
Phase 1 Heritage Impact Assessment Report

HERITAGE IMPACT ASSESSMENT FOR THE
PROPOSED BOTSWANA SOUTH AFRICA (BOSA)
TRANSMISSION PROJECT (PROJECT NO. 112581).

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SIGNED OFF BY: STEPHAN GAIGHER



MANAGEMENT SUMMARY

Site name and location: Proposed Botswana South Africa (BOSA) Transmission Project (Project no. 112581).

Municipal Area: Ngaka Modiri Molema District Municipality, North West Province and the South-East Province of Botswana.

Developer: Eskom, South Africa and Botswana Power Corporation.

Consultant: G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa.
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Date of Report: 24 August 2017

The purpose of the management summary is to distil the information contained in the report into a format that can be used to give specific results quickly and facilitate management decisions. It is not the purpose of the management summary to repeat in shortened format all the information contained in the report, but rather to give a statement of results for decision making purposes.

This study focuses on the proposed Botswana South Africa (BOSA) Transmission Project (Ref.: 112581). The Southern African Power Pool Coordination Centre (SAPP CC) has initiated the Botswana – South Africa (BOSA) Transmission Interconnection Project on behalf of two sponsors: Eskom of South Africa and Botswana Power Corporation of Botswana.

This study encompasses the heritage impact investigation. A preliminary layout has been supplied to lead this phase of this study.

Scope of Work

A Heritage Impact Assessment (including Archaeological, Cultural heritage, Built Heritage and Paleontological Assessment) to determine the impacts on heritage resources within the study area.

The following are the required to perform the assessment:

- A desk-top investigation of the area;
- A site visit to the proposed development site;
- Identify possible archaeological, cultural, historic, built and paleontological sites within the proposed development area;
- Evaluate the potential impacts of construction and operation of the proposed development on archaeological, cultural, historical resources; built and paleontological resources; and
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural, historical, built and paleontological importance.

The purpose of this study is to determine the possible occurrence of sites with cultural

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heritage significance within the study area. The study is based on archival and document combined with fieldwork investigations.

Findings & Recommendations

The area was investigated during a field visit and through archival studies. It was determined that it would be impractical and prohibitively expensive to survey the whole corridor at a high resolution. The study therefore focused on identifying potential fatal flaws within the corridor. None were found. After final pylon placement is done the route will be subjected to a Walk-down evaluation to verify that no sites will be directly impacted upon.

Fatal Flaws

No fatal flaws were identified.

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LIST OF ABBREVIATIONS

Bp	Before Present
BOSA	Botswana South Africa
DBSA	Development Bank of Southern Africa
EIA	Early Iron Age
ESA	Early Stone Age
ESIA	Environmental and Social Impacts Assessment
Fm	Femtometre (10^{-15} m)
GPS	Geographic Positioning System
HIA	Heritage Impact Assessment
IDZ	Industrial Development Zone
LIA	Late Iron Age
LSA	Late Stone Age
MCDM	Multi Criteria Decision Making
MSA	Middle Stone Age
MYA	Million Years Ago
NHRA	National Heritage Resources Act no 22 of 1999
PWWF	Peak Wet Weather Flow
SAHRA	South African Heritage Resource Agency
SAPP CC	Southern African Power Pool Coordination Centre
S&EIR	Scoping & Environmental Impact Reporting
Um	Micrometre (10^{-6} m)
WGS 84	World Geodetic System for 1984
WwTW	Wastewater Treatment Works

HERITAGE IMPACT REPORT

HERITAGE IMPACT ASSESSMENT REPORT FOR THE PROPOSED BOSA TRANSMISSION PROJECT.

1. INTRODUCTION

LEGISLATION AND METHODOLOGY

G&A Heritage was appointed by Aurecon (Pty) Ltd to undertake a heritage impact assessment for the proposed BOSA Transmission Project in the Ngaka Modiri Molema District Municipality, North West Province and the South East Province of Botswana.

The cultural heritage and inheritance of Botswana is protected through the implementation of the *Monuments and Relics Act no 12 of 2001*.

According to the M&R Act, Paragraph 19, any new development should;

19. Pre-development impact assessment

(1) For the purposes of this section:

"pre-development archaeological impact assessment" means

(a) the study, by an archaeologist, of an area in which development or any ground disturbing activity is to be carried out, to determine the likelihood of the development or activity impacting negatively on any cultural material or evidence that may be present in the area to be disturbed; and

(b) any recommendation made by the archaeologist on how to prevent or mitigate any negative impact to the cultural material or evidence referred to under paragraph (a); and

"environmental impact assessment study" means the study of an area in which development or any ground disturbing activity is to be carried out, to

(a) determine the possible extent of damage to the natural environment;

(b) determine means to

(i) preserve as far as is possible, the natural environment;

(ii) minimize and control waste or undue loss of or damage to natural and biological resources;

(iii) prevent, and where inevitable, promptly treat pollution or contamination of the environment.

(2) Both an archaeological pre-development impact assessment study and an environmental impact assessment study, shall be caused to be done by any person wishing to undertake major development, such as construction or excavation, for the purposes of mineral exploration and prospecting, mining, laying of pipelines,

construction of roads or dams, or erection of any other structure, which will physically disturb the earth's surface.

(3) A report from the studies conducted in terms of subsection (2), shall be furnished to the Commissioner within 60 days of completion of both studies, together with a written application for the development of the area in which the studies have been conducted.

(4) No person shall, without the written permission of the Commissioner, which permission may be given only after the Commissioner has considered the report, and which permission shall include such conditions, if any, as the Commissioner deems necessary, commence such development, or undertake such development contrary to any such condition as may be imposed.

(5) A person who contravenes subsection (4) commits an offence and is liable upon conviction to a fine not exceeding P10 000 or to imprisonment for a term not exceeding 1 year, or to both.

(6) Any permission, given in terms of this section, may at any time be withdrawn if any person has, in an application to the Commissioner for his permission, knowingly made any statement which is false in any material particular or supplied therewith any report, drawing or photograph which is false in any material particular.

(7) Where a development has been undertaken without the written permission of the Commissioner, or where such permission has been withdrawn, and the excavation or construction is suspended in terms of section 12(2)

(a) no damages, including consequential damages, of any kind, shall be payable by the State in respect of the suspension; and

(b) any extra archaeological salvage costs, being costs that would not have been necessary had the salvage work been done before the development had commenced, shall be borne by the person who has undertaken such development.

Town and Country Planning Act 2013

This is a principal Act relating to planning and control of developments and land use in the country. It aims at providing orderly and progressive development of land and to establish control over the use of land through planning permission. It is applicable to all Planning Areas in the country. Section 6, provides any place declared a planning area shall within two years prepare a development plan designating the various land uses as may be appropriate. Such uses may include uses like residential, commercial, agricultural, recreational etc.

The Town and Country Planning Act (Cap 32:09), section 27(1) empowers the Minister to make provisions for the preservation of any buildings of special architectural or special architectural or historic interest. It also has recommendations for the preservation of buildings of historical or national heritage.

The National Conservation Strategy of 1990

This is a plan that advocates for the protection of national cultural and heritage in Botswana. Several heritage sites are protected through this strategy.

100 Monuments Project

This project is an initiative of His Excellency the President of Republic of Botswana Seretse Khama aimed at poverty alleviation by developing 100 monuments. The project develops heritage sites for tourism through development of access roads, site trails, design, installation of signage at heritage sites and employment of local guides to manage the sites. Some of sites discussed in this report are covered by this project.

National Policy on Culture of 2001

The Botswana Government recognizes the need to preserve the national cultural and historical heritage as evidenced by the establishment of museums, archives libraries and educational institutions. The Policy promotes pride and nationhood using various forms of languages, performing and visual arts as well as other forms of cultural expression.

Vision 2036

The national development vision, Vision 2036 was established in 2016 following nationwide consultations led by a Presidential Task Group. The need for the creation of a national vision was precipitated by the need for Botswana to intentionally define and manage its path to 'Prosperity for All', as well as how it adjusts to the rapidly changing global economy and social order. The policy advocates for a proud and united nation with diverse cultures that are upheld, tolerated and celebrated to unite the nation.

EA Act No 10, of 2011

The mandate of the EA Act of 2011 is to foster national development planning principles and emphasis on the role of natural resources. It is in this regard that all developmental interventions are required by the Act to carry out an EIA to assess the potential effects of "planned developmental activities; to determine and to provide mitigation measures for impacts of such activities as may have a significant adverse impact on the environment; to put in place a monitoring process and evaluation of the environmental impacts of implemented activities; and to provide for matters incidental to the foregoing" (EA Act, 2011). Archaeological sites are protected as part of the environment under this Act.

Public Health Act (Cap. 63:01) of 1981

In addition to the above, another relevant piece of legislation at the phase of salvage exhumation is the Public Health Act. The Act makes provision for public health concerns including areas such as housing, trading places, sanitation, and protection of foodstuffs, water supplies and the regulation of the use of cemeteries. The main functions under the Act are the promotion of personal health and environmental health in Botswana. This involves advising and assisting local authorities in regard to matters affecting public health. The Public Health Act defines the procedure for obtaining the exhumation permission. The Act state at Section 73:

It shall be lawful for the Minister whenever he deems it expedient for the execution of any public work or any public, mining or industrial purpose, to remove any body or the remains of any body from any grave whether in an authorized cemetery or elsewhere, and by order under his hand to direct such removal to be made in such manner as he shall direct.

Conveyance of Dead Bodies Act (1933)

The Conveyance of Dead Bodies Act establishes the procedure for conveyance of dead bodies from one district to the other. The Act provides that authority must be sought from the District Administration Officer who shall satisfy himself or herself that such conveyance of dead bodies does not present a health risk to the community or places through which it traverses to its internment site. Further, the Act provides that re-internment must be done within 24 hours of the arrival of remains at the reburial site. This act is normally triggered when sites have been identified with human burial remains, which sites may have to be salvaged.

Town and Country Planning Act (2013)

The Act provides for the orderly and progressive development of land in both urban and rural areas in order to preserve and improve the amenities thereof. The Act requires that development plans for all areas declared as planning areas be approved (Section 11). The Act also protects old buildings and monuments that may be threatened by development.

Section 38(1) of the South African Heritage Resources Act (25 of 1999) requires that a heritage study is undertaken for:

- (a) Construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;*
- (b) Construction of a bridge or similar structure exceeding 50 m in length; and*
- (c) Any development, or other activity which will change the character of an area of land, or water –*
 - (1) Exceeding 10 000 m² in extent;*
 - (2) Involving three or more existing erven or subdivisions thereof; or*
 - (3) Involving three or more erven, or subdivisions thereof, which have been consolidated within the past five years; or*
 - (d) The costs of which will exceed a sum set in terms of regulations; or*
 - (e) Any other category of development provided for in regulations.*

While the above describes the parameters of developments that fall under this Act., Section 38 (8) of the NHRA is applicable to this development. This section states that;

- (8) The provisions of this section do not apply to a development as described in subsection (1) if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act, 1989 (Act 73 of 1989), or the integrated environmental management guidelines issued by the Department of Environment Affairs and Tourism, or the Minerals Act, 1991 (Act 50 of 1991), or any other legislation: Provided that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of subsection (3), and any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.*

In regards to a development such as this that falls under Section 38 (8) of the NHRA, the requirements of Section 38 (3) applies to the subsequent reporting, stating that;

- (3) *The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2) (a): Provided that the following must be included:*
- (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;*
 - (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.*
 - (1) Ancestral graves,
 - (2) Royal graves and graves of traditional leaders,
 - (3) Graves of victims of conflict (iv) graves of important individuals,
 - (4) Historical graves and cemeteries older than 60 years, and
 - (5) Other human remains which are not covered under the Human Tissues Act, 1983 (Act No.65 of 1983 as amended);
 - (h) Movable objects, including ;*
 - (1) Objects recovered from the soil or waters of South Africa including archaeological and paleontological objects and material, meteorites and rare geological specimens;
 - (2) Ethnographic art and objects;
 - (3) Military objects;
 - (4) Objects of decorative art;
 - (5) Objects of fine art;
 - (6) Objects of scientific or technological interest;
 - (7) Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and
 - (8) Any other prescribed categories, but excluding any object made by a living person;
 - (i) Battlefields;*
 - (j) Traditional building techniques.*

A 'place' is defined as:

- (a) A site, area or region;

(b) A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure);
(c) A group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures); and (d) an open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place.

'Structures' means any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

'Archaeological' means:

(a) Material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
(b) Rock art, being a 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 is older than 100 years including any area within 10 m of such representation; and
(c) Wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land or in the maritime cultural zone referred to in section 5 of the Maritime Zones Act 1994 (Act 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which are older than 60 years or which in terms of national legislation are considered to be worthy of conservation;
(d) Features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

'Paleontological' means 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.

'Grave' means a place of interment and includes the contents, headstone or other marker of and any other structures on or associated with such place. The South African Heritage Resources Agency (SAHRA) will only issue a permit for the alteration of a grave if it is satisfied that every reasonable effort has been made to contact and obtain permission from the families concerned.

The removal of graves is subject to the following procedures as outlined by the SAHRA:

- Notification of the impending removals (using English, Afrikaans and local language media and notices at the grave site);
- Consultation with individuals or communities related or known to the deceased;
- Satisfactory arrangements for the curation of human remains and / or headstones in a museum, where applicable;
- Procurement of a permit from the SAHRA;
- Appropriate arrangements for the exhumation (preferably by a suitably trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery);
- Observation of rituals or ceremonies required by the families.

The limitations and assumptions associated with this heritage impact assessment are as follows;

- Field investigations were performed on foot and by vehicle where access was readily available.
- Sites were evaluated by means of description of the cultural landscape, direct observations and analysis of written sources and available databases.
- It was assumed that the site layout as provided by Aurecon is accurate.
- We assumed that the public participation process performed as part of the S&EIR process was sufficiently encompassing not to be repeated in the Heritage Assessment Phase.
- Service Delivery Action at Dinokana with protestors blocking the road leading to limited access due to a safety concern (see photos below).



Figure 1. Road blocked by protestors



Figure 2. Service Delivery Action

Table 1. Impacts on the NHRA Sections

Act	Section	Description	Possible Impact	Action
National Heritage Resources Act (NHRA)	34	Preservation of buildings older than 60 years	Yes	Walk-down
	35	Archaeological, paleontological and meteor sites	Yes	Walk-down
	36	Graves and burial sites	Yes	HIA and Walk-down
	37	Protection of public monuments	No impact	None

	38	Does activity trigger a HIA?	Yes	HIA
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Table 2. NHRA Triggers

Action Trigger	Yes/No	Description
Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length.	Yes	BOSA Transmission Project
Construction of a bridge or similar structure exceeding 50m in length.	No	N/A
Development exceeding 5000 m ²	No	N/A
Development involving more than 3 erven or sub divisions	No	N/A
Development involving more than 3 erven or sub divisions that have been consolidated in the past 5 years	No	N/A
Re-zoning of site exceeding 10 000 m ²	No	N/A
Any other development category, public open space, squares, parks or recreational grounds	No	N/A

2. BACKGROUND INFORMATION

2.1 PROJECT BACKGROUND

The proposed Botswana South Africa (BOSA) Transmission Project (Ref.: 112581). The Southern African Power Pool Coordination Centre (SAPP CC) has initiated the Botswana – South Africa (BOSA) Transmission Interconnection Project on behalf of two sponsors: Eskom of South Africa and Botswana Power Corporation of Botswana.

The objective of the project includes aspects as such:

- Alleviate congestion on the Matimba-Phokole-Insukamini line,
- Complement other regional supply initiatives by increasing the power transfers within the SAPP network,
- Increase stability in the power pool through additional interconnection between strong versus weak networks, which has been a source of SAPP grid instability,
- Improve system control, adequacy and reliability, and
- Deepen regional integration that will facilitate improved electricity trading.

The project is sponsored by Eskom of South Africa and Botswana Power Corporation of Botswana and is coordinated by the Southern African Power Pool Coordination Centre (SAPP CC). The support funds, administered by the Development Bank of Southern Africa (DBSA), have been sourced from the Infrastructure Investment Program for South Africa and Project Preparation of Development Fund.

2.2 PROJECT DESCRIPTION

The interconnector infrastructure components consist of approximately 560km, 400kV transmission line connecting the Isang 400kV substation to a proposed new Watershed B 400/132kV substation, and further connecting the proposed Watershed B substation

to the Mokoodi and Pluto 400kV substations. Note that the Watershed B substation is proposed to be positioned approximately 40km's north west of the current Watershed substation.

The figure below provides a high-level geo-spatial presentation of the planned BOSA transmission interconnection.



Figure 3. Original BOSA Study Area

The transaction advisor will be responsible for the preliminary design and the Environmental and Social Impacts Assessment (ESIA) for the Isang to Watershed 400kV transmission lines as well as the review of the preliminary design and ESIA done by Eskom for the portions between Watershed B and Pluto as well as Watershed B and Mokoodi substations.

The route identification between the Isang substation and the proposed Watershed B substations forms part of the project scope for the Transaction Advisor. Once a preferred route has been selected, this will be taken into Part 2 (Feasibility to PIM) of the project (which includes ESIA) and preliminary design.

The project team has followed a structured, systematic and comprehensive transmission line corridor best practice selection process through which several corridors have been identified. From these base corridors, several variations were identified resulting in 19 transmission corridors. After further analysis of these, 5 corridors were selected as the most viable potential corridors to be further evaluated

during a Multi Criteria Decision Making (MCDM) workshop.

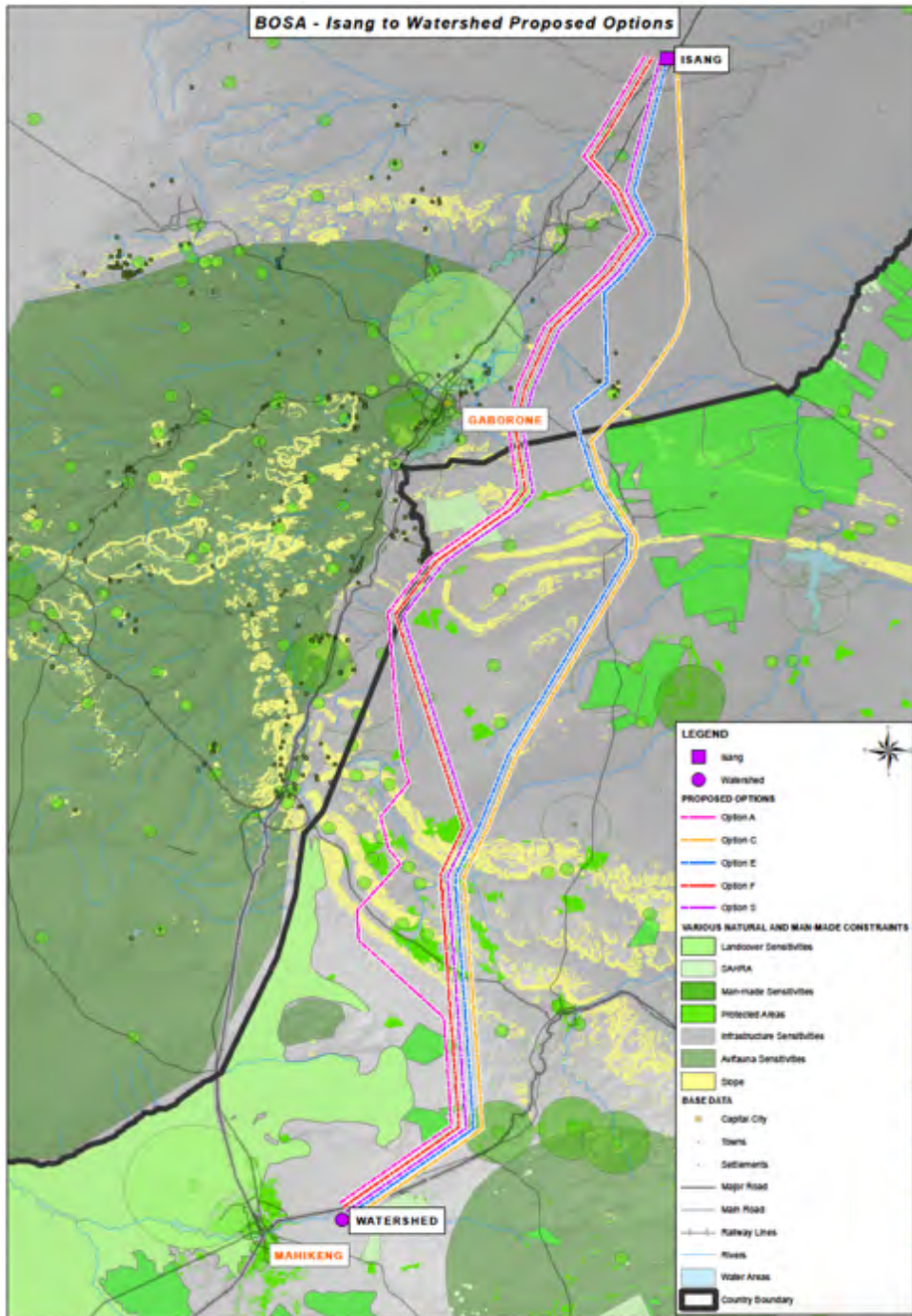


Figure 4. Proposed Alignment Options

Corridor Selection Methodology

Prior to the MCDM workshop a rigorous process was followed to identify a range of potential route alignment corridors. The base information used to inform these potential route alignments included:

- Roads / Towns / Settlements / Airports

- Rivers / Water areas / Vegetation
- Land cover / Places of Interest
- Protected areas
- Contours, a Digital Elevation Model, and Slope, as well as
- Constraints identified by Ecological, Heritage and Avifaunal Specialists.

Based on the above, 19 potential linkages between the existing Isang substation in Botswana and the proposed Water B substation in South Africa were identified. Of these 19, 12 were considered fatally flawed based on one or more of the following considerations:

- Alignment through formally protected areas, and
- The need to cross the existing 220kV transmission lines west of the Isang substation.

Additional routes were considered compromised and thus excluded from the potential routes if they covered large area with one or more of the following:

- Densely populated areas (high levels of resettlement),
- Intensively farmed areas – either subsistence or formal farming (high levels of compensation),
- Long line length (high cost of construction),
- Areas identified as sensitive for vultures, and
- Routes near Gaborone.

A total of 5 corridors have been identified as potential routes for the more detailed assessment. These route alignment corridors include buffer areas to allow for the exact siting to be informed by detailed assessment of the study route.

2.3 MCDM CRITERIA

The potential routes were assessed on the criteria identified below. The preferred route and two alternatives were assessed in detail in the ESIA.

The criteria that were used in the MCDM were as follows:

Category	Criteria	Description
Technical (Inc. Financial)	Te1. Slope	Avoid steep slopes more than 1:10
	Te2. Access	Constructability and maintainability in terms of construction and access to site
	Te3. Length	Line length and associated cost
	Te4. Width	Ability to construct 2 single circuit transmission lines spaced between 7 to 10 km apart
Environmental	En1. Biodiversity	Aquatic and terrestrial ecology; Ecological services
	En3. Avifauna	Flight paths; Nesting areas, Focal points
Social	So1. Heritage	Archaeological and cultural heritage resources
	So2. Compensation	Homes or other assets that will require resettlement or other compensation
	So3. Social	Proximity to existing large villages or towns that will remain; Distance to communities
	So4. Visual	Visibility on ridges
Strategic	St1. Proximity	Proximity to potential new Generation and Large Power Users

Results of the MCDM

The MCDM workshop resulted in Option C being chosen as the least sensitive and most practical alignment for the proposed BOSA line.

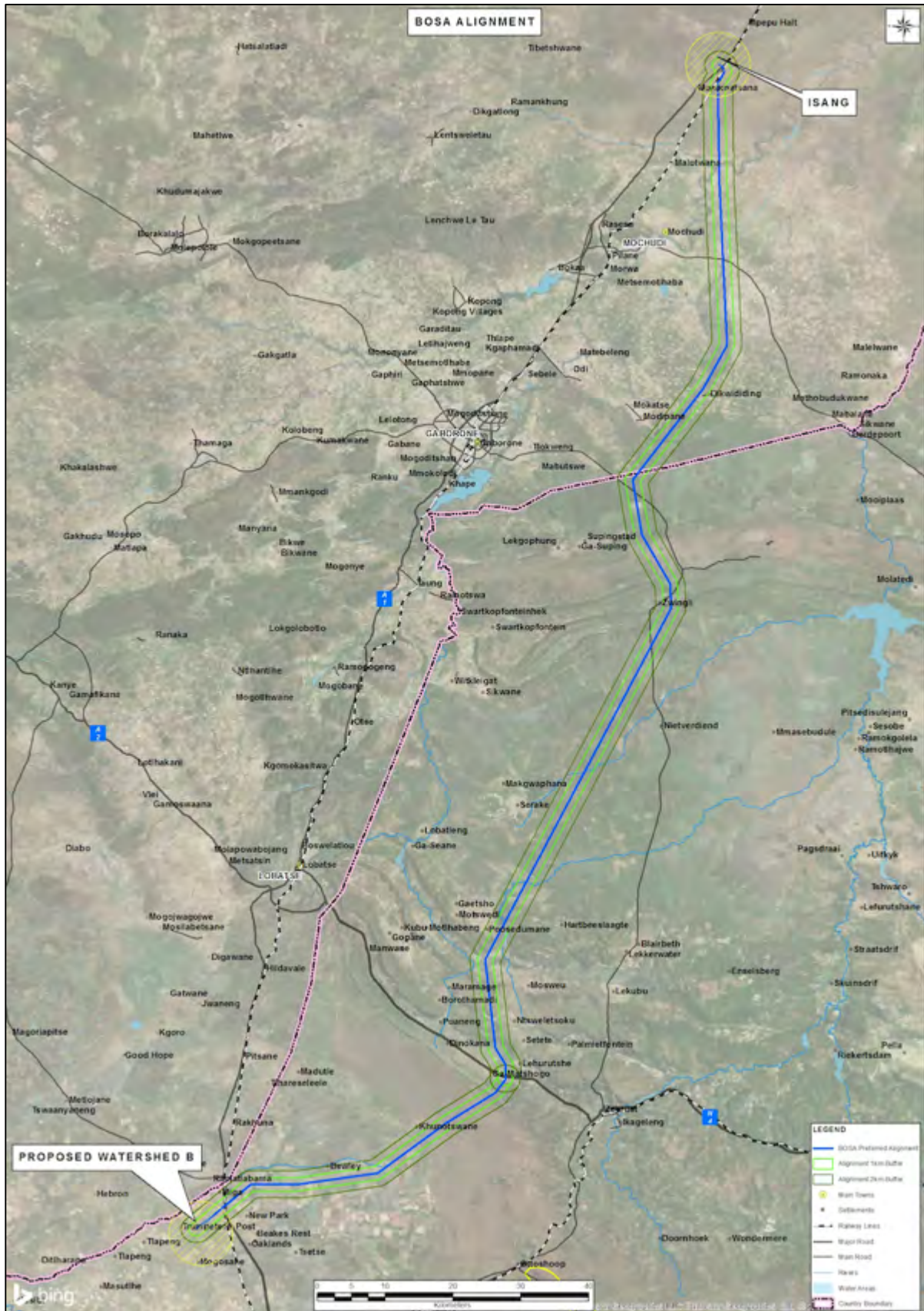


Figure 5. Route Alignment Corridor

Watershed B to Isang Substation Connection

Three possible routes were proposed.

Route 1

This route cuts through some parts of the elevated mountainous “Swartruggens” hills. These are known to contain occupational sites of both the Iron Age and the Stone Age. It then runs through some developed areas (which has the lowest sensitivity) and finally through some greenfield areas, which might also be of heritage significance.

Route 2

Route 2 has the same alignment through the hilly areas to the northeast as Route 1, however when it reaches the flats in the south it follows an alignment that almost exclusively runs through developed agricultural fields. These have a very low heritage significance since most sites have been demolished.

Route 3

This runs through large sections of the Swartruggens Mountains, which are of high potential for harbouring heritage sites. It also runs through a large section of greenfield on the lowlands. It therefore has a higher potential than the other two options for impacting on potential heritage sites.

Route Selection (from preferred to least preferred)

Option 2

Option 1

Option 3

WATERSHED B SUBSTATION VARIATIONS

The following recommendations are given in regards the potential variation to the location of the Watershed B Substation and the associated connecting lines to the proposed BOSA line.

A) New Substation Locations

The proposed new locations for the Watershed B Substation are all located within agriculturally altered environments. As such the anticipated heritage impact is expected to be limited. Of the three sites, Option C overlays an occupational structure and would therefore have a larger potential for causing negative heritage impacts.



