Heritage / Archaeological Impact Assessment

Proposed Gibson Bay Wind Farm Grid Connection, Kou-Kamma and Kouga Local Municipalities, Humansdorp District, Eastern Cape Province

prepared for

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prepared by

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1. Executive Summary

The approved Gibson Bay Wind Farm requires a connection to the Eskom network via direct or indirect connections to the Dieprivier or Melkhout Substations in the Humansdorp region. Unless the wind farm does not proceed, the NO-GO option is not an option. Two alternative power line route options are provided for the grid connection. The overhead power line will involve the excavation of foundations for pylon bases and construction of switch stations that may have a permanent negative impact on archaeological and palaeontological resources.

Cape Environmental Assessment Practitioners (Pty) Ltd are facilitating the environmental assessment process and this report focuses on the impact of the proposed activity and alternatives on cultural landscapes, archaeology and palaeontology. The visual assessment is being conducted by Mr Steven Stead.

Due to a relatively unspoilt stretch of a significant pre-colonial cultural landscape occurring along a large portion of the Alternative 2 option, it is strongly recommended that this option be eliminated. For this, and other heritage and environmental reasons, it is argued that the Alternative 1 option is highly favoured over the Alternative 2 option.

Although archaeological visibility was generally poor, sufficient observations were made - including reference to previous studies in the immediate vicinity - to assess the overall heritage and archaeological sensitivity of the study area. A Stone Age quarry site was identified and is considered to be of medium significance. Since the evidence is fixed in the environment (flake scars on quartzite outcrop), it cannot be sampled, and therefore, it is recommended that the site be protected and conserved in perpetuity. No significant archaeological resources were identified in the potentially sensitive area west of Brandewynkop. Nevertheless, recommendations are made below to ensure that this potentially sensitive zone is not negatively impacted by the proposed activity.

An earlier palaeontological desktop assessment in the affected area identified three geological units that are rich in fossil heritage. Based on this, recommendations are made below to deal with the potential palaeontological sensitivity of Alternative 1.

Apart from the Stone Age quarry and potentially sensitive zone west of Brandewynkop, for which recommendations in mitigation are made below, the remainder of the studied area is suitable for the proposed activity and there are no constraints on heritage grounds.

The Public Participation Process, in terms of the National Heritage Resources Act, is being advertised and run as part of the environmental impact process. The registered Interested & Affected Party - the Gamtkwa KhoiSan Council - will provide feedback regarding this report and others related to the proposed activity.

Provided that the below recommended mitigation measures and additional assessments are considered and/or implemented, there are no fatal flaws on heritage grounds, and therefore, there are no further objections to the proposed Alternative 1 power line route for the Gibson Bay Grid Connection.

Recommended mitigation measures:

- *In order to preserve the aesthetic value of the relatively unspoilt pre-colonial cultural landscape in the immediate surroundings of the study area, it is*

recommended that the Alternative 2 power line option should be eliminated and that the Alternative 1 option is preferred.

- *A 50m buffer (100m across) should be observed - by means of a fence - around the Stone Age quarry site identified at waypoint 20 to ensure that the site is avoided during the construction and operational phases. If the overhead power line must straddle or span / cross over the site, then the pylon structures and maintenance or access tracks should be kept outside the 50m buffer zone.*
- *Although no significant archaeological resources were identified in the dunes extending to the west from Brandewynkop, it is recommended that an archaeological micrositing study be undertaken - prior to the construction phase - at proposed pylon localities in this zone to ensure that no significant archaeological resources are negatively impacted. Alternatively, test excavations can be done with a mechanical excavator at proposed pylon localities, but such excavations must be conducted in the presence of a suitably accredited professional archaeologist. Where possible, pylons should be placed in previously disturbed areas such as existing vehicle tracks and the sand borrow pit at waypoint 3.*
- *Due to the presence of potentially fossiliferous geological units occurring in the northern portion along the alignment of Alternative 1, a Phase 1 pre-construction field assessment must be conducted in that portion of the affected area by a professional palaeontologist to identify areas of potential palaeontological sensitivity and to make recommendations in mitigation where necessary.*

Required Mitigation Measures:

- *In the event that vegetation clearing and earthmoving activities expose archaeological or palaeontological resources, then such activities must stop and SAHRA and/or ECPHRA must be notified immediately. These heritage resources are protected by the NHRA (Act 25 of 1999) and may not be damaged or disturbed in any way without a permit from the relevant heritage authorities.*
- *If archaeological or palaeontological materials are exposed during vegetation clearing and/or earth moving activities, then they must be dealt with in accordance with the National Heritage Resources Act (No. 25 of 1999) and at the expense of the developer.*
- *In the event of exposing human remains older than 60 years during construction, the matter will fall into the domain of South African Heritage Resources Agency (Mrs Collette Scheermeyer) and will require a professional archaeologist to undertake mitigation if needed. Such work will also be at the cost of the developer.*

2. Name, Expertise and Declaration

I, Peter Nilssen (PhD in archaeology, UCT 2000), herewith confirm that I am a Professional member - in good standing - of the Association of South African Professional Archaeologists (ASAPA), including the Cultural Resource Management section of the same association (ASAPA professional member # 097). I am an accredited Principal Investigator for archaeozoology (specialist analysis), coastal & shell midden and Stone Age; Field Director for Colonial Period; Field Supervisor for Iron Age and Rock Art.

As the appointed independent specialist (archaeologist) for this project hereby declare that I:

- act as an independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Peter Nilssen

Signature of the specialist:

Name of company: Dr Peter Nilssen

Date: **13 September 2013**

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3. Introduction

3.1. Background

The following provides background to the required assessment for the Gibson Bay Wind Farm Grid Connection, which is based on information supplied by Mrs Siân Holder of Cape Environmental Assessment Practitioners (Pty) Ltd (Cape EAPrac). During the Environmental Impact Assessment (EIA) for the Red Cap Kouga Wind Farm, Eskom claimed responsibility for the planning, design, approvals and construction of the grid connection infrastructure required for connecting to the Eskom network. It is preferred that Eskom plans, designs and constructs the grid connection (power lines) for renewable energy projects since Eskom eventually owns, operates and manages such connecting power lines. Eskom undertook an environmental assessment and was granted approval for a 132kV line linking the Kouga Wind Farm to the Melkhout Substation (DEA ref 12/12/20/1889). The wind farm EIA stated that, acquiring approval for other connections (e.g. Gibson Bay Wind Farm) would be finalised in due course with Eskom. Consequently, the Red Cap Kouga Wind Farm EIA process was conducted with this assumption and the subsequent Environmental Authorisation (EA) for the Wind Farm was issued without approval of grid connection for the Western Cluster (Gibson Bay Wind Farm).

