

**HERITAGE SURVEY OF THE PROPOSED 66 kV LINE
BETWEEN ST FRANCIS AND RED CAP KOUGA WIND
FARM, EASTERN CAPE**

FOR COASTAL & ENVIRONMENTAL SERVICES

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INTRODUCTION

Umlando was contracted to undertake an heritage survey¹ for the proposed Red Cap Kouga Wind Farm-St Francis 66kV transmission line. The transmission line is to be used in conjunction with the Red Cap Kouga Wind Farm. An initial desktop study located several heritage sites (report available on request). The corridor is located ~3km west of St Francis, and ~11km south of Humansdorp (fig. 1 - 3). The corridor is ~9km x ~4km in size. It occurs mostly on the rocky outcrops and pasture fields adjacent to the main dune system. The desktop used the available literature (Anderson 2010; Hart 2010; van Ryneveldt 2010) and various topographical and aerial maps to note areas of potential sensitivity. The desktop located the following sites:

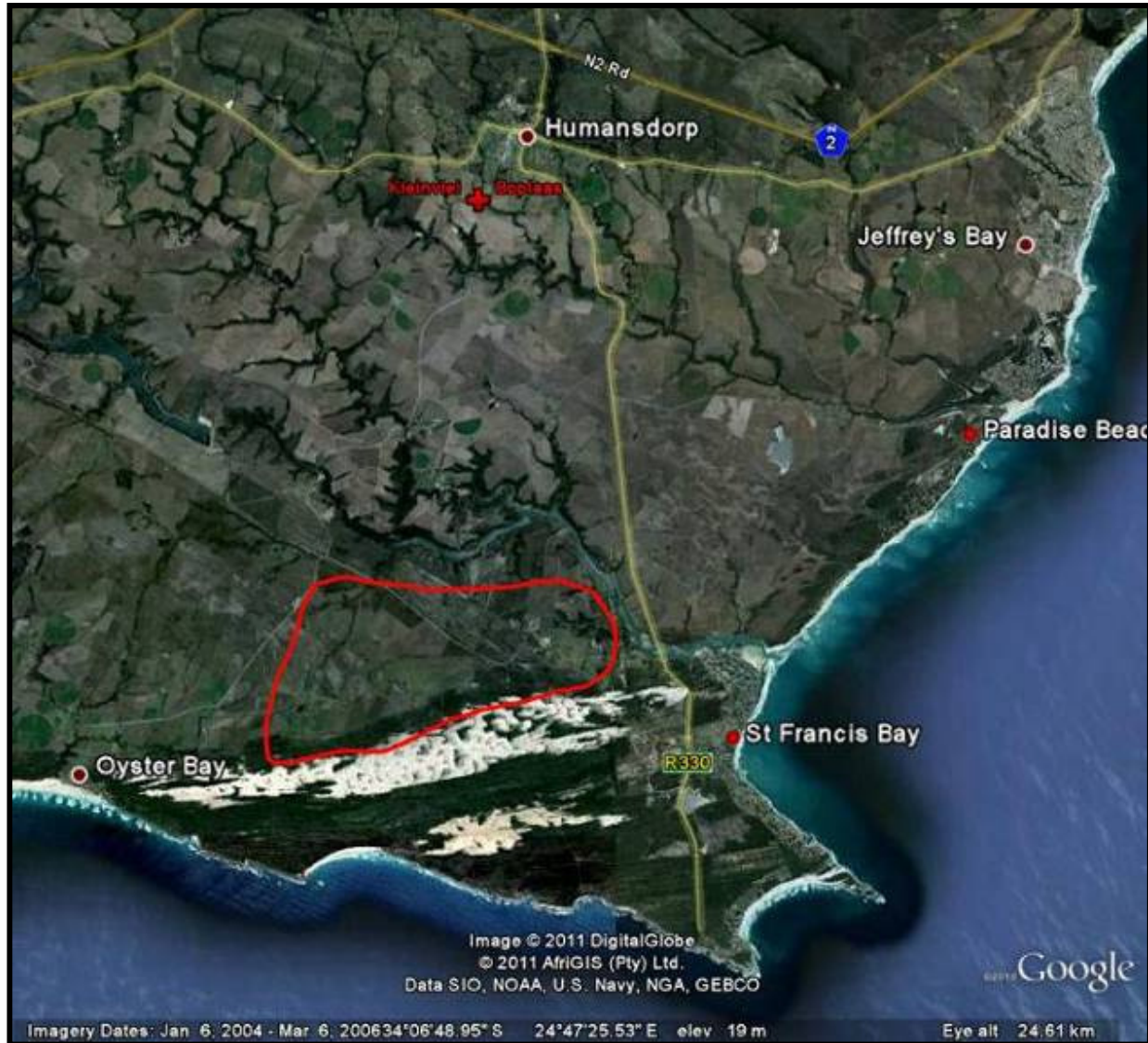
- 28 buildings related to farming activity pre-dating 1975
- 2 Ruins
- 1 school
- 4 archaeological sites

Only one heritage site is a red flag, while the rest of the sites can be mitigated and/or avoided. The red-flag is a site noted in all three previous surveys and is a farmhouse dating to the 19th century.

A sensitivity map was produced by CES where several line options were suggested (fig. 4). The aim of the survey was to survey these lines and list the preferred route. Subsequent to the initial survey, the proposed line has been modified. This report will give the results of the initial survey and only the final line route. Some sites will no longer be affected due to the route line change; however, they have been included in the study as they indicate the types of heritage sites in the area.

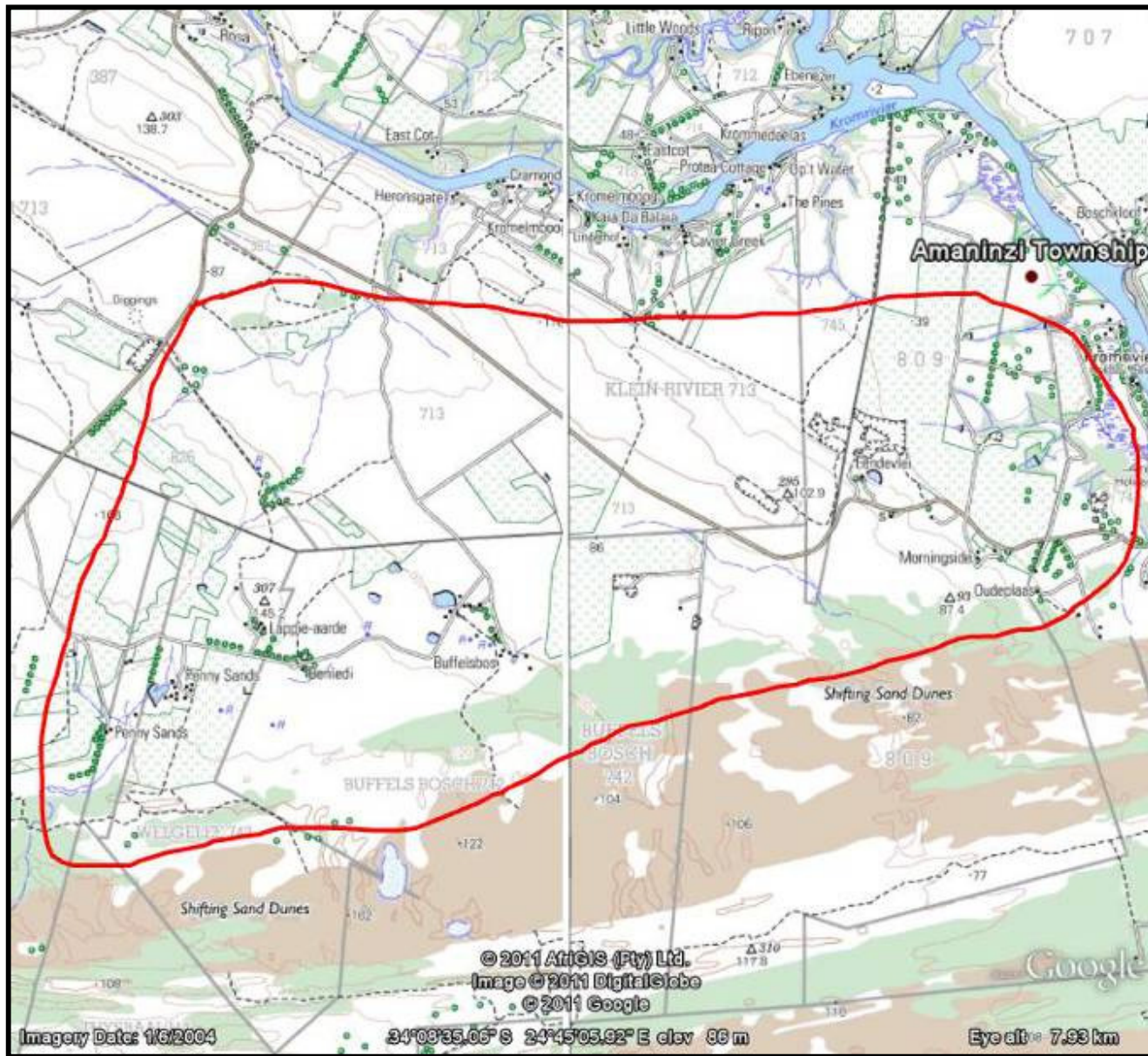
¹ Heritage survey includes archaeology, historical buildings, palaeontology, any features on the landscape that may have cultural value, and areas noted by communities and/or individuals as having value. The last aspect is normally covered in the PPP meetings or with conversations with landowner and are then surveyed

FIG. 1 GENERAL LOCATION OF THE PROPOSED CORRIDOR²



² Red polygon = study area

FIG. 2: TOPOGRAPHICAL OVERVIEW OF THE PROPOSED CORRIDOR



The impacts will be:

- 2.7m x 2.7m x 2m per pylon structure.
- Pylons are 150m to 320m apart
- The underground cable is buried 1.2m deep
- The servitude for above ground is 22m, and 6m for below ground
- The size for each substation is 80x80m.
- A construction camp will be made within the wind farm area.

NATIONAL HERITAGE RESOURCES ACT OF 1999

The National Heritage Resources Act of 1999 (pp 12-14) protects a variety of heritage resources. These 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—
 - 2.8. Ancestral graves;
 - 2.9. Royal graves and graves of traditional leaders;
 - 2.10. Graves of victims of conflict;

- 2.11. Graves of individuals designated by the Minister by notice in the Gazette;
- 2.12. Historical graves and cemeteries; and
- 2.13. 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. This databases contains 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.