Figure 6. Occupational Sctructure at Option C

B) Connecting Power Lines

The areas between the end of the proposed BOSA line and the new locations for the proposed Watershed B substation seems to be significantly altered by human occupation or a combination of human occupation and agricultural activities. These impacts might however only be superficial with important deposits still laying intact underneath. The main concern (from the archival study) lies with the historic battle sites associated with the Siege of Mafikeng during the Anglo Boer War.



Figure 7. Area Implicated in the Siege of Mafikeng

Although much of the Siege was focussed on the southern and south-western parts of the town, sites associated with this can be found all around the current town area. The most relevant and well-known sites fall within the red line in the figure above.

Watershed B Heritage Sensitivities

Several areas of possible heritage significance were identified through aerial analysis of the proposed routes. Known information about the characteristics of settlement patterns in these areas as well as geographic suitability analysis was used to determine possible sites of heritage significance. The following categories were identified;

Baberspan Archaeological Sites

The Baberspan area is a well-known repository for archaeological deposits both from the Stone Age and the Iron Age. Several sites have been identified here throughout the years and it also serves as an excellent example of the pan fringe settlement pattern that has become distinct in this area.

Cemeteries

These are official municipal cemeteries that could be identified close to the proposed corridors. It is important to take into consideration that developments should adhere to a 100m buffer around these burial grounds.

Possible Stone Age Sites

It has been determined that the frequently occurring pans in this area is a popular settlement area for especially Stone Age (more commonly Middle- to Late Stone Age)

communities. The abundance of agate (extremely good base material for the manufacturing of stone tools) might have led to these sites. Animals also frequent these pans, making them excellent hunting areas.

Possible Iron Age Sites

Several areas indicated geographically suitable areas for Iron Age site settlements. Such areas are specifically at the confluence of water courses and around permanent springs (or “oogs”). Several such sites were found. The area is not known for monumental stone walled sites and none could be observed through the aerial analysis.

Possible Rock Art Sites

The area under investigation is known to have sustained several groups of San hunter-gatherer groups in the past. These communities might have been living in this area for as long as 20 000 years ago. Although the large majority of this area is low lying without prominent elevated areas, there is a few ridges running for short distances mostly formed through sandstone. Some of these (especially the elevated areas around pans) have produced both rock painting and rock engravings.

Paleoanthropological Sites

The southern part of the study area is also quite well known for its paleoanthropological history with prominent finds such as the Taung Child Skull (now thought to be an adult *Australopithecine*) was made less than 60km south of Vryburg. It is therefore prudent to keep the possibility of such finds in mind during the study. Such sites will however only be identifiable during the fieldwork phase of the project.

Recommendations

If Option A is chosen for the development of the Watershed B Substation, the occupants of the rural house here should be included in the list of IAP's. The possibility of family graves should be followed up with them.

It is further recommended that the final alignment of the Watershed B to BOSA connecting lines be subjected to a Heritage Walk-down to ensure that it will not impact on historic battle sites associated with the Siege of Mafikeng.

After a MCDM Workshop on the possible routes the least impact route was selected.

2.4 PROJECT LOCATION

Ngaka Modiri Molema District Municipality, North West Province and the South-East Province of Botswana.