More recently, Proponents of EIA applications for renewable energy projects often obtain EA for their grid connections ahead of time because Eskom will no longer obtain EAs for grid connections until after the Proponent has become a preferred bidder. The latter often comes too late for a feasible project that meets the Department of Energy's schedules. Eskom's stance is reasonable as they would have no assurance that a project will progress past the preferred bidder stage. Now, if the Proponent obtains an EA for the grid connection as a separate approval, then the EA can easily be transferred to Eskom if needed. If the grid connection is part of a wind farm EA however, then it cannot be transferred to Eskom.

In accordance with the National Environmental Management Act (NEMA, Act 107 of 1998, as amended and the 2010 EIA NEMA Regulations), the Applicant, Gibson Bay Wind Farm (Pty) Ltd., appointed Cape EAPrac to undertake the Basic Assessment process for the proposed Gibson Bay Wind Farm Grid Connection. The Applicant's Project Manager is Mr Lance Blaine of Red Cap. This author was appointed, in terms of Section 38(1)(a) and (c) of the National Heritage Resources Act (NHRA, Act 25 of 1999), to conduct a Heritage / Archaeological Impact Assessment that focuses on archaeology, cultural landscapes and palaeontology while Mr Steven Stead is performing the Visual Impact Assessment.

Three separate clusters - Eastern (no longer being developed), Central (now Kouga Wind Farm) and Western (now Gibson Bay Wind Farm) - were approved when the Red Cap Kouga Wind Farm was authorised in 2011 (DEAT Ref: EIA12095/2010). Construction is underway or imminent at the following three wind farms in the Kouga area; the Kouga Wind Farm (north of Oyster Bay - Central Cluster), the Mainstream Jeffrey's Bay Wind Farm (north of Jeffrey's Bay) and the Cennergi Tsitsikamma Community Wind Farm (north of the Gibson Bay Wind Farm). All wind farms in the area will connect directly or indirectly to the main Eskom substations of Dieprivier and Melkhout, which are located north of the N2.

Through its switching station on Farm 11/717, the approved Gibson Bay Wind Farm needs connection to the Eskom grid. Two options are available for indirect connections to the Dieprivier / Melkhout Substations via substations linked to approved wind farms in the area (Figures 1 & 2).

Alternative 1: The preferred and shortest option is to link to the approved Cennergi Tsitsikamma Community Wind Farm's Wittekleibosch Substation, which will link to Eskom's Dieprivier Substation under a separate application and process. The connection via the Cennergi network requires a new 132kV overhead power line of approximately 11.7km in length that mostly runs in a northerly direction. The northern part of this route falls within the Kou-Kamma Local Municipality while the remainder falls within the Kouga Local Municipality.

Alternative 2: The alternative power line route links to the Kouga Substation on the approved Kouga Wind Farm and requires a new 132kV overhead power line of some 19.3km in length that runs in an easterly direction. This route falls within the Kouga Local Municipality.

A corridor of approximately 400m wide (maximum width that is often less given all the existing constraints) was identified around and along the proposed power line route alternatives for the purposes of the EIA. Alternative 1 corridor is called the Wittekleibosch Corridor and Alternative 2 is called the Kouga Corridor (Figures 1 & 2). Where possible, the power line route alternatives (and corridors) were aligned to avoid known constraints and sensitive areas in the landscape as identified during the previous EIA for the wind farm, and these include:

- the Brandewynkop area as delineated by SAHRA (cultural heritage sensitive area / no-go);
- turbine positions (170-250m diameter buffer);
- weather & wind masts (150m diameter buffer);
- agricultural centre-pivots;
- 32m buffer of rivers & streams;
- 50m buffers from wetlands and 500m buffers i.t.o. WULA;
- 50m buffers on wind farm roads and servitudes etc.

The Brandewynkop area is considered to be a sensitive cultural heritage area due to the presence of archaeological resources of Early, Middle and Later Stone Age origin as well as more recent San and KhoiSan sites.

From Cape EAPrac's initial site visit it appears that Alternative 1 is the preferred environmental alternative for the following reasons;

1. Alternative 1 is about half the length of Alternative 2.
2. The bulk of Alternative 1's length crosses significantly disturbed environments.
3. Most of the Alternative 1 route includes existing vehicle access.
4. Being the closest to the Gibson Bay Wind Farm, it makes sense to link to the Tsitsikamma Community Wind Farm in order to minimise as much as possible the infrastructure linking these wind farms to the Eskom grid.
5. Alternative 2 crosses considerably more sensitive and less disturbed environmental areas than Alternative 1, including the lower reaches of the Klipdrift River, intact dune systems as well as pristine or near-pristine Fynbos and Thicket vegetation associated with sensitive dune systems.
6. Alternative 2 has fewer existing vehicle access tracks than Alternative 1.
7. Alternative 2 impacts on many more landowners and has to avoid a far greater numbers of centre pivots and homesteads in comparison with Alternative 1.
8. Alternative 2 impacts much more agricultural land than Alternative 1.

The grid connection will be a 132kV power line with the following aspects relevant to the impact assessment (see Plate 1):

1. The pylons will most likely be monopole structures up to a maximum height of 21m.
2. Depending on topography, the pylons will be placed between 150m and 320m apart, but where possible, they will be between 250m and 300m apart.
3. The footprint of the power line will be relatively small and involves a foundation for each pylon of about 2.5x2.5m foundation excavated to a depth of about 3m. The placement of such foundations are flexible to a point.
4. Access tracks are required for maintenance during operation and these will be single vehicle tracks rather than gravel roads, but see point 5 below. Much of the Alternative 1 route is already accessible for maintenance, and therefore, very few additional tracks are required.
5. Where the power line crosses steep, narrow and forested dune valleys (such as indicated by a green oval in Figure 2), a pylon will be placed near the top of each side of the valley. No vehicle access tracks will be made through the valley and no clearing of trees will be undertaken. Only a walk path will be cut so that a thin “lead” line can be walked across and then this will be used to pull the cable over the valley.

The impact in such sensitive areas will be restricted, therefore, to a temporary walk path. Access to the pylons on each side of the valley will be via tracks coming from either side of the valley rather than cutting through it.

