HERITAGE SURVEY OF THE UNITRA/THORNHILL POWERLINE, EASTERN CAPE.

FOR INDWE CONSULTANCY

DATE: 18 AUGUST 2015

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Umlando: Archaeological Surveys and Heritage Management

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INTRODUCTION

Indwe Consultancy requested that Umlando quote for the Unitra/Thornhill Powerline project. Umlando noted that a heritage survey had already been undertaken for the Nduli Nature Reserve in 2010 (Anderson 2010) and that a PIA was only required. Two heritage sites were noted during the survey of the Nduli Nature Reserve.

The report is an updated desktop report of the study area that will recommend that the project is exempted from further HIA studies.

The project will consist of:

- Construction of approximately 6km overhead 66kV powerline with Chicadee conductor between the Unitra and Thornhill Substations (Two alternative routes have been assessed).
- Installation of steel- monopole type support structures
- Clearing of a servitude width of 28 m of all tall vegetation
- Removal of the original 66kV wooden H pole powerline once the new powerline has been commissioned

Figures 1 -3 show the location of the powerline options

FIG. 1 GENERAL LOCATION OF POWERLINE

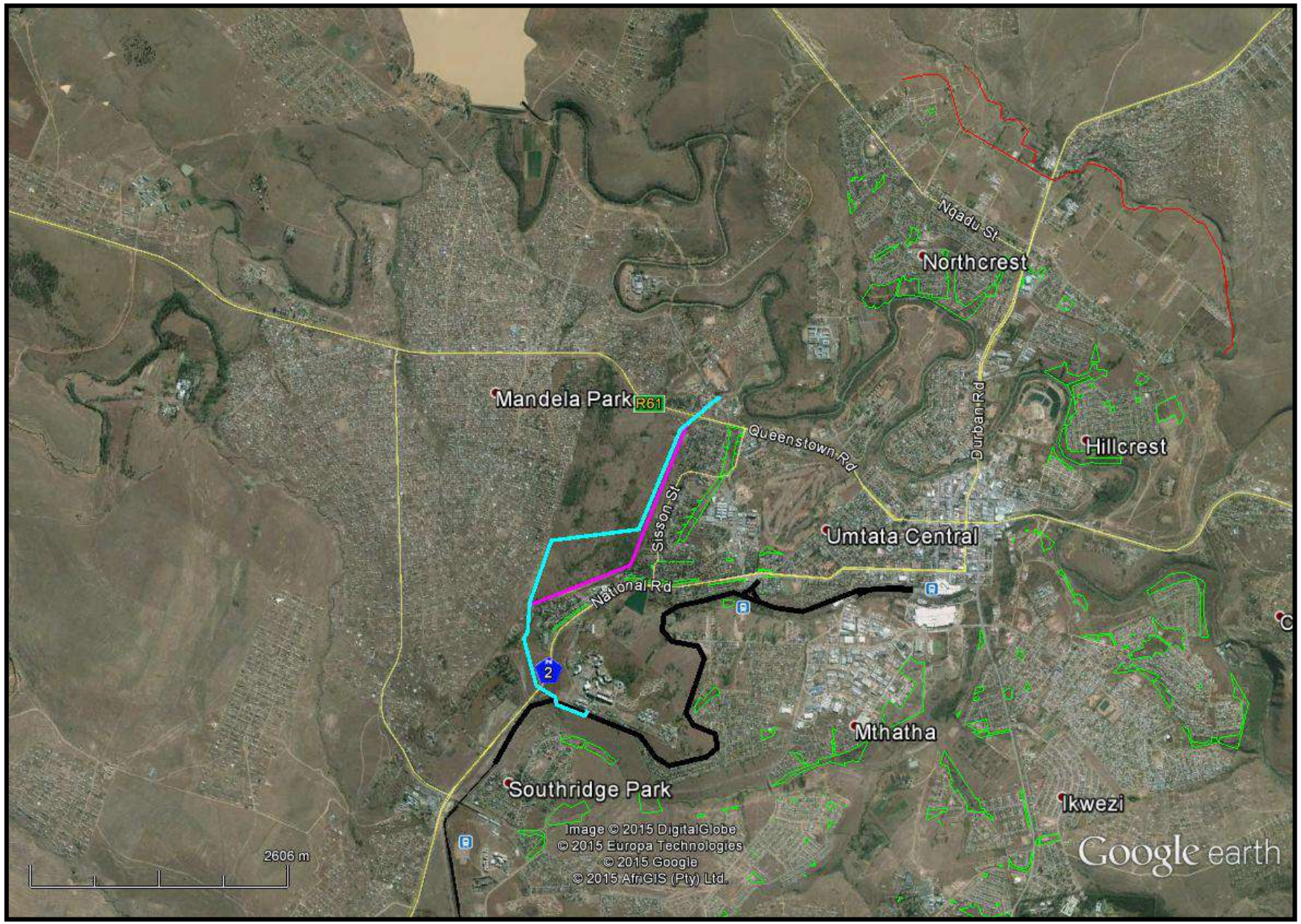


FIG. 2: AERIAL OVERVIEW OF POWERLINE

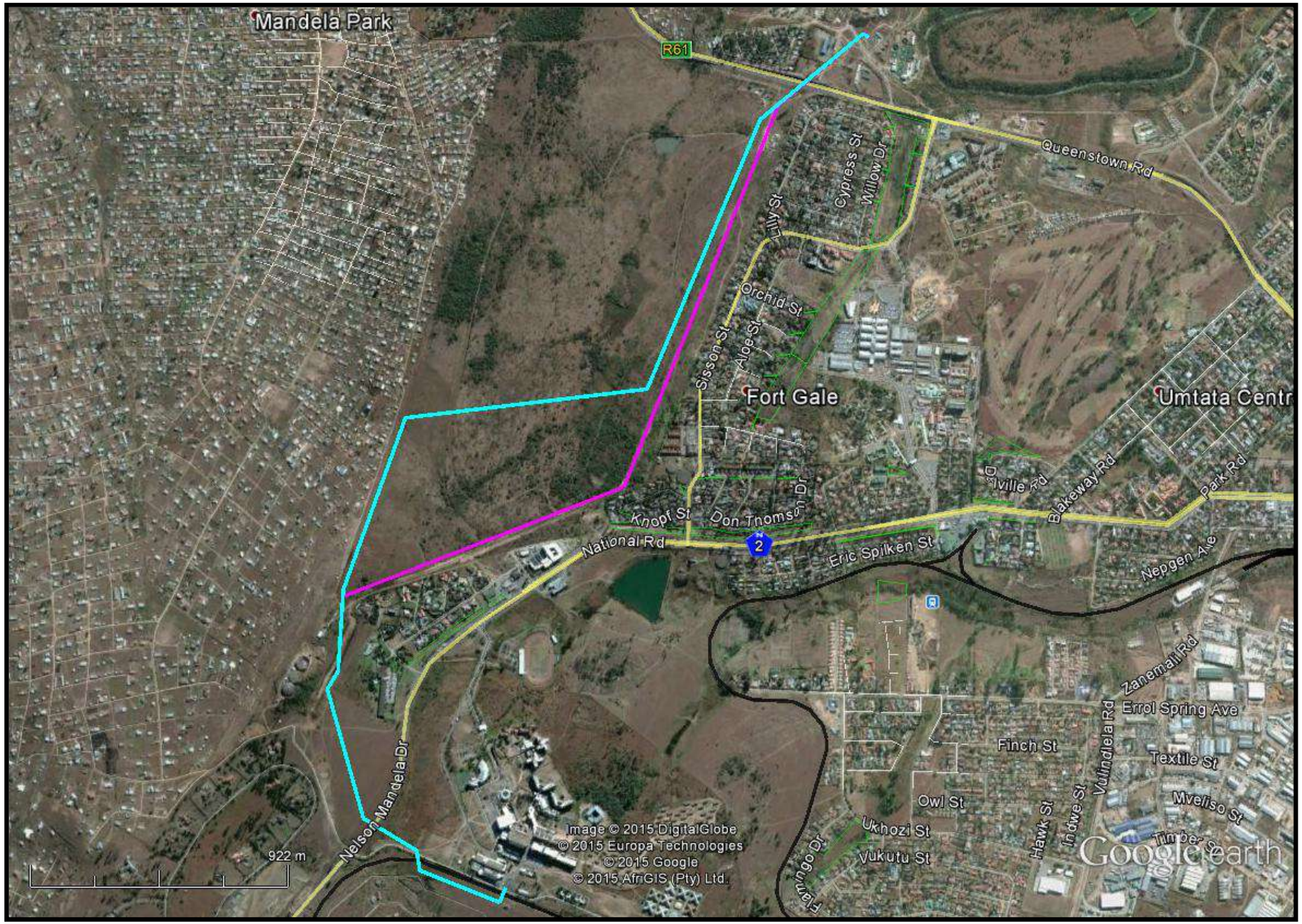
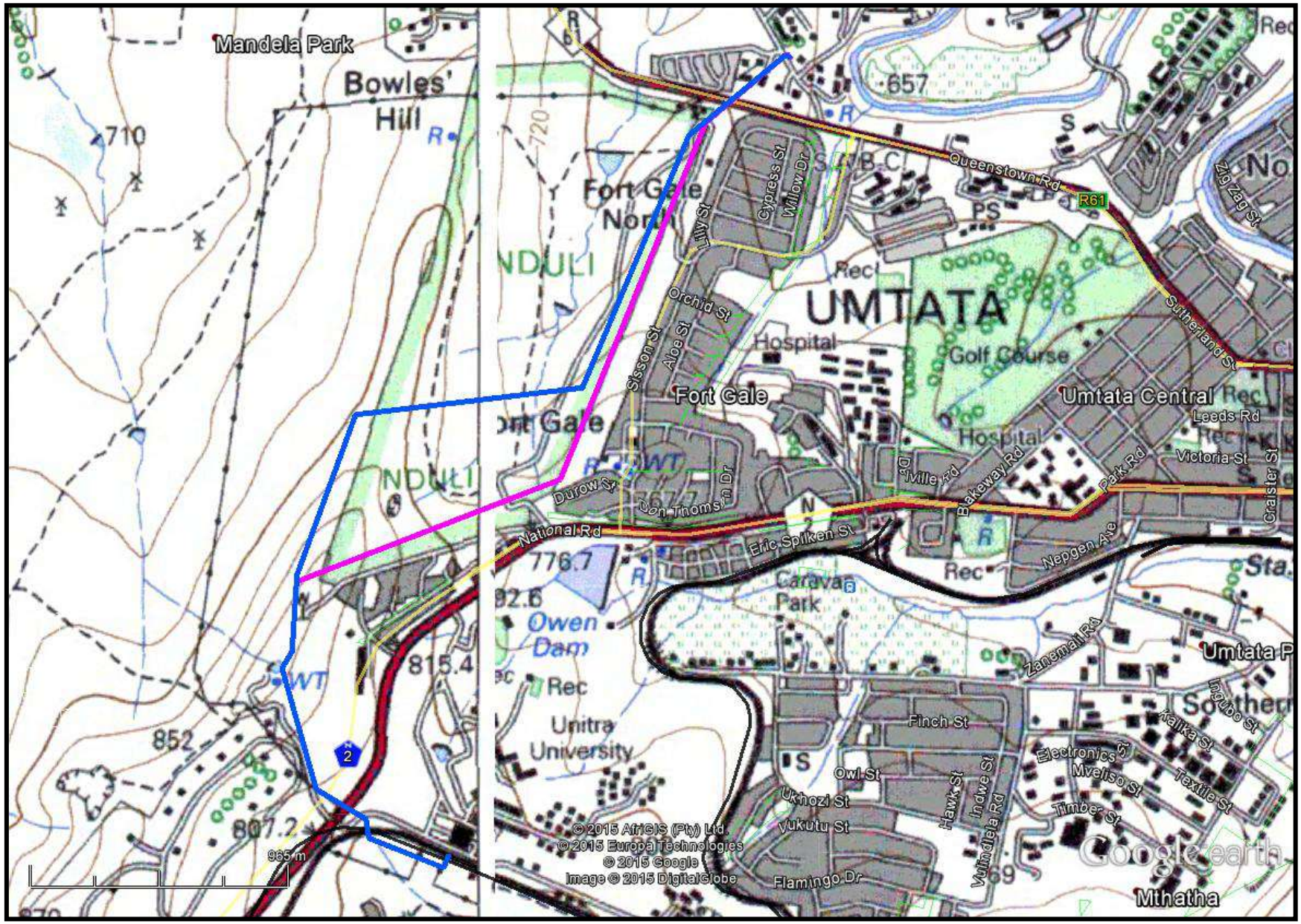