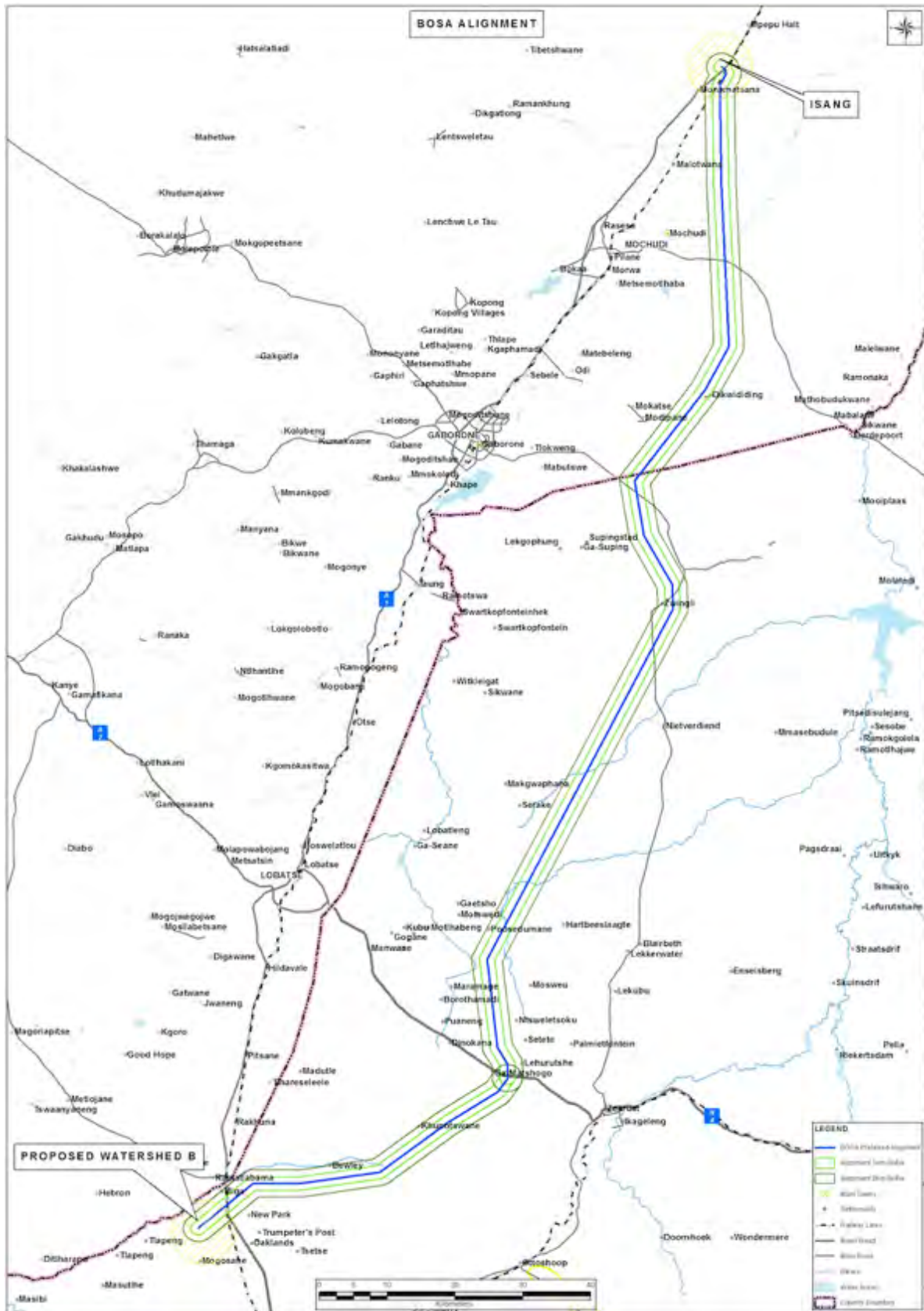


Figure 8. BOSA Transmission Project Alignment



Figure 9. BOSA Transmission Project Study Area

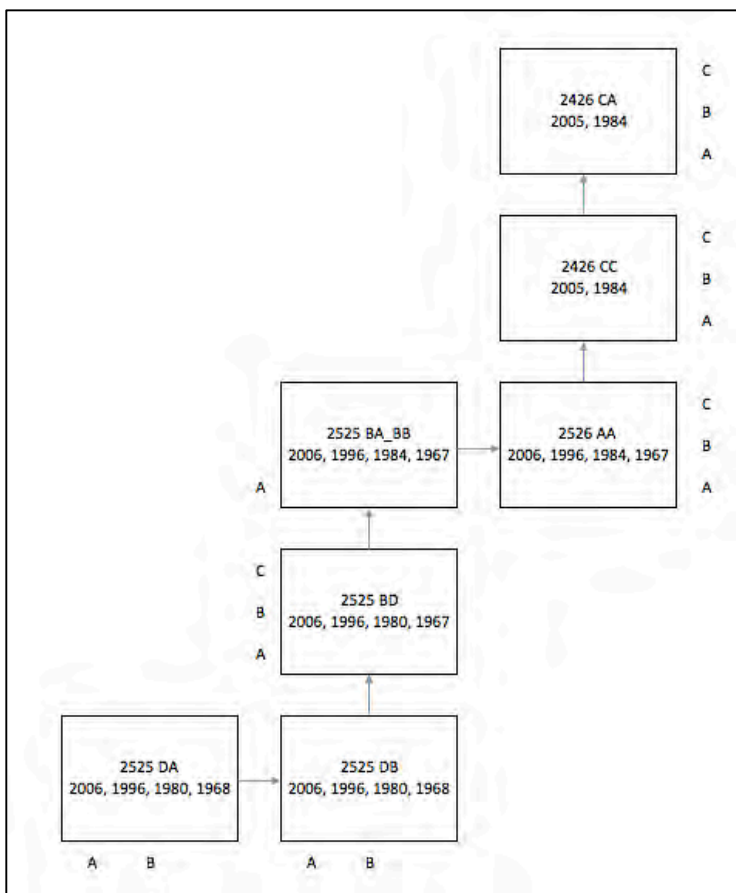


Figure 10. Topographical Maps Key

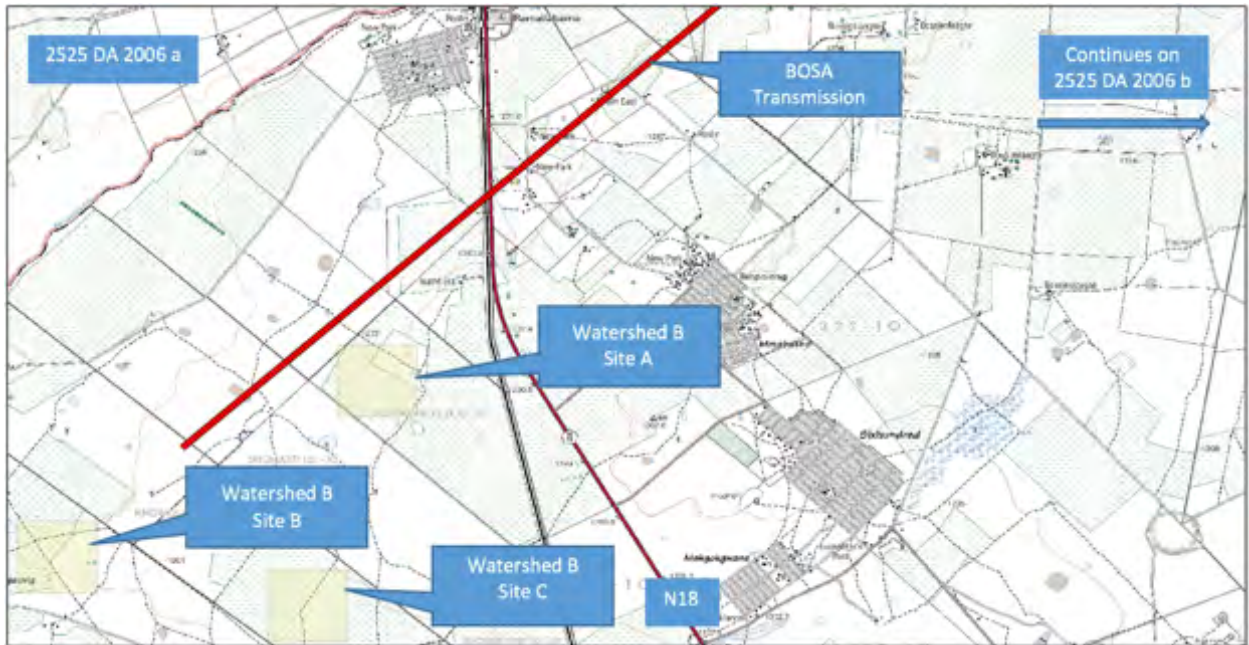


Figure 11. Topographical Map 2525 DA 2006 a



Figure 12. Topographical Map 2525 DA 2006 b



Figure 13. Topographical Map 2525 DB 2006 a

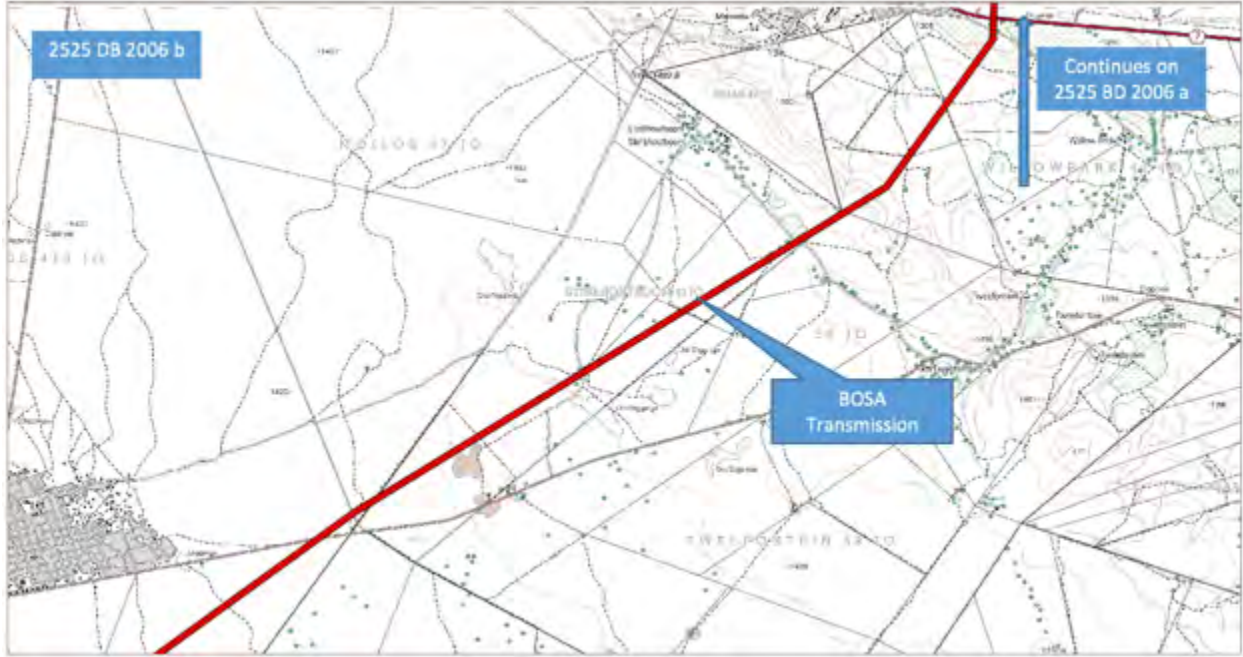


Figure 14. Topographical Map 2525 DB 2006 b

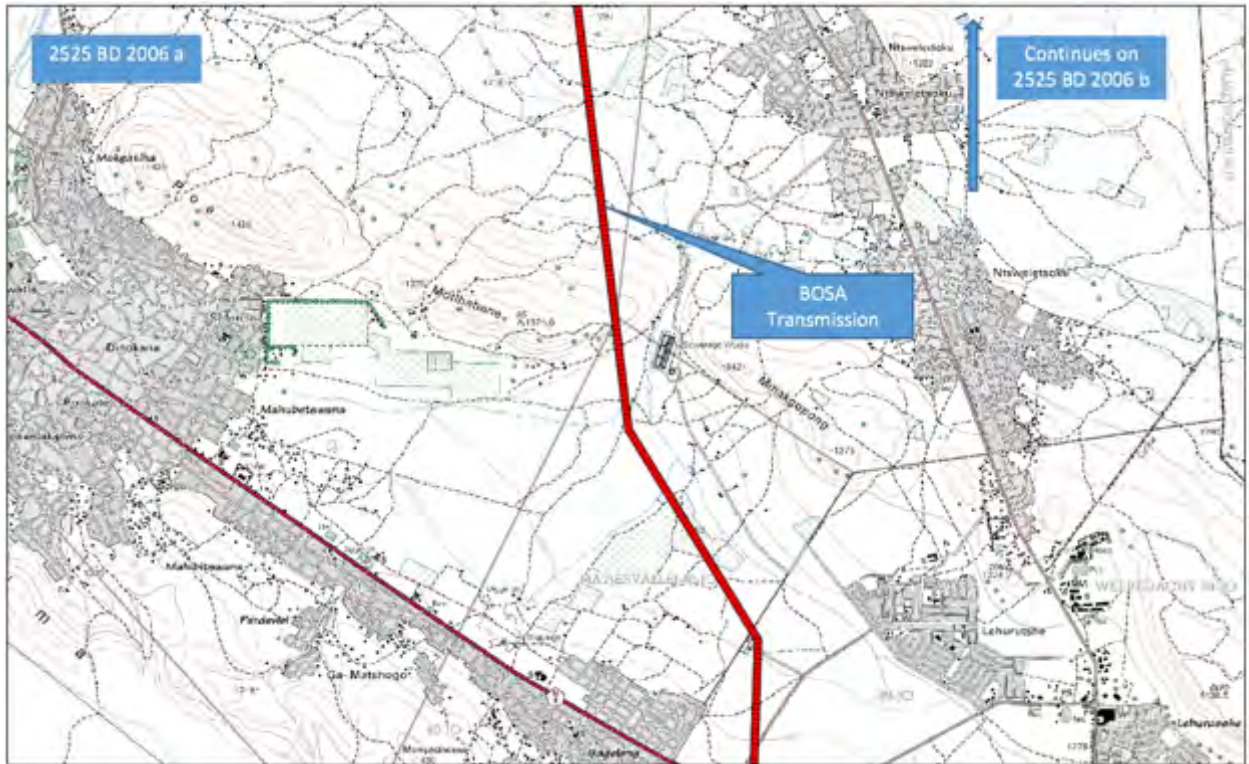


Figure 15. Topographical Map 2525 BD 2006 a



Figure 16. Topographical Map 2525 BD 2006 b



Figure 17. Topographical Map 2525 BD 2006 c



Figure 18. Topographical Map 2525 BA_BB 2006 a

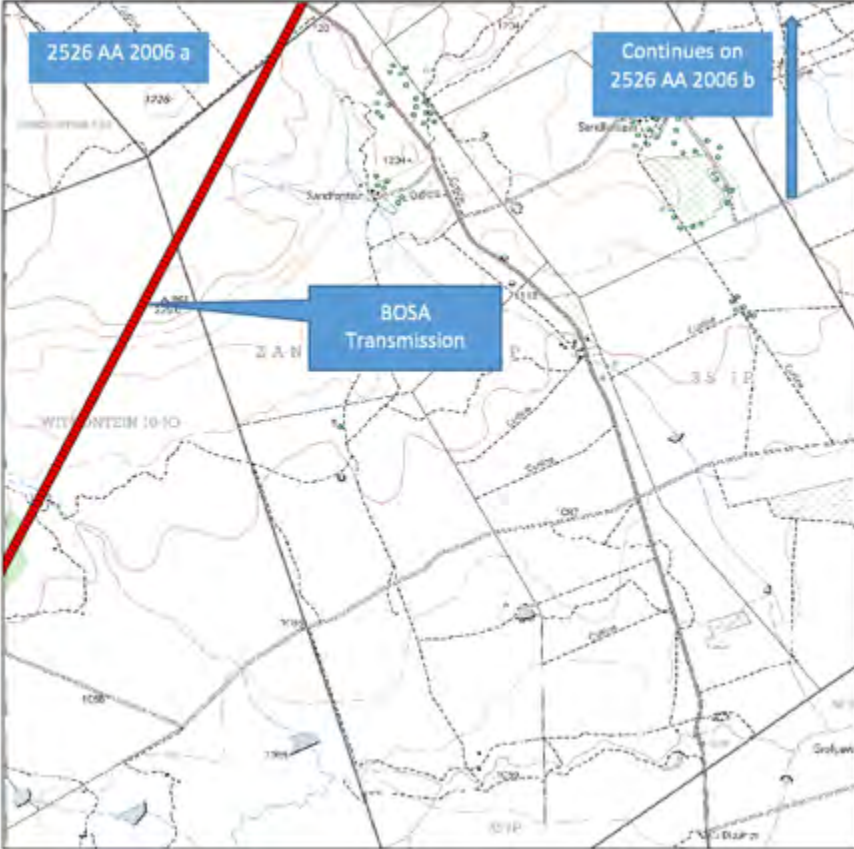


Figure 19. Topographical Map 2526 AA 2006 a

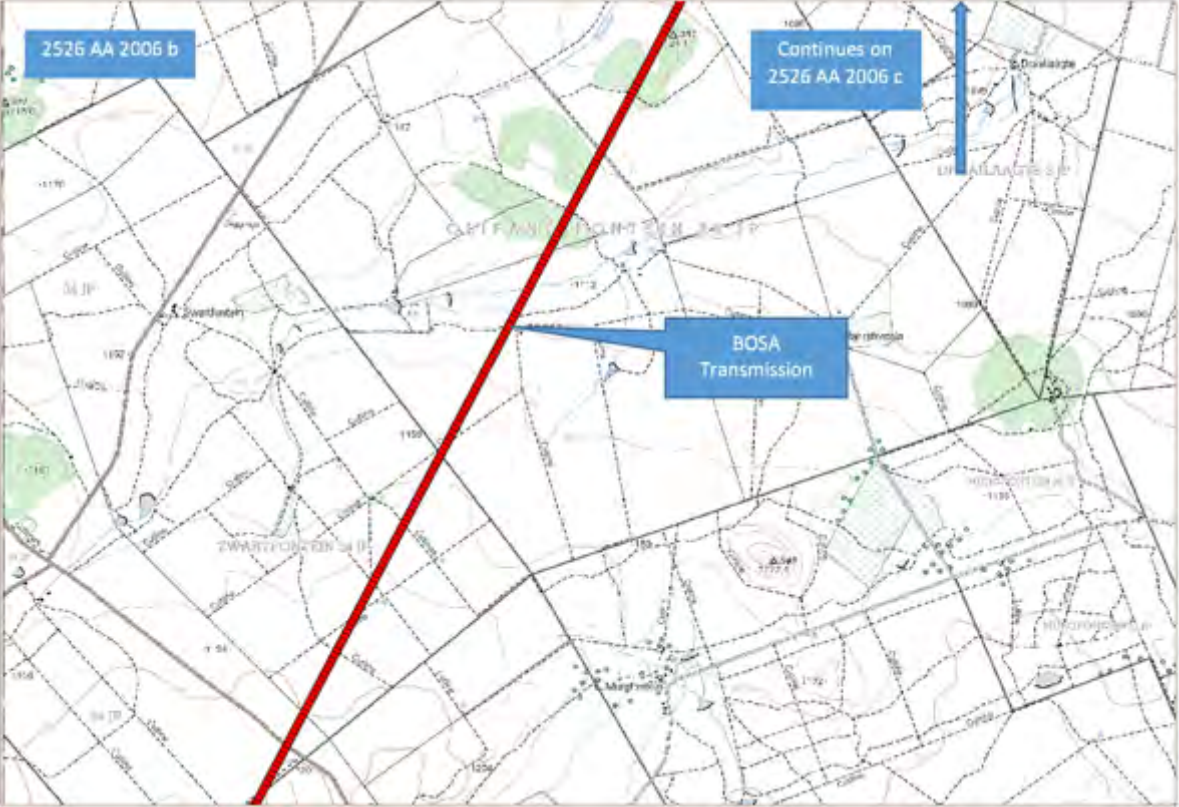


Figure 20. Topographical Map 2526 AA 2006 b

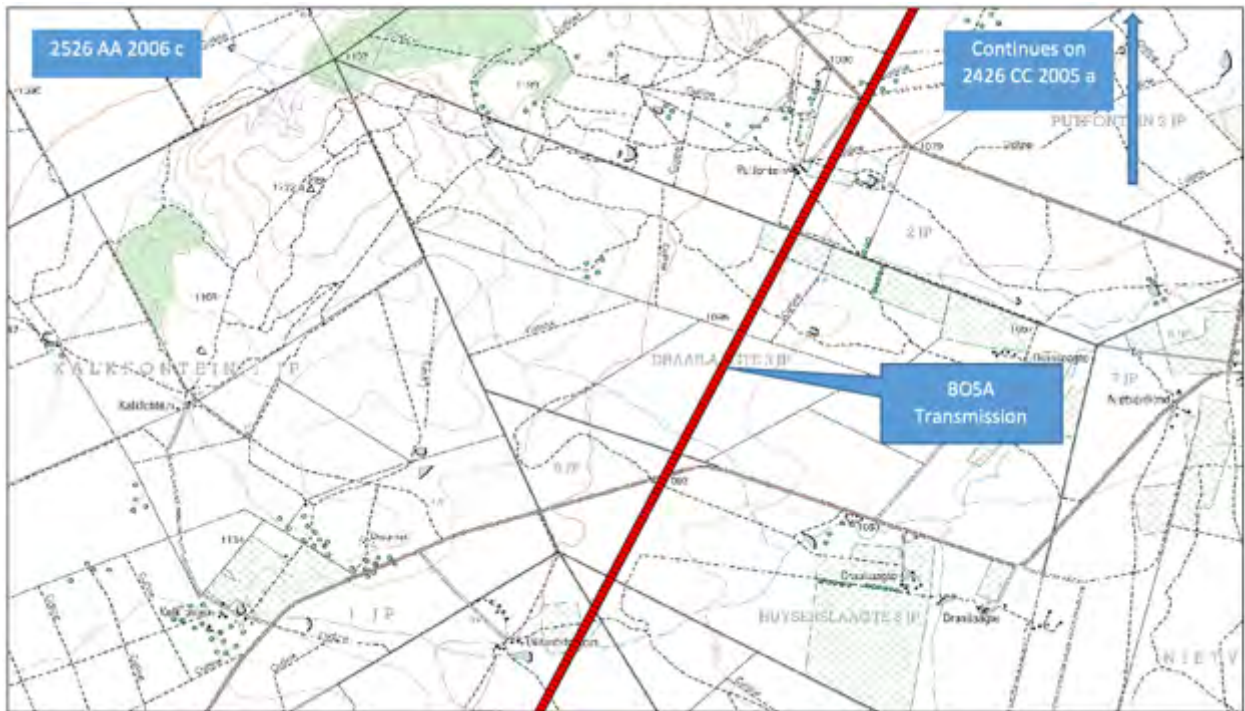


Figure 21. Topographical Map 2526 AA 2006 c



Figure 22. Topographical Map 2426 CC 2005 a

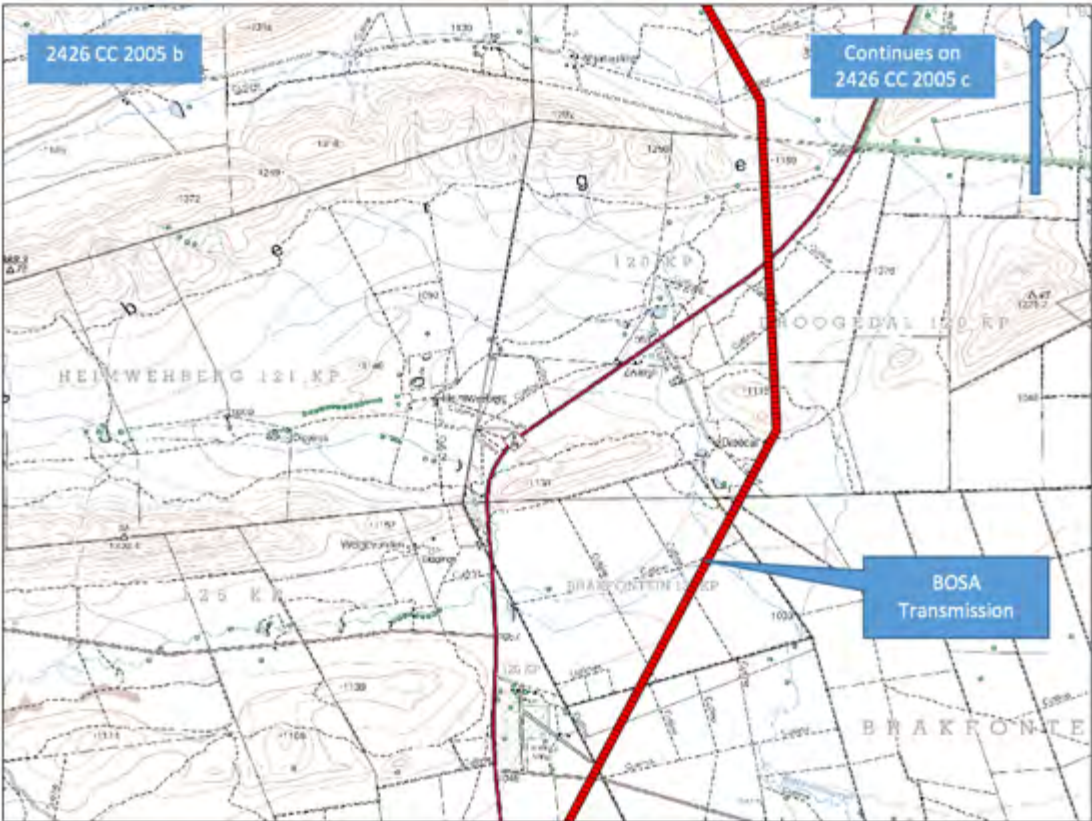


Figure 23. Topographical Map 2426 2005 b

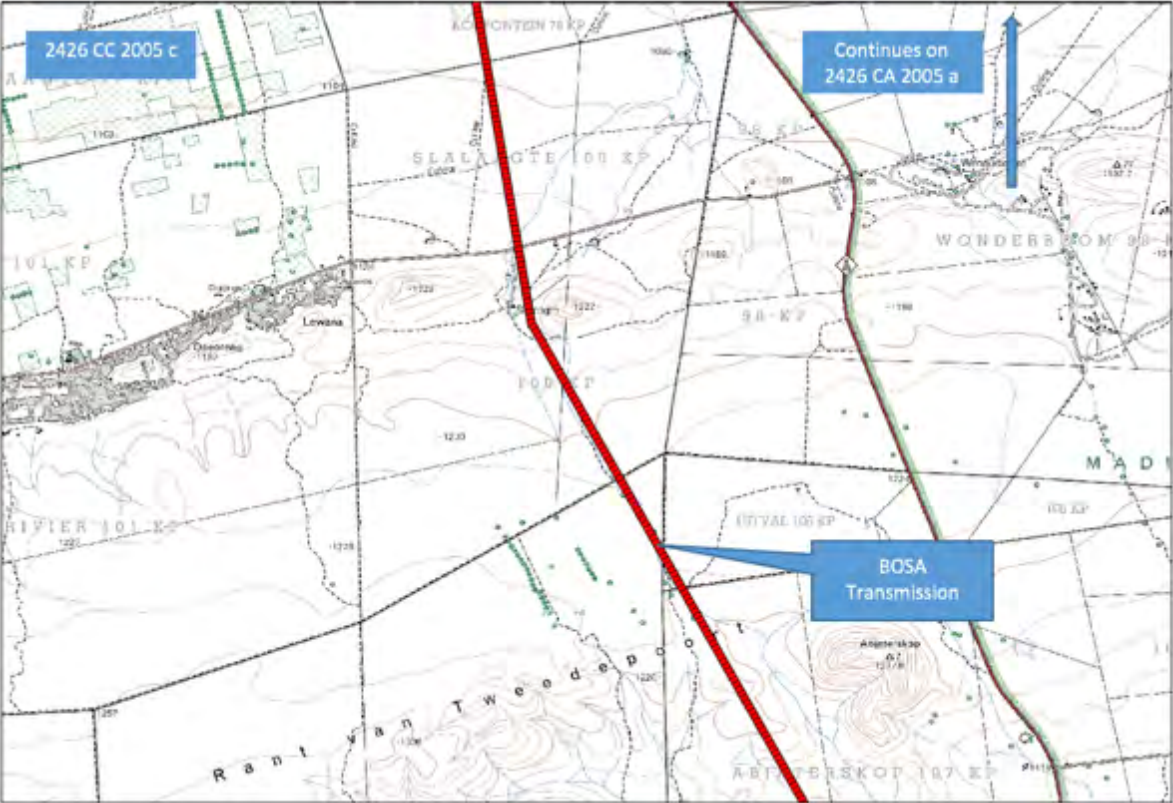


Figure 24. Topographical Map 2426 2005 c

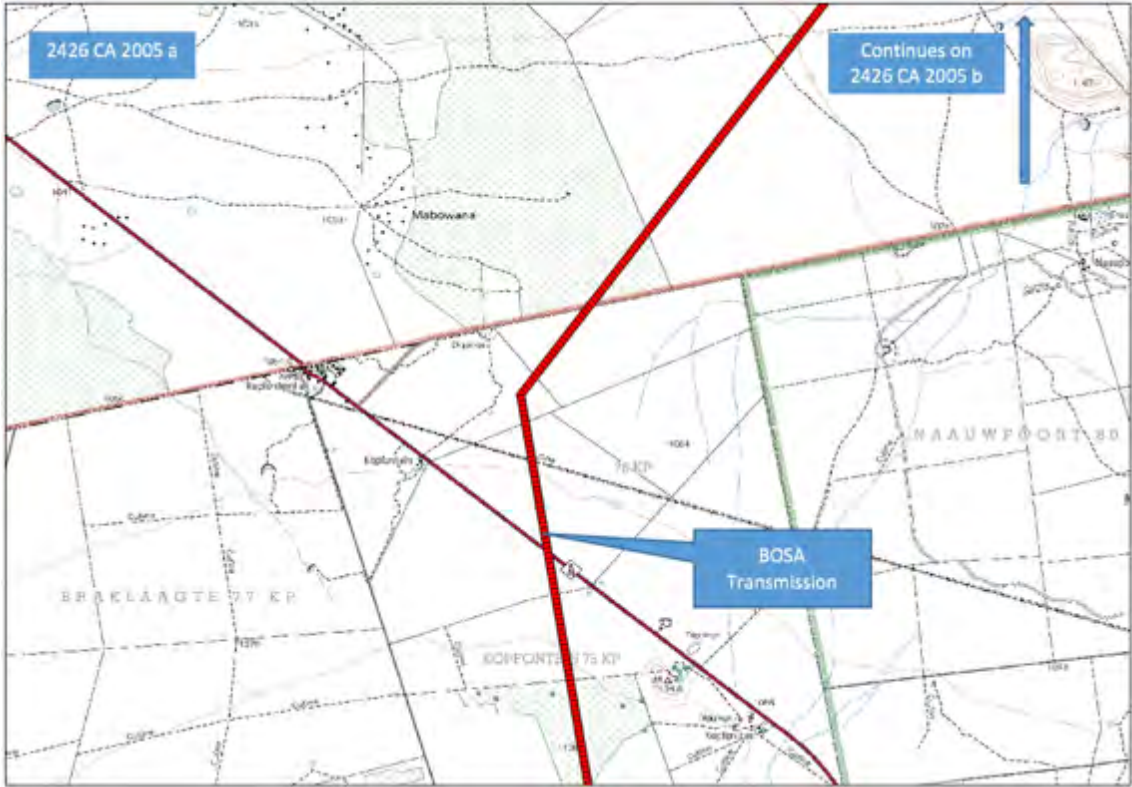


Figure 25. Topographical Map 2426 CA 2005 a

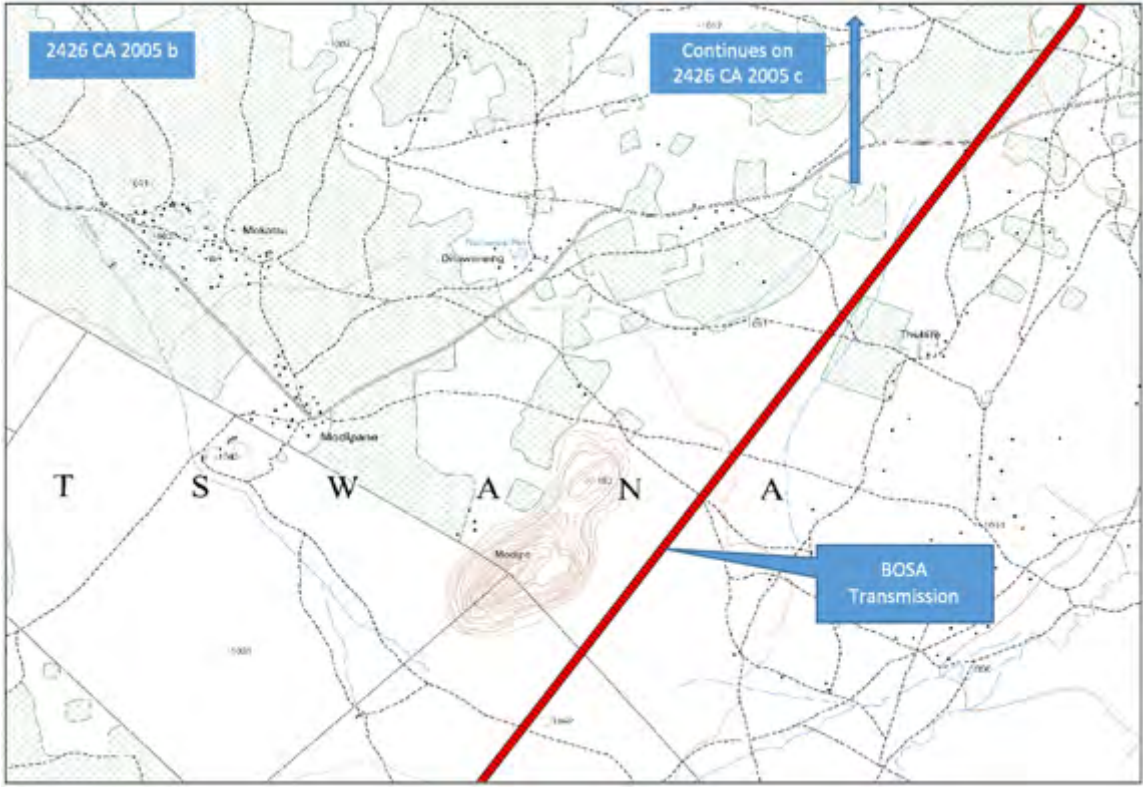


Figure 26. Topographical Map 2426 2005 b



Figure 27. Topographical Map 2426 CA 2005 c

2.5 GPS TRACK PATHS

Survey routes roughly followed the power line corridor alignment and is available from G&A Heritage Properties (Pty) Ltd on request in GPX format.

HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENT

3. REGIONAL CULTURAL CONTEXT

3.1 PALEONTOLOGY

Several Paleontological studies have been performed in this general area.

The proposed alignment runs through only two narrow corridors of high palaeontological deposits. One is in the north and one in the south according to the paleo sensitivity map published by SAHRA.

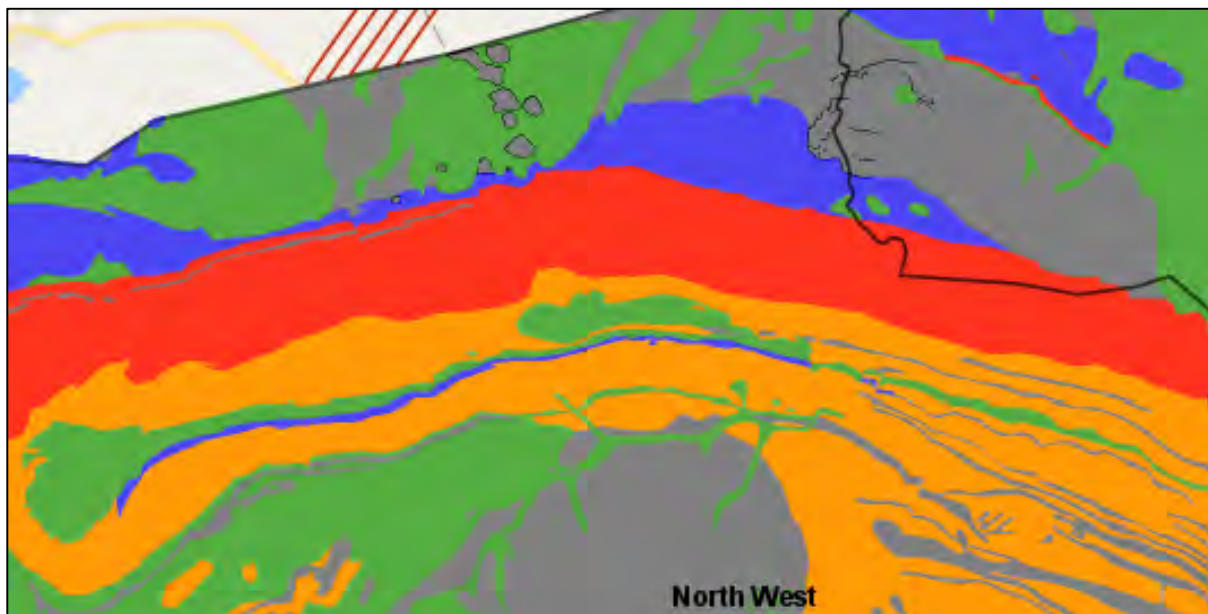


Figure 28. Northern Palaeontology Sensitive Area

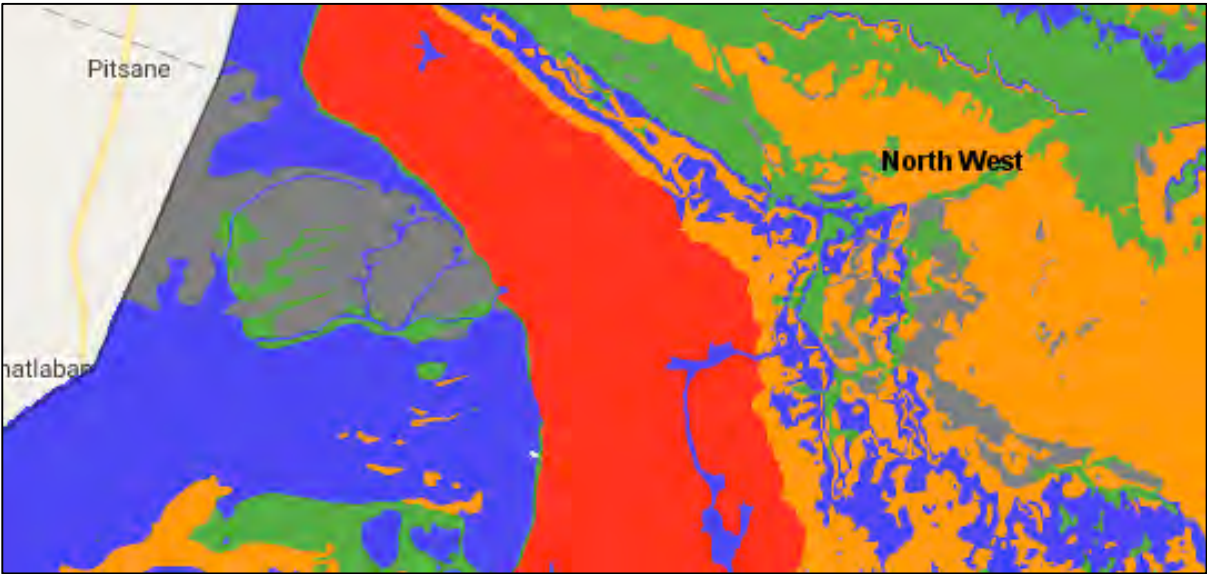


Figure 29. Southern Palaeontological Sensitive Areas

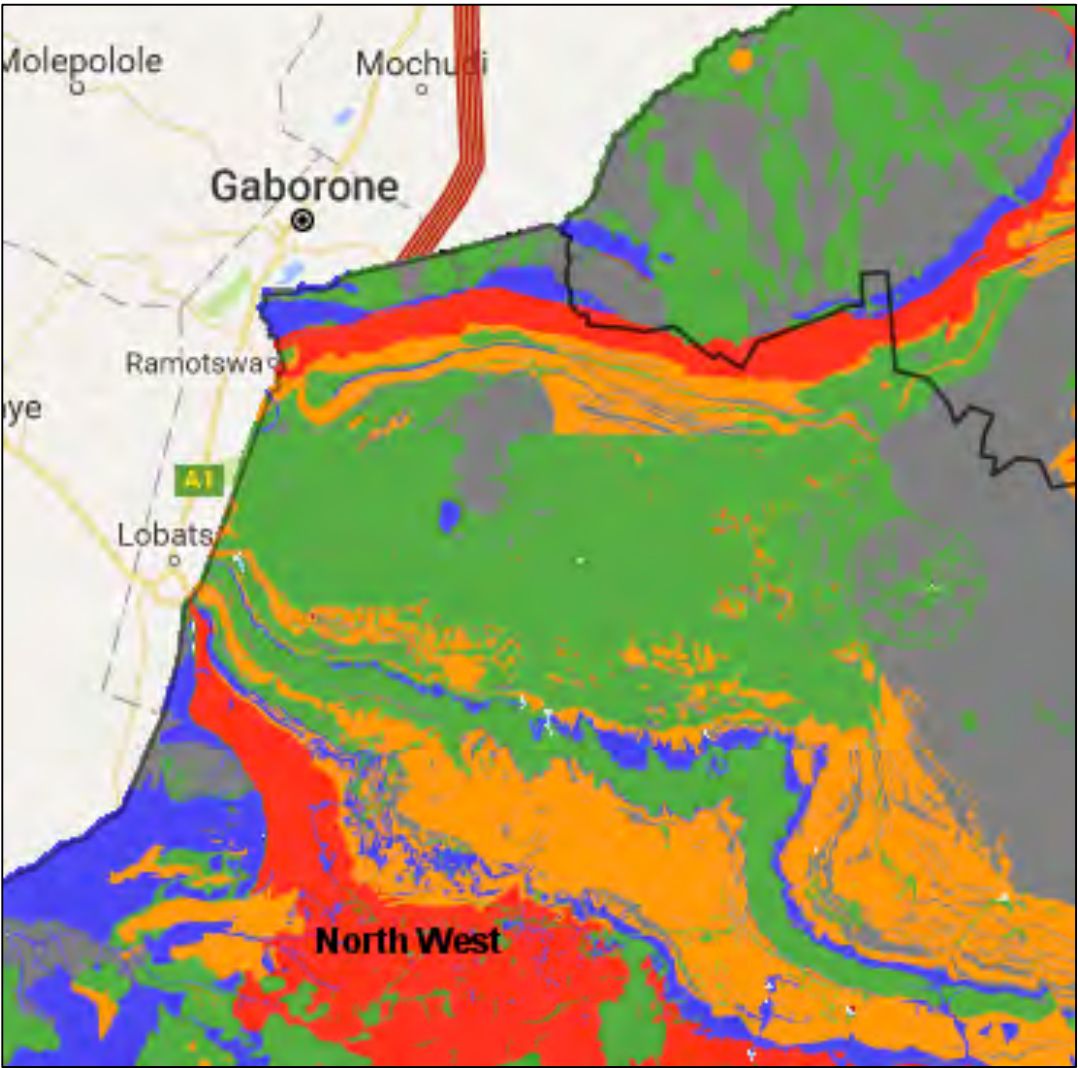


Figure 30. Please refer to key below

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.

Since palaeontological resources are found mostly underground, it is unlikely that a surface investigation would reveal their location. No references of significant palaeontological sites could be found in the literature study of these areas. Excavations along the route and in these two areas were investigated during the fieldwork for any signs of fossiliferous material, however none were found. The power line construction is also not expected to be intrusive and the possibility of it impacting on palaeontological sites is very small.

3.2 STONE AGE

Several occurrences of Late- and Middle Stone Age artefacts were identified on the proposed route. No manufacturing sites could be positively identified.



Figure 31. Stone tools

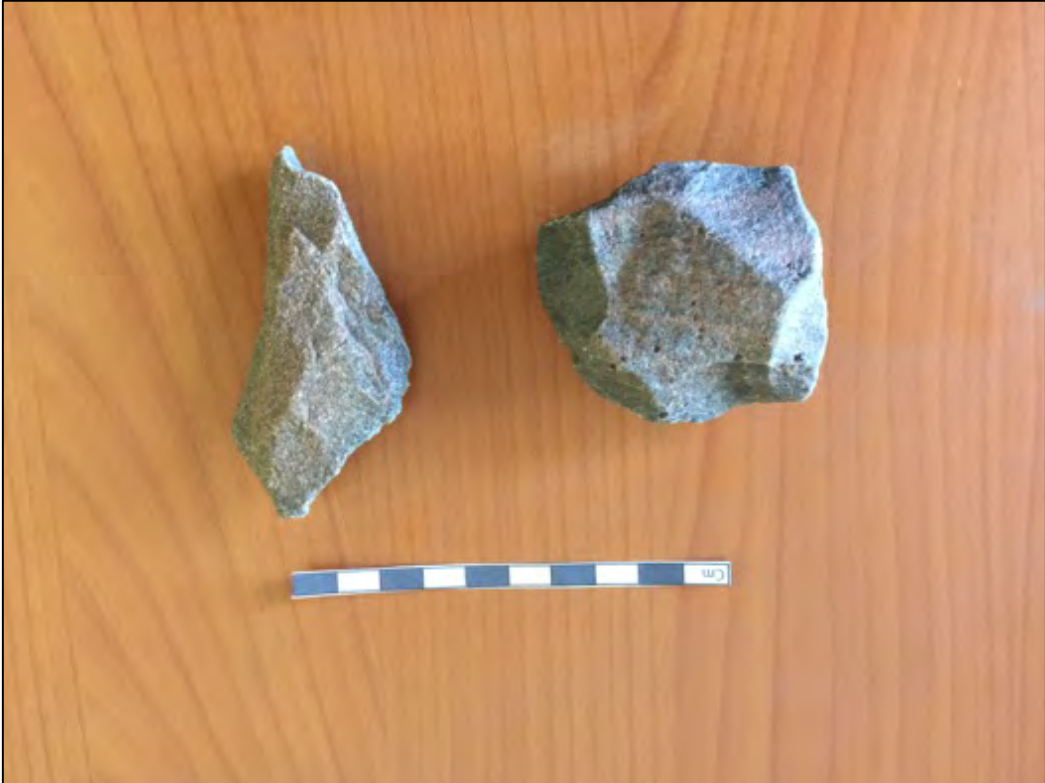


Figure 32. Stone tools

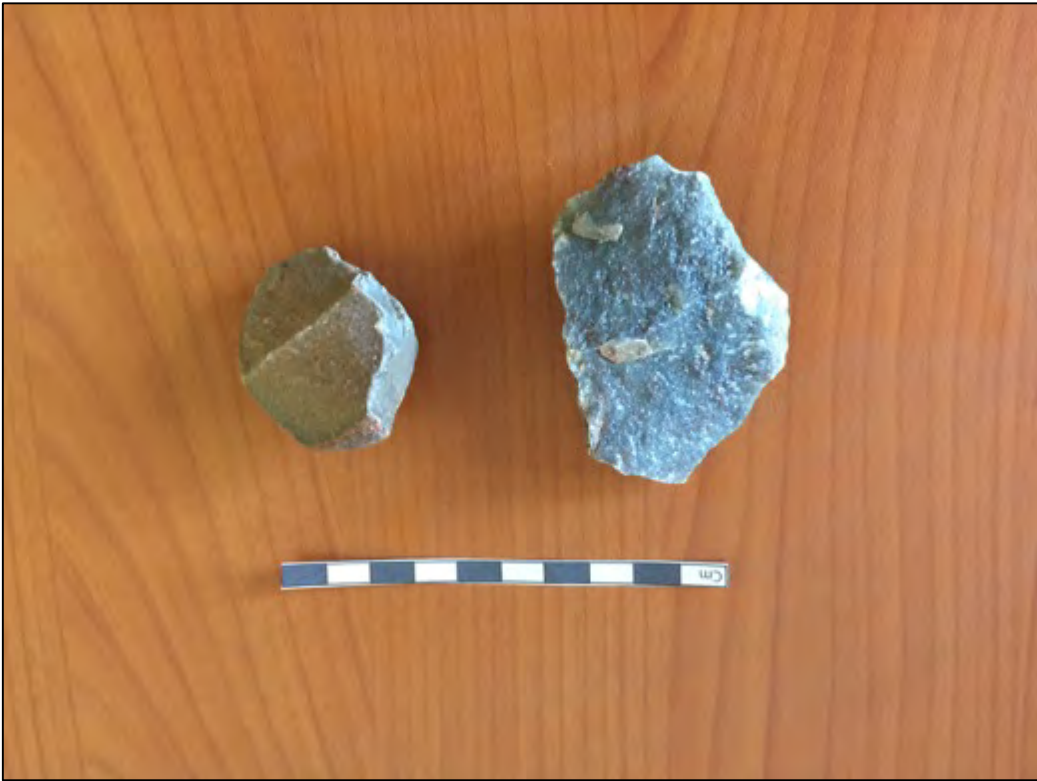


Figure 33. Stone tools



Figure 34. Stone tools



Figure 35. Stone tools



Figure 36. Stone tools



Figure 37. Stone tools



Figure 38. Stone tools



Figure 39. Stone tools

The following occurrences were documented

No	Location	Description	Significance
1	24° 42' 55,4"S 26° 06' 35,9"E	Flake	Low/Medium
2	24° 43' 04,2"S 26° 07' 17,4"E	Thumbnail scraper	Low/Medium
3	24° 43' 37,6"S 26° 07' 19,9"E	Partial blade	Low/Medium
4	24° 43' 21,6"S 26° 06' 11,3"E	Microlith	Low/Medium
5	24° 43' 51,3"S 26° 07' 03,8"E	Point	Low/Medium
6	24° 44' 37,5"S 26° 07' 53,4"E	Core	Low/Medium
7	24° 46' 19,8"S 26° 06' 00,1"E	Microliths and flakes	Low/Medium
8	24° 46' 37,1"S 26° 06' 40,2"E	4 Flakes	Low/Medium
9	24° 47' 51,5"S 26° 08' 34,7"E	2 Flakes	Low/Medium
10	24° 51' 08,1"S	1 Core and 2 Flakes	Low/Medium

	26° 10' 29,6"E		
11	24° 52' 17,4"S 26° 09' 53,9"E	One Microlith	Low/Medium
12	24° 54' 54,0"S 26° 08' 58,6"E	Irregular microliths	Low/Medium
13	24° 55' 50,1"S 26° 08' 27,4"E	Denticulate	Low/Medium
14	24° 57' 49,5"S 26° 08' 03,6"E	Fractured blade	Low/Medium
15	24° 59' 55,1"S 26° 05' 56,1"E	Core and some flakes	Low/Medium
16	25° 00' 42,1"S 26° 06' 23,7"E	Point	Low/Medium
17	25° 01' 02,0"S 26° 06' 00,9"E	5 Microliths	Low/Medium
18	25° 01' 24,6"S 26° 04' 54,2"E	One core and three microliths	Low/Medium
19	25° 00' 42,1"S 26° 06' 23,7"E	Reworked core	Low/Medium
20	25° 08' 40,8"S 26° 01' 43,0"E	Core/Point	Low/Medium
21	25° 12' 18,3"S 26° 00' 07,3"E	Microliths	Low/Medium
22	25° 13' 37,9"S 25° 59' 23,8"E	Point	Low/Medium
23	25° 17' 52,0"S 25° 57' 15,2"E	Scraper (Possible Thumbnail)	Low/Medium
24	25° 19' 10,6"S 25° 56' 08,6"E	Fractured blade	Low/Medium
25	25° 33' 36,9"S 25° 52' 54,2"E	Scattered flakes	Low/Medium
26	25° 57' 00,2"S 25° 48' 06,8"E	Scraper	Low/Medium
27	25° 56' 23,6"S 25° 48' 54,5"E	One core and one thumbnail scraper	Low/Medium
28	25° 56' 31,6"S 25° 48' 26,8"E	Two possible microliths	Low/Medium

This table shows that there is a high likelihood of encountering Stone Age sites of high heritage significance within the study corridor.

The ancient rocks of the Timeball Hill and Rooihogte Formations of the Pretoria Group are located in this region of the North West Province, near Zeerust. There is also diabase in the area. These rocks are predominantly mudrocks, quartzites with some basal lavas and have been submitted to low grade metamorphism (Eriksson et al.

2006). These rocks are more than 22 00 million years old and this predates macro- and land fossils. If any microscopic organisms such as bacteria, algae or fungi had been present, they would likely have been destroyed by the metamorphism (Bamford, 2013).



Figure 40. Geology of the region around Zeerust (marked with white arrow)

3.2 STONE AGE

South African Component

The Southern African Stone Age sequence is well established based on the terrace stratigraphy of the Vaal River Valley. Just as in North and East Africa, this begins in the basal Pleistocene with the occurrence of simple pebble tools of Kafuan type. These develop into what is called the pre-Stellenbosch, which is found in the oldest gravels of the Vaal and which includes artifacts made from pebbles that recall both the Kafuan and the Oldowan. The true Stellenbosch complex occurs in the next-younger series of deposits; it is simply a Southern African version of the Abbevillian and Acheulean of other parts of Africa and Europe. Typical are hand axes, cleavers, flakes struck from Victoria West cores, and (in its later phases) various sorts of flakes produced by the prepared striking-platform–tortoise-core technique. The Stellenbosch was followed by the Fauresmith, which is characterized by evolved hand axes and Levallois-type flakes. The Stellenbosch and Fauresmith together constitute what is called the South African Older Stone Age, a period roughly corresponding to the Lower and Middle Paleolithic stages of Europe. On the other hand, the South African Middle Stone Age belongs to the later part of the Upper Pleistocene. It is characterized by a series of contemporary flake-tool assemblages, each of which displays local features. These are known as Mossel Bay, Pietersburg, Howieson's Poort, Bambata Cave, Stillbay, etc.; Stillbay, which occurs in Kenya and Uganda, is the only one of these found outside Southern Africa. The characteristic tools are made on flakes produced by a developed Levalloisian technique, including slender unifacial and bifacial lances or spear points for stabbing or throwing. In the final stages of the Middle Stone Age, known as the South African Magosian, microlithic elements appear, just as in the case of East Africa.