6. During the operational phase, technicians will periodically access the power line route via access tracks and, where the line is not running across valleys, occasional clearing of high vegetation under the line may be required.
7. A switching station with a maximum extent of 100m x 150m will be located at the start and end of the power line route.

3.2. Purpose and Scope of the Study

From the initial investigation of the two alternative power line routes, Cape EAPrac found that, for reasons given in section 3.1 above, Alternative 1 is the preferred environmental option. It was suggested that, if other specialist studies came to the same conclusion, then Alternative 2 could be eliminated as an option at an early date, so that the main focus of the impact assessment would be on Alternative 1. Since the Gibson Bay Wind Farm is already approved, the NO-GO option is only an option if the wind farm development does not proceed. Based on this, the first objective of the study presented here was to determine whether or not Alternative 1 is preferred over Alternative 2 on heritage and archaeological grounds. This objective was met by a desktop study and literature review of heritage related work done in the surroundings of the 2 alternative power line routes.

Thereafter, with a focus on Alternative 1, the objectives of the Heritage / Archaeological Impact Assessment are:

- To assess the nature and sensitivity of heritage resources including cultural landscapes, archaeology and palaeontology;
- To identify the impact on such resources as well as options for mitigation in order to minimize potential negative impacts and to make recommendations for mitigation where necessary; and
- To identify heritage resources and issues that may require further attention.

Terms of Reference (ToR):
a) Locate boundaries and extent of the study area.
b) Conduct a survey of the study area to identify and record all heritage / archaeological resources.
c) Assess the impact of the proposed development on above-named resources according to assessment criteria provided by Cape EAPrac.
d) Recommend mitigation measures and additional studies where necessary.
e) Prepare and submit a report to the client that meets standards required by Heritage Authorities in terms of the National Heritage Resources Act, No. 25 of 1999

3.3. Study Area

The start of Alternative 1 for the Gibson Bay Wind Farm Grid Connection is a switching station situated on Farm 11/717 some 10km north west of Oyster Bay, Kouga Local Municipality, Humansdorp District, Eastern Cape Province (Figures 1 & 2). From there, the route runs in a westerly direction for about 3.5km over Remainder 717 and then turns to follow a NNE path for some 5.5km while traversing Farms 1/717, 2/720, 7/787 and 6/787, while the last section of about 2.4km turns in a NW direction over Farm 6/787 and ends at the Wittekleibosch Substation of the Cennergi Tsitsikamma Community Wind Farm on Farm 4/787 in the Kou-Kamma Local Municipality. Examples of topography, vegetation cover, disturbances and exposed surfaces are shown in Plates 2 through 8.

Both route alternatives begin south of the Brandewynkop dune line, but Route Alternative 2 runs parallel to and south of another dune line further south. Fynbos is the

dominant vegetation atop and on the northern dune slopes whereas the southern dune slopes and valley floors include dense coastal thicket or forest that is often invaded by alien trees such as Rooikranz, Port Jackson and black wattle.

The predominant land use in the area consists of grazing lands for dairy farming that has dramatically changed the landscape from one formerly vegetated by Tsitsikamma Sandstone Fynbos, Garden Route Shale Fynbos, Coastal Shale Band Vegetation and Southern Cape Dune Fynbos. The Eastern Cape Biodiversity Conservation Plan has designated certain parts of the region as Critical Biodiversity Areas for the protection of endangered vegetation types, ecological corridors and water management areas such as the Tsitsikamma, Klipdrift and Slang Rivers. The coastal strip in this region mostly comprises sensitive dune systems.

The landscape consists of a gently undulating coastal plain that is cut by the Tsitsikamma, Klipdrift and Kromme Rivers. The main geological units in the area include the Table Mountain Group (with palaeontologically sensitive Cedarberg and Baviaanskloof Formations), the Bokkeveld Group (with palaeontologically sensitive Gydo Formation) and the Algoa Group that is partly represented by the fossil and more recent dunes in the coastal strip (Almond 2011a & 2011b and Binneman 2010). For the most part, hard rock geological sediments - mainly quartzites and sandstones - are covered by top soils, dune sands, ferricretes and calcretes with a few surface outcrops of quartzites occurring in the study area.

The main landscape features include gravelled terraces in the north and remnants of a dynamic dune systems in the south. Today the latter are largely stabilized by alien and dune vegetation. Small remnants of a formerly much larger dynamic dune system stretching from about Klasies River in the west to the Kromme River in the east are still exposed. These include exposed dunes at Geelhoutboom (north of Klasies River Caves), Brandewynkop and the dune field between Oyster Bay and the Kromme River mouth (Figure 2). For the most part, these exposed dune areas contain abundant archaeological and palaeontological resources where the shifting dune sands are continually burying and exposing sites (Binneman 2010 & 2011a, Deacon & Geleijnse 1988, Nilssen 2010 and ACO 2010).

The surrounding environment is substantially altered by recent human related activities including agricultural activities (vegetation clearing, ploughing, grazing, roads and vehicle tracks, dams, dwellings & outbuildings, centre pivot irrigation systems, etc.), public roads, overhead power lines, fencing, earthmoving activities, telecommunication towers and overhead lines, fencing, ongoing and imminent construction of wind turbines and associated infrastructure, and so on. Coordinate data for the alignment of the Alternative 1 route are given in Table 1 below.

Table 1. Coordinate data for the main points along the Alternative 1 route for the Gibson Bay Grid Connection (see Figure 4)

Name	Description	Datum: WGS 84 Lat/Lon dec.degrees	Datum: WGS 84 Grid: SA National
Gibson Bay Wind Farm switching station	Alternative 1 Start	S34.14195 E24.54243	25 Y0042203 X3779501
2	Alternative 1 route	S34.14087 E24.53301	25 Y0043072 X3779386
3	Alternative 1 route	S34.14047 E24.53037	25 Y0043316 X3779342
4	Alternative 1 route	S34.14132 E24.51007	25 Y0045187 X3779446
5	Alternative 1 route	S34.13772 E24.50524	25 Y0045635 X3779048
6	Alternative 1 route	S34.11276 E24.51402	25 Y0044838 X3776276
7	Alternative 1 route	S34.11019 E24.51348	25 Y0044889 X3775991
8	Alternative 1 route	S34.10935 E24.51374	25 Y0044866 X3775898
9	Alternative 1 route	S34.10828 E24.51554	25 Y0044700 X3775778
10	Alternative 1 route	S34.08897 E24.52230	25 Y0044086 X3773633
11	Alternative 1 route	S34.07738 E24.51312	25 Y0044940 X3772352
Wittekleibosch Substation	Alternative 1 End	S34.07247 E24.50565	25 Y0045632 X3771810

3.4. Approach to the Study

This assessment was conducted with accepted best practice principles and in accordance with guidelines and minimum standards as set out by the Department of Environmental Affairs and Development Planning, Heritage Western Cape, and the South African Heritage Resources Agency (DEA&DP 2005, HWC 2007, SAHRA 2007).