FIG. 3: TOPOGRAPHICAL MAP OF POWERLINE



NATIONAL HERITAGE RESOURCES ACT OF 1999

The National Heritage Resources Act of 1999 (pp 12-14) protects a variety of heritage resources. This are resources are defined as follows:

1. **"**For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.
2. Without limiting the generality of subsection (1), the national estate may include—
   - 2.1. Places, buildings, structures and equipment of cultural significance;
   - 2.2. Places to which oral traditions are attached or which are associated with living heritage;
   - 2.3. Historical settlements and townscapes;
   - 2.4. Landscapes and natural features of cultural significance;
   - 2.5. Geological sites of scientific or cultural importance;
   - 2.6. Archaeological and palaeontological sites;
   - 2.7. Graves and burial grounds, including—
     - 2.7.1. Ancestral graves;
     - 2.7.2. Royal graves and graves of traditional leaders;
     - 2.7.3. Graves of victims of conflict;
     - 2.7.4. Graves of individuals designated by the Minister by notice in the Gazette;
     - 2.7.5. Historical graves and cemeteries; and
     - 2.7.6. Other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
3. Sites of significance relating to the history of slavery in South Africa;
   - 3.1. Movable objects, including—

4. Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
   4.1. Objects to which oral traditions are attached or which are associated with living heritage;
   4.2. Ethnographic art and objects;
   4.3. Military objects;
   4.4. objects of decorative or fine art;
   4.5. Objects of scientific or technological interest; and
   4.6. books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).
5. Without limiting the generality of subsections (1) and (2), a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—
   5.1. Its importance in the community, or pattern of South Africa's history;
   5.2. Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
   5.3. Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
   5.4. Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
   5.5. Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
   5.6. Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
   5.7. Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
   5.8. Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and

5.9. sites of significance relating to the history of slavery in South Africa"

METHOD

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult the database that has been collated by Umlando. These database contain archaeological site locations and basic information from several provinces (information from Umlando surveys and some colleagues), most of the national and provincial monuments and battlefields in Southern Africa (http://www.vuvuzela.com/googleearth/monuments.html) and cemeteries in southern Africa (information supplied by the Genealogical Society of Southern Africa). We use 1st and 2nd edition 1:50 000 topographical and 1937 aerial photographs where available, to assist in general location and dating of buildings and/or graves. The database is in Google Earth format and thus used as a quick reference when undertaking desktop studies. Where required we would consult with a local data recording centre, however these tend to be fragmented between different institutions and areas and thus difficult to access at times. We also consult with an historical architect, palaeontologist, and an historian where necessary.

The survey results will define the significance of each recorded site, as well as a management plan.

All sites are grouped according to low, medium, and high significance for the purpose of this report. Sites of low significance have no diagnostic artefacts or features. Sites of medium significance have diagnostic artefacts or features and these sites tend to be sampled. Sampling includes the collection of artefacts for future analysis. All diagnostic pottery, such as rims, lips, and decorated sherds are sampled, while bone, stone, and shell are mostly noted. Sampling usually

occurs on most sites. Sites of high significance are excavated and/or extensively sampled. Those sites that are extensively sampled have high research potential, yet poor preservation of features.

Defining significance

Heritage sites vary according to significance and several different criteria relate to each type of site. However, there are several criteria that allow for a general significance rating of archaeological sites.

These criteria are:

1. State of preservation of:

1.1. Organic remains:

1.1.1. Faunal

1.1.2. Botanical

1.2. Rock art

1.3. Walling

1.4. Presence of a cultural deposit

1.5. Features:

1.5.1. Ash Features

1.5.2. Graves

1.5.3. Middens

1.5.4. Cattle byres

1.5.5. Bedding and ash complexes

2. Spatial arrangements:

2.1. Internal housing arrangements

2.2. Intra-site settlement patterns

2.3. Inter-site settlement patterns

3. Features of the site:

3.1. Are there any unusual, unique or rare artefacts or images at the site?

3.2. Is it a type site?

3.3. Does the site have a very good example of a specific time period, feature, or artefact?

4. Research:

4.1. Providing information on current research projects

4.2. Salvaging information for potential future research projects

5. Inter- and intra-site variability

5.1. Can this particular site yield information regarding intra-site variability, i.e. spatial relationships between various features and artefacts?

5.2. Can this particular site yield information about a community's social relationships within itself, or between other communities?

6. Archaeological Experience:

6.1. The personal experience and expertise of the CRM practitioner should not be ignored. Experience can indicate sites that have potentially significant aspects, but need to be tested prior to any conclusions.

7. Educational:

7.1. Does the site have the potential to be used as an educational instrument?

7.2. Does the site have the potential to become a tourist attraction?

7.3. The educational value of a site can only be fully determined after initial test-pit excavations and/or full excavations.

8. Other Heritage Significance:

8.1. Palaeontological sites

8.2. Historical buildings

8.3. Battlefields and general Anglo-Zulu and Anglo-Boer sites

8.4. Graves and/or community cemeteries

8.5. Living Heritage Sites

8.6. Cultural Landscapes, that includes old trees, hills, mountains, rivers, etc related to cultural or historical experiences.

The more a site can fulfill the above criteria, the more significant it becomes. Test-pit excavations are used to test the full potential of an archaeological deposit. This occurs in Phase 2. These test-pit excavations may require further excavations if the site is of significance (Phase 3). Sites may also be mapped and/or have artefacts sampled as a form of mitigation. Sampling normally occurs when the artefacts may be good examples of their type, but are not in a primary archaeological context. Mapping records the spatial relationship between features and artefacts.