The Later Stone Age cultures of this region—the Smithfield and the Wilton—developed during post-Pleistocene times. These are closely related and, in their later stages,

reveal varying degrees of influence as the result of contact with the culture introduced by the Bantu-speaking peoples. Both were extant at the time the first Europeans arrived in Southern Africa, and there is little doubt that the Wilton, which is a typical microlithic assemblage, is to be associated with the modern San (Bushman). There are many paintings in the rock shelters and engravings on stones in the open-air sites of Southern Africa, the oldest of which belong to the Later Stone Age. The naturalistic style of art revealed at these sites persisted until well into historic times (*Encyclopedia Britannica*).

Sensitive Areas

The following areas within the study corridor is identified as possible high potential areas for the location of Stone Age sites. This selection is based on the following;

- Geographic suitability
- The presence of other known Stone Age sites
- Geological appropriateness

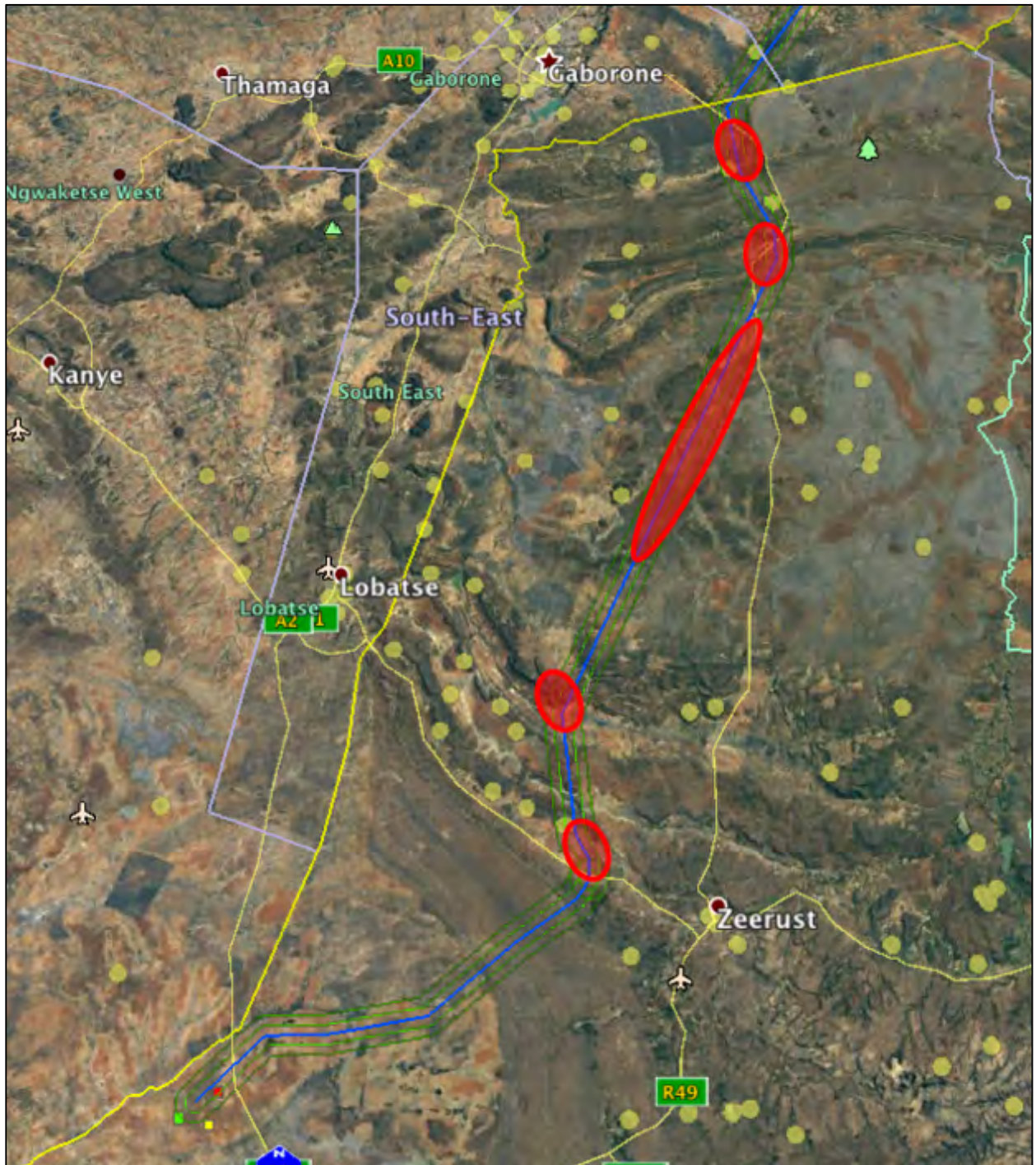


Figure 41. Possible high risk area for Stone Age Sites

Botswana Component

For the purposes of this study with classify baseline archaeological information into four parts of south-eastern Botswana: Gaborone, Kgatleng and Southern Regions. South-eastern Botswana is one of the richest regions in country in terms of archaeological, historical and heritage resources (both tangible and intangible). There are over 200 archaeological sites recorded in the area. Most of the sites were identified during Archaeological Impact Assessment for dams and associated developments.

The archaeological diversity of area includes the Early Stone Age (ESA), Middle Stone Age (MSA), Early Iron Age (EIA), Middle Iron Age (MIA), and Late Iron Age (LIA). ESA tools have been found in various parts of the south eastern Botswana, which date between 1 million to 150 000 years ago. Most of the tools are crude, big and are mainly cores. Unfortunately, most of the EAS sites in Botswana are found with materials that are not datable. Several Stone Age sites have been identified in the south eastern Botswana.

3.3 IRON AGE

South African Component

The Iron Age is well represented in this area with the majority of sites being composed of the Late Iron Age sequence.

Loose scatters of potsherds were noticed throughout the study area, however the provenance of these could not be determined. The area is known for small Early Iron Age (EIA) sites such as *Schietkraal* connected to the Early Moloko tradition as well as megalithic Late Iron Age (LIA) sites associated with the Sotho Tswana. A small version of such a site is found to the east of the study area close to *Lehurutshe Unit 3*.

These sites are easily identified from aerial photographs and would show up readily on the Lidar data provided. No such sites could be identified within the study corridor.



Figure 42. LIA Stone Walled Site at Lehurutshe Unit 3

The smaller EIA sites are much more difficult to identify and although the Lidar investigation as well as the ground survey did not detect any of these sites, it is still possible that they might occur within the study area.

These sites are found in a variety of geographic locations; however, their prominent stone walling makes them easily identifiable on the ground. Early Iron Age sites have been identified and is mostly associated with the San in these areas. Several rock art sites also attest to their presence within the study area.

The later Iron Age sites such as Kaditshwene (close to Mafikeng) is recognized by the typical Sotho-Tswana scalloped stone walling. Some of these sites gained mega status and could have contained as much as 30 000 people.

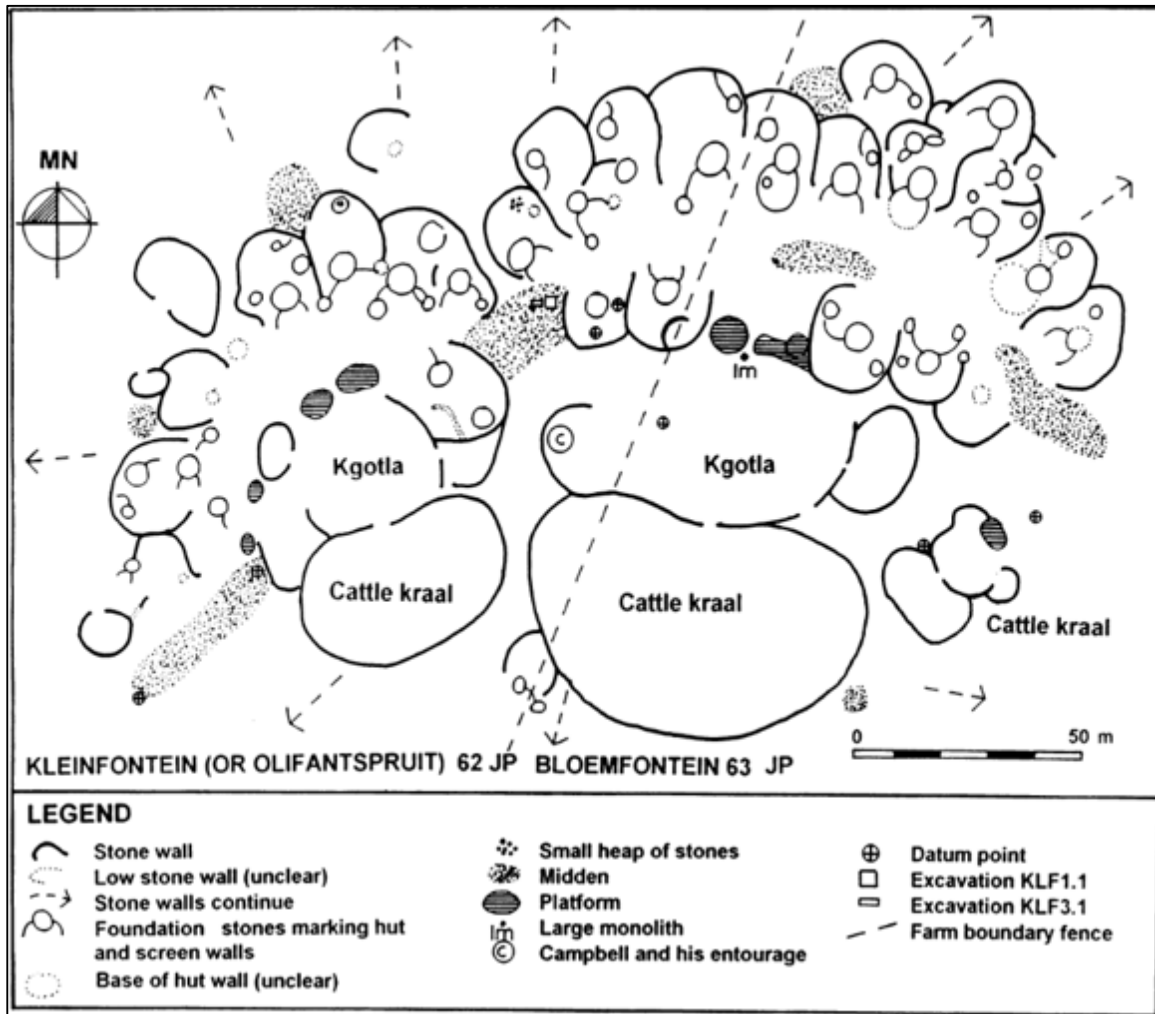


Figure 43. Scalloped Stone Walling at Kleinfontein



Figure 44. Cambell's 1822 skch of Kaditswhene and Stone Walling

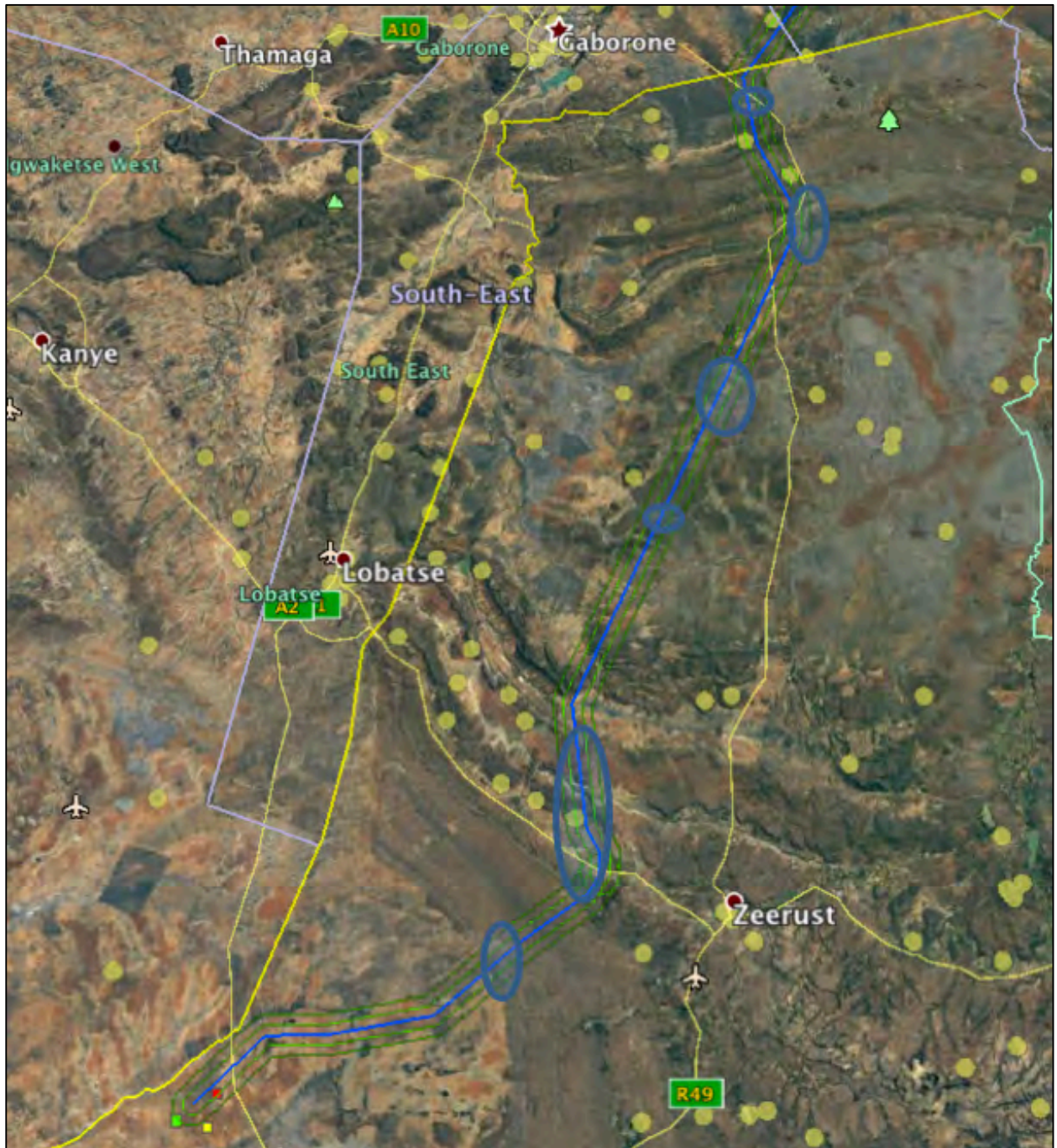


Figure 45. Possible Sensitive Areas along the Alignment

Botswana Component

Iron Age sites noted in around south eastern Botswana include EIA (Zhizo Tradition), MIA (Toutswe Tradition, Great Zimbabwe Tradition) and LIA (Khami Tradition) sites. Spiritual and ritual sites have been recorded in especially in caves and hilltops.

Gaborone is located in south-eastern Botswana. Several archaeological sites are found this area. It is also nearer to Kweneng and Kgatleng Districts where archaeological remains of national value have been identified. These include the Matsieng footprints in Rasesa, Kolobeng and Ntsweng sites in Molepolole. There are also archaeological

remains and sites that are found in Gaborone and its environs.

One important site in Gaborone is one at Broadhurst where an Iron Age settlement which dates back to 14th century AD was found. A small midden was uncovered during earth-moving operations which contained well preserved faunal remains, charcoal and pottery (Denbow and Campbell, 1980). The Broadhurst pottery is characterized by very fine herringbone and cross-hatching motifs bordered by stepladder arches on slightly necked jars with thickened rims. Red ochre was used as infilling for panels and to burnish the inside of bowls. This pottery style was first identified at Broadhurst where it was dated to A.D. 1360 (Van de Ryst, 2006). Similar materials have also been identified at the top of the Taukome, Toutswe, Thatwane, Bosutswe, and Shoshong. Related materials occur at Mapungubwe but the date for Broadhurst is later than these sites. The discovery of these materials at Broadhurst provides useful information on the occupation times of south eastern Botswana in relation to eastern Botswana.

Excavations have been undertaken at the site of Moritsane approximately 20 km west of Gaborone. This site was organized around a central kraal. An infant burial with several hundred very small blue-green and yellow cane glass beads was recovered. Ceramics from this site contain much more of an emphasis on incised techniques, though the motifs and placement of decoration are virtually identical to Broadhurst (Denbow and Campbell, 1980). It is suggested that occupants of these sites were people who possessed large herds of domestic animals. Wealth, social status and influence were instrumental in the longer maintenance of cultural traditions (Cohen, 2010).

In his study at Ranaka, Lane, (1992) states that pottery from excavations presented similar range of decorative motifs and techniques of decoration like that of the 14th century EIA site at Broadhurst. These include a higher percentage of thickened rims in the Broadhurst assemblage, and a corresponding greater proportion of necked jars relative to open bowls but with a difference in assemblage and the pottery from sites around Ranaka (Lane, 1992). According to Denbow (1986) Moritsane and Broadhurst ceramics indicate continuity of settlement through at least the fourteenth century (Denbow, 1986).

There is the Bonnington Farm remains at Block 5 located adjacent to Gaborone-Molepolole road. Here grain silos and a housing structure are still standing intact. According to Dewah (2014), Bonnington Farm was originally owned by British farmers from the Cape. It is a remnant of what used to be Broadhurst Farms that were situated in the area in 1800s. Kgosi Sechele I gave this farm to the British farmers with a strategy of creating a buffer against encroaching Boers from the south. In this farm, livestock was reared and crops including maize, sorghum, groundnuts, beans and cotton were produced and sold in South Africa. The silos were built in 1952 to store animal feeds (Dewah 2014).

According to the Department of National Monument and Museum (DNMM) Site Register, there are several sites that have been found within Gaborone and the immediate surroundings but no further studies have been undertaken there. Most of these sites belong to Stone Age and Iron Age. A list of these sites is provided in the

appendices section.

It is also essential to contextualize the study area within the broader archaeological data of Kgatleng District. Kgatleng District has undergone extensive archaeological research (see Walker 1996, Pearsons 1995, Marshals 1995, and Motlotle 1995). The National Museum databases record shows that there is some form of Archaeology within the broader project area. The most prominent being Modipe National Monument, Seoke and Matsieng.

Modipe Hill which is an Iron age settlement comprises of a granite outcrop measuring 3 kilometres in length and a kilometre in width (Mabuse & Tlhako 2009). According to recent research conducted in the area, the site was occupied by the Bakgalagadi people around the 15th century with the Tswana groups occupying it at a later period. The extent of the settlement is more prominent and elaborate on the eastern side of the hill with an area measuring 300 metres characterised by pot sherds and hut remains.

Between 1992 and 1995 archaeological excavations and survey work was conducted at Modipe Hill, Kgatleng District. The is a known Iron Age site comprising of a wide range of materials including hut settlement and associated scatter at the base of the hill and a complex of stone enclosures on the slopes (Pearson 1995).

In addition, Seoke, just like Modipe hill, consists of rich intensive stone walling. The disserted ruins are visible on hills and are on defensive spots. These areas were probably ideal in the late 18th century due to Difaqane invasions. There are also a number of Anglo-Boer places such as Basuto Kop situated in the area. In addition, there are various defensive positions and stonewalls that were built between October 1899 and February 1900.

Matsieng is a petroglyph site characterised by pecked human and animal's tracks located near a 3-metre-deep natural crevice on a granite rock. The human foot prints found in Matsieng are more like outlines while feline pugs are pecked in full (Walker 1998). Matsieng footprints can be found in many parts of Botswana and are associated with a legendary ancestor of Tswana people. Many believe that he(Matsieng) emerged from a hole in the ground with his cattle when the sand was apparently wet, the tracks subsequently dried when the earth hardened.

This assertion has however been quashed by Tlou and Campbell(1984) who explain that these traditions are merely used to justify occupation of these lands. This being the case because the Tswana people are failing to account for similar footprints in other parts of Southern Africa for example in Angola, South-east Zimbabwe, Victoria falls, Southern Namibia and Orange River as they fall outside the Tswana historic range (Walker 1998:213).

It is worth noting that the petroglyphs like the one in Matsieng and the rest of Southern Africa are attributed to the San people. These were "title deeds" to waterholes, directions to water holes or teaching youngsters how to identify and recognise antelope species from their tracks (Wilman 1933).

3.5 CULTURAL LANDSCAPE

The cultural landscape changes along the route from rural township areas in the south to greenfield game farms in the north. Two prominent mountain ridges also pass through the corridor.



Figure 46. Rural townships



Figure 47. Possible burial sites in township



Figure 48. Southern mountain ridge



Figure 49. Greenfield areas in north



Figure 50. Roads in township

3.6 PREVIOUS STUDIES

An extensive research into the SAHRIS database resulted in the identification of the following heritage related studies that have been performed over the last decade in the study area. Only studies within a radius of 50km from the study area were considered.

- Gaigher, S. 2016. Heritage Pre-Scoping Report for the First Phase of Investigation into the Heritage Sensitivity of the Proposed BOSA Power Line Alignment.
- Pelser, A. 2014. Phase 1 HIA Report for the Proposed Zeerust Chicken Abattoir in Zeerust, North West Province.
- Bamford, M. 2013. Palaeontological Impact Assessment for proposed Photovoltaic facility near Zeerust.
- Coetzee, F.P. 2008. Cultural Heritage Survey of the PPC Slurry Operation, near Zeerust, North West Province.
- Kusel, U. 2007. Cultural Heritage Resources Impact Assessment of Proposed Report Development in Poosedumane Zeerust, North West Province.
- Pelser, A., Van Vollenhoven, A. 2008. The Archaeological and Historical Investigation and Exhumation of three Graves on Plot 1242, Zeerust, Northwest Province.
- Pelser, A. Jansen, L. 2013. Archaeological Impact Assessment (AIA) Report for a Proposed 75MW Photovoltaic Solar Facility on the Remainder of Kameeldoorn 271JP, Portion 15 of Kameeldoorn 271JP & Portion 14 of Kruisrivier 270JP, Zeerust, Northwest Province.
- Huffman, T. 2008. Kameeldoorn Archaeological Survey, Zeerust.
- Fourie, W. 2008. Heritage Scoping Proposed Development on Portion 32 of the Farm Klaarstroom 267JP, Zeerust, North West Province.
- Van Der Walt, J. 2008. Archaeological Impact Assessment on Portion 1 of the Darm Kameeldorn 271 JA, Zeerust District, North West Province.
- Pistorius, J.C.C. 2011. A Phase 1 Heritage Impact Assessment (HIA) Study for the Proposed Mehikeng Cement Project near Itsosng in the North-West Province of South Africa.
- Pistorius, J.C.C. 2011. A Phase 1 Heritage Impact Assessment Study for a Proposed Photovoltaic Solar Power Installation (Solar Plant) at Harmony's Kalgold Mine south west of Mahikeng in the North West Province of South Africa.
- Rubidge, B. 2012. Clare Energy Photovoltaic Solar Energy Project at Kalgold in NW Province, South West of Mahikeng – Palaeontological Impact Assessment.

3.7 FINDINGS ON HISTORICAL MAPS

Site no. 001

Description: Cemetery

Location: S25°41'14.42" E25°36'16.68"

Approximately 3.2km from the BOSA Transmission Line, at Ikopeleng Village. Outside the Buffer Zone.



Figure 51. Location of BOSA Site 001: Cemetery

Site no. 002

Description: Cemetery

Location: S25°42'18.01" E25°36'42.45"

Approximately 5.2km from the BOSA Transmission Line, at Six Hundred Village.

Outside the Buffer Zone.



Figure 52. Location of BOSA Site 002: Cemetery

2017/08/24

Site no. 003

Description: Cemetery

Location: S25°39'9.16" E25°33'36.78"

Approximately 2.6km from the BOSA Transmission Line, at Miga Village near the Ramatlabama Border Post.

Outside the Buffer Zone.



Figure 53. Location of BOSA Site 003: Cemetery

2017/08/24

Site no. 004

Description: Grave

Location: S25°35'5.31" E25°47'48.81"

Approximately 2.6km from the BOSA Transmission Line, near Khunotswana Village.
Outside the Buffer Zone.



Figure 54. Location of BOSA Site 004: Grave

2017/08/24

Site no. 005

Description: Ruins

Location: S25° 8'45.91" E25°59'6.48"

Approximately 4.8km from the BOSA Transmission Line, near Driefontein Village.
Outside the Buffer Zone.



Figure 55. Location of the BOSA Site 005: Ruins

2017/08/24

Site no. 006

Description: Ruins

Location: S25° 7'41.98" E25°59'54.01"

Approximately 3.4km from the BOSA Transmission Line, near Driefontein Village.
Outside the Buffer Zone.



Figure 56. Location of BOSA Site 006: Ruins

2017/08/24

Site no. 007

Description: Ruins

Location: S25°10'26.01" E26° 3'18.62"

Approximately 4.3km from the BOSA Transmission Line, near Driefontein Village.
Outside the Buffer Zone.



Figure 57. Location of BOSA Site 007

2017/08/24

Site no. 008

Description: Ruins

Location: S25° 8'47.40" E 26° 4'39.42"

Approximately 4.6km from the BOSA Transmission Line, near Driefontein Village.
Outside the Buffer Zone.



Figure 58. Location of BOSA Site 008: Ruins

2017/08/24

Site no. 009

Description: Ruins

Location: S25° 4'36.92" E26° 0'11.85"

Approximately 5.4km from the BOSA Transmission Line, near Doornhoek Village.
Outside the Buffer Zone.



Figure 59. Location of BOSA Site 009: Ruins

2017/08/24

Site no. 010

Description: Ruins

Location: S24°55'43.95" E26° 5'24.99"

Approximately 5.1km from the BOSA Transmission Line, west of the National Route R49.

Outside the Buffer Zone.



Figure 60. Location of BOSA Site 010: Ruins

Site no. 011

Description: Ruins

Location: S24°49'5.07" E26°11'57.28"

Approximately 4.6km from the BOSA Transmission Line, east of the National Route R49.

Outside the Buffer Zone.



Figure 61. Location of BOSA Site 011: Ruins

4. FINDINGS

GRAVE AND BURIAL SITES

The proposed alignment area contains several small village sites. Due to the rural and primitive nature of these occupational units, burials are often performed close to the houses or huts. Although the documentation of grave sites will be part of the social impact assessment their relocation will form a second phase of the heritage management project.

5. METHODOLOGY

This study defines the heritage component of the EIA process being undertaken for the proposed BOSA Transmission Project in the Ngaka Modiri Molema District Municipality, North West Province and the South East Province of Botswana. It is described as a first phase (HIA). This report attempts to evaluate both the accumulated heritage knowledge of the area as well as information derived from direct physical observations.

5.1 INVENTORY

Inventory studies involve the in-field survey and recording of archaeological resources within a proposed development area. The nature and scope of this type of study is defined primarily by the results of the overview study. In the case of site-specific developments, direct implementation of an inventory study may preclude the need for an overview.

There are several different methodological approaches to conducting inventory studies. Therefore, the proponent, in collaboration with the archaeological consultant, must develop an inventory plan for review and approval by the SAHRA prior to implementation (*Dincause, Dena F., H. Martin Wobst, Robert J. Hasenstab and David M. Lacy 1984*).

5.2 EVALUATING HERITAGE IMPACTS

A combination of document research as well as the determination of the geographic suitability of areas and the evaluation of aerial photographs determined which areas could and should be accessed.

After plotting of the site on a GPS the areas were accessed using suitable combinations of vehicle access and access by foot.

Sites were documented by digital photography and geo-located with GPS readings using the WGS 84 datum.

Further techniques (where possible) included interviews with local inhabitants, visiting local museums and information centers and discussions with local experts. All this information was combined with information from an extensive literature study as well as the result of archival studies based on the SAHRA (South African Heritage Resource Agency) provincial databases.