FIG. 3a: 1999/2000 TOPOGRAPHICAL MAPS OF THE FINAL SURVEY ROUTE OPTIONS MARCH 2011

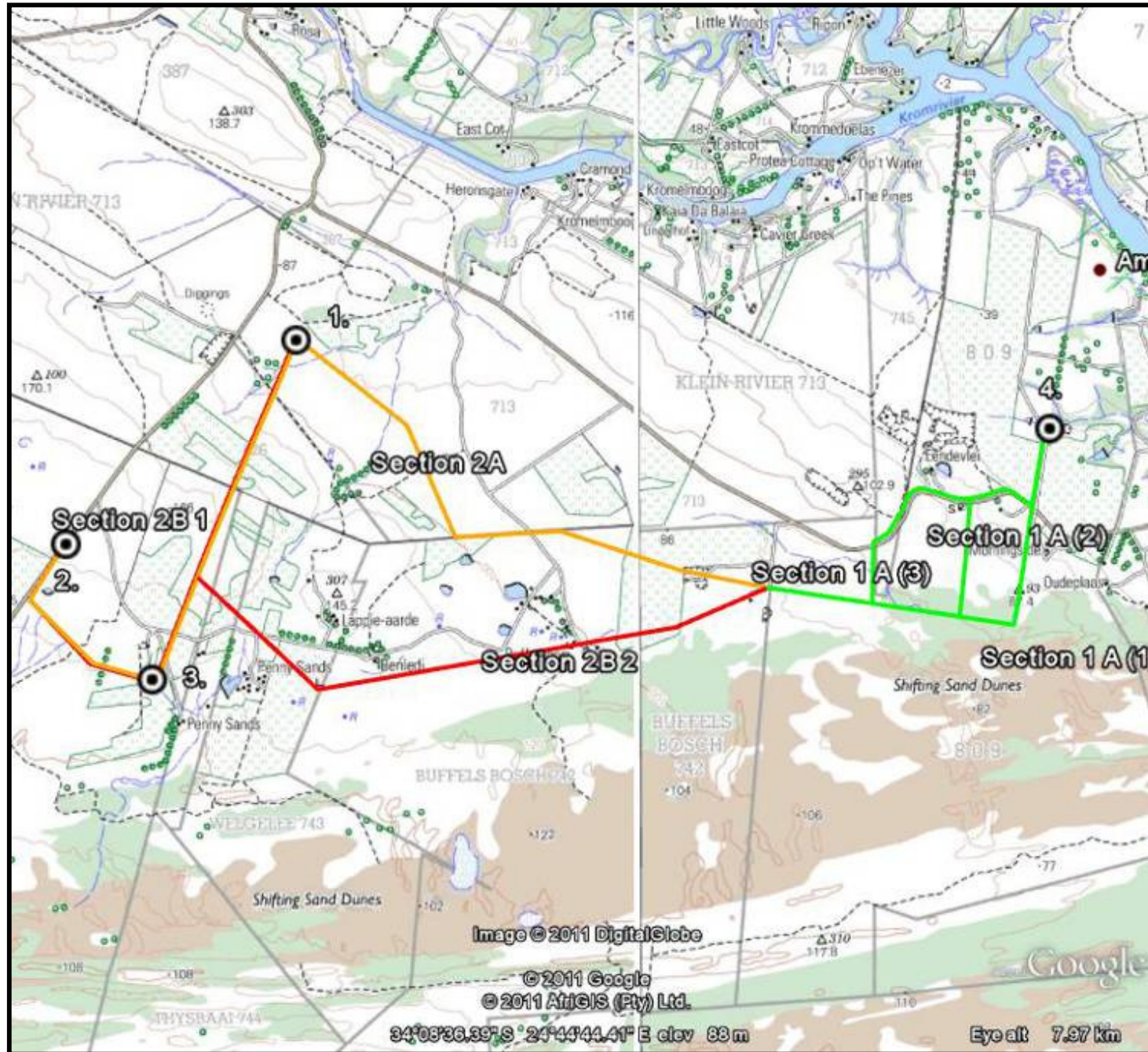
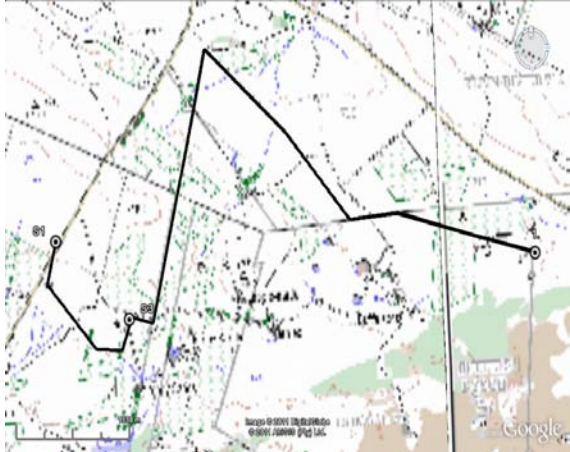
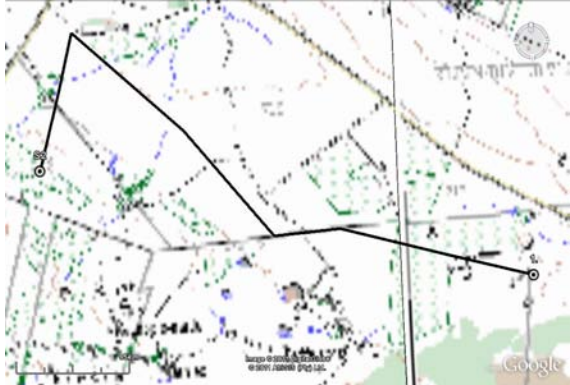
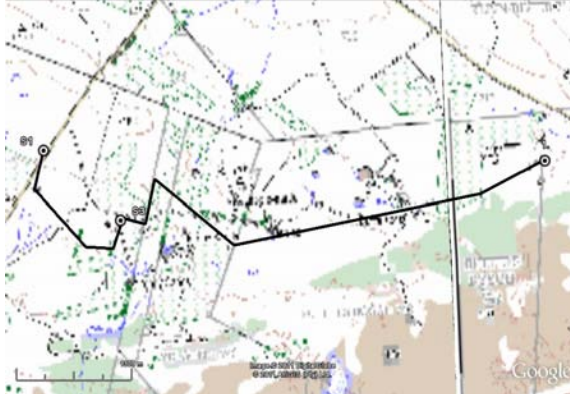
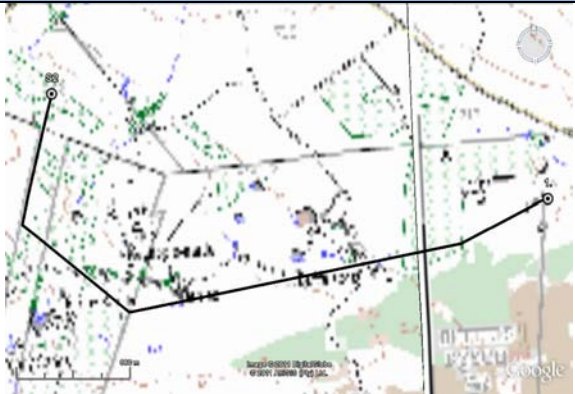




FIGURE 3b. SHOWING THE FINAL DIFFERENT SECTIONS IN THE STUDY SITE July 2011³

³ Section A has 4 alternative layouts namely A1, A2, A3 and A4 while Section B has 3 alternative layouts namely B1, B2 and B3 (Table 1).

Table 1. Description of the different power line alternatives.

Alternative	Layout	Approximate number of monopoles	Approximate footprint
Section A			
A1		61	47.58 m ² or 0.004 ha
A2		28	36.38 m ² or 0.003 ha
A3		48	61.54 m ² or 0.006 ha

Alternative	Layout	Approximate number of monopoles	Approximate footprint
A4		45	57.70 m ² or 0.006 ha
Section B			
B1		24	30.77 m ² or 0.003 ha
B2		24	30.77 m ² or 0.003 ha


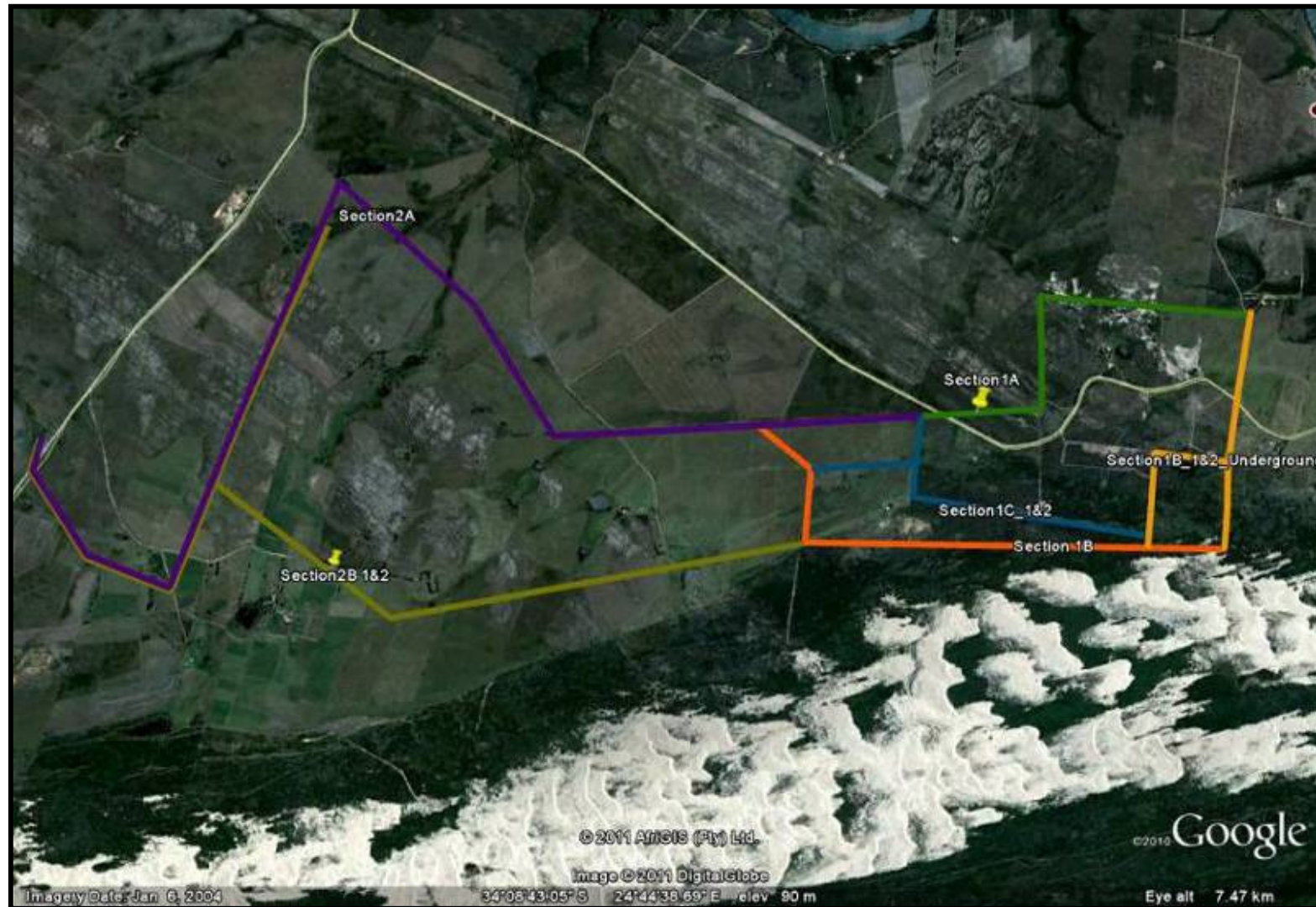
Alternative	Layout	Approximate number of monopoles	Approximate footprint
B3		24	30.77 m ² or 0.003 ha

FIG. 4: AERIAL LOCATION OF THE ORIGINAL PROPOSED 66 kV LINE OPTIONS⁴



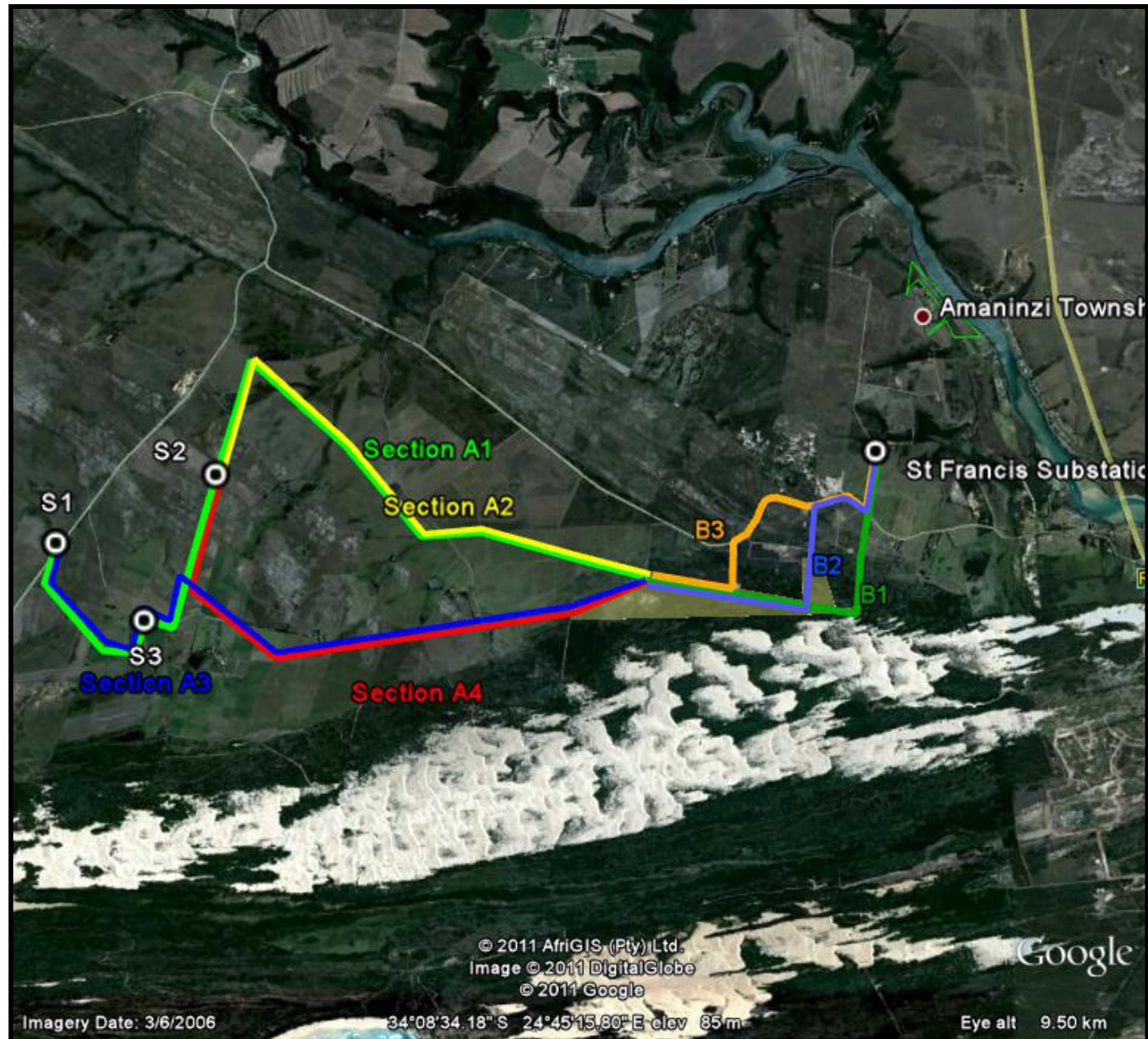
⁴ This indicates the lines in the survey