TABLE 1: SAHRA GRADINGS FOR HERITAGE SITES

SITE SIGNIFICANCE	FIELD RATING	GRADE	RECOMMENDED MITIGATION
High Significance	National Significance	Grade 1	Site conservation / Site development
High Significance	Provincial Significance	Grade 2	Site conservation / Site development
High Significance	Local Significance	Grade 3A / 3B	
High / Medium Significance	Generally Protected A		Site conservation or mitigation prior to development / destruction
Medium Significance	Generally Protected B		Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction
Low Significance	Generally Protected C		On-site sampling monitoring or no archaeological mitigation required prior to or during development / destruction

RESULTS

DESKTOP STUDY

The desktop study consisted of analysing various maps for evidence of prior habitation in the study area, as well as for previous archaeological surveys. No national monuments, battlefields, or historical cemeteries are known to occur along the route.

Anderson located two heritage sites in the 2010 study (fig. 4). These two sites are not in the buffer zone of the powerline options.

The 1955 and 1982 topographical maps (fig. 5) and 1955 aerial photographs (fig. 6) indicate that there are no heritage sites in the powerline paths.

The powerline routes outside of the Nduli Nature Reserve occur in areas that have been affected by various servitudes or development. They are thus not sensitive in terms of the HIA.

PALAEONTOLGOICAL IMPACT ASSESSMENT

The palaeontological sensitivity map indicated that the area is of very high sensitivity – Appendix B has the PIA desktop report. The SAHRIS palaeontological map is shown in fig. 7.