The first objective, to determine the suitability of the 2 proposed alternative power line routes, was met by a desktop study of literature concerning the nature and sensitivity of heritage and archaeological resources in the immediate surroundings. Since Dr Johan Binneman has worked in this area for much of his career and has an intimate understanding of the local archaeological record and cultural landscapes, the primary focus was on his findings and recommendations regarding two wind farms in the immediate surroundings of the proposed development site.

Previous heritage and archaeological studies in the immediate surroundings, including much of the Alternative 1 power line option and portions of the Alternative 2 option, have already provided detailed literature reviews of the history, heritage and archaeological record of the area (see Binneman 2010, 2011a, 2011b & 2011c and references therein as well as Van Ryneveld 2010 and references therein and ACO 2010). While giving a broad overview of the literature reviews presented in the above-named reports, the focus here is on presenting key heritage concerns already identified in these earlier studies and how they relate to the assessment being conducted here.

Palaeontological studies in the immediate surroundings were consulted for their findings and recommendations in order to ascertain whether or not further palaeontological studies are required for the proposed power line routes.

On behalf of Gibson Bay Wind Farm (Pty) Ltd, Mrs Siân Holder of Cape EAPrac provided background information, terms of reference, locality maps and alternative development layout plans for the proposed activity. Mr Lance Blaine, representing the applicant, arranged permission to access the study area and initially accompanied this author for logistical support, after which the survey was conducted independently. Thereafter, permission to access specific parts of the power line route were obtained from land owners, Mr Dawid Zietsman and Mr Conrad Dreyer, while Mr Oeloff Cilliers kindly assisted with transport. The entire heritage / archaeological survey was conducted on foot.

Through a desktop study it was established that the Alternative 1 power line route is the preferred option, and therefore, the heritage / archaeological survey focused only on this route alignment. Only small portions of the route could not be accessed due to impenetrable vegetation (variation of Alternative 1, through dense wooded vegetation) but this does not alter the heritage or archaeological significance rating, assessment or recommendations made here (see blue ellipses in Figure 4). While the remainder was accessible on foot, large parts of the ground are covered by natural vegetation and grazing pastures thereby limiting archaeological visibility. Nevertheless, numerous exposed surfaces were open to inspection and large areas of pastures included mole activity, which provided a window on sub-surface sediments and their contents. Sufficient observations were made to assess the overall heritage / archaeological sensitivity of the Wittekleibosch Corridor, even though the entire width of the corridor could not be assessed due to restricted archaeological visibility. All identified archaeological occurrences were recorded, mapped and photographed.

Survey tracks were fixed with a hand held Garmin Camo GPS to record the search area (Figure 4, gpx tracking file is available from author). The position of identified archaeological occurrences and photo localities were fixed by GPS (Figure 4, Plates 2 through 8 and Table 2). Digital audio notes and a comprehensive, high quality digital photographic record were also made (full data set available from author). In this report, localities of archaeological occurrences and photographs are established by matching the numbers on photographs with those of

waypoints in Figure 4. Directions of views are indicated with compass bearing names like E is east; WSW is west south west, and so on.

3.5. Assumptions, Limitations and Gaps in Knowledge

This assessment assumes that the approved Gibson Bay Wind Farm becomes a preferred bidder and that the construction of the wind turbines and associated infrastructure and services will proceed. In the event that the development does not proceed, then there is no longer a requirement for a grid connection to the Eskom network. It is assumed that all background information and layout plans provided by Cape EAPrac and the applicant are correct and current.

This assessment is specifically for the footprint and corridor of the proposed power line route and does not apply to, and may not be used for, any other future developments on the remainder of the affected properties. The major limitation to the study involves restricted archaeological visibility though it is considered that sufficient observations were made for the purpose of this assessment. Due to the fact that much of the archaeological record, and that with potentially the best context, is covered by vegetation and surface sediments, this study is limited to such resources exposed on the surface or in disturbed contexts. Consequently, it cannot be ruled out that more heritage resources may be exposed during the construction phase of the development activity.

The literature review provided below is limited to archaeological and heritage aspects applicable to this assessment because an exhaustive and detailed literature review was provided in the study for the areas including the Gibson Bay Wind Farm and Kouga Wind Farm (Van Ryneveld 2010) as well as the Tsitsikamma Community Wind Farm and Oyster Bay Wind Farm (Binneman 2010, 2011a, 2011b & 2011c). The previous studies for the Tsitsikamma Community Wind Farm also included parts of the northern portion of the Alternative 1 power line route (Binneman 2011a & 2011c).

At present there is a gap in knowledge concerning input from the Gamtkwa Khoisan Council, a registered Interested and Affected Party, as their legal representative, Mr Kobus Reichert, suggested that they should first review this and associated reports concerning the proposed development before providing input or calling for a meeting to discuss same regarding the Public Participation Process. Mr Reichert did indicate in conversation, however, that there is a concern that a portion of the Alternative 1 option may have an impact on the Brandewynkop archaeological resources were they to extend in a westerly direction.

Since the archaeological survey for this assessment did not include the Alternative 2 power line route, there is a gap in knowledge concerning heritage and archaeological resources that may occur in the Kouga Corridor.

4. Results

4.1. Heritage / Archaeological Background - Literature Review

As noted above, this review focuses on heritage and archaeological resources relevant to the proposed Gibson Bay Grid Connection, because detailed literature reviews have already been produced for parts of the study area and immediate surroundings (see Van Ryneveld 2010 and Binneman 2010, 2011a, 2011b, 2011c & 2012 and references therein). Due to his extensive experience with the archaeological record in this area, the below review draws largely on the work and opinion of Dr Johan Binneman and includes this author's own work and observations in the St Francis Bay area (see Binneman 2010, 2011b, 2011c and references therein and Nilssen 2010).

Several heritage related studies have been conducted along the nearby coastline, which is rich in archaeological resources of Early, Middle and Later Stone Age origin. An approximately 5km wide strip along the coast is particularly rich and is considered to be one of the richest archaeological and pre-colonial cultural landscapes in South Africa (Binneman 2010 and ACO 2010). The archaeology of the adjacent interior is not well known due to a paucity of research.