This Heritage Impact Assessment relies on the analysis of written documents, maps, aerial photographs and other archival sources combined with the results of site investigations and interviews with effected people. Site investigations are not exhaustive and often focus on areas such as river confluence areas, elevated sites or occupational ruins.

The following documents were consulted in this study;

- South African National Archive Documents
- SAHRIS (South African Heritage Resources Information System) Database of Heritage Studies
- Internet Search
- Historic Maps
- 2006, 1996, 1980, and 1968 2525 DA Surveyor General Topographic Map series
- 2006, 1996, 1981, 1980 and 1968 2525 DB Surveyor General Topographic Map series
- 2006, 1996, 1984, 1980 and 1967 2525 BD Surveyor General Topographic Map series
- 2006 1996, 1984, 1980 and 1967 2525 BB_BA Surveyor General Topographic Map series
- 2006, 1996, 1984 and 1967 2526 AA Surveyor General Topographic Map series
- 2005 and 1984 2426 CC Surveyor General Topographic Map series
- 2005 and 1984 2426 CA Surveyor General Topographic Map series
- 1952 1:10 000 aerial photo survey
- Google Earth 2017 imagery
- Published articles and books
- JSTOR Article Archive

5.3 FIELDWORK

Fieldwork for this study was performed during July and August of 2017. Most of the areas were found to be accessible by vehicle. Areas of possible significance were investigated on foot. The survey was tracked using GPS and a track file in GPX format is available on request.

The study was mainly focused on systematic field surveys of the study area.

Areas with less development impact was investigated closer to determine whether any sites of heritage value could still occur sub-surface, however no indications of such sites were evident (such as graves, shell middens, disposed pot sherd etc.).

Where sites were identified, it was documented photographically and plotted using GPS with the WGS 84 datum point as reference. GPX files are available on request from G&A Heritage.

The study area was surveyed using standard archaeological surveying methods. The area was surveyed using directional parameters supplied by the GPS and surveyed by foot. This technique has proven to result in the maximum coverage of an area. This action is defined as;

'an archaeologist being present in the course of the carrying-out of the development works (which may include conservation works), so as to identify and protect archaeological deposits, features or objects which may be uncovered or otherwise affected by the works' (DAHGI 1999a, 28).

Standard archaeological documentation formats were employed in the description of sites. Using standard site documentation forms as comparable medium, it enabled the

surveyors to evaluate the relative importance of sites found. Furthermore, GPS (Global Positioning System) readings of all finds and sites were taken. This information was then plotted using a **Garmin Colorado** GPS (WGS 84- datum).

Indicators such as surface finds, plant growth anomalies, local information and topography were used in identifying sites of possible archaeological importance. Test probes were done at intervals to determine sub-surface occurrence of archaeological material. The importance of sites was assessed by comparisons with published information as well as comparative collections.

Test excavation is that form of archaeological excavation where the purpose is to establish the nature and extent of archaeological deposits and features present in a location, which it is proposed to develop (though not normally to fully investigate those deposits or features) and allow an assessment to be made of the archaeological impact of the proposed development. It may also be referred to as archaeological testing' (DAHGI 1999a, 27).

'Test excavation should not be confused with, or referred to as, archaeological assessment which is the overall process of assessing the archaeological impact of development. Test excavation is one of the techniques in carrying out archaeological assessment which may also include, as appropriate, documentary research, field walking, examination of upstanding or visible features or structures, examination of aerial photographs, satellite or other remote sensing imagery, geophysical survey, and topographical assessment' (DAHGI 1999b, 18).

6. MEASURING IMPACTS

In 2003, the SAHRA (South African Heritage Resources Agency) compiled the following guidelines to evaluate the cultural significance of individual heritage resources:

6.1 TYPE OF RESOURCE

- Place
- Archaeological Site
- Structure
- Grave
- Paleontological Feature
- Geological Feature

6.2 TYPE OF SIGNIFICANCE

6.2.1 HISTORIC VALUE

It is important in the community, or pattern of history

- o Important in the evolution of cultural landscapes and settlement patterns
- o Important in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, province, region or locality.
- o Important for association with events, developments or cultural phases that have had a significant role in the human occupation and evolution of

the nation, province, region or community.

- Important as an example for technical, creative, design or artistic excellence, innovation or achievement in a particular period.

It has strong or special association with the life or work of a person, group or organisation of importance in history

- Importance for close associations with individuals, groups or organisations whose life, works or activities have been significant within the history of the nation, province, region or community.

It has significance relating to the history of slavery

- Importance for a direct link to the history of slavery in South Africa.

6.2.2 AESTHETIC VALUE

It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

- Important to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.
- In the case of an historic precinct, importance for the aesthetic character created by the individual components which collectively form a significant streetscape, townscape or cultural environment.

6.2.3 SCIENTIFIC VALUE

It has potential to yield information that will contribute to an understanding of natural or cultural heritage

- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.
- Importance for information contributing to a wider understanding of the origin of life; the development of plant or animal species, or the biological or cultural development of hominid or human species.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the nation, Province, region or locality.
- It is important in demonstrating a high degree of creative or technical achievement at a particular period

- Importance for its technical innovation or achievement.

(a) Does the site contain evidence, which may substantively enhance understanding of culture history, culture process, and other aspects of local and regional prehistory?

- internal stratification and depth
- chronologically sensitive cultural items
- materials for absolute dating
- association with ancient landforms
- quantity and variety of tool type
- distinct intra-site activity areas
- tool types indicative of specific socio-economic or religious activity
- cultural features such as burials, dwellings, hearths, etc.
- diagnostic faunal and floral remains
- exotic cultural items and materials
- uniqueness or representativeness of the site
- integrity of the site

(b) Does the site contain evidence which may be used for experimentation aimed at improving archaeological methods and techniques?

- monitoring impacts from artificial or natural agents
- site preservation or conservation experiments
- data recovery experiments
- sampling experiments
- intra-site spatial analysis

(c) Does the site contain evidence which can make important contributions to paleoenvironmental studies?

- topographical, geomorphological context
- depositional character
- diagnostic faunal, floral data

(d) Does the site contain evidence which can contribute to other scientific disciplines such as hydrology, geomorphology, pedology, meteorology, zoology, botany, forensic medicine, and environmental hazards research, or to industry including forestry and commercial fisheries?

6.2.4 SOCIAL VALUE / PUBLIC SIGNIFICANCE

- It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
- Importance as a place highly valued by a community or cultural group for reasons of social, cultural, religious, spiritual, symbolic, aesthetic or educational associations.
- Importance in contributing to a community's sense of place.

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?

- integrity of the site
- technical and economic feasibility of restoration and development for public use
- visibility of cultural features and their ability to be easily interpreted
- accessibility to the public

- opportunities for protection against vandalism
- representativeness and uniqueness of the site
- aesthetics of the local setting
- proximity to established recreation areas
- present and potential land use
- land ownership and administration
- legal and jurisdictional status
- local community attitude toward development

(b) Does the site receive visitation or use by tourists, local residents or school groups?

6.2.5 ETHNIC SIGNIFICANCE

(a) Does the site presently have traditional, social or religious importance to a particular group or community?

- ethnographic or ethno-historic reference
- documented local community recognition or, and concern for, the site

6.2.6 ECONOMIC SIGNIFICANCE

(a) What value of user-benefits may be placed on the site?

- visitors' willingness-to-pay
- visitors' travel costs

6.2.7 SCIENTIFIC SIGNIFICANCE

(a) Does the site contain evidence, which may substantively enhance understanding of historic patterns of settlement and land use in a particular locality, regional or larger area?

(b) Does the site contain evidence, which can make important contributions to other scientific disciplines or industry?

6.2.8 HISTORIC SIGNIFICANCE

- (a) Is the site associated with the early exploration, settlement, land use, or other aspect of southern Africa's cultural development?
- (b) Is the site associated with the life or activities of a particular historic figure, group, organization, or institution that has made a significant contribution to, or impact on, the community, province or nation?
- (c) Is the site associated with a particular historic event whether cultural, economic, military, religious, social or political that has made a significant contribution to, or impact on, the community, province or nation?
- (d) Is the site associated with a traditional recurring event in the history of the community, province, or nation, such as an annual celebration?

6.2.9 PUBLIC SIGNIFICANCE

- (a) Does the site have potential for public use in an interpretive, educational or recreational capacity?
 - visibility and accessibility to the public
 - ability of the site to be easily interpreted
 - opportunities for protection against vandalism
 - economic and engineering feasibility of reconstruction, restoration and maintenance
 - representativeness and uniqueness of the site
 - proximity to established recreation areas
 - compatibility with surrounding zoning regulations or land use
 - land ownership and administration
 - local community attitude toward site preservation, development or destruction
 - present use of site
- (b) Does the site receive visitation or use by tourists, local residents or school groups?

6.2.10 OTHER

- (a) Is the site a commonly acknowledged landmark?
- (b) Does, or could, the site contribute to a sense of continuity or identity either alone or in conjunction with similar sites in the vicinity?
- (c) Is the site a good typical example of an early structure or device commonly used for a specific purpose throughout an area or period of time?
- (d) Is the site representative of a particular architectural style or pattern?

6.3 DEGREES OF SIGNIFICANCE

6.3.1 SIGNIFICANCE CRITERIA

There are several kinds of significance, including scientific, public, ethnic, historic and economic, that need to be taken into account when evaluating heritage resources. For any site, explicit criteria are used to measure these values. Checklists of criteria for evaluating pre-contact and post-contact archaeological sites are

provided in Appendix B and Appendix C. These checklists are not intended to be exhaustive or inflexible. Innovative approaches to site evaluation which emphasize quantitative analysis and objectivity are encouraged. The process used to derive a measure of relative site significance must be rigorously documented, particularly the system for ranking or weighting various evaluated criteria.

Site integrity, or the degree to which a heritage site has been impaired or disturbed as a result of past land alteration, is an important consideration in evaluating site significance. In this regard, it is important to recognize that although an archaeological site has been disturbed, it may still contain important scientific information.

Heritage resources may be of scientific value in two respects. The potential to yield information, which, if properly recovered, will enhance understanding of Southern African human history, is one appropriate measure of scientific significance. In this respect, archaeological sites should be evaluated in terms of their potential to resolve current archaeological research problems. Scientific significance also refers to the potential for relevant contributions to other academic disciplines or to industry.

Public significance refers to the potential a site has for enhancing the public's understanding and appreciation of the past. The interpretive, educational and recreational potential of a site are valid indications of public value. Public significance criteria such as ease of access, land ownership, or scenic setting are often external to the site itself. The relevance of heritage resource data to private industry may also be interpreted as a particular kind of public significance.

Ethnic significance applies to heritage sites which have value to an ethnically distinct community or group of people. Determining the ethnic significance of an archaeological site may require consultation with persons having special knowledge of a particular site. It is essential that ethnic significance be assessed by someone properly trained in obtaining and evaluating such data.

Historic archaeological sites may relate to individuals or events that made an important, lasting contribution to the development of a particular locality or the province. Historically important sites also reflect or commemorate the historic socioeconomic character of an area. Sites having high historical value will also usually have high public value.

The economic or monetary value of a heritage site, where calculable, is also an important indication of significance. In some cases, it may be possible to project monetary benefits derived from the public's use of a heritage site as an educational or recreational facility. This may be accomplished by employing established economic evaluation methods; most of which have been developed for valuating outdoor recreation. The objective is to determine the willingness of users, including local residents and tourists, to pay for the experiences or services the site provides even though no payment is presently being made. Calculation of user benefits will normally require some study of the visitor population (*Smith, L.D. 1977*).

6.3.2 RARITY

- It possesses uncommon, rare or endangered aspects of natural or cultural heritage.
- Importance for rare, endangered or uncommon structures, landscapes or

phenomena.

6.3.3 REPRESENTIVITY

- It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects.
- Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.
- Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.

The table below illustrates how a site's heritage significance is determined

Spheres of Significance	High	Medium	Low
International			
National			
Provincial			
Regional			
Local			
Specific Community			

7. ASSESSMENT OF HERITAGE POTENTIAL

7.1 ASSESSMENT MATRIX: DETERMINING ARCHAEOLOGICAL SIGNIFICANCE

In addition to guidelines provided by the National Heritage Resources Act (Act No. 25 of 1999), a set of criteria based on Deacon (J) and Whitelaw (1997) for assessing archaeological significance has been developed for Eastern Cape settings (Morris 2007a). These criteria include estimation of landform potential (in terms of its capacity to contain archaeological traces) and assessing the value to any archaeological traces (in terms of their attributes or their capacity to be construed as evidence, given that evidence is not given but constructed by the investigator).

Estimating site potential

Table 1 (below) is a classification of landforms and visible archaeological traces used for estimating the potential of archaeological sites (after J. Deacon and, National Monuments Council). Type 3 sites tend to be those with higher archaeological potential, but there are notable exceptions to this rule, for example the renowned rock engravings site Driekopseiland near Kimberley which is on landform L1 Type 1 – normally a setting of lowest expected potential. It should also be noted that, generally, the older a site the poorer the preservation, so that sometimes any trace, even of only Type 1 quality, could be of exceptional significance. In light of this, estimation of potential will always be a

matter for archaeological observation and interpretation.

Table 1: Classification of landforms and visible archaeological traces for estimating the potential for archaeological sites (after J. Deaon, NMC as used in Morris)

Class	Landform	Type 1	Type 2	Type 3
L1	Rocky Surface	Bedrock exposed	Some soil patches	Sandy/grassy patches
L2	Ploughed land	Far from water	In floodplain	On old river terrace
L3	Sandy ground, inland	Far from water	In floodplain or near features such as hill/dune	On old river terrace
L4	Sandy ground, coastal	>1 km from sea	Inland of dune cordon	Near rocky shore
L5	Water-logged deposit	Heavily vegetated	Running water	Sedimentary basin
L6	Developed urban	Heavily built-up with no known record of early settlement	Known early settlement, but buildings have basements	Buildings without extensive basements over known historical sites
L7	Lime/dolomite	>5 myrs	<5000 yrs	Between 5000 yrs and 5 myrs
L8	Rock shelter	Rocky floor	Loping floor or small area	Flat floor, high ceiling
Class	Archaeological traces	Type 1	Type 2	Type 3
A1	Area previously excavated	Little deposit remaining	More than half deposit remaining	High profile site
A2	Shell of bones visible	Dispersed scatter	Deposit <0.5 m thick	Deposit >0.5 m thick; shell and bone dense
A3	Stone artefacts or stone walling or other feature visible	Dispersed scatter	Deposit <0.5m thick	Deposit >0.5 m thick

Table 2: Site attributes and value assessment (adopted from Whitelaw 1997 as used in Morris)

Class	Landforms	Type 1	Type 2	Type 3
1	Length of sequence /context	No sequence Poor context Dispersed distribution	Limited sequence	Long sequence Favourable context High density of arte / ecofacts
2	Presence of	Absent	Present	Major element

	exceptional items (incl. regional rarity)			
3	Organic preservation	Absent	Present	Major element
4	Potential for future archaeological investigation	Low	Medium	High
5	Potential for public display	Low	Medium	High
6	Aesthetic appeal	Low	Medium	High
7	Potential for implementation of a long-term management plan	Low	Medium	High

7.2 ASSESSING SITE VALUE BY ATTRIBUTE

Table 2 is adapted from Whitelaw (1997), who developed an approach for selecting sites meriting heritage recognition status in KwaZulu-Natal. It is a means of judging a site's archaeological value by ranking the relative strengths of a range of attributes (given in the second column of the table). While aspects of this matrix remain qualitative, attribute assessment is a good indicator of the general archaeological significance of a site, with Type 3 attributes being those of highest significance.

7.3 IMPACT STATEMENT

7.3.1 ASSESSMENT OF IMPACTS

A heritage resource impact may be broadly defined as the net change between the integrity of a heritage site with and without the proposed development. This change may be either beneficial or adverse.

Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource. For example, development may have a beneficial effect by preventing or lessening natural site erosion. Similarly, an action may serve to preserve a site for future investigation by covering it with a protective layer of fill. In other cases, the public or economic significance of an archaeological site may be enhanced by actions, which facilitate non-destructive public use. Although beneficial impacts are unlikely to occur frequently, they should be included in the assessment.

More commonly, the effects of a project on heritage sites are of an adverse nature.

Adverse impacts occur under conditions that include:

- (a) destruction or alteration of all or part of a heritage site;
- (b) isolation of a site from its natural setting; and
- (c) introduction of physical, chemical or visual elements that are out-of-character with the heritage resource and its setting.

Adverse effects can be more specifically defined as direct or indirect impacts. Direct impacts are the immediately demonstrable effects of a project which can be attributed to particular land modifying actions. They are directly caused by a project or its ancillary facilities and occur at the same time and place. The immediate consequences of a project action, such as slope failure following reservoir inundation, are also considered direct impacts.

Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon heritage sites. Increased vandalism of heritage sites, resulting from improved or newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.

Once all project related impacts are identified, it is necessary to determine their individual level-of-effect on heritage resources. This assessment is aimed at determining the extent or degree to which future opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. Therefore, the assessment provides a reasonable indication of the relative significance or importance of a particular impact. Normally, the assessment should follow site evaluation since it is important to know what heritage values may be adversely affected.

The assessment should include careful consideration of the following level-of-effect indicators, which are defined below:

- magnitude
- severity
- duration
- range
- frequency
- diversity
- cumulative effect
- rate of change

7.3.2 INDICATORS OF IMPACT SEVERITY

Magnitude

The amount of physical alteration or destruction, which can be expected. The resultant loss of heritage value is measured either in amount or degree of disturbance.

Severity

The irreversibility of an impact. Adverse impacts, which result in a totally irreversible and irretrievable loss of heritage value, are of the highest severity.

Duration

The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on heritage sites.

Range

The spatial distribution, whether widespread or site-specific, of an adverse impact.

Frequency

The number of times an impact can be expected. For example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or on-going nature.

Diversity

The number of different kinds of project-related actions expected to affect a heritage site.

Cumulative Effect

A progressive alteration or destruction of a site owing to the repetitive nature of one or more impacts.

Rate of Change

The rate at which an impact will effectively alter the integrity or physical condition of a heritage site. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.

The level-of-effect assessment should be conducted and reported in a quantitative and objective fashion. The methodological approach, particularly the system of ranking level-of-effect indicators, must be rigorously documented and recommendations should be made with respect to managing uncertainties in the assessment. (*Zubrow, Ezra B.A., 1984*).

7.3.3 PALEONTOLOGICAL SITES

Paleontology will be evaluated in a separate specialist report appended to this report.

7.3.4 POST-CONTACT SITES

No sites associated with the post-contact era will be affected by the proposed development.

7.3.5 BUILT ENVIRONMENT

The study area runs through numerous villages and built up areas. Several farm homesteads also fall within the study area. It is expected that the social consultants will facilitate this component of the study. All the areas are mostly of recent construction and only a few religious structures and some schools have any heritage value. The only other aspect that is of heritage significance are the community cemeteries.



Figure 62. Example of Built Environment

Cemeteries

Al together six community cemeteries could be affected by the construction of the power line. These are as follows;

Name	Location
Niga	25° 39' 10,7"S 25° 33' 37,1"E
Romatlabana	25° 38' 39,3"S 25° 32' 26,9"E
Khunotswana	25° 34' 21,7"S 25° 49' 02,7"E
Dinokana	25° 27' 07,1"S 25° 52' 37,2"E
Dinokana	25° 29' 48,7"S 25° 55' 59,7"E
Poosedumane	25° 17' 40,8"S 25° 55' 13,4"E



Figure 63. Example of a Community Graveyard

7.3.6 HISTORIC SIGNIFICANCE

Built Environment within the Study Area.

No	Criteria	Significance Rating
1	Are any of the identified sites or buildings associated with a historical person or group? N/A	N/A
2	Are any of the buildings or identified sites associated with a historical event? N/A	N/A
3	Are any of the identified sites or buildings associated with a religious, economic social or political or educational activity? N/A	N/A
4	Are any of the identified sites or buildings of archaeological significance? N/A	N/A
5	Are any of the identified buildings or structures older than 60 years?	N/A

	N/A	
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7.3.7 ARCHITECTURAL SIGNIFICANCE

No	Criteria	Rating
1	Are any of the buildings or structures an important example of a building type? N/A	N/A
2	Are any of the buildings outstanding examples of a particular style or period? N/A	N/A
3	Do any of the buildings contain fine architectural details and reflect exceptional craftsmanship? N/A	N/A
4	Are any of the buildings an example of an industrial, engineering or technological development? No	N/A
5	What is the state of the architectural and structural integrity of the building? N/A	N/A
6	Is the building's current and future use in sympathy with its original use (for which the building was designed)? N/A	N/A
7	Were the alterations done in sympathy with the original design? N/A	N/A
8	Were the additions and extensions done in sympathy with the original design? N/A	N/A
9	Are any of the buildings or structures the work of a major architect, engineer or builder? No	N/A

7.3.8 SPATIAL SIGNIFICANCE

Even though each building needs to be evaluated as a single artefact the site still needs to be evaluated in terms of its significance in its geographic area, city, town, village, neighbourhood or precinct. This set of criteria determines the spatial significance.

No	Criteria	Rating
1	Can any of the identified buildings or structures be considered a landmark in the town or city? No	N/A
2	Do any of the buildings contribute to the character of the neighborhood? No	N/A
3	Do any of the buildings contribute to the character of the square or streetscape?	

	No	N/A
4	<i>Do any of the buildings form part of an important group of buildings?</i> No	N/A

8. IMPACT EVALUATION

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

8.1 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 if 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 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.

8.2 IMPACT RATING SYSTEM

Impact assessment must take account of the nature, scale and duration of effects on the heritage 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 will be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

8.3 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:

NATURE		
Including a brief description of the impact of the heritage parameter being assessed in the context of the project. This criterion includes a brief written statement of the heritage 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 a heritage 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 heritage 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 heritage 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 heritage 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 heritage 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 Rating	Significance	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.

9. ASSESSMENT OF ANTICIPATED IMPACT OF THE DEVELOPMENT

9.1 PALEONTOLOGICAL SITES

IMPACT TABLE FORMAT		
Heritage component	<i>BOSA Power Line</i>	
Issue/Impact/Heritage Impact/Nature	Paleontological sites within the high risk (red areas) of the Paleo Sensitivity Map	
<i>Extent</i>	<i>Local</i>	
<i>Probability</i>	<i>Possible</i>	
<i>Reversibility</i>	<i>Irreversible</i>	
<i>Irreplaceable loss of resources</i>	<i>Significant loss of resources</i>	
<i>Duration</i>	<i>Medium term</i>	
<i>Cumulative effect</i>	<i>Medium cumulative effect</i>	
<i>Intensity/magnitude</i>	<i>High</i>	
<i>Significance Rating of Potential Impact</i>	<i>8 points. The impact will have a low negative impact rating.</i>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	4	2
Irreplaceable loss	3	1
Duration	2	2
Cumulative effect	3	1
Intensity/magnitude	3	1
Significance rating	48 (Medium negative)	8 (low negative)
Mitigation measure	<i>The final pylon placements should be subjected to a Walk-Down Survey to verify that no sites will be affected.</i>	

9.2 STONE AGE

IMPACT TABLE FORMAT		
Heritage component	<i>BOSA Power Line</i>	
Issue/Impact/Heritage Impact/Nature	Stone Age Sites	
<i>Extent</i>	<i>Local</i>	
<i>Probability</i>	<i>Possible</i>	
<i>Reversibility</i>	<i>Irreversible</i>	
<i>Irreplaceable loss of resources</i>	<i>Significant loss of resources</i>	
<i>Duration</i>	<i>Medium term</i>	
<i>Cumulative effect</i>	<i>Medium cumulative effect</i>	
<i>Intensity/magnitude</i>	<i>High</i>	
<i>Significance Rating of Potential Impact</i>	<i>8 points. The impact will have a low negative impact rating.</i>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	4	2
Irreplaceable loss	3	1
Duration	2	2
Cumulative effect	3	1
Intensity/magnitude	3	1
Significance rating	48 (Medium negative)	8 (low negative)
Mitigation measure	<i>The final pylon placements should be subjected to a Walk-Down Survey to verify that no sites will be affected.</i>	

9.3 IRON AGE

IMPACT TABLE FORMAT	
Heritage component	<i>BOSA Power Line</i>
Issue/Impact/Heritage Impact/Nature	Iron Age Sites
<i>Extent</i>	<i>Local</i>
<i>Probability</i>	<i>Possible</i>

<i>Reversibility</i>	<i>Irreversible</i>	
<i>Irreplaceable loss of resources</i>	<i>Significant loss of resources</i>	
<i>Duration</i>	<i>Medium term</i>	
<i>Cumulative effect</i>	<i>Medium cumulative effect</i>	
<i>Intensity/magnitude</i>	<i>High</i>	
<i>Significance Rating of Potential Impact</i>	<i>8 points. The impact will have a low negative impact rating.</i>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	4	2
Irreplaceable loss	3	1
Duration	2	2
Cumulative effect	3	1
Intensity/magnitude	3	1
Significance rating	48 (Medium negative)	8 (low negative)
Mitigation measure	<i>The final pylon placements should be subjected to a Walk-Down Survey to verify that no sites will be affected.</i>	

9.4 BUILT ENVIRONMENT

IMPACT TABLE FORMAT	
Heritage component	<i>BOSA Power Line</i>
Issue/Impact/Heritage Impact/Nature	Built Environment
<i>Extent</i>	<i>Local</i>
<i>Probability</i>	<i>Possible</i>
<i>Reversibility</i>	<i>Irreversible</i>
<i>Irreplaceable loss of resources</i>	<i>Significant loss of resources</i>
<i>Duration</i>	<i>Medium term</i>
<i>Cumulative effect</i>	<i>Medium cumulative effect</i>
<i>Intensity/magnitude</i>	<i>High</i>
<i>Significance Rating of Potential Impact</i>	<i>8 points. The impact will have a low negative impact rating.</i>

	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	4	2
Irreplaceable loss	3	1
Duration	2	2
Cumulative effect	3	1
Intensity/magnitude	3	1
Significance rating	48 (Medium negative)	8 (low negative)
Mitigation measure	<i>The final pylon placements should be subjected to a Walk-Down Survey to verify that no sites will be affected.</i>	

9.5 BURIAL SITES

IMPACT TABLE FORMAT		
Heritage component	<i>BOSA Power Line</i>	
Issue/Impact/Heritage Impact/Nature	<i>Burial Sites</i>	
<i>Extent</i>	<i>Local</i>	
<i>Probability</i>	<i>Possible</i>	
<i>Reversibility</i>	<i>Irreversible</i>	
<i>Irreplaceable loss of resources</i>	<i>Significant loss of resources</i>	
<i>Duration</i>	<i>Medium term</i>	
<i>Cumulative effect</i>	<i>Medium cumulative effect</i>	
<i>Intensity/magnitude</i>	<i>High</i>	
<i>Significance Rating of Potential Impact</i>	<i>8 points. The impact will have a low negative impact rating.</i>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	4	2
Irreplaceable loss	3	1
Duration	2	2

Cumulative effect	3	1
Intensity/magnitude	3	1
Significance rating	48 (Medium negative)	8 (low negative)
Mitigation measure	<i>The final pylon placements should be subjected to a Walk-Down Survey to verify that no sites will be affected.</i>	

9.6 ASSESSING VISUAL IMPACT

Visual impacts of developments result when sites that are culturally celebrated are visually affected by a development. The exact parameters for the determination of visual impacts have not yet been rigidly defined and are still mostly open to interpretation. CNdV Architects and The Department of Environmental Affairs and Development Planning (2006) have developed some guidelines for the management of the visual impacts of wind turbines in the Western Cape, although these have not yet been formalised. In these guidelines they recommend a buffer zone of 1km around significant heritage sites to minimise the visual impact.

Since the project will mainly involve sub-surface infrastructure it is not anticipated that any visual impacts will be encountered. Pump stations will also be of low profile and will therefore have a minimum of impact.

9.7 ASSUMPTIONS AND RESTRICTIONS

- It is assumed that the South African Heritage Resources Information System (SAHRIS) database locations are correct
- It is assumed that the paleontological information collected for the project is comprehensive.
- It is assumed that the social impact assessment and public participation process of the Basic Assessment will result in the identification of any intangible sites of heritage potential.

9.8 CULTURAL LANDSCAPE

The following landscape types were identified during the study.