FIG. 4: KNOWN HERITAGE SITES IN THE GENERAL AREA

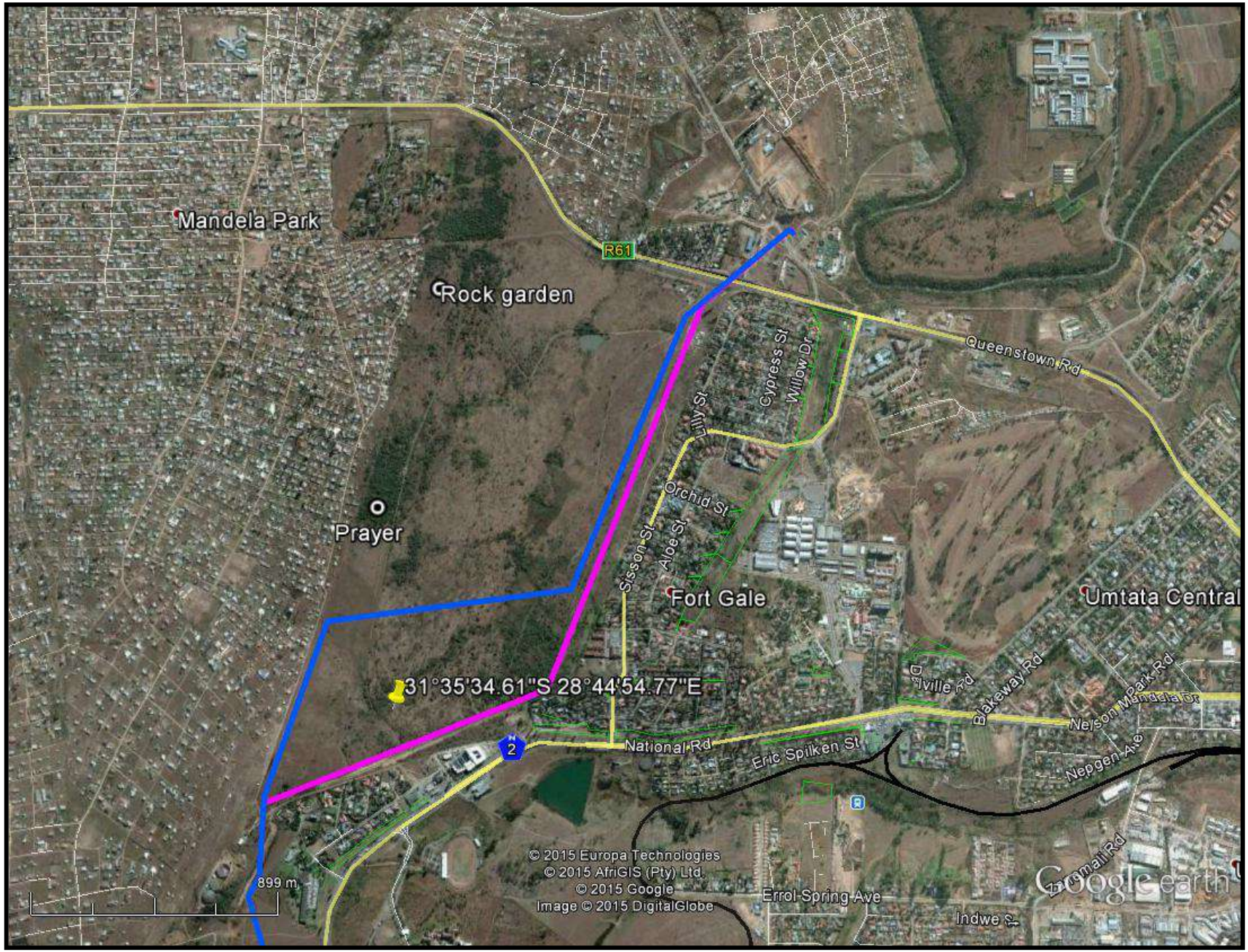


FIG. 5: STUDY AREA IN 1955 AND 1982

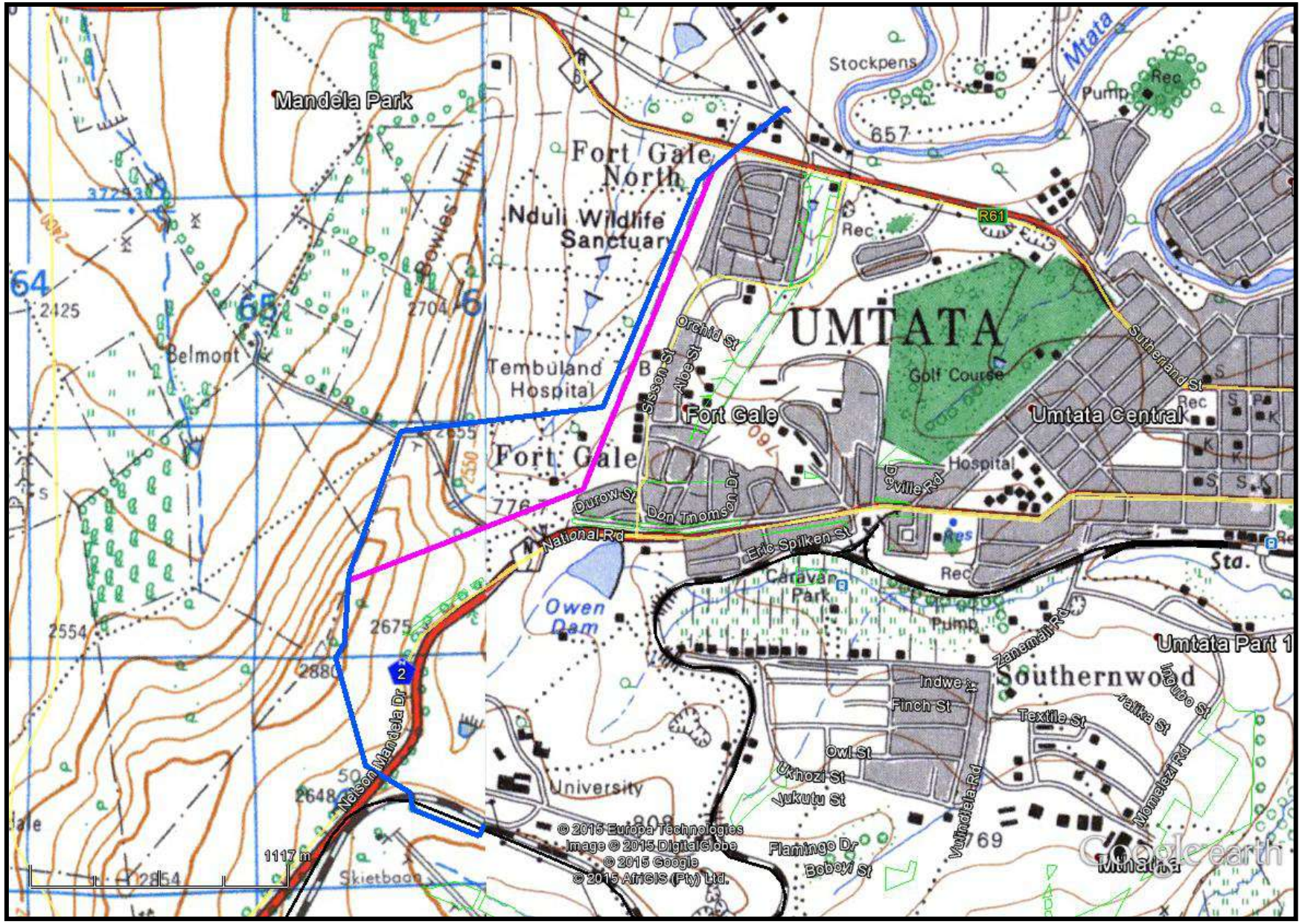


FIG. 6: STUDY AREA IN 1952

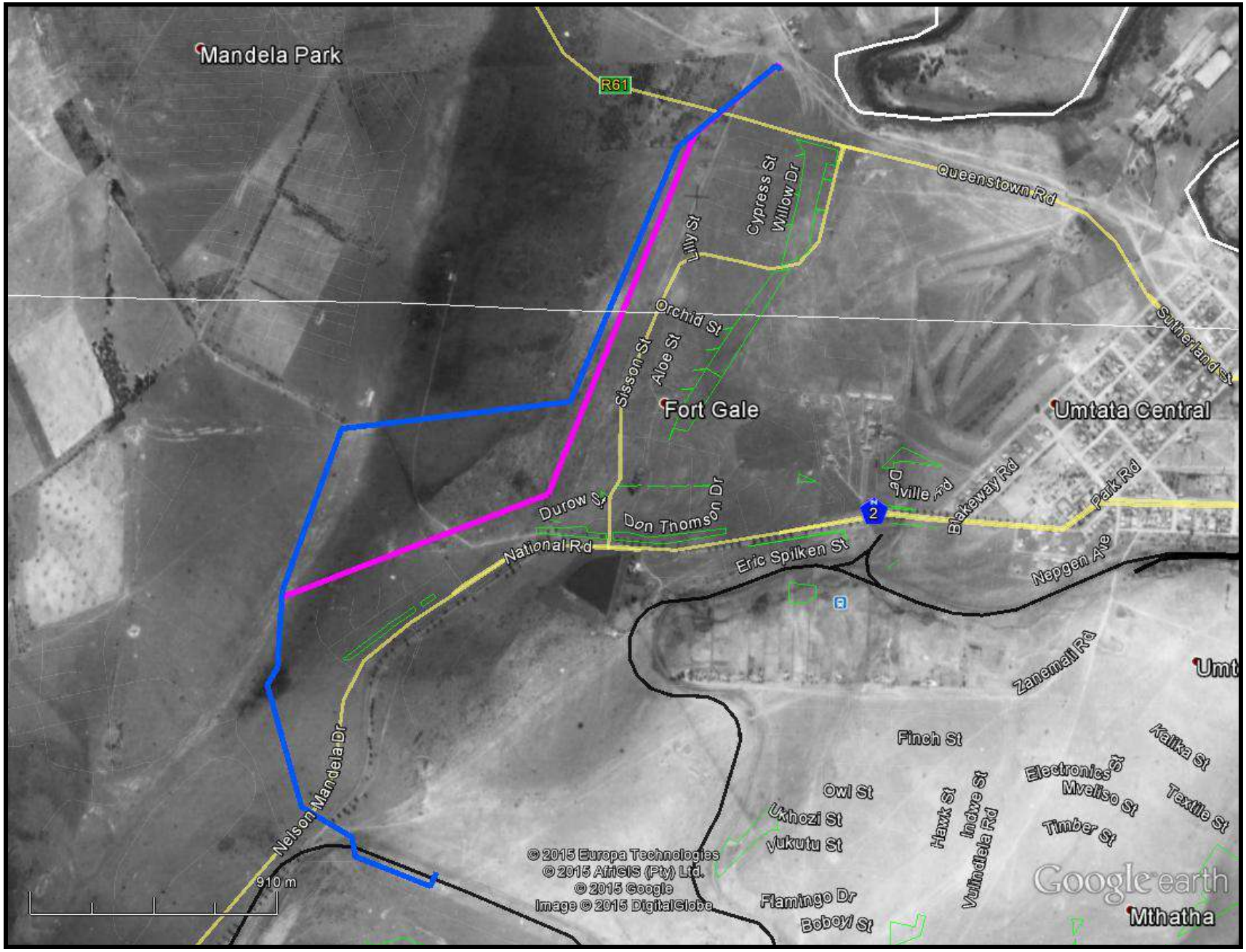


FIG. 7: PALAEONTOLOGICAL SENSITIVITY OF THE STUDY AREA

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.

"About 80% of the study area... is located on areas underlain by Karoo aged sedimentary rocks of the Permian to Early Triassic Balfour Formation, Adelaide

Subgroup and Triassic aged Katberg Formation, Tarkastad Subgroup of the Karoo Supergroup. Fossils are expected in the Permian and Triassic sediments, cutting the significant Permian Extinction zone that records the extinction event during which 80%-90% of life on earth perished. Due to the nature of the development it is expected that most of the excavations will be for steel, monopole towers, which are limited excavation or drilling of foundation holes. From the Google image interpretation it is also obvious that the area lacks large areas of exposure of bedrock, reducing the possibility of finding fossils before clearance of the site. It is therefore unlikely that bedrock will be exposed during the development and fossils will be restricted to natural erosion dongas and areas exposed by erosion, which is not evident on the Google image. Unless such exposures are reported from the site, no further mitigation for palaeontological heritage in these areas is recommended. The remainder of the study area is underlain by Jurassic aged dolerite that will not contain fossils" (Groenewald – Appendix B)

MANAGEMENT PLAN

No management plan is required. However, the ECO should be informed if any heritage sites or artefacts are observed during construction

CONCLUSION

A heritage survey was undertaken Unitra-Thornhill powerline in Mthatha, E. Cape. Most of the line occurs in a previously surveyed area, or in areas disturbed by servitudes. The palaeontological impact assessment noted that while the area is sensitive the proposed powerline will have little impact on the fossil bearing layers.

I recommend that no further HIA work be undertaken for this project.

REFERENCES

Anderson, G. 2010. Heritage Survey Of The Proposed Development At Nduli Game Reserve, Mthatha. For Coastal Environmental Services

APPENDIX A:

NDULI HIA

HERITAGE SURVEY OF THE PROPOSED DEVELOPMENT AT NDULI GAME RESERVE, MTHATHA

FOR COASTAL ENVIRONMENTAL SERVICES

DATE: 29 April 2010

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INTRODUCTION

Umlando cc was contracted by Coastal Environmental Services (CES) to undertake a heritage assessment of the proposed development at Nduli Game Reserve, Umthatha, Eastern Cape (fig. 1-2). The development consists of several buildings along the south and western parts of the Reserve (fig. 3). These buildings will consist of a hotel and related structures.

The impacts on the area will be:

- Construction
- Access roads
- Servitudes related to water, sewage, electricity

The Nduli Game Reserve was declared in the late 1970s as a reserve by the then Transkei government. It was to be used as a public recreational area. Later on, it became popular for weddings at the 'Rock Garden'. In the 1980s, an area was used as a place for Christian worship. The general area appears not to have been heavily affected by human activity.

No heritage sites *per se* were observed in the study area; however, two living heritage sites were noted.

The western part of the reserve consists of a high hill with grasslands and rock outcrops (see figure 4).