Early Stone Age (ESA) materials including Acheulian hand axes, cleavers and chopping tools that date from between about 1.5 million and 250 000 years ago is the earliest evidence for human ancestors occupying this area. Such artefacts are usually found among ancient river gravels and on old palaeosols exposed within dune fields like those at Geelhoutboom and Brandewynkop (Deacon & Geleijnse 1988 and Binneman's personal observations). While ESA artefacts are common among the dunes immediately east of Thysbaai, they are rare in the dunes a bit further north between Oyster Bay and St Francis Bay and always occur in disturbed or derived contexts where they are usually mixed with artefacts of more recent Stone Age times. Although ESA artefacts were identified in the immediate surroundings of the study area, they are rare, and are always found in secondary, derived and mixed contexts, and are therefore considered to be of low significance (also see Van Ryneveld 2010).

The Middle Stone Age (MSA) starts at about 250 000 years ago and gives way to the Later Stone Age some 30 000 years ago. MSA stone artefacts are characterised by flake and blade industries where evidence for core preparation - also known as the Levallois technique - is seen on prepared or faceted platforms of flakes and blades. Convergent flakes or points are also one of the markers of the MSA period. The Klasies River Cave complex - a Provincial Heritage Site some 15km west of the study area - is the most significant MSA site in the area that contains evidence for human occupation spanning the last 120 000 years. Research at the site has made a significant contribution to our understanding of the origins of modern humans, and therefore, Klasies River Cave is among 5 other South African archaeological sites that are in the process of being nominated for World Heritage Site status. Stone artefacts of MSA origin occur among the dunes and exposed gravels in the area, with the dunes at Brandewynkop containing numerous MSA stone tools. Unfortunately, no other cultural materials or faunal remains are associated with these artefacts at Brandewynkop, but bone and fossil bone is associated with MSA materials in the dunes between Oyster Bay and St Francis Bay (also see Nilssen 2010). SAHRA has declared a delineated area containing Brandewynkop an exclusion area where no development is permitted (Figure 2). "At the eastern end of the (St Francis Bay) dune field are most remarkable Middle Stone Age 'factory' sites which consisted of large circular piles of flakes and cores. Most of the flake piles represent unique 'moments in time' where large numbers of flakes were produced from a single core." (Binneman 2010 pg 3). Apart from Brandewynkop, the most significant ESA / MSA site recorded in the vicinity of the study area is site 2.3 at the Kouga Wind Farm (formerly the Central Cluster), which will be conserved in perpetuity (Van Ryneveld 2010).

The Later Stone Age (LSA) in this area starts about 25 000 years ago and is characterised by substantial technological improvements over the MSA industries. Advancements on previous technologies and new technologies as well as cultural developments include the widespread occurrence of rock art (cave paintings and rock engravings), decorative objects (ostrich egg shell beads, marine shell pendants and beads, ochre), human burials with grave goods including painted stones, an expanded stone tool kit, microlithic stone tool industries (often associated with composite tools such as bow and arrow hunting), bone tools, tortoise carapace bowls, ostrich egg shell containers, fire making sticks and so on. Many of the LSA sites in the area are shell middens, and though these usually occur within a few hundred metres of the shoreline, they are also found up to 5km inland. Binneman has identified, described and dated the following types of LSA archaeological sites and their contents that occur in the dune systems along the 5km coastal strip: large stone features associated with cooking (one dated to some 300 years ago); shell middens with pottery only and with pottery and domesticated fauna that represent Khoi pastoralists or herders (dated to about 1800 and 1600 years ago respectively); shell middens, without pottery, associated with a

quartzite stone industry that Binneman has named the Kabeljous industry, which represent hunter-collector-fishers who lived along the coastal foreland (dated to between about 4700 and 1800 years ago); shell middens, without pottery, associated with a silcrete or quartz microlithic Wilton Industry that represent hunter gatherers or San who lived mainly in the interior and only visited the coast periodically (dated to between about 5180 and 1900 years ago) (Binneman 2010 pg 4-5). No significant LSA sites have been recorded by previous studies in the immediate vicinity of the present study area.

The last 2000 years saw a significant shift in the socio-economic setting with the settlement of KhoiKhoi peoples in the area from about 1800 years ago. These were the first food producing peoples who brought domestic stock, pottery / ceramic containers and bowls and associated cultural items into the region. Descendents of these first farming peoples, such as members of the Gamtkwa KhoiSan Council, still live in the region today.

The most recent inhabitants of the area are mostly of European stock and started settling here from around the late 1700s during the Colonial Period. These latest arrivals have had the most dramatic effect on the environment, particularly in more recent years with large scale cattle / dairy farming where large tracts of indigenous vegetation was cleared for ploughing and planting pastures for grazing. Heritage resources related to this period - older than 60 years or of historic significance - include dwellings and associated structures as well as cemeteries, marked and unmarked human burials (Van Ryneveld 2010).

The bulk of archaic human (ESA) and human (MSA to recent) occupation of this area involves the Stone Age era, and therefore, the most significant cultural layer in this area involves the pre-colonial cultural landscape and its sense of place (see UNESCO 2008 for definitions, significance and preservation of cultural landscapes). SAHRA has already recognized the significance of the Thyspunt cultural landscape and will not approve any developments that will have a negative impact on it (SAHRA 2010). The Thyspunt cultural landscape, however, is only a fraction of a much larger and equally significant pre-colonial cultural landscape that involves a 5km coastal strip that extends at least from St Francis Bay in the east to Klasies River in the west (Binneman 2011b & 2011c and ACO 2010; see Figures 2 & 3). Binneman provides a detailed description of the archaeological riches in this area, which he uses to justify the significance attributed to the pre-colonial cultural landscape in this area (Binneman 2011b & 2011c). Moreover, large stretches of South Africa's coastline are rich and varied cultural landscapes that house the highest quantity and quality archaeological Stone Age sites in the world. With ever increasing coastal developments and resulting degradation of the coastal strip, it follows that as much as possible of this cultural landscape should be protected for future generations and scientists.

A few approved wind farms in the surroundings of the study area will already encroach on, and have a negative, mostly aesthetic impact on the pre-colonial cultural landscape (Figure 3).