Landscape Type	Description	Occurrence still possible?	Identified on site?
1 Paleontological	Mostly fossil remains. Remains include microbial fossils such as found in Barberton Greenstones	Yes, sub-surface	No
2 Archaeological	Evidence of human occupation associated with the following phases – Early-, Middle-, Late Stone Age, Early-, Late Iron Age, Pre-Contact Sites, Post-Contact Sites	Yes, sub-surface	No
3 Historic Built Environment	<ul style="list-style-type: none"> - Historical townscapes/streetscapes - Historical structures; i.e. older than 	Yes	Yes

	60 years - Formal public spaces - Formally declared urban conservation areas - Places associated with social identity/displacement		
4 Historic Farmland	These possess distinctive patterns of settlement and historical features such as: - Historical farm yards - Historical farm workers villages/settlements - Irrigation furrows - Tree alignments and groupings - Historical routes and pathways - Distinctive types of planting - Distinctive architecture of cultivation e.g. planting blocks, trellising, terracing, ornamental planting.	Yes	No
5 Historic rural town	- Historic mission settlements - Historic townscapes	Yes	No
6 Pristine natural landscape	- Historical patterns of access to a natural amenity - Formally proclaimed nature reserves - Evidence of pre-colonial occupation - Scenic resources, e.g. view corridors, viewing sites, visual edges, visual linkages - Historical structures/settlements older than 60 years - Pre-colonial or historical burial sites - Geological sites of cultural significance.	Yes	No
7 Relic Landscape	- Past farming settlements - Past industrial sites - Places of isolation related to attitudes to medical treatment - Battle sites - Sites of displacement,	No	No
8 Burial grounds and grave sites	- Pre-colonial burials (marked or unmarked, known or unknown) - Historical graves (marked or unmarked, known or unknown) - Graves of victims of conflict - Human remains (older than 100 years) - Associated burial goods (older than 100 years) - Burial architecture (older than 60	Yes	No

	years)		
9 Associated Landscapes	<ul style="list-style-type: none"> - Sites associated with living heritage e.g. initiation sites, harvesting of natural resources for traditional medicinal purposes - Sites associated with displacement & contestation - Sites of political conflict/struggle - Sites associated with an historic event/person - Sites associated with public memory 	No	No
10 Historical Farmyard	<ul style="list-style-type: none"> - Setting of the yard and its context - Composition of structures - Historical/architectural value of individual structures - Tree alignments - Views to and from - Axial relationships - System of enclosure, e.g. defining walls - Systems of water reticulation and irrigation, e.g. furrows - Sites associated with slavery and farm labour - Colonial period archaeology 	No	No
11 Historic institutions	<ul style="list-style-type: none"> - Historical prisons - Hospital sites - Historical school/reformatory sites - Military bases 	No	No
12 Scenic visual	<ul style="list-style-type: none"> - Scenic routes 	No	No
13 Amenity landscape	<ul style="list-style-type: none"> - View sheds - View points - Views to and from - Gateway conditions - Distinctive representative landscape conditions - Scenic corridors 	No	No

Mitigation

It is recommended that the development designs consider the positive and negative characteristics of the existing cultural landscape type and that they endeavor to promote the positive aspects while at the same time mitigating the negative aspects.

10. RESOURCE MANAGEMENT RECOMMENDATIONS

Although unlikely, sub-surface remains of heritage sites could still be encountered

during the construction activities associated with the project. Such sites would offer no surface indication of their presence due to the high state of alterations in some areas as well as heavy plant cover in other areas. The following indicators of unmarked sub-surface sites could be encountered:

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
- Bone concentrations, either animal or human;
- Ceramic fragments such as pottery shards either historic or pre-contact;
- Stone concentrations of any formal nature.

The following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above:

- All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered.
- All construction in the immediate vicinity (50m radius of the site) should cease.
- The heritage practitioner should be informed as soon as possible.
- In the event of obvious human remains the South African Police Services (SAPS) should be notified.
- Mitigation measures (such as refilling etc.) should not be attempted.
- The area in a 50m radius of the find should be cordoned off with hazard tape.
- Public access should be limited.
- The area should be placed under guard.
- No media statements should be released until such time as the heritage practitioner has had sufficient time to analyze the finds.

11. CONCLUSION

A large corridor has been identified as the proposed route for the power line. The line can still be designed to follow any path within this designated corridor. The surface area of the total corridor with buffer zone is 73 245ha. It was found that a survey of the required resolution for the complete corridor would be impractical and prohibitively expensive. The Lidar Data and spot surveys on the ground was used to determine if there would be any no-go or red flag areas within the corridor that would be totally excluded. No sites of such high significance were found within the corridor.

It is therefore recommended that the line undergoes a final walk-down review once the exact pylon placements have been determined. The actual footprint of the pylons is relatively small and can be easily shifted should it be found that they are located exactly over a site of high heritage significance.

No sites were found that could result in a fatal flaw.