FIG. 1: GENERAL LOCATION OF THE PROPOSED DEVELOPMENT

FIG. 2: PROPOSED LOCATION OF NDULI CONSERVANCY

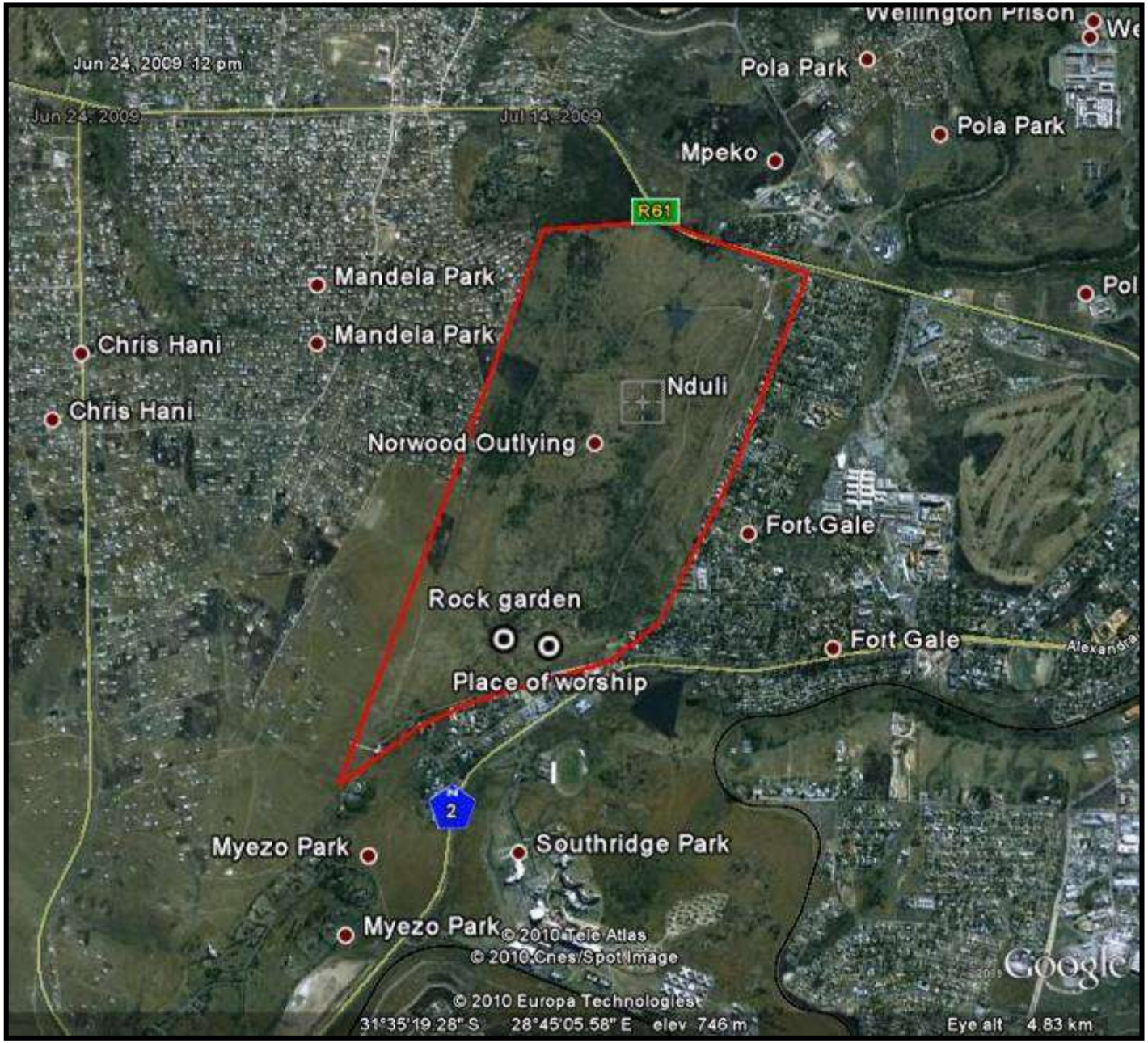

FIG. 3: LOCATION OF SITES AT NDULI CONSERVANCY

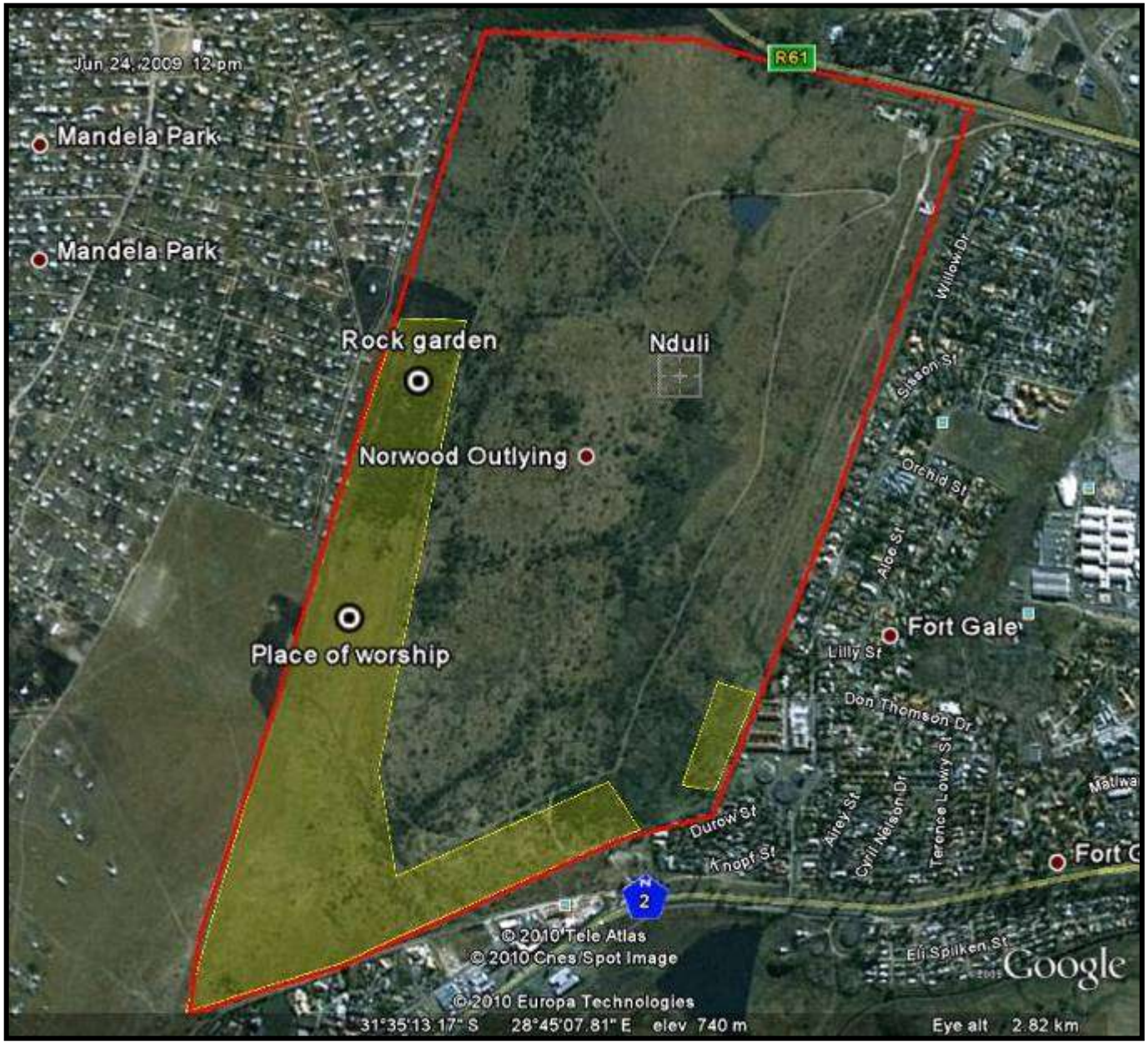

FIG. 4: HILLS OF NDULI GAME RESERVE NORTH (TOP) AND SOUTH VIEW (BOTTOM)1

[1] Yellow arrow = place of worship; red arrow indicates approximate location of the Rock Garden

LEGISLATION PERTAINING TO HERITAGE SITES

The National Heritage Resources Act of 1999 (pp 12-14) protects a variety of heritage resources. This are resources are defined as follows:

"3. (1) For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.

(2) Without limiting the generality of subsection (1), the national estate may include—

(a) Places, buildings, structures and equipment of cultural significance;

(b) Places to which oral traditions are attached or which are associated with living heritage;

(c) Historical settlements and townscapes;

(d) Landscapes and natural features of cultural significance;

(e) Geological sites of scientific or cultural importance;

(f) Archaeological and palaeontological sites;

(g) Graves and burial grounds, including—

(i) Ancestral graves;

(ii) Royal graves and graves of traditional leaders;

(iii) Graves of victims of conflict;

(iv) Graves of individuals designated by the Minister by notice in the Gazette;

(v) Historical graves and cemeteries; and

(vi) Other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);

(h) Sites of significance relating to the history of slavery in South Africa;

(i) Movable objects, including—

(i) Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;

(ii) Objects to which oral traditions are attached or which are associated with living heritage;

(iii) Ethnographic art and objects;

(iv) Military objects;

(v) objects of decorative or fine art;

(vi) Objects of scientific or technological interest; and

(vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

(3)Without limiting the generality of subsections (1) and (2), a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

(a) Its importance in the community, or pattern of South Africa's history;

(b) Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;

(c) Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;

(d) Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;

(e) Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;

(f) Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
(g) Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
(h) Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
(i) sites of significance relating to the history of slavery in South Africa"

METHOD

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult the databases. These databases contain most of the known memorials and other protected sites, battlefields and cemeteries in southern Africa. We also consult with an historical architect, palaeontologist, and an historian where necessary.

The second step is the foot survey. The survey results will define the significance of each recorded site, as well as a management plan.

All sites are grouped according to low, medium and high significance for the purpose of this report. Sites of low significance have no diagnostic artefacts or features. Sites of medium significance have diagnostic artefacts or features and these sites tend to be sampled. Sampling includes the collection of artefacts for future analysis. All diagnostic pottery, such as rims, lips and decorated sherds are sampled, while bone, stone and shell are mostly noted. Sampling usually occurs on most sites. Sites of high significance are excavated and/or extensively sampled. Those sites that are extensively sampled have high research potential, yet poor preservation of features.

Defining significance

Heritage sites vary according to significance and several different criteria relate to each type of site. However, there are several criteria that allow for a general significance rating of archaeological sites.

These criteria are:

9. State of preservation of:
9.1. Organic remains:
9.1.1. Faunal
9.1.2. Botanical
9.2. Rock art
9.3. Walling
9.4. Presence of a cultural deposit
9.5. Features:
9.5.1. Ash Features
9.5.2. Graves
9.5.3. Middens
9.5.4. Cattle byres
9.5.5. Bedding and ash complexes

10. Spatial arrangements:
10.1. Internal housing arrangements
10.2. Intra-site settlement patterns
10.3. Inter-site settlement patterns

11. Features of the site:
11.1. Are there any unusual, unique or rare artefacts or images at the site?
11.2. Is it a type site?
11.3. Does the site have a very good example of a specific time period, feature, or artefact?