FIG. 5: LOCATION OF POSSIBLE HERITAGE SITES FROM THE DESKTOP SURVEY⁵

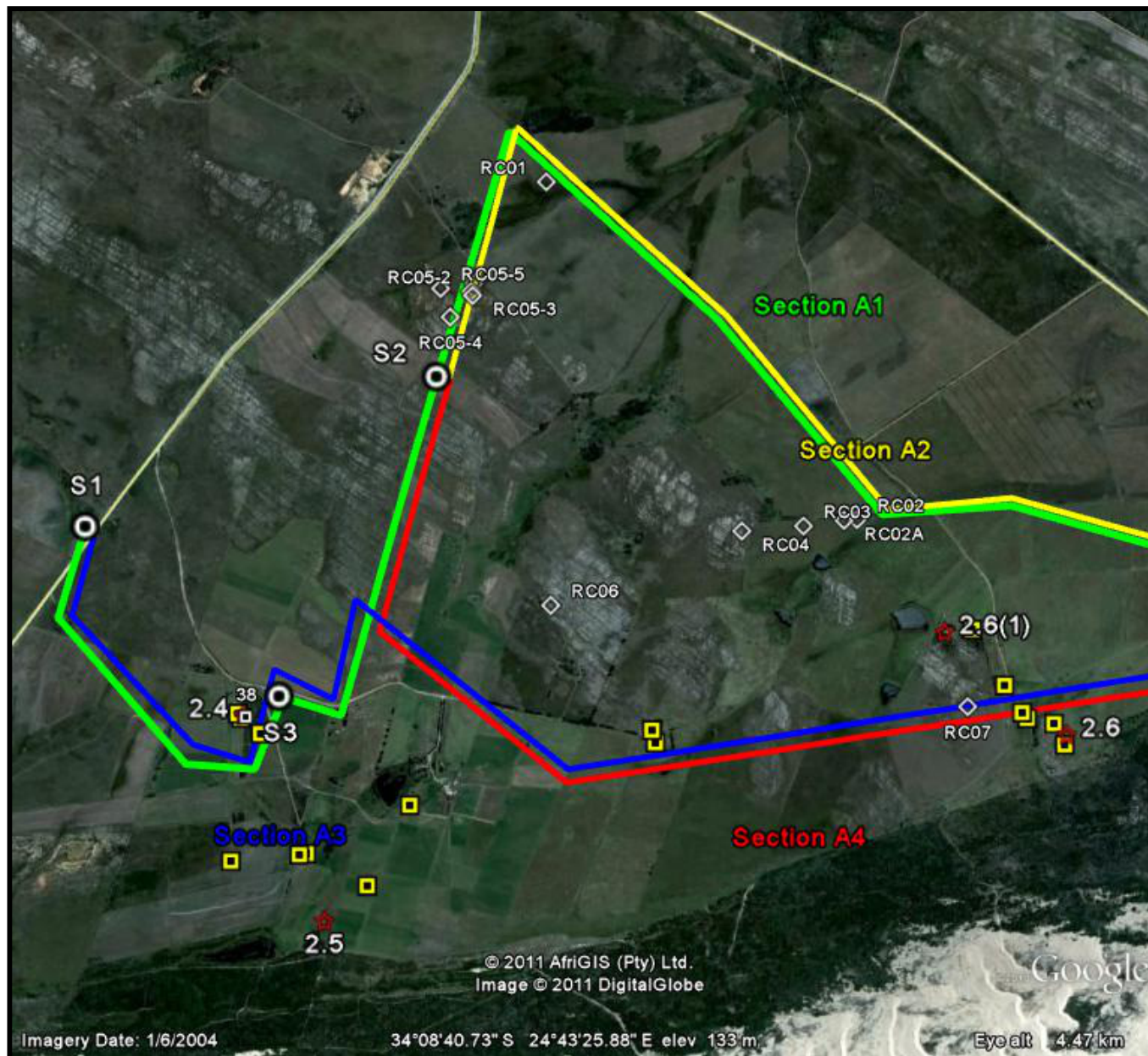
⁵ Pink circle = ruin, yellow square = house; green circle = school/factory; white square = Hart (2010), red star = van Ryneveldt (2010). Old routing applies

FIG. 6a: ROUTE ALIGNMENT & SUBSTATIONS FOR THE SURVEY⁶

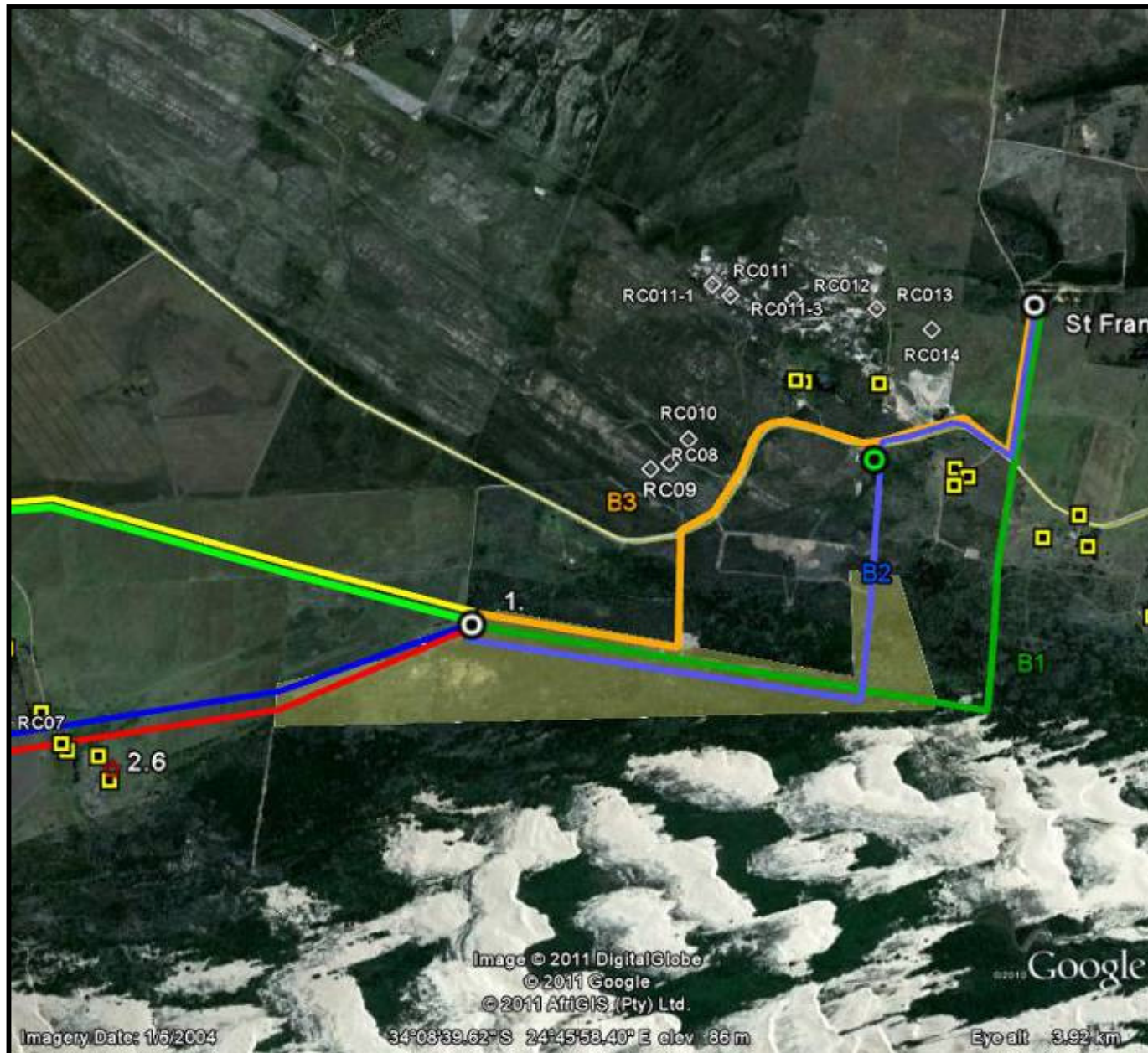
⁶ Shaded yellow polygon is unsurveyed area; White circle is a proposed substation. Old routing applies

FIG. 6b: FINAL ROUTE ALIGNMENT, NAMES & SUBSTATIONS⁷

⁷ Shaded yellow polygon is unsurveyed area; White circle is a proposed substation

FIG. 7: LOCATION OF HERITAGE SITES ALONG THE WESTERN SIDE⁸

⁸ White diamond = archaeological site, yellow square = building (from desktop survey), White circle = substation

FIG. 8: LOCATION OF HERITAGE SITES ALONG THE EASTERN SIDE⁹

⁹ White diamond = archaeological site, yellow square = building (from desktop survey), White circle = substation, yellow Polygon is unsurveyed area

RESULTS

Desktop Survey

The desktop survey used the available literature (Anderson 2010; Hart 2010; van Ryneveldt 2010) and various topographical and aerial maps to note areas of potential sensitivity (fig.'s 5 - 7). The desktop located the following sites:

- 28 buildings related to farming activity pre-dating 1975
- 2 Ruins
- 1 school
- 4 archaeological sites

Only one building in the Buffelsbosch farm complex will be indirectly affected by the 66 kV line, and this is discussed below. In Figure 5 the lines appear to be on/over houses, however they are at least 25m away from any building. The line passes over a shed; however, the shed is a recent construction of corrugated iron.

The site Ruins 2 does not exist and was probably an error on the 1999 topographical map. The closest structure is a water reservoir.

Field Survey

There have been a few reroutes and route line name changes since the original survey and May 2011 report. This final report refers to the latest routes. Figures 3a/b and 6a/b show the old (referred to as 'a') and new routes (referred to as 'b').

The route name changes are as follows:

New name	Old Name
Section A1	Section 2A
Section A2	part of Section 2A
Section A3	Section 2B 2 and part of Section 2B 1
B1	Section 1 A (1)
B2	Section 1 A (2) and part of Section 1 A (1)
B3	Section 1 A (3) and part of Section 1 A (1)

The results of the field survey are shown in Figures 6 – 8, and Table 2. Some sites have additional numbers and these are to indicate concentrations of artefacts on that specific hill. In most cases, the vegetation was not too dense to be a hindrance for visibility – this may be a seasonal condition (fig. 9). However, the line options along the first dune cordon (most southern portion of B1, B2 and B3 that runs east-west) was overgrown with wattle and natural coastal thicket, and this area was not surveyed (fig. 8 and 10). The route options that were in agricultural fields tend to have little, if any, archaeological material. However, material may occur below the surface, as observed along the northern parts of original field survey route.

The various route options were subdivided into sections. Figures 9 – 12 show some of these options.

FIG. 9: VIEW OF RC011 to RC013¹⁰



¹⁰ This is located ~400m north of B3, original routing name

FIG. 10: VIEW LOOKING ALONG THE EAST-WEST SECTION OF B1¹¹



¹¹ The line runs along the top of the dune ridge for only the first 100m or so

FIG. 11: VIEW OF SECTION A1/A2



FIG. 12: SOUTHWEST VIEW OF EASTERN SIDE OF SECTION A4/A3¹²



RC01

RC01 is located along the northern part of Section A1/A2. The site is a small rock outcrop (~1m x 1.5m) overlooking a stream. The rock is a local quartzite. There are at least four areas in the rock where flaking occurs to make stone tools, although it is not possible to state whether these are MSA or LSA flakes (fig. 13). The current route option occurs ~60m northeast of this singular rock outcrop.

Significance: The site is of low significance, and better examples occur at RC05.

Mitigation: The outcrop is unlikely to be affected by the line. If it is, then it should be photographed and studied in detail.

¹² Arrow indicates location of line

FIG. 13: QUARRIED ROCK OUTCROP AT RC01¹³



¹³ Scale = 10cm – GPS = 11cm x 6cm (in all photos)

RC02

RC02 and RC02a are located south of the central part of the Section A1/A2. The site occurs in the agricultural field that is used for grazing and has been repeatedly tilled in some manner. The site consists of a scatter of animal bones and two porcelain sherds (fig. 14). The porcelain consists of a rim and lip of a plate, is white in colour and undecorated. The various faunal remains appear to belong to large bovids, presumably domestic cattle. There were suggestions that the site extends over a wider area, however this is probably related to the scattering affect of ploughing or mechanical seed planting over time. Several very fragmented *coquinas* (R. De Kok pers. comm.) were observed in the area as well – see RC03 and the PIA. There was no evidence of a defined general historical midden and the nearest historical dwelling is ~500m – 600m southeast of the site. There is thus no dwelling currently associated with the scatter, and it may be a ‘chance occurrence’ or a broken plate dropped along the side of the track – see RC03 for another historical artefact. The bone could be from carcasses that are more recent.

Significance: The site is off low significance as the artefacts and ecofacts may be in a secondary context and/or random occurrence.