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13. HISTORICAL MAPS

Typographical Maps 2525 DA 1968, 1980, 1996

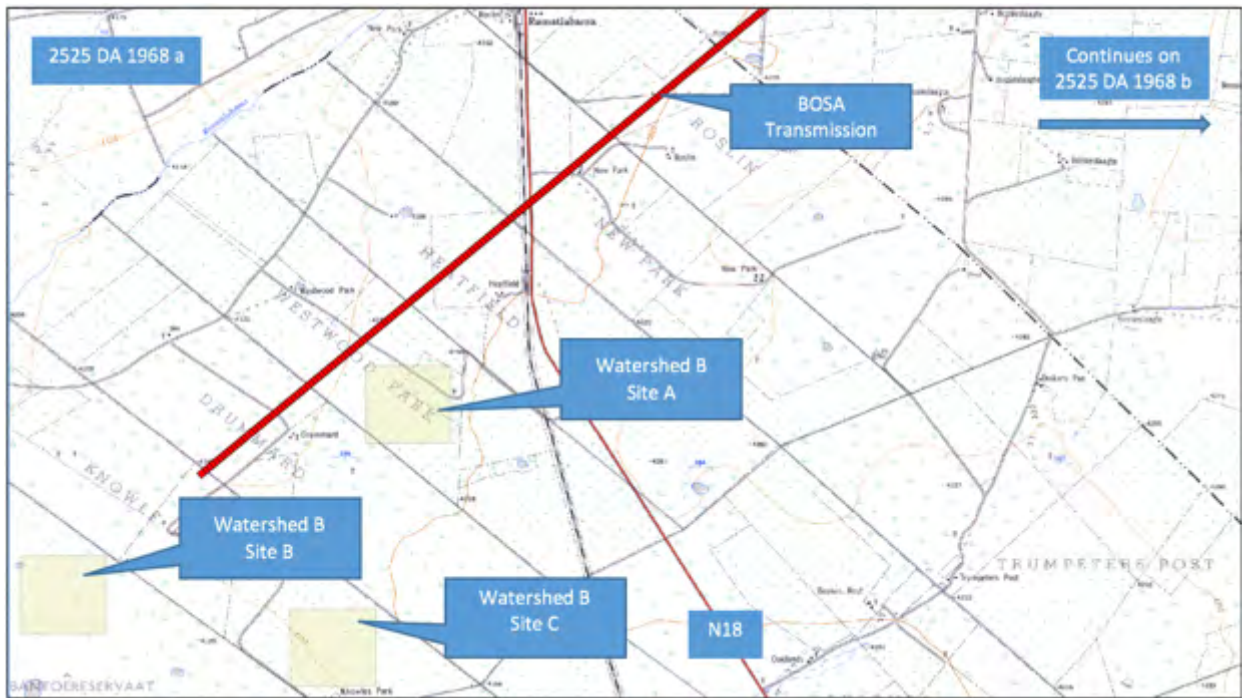


Figure 64. 2525 DA 1968 a



Figure 65. 2525 DA 1968 b

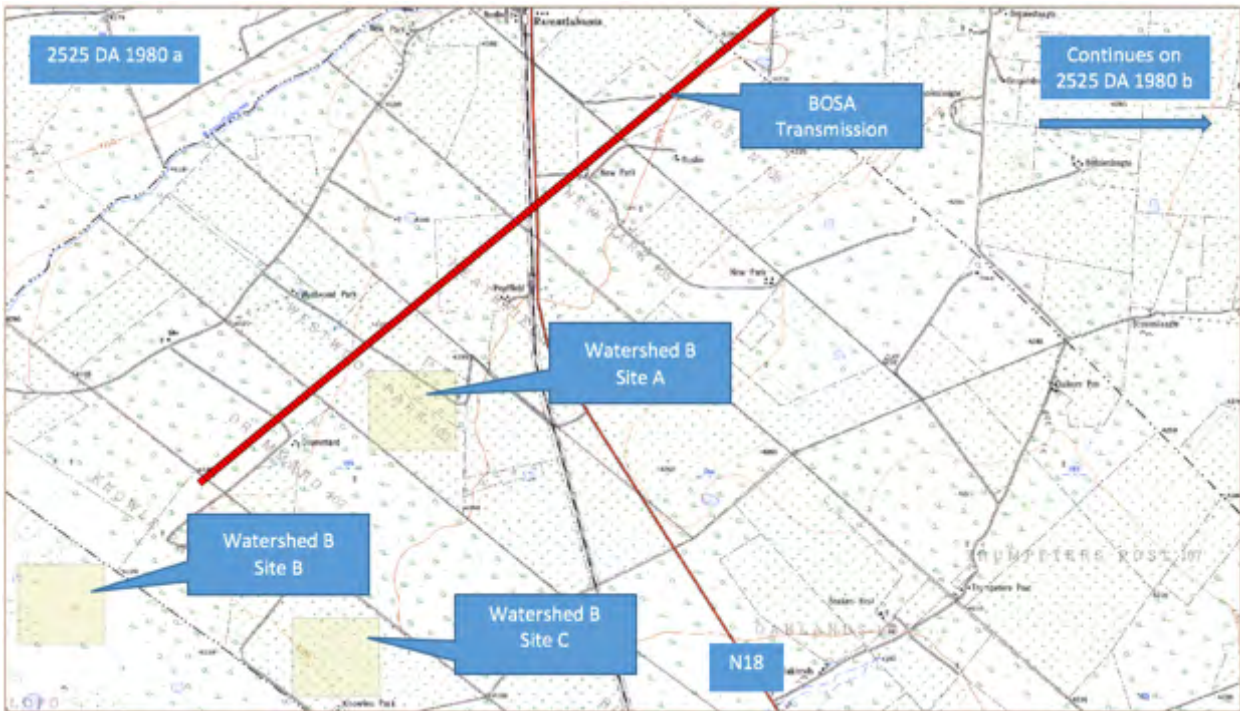


Figure 66. 2525 DA 1980 a



Figure 67. 2525 DA 1980 b

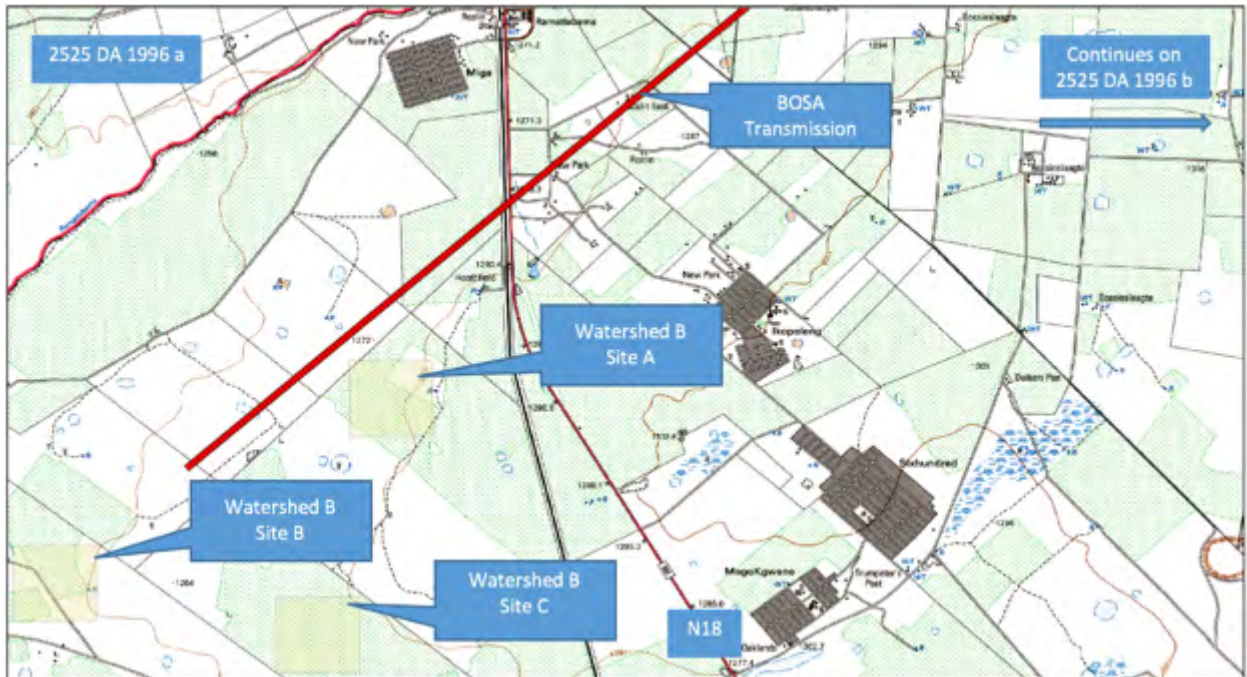


Figure 68. 2525 DA 1996 a



Figure 69. 2525 DA 1996 b

Typographical Maps 2525 DB 1968, 1980, 1996

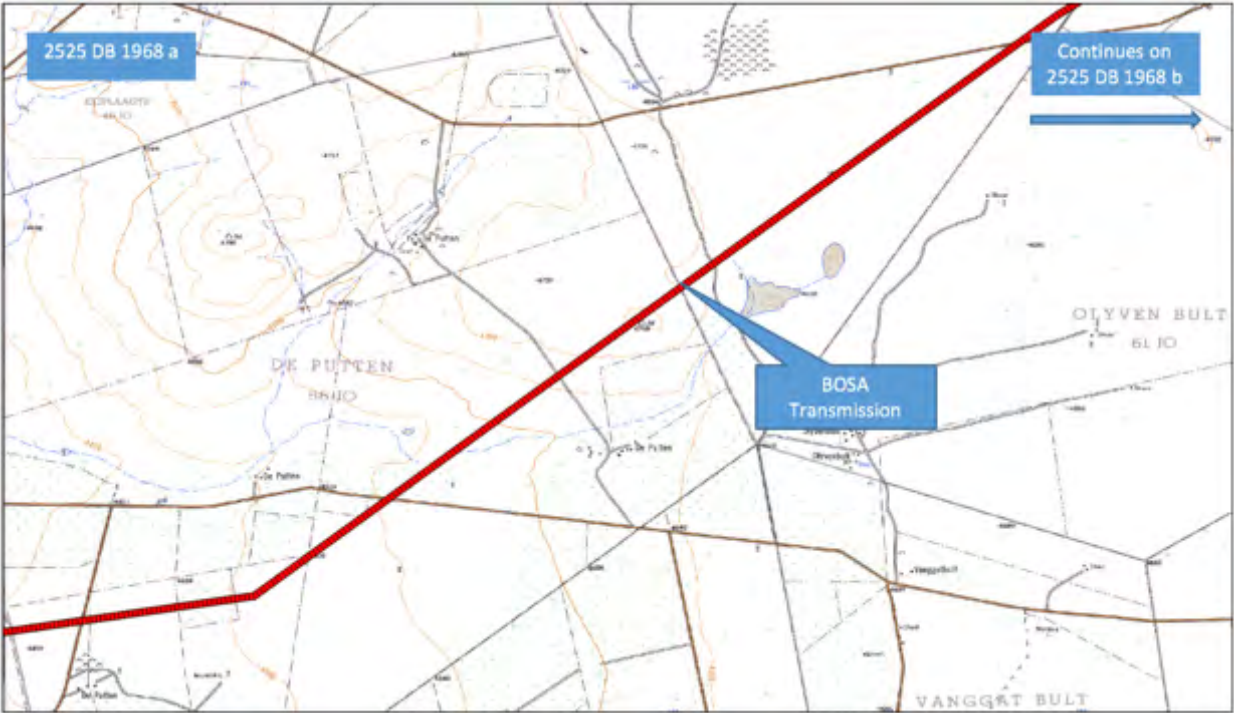


Figure 70. 2525 DB 1968 a

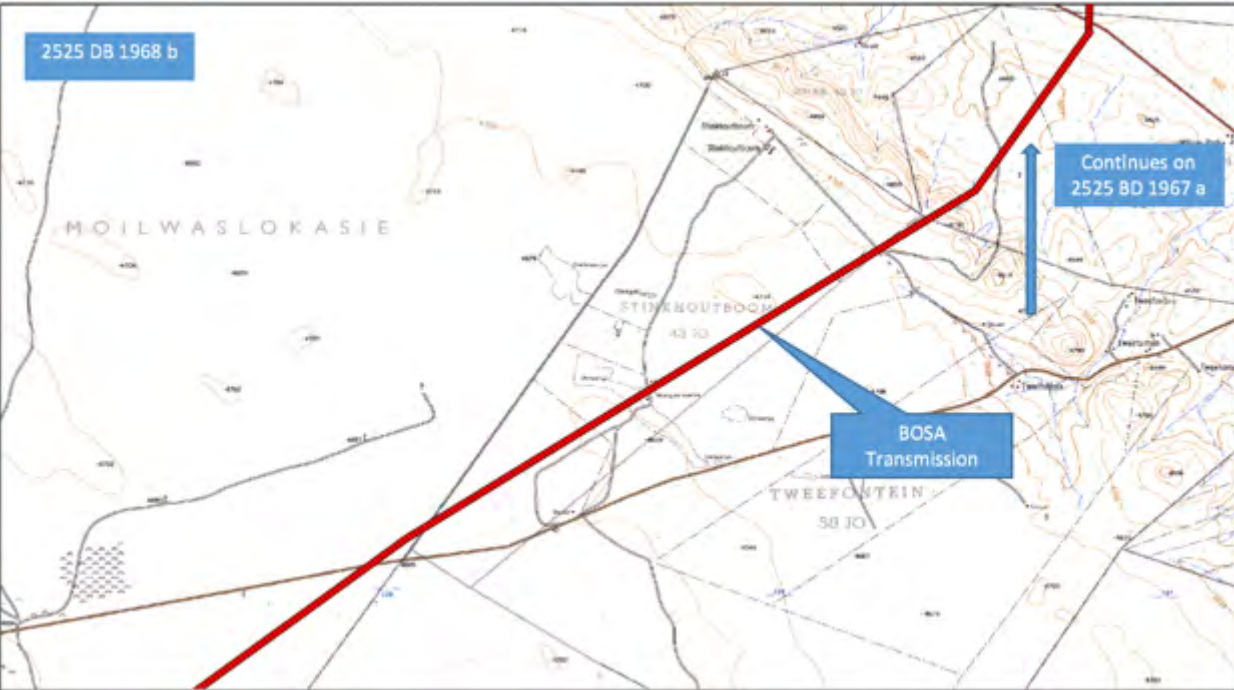


Figure 71. 2525 DB 1968 b

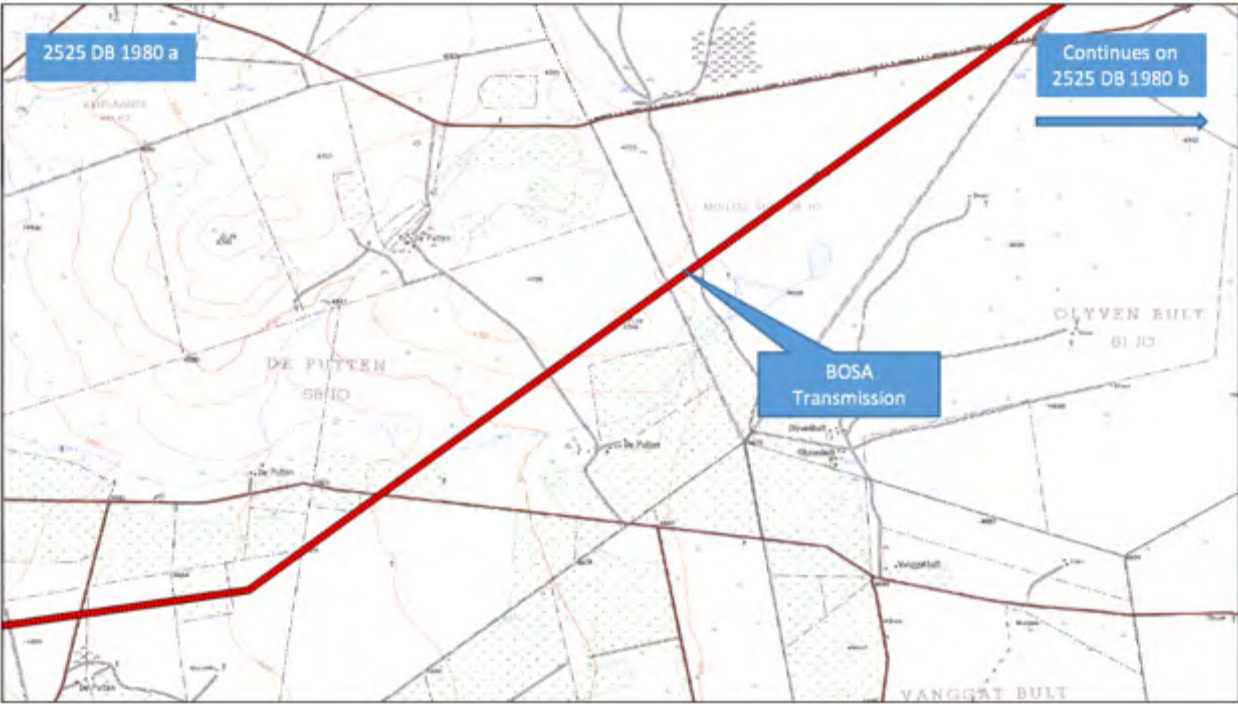


Figure 72. 2525 DB 1980 a

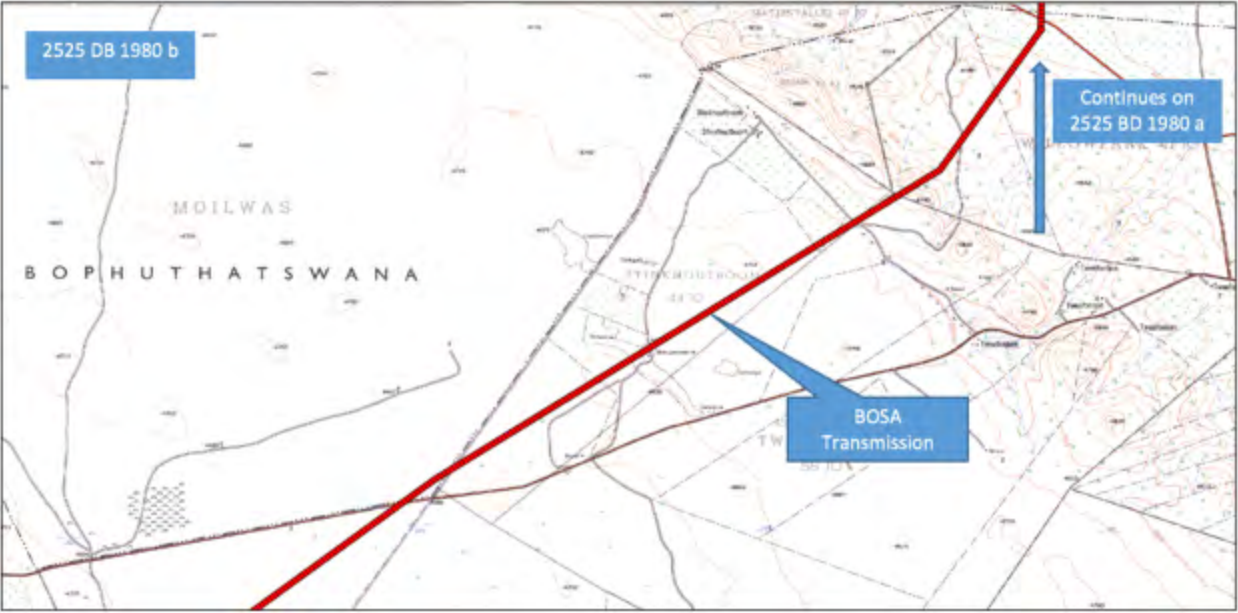


Figure 73. 2525 DB 1980 b

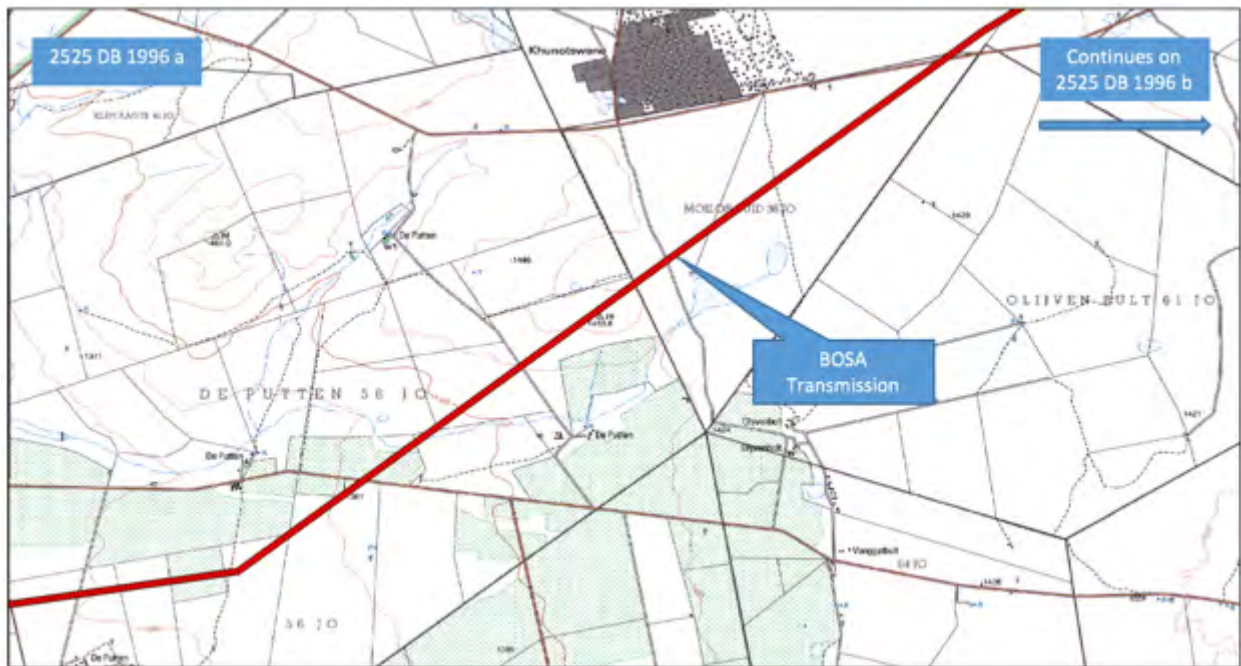


Figure 74. 2525 DB 1996 a

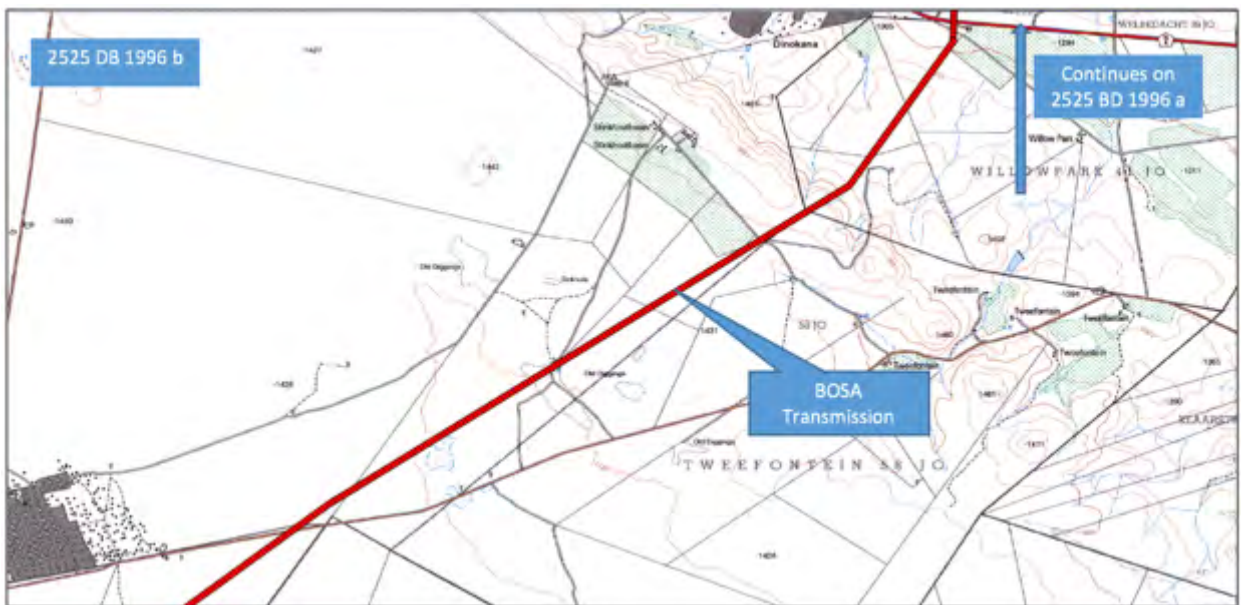


Figure 75. 2525 DB 1996 b

Typographical Maps 2525 BD 1967, 1980, 1996

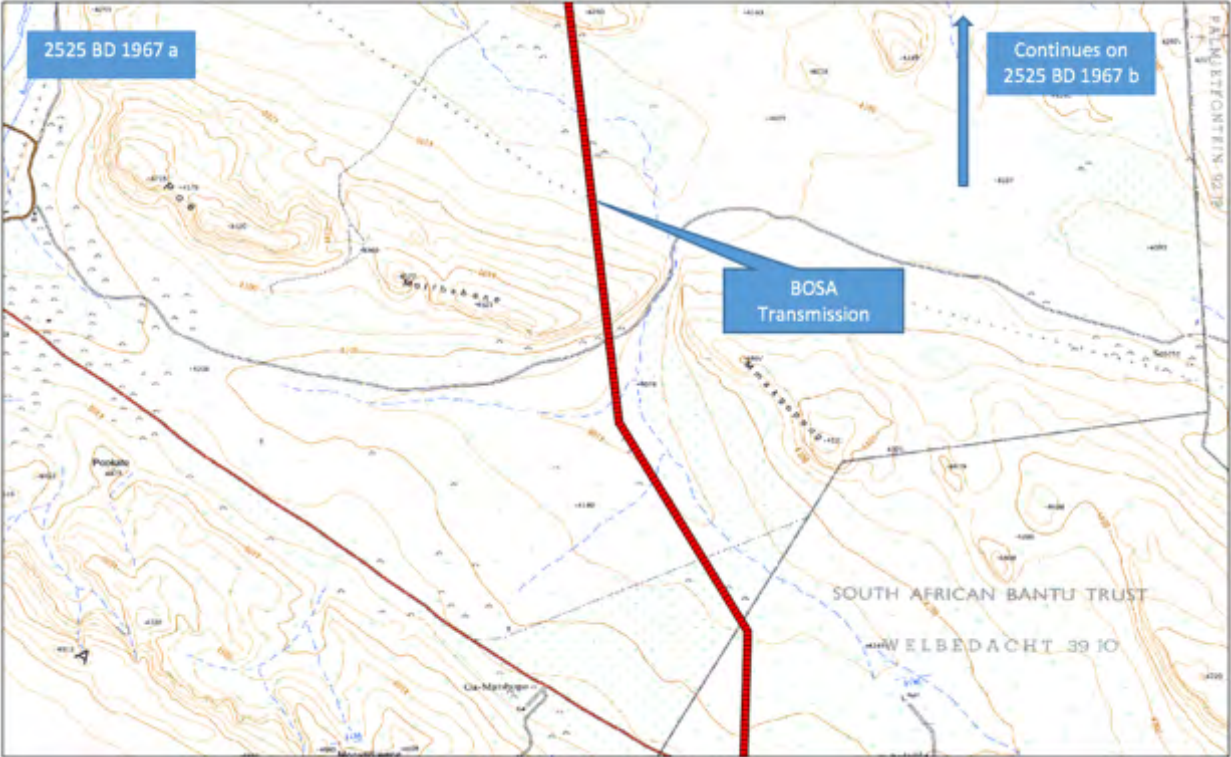


Figure 76. 2525 BD 1967 a

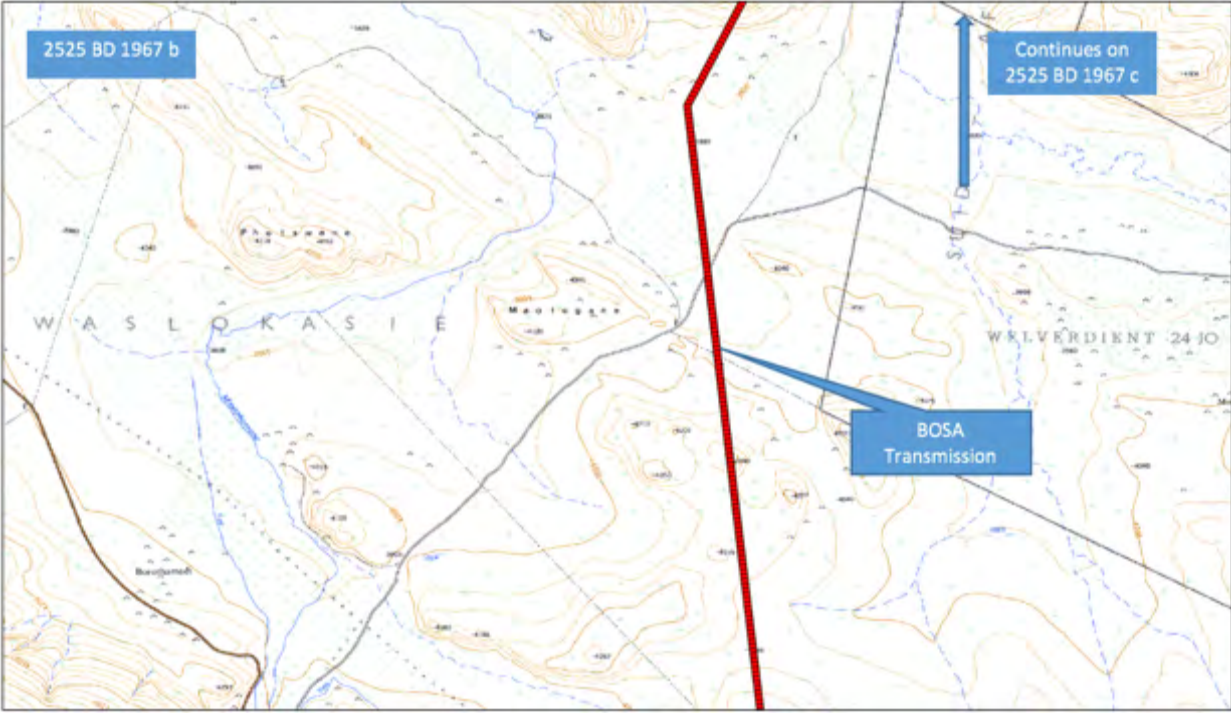


Figure 77. 2525 BD 1967 b

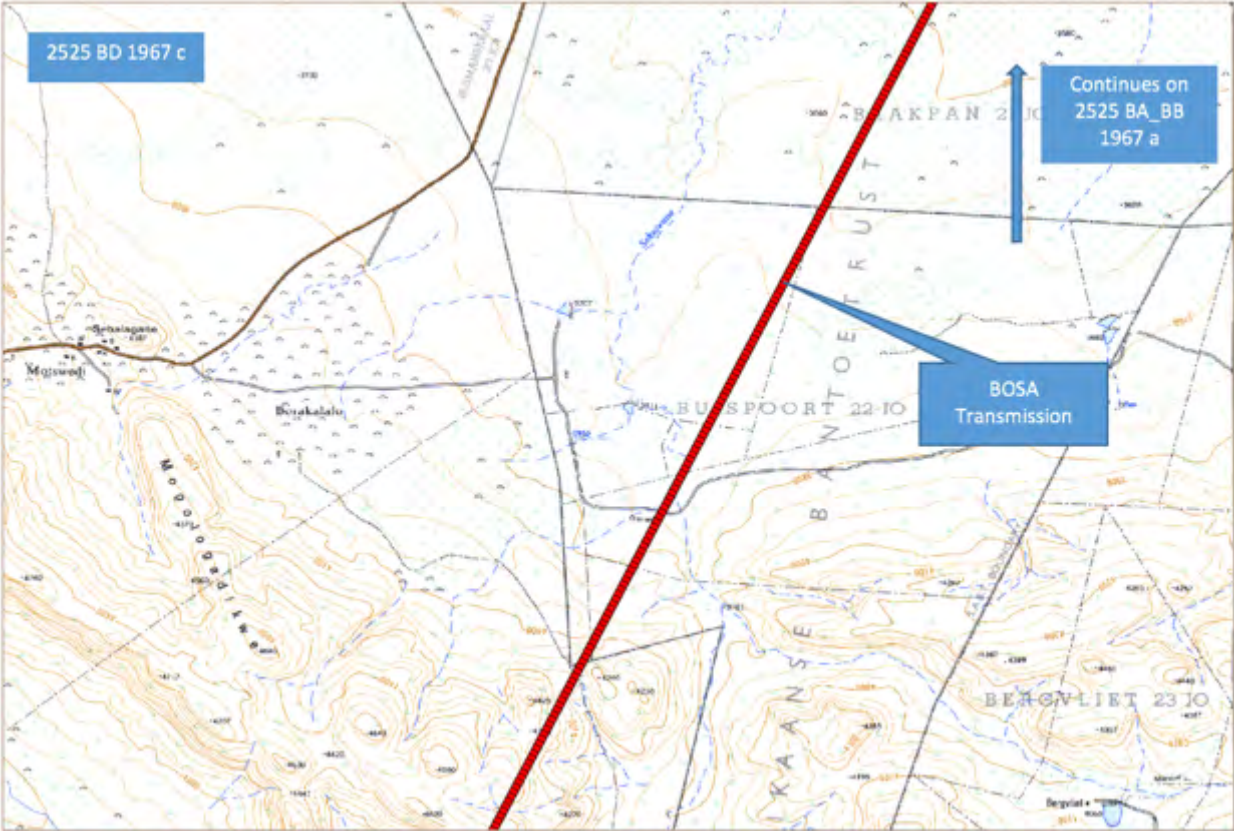


Figure 78. 2525 BD 1967 c

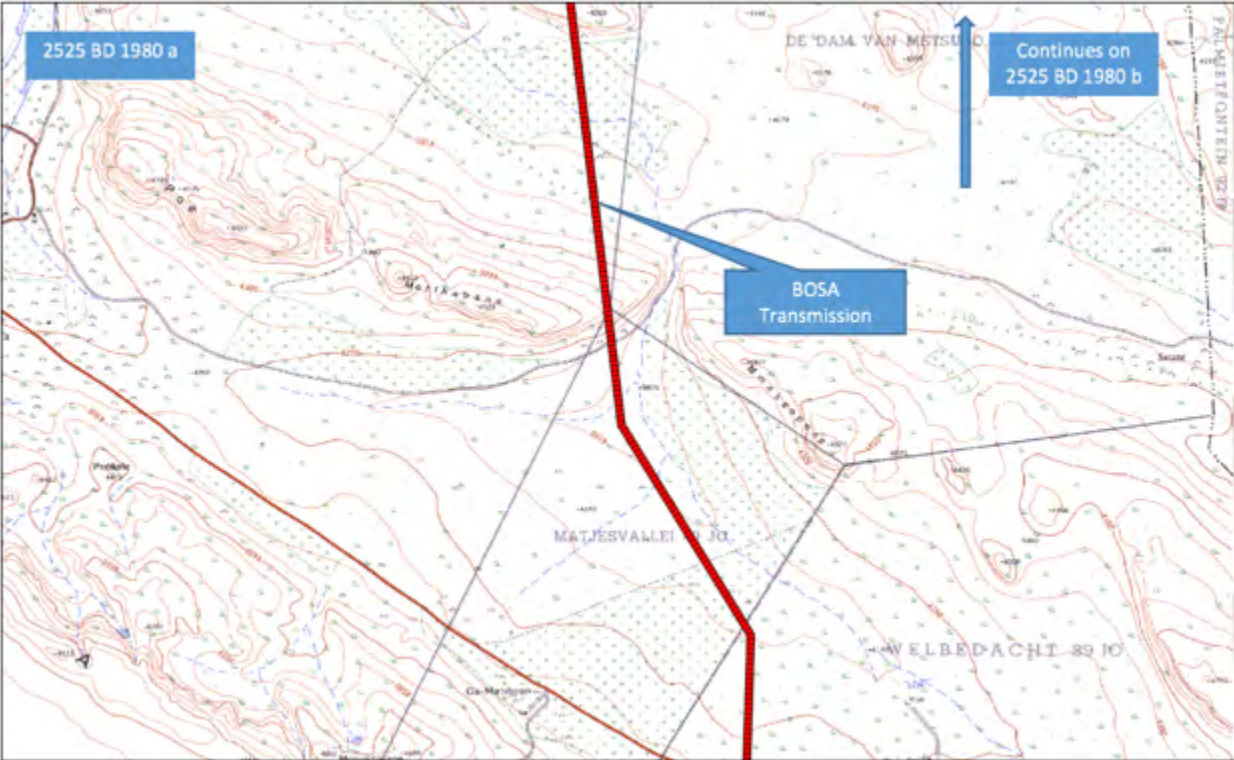


Figure 79. 2525 BD 1980 a

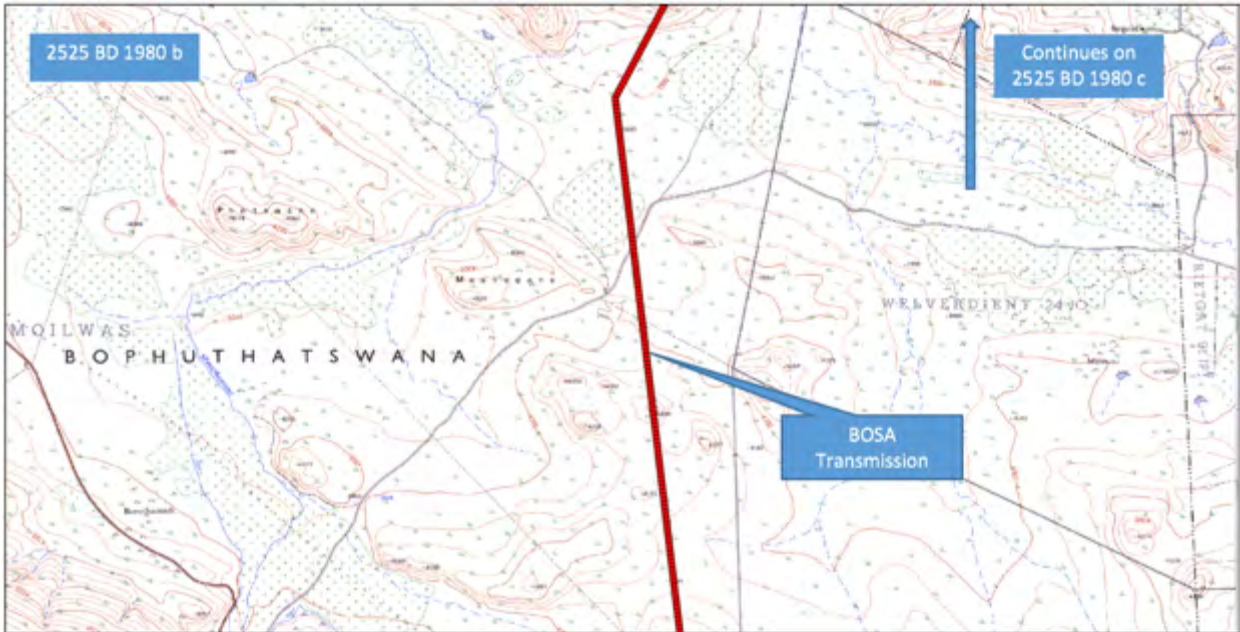


Figure 80. 2525 BD 1980 b

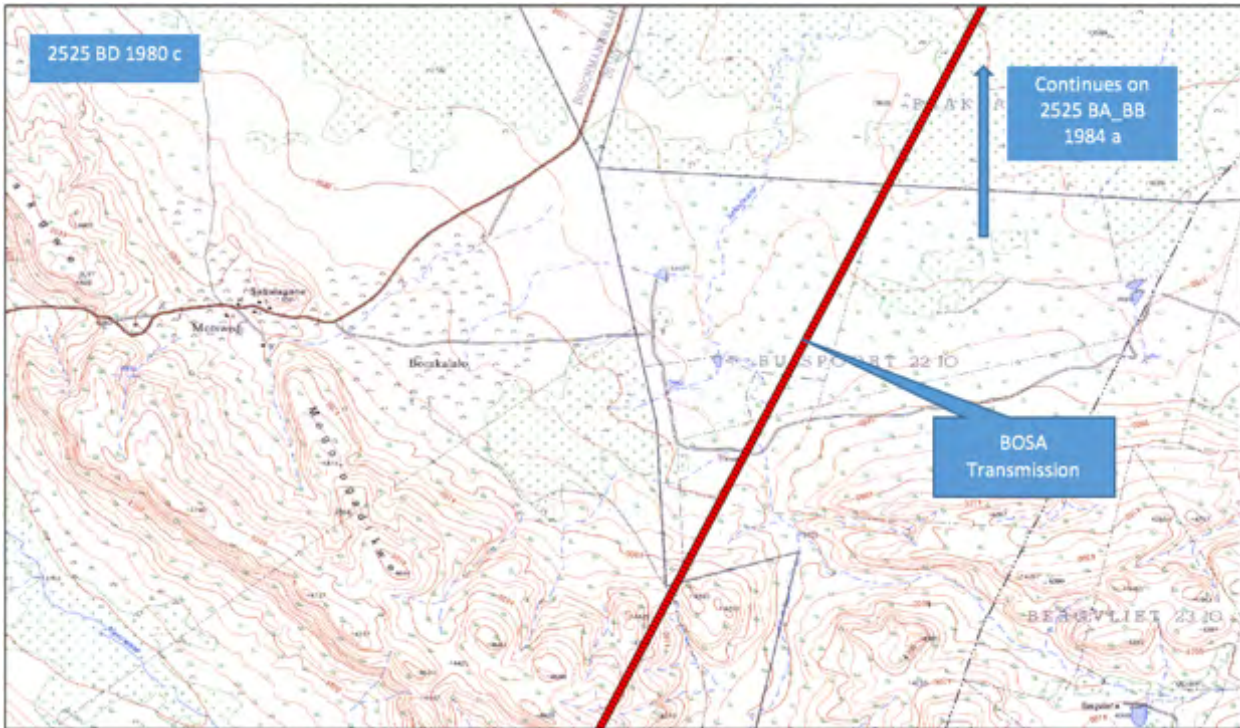


Figure 81. 2525 BD 1980 c

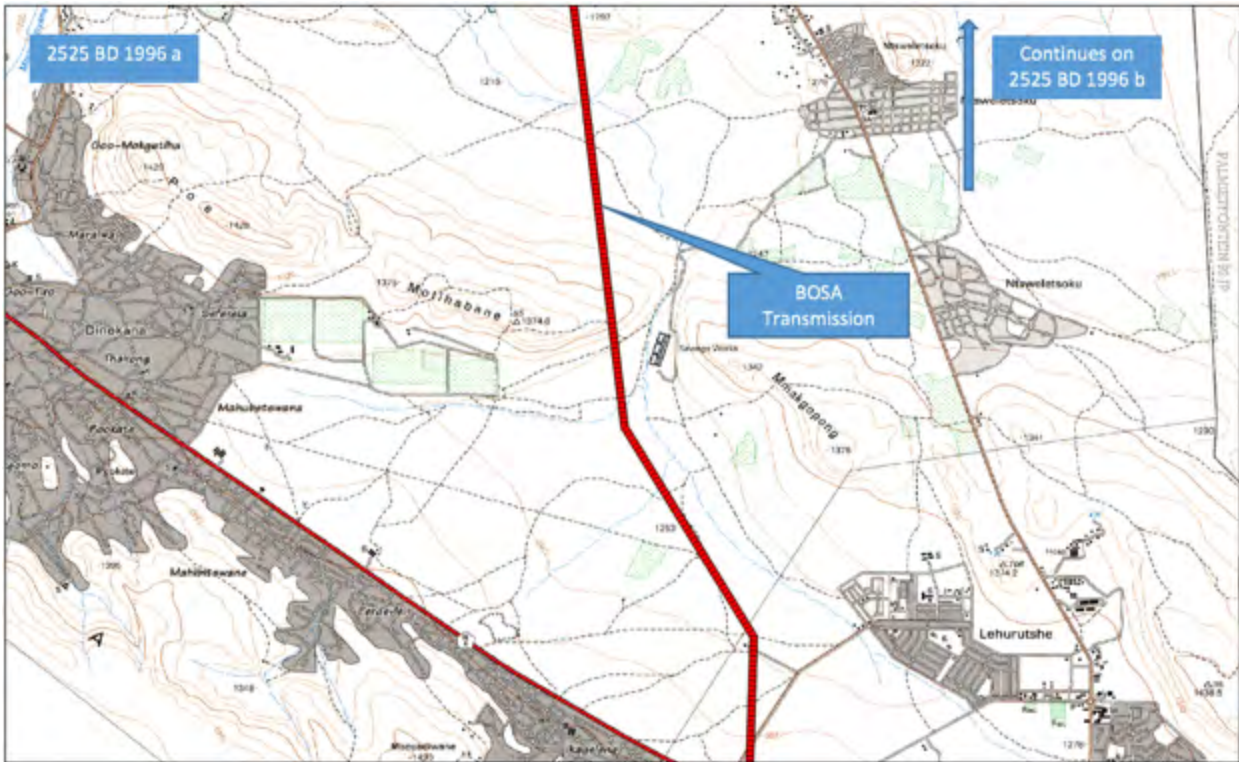