12. Research:
12.1. Providing information on current research projects
12.2. Salvaging information for potential future research projects

13. Inter- and intra-site variability
13.1. Can this particular site yield information regarding intra-site variability, i.e. spatial relationships between various features and artefacts?
13.2. Can this particular site yield information about a community's social relationships within itself, or between other communities?

14. Archaeological Experience:

14.1. The personal experience and expertise of the CRM practitioner should not be ignored. Experience can indicate sites that have potentially significant aspects, but need to be tested prior to any conclusions.

15. Educational:

15.1. Does the site have the potential to be used as an educational instrument?

15.2. Does the site have the potential to become a tourist attraction?

15.3. The educational value of a site can only be fully determined after initial test-pit excavations and/or full excavations.

16. Other Heritage Significance:

16.1. Palaeontological sites

16.2. Historical buildings

16.3. Battlefields and general Anglo-Zulu and Anglo-Boer sites

16.4. Graves and/or community cemeteries

16.5. Living Heritage Sites

16.6. Cultural Landscapes, that includes old trees, hills, mountains, rivers, etc related to cultural or historical experiences.

The more a site can fulfill the above criteria, the more significant it becomes. Test-pit excavations are used to test the full potential of an archaeological deposit. This occurs in Phase 2. These test-pit excavations may require further excavations if the site is of significance (Phase 3). Sites may also be mapped and/or have artefacts sampled as a form of mitigation. Sampling normally occurs when the artefacts may be good examples of their type, but are not in a primary archaeological context. Mapping records the spatial relationship between features and artefacts.

RESULTS

No heritage sites were observed during the survey. I did speak to the reserve manager who had no knowledge of any graves in the area. He did mention two areas that would be classified as living heritage sites.

PLACE OF WORSHIP

Mrs Nozuko Matanzima placed the memorial in 1986 (fig. 5). It was in commemoration of the fifth 'Anniversary of Women's Day of Prayer'. Since then it has been used as a general pale of worship.

The 'place of worship' is; however, in a neglected state. The corrugated iron cross has been toppled over, and the grass surrounding the memorial has not been mowed or cleared for a while.

The site would be considered as a living heritage site, and thus does not fall under the general heritage legislation.

Significance: Defining the significance of living heritage sites is difficult as it is relative. This specific site may be relevant to members of the community and the site would thus be of high significance. However, if no one uses or remembers the site any more then it would be of low significance in terms of living heritage status.

Mitigation: If the memorial plaque is in the line of development then there are several options:

1. Do not move the memorial and the cross
2. Move the memorial and cross away from the development, but keep it on the top of the hill. If it is moved, a small sign should state it has been moved.
3. Incorporate the memorial into the design of the development, e.g. make a public garden with the memorial as a centrepiece. The material originally used for the cross must remain the same.
4. If no one uses the area for worship and if there are no public objections then the memorial can be removed to a more central location, such as the picnic area near the entrance.
5. I believe the public should be consulted regarding this site and this can be undertaken by the social impact study.

FIG.5: PLACE OF WORSHIP

REG. TOOKE GARDEN OF REMEMBERANCE

The Reg. Tooke Garden of Remembrance, or colloquially referred to as 'The Rock Garden' is situated at the base of the northern part of the hill (fig. 6). I could not locate information on R. Tooke himself. The Rock Garden is now used mainly for wedding ceremonies.

The site is probably outside of the development footprint.

Significance: The site would be considered as a living heritage site, and thus does not fall under the general heritage legislation. The site would have general significance as it is in the memory of a specific person.

Mitigation: The site should not be affected by the development.

FIG.6: REG TOOKE GARDEN OF REMEMBERANCE (a.k.a THE ROCK GARDEN)

MANAGEMENT PLAN

There is no general management plan for the development. Only one site may be directly affected by the proposed development: the ‘place of worship’. The site has a living heritage status and I believe the Public Participation Process should incorporate this site. If the site is in the path of the development then it can be moved.

CONCLUSION

The heritage survey of the proposed development at Nduli Game Reserve did not observe any heritage sites. Two living heritage sites were noted, and one may be affected by the development. This site may be relocated or incorporated into the design of the proposed development.

SITE RECORD FORMS

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)
Stone Age:
Early Iron Age:
Late Iron Age
Historical Period:
Living Heritage: X

Recorder's Site No.: NDU01
Official Name: Place of worship
Local Name: Nduli Game Reserve
Map Sheet:
GPS reading: S31°35'35.57" E28°45'1.84"

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From Mthatha drive towards East London. Pass the Savoy Hotel on the Left. Just before the Engen garage is a dirt road with the Nduli Game Reserve sign. Follow the left fork dirt road that goes along the middle of the hill. Site is on the crest near a bricked feature and would be visible if the cross was not broken

SITE DESCRIPTION:

Type of Site: Living heritage/Christian prayer
Merits conservation: possible
Threats: Yes
What threats: hotel development

RECORDING:
Graphic record: Yes
Digital pictures: X Tracings : Re-drawings:

Recorder/Informant: Name: Gavin and Louise Anderson
Address: PO Box 102532, Meerensee, 3901
Date: April 2010
Owner: Mthatha Municipality
References:

Description of site and artefactual content.

Site consists of a memorial and corrugated iron cross. Memorial placed in 1986 in commemoration of the 5th anniversary of women's day of prayer.

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)
Stone Age:
Early Iron Age:
Late Iron Age
Historical Period:
Living Heritage: X

Recorder's Site No.: NDU02
Official Name: Reg. Tooke Garden of Remembrance
Local Name: Rock Garden
Map Sheet:
GPS reading: 31°35'34.61"S 28°44'54.77"E

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From Mthatha drive towards East London. Pass the Savoy Hotel on the Left. Just before the Engen garage is a dirt road with the Nduli Game Reserve sign. Follow the left fork dirt road that goes along the middle of the hill. Carry on with this road to the parking area. Just in front is the sign for the Rock Garden.

SITE DESCRIPTION:

Type of Site: Living heritage Site
Merits conservation: possible
Threats: No
What threats:

RECORDING:
Graphic record: Yes
Digital pictures: x Tracings : Re-drawings:

Recorder/Informant: Name: Gavin and Louise Anderson
Address: PO Box 102532, Meerensee, 3901
Date: April 2010
Owner: Mthatha Municipality
References:

Description of site and artefactual content.

Site consists of a memorial plaque to Reginald Tooke. It is a garden of Remembrance and currently used mainly for weddings.

APPENDIX B

DESKTOP PALAEONTOLOGICAL IMPACT ASSESSMENT

DESKTOP PALAEONTOLOGICAL ASSESSMENT FOR THE PROPOSED UNITRA THORNHILL 66KV POWERLINE REFURBISHMENT MTHATHA, KSD MUNICIPALITY OR TAMBO DISTRICT MUNICIPALITY, EASTERN CAPE.

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DATE: 22 AUGUST 2015

By

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EXECUTIVE SUMMARY

Gideon Groenewald was appointed to undertake a desktop survey, assessing the potential Palaeontological Impact of the proposed Unitra Thornhill 66kv Powerline refurbishment Mthatha, KSD Municipality OR Tambo District Municipality, Eastern Cape.

As part of the Electricity Masterplan for Mthatha, the KSD Municipality is proposing a new 66kV powerline between the Unitra and Thornhill Substations. This powerline will extend over a distance of 6km and will comprise a single circuit Chicadee conductor line, which will be installed on single pole steel stayed supports. It is not possible to construct the new powerline within the existing servitude because the servitude is contaminated by informal residential developments located within the servitude. Two alternative new routes have been identified which both traverse the Nduli Nature Reserve.

This .Palaeontological Assessment forms part of the Heritage Impact Assessment (HIA) and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a HIA is required to assess any potential impacts to palaeontological heritage within the development footprint.

About 80% of the study area proposed for the development of the Unitra Thornhill 66kv Powerline refurbishment Mthatha, KSD Municipality is located on areas underlain by Karoo aged sedimentary rocks of the Permian to Early Triassic Balfour Formation, Adelaide Subgroup and Triassic aged Katberg Formation, Tarkastad Subgroup of the Karoo Supergroup. Fossils are expected in the Permian and Triassic sediments, cutting the significant Permian Extinction zone that records the extinction event during which 80%-90% of life on earth perished. Due to the nature of the development it is expected that most of the excavations will be for steel, monopole towers, which are limited excavation or drilling of foundation holes. From the Google image interpretation it is also obvious that the area lacks large areas of exposure of bedrock, reducing the possibility of finding fossils before clearance of the site. It is therefore unlikely that bedrock will be exposed during the development and fossils will be restricted to natural erosion dongas and areas exposed by erosion, which is not evident on the Goolge image. Unless such exposures are reported from the site, no further mitigation for palaeontological heritage in these areas is recommended. The remainder of the study area is underlain by Jurassic aged dolerite that will not contain fossils.

