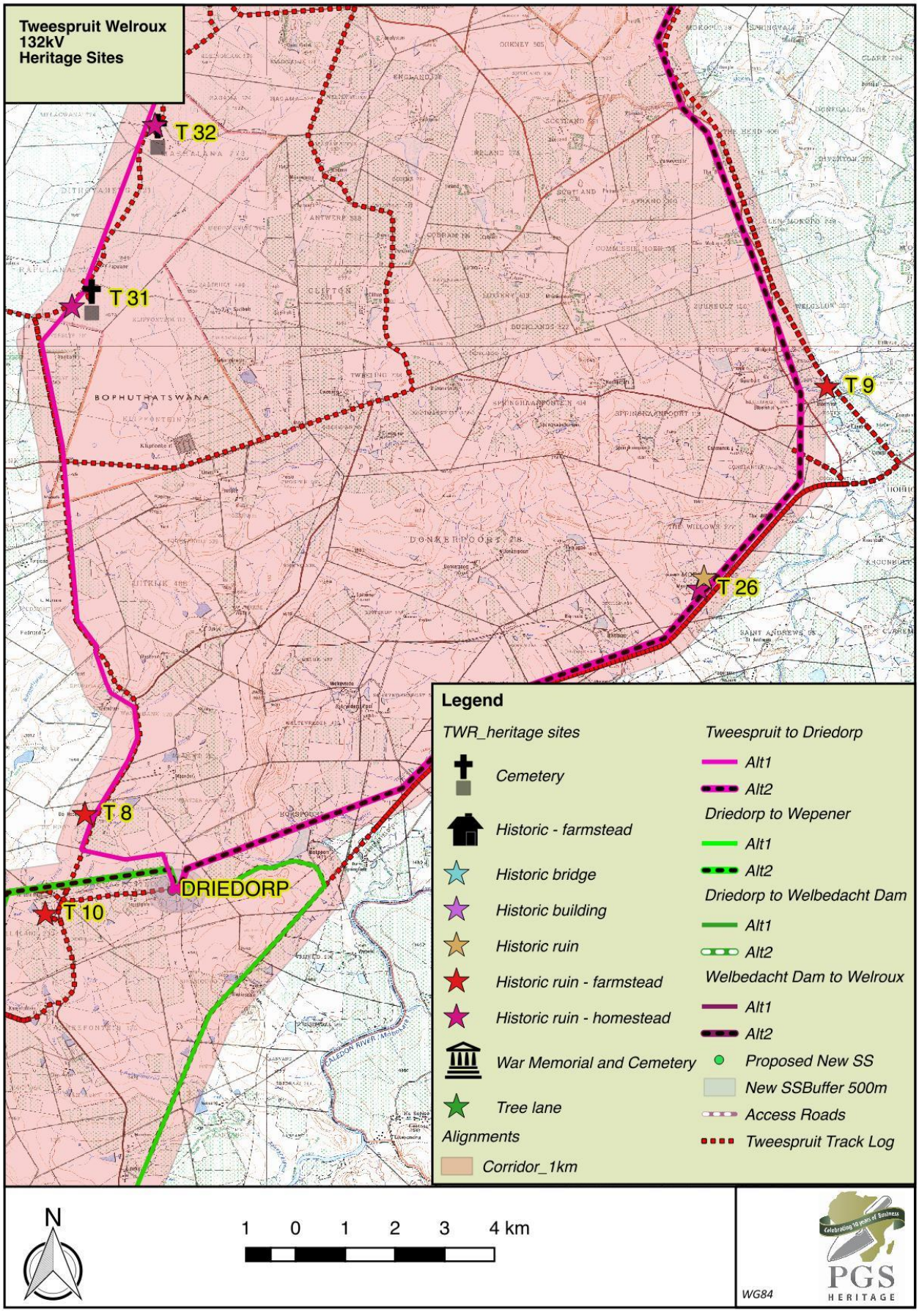

Tweespruit Welroux
132kV
Heritage
background map
Legend
Heritage 500m buffer
All Declared Sites
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
WELROUX
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE

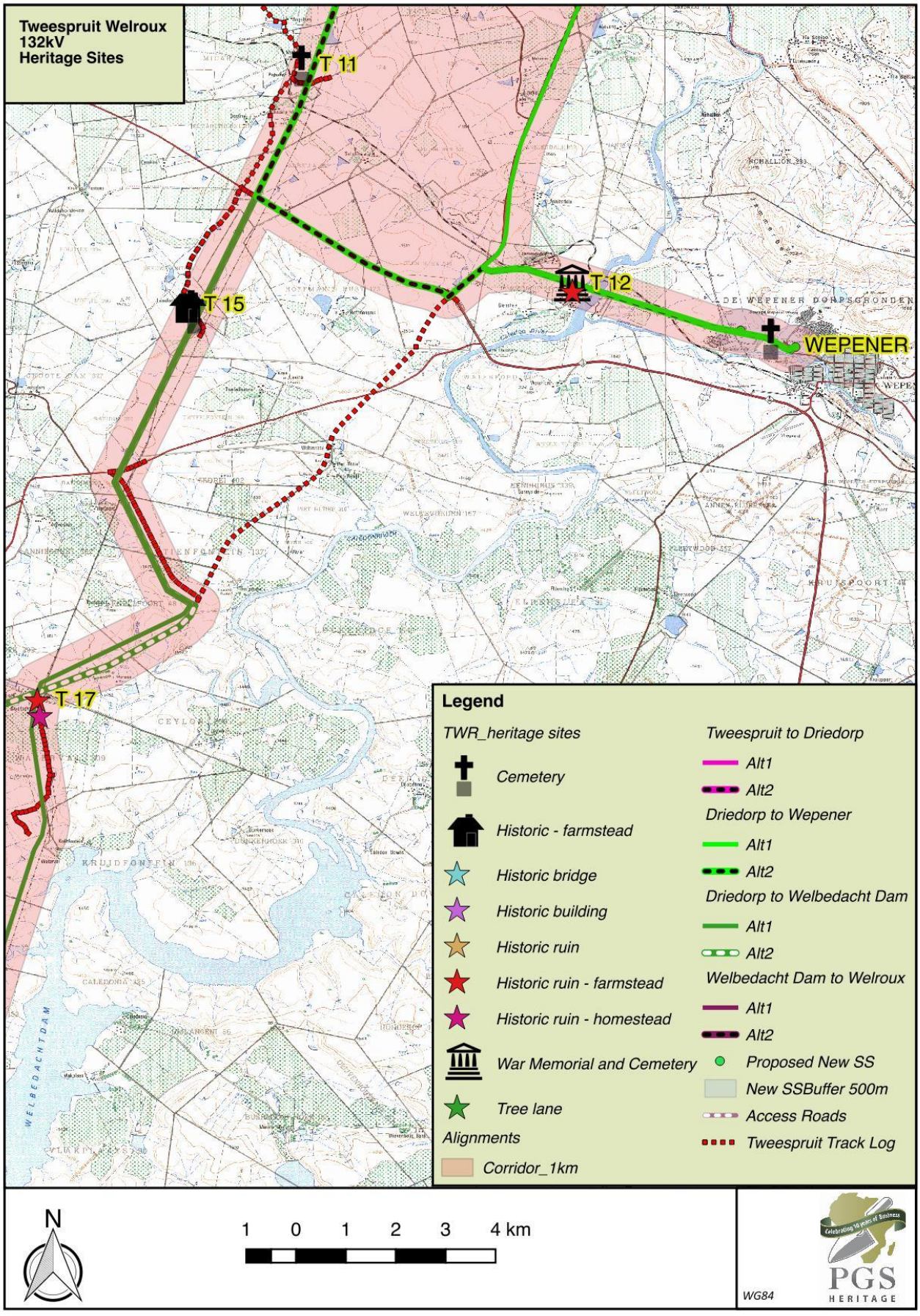
Appendix B

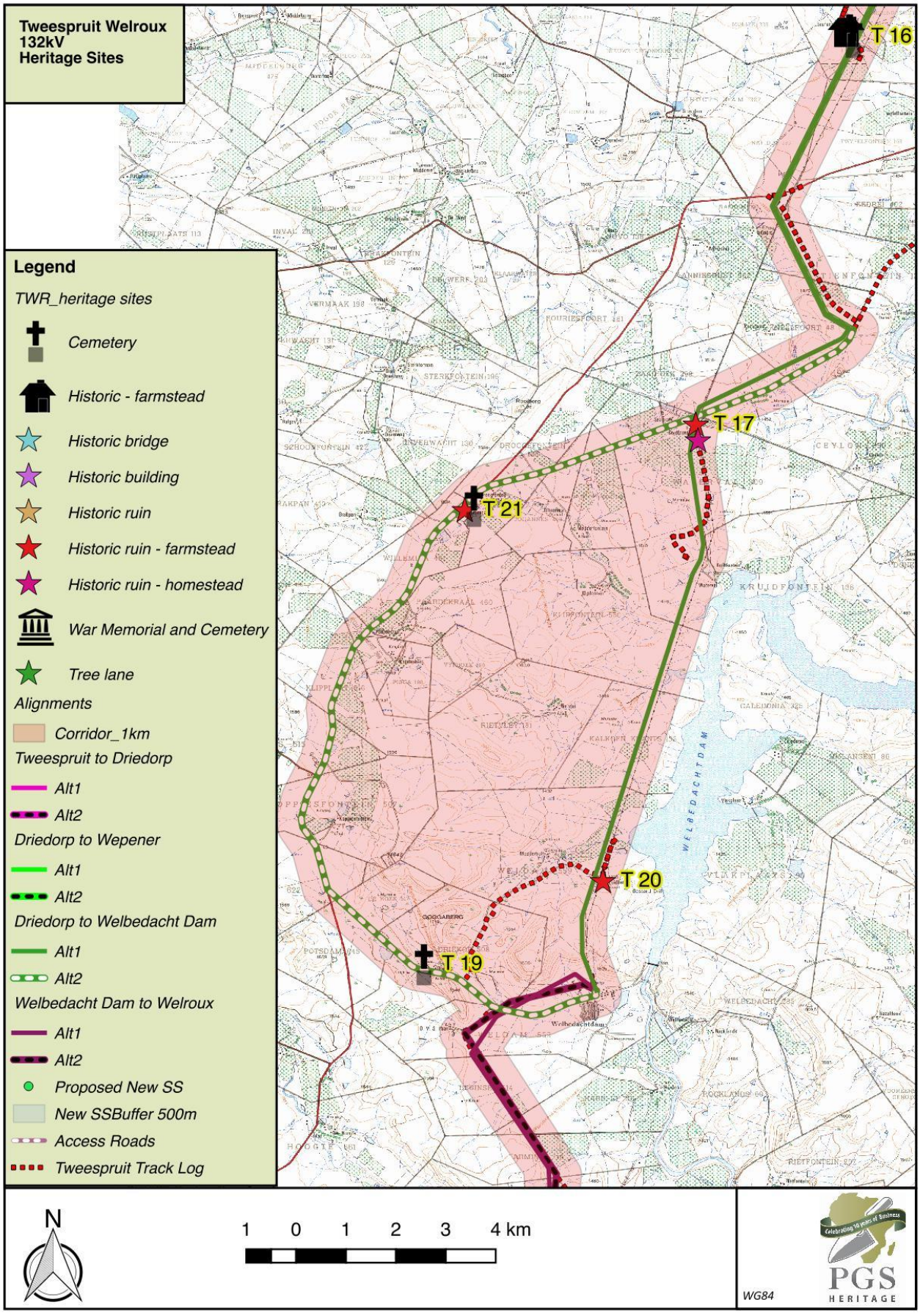
MAP OF HERITAGE SITES

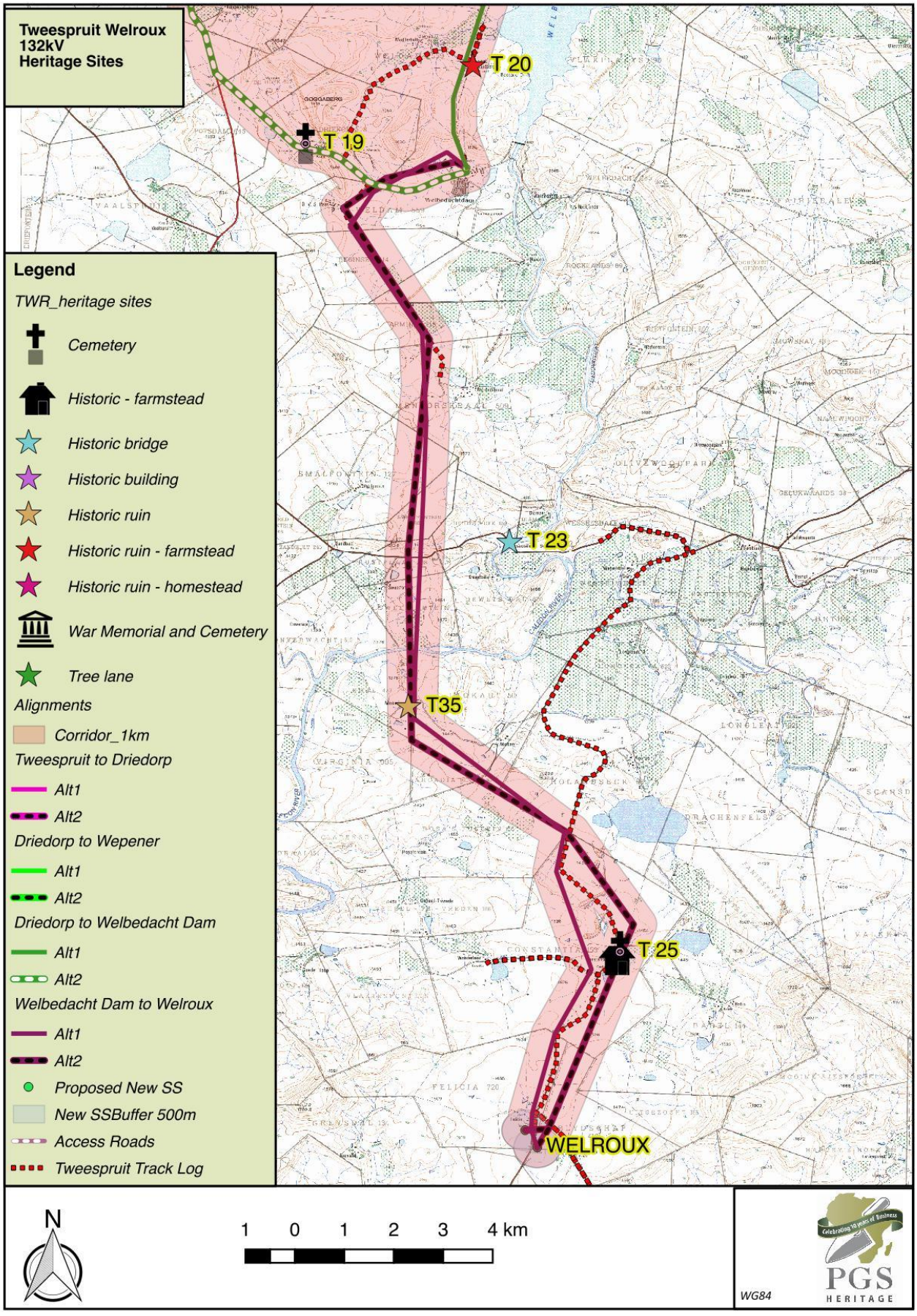

Tweespruit Welroux
132kV
Heritage Sites
T 1
T 2
T 3
T 4
T 5
Legend
TWR_heritage sites
Cemetery
Historic - farmstead
Historic bridge
Historic building
Historic ruin
Historic ruin - farmstead
Historic ruin - homestead
War Memorial and Cemetery
Tree lane
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
Tweespruit Track Log
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE


Tweespruit Welroux
132kV
Heritage Sites
T 3
T 4
T 5
T 29
T 7
T 34
T 32
T 31
BOPHUTHATSWANA
Legend
TWR_heritage sites
Cemetery
Historic - farmstead
Historic bridge
Historic building
Historic ruin
Historic ruin - farmstead
Historic ruin - homestead
War Memorial and Cemetery
Tree lane
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
Tweespruit Track Log