Mitigation: The line has been moved away from the site and no mitigation is required.

FIG. 14: PORCELAIN AND BONE FRAGMENT AT RC02



RC03

RC03 occurs ~ 150m west of RC02a; however, the one site probably merges into the other. The site consists of large chunks of *coquina* (R. De Kok pers. comm.) along the surface. – see figure 15 and the PIA. The line has been moved away from the site.

Significance: See PIA report

Mitigation: See PIA report

FIG. 15: COCQUINA CHUNCK AT RC03



RC04

RC04 occurs on a rock outcrop ~450m west of Section A1/A2. I surveyed the outcrop to test a hypothesis regarding rock outcrops and stone tool quarries in the area. I hypothesised that all rock outcrops would have been used as a raw material source and thus would be archaeological by default. If this was the case,

then all outcrops in this general area can be noted as being sensitive in a planning stage. The hypothesis works for most of the outcrops.

The entire outcrop at RC04 consists of “quarries” and scatters of stone tools dating to the Early Stone Age (ESA) and Middle Stone Age (MSA) (fig. 16). These include the following:

- Handaxe
- Cleaver
- Unifacial points
- Irregular cores
- Possible unfinished backed flake, or bifacial point – the tool was broken at both ends
- Several flakes of various sizes

The stone tools are in a secondary context, but are well preserved and would yield information regarding stone tool manufacture. All tools are made from the local raw material of the outcrop. The occurrence of a possible bifacial point is significant.

A single glass stopper was observed amongst the rocks. The glass top is handmade (there are no seams and several bubbles occur) and it probably originates from the 19th century.

Significance: The site is of medium significance due to the variety of tools and their preservation.

Mitigation: The site will not be affected by the current line route. However, if it is affected then each area around a pylon will need to be sampled. The method of line construction should also be noted. If any heavy-duty machinery is used along the line, then it has the possibility of damaging artefacts. If that is the case, then the line servitude should be sampled.

FIG. 16: ARTEFACTS AT RC04



RC05

RC05 is located along the north-western part of Sections A1/A2. It is concentrated on the area of the line route; however, the site does extend across the entire hill. The site, like RC04, consists of ESA and MSA tools (fig. 17); however, they appear to be more weathered. The outcrop consists of several concentrations of stone tools, as well as individual artefacts. All of the artefacts are from the local outcrop, which has also been used as a quarry.

These include the following:

- Handaxe
- Cleaver
- Unifacial points
- Several flakes of various sizes

The site may extend further south for another 500m, however, the vegetation became too dense to make accurate observations.

Significance: The site is of medium significance in terms of Stone Age samples.

Mitigation: The site will be directly affected by the current line route. Each area around the pylon will need to be sampled. The method of line construction should also be noted. If any heavy-duty machinery is used along the line, then it has the possibility of damaging artefacts. If that is the case, then the line servitude should be sampled. The rest of the site to the south can be assessed and mitigated if this line option is chosen

FIG. 17: ARTEFACTS & FEATURES AT RC05



RC06

RC06 is located in the middle of the study area, and is not directly affected by the line. The site consists of a presumed labourer's house with corrugated iron additions. While the building is not new, it is not older than 60 years, as seen with the metal window frames and cement/concrete used for the walls. It appears that the house is currently used for livestock.

Significance: The site is of low significance.

Mitigation: No mitigation is required since it is not affected.

FIG. 18: HOUSE AT RC06



RC07

The main part of RC07 occurs along eastern portion of Section A3/A4. The site is a general scatter of tools over the entire hill (fig. 19). As with the other outcrops in the area, the local raw material is used and several rocks have evidence of being utilised. The tools included:

- Unifacial point
- General flakes
- Blades
- Rock outcrops used a quarry
- LSA flake

The site has fewer tools than other outcrops; however, two unifacial points appear to have more formal retouch than other unifacial points at nearby outcrops. The artefacts would extend over the entire hill.

Significance: The site is of low significance in terms of Stone Age samples.

Mitigation: The hill will be directly affected by the final line route. Each area around the pylon will need to be systematically surveyed and sampled.

The method of line construction should also be noted. If any heavy-duty machinery is used along the line, then it has the possibility of damaging artefacts. If that is the case, then the line servitude should be surveyed and sampled.

FIG. 19: STONE TOOLS AT RC07



RC08 & RC09

RC08 and RC09 are located on top of a heavily (fynbos) vegetated hill. The entire hill (from RC08 to RC010) appears to have been extensively quarried in the past. There are many semi-circular holes along the hill and many of the rocks have “teeth mark scars” from mechanical instruments. Some of the machines have left pressure flakes from the rocks, resulting in false stone tools. However, there are occasional MSA flakes in the area.

The site will not be affected as the line option has moved away.

Significance: The site is of low significance

Mitigation: No further mitigation is required since this area has been severely disturbed by quarry activity. The site will not be affected as the line option has moved away.

FIG. 19: DENSE FYNBOS VEGETATION AT RC08



RC010

RC010 occurs near the northeastern side of the same hill as RC08 and RC09. The area has been quarried; however, four areas appear to look more like walls: they are larger and more circular than the other quarried areas. These walls also appeared to be stacked dry stone walling, whereas the quarried areas were more disjointed. The dense vegetation made it difficult to view the entire wall, and these would need to be re-assessed when the vegetation is less dense and/or if the area is affected. There were a total of four possible walls in this area (fig. 20). If these are dry stone walls then they may be kraals that may relate to Colonial farmers or pastoralists - this would need to be studied in depth before a final statement can be made.

The site will not be affected as the line option has moved away.

Significance: Few, if any, dry stone walls for kraals have been recorded in the area. If these are not the result of quarrying activity then the walls are at least of medium significance in terms of their rarity.

Mitigation: Currently the area will not be affected as the line has moved. If the area is to be affected, then it needs to be re-assessed when the vegetation is less dense to determine if these are indeed walls or the result of quarrying activity. The (possible) walling would need to be mapped and photographed, and clearly demarcated, so that it is not damaged by line construction.

FIG. 20: POSSIBLE WALLING AT RC010



RC011

RC011 occurs at the base of the hill where it becomes part of the plains for the Kromrivier. The site is a lag deposit that occurs on a gravel bed ~50cm below the surface (fig. 21). The artefacts are visible in the eroded area that is 200m x 150m in size. More artefacts would obviously occur in the uneroded areas. The areas of the site that is not eroded, is covered by wattle trees.

The site consists of a large array of ESA and MSA stone tools, most of which are well preserved. Most of the tools are on local raw materials (fig. 22a - b). These include:

- (Acheulian) Handaxes
- Cleavers
- Unifacial points
- Cores
- Blades
- (LSA?) flakes

The types of points in figure 22b (bottom) occur between 38 000 and 60 000 years ago and between 65 000 and 77 000 years ago (Villa et al 2005, Soriano et al 2005, Villa et al 2009, Wadley 2007, Wadley et al 2006).

The site will not be affected as the line option has moved away.

Significance: The site is significant in terms of its tool variety and preservation of the stone tools, even if it is in a secondary context. Most of the previously recorded sites in this area only date to the last ~4000 years (with the exception of a few – see van Ryneveldt 2010).

Mitigation: If the site is to be affected, or the general area near the site (i.e. from the base of the hill to the Kromrivier), then the site would need so form of mitigation. In terms of the line, the site will need to be sampled where the pylons are placed. If any heavy machinery for line construction and/or vegetation

clearance is used, then the servitude corridor would need to be sampled as well. Any subsurface activity (i.e. more than 10cm), in the general area of the site would require a survey and/or sampling strategy.

FIG. 21: GRAVEL BED AND SAND DEPOSITS AT RC011



FIG. 22a: STONE ARTEFACTS FROM RC011



FIG. 22b: STONE ARTEFACTS FROM RC011¹⁴



¹⁴ Bottom tool is ~5cm in length

RC012 & RC013

RC012 & RC013 is located ~220m east of RC011. This site was separated from RC011 due to its content and distance. While RC012 is probably a continuation of RC011 in terms of being a large scatter of artefacts, the gravel deposit is denser (fig. 23) and the stone tools appear to be Late Stone Age (LSA). Figure 24 illustrates a close up of two areas (approx. 50cm x 50cm) of the gravel deposit. The figures clearly show the high concentration of stone tools (see footnote). The tools appear to be mostly debitage (chips, chunks, flakes and a few irregular cores) and to occur on a gravel bed. The site extends for ~200m along the line, and probably for further towards the Kromrivier. There would be concentrations of tools at the site. Fig. 24 clearly indicates that this area has a high concentration of stone tools, even if they are debitage and in a lag deposit. The site is however significant, in that it appears to be exclusively related to the LSA whereas the previous sites appear to date more to the ESA and MSA. The latter areas (RC011.1 - 11.2) are also not as highly concentrated. This site appears to continue for at least 100m each side of the GPS point. The site has potential to yield information regarding LSA stone tool manufacture even if it is a lag deposit.

RC013 is a continuation of RC012 but ~300m eastwards. It is in essence the same sites; however, I had separated them in the field.

The site will not be affected as the line option has moved away.

Significance: The site is of medium significance due to its high concentration of debitage material. No other sites in the general area have recorded such a high concentration of stone tools.

Mitigation: The site will require mitigation if it is affected in any manner. The areas around each pylon will need to be sampled and or excavated if not exposed. The area along the final servitude will need to be demarcated and sampled, as bush clearance and/or construction equipment will disturb the site.

FIG. 23: STONE ARTEFACTS ON A GRAVEL BED



FIG. 24: CLOSE-UP VIEW OF STONE ARTEFACTS ON A GRAVEL BED AT RC012¹⁵



¹⁵ Blue star = stone tool: chip, chunk, flake or irregular core

RC014

RC014 occurs along the northern part of the study area. The area has been heavily affected by sand mining operations. The site appears to be an extension of RC011 – RC013 in that there is a continual scatter of stone tools. However, in this area, either the sand has been removed down to bedrock, or the sand deposit still exists covering the rest of the site.

The observable artefacts at the site consist of one core and a few flakes, probably dating to the LSA. This would normally not fit into my definition of a site; however, it would be a safe assumption to state that more artefacts occur in this general area.

The site will not be affected as the line option has moved away.

Significance: This specific part of the site is of low significance due to the low density of artefacts.

Mitigation: The area should be monitored during any earthmoving activity.

SITE 2.6

Site 2.6 was initially recorded by van Ryneveld (2010) and is part of the Buffelsbosch farm complex. The site is along the eastern portion of Section A3/A4 . Several of the buildings predate the 60-year mark, and may even date to the 19th century (fig. 25). Both buildings are fairly run down: one is inhabited by farm labourers and the others have been modified for storage areas. One of the latter buildings has several cracks along the walls, especially where add-ons have been placed. This appears to be one of the original farm buildings.

The line goes over recent sheds (fig. 25 middle – white arrow), and misses the older houses. Since there are lines already passing the house, another small line will unlikely have an additional visual affect.

Significance: If the houses are affected, then they need to be assessed by a qualified architect historian.

Mitigation: Currently no mitigation is required

FIG. 25: BUILDINGS AT BUFFELSHOEK



TABLE 2: SUMMARY OF SURVEYED SITES

Name	Type	Co-ordinates	Significance	Mitigation if affected	Will be affected
RC01	Quarried stone	34° 7'50.56"S 24°43'18.42"E	Low	Photograph	Unlikely
RC02	Palaeontology, Historical midden?	34° 8'38.54"S 24°44'11.56"E	Low	Monitor and sample	No
RC03	Palaeontology	34° 8'39.45"S 24°44'2.37"E	N/A	See PIA	No
RC04	Hill with Stone tools	34° 8'40.16"S 24°43'51.78"E	Medium	Monitor and sample	No
RC05	Hill with Stone tools	34° 8'6.33"S 24°43'5.67"E	Medium	Monitor and sample	Yes
RC06	House	34° 8'50.60"S 24°43'19.29"E	Low	N/A	No
RC07	Hill with Stone tools	34° 9'4.95"S 24°44'30.27"E	Medium	Monitor and sample	Yes
RC08	Hill with Stone tools	34° 8'31.80"S 24°46'7.83"E	Low	Monitor and sample	No
RC09	Hill with Stone tools	34° 8'31.51"S 24°46'10.67"E	Low	Monitor and sample	No
RC010	Stone tools, possible walling	34° 8'28.11"S 24°46'13.52"E	Medium	Monitor and sample, photograph and measure walling after vegetation clearance.	No
RC011	Stone tool scatter	34° 8'8.60"S 24°46'17.34"E	Medium	N/A	No
RC012	Stone tool scatter	34° 8'10.38"S 24°46'29.68"E	Medium	N/A	No
RC013	Stone tool scatter	34° 8'11.50"S 24°46'42.33"E	Medium	N/A	No
RC014	Stone tool scatter	34° 8'14.09"S 24°46'50.80"E	Medium	N/A	No
2.6	Farm complex	34° 9'1.80"S 24°44'36.84"E	N/A	N/A	Partially

PALAEONTOLOGICAL IMPACT ASSESSMENT

The PIA occurs in Appendix B, but can be summarised as follows:

“There are **no major palaeontological grounds to put off planned construction** of a 66 Kv transmission line in the designated footprint, **but development along Section B1, B2, and B3 will require** certain **mitigation** measures, namely monitoring of fresh exposures and bedrock excavations into potential fossil-bearing strata. Access by a palaeontologist should be facilitated at the appropriate stage during development in order to inspect fresh excavations

Development along **Sections A1, A2, A3 and A4, as well as infrastructure development for all three substation options will require no mitigation**. There is a very low likelihood of finding well-preserved fossils along these sections and within these localities, respectively” (Rossouw – Appendix D)

MANAGEMENT PLAN & LINE ROUTING OPTION

All of the sites noted in the survey can be managed in some manner if they are to be affected, with the exception of the houses. The houses should not be directly affected and the visual impact will not be changed, as there is an existing line. Furthermore, the visual impact assessment has been undertaken by the wind farm study.