It is recommended that:

- The EAP and ECO of the project team should be made aware of the Very High Palaeontological sensitivity of the Balfour and Katberg Formations. If any fossils are recorded during initial field visits, a trained palaeontologist must be notified to assess the finds and report to SAHRA.
- Due to the nature of the development (construction of single point steel towers) fossils will be restricted to natural exposure of mudstone in dongas and bedrock exposure on site. If these erosion features are not present, no further mitigation for palaeontological heritage is recommended.

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INTRODUCTION

Gideon Groenewald was appointed to undertake a desktop survey, assessing the potential Palaeontological Impact of the proposed Unitra Thornhill 66kv Powerline refurbishment Mthatha, KSD Municipality OR Tambo District Municipality, Eastern Cape (Figure 1)

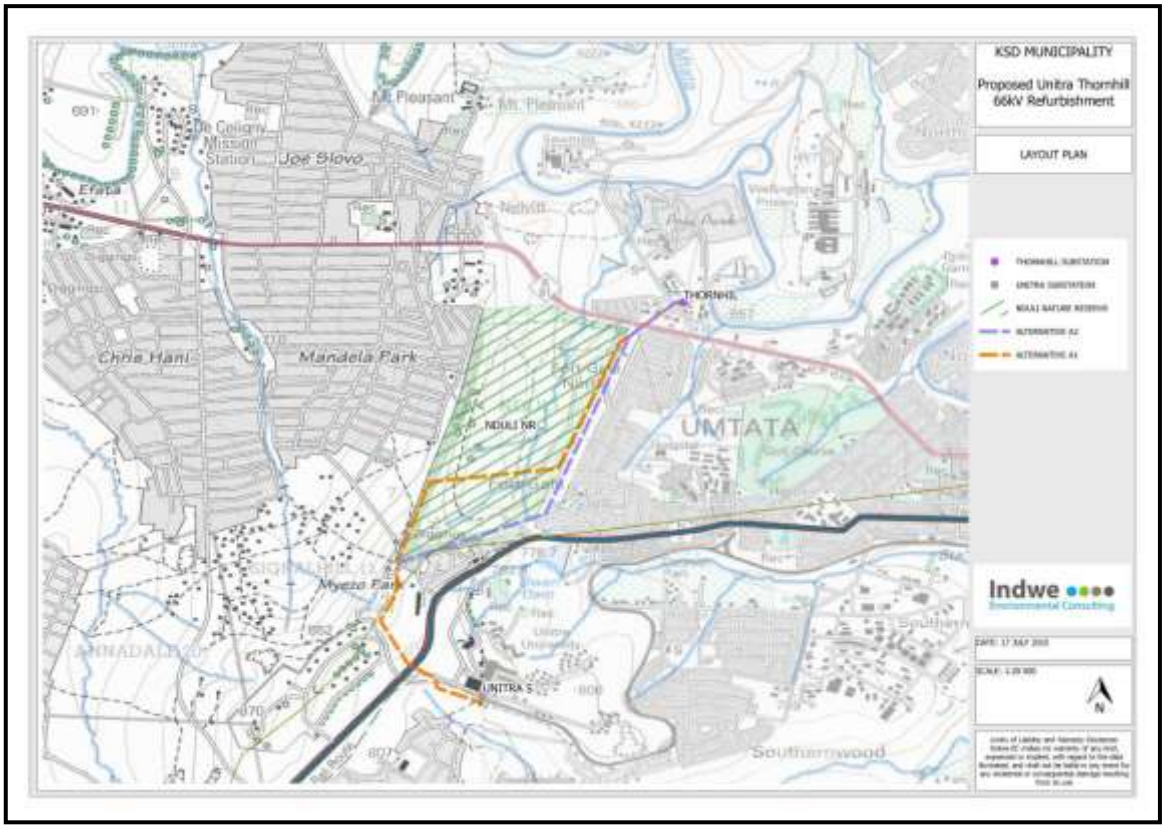

Figure 1 Locality of the Study Area

As part of the Electricity Masterplan for Mthatha, the KSD Municipality is proposing a new 66kV powerline between the Unitra and Thornhill Substations. This powerline will extend over a distance of 6km and will comprise a single circuit Chicadee conductor line, which will be installed on single pole steel stayed supports. It is not possible to construct the new powerline within the existing servitude because the servitude is contaminated by informal residential developments located within the servitude. Two alternative new routes have been identified which both traverse the Nduli Nature Reserve.

The project area is located to the West of the Mthatha CBD in the KSD Municipality, OR Tambo District Municipality Eastern Cape Province. The

powerline will extend from the existing Unitra Substation situated at the Unitra University where it will cross to the Western side of the N2 National Road, just North of the OR Tambo District Municipal offices and travel Northwards through the Nduli Nature Reserve to cross the R61 road to the Thornhill Substation.

SOUTH AFRICAN NATIONAL HERITAGE RESOURCE ACT NO 25/1999

This .Palaeontological Assessment forms part of the Heritage Impact Assessment (HIA) and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a HIA is required to assess any potential impacts to palaeontological heritage within the development footprint.

Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include:

geological sites of scientific or cultural importance;

objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;

objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.

METHODOLOGY

Following the "SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports" the aims of the palaeontological impact assessment are:

to identify exposed and subsurface rock formations that are considered to be palaeontologically significant;

to assess the level of palaeontological significance of these formations;

to comment on the impact of the development on these exposed and/or potential fossil resources and

to make recommendations as to how the developer should conserve or mitigate damage to these resources.

In preparing a palaeontological desktop study the potential fossiliferous rock units (groups, formations etc) represented within the study area are determined from geological maps and Google Earth imagery. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience.

The likely impact of the proposed development on local fossil heritage is determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1 below.

Table 1 Palaeontological sensitivity analysis outcome classification

PALAEONTOLOGICAL SIGNIFICANCE/VULNERABILITY OF ROCK UNITS	
The following colour scheme is proposed for the indication of palaeontological sensitivity classes. This classification of sensitivity is adapted from that of Almond et al (2008, 2009) (Groenewald etal.,2014).	
RED	Very High Palaeontological sensitivity/vulnerability. Development will most likely have a very significant impact on the Palaeontological Heritage of the region. Very high possibility that significant fossil assemblages will be present in all outcrops of the unit. Appointment of professional palaeontologist, desktop survey, phase I Palaeontological Impact Assessment (PIA) (field survey and recording of fossils) and phase II PIA (rescue of fossils during construction) as well as application for collection and destruction permit compulsory.
ORANGE	High Palaeontological sensitivity/vulnerability. High possibility that significant fossil assemblages will be present in most of the outcrop areas of the unit. Fossils most likely to occur in associated sediments or underlying units, for example in the areas underlain by Transvaal Supergroup dolomite where Cenozoic cave deposits are likely to occur. Appointment of professional palaeontologist, desktop survey and phase I Palaeontological Impact Assessment (field survey and collection of fossils) compulsory. Early application for collection permit recommended. Highly likely that a Phase II PIA will be applicable during the construction phase of projects.
GREEN	Moderate Palaeontological sensitivity/vulnerability. High possibility that fossils will be present in the outcrop areas of the unit or in associated sediments that underlie the unit. For example areas underlain by the Gordonia Formation or undifferentiated soils and alluvium. Fossils described in the literature are visible with the naked eye and development can have a significant impact on the Palaeontological Heritage of the area. Recording of fossils will contribute significantly to the present knowledge of the development of life in the geological record of the region. Appointment of a professional palaeontologist, desktop survey and phase I PIA (ground proofing of desktop survey) recommended.

BLUE	Low Palaeontological sensitivity/vulnerability. Low possibility that fossils that are described in the literature will be visible to the naked eye or be recognized as fossils by untrained persons. Fossils of for example small domal Stromatolites as well as micro-bacteria are associated with these rock units. Fossils of micro-bacteria are extremely important for our understanding of the development of Life, but are only visible under large magnification. Recording of the fossils will contribute significantly to the present knowledge and understanding of the development of Life in the region. Where geological units are allocated a blue colour of significance, and the geological unit is surrounded by highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a blue colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in larger alluvium deposits. Collection of a representative sample of potential fossiliferous material is recommended.
GREY	Very Low Palaeontological sensitivity/vulnerability. Very low possibility that significant fossils will be present in the bedrock of these geological units. The rock units are associated with intrusive igneous activities and no life would have been possible during implacement of the rocks. It is however essential to note that the geological units mapped out on the geological maps are invariably overlain by Cenozoic aged sediments that might contain significant fossil assemblages and archaeological material. Examples of significant finds occur in areas underlain by granite, just to the west of Hoedspruit in the Limpopo Province, where significant assemblages of fossils and clay-pot fragments are associated with large termite mounds. Where geological units are allocated a grey colour of significance, and the geological unit is surrounded by very high and highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a grey colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in dolerite sill outcrops. It is important that the report should also refer to archaeological reports and possible descriptions of palaeontological finds in Cenozoic aged surface deposits.

When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a field-based assessment by a professional palaeontologist is usually warranted.

The key assumption for this desktop study is that the existing geological maps and datasets used to assess site sensitivity are correct and reliable. However, the geological maps used were not intended for fine scale planning work and are largely based on aerial photographs alone, without ground-truthing.