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE


Tweespruit Welroux
132kV
Heritage Sites
T 32
T 31
T 9
T 26
T 8
DRIEDORP
T 10
BOPHUTHATSWANA
Legend
TWR_heritage sites
Cemetery
Historic - farmstead
Historic bridge
Historic building
Historic ruin
Historic ruin - farmstead
Historic ruin - homestead
War Memorial and Cemetery
Tree lane
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
Tweespruit Track Log
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE


Tweespruit Welroux
132kV
Heritage Sites
T 11
T 12
T 15
T 17
WEPENER
Legend
TWR_heritage sites
Cemetery
Historic - farmstead
Historic bridge
Historic building
Historic ruin
Historic ruin - farmstead
Historic ruin - homestead
War Memorial and Cemetery
Tree lane
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
Tweespruit Track Log
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE


Tweespruit Welroux
132kV
Heritage Sites
Legend
TWR_heritage sites
Cemetery
Historic - farmstead
Historic bridge
Historic building
Historic ruin
Historic ruin - farmstead
Historic ruin - homestead
War Memorial and Cemetery
Tree lane
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
Tweespruit Track Log
T 16
T 17
T 21
T 20
T 19
WELBEDACHTDAM
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE


Tweespruit Welroux
132kV
Heritage Sites
T 20
T 19
T 23
T35
T 25
WELROUX
Legend
TWR_heritage sites
Cemetery
Historic - farmstead
Historic bridge
Historic building
Historic ruin
Historic ruin - farmstead
Historic ruin - homestead
War Memorial and Cemetery
Tree lane
Alignments
Corridor_1km
Tweespruit to Driedorp
Alt1
Alt2
Driedorp to Wepener
Alt1
Alt2
Driedorp to Welbedacht Dam
Alt1
Alt2
Welbedacht Dam to Welroux
Alt1
Alt2
Proposed New SS
New SSBuffer 500m
Access Roads
Tweespruit Track Log
N
1 0 1 2 3 4 km
WG84
PGS
HERITAGE