Figure 82. 2525 BD 1996 a

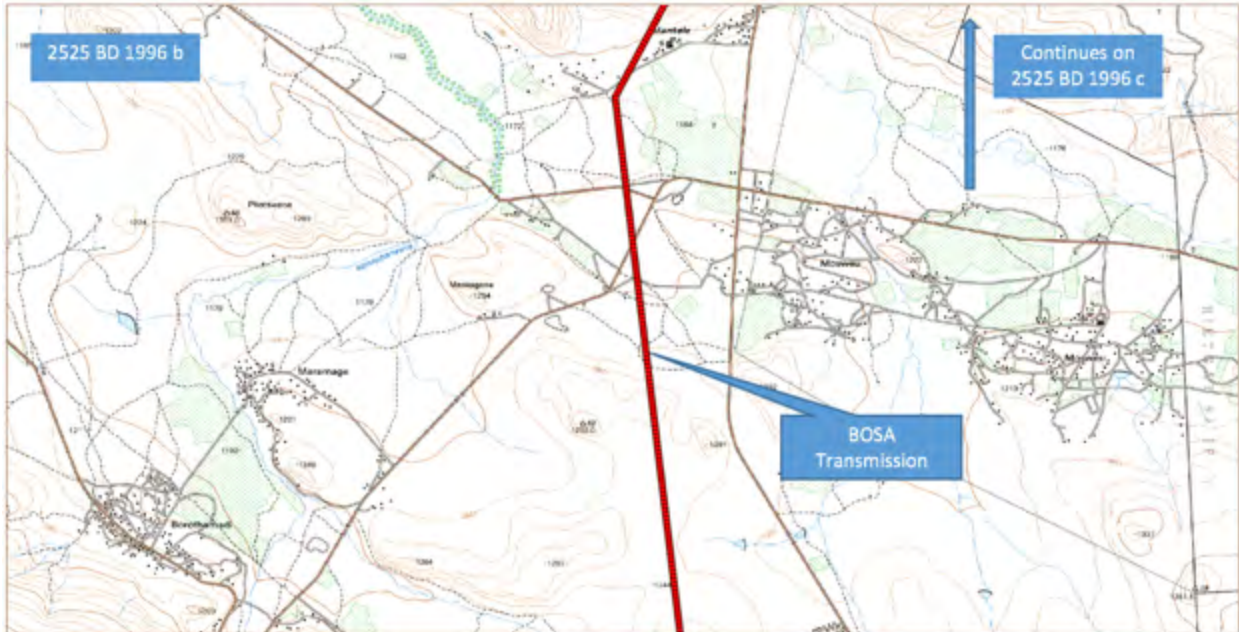


Figure 83. 2525 BD 1996 b

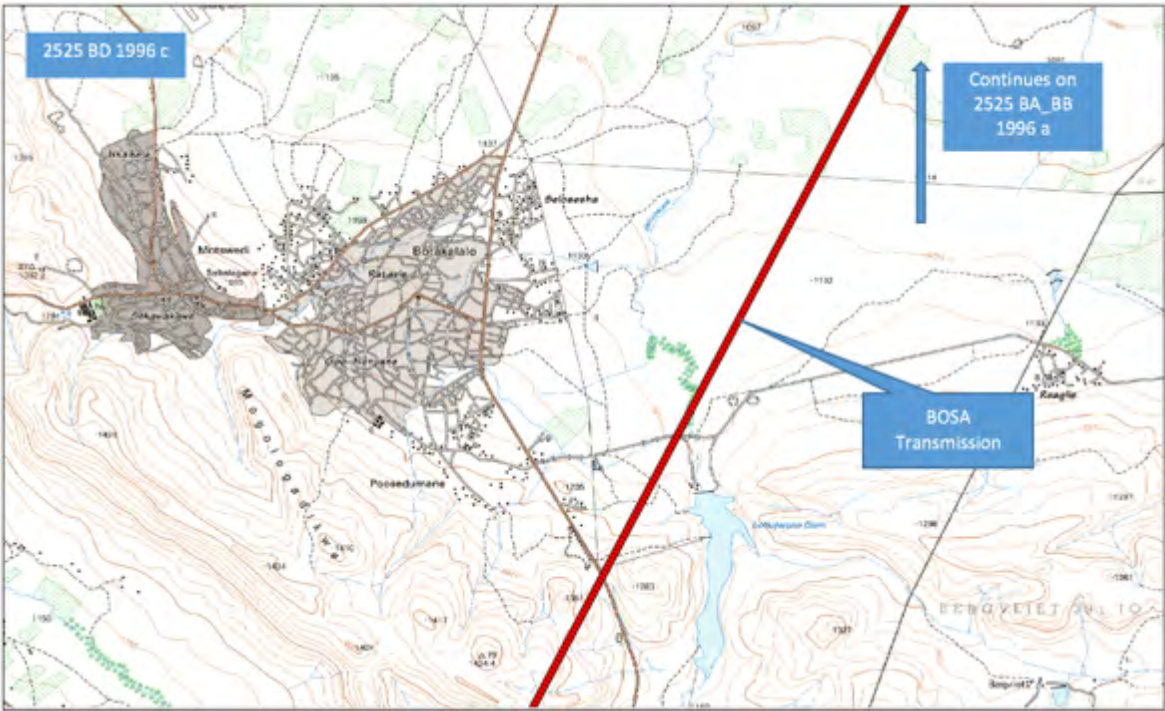


Figure 84. 2525 BD 1996 c

Typographical Maps 2525 BA_BB 1967, 1984, 1996



Figure 85. 2525 BA_BB 1967 a

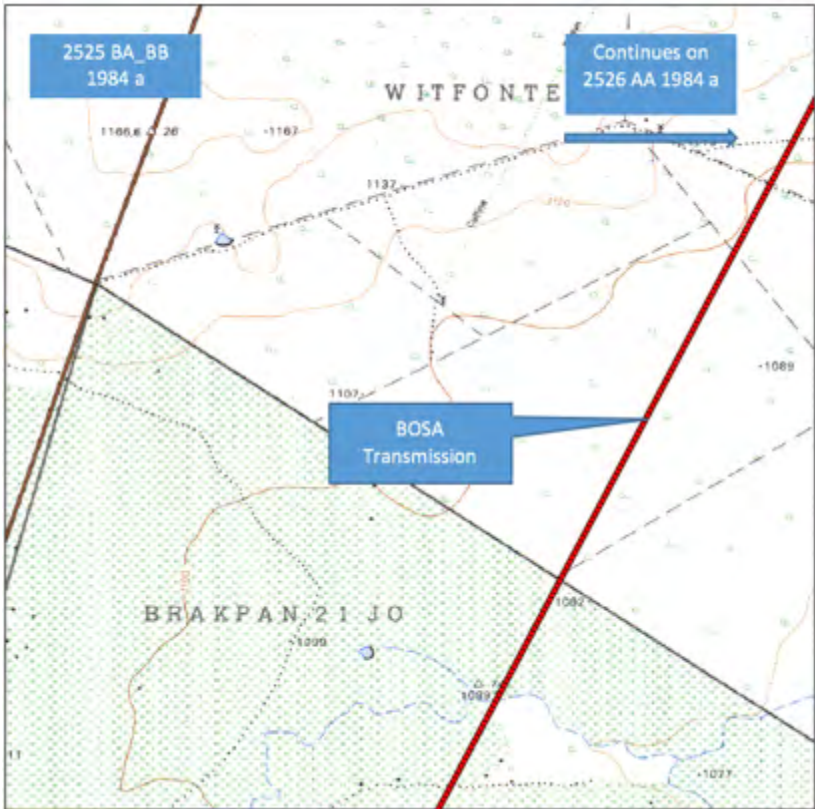


Figure 86. 2525 BA_BB 1984 a

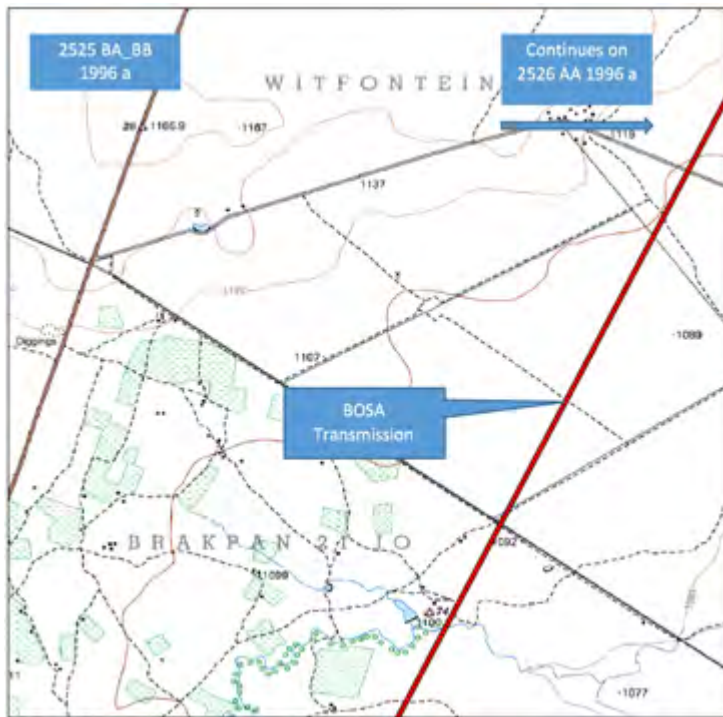


Figure 87. 2525 BA_BB 1996 a

Typographical Maps 2526 AA 1967, 1984, 1996



Figure 88. 2526 AA 1967 a

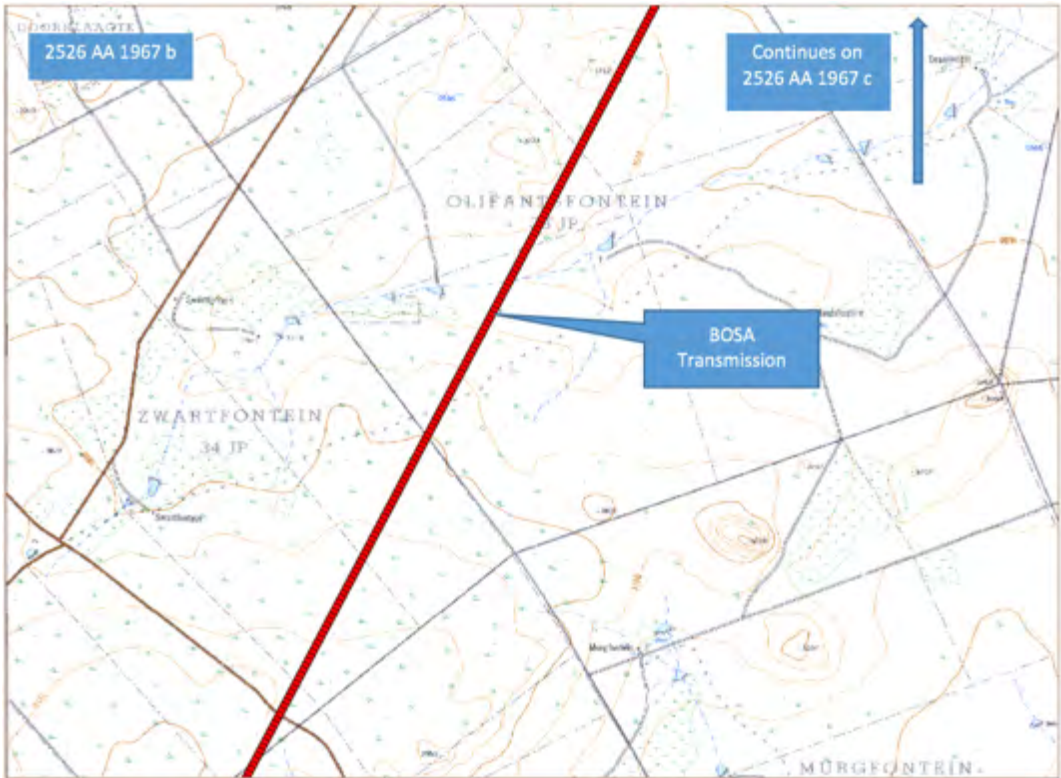


Figure 89. 2526 AA 1967 b

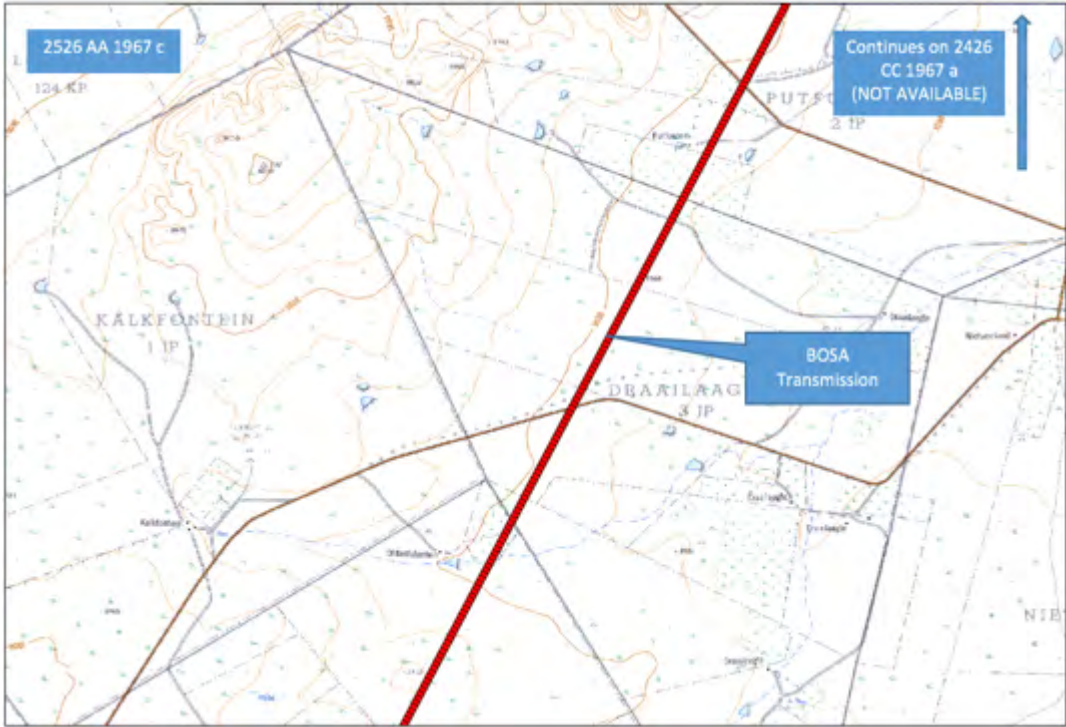


Figure 90. 2525 AA 1967 c



Figure 91. 2526 AA 1984 a

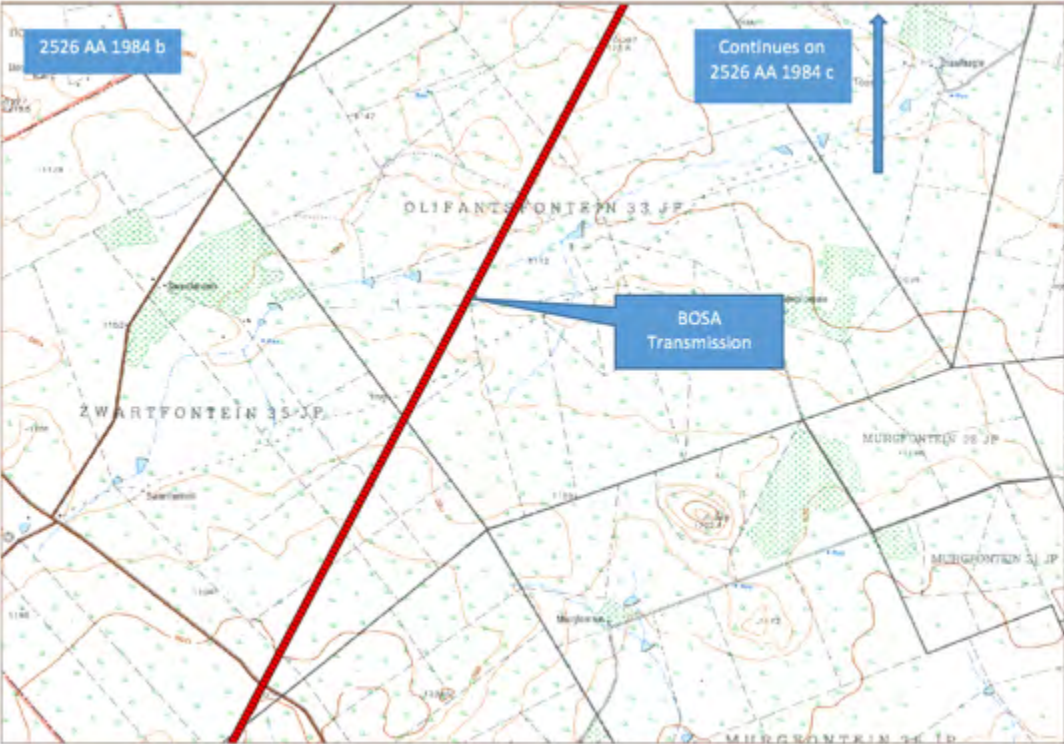


Figure 92. 2526 AA 1984 b

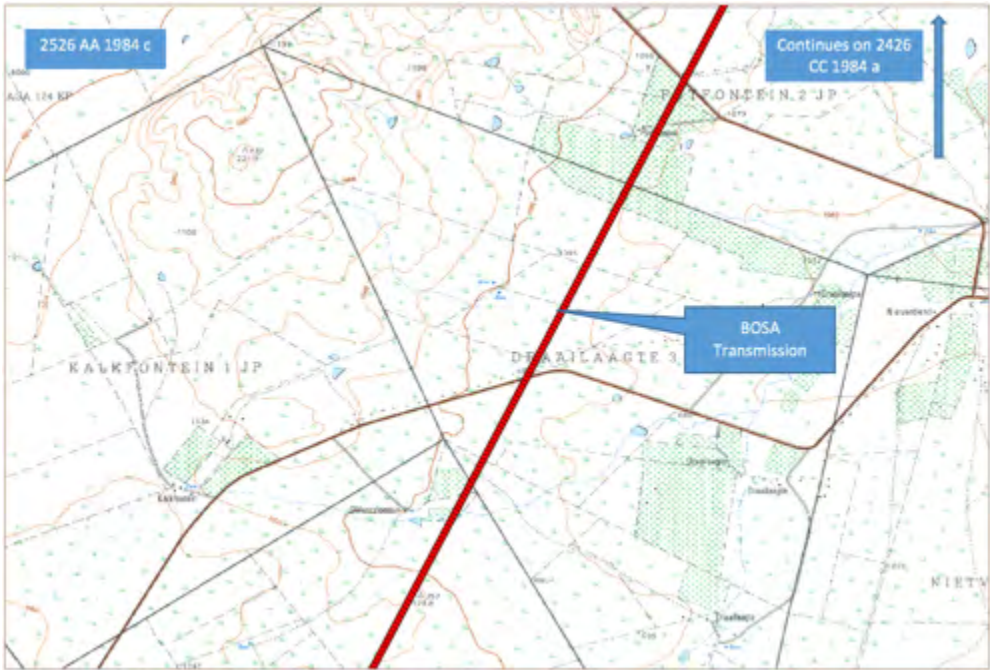


Figure 93. 2526 AA 1984 c

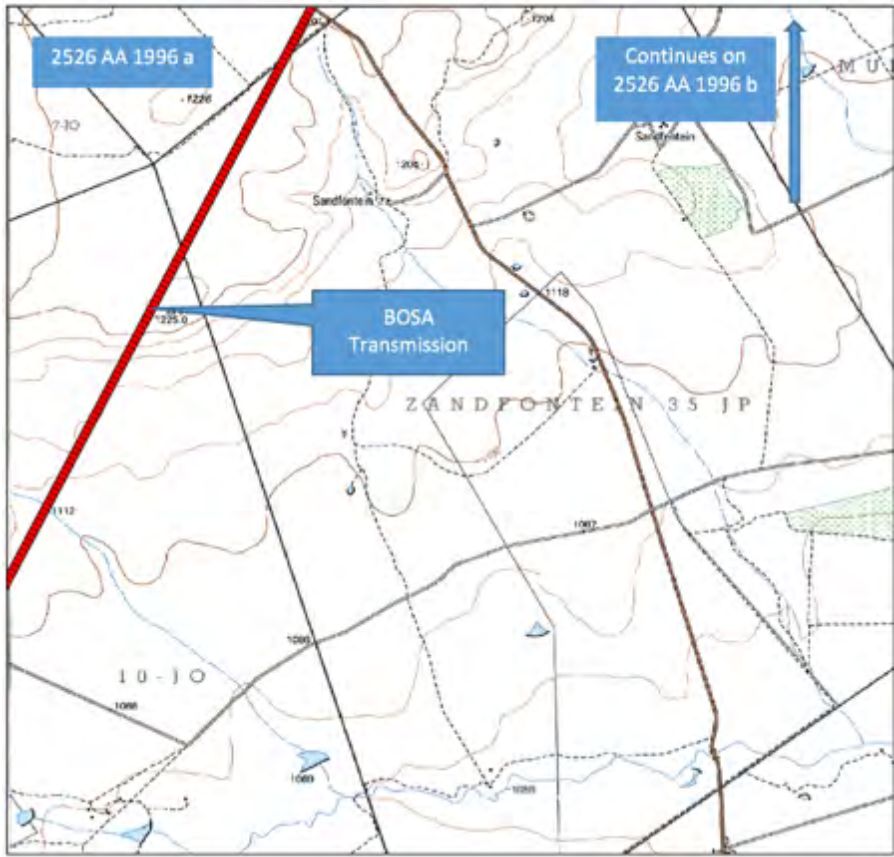


Figure 94. 2526 AA 1996 a



Figure 95. 2526 AA 1996 b



Figure 96. 2526 AA 1996 c

Typographical Maps 2426 CC 1984

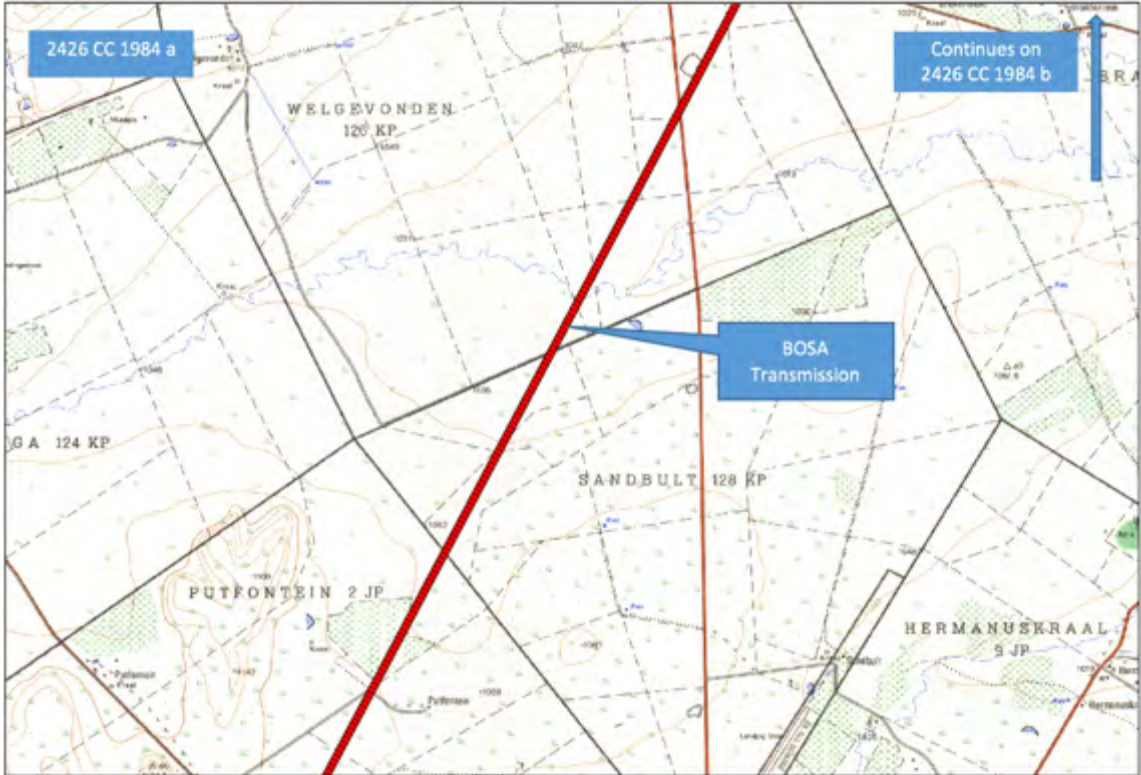


Figure 97. 2426 CC 1984 a

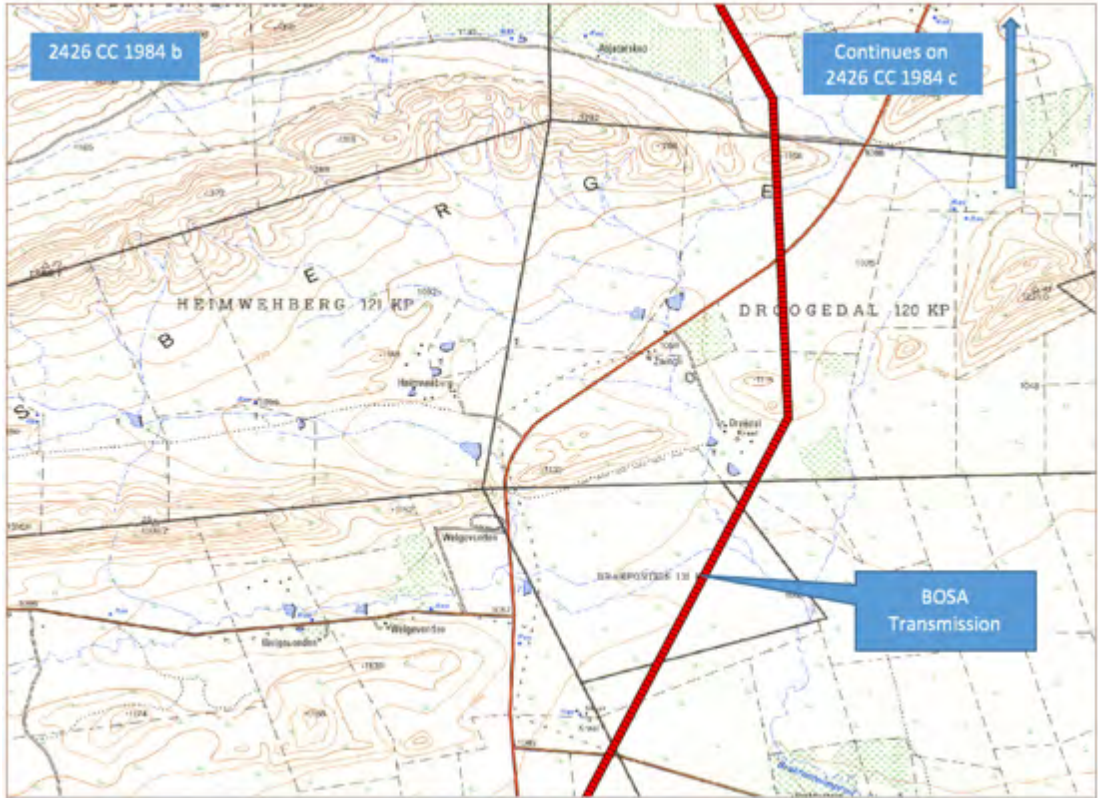


Figure 98. 2426 CC 1984 b

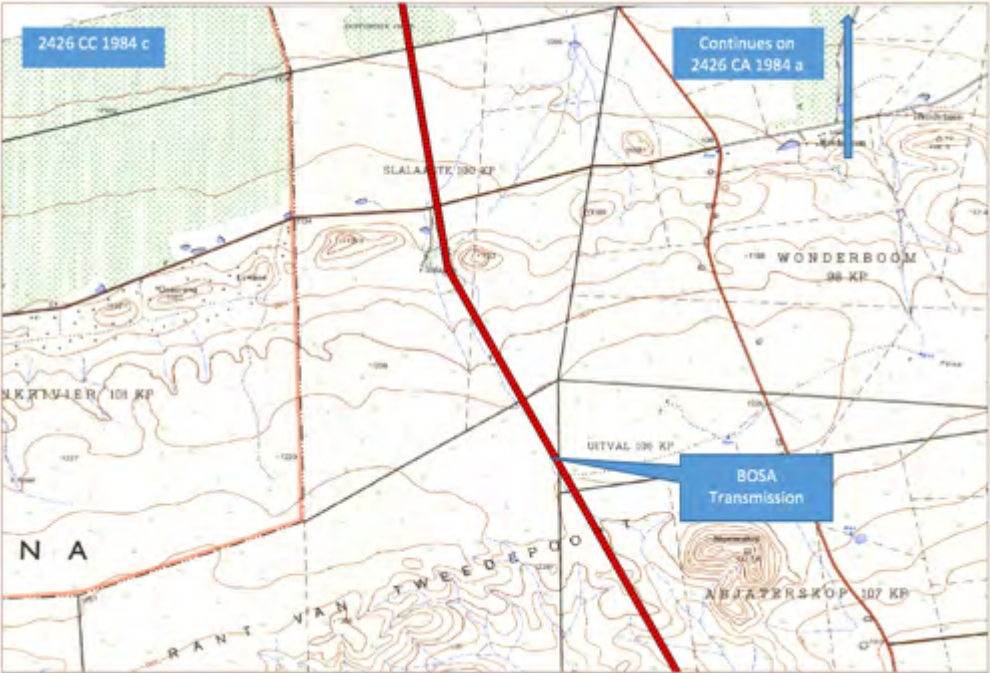


Figure 99. 2426 CC 2984 c

Typographical Maps 2426 CA 1984



Figure 100. 2426 CA 1984 a

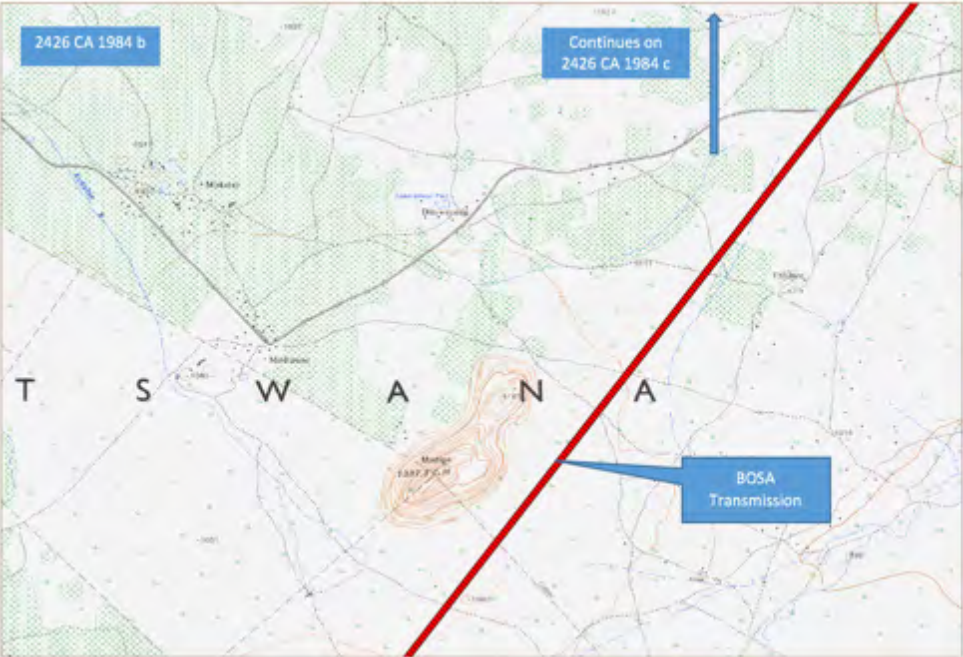


Figure 101. 2426 CA 1984 b

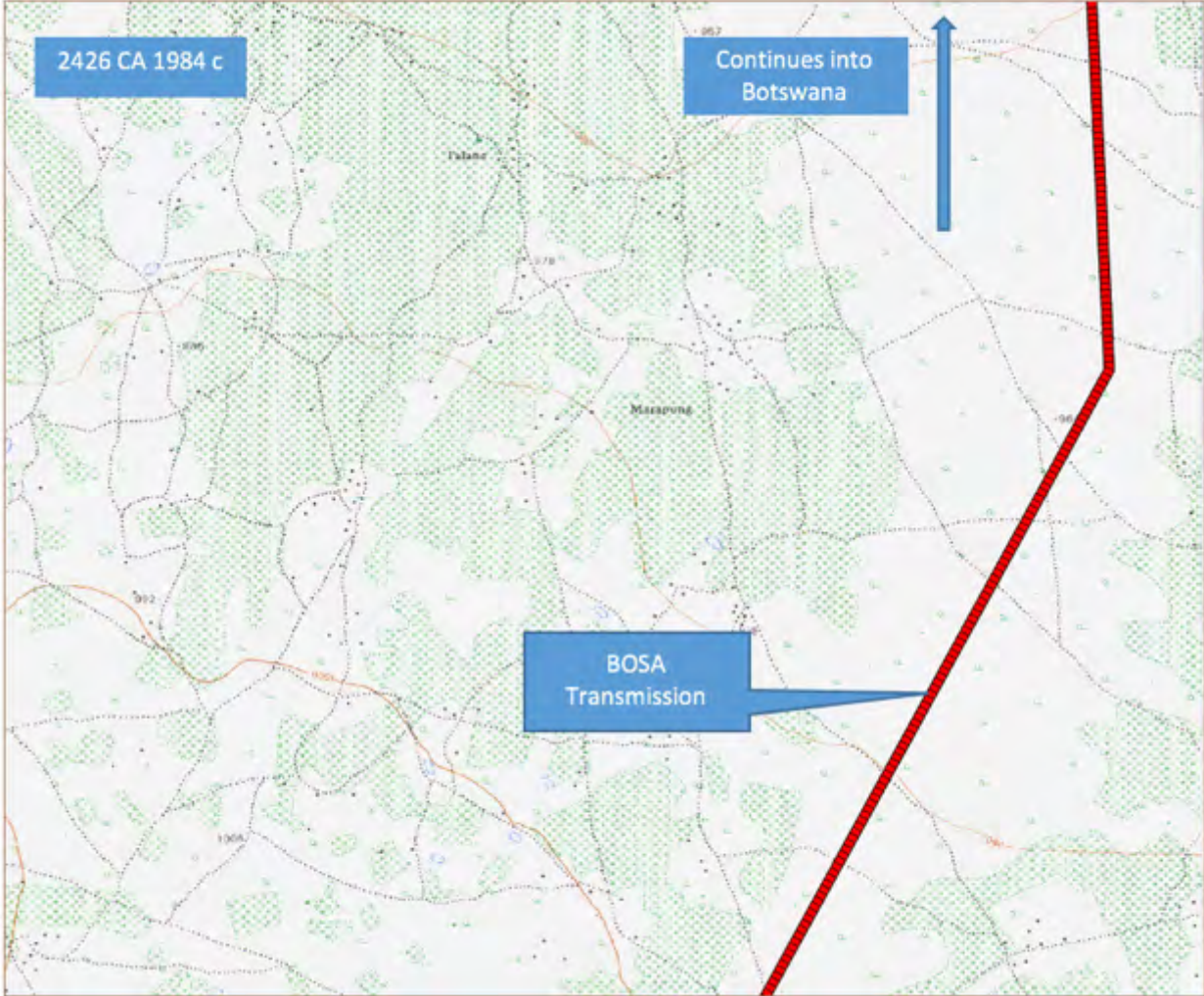


Figure 102. 2426 CA 1984 c