These factors may have a major influence on the assessment of the fossil heritage significance of a given development and, without supporting field assessments, may lead to either:

an underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or

an overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by weathering, or are buried beneath a thick mantle of unfossiliferous “drift” (soil, alluvium etc).

GEOLOGY

The study area is underlain by sedimentary rocks of the Jurassic to Triassic aged Balfour Formation of the Adelaide Subgroup, Triassic aged Katberg Formation of the Tarkastad Subgroup, Beaufort Group, Karoo Supergroup as well as Jurassic aged dolerite intrusions that cut across the older strata in the vicinity of the study area (Figure 2).

Adelaide Subgroup, Balfour Formation (Pa)

The Permian to Triassic aged Balfour Formation forms the upper part of the Adelaide Subgroup of the Karoo Supergroup. The formation consists of a lower sequence of interbedded green-coloured mudstone and grey sandstone, overlain by a predominantly red mudstone unit, known as the Palingkloof Member (Groenewald, 1996; Johnson et al, 2009).

The Balfour Formation is interpreted as a meandering fluvial environment that gradually grades upwards into a lacustrine environment (Groenewald, 1996).

Tarkastad Subgroup, Katberg Formation (Trk)

The Triassic aged Katberg Formation consists predominantly of grey sandstone and thin, subordinate, red mudstone. The formation is interpreted as a braided river, fluvial sedimentary deposit (Groenewald, 1996; Johnson et al. 2009).

Jurassic Dolerite (Jd)

The Jurassic aged dolerite intrusions are of both sills and dykes that cut the sedimentary units. The dolerite is in general very dark green to black in colour, representing magma intrusions into this part of the Karoo Basin during the break-up of Gondwanaland.

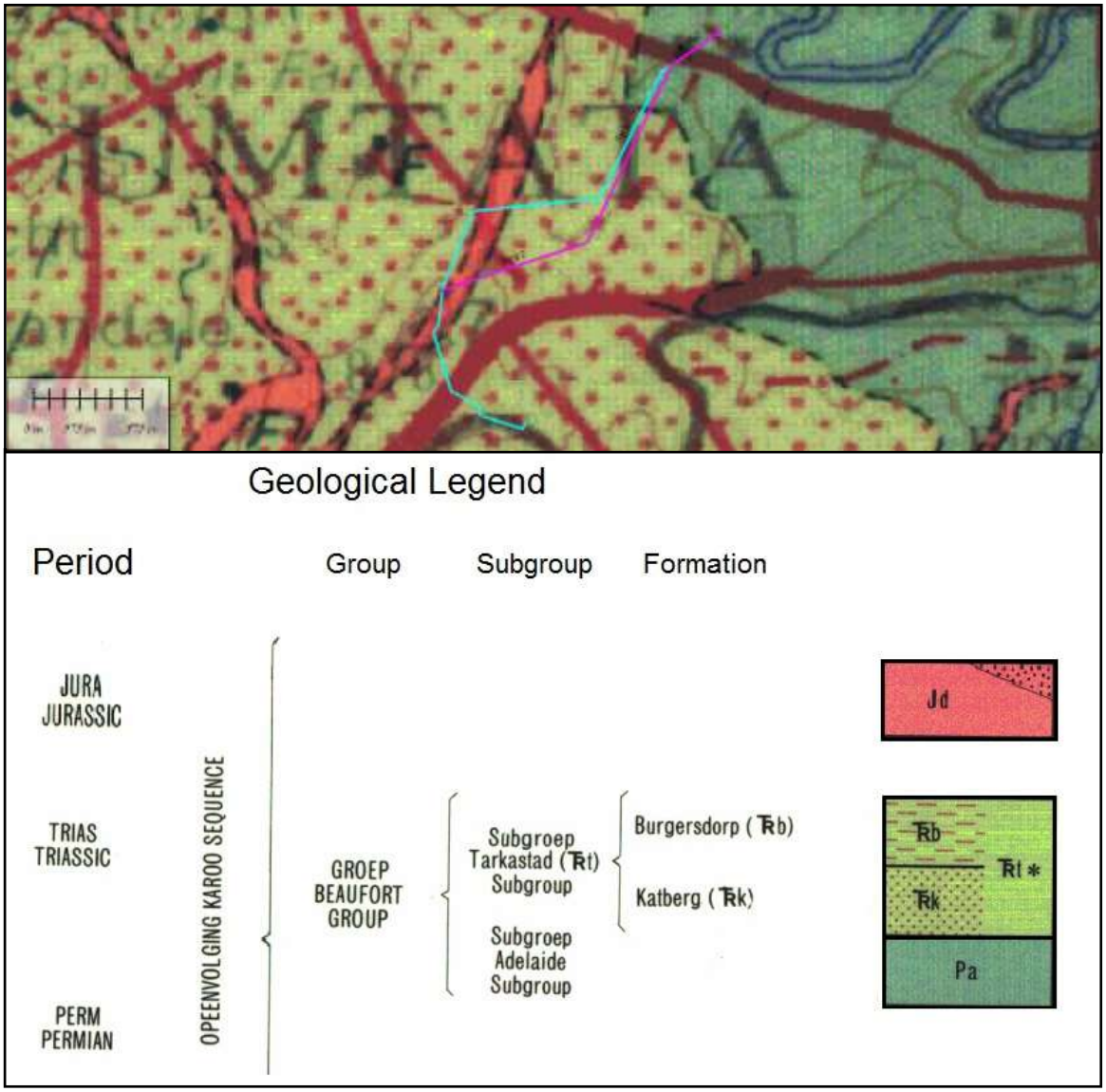

Figure 2 Geology of the Study Area

PALAEONTOLOGY

Adelaide Subgroup/Balfour Formation (Pa)

The Adelaide Subgroup, with special reference to the Balfour Formation, is highly productive as far as fossils are concerned. Fossils include plant fossils of

Glossopteris and vertebrate fossils of the *Dicynodon* and *Lystrosaurus* Assemblage zones have been recorded from these rock units (Rubidge ed, 1995; Groenewald, 1996; Johnson et al, 2009).

The upper part of the Balfour Formation is characterised by a prominent red mudstone unit, the Triassic Palingkloof Member, dominated by the occurrence of fossils from the *Lystrosaurus* Assemblage Zone, including casts of vertebrate burrows (Groenewald, 1996).

Tarkastad Subgroup, Katberg Formation (Trk)

The Triassic aged Katberg Formation is known for the abundant presence of vertebrate fossils of the *Lystrosaurus* Assemblage Zone. Plant fossils of the Dicroidium Assemblage have also been recorded from this unit, but they are sparse and difficult to find. Casts of vertebrate burrows are frequently found and several unique trace fossils, including several species of burrow casts are recorded from the Katberg Formation (Groenewald, 1996).

Jurassic Dolerite (Jd)

Due to the igneous nature of these rocks, they will not contain fossils.

DISCUSSION

The predicted palaeontological impact of the development is based on the initial mapping assessment and literature reviews. The palaeontological significance is summarised in Table 2.

Due to the number and abundance of fossils described from the Adelaide Subgroup/Balfour Formation and the Tarkastad Subgroup/Katberg Formation, these units have been allocated a Very High Palaeontological sensitivity.

Table 2 Palaeontological significance of geological units on site

Geological Unit	Rock Type and Age	Fossil Heritage	Vertebrate Biozone	Palaeontological Sensitivity
Adelaide Subgroup/ Balfour Formation	Mudstone and sandstone *LATE PERMIAN/ TRIASSIC*	Plant fossils of *Glossopteris.* Numerous vertebrate fossils, most notably from animals of the Therapsid group e.g. *Gorgonopsians* and *Dicynodonts*	*Dicynodon* and *Lystrosaurus* Assemblage Zones	Very High Sensitivity
Tarkastad Subgroup/ Katberg Formation	Grey sandstone and red mudstone TRIASSIC	Numerous vertebrate remains of *Lystrosaurus* Assemblage Zone, casts of vertebrate burrows, plant fossils of the Dicroidium Assembalge	*Lystrosaurus* Assemblage Zone	Very High Sensitivity

MANAGEMENT PLAN

The likely impact of the proposed development on local fossil heritage is determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1 above.

The palaeontological sensitivity of the development is related to the specific geology that underlies the development footprints. The palaeontological sensitivity of the study area is shown in Figure 3.

Figure 3 Palaeosensitivity for Alternatives A1 and A2 of the powerline. See Table 1 for explanation of colour coding.

CONCLUSION

About 80% of the study area proposed for the development of the Unitra Thornhill 66kv Powerline refurbishment Mthatha, KSD Municipality is located on areas underlain by Karoo aged sedimentary rocks of the Permian to Early Triassic Balfour Formation, Adelaide Subgroup and Triassic aged Katberg Formation, Tarkastad Subgroup of the Karoo Supergroup. Fossils are expected in the Permian and Triassic sediments, cutting the significant Permian Extinction zone that records the extinction event during which 80%-90% of life on earth perished. Due to the nature of the development it is expected that most of the

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QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeo-ecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

DECLARATION OF INDEPENDENCE

I, Gideon Groenewald, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.

Dr Gideon Groenewald
Geologist