The area with the possible stone walling (RC010) should be monitored to ensure that the walls are not damaged. The sensitive areas would need to be clearly demarcated. **However, this site is currently out of the line route.**

The area with a possible historical midden (RC02) is no longer affected by the line.

All hills with rock outcrops have some form of site with stone tools. All of the Stone Age sites should be sampled and monitored if they are to be affected, with the exception of RC014 that only needs to be monitored. The sampling should be as follows:

1. The final line route should be assessed via desktop to ascertain which sites will be affected.
2. The line route and the servitude should be demarcated in some manner, as well as the location of the electricity poles
3. The servitude should be resurveyed and sampled. Sites such as RC011 – RC013 would require a very detailed sampling strategy due to the high density of well preserved artefacts. These three sites will **not** be affected by the line. Sites such as RC05 and RC07 do not have as dense artefact scatters and require basic sampling and monitoring.
4. Those areas to be directly affected by the pylon should be systematically sampled

Section B1

Only the first ~100m of the southern east-west orientated part of this section was surveyed due to the dense vegetation (see area not surveyed in Figure 8). No artefacts or sites were observed along the section surveyed which runs north-south from the St Francis Substation right up to the sand dunes and along the first 100m of the sand dunes (again see figure 8 for section surveyed).

Only the section of B1 that was not surveyed would require on site monitoring during vegetation clearance and construction phase. This is due to the fact stated above that no sites were observed along the surveyed portion of B1. If sites do occur along the unsurveyed portion they can most likely be mitigated.

Section B1 will require monitoring by a palaeontologist.

B2

The southern part of this section was not surveyed due to the dense vegetation beside the track. No artefacts were observed along the northern section. If sites do occur along the route they can most likely be mitigated. Part of this section was not surveyed and this would require on site monitoring during vegetation clearance and construction phase. This section will require monitoring by a palaeontologist

B3

This southern part of this section was not surveyed due to the dense vegetation. No artefacts were observed along the northern section. If sites do occur along the route they can probably be mitigated. Part of this section was not surveyed and this would require on site monitoring during vegetation clearance and construction phase. This section will require monitoring by a palaeontologist.

Section A1 and A2

One site occurs along these sections of the line: RC05. RC05 is of medium significance and would require sampling. No other sites occur along these section, although two sites occur just over 50m from the line: RC01 and RC02. Sections A1 and A2 are unlikely to have a negative impact on the archaeological site. These sections will not require monitoring by a palaeontologist.

Section A3 and A4

Two sites occur along these sections of the line: RC07, 2.6 (Buffelsbosch farm complex). RC07 is of medium significance and would require sampling. The line will not directly affect the older houses, and the visual impact will be minimal, if at all. Sections A3 and A4 are unlikely to have a negative impact on the archaeological sites, as mitigation would make it a positive impact. The last 800m along the eastern part of these sections was not surveyed and this would require

on site monitoring during vegetation clearance and construction phase. This section will not require monitoring by a palaeontologist.

Substation 1

No sites occur near this substation. This section will not require monitoring by a palaeontologist.

Substation 2

No sites occur near this substation, however isolated stone tools may occur in the general area as it forms part of RC05. The area should be sampled if this substation option is chosen. This section will not require monitoring by a palaeontologist.

Substation 3

No sites occur near this substation. This section will not require monitoring by a palaeontologist.

No specific Section, or Substation, will have a higher impact on archaeological sites, than another Section, or Substation. The southern east-west portion of Sections B1-3 was not fully surveyed apart from the first 100m from the east. The 100m surveyed did not yield any sites and this is the section of the line closest to the dunes. It is likely that the unsurveyed portion of this section would probably yield similar types of sites to the rest of the sections. However, the longer the line spends within the dune system, the more likely it will affect important sites. I would thus suggest that Section B3 is chosen **if possible only** because it is the shortest route; however the entire area is of equal sensitivity and all sites/routes can be mitigated.

Since the initial survey and report, the feasibility of using alternatives B2 and B3 have been curtailed for the following reasons:

“Alternative B2 and B3 in the Draft Basic Assessment were proposed to run along the main road (DR01762) between St Francis Bay and Oyster Bay. The proponent of this power line project has been in discussions with the district road engineer in the area to try and facilitate that if it was to use its alternate B2 or B3 it would be able to run the line along the edge of the road so as not to have to cut through the small holdings on either side of the road. After numerous interactions it has learnt since the finalisation of the draft Basic Assessment document that no 66kv powerline is allowed closer than 50m from a District Road (DR).

The proponent, after interacting with the owners of the small holdings along this road, also found out that numerous of these small holdings had, or were, in the process of subdividing their land even further and thus even if the power line were to run just on the edge of their property along the road, they would still not be interested in negotiating a servitude over their property. They believed that the impact on their land value from having a "sterile" development servitude running on their property would be significant if it was along the edge and even more so if it was within their smallholdings and subdivisions. Furthermore they believed that the impact not only on the value of their land but on the sense of place given a line within their properties would be significant.

This compared to option B1 which runs straight down south from the St Francis Bay Substation along a small 5m access servitude (can run along this as not a DR or NM road) until it gets to the large farm 809. Here it heads West along the farm boundary of this large farm as there is no road issues and not over small holdings. The impact of a power line cutting across a small holding within its boundary has a significant impact on the land and land owner and homesteads

compared to a line cutting across a large farm where views, access, privacy and land value are not infringed nearly as much.

Thus it can be seen from the above that options B2 and B3 are not feasible and would anyway have a far greater impact on the small holdings in this area. This linked to the fact that Eskom (the land owner) is planning on putting in a fire brake along the boundary of 809 where alternate B1 runs makes it the environmentally preferred and only viable alternative for the B section of the line.” (Email correspondence with Lance Blaine, 1/08/2011)

I have no objections to the B1 route option, and believe it is unlikely that there will be a high density of archaeological sites on this side of the dunes. This area is partially similar to the grazing areas to the east, where very little material was observed. The southern section of B1 appears to be in old grazing fields that have been overgrown with wattle. The other area along this southern section is along the edges of a dune cordon. While this is a sensitive area, it is unlikely to yield many sites. The entire southern section of B1 would need to be monitored during vegetation clearance and the construction phase. However, **no monitoring would be necessary for the north-south orientated portion of B1** that runs from the St Francis Substation to the dunes as no sites were noted here during the survey.

I suggest that the pole locations are finalised before vegetation clearance, and that the excavations for the pylons in this area are undertaken shortly thereafter. An archaeologist should monitor these excavations and undertake the appropriate mitigation if any artefacts are noted. If there initially appears to be a high density of artefacts, or even human remains, then the pylon can be moved.

The developer will need to obtain a permit from SAHRA to impact on any of the sites. The archaeologist would need to obtain a permit for sampling and/or excavations along the final route option.

CONCLUSION

The proposed 66kV line route and corridor between Red Cap Kouga Wind Farm and St Francis was surveyed in March 2011. The initial survey consisted of a desktop survey noting previous work in the area as well as areas of potential sensitivity. Much of the other impact assessments, such as the visual impact assessment and cultural landscape, as well as the consultation with IAPs have already been undertaken by other aspects of the wind farm.

The survey recorded 14 news sites of which most of these dated to the ESA and MSA. The most significant sites will not be affected as the line route has been modified since the initial survey. No specific Section or Substation has a higher impact on archaeological sites, and thus any route option is preferred, provided mitigation is undertaken at the sites.

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APPENDIX A
SITE RECORD FORMS

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC01

Official Name: Kleinrivier 713

Map Sheet: 3424BA Kruisfontein

GPS reading: S34 07.843 E24 43.307



DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt.

Turn left onto Road after 9.8 km (S34 07.223 E24 43.295)

RC01 is 11.4 km, and 1.6 km after T junction overlooking a wetland

SITE DESCRIPTION:

Type of Site: "Quarry"

Merits conservation: Yes

Threats: Possible

What threats: Substation

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

The site is a small rock outcrop (~1m x 1.5m) overlooking a stream. The rock is a local quartzite. There are at least four areas in the rock where flaking occurs to make stone tools, although it is not possible to state whether these are MSA or LSA flakes.

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC02

Official Name: Buffelsbosch 742

Map Sheet: 3424BA Kruisfontein

GPS reading: S34 08.642 E24 44.193

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt. Turn left onto Unpaved Road at 8.6 km or S34 07.538 E24 43.978). RC02 = 10.9 km, or 2.3 km after turn off), along pasture field's fence

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation: Yes - monitor

Threats: Yes

What threats: 66kV line

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

The site occurs in the agricultural field that is used for grazing and has been repeatedly tilled in some manner. The site consists of a scatter of animal bones and two porcelain sherds. The porcelain was a rim and lip of a plate, white in colour and undecorated. The various faunal remains appear to belong to large bovids, presumably domestic cattle. There were suggestions that the site extends over a wider area, however this is probably related to the scattering affect of ploughing or mechanical seed planting over time. Several very fragmented *coquina* were observed in the area as well There was no evidence of a defined general historical midden and the nearest historical dwelling is ~500m – 600m southeast of the site. There is thus no dwelling currently associated with the scatter, and it may be a 'chance occurrence' or a broken plate dropped along the side of the track. The bone could be from more recent carcasses.

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: Fossils

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC03

Official Name: Buffelsbosch 742

Map Sheet: 3424BA Kruisfontein

GPS reading: S34 08.658 E24 44.040

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt

Turn left onto Unpaved Road at 8.6 km or S34 07.538 E24 43.978

RC03 at 11.0 km or 2.3 km from turnoff just above RCo2, and before the rocky outcrop

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation: unknown

Threats: Yes

What threats: 66kV line

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

RC03 occurs ~ 150m west of RC02a, however the one site probably merges into the other.

The site consists of large chunks of *coquina*

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC05

Official Name: Kleinrivier 713

Map Sheet: 3424BA Kruisfontein

GPS reading: S34 08.086 E24 43.102

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt

Turn left onto Road T-Junction at 9.8 km or S34 07.223 E24 43.295

At road to quarry at 11.9 km from start, or 2.1 km after T-junction, drive along ridge to the site.

Site extends along entire ridge

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation: yes

Threats: Yes

What threats: 66kV line, possible wind farm

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

I concentrated on the area of the line route, however the site does extend across the entire hill. The site, like RC04, consists of ESA and MSA tools; however, they appear to be more weathered. The outcrop consists of several concentrations of stone tools, as well as individual artefacts. All of the artefacts are from the local outcrop, which has also been used as a quarry. These include the following: Handaxe, Cleaver, Unifacial points, Several flakes of various sizes

The site may extend further south for another 500m, however, the vegetation became too dense to make accurate observations.

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC06

Official Name: Welgelee 743

Map Sheet: 3424BA Kruisfontein

GPS reading: S34 08.843 E24 43.322

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt

Turn left onto Road at 9.8 km or at the T-Junction at S34 07.223 E24 43.295

Take next left road at 15.4km or 5.6km after T-Junction and continue with gravel road to the site.

SITE DESCRIPTION:

Type of Site: House

Merits conservation: No

Threats: no

What threats: none

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

RC06 is located between Sections 2A and 2B, and is not directly affected by the line. The site consists of a presumed labourer's house with corrugated iron additions. While the building is not new, it is not older than 60 years, as seen with the metal window frames and cement/concrete used for the walls. It appears that the house is currently used for livestock.

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC07

Official Name: Buffelsbosch 742

Map Sheet: 3424BA Kruisfontein

GPS reading: S34 08.843 E24 43.322

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt

Turn left onto Unpaved Road at 8.6 km or S34 07.538 E24 43.978

Follow gravel road for 3.4 km to rock outcrop behind farm house.

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation:

Threats: Yes

What threats:

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

The main part of RC07 occurs along Section 2B 2. The site is a general scatter of tools over the entire hill (fig. 19). As with the other outcrops in the area, the local raw material is used and several rocks have evidence of being utilised. The tools included: Unifacial point, General flakes, Blades, Rock outcrops used a quarry, LSA flakes

The site has fewer tools than other outcrops, however, two unifacial points appear to have more formal retouch than other unifacial points at nearby outcrops.