4.2. Alternative 1 Versus Alternative 2 - Pre-Colonial Cultural Landscape

Assuming that the approved Gibson Bay Wind Farm development proceeds, then the NO-GO option is not an option because the wind farm will require a grid connection to the Eskom network via either a direct or indirect link to the Dieprivier or Melkhout Substations located north of the N2. Alternative 1 involves a connection indirectly to Eskom's Dieprivier Substation via a link to the approved Cennergi Tsitsikamma Community Wind Farm's Wittekleibosch Substation while Alternative 2 will connect indirectly to Eskom's Melkhout Substation by linking to the Kouga Substation on the approved Kouga Wind Farm. Alternative 1 is currently the preferred environmental alternative for several reasons as detailed in Section 3.1 above.

While significant Stone Age sites - such as site 2.3 at the Kouga Wind Farm - and Colonial Period structures and cemeteries may be found along the Alternative 2 route (Kouga Corridor), the most significant impact of this alignment option concerns the aesthetic value of the pre-colonial cultural landscape. Given the approval of, among others slightly further afield, the Gibson Bay Wind Farm in the west and the Kouga Wind Farm in the east - both having numerous wind turbines within the said cultural landscape - there remains a small, presently relatively undeveloped stretch of the cultural landscape nestled between these wind farms (Figures 2 & 3). It is considered critical that this approximately 6km stretch of relatively unspoilt coast should remain as undeveloped as possible to retain at least a portion of the former aesthetic value of this significant pre-colonial cultural landscape (Figures 2 & 3). For this simple reason alone, it is strongly recommended here that the Alternative 2 power line option should be eliminated.

The first 4 to 5km of the Alternative 1 option falls within the pre-colonial cultural landscape, and along this stretch, the power line will be surrounded by large (up to 150m in height) wind turbines of the approved Gibson Bay Wind Farm that will have a notably higher negative impact on the aesthetic value of the said cultural landscape in comparison with that of the proposed power line (maximum height of 21m). Even if the Brandewynkop archaeological materials extend this far west and outside of the SAHRA exclusion area, then it would be worth deploying mitigation measures to deal with those materials rather than having a substantial overhead power line traversing some 7km of the relatively undeveloped pre-colonial cultural landscape between the Gibson Bay and Kouga Wind Farms (Figures 2 & 3). Consequently, and on heritage and archaeological grounds, it is the opinion of this author, which agrees with the initial preferred environmental option, that the Alternative 1 power line route is highly favoured over the Alternative 2 option.

4.3. Alternative 1 - Heritage / Archaeological Foot Survey

On 26 July and 20 August 2013 a heritage and archaeological foot survey was conducted along and within the Wittekleibosch Corridor (Alternative 1) as well as the proposed site for a switching station on Farm 11/717 when a distance of some 25km was walked, covering an area of about 22ha (Figure 4). Two areas along the route alignment could not be accessed due to impenetrable vegetation (see Figure 4). Archaeological visibility was generally poor (about 10%) due to natural vegetation cover and thick grass in grazing pastures. Inspection of ground surfaces were restricted to vehicle, pedestrian and animal tracks, recently cleared and/or disturbed areas (eroded areas, dams, vegetation clearing, etc.), large mammal burrows and mole heaps. While low visibility of ground surfaces was the major limitation of the survey, sufficient observations were made to assess the overall heritage and archaeological sensitivity of the study area. Examples of the study area are shown in Plates 2 through 8.

Waypoint 3 is a recent borrow pit or sand quarry that is approximately 400m^2 in extent where 11 Stone Age artefacts were identified that are a mix of mostly MSA and a few LSA flakes and flaked pieces in quartzite (Figure 4, Plate 5 [3] and Table 2). Given the extent of the disturbed area and the likelihood that some artefacts were not seen, this is a very low density scatter. An exposed profile revealed that the borrow pit cut mostly into fairly recent dune sands of beige colour while a lower and older dune (reddish colour sands) or palaeosol was also truncated. The artefacts are thus derived from either or both the younger dunes and the older palaeosol.

Significance and recommendation: Due to the very low density of this occurrence, the lack of any other associated cultural or faunal remains and its derived and mixed nature, it is considered to be of low significance and therefore, no further mitigation is required. The find is given a field rating of Generally Protected C and because it was adequately recorded during this study, it is recommended that a permit is not required for its destruction.

Waypoints 4, 9, 46 and 56 consist of isolated occurrences of Stone Age artefacts of most likely MSA origin including flakes, a hammer stone, a disc or radial core and a flaked

piece, all in quartzite (Figure 4, Plates 5, 6 & 7 and Table 2). At least one specimen is of ESA origin. Apart from the flake at waypoint 9 found on recent dune sands, these finds were found on exposed surfaces of an old dune or palaeosol with reddish coloured sands.

Significance and recommendation: Being isolated occurrences involving a few stone tools that lack context and other cultural or food remains, these finds are given a field rating of Generally Protected C and are considered to be of low significance that require no further mitigation. It is recommended that no permit is required for their destruction.

Waypoint 5 is an exposed surface approximately 80m^2 in extent along a disused vehicle track where a very low density scatter - 9 pieces were seen - of mostly MSA stone artefacts in quartzite were identified (Figure 4, Plates 5 & 6 and Table 2). These specimens were lying atop an old dune or palaeosol of reddish colour and were almost certainly exposed as a result of the single vehicle track and subsequent erosion. Artefacts include flakes, flaked pieces, a possible upper grind stone (likely LSA in age) and what appears to be a Fauresmith type hand axe or cleaver of late ESA or early MSA origin.

Significance and recommendation: This very low density scatter of stone artefacts are in a derived and disturbed context and include a mix of MSA, ESA and possibly LSA materials. No other cultural or faunal remains are represented. This stone artefact scatter is given a field rating of Generally Protected C and is considered to be of low significance, and therefore, no further mitigation is necessary. It is recommended that a permit is not needed for its destruction.

Waypoint 20 is a quartzite outcrop where several of the exposed rocks display flake scars that are almost certainly the result of this outcrop being used as a source for raw material (i.e. a quarry) to manufacture stone tools during Stone Age times (Figure 4, Plate 7 and Table 2). Red arrows in Plate 7 show the more obvious flake scars though on closer inspection, numerous flake scars are evident. These flake scars are very unlikely to have been produced by natural causes or by agricultural activities and the slight patination or cortification on certain flake scars indicates that they were made in antiquity. Unfortunately the ground surfaces in the surrounding area are thickly covered in pine needles, and therefore, ground surfaces could not be inspected for flakes and other debris that may be associated with the quarry. Although other Stone Age quarry sites may occur in the area, they have not been reported in other studies in the immediate surroundings or at least that this author is aware of.

Significance and recommendation: This site is most likely a Stone Age quarry for quartzite, and since such sites are relatively rare in this landscape, it is considered to be of medium to high significance and should be conserved in perpetuity. Because the evidence is literally fixed in the landscape (flake scars on quartzite outcrop), this site cannot be sampled or mitigated other than protecting and conserving it. It is recommended that a 50m buffer (100m across) should be observed - by means of a fence - around the Stone Age quarry site identified at waypoint 20 to ensure that the site is avoided during the construction and operational phases.

Waypoint 25 is a very low density scatter of Stone Age flakes and flaked pieces in quartzite that lie in a deforested and disturbed area where quartzitic gravels and/or outcrops were noted nearby (Figure 4, Plate 8 and Table 2). Seven specimens were seen in an area of about 300m^2 and while at least one was of MSA origin, the age of the remainder is indeterminate. Consequently, it is likely that ESA and LSA pieces may be present.

Significance and recommendation: Being in a disturbed, derived and likely mixed context, and in the absence of any other cultural or faunal remains, this very low density scatter is considered to be of low significance and requires no further mitigation. The scatter is given a field rating of Generally Protected C and it is recommended that a permit is not required for its destruction.

Apart from the above observations, and with the exclusion of the areas that could not be accessed due to impenetrable vegetation, no other heritage resources were identified along the Alternative 1 power line route. Note that, while visibility of ground surfaces was generally poor, structures and ruins are usually exposed and readily visible, and none were seen within the Wittekleibosch Corridor.

Table 2. Coordinate and descriptive data for identified archaeological occurrences (see Figure 4 and Plates 5 through 8).

Point Name	Description	Datum: WGS 84 Lat/Lon dec.degrees	Datum: WGS 84 Grid: SA National	meters above sea level
3	very low density mixed MSA-LSA stone artefacts	S34.12895 E24.50860	25 Y0045329 X3778075	135 m
4	isolated Stone Age - MSA	S34.12938 E24.50835	25 Y0045352 X3778122	133 m
5	very low density mixed MSA-ESA poss LSA	S34.12948 E24.50832	25 Y0045355 X3778133	133 m
9	isolated Stone Age - MSA	S34.13370 E24.50679	25 Y0045494 X3778601	129 m
20	Stone Age Quarry site	S34.10393 E24.51711	25 Y0044557 X3775295	112 m
25	very low density MSA & poss ESA-LSA	S34.09326 E24.52050	25 Y0044250 X3774110	134 m
46	isolated Stone Age - MSA	S34.13026 E24.50816	25 Y0045369 X3778220	120 m
56	isolated Stone Age - MSA	S34.12918 E24.50851	25 Y0045337 X3778099	128 m

4.4. Palaeontology - Literature Overview & Recommendations

In the palaeontology study conducted for the three Clusters of the Kouga Wind Farm, including the now named and approved Gibson Bay Wind Farm and Kouga Wind Farm, it was stated that, "within the three Clusters of the Kouga Wind Farm development, two geological factors have effectively eliminated fossils from being preserved. Firstly the tectonic overprint of the Cape Folding Event that took place around 310 million years ago and secondly, the long period of weathering and erosion that produced the African Land Surface and the coastal plane. There is therefore a very low likely hood of finding well preserved fossils at any of the three Kouga Wind Farm Clusters. The only rock unit that may be palaeontologically sensitive is the Cedarberg Formation that occurs in the Western (Gibson Bay Wind Farm) and Central (Kouga Wind Farm) Cluster areas. Again the chances of encountering this thin unit is remote and it will also have the metamorphic overprint which has effectively destroyed any potential fossils. As such, the environmental impact significance can be rated as Low" (de Klerk 2010 pg 13). These conclusions were largely echoed in the palaeontology study for the Oyster Bay Wind Farm situated to the east (Almond 2011a and see Figure 3).

The above studies, however, did not include the northern portion of the Alternative 1 power line route being assessed in this report. Nevertheless, the palaeontology study for the proposed Tsitsikamma Community Wind Energy Facility did include the area that will be impacted by Alternative 1 of the proposed Gibson Bay Wind Farm Grid Connection (Almond 2011b). The palaeontologically sensitive geological units that occur in the study area, as well as along the northern section - NW of Brandewynkop - of the Alternative 1 route, include the Cedarberg Formation (Oc, grey) and Baviaanskloof Formation (S-Db, dark blue) of the Table Mountain Group as well as the Gydo Formation (Dg, v. Pale blue) of the Bokkeveld Group (Almond 2011b and see Figure 5 [Almond 2011a & 2011b]).

Considering the occurrence of sensitive geological members in the study area, the following is drawn directly from Almond's 2011b study.

"Given the uncertainties concerning the geological mapping of the poorly-exposed, potentially fossiliferous marine rock formations within the study area, as well as their actual palaeontological sensitivity on the ground, it is recommended that a Phase 1 pre-construction field assessment ... by a professional palaeontologist be carried out to identify possible zones or areas of high palaeontological sensitivity and to recommend further mitigation measures deemed necessary. Note that the recommended field assessment is *not* restricted to the development footprint alone because bedrock exposure here may be inadequate to adequately assess buried fossil heritage.

If fossil-rich rocks are identified within the development footprint, further (Phase 2) palaeontological mitigation is likely to involve:

- Recording and judicious sampling of fossil heritage and relevant geological data within development footprint during the construction phase;

- Monitoring of all substantial bedrock excavations for fossil remains by the ECO;
- In the case of any significant fossil finds (*e.g.* shell beds, vertebrate teeth, bones, burrows, petrified wood) during construction, these should be safeguarded - preferably *in situ* and reported by the ECO as soon as possible to the relevant heritage management authority (SAHRA) so that any appropriate mitigation by a palaeontological specialist can be considered and implemented, as the developer's expense" (Almond 2011b pg 22).

"Providing that the recommended mitigation measures are carried through, it is likely that the potentially negative impacts of the proposed development on local fossil resources will be substantially reduced and, furthermore, they will partially offset by the *positive* impact represented by increased understanding of the palaeontological heritage of the Humansdorp region" (Almond 2011b pg 22).

"Please note that

- All South African fossil heritage is protected by law (National Heritage Resources Act of 1999) and fossils cannot be collected, damaged or disturbed without a permit from SAHRA or the relevant Provincial Heritage Resources Agency;
- The palaeontologist concerned with mitigation work will need a valid permit from SAHRA;
- All palaeontological specialist work would have to conform to international best practice for palaeontological fieldwork and the study (*e.g.* data recording, fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies currently being developed by SAHRA" (Almond 2011b pg 22).