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC08

Official Name: Kleinrivier 713

Map Sheet: 3424BB Humansdorp

GPS reading: S34 08.530 E24 46.131

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt

At 4.9 km take right gravel road into private property. Area is extensively quarried

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation:

Threats: Yes

What threats:

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

RC08 and RC09 are located on top of a heavily (fynbos) vegetated hill. The entire hill (from RC08 to RC010) appears to have been extensively quarried in the past. There are many semi-circular holes along the hill and many of the rocks have "teeth mark scars" from mechanical instruments. Some of the machines have left pressure flakes from the rocks, resulting in false stone tools. However, there are occasional MSA flakes in the area.

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC09

Official Name: Kleinrivier 713

Map Sheet: 3424BB Humansdorp

GPS reading: S34 08.515 E24 46.205

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt

At 4.9 km take right gravel road into private property. Area is extensively quarried

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation:

Threats: Yes

What threats:

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

RC08 and RC09 are located on top of a heavily (fynbos) vegetated hill. The entire hill (from RC08 to RC010) appears to have been extensively quarried in the past. There are many semi-circular holes along the hill and many of the rocks have "teeth mark scars" from mechanical instruments. Some of the machines have left pressure flakes from the rocks, resulting in false stone tools. However, there are occasional MSA flakes in the area.

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC010

Official Name: Kleinrivier 713

Map Sheet: 3424BB Humansdorp

GPS reading: S34 08.468 E24 46.225

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt

At 4.9 km take right gravel road into private property, walk to northern edge of the rock outcrop.

Area is extensively quarried

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation:

Threats: Yes

What threats:

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

RC010 occurs near the northeastern side of the same hill as RC08 and RC09. The area has been quarried, however four areas appear to look more like walls: they are larger and more circular than the other quarried areas. These walls also appeared to be stacked dry stone walling, whereas the quarried areas were more disjointed. The dense vegetation made it difficult to view the entire wall, and these would need to be re-assessed when the vegetation is less dense and/or if the area is affected. There was a total of four possible walls in this area. If these are dry stone walls then they may be kraals

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC011

Official Name: Goed Geloof 743

Map Sheet: 3424BB Humansdorp

GPS reading: S34 08.143 E24 46.289

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt to RC010. Walk down the rock outcrop towards the Kromrivier. Site is at base of the hill in the eroded areas and extends for ~200m.

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation:

Threats: Yes

What threats:

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

RC011 occurs at the base of the hill where it becomes part of the plains for the Kromrivier. The site is a lag deposit that occurs on a gravel bed ~50cm below the surface. The artefacts are visible in the eroded area that is 200m x 150m in size. More artefacts would obviously occur in the uneroded areas. The areas of the site that is not eroded, is covered by wattle trees. The site consists of a large array of ESA and MSA stone tools, most of which are well preserved. Most of the tools are on local raw materials. These include: (Acheulian) Handaxes, Cleavers, Unifacial points, Cores, Blades, (LSA?) flakes

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC012

Official Name: Goed Geloof 743

Map Sheet: 3424BB Humansdorp

GPS reading: S34 08.173 E24 46.495

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt to RC010. Walk down the rock outcrop towards the Kromrivier. From RC011 walk ~220m east. Site is in the eroded areas on a gravel bed. and extends for ~200m.

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation:

Threats: Yes

What threats:

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

RC012 & RC013 is located ~220m and 400m east of RC011. This site was separated from RC011 due to its content and distance. While RC012 is probably a continuation of RC011 in terms of being a large scatter of artefacts, the gravel deposit is more dense and the stone tools appear to be Late Stone Age (LSA). There is a high concentration of stone tools in amongst the gravels. The tools are debitage (chips, chunks, flakes and a few irregular cores) and appear to occur in an old river bed. The site extends for ~200m along the line, and probably for further towards the Kromrivier. This area has a high concentration of stone tools, even if they are debitage and in a lag deposit. The site is however significant, in that it appears to be exclusively related to the LSA whereas the previous sites appear to date more to the ESA and MSA. The latter areas (RC011.1 - 11.2) are also not as highly concentrated. The site appears to continue for at least 100m each side of the GPS point. The site has potential to yield information regarding LSA stone tool manufacture even if it is a lag deposit.

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC013

Official Name: Goed Geloof 743

Map Sheet: 3424BB Humansdorp

GPS reading: S34 08.192 E24 46.705

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt and get to RC012. Site is ~300m east of RC012, or 600m west of the nearby Substation's access road.

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation:

Threats: Yes

What threats:

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

RC013 is a continuation of RC012 but ~300m eastwards. It is in essence the same sites, however I had separated them in the field. This area has a high concentration of stone tools, even if they are debitage and in a lag deposit. The site is however significant, in that it appears to be exclusively related to the LSA whereas the previous sites appear to date more to the ESA and MSA. The latter areas (RC011.1 - 11.2) are also not as highly concentrated. The site appears to continue for at least 100m each side of the GPS point. The site has potential to yield information regarding LSA stone tool manufacture even if it is a lag deposit.

UMLANDO ARCHAEOLOGICAL SITE RECORD FORM

SITE CATEGORY: (X where applicable)

Stone Age: ESA, MSA

Early Iron Age:

Late Iron Age

Historical Period:

Recorder's Site No.: RC014

Official Name: Goed Geloof 743

Map Sheet: 3424BB Humansdorp

GPS reading: S34 08.235 E24 46.847

DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.

From St Francis take the gravel road to Thyspunt. At 2.9km turn right to the substation. At the entrance road, walk ~400m west along the fence line. Artefacts visible in the quarried areas.

SITE DESCRIPTION:

Type of Site: Open scatter

Merits conservation:

Threats: Yes

What threats:

RECORDING:

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin Anderson

Address: PO Box 102532, Meerensee, 3901

Date: March 2011

Description of site and artefactual content.

The area has been heavily affected by sand mining operations. The site appears to be an extension of RC011 – RC013 in that there is a continual scatter of stone tools. However, in this area the sand has either been removed down to a bedrock, or the sand deposit still exists covering the rest of the site. The observable artefacts at the site consists of one core and a few flakes, probably dating to the LSA. This would normally not fit into my definition of a site, however, it would be a safe assumption to state that more artefacts occur in this general area.

APPENDIX B
FINAL PALAEOONTOLOGICAL SURVEY REPORT

Phase 1 Palaeontological Impact Assessment of a proposed 66Kv Transmission Line between St Francis and Thyspunt, EC



Lloyd Rossouw, PO Box 38806, Langenhovenpark 9330
April 2011

Executive Summary

- Anticipated development calls for the installation of a 66 Kv transmission line to maintain a commercial wind energy facility and associated infrastructure designated for the area.
- The area in question is underlain by Palaeozoic and Cenozoic sediments.
- The geology largely consists of Table Mountain Group strata and the basal part of the overlying Bokkeveld Group.
- Tectonic deformation as a result of the Cape Folding Event and the creation of the African Land Surface in the region, have been detrimental to the preservation of fossils in the Cape Supergroup rocks.
- There are **no major palaeontological grounds to put off planned construction** of a 66 Kv transmission line in the designated footprint, **but development along Section B (new name given in final layout) will require** certain **mitigation** measures, namely monitoring of fresh exposures and bedrock excavations into potential fossil-bearing strata. Access by a palaeontologist should be facilitated at the appropriate stage during development in order to inspect fresh excavations
- Development along **Sections A1, A2, A3 and A4, (new names given in final layout) as well as infrastructure development for all three substation options will require no mitigation**. There is a very low likelihood of finding well-preserved fossils along these sections and within these localities, respectively.

INTRODUCTION

A Phase 1 Palaeontological Impact Assessment was carried out along designated areas between Cape St. Francis and Thyspunt in the Eastern Cape Province. The survey is required as a prerequisite for new development in terms of the National Environmental Management Act and is also called for in terms of the National Heritage Resources Act 25 of 1999.

Anticipated development calls for the installation of a 66 Kv transmission line to maintain a commercial wind energy facility and associated infrastructure designated for the area. A site visit and assessment took place in March 2011.

Please note that all labels given to sections in this report have been updated to relate to the final labeling used in the Basic Assessment Report unless specifically noted otherwise. However, Figure 1 in this report has not been updated so this still has the old numbering which is used in all the remaining figures and in one or two referenced places in the report to identify a smaller specific section of line. Refer to the main Heritage Survey report figures to see locations of final labeled sections.

THE TERMS OF REFERENCE

An assessment was carried out to evaluate the palaeontology and fossil potential within the footprint of the proposed transmission line as well as within three possible areas demarcated for the construction of a substation (**Fig. 1**). A section of the transmission line will run underground (North-South orientated portion of B1). It will be installed 1.2m below surface and a servitude of 6m (width) will be provided for it. The section close to the sand dunes in the southeast corner will be cleared of vegetation along the most southern property borders by Eskom (who now owns those 2 properties; 809/22 and 809/23) to create a fire break. This will also serve as a servitude.

Pylons for the aboveground sections will be 150m to 320m apart depending on the lay of land and obstacles like roads and turn points. Each pylon will be a single mast structure 15m to 24m high depending on technical requirements. The servitude for the aboveground sections will be 22m wide. Three potential sites were identified for the construction of a substation (**Fig. 1**, red squares 1-3). The size for each is 80x80m

The palaeontological assessment required:

identification and recording of potential palaeontological heritage resources in the proposed areas of impact and;

recommendation of mitigation measures to minimize potential impacts associated with the proposed development.

DESCRIPTION OF THE AFFECTED AREA

Details of area surveyed

The affected area is located on the following 1:50 000 topographic maps:

3424 BA Kruisfontein and 3424 BB Humansdorp (**Fig. 2**)

The greater extent of the footprint consists of generally flat to undulating countryside with sedimentary rock outcrops exposed along anticlines (**Fig. 3**). The footprint mainly covers residential plots and agricultural land.

METHODOLOGY

With the exception of Cenozoic deposits, the palaeontological footprint is largely related to continuous sedimentary units that cover large geographical areas. Lateral distribution and lithostratigraphy of the Cape Supergroup rocks, compared to the more locus-based nature of potential Plio-Pleistocene and Holocene palaeontological occurrences within the Algoa Group sediments, was taken into consideration during the assessment.

A pedestrian survey was conducted along the proposed sections. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant geological and palaeontological information were assimilated for the report and integrated with data acquired during the on-site inspection.

PALAEONTOLOGICAL BACKGROUND

The geology of the area has been described by Toerien and Hill (1989) Illenberger (1992), Le Roux (1992), Maud and Botha (1999), Thamm and Johnson (2006) and Roberts *et al.* (2006). The area in question is underlain by Palaeozoic and Cenozoic sediments (1: 250

000 scale geological map 3324 Port Elizabeth, Council for Geoscience, Pretoria, 1991). These are sediments of widely different geological ages.

The Palaeozoic Cape Supergroup represents a record of approximately 170 million years from the Early Ordovician (~ 500 Ma) to the Early Carboniferous (~ 330 Ma). Cape Supergroup sediments and meta-sediments in the study area are made up of sandstone and shale from the Table Mountain Group and the basal part of the Bokkeveld Group form the uppermost part of the sequence (**Fig. 4**). The Cape Supergroup strata in turn are unconformably overlain by Plio-Pleistocene aeolianites and non-calcareous Holocene coastal dunefields of the Algoa Group (Nanaga and Schelm-Hoek Formations respectively).

Palaeozoic sediments

From oldest to youngest, the Table Mountain Group in the footprint area is represented by the Peninsula (*Op*) and Cederberg (*Oc*) Formations, and the Goudini (*Sg*), Skurweberg (*Ss*) and Baviaanskloof (*Db*) Formations of the Nardouw Subgroup. Fossil evidence from the Cederberg Formation, the uppermost Baviaanskloof Formation and the overlying Bokkeveld shales in the Western Cape suggests that the Table Mountain Group is of Early Ordovician to earliest Devonian age.

The Peninsula Formation is the main unit of the Table Mountain Group. It consists of weathering-resistant quartzitic sandstones with minor pebbly conglomerates and subordinate, lenticular shale layers. The Cederberg Formation is made up of shale and arenaceous siltstones towards the top of the sequence. Mudrocks, siltstones and subordinate sandstones from the Cederberg Formation were acquired through the erosion of pre-existing glacial sediments that were deposited during the glaciation of Gondwana 430 million years ago. The Cederberg Formation has yielded a diverse assemblage of marine invertebrate fossils, early vertebrates and some of the earliest known primitive fishes.

The Nardouw Subgroup embraces the uppermost three units of the Table Mountain Group. The Goudini Formation forms the basal unit of the Nardouw Subgroup and overlies the Cederberg Formation. A Silurian age is assigned to this formation. The unit consists of quartzose sandstone which also contains thin shale and siltstone lenses. A fluvial environment is postulated for the origin of the bulk of the unit in the east. In the Western Cape worm trails are closely related to bluish-grey siltstones near the top of the formation,

while bioturbated siltstone have been recorded two thirds of the way up from the base of the formation near Bredasdorp. The Goudini Formation weathers positively with respect to the underlying Cederberg shales and siltstones.

The Skurweberg Formation overlies the Goudini Formation and constitutes the central and most prominent sandstone unit of the Nardouw Subgroup. An Early Silurian age is assigned to this formation. Depositional history is interpreted as shoreline or shallow marine and braided stream environments. The Skurweberg Formation weathers positively with respect to the underlying Goudini Formation.

The Baviaanskloof Formation conformably overlies the Skurweberg Formation and is regarded as Early Devonian in age. It consists mainly of medium to dark gray, fine-grained sandstone and subordinate mudrock. Wave ripples and marine invertebrates suggest that low-energy conditions and shallow marine shelf environments prevailed during the formation of the unit.

Undifferentiated strata (*Dc*) of the basal part of the Bokkeveld Group (Ceres Subgroup) make up the uppermost part of the Palaeozoic sequence in the study area. The subgroup consists of an alternation of three thick shale and three thinner sandstone formations of early Middle Devonian age. The sandstone formations are interpreted as having been deposited along an epicontinental sea margin and the shale formations in the off-shore regions. The Ceres Subgroup is characterized by a wide variety of benthic invertebrate fossils, including brachiopods, bivalves and trilobites (Oosthuizen 1984). Cephalopods, crinoids, ophiroids, hyoliths, cricoconarids, corals and gastropods have also been recorded. Trace fossils are rare, becoming more common towards the top of the Bokkeveld succession. Fossils invariably occur as internal moulds or external impressions and are in places much distorted by tectonic deformation.

Cenozoic sediments

The coastline between Cape St. Francis and Thyspunt is almost entirely bounded by dune barriers located landward of the shoreline (**Fig. 5**). Semi- to well-consolidated aeolianites and sandy limestones of the Plio-Pleistocene Nanaga Formation (*T-Qn*) overlie the Palaeozoic Cape Supergroup rocks and are in turn overlain by wind-blown calcareous and non-calcareous sand in the form of coastal dunefields that are inferred to be Holocene in age (*Qw*). These unconsolidated coastal dunefields make up the Schelm Hoek Formation, which

is the uppermost unit of the Algoa Group. Fossilized terrestrial gastropods (*Tropidophora*), fragmentary marine shells and foraminifera have been recorded in the Nanaga Formation (Le Roux 1992), while root casts and land snail shells (*Achatina*) are common in the overlying coastal dunefields of the Schelm Hoek Formation (Illenberger 1992).

Fossil potential in the area

The study area is largely underlain by sedimentary rocks of the Table Mountain Group and the basal part of the overlying Bokkeveld Group (**Table 1**). The tectonic overprint of the Cape Folding Event and the creation of the African Land Surface in the region have been detrimental to the preservation of fossils in the underlying rocks.

Cape Supergroup rocks

Fossils have in the past been recovered from these sediments throughout the southern Cape, but fossil preservation is generally more superior in the Western Cape region.

The Cape Folding Event

Cape Supergroup sediments have been severely deformed during the Cape Folding Event which took place about 310 million years ago. Lateral compression produced zones of intense folding. While tectonic deformation was mainly confined to the Cape depositional basin it often obliterated original bedding planes in the Cape Supergroup rocks. Higher temperatures and pressures created by tectonic shifts also resulted in regional, low-grade metamorphic recrystallization of sediments and effectively contributed to the destruction of fossils in the original sedimentary rocks where high pressure zones of the folds occurred. Post-Cretaceous epeirogenic events caused further warping and periodic seaward tilting of the coastal belt.

The African Erosion Cycle

The present-day geomorphology of the landscape in the footprint forms part of the

Table 1.2: Geology and potential fossil heritage.

Geological Unit		Rock types and Age	Fossils Recorded / Biostratigraphy
Algoa Group	Schelm Hoek Frm. (<i>Qw</i>)	Calcareous and non-calcareous aeolian sands (dunefields); Holocene to Recent	Large mammal bones, horn cores and dentition, coprolites, pollen, phytoliths, terrestrial gastropods (Florisian LMA)
	Nanaga Frm. (<i>T-Qn</i>)	Aeolianite; Pliocene	Terrestrial gastropods, foraminifera
Bokkeveld Group	Undifferentiated Sediments, Ceres Subgroup (<i>Dc</i>)	Shale, sandstone; Devonian	Brachiopods, bivalves, trilobites, cephalopods, hyoliths, gastropods
Table Mountain Group	Nardouw Subgroup	Mudrock, sandstone; Silurian	Trace fossils
	Baviaanskloof Frm. (<i>Db</i>)		trilobites, gastropods, bivalves
	Skurweberg Frm. (<i>Ss</i>)		
	Goudini Frm. (<i>Sg</i>)		
	Cederberg Frm. (<i>Oc</i>)	Shale; Ordovician	marine invertebrates, early vertebrates, primitive fishes
	Peninsula Frm. (<i>Op</i>)	Quartzitic sandstone; Ordovician	

African Erosion Surface, and is the result of prolonged erosion and weathering that occurred throughout the subcontinent since the late Jurassic (145 Ma) until the end of the early Miocene around 15 Ma ago (Partridge and Maud, 1987). Extensive planation from the

coast inland, in time resulted in the exposure of the Cape Fold Mountains as well as the creation of the Great Escarpment and the Coastal Platform.

The Coastal Platform is a dominant component of the modern landscape between the Bot River, east of Cape Town and Port Elizabeth and represents a deep-weathered profile generally consisting of thin soils, pedicretes or clay-rich horizons grading downwards into fresh, unweathered sedimentary bedrock. The prolonged weathering and erosion cycles had a detrimental effect on Cape Supergroup rocks and fossil preservation. Any fossils within the weathered profile would have been destroyed.

Late Tertiary Deposits

Towards the end of the Cenozoic Era, sandy limestones and calcarenites fringed the southern and southeastern shoreline. These deposits are characterized by the Algoa Group (Nanaga Formation) in the region. Except for foraminifera and terrestrial gastropod remains, no other fossil types are known from this formation. However, Last Glacial vertebrate faunal remains have been exposed at regular intervals in the dunefields (Schelm Hoek Formation) just east of the Oyster Bay (see Fig. 4 for site details). The fossils derive from older deflated and wind-eroded palaeosols, which also contain fossilized hyena coprolites rich in pollen and phytoliths (Carrion *et al.* 2000). These clusters of bone and hyena coprolites are interpreted as eroded hyena burrows. Vertebrate fossils formerly recovered from these deflated horizons include the remains of plains zebra, elephants, the extinct giant buffalo (*Pelorovis antiquus*) as well as a variety of other artiodactyls.

Hyena burrows are intrusive features and may not be contemporaneous with their surrounding matrix. Their localized nature makes occurrences difficult to predict, but in this case highlights the potential for Quaternary palaeontological finds in the Nanaga and Schelm Hoek Formations.

RESULTS

Impact on potential palaeontological resources within the footprint is summarized in **Table 3**. Map details are provided in **Figure 4**.

Section B1

B1 crosses approximately 6 km of Cape Supergroup (Goudini Frm. *Sg*, Skurweberg Frm. *Ss*, Baviaanskloof Frm. *Db*, basal part of Bokkeveld Group *Dc*), and Algoa Group sediments in the southeast corner of the footprint (Old Section 1A, subsection 1 in Fig 1). A 200m

section of the transmission line will be placed 1.2m underground near the southeast corner of Section 1A, subsection 1 (S34 08.780 E24 46.979 to S34 08.879 E24 46.962) in the Nanaga Formation (*T-Qn*).

Rock units that may be palaeontologically sensitive in Section 1A are the Baviaanskloof Formation (*Db*), Bokkeveld Group (*Dc*) and the Schelm Hoek Formation (*Qw*). The northern part of B2 and B3 traverses the Baviaanskloof Formation, which are known to have yielded trilobites, gastropods, bivalves and occasional trace fossils. The northern part of sB1 traverses Ceres Subgroup sediments (basal part of the Bokkeveld Group) which are known to have yielded shelly invertebrate fauna and trace fossils (**Fig. 6**). These units may be impacted where pit excavations are required into fresh bedrock for the installation of overhead pylons.

The known occurrence of Quaternary hyena burrows within the coastal dunefields implies that the Schelm Hoek Formation may also be palaeontologically sensitive in places. As a result, potential fossil heritage in the southeast corner of B1 may be affected where pit excavations are required into *in situ* Schelm Hoek Formation sediments for the installation of pylons (**Fig. 7**). This also applies to clearance of vegetation close to the dunefields (subsection).

Excavations into fresh bedrock and *in situ* sediments of the Baviaanskloof Formation (*Db*), Bokkeveld Group (*Dc*) and the Schelm Hoek Formation (*Qw*) should be conducted on condition that access by a palaeontologist is facilitated at the appropriate stage during development and that appropriate and effective mitigation measures such as inspection of fresh excavations are undertaken by a professional palaeontologist in order to determine whether, as is probable, palaeontological remains or features are exposed *in situ*.

Western Portion of B sections and start of A sections

The section traverses approximately 2 km of Table Mountain Group sediments (Goudini Formation, *Sg*) along relatively flat-lying land (**Figs. 8 and 9**). The sediments in the demarcated area are not palaeontologically vulnerable and are of low palaeontological significance.

Table 3. Assessment of impacts. Palaeozoic strata consist of the Table Mountain Group (including the Nardouw Subgroup): Peninsula Frm. (*Op*), Cederberg Frm. (*Oc*), Goudini Frm. (*Sg*), Skurweberg Frm. (*Ss*), Baviaanskloof Frm. (*Db*), the Bokkeveld Group (*Dc*, Ceres

Subgroup). Cenozoic sediments are represented by the Nanaga (*T-Qn*) and Schelm Hoek (*Qw*) Formations.

Feature	Geological Unit	Potential impact	Extent	Palaeontological significance of footprint loss	Palaeontological	Mitigation and required measures
Section B1-3	<i>Dc, Db, Ss, Sg, T-Qn, Qw</i>	medium	local	medium to low (<i>Db, Dc, Qw</i>)	no	yes (<i>Db, Dc, Qw</i>); monitoring of fresh exposures and bedrock excavations
Section B1-3	<i>Sg</i>	low	local	low	no	no
Section A1/A2	<i>Sg, Oc, Op</i>	low	local	low	no	no
Section A3/A4	<i>Sg, Oc, Op</i>	low	local	low	no	no
Substation Site 1	<i>Sg</i>	low	local	low	no	no
Substation Site 2	<i>Op</i>	low	local	low	no	no
Substation Site 3	<i>Op</i>	low	local	low	no	no

Section A1/A2

The section traverses approximately 8.5 km of Table Mountain Group sediments (Peninsula Formation *Op*, Cederberg Formation *Oc*, Goudini Formation, *Sg*) over generally flat countryside (**Figs. 10 and 11**). The only unit that may be palaeontologically sensitive in this section is the Cederberg Formation, which has yielded marine invertebrates, early vertebrates and primitive fishes (**Fig 12**). The outcrop of Cederberg shales occurs as a thin band and dissects Section A2 and A3 on the geological map. It will most likely not be negatively affected by this configuration. The rest of the geological units in the demarcated area are not palaeontologically vulnerable and are of low palaeontological significance.

Section A3, A4

As with Section A1, this section also pass over approximately 8.5 km of Table Mountain Group sediments (Peninsula Formation *Op*, Cederberg Formation *Oc*, Goudini Formation, *Sg*), and mainly over the Peninsula Formation quartzitic sandstones (**Fig 13**). Except for the Cederberg Formation, the other geological units in the demarcated area are not palaeontologically vulnerable and are of low palaeontological significance. The Cederberg Formation will most likely not be negatively affected by this configuration.

Substation site options

All the proposed substation localities are sited on Table Mountain Group rocks. Option 1 are located on Goudini Formation quartzitic sandstone (**Fig. 14**), while options 2 and 3 are both located on weather-resistant quartzitic sandstones of the Peninsula Formation (**Figs. 15 and 16**). All three options are sited on bedrock that is not palaeontologically vulnerable and that is of low palaeontological significance.

Impact Statement and Recommendations

There are **no major palaeontological grounds to put off the construction** of a 66 Kv transmission line in the designated footprint. However, any developments that may potentially destroy or damage fossils or that conduct excavations exposing fresh sedimentary bedrock or old superficial deposits are of conservation and research interest. **Development of B1, B2 and B3 will require certain mitigation measures.** The most appropriate recommendation for mitigation in Section B1, B2, and B3, is monitoring of fresh exposures and bedrock excavations into potential fossil-bearing strata of the Baviaanskloof Formation (*Db*) and Bokkeveld Group (*Dc*), and *in situ* superficial deposits of the Schelm Hoek

Formation (*Qw*). Access by a palaeontologist should be facilitated at the appropriate stage during development in order to inspect fresh excavations. It is also advised that newly uncovered objects of palaeontological significance, found during the course of excavation activities, may require a Phase 2 rescue operation at the cost of the developer. Development along **Sections A1, A2, A3 and A4, as well as** infrastructure development for **all three substation options will require no mitigation**. There is a very low likelihood of finding well-preserved fossils along these sections and within these localities, respectively.

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Declaration

Dr. L. Rossouw occasionally does independent specialist consulting and is in no way connected with the proponents of the development, other than delivery of consulting services.

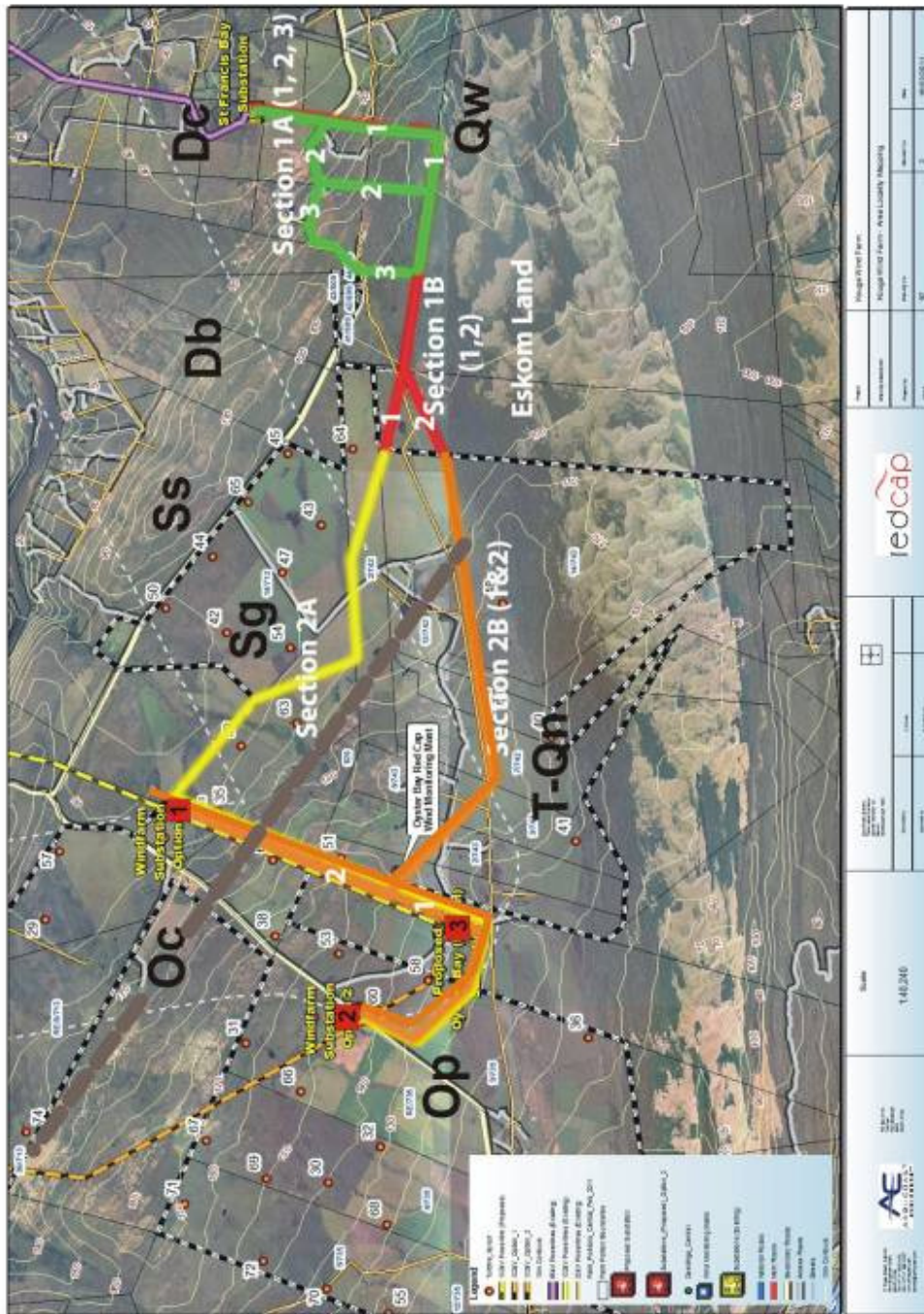


Figure 1. Aerial photograph of the 66 Kv transmission line footprint. The numbered red squares indicate site options for the construction of a substation.



Figure 3. General view (looking east, southeast) showing the flat to rolling nature of the countryside. St. Francis Bay is situated top left in the photograph with quartzite outcrops in the foreground.

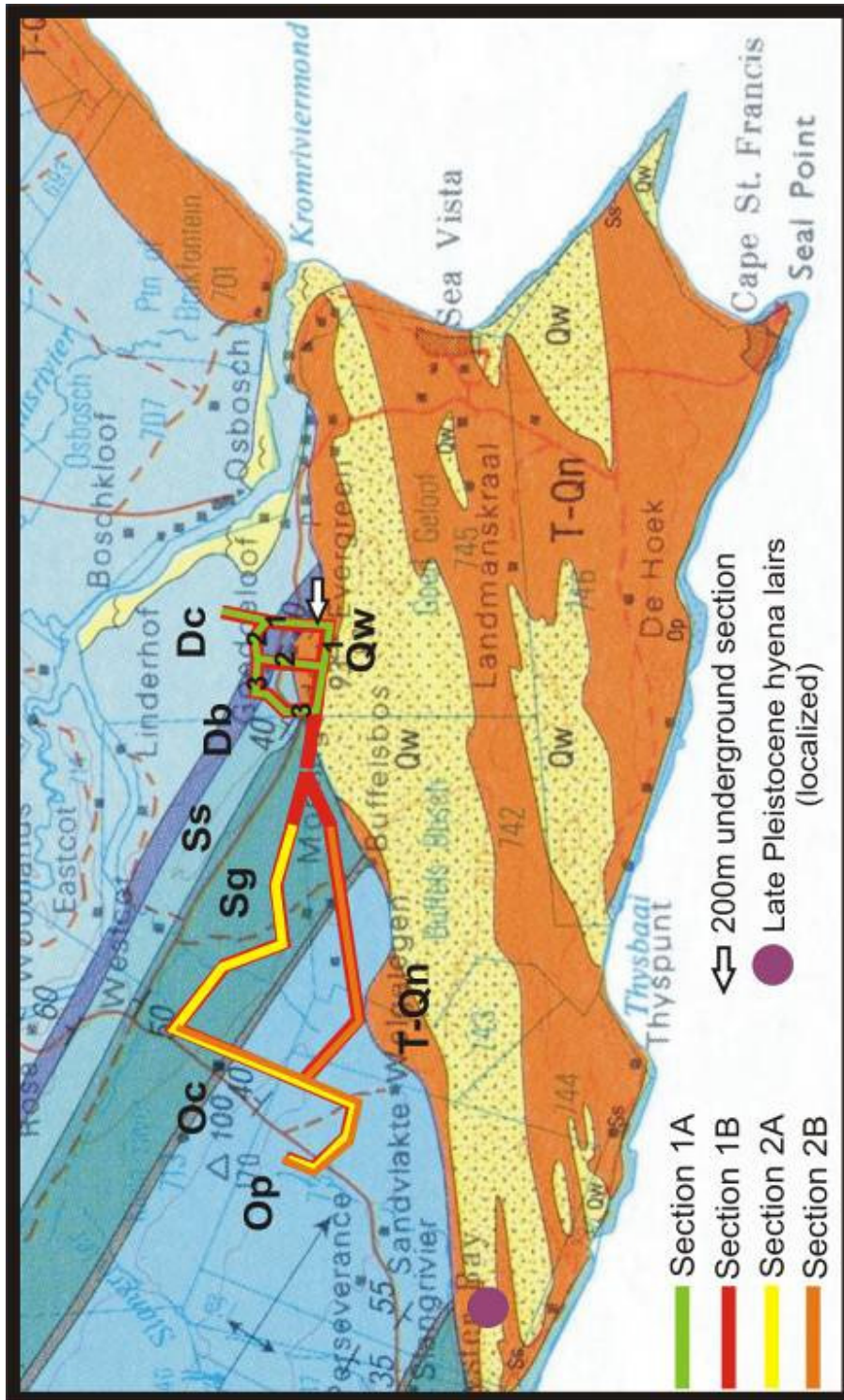


Figure 4. Portion of the 1:250 000 scale geological map 3324 Port Elizabeth showing bedrock geology of the study area. Palaeozoic strata consist of the Table Mountain Group (including the Nardouw Subgroup): Peninsula Fm. (Op), Cederberg Fm. (Oc), Goudini Fm. (Sg), Skurweberg Fm. (Ss), Bavianskloof Fm. (Db), the Bokkeveld Group (Dc, Ceres Subgroup). Cenozoic sediments are represented by the Nanaga (T-Qn) and Schelm Hoek (Qw) Fms.



Figure 5. The shoreline south of the footprint is bounded by coastal dunefields that make up the Schelm Hoek Formation, which is the uppermost unit of the Algoa Group.



Figure 6. Section 1A. Featureless plain (looking east) with no apparent outcrop covering basal Bokkeveld Group sediments. Outcrops of Ceres Subgroup shales are well-exposed in road cuttings along the R330 between St. Francis Bay and Humansdorp.



Figure 7. Calcareous and non-calcareous aeolian sands of the Schelm Hoek Formation (Algoa Group).



Figure 8. Section 1B. Brown-weathering quartzitic sandstone of the Goudini Formation.



Figure 9. Section 1B. General view (looking west) showing a paucity of bedrock outcrop.



Figure 10. Section 2A. Isolated outcrop of quartzitic sandstone (looking south).



Figure 11. Section 2A. A weather-resistant Peninsula Fm. quartzite outcropping predominantly found on higher ground.



Figure 12. Section 2A. Eroded Cederberg shales. Exposed strata occurs in a thin band along the high ground.



Figure 13. Section 2B. Quartzitic sandstone of the Peninsula Fm. predominate the underlying geology of this section.



Figure 14. General view (looking south) of substation site Option 1, located on Goudini Frm. sandstones.

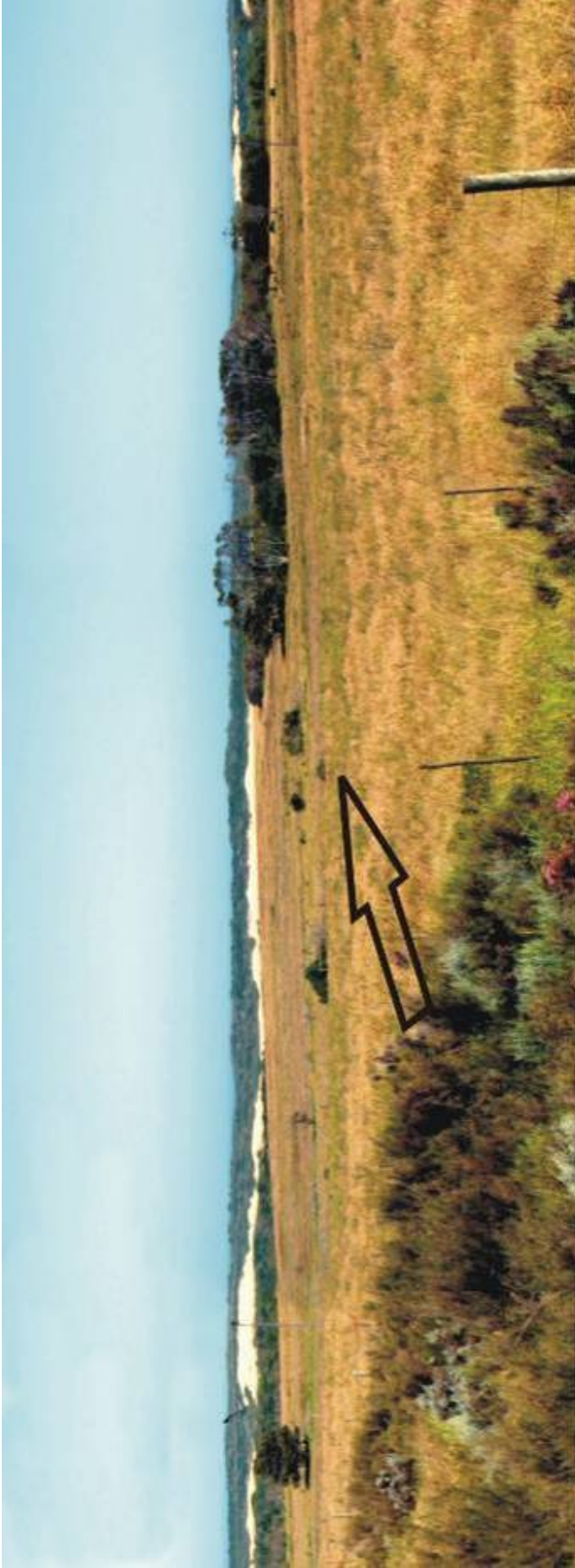


Figure 15. General view (looking south southwest) of substation site Option 2, located on Peninsula Fm. Sandstones. Coastal sand dunes of the Schelm Hoek Fm. are seen exposed in the distance.



Figure 16. General view (looking west southwest) of substation site Option 3, located on Peninsula Frm. sandstones.