5. Sources of Risk, Impact Identification and Assessment

The below criteria for assessment are drawn from the EIA Regulations that were published in April 1998 by the South African Department of Environmental Affairs and Tourism. The format of impact tables presented below were provided by Cape EAPrac.

5.1. Alternative 1 Versus Alternative 2 - Pre-Colonial Cultural Landscape

The below focuses on the impact of Alternative 2 since it is argued that Alternative 1 will have a negligible impact due to it being situated among large wind turbines that will have a much greater negative impact on the aesthetic value of the 5km wide coastal strip of pre-colonial cultural landscape than that of the overhead power line. Nevertheless, both alternatives are presented in the impact Table 3 below.

Nature of Impact

The main concern regarding the stretch of relatively unspoilt pre-colonial cultural landscape between the Gibson Bay and Kouga Wind Farms as shown in Figures 2 and 3, lies in the detraction from the aesthetic value of that landscape in the long term, i.e. operational phase. Since it is recommended that the Alternative 2 option should be eliminated, a foot survey for heritage and archaeological resources was not conducted in the Kouga Corridor, and therefore, the impact on such resources during the construction phase cannot be assessed at present.

Extent of Impact

While the physical and aesthetic impact will be local, the affected portion of the relatively undisturbed pre-colonial cultural landscape as indicated in Figures 2 and 3 is a feature significant to the region and arguably, also significant at the national level, particularly since the site of Klasies River Cave is in the process of being serially nominated for World Heritage Site status.

Duration of Impact
Long term to permanent.

Intensity
Medium to high.

Probability of Occurrence
Definite

Legal Requirements
Since the visual / aesthetic / sense of place value of heritage resources, including cultural landscapes, are protected by the NHRA (Act 25 of 1999), the responsibility rests with SAHRA or the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) to ensure that such value is adequately assessed and protected according to its significance.

Status of the Impact
Negative for both the development and heritage resources.

Accumulative Impact
Since wind farms and other developments are already having a negative impact on the pre-colonial cultural landscape, the addition of Alternative 2 in a relatively undeveloped stretch of this landscape will add significantly to this negative impact. Therefore this negative impact is graded as high. See Sections 4.1 and 4.2 above for more detailed motivation.

Degree of Confidence in Prediction
High

5.2. Alternative 1 - Heritage / Archaeological Foot Survey

Table 4 below presents a summary of impacts on heritage and archaeological resources in the Wittekleibosch Corridor including the proposed switching station site on Farm 11/717.

Nature of Impact
Although the assessment conducted here has shown that the bulk of the Wittekleibosch Corridor is not archaeologically sensitive, it cannot be ruled out that significant heritage resources lie beneath vegetation and in sub-surface sediments. Since the construction phase will involve approximately 2.5x2.5m excavations to a depth of up to 3m into mostly virgin sediments, sub-surface heritage resources may be impacted negatively. Vegetation clearing for single vehicle access tracks may also expose such resources. No further negative impact will occur during the operational phase provided that the Stone Age quarry at waypoint 20 is adequately protected and conserved.

Extent of Impact
Local

Duration of Impact
Permanent.

Intensity
Low.

Probability of Occurrence
Low to medium

Legal Requirements

Heritage and archaeological resources are protected by the NHRA (Act 25 of 1999) and may not be damaged or disturbed without a permit from SAHRA or the ECPHRA. Apart from the Stone Age quarry at waypoint 20, all identified heritage resources are of low significance and were adequately recorded during this study, and therefore, no further studies or mitigation is needed and a permit is not required for their destruction.

Status of the Impact

Since the Stone Age quarry site may not have been identified without the proposed activity, this development has had a positive result for the archaeological record. The development has also resulted in expanding the recorded search area and recorded finds for heritage resources. Alternative 1 will have a negligible negative impact on heritage resources and this alignment option is positive for the development.

Accumulative Impact

Negligible negative impact.

Degree of Confidence in Prediction

High

5.3. Palaeontology

Note that this author is not a palaeontologist and that the below section is completed with information gained from a literature review as presented above in Section 4.4. A Phase 1 pre-construction field assessment must be conducted in the northern portion of the affected area by a professional palaeontologist to identify areas of potential palaeontological sensitivity and to make recommendations in mitigation where necessary (see red ellipse in Figure 5). "For example, fieldwork might reveal the presence of previously unrecorded fossil assemblages or, more likely, show that in practice the sensitivity of these three formations is low due to high levels of tectonic deformation, chemical weathering or superficial sediment cover locally or regionally" (Almond 2011b pg 19). Such a Phase 1 field assessment for the Tsitsikamma Community Wind Farm had not been conducted or was not available to this author at the time of compiling this report. Table 5 below presents a summary of impacts on palaeontological resources in the study area.

Nature of Impact

Palaeontologically sensitive geological units that occur in the study area include the Cedarberg and Baviaanskloof Formations of the Table Mountain Group as well as the Gydo Formation of the Bokkeveld Group (Almond 2011b and see Figure 5). Excavations for pylon foundations may penetrate these geological units and damage or destroy significant palaeontological resources. The operational phase, however, will have no further impact on fossil heritage. At this stage, there are no fatal flaws on palaeontological grounds.

Extent of Impact

"In general, the destruction, damage or disturbance ... of fossils preserved at the ground surface or below ground that may occur during construction represents a *negative* impact that is limited to the development footprint. Such impacts can usually be mitigated but cannot be fully rectified (i.e. permanent)" (Almond 2011b pg 20).

Duration of Impact

Permanent.

Intensity

"Because of the generally sparse occurrence of fossils within most of the formations concerned as well as within the overlying superficial sediments (soil *etc*), as inferred from better exposed localities elsewhere, the magnitude and probability of impacts are conservatively rated

as *low*. As discussed, professional field studies may demonstrate rich pockets or zones of fossils within the study area, in which case the magnitude of impacts without mitigation would be potentially *high*" (Almond 2011b pg 20).

Probability of Occurrence

As above, either low or high, but low with mitigation.

Legal Requirements

Palaeontological resources are protected by the NHRA (Act 25 of 1999) and may not be damaged or disturbed without a permit from SAHRA or the ECPHRA.

Status of the Impact

Negative (medium to low) without mitigation and positive with mitigation.

Accumulative Impact

Unknown due to insufficient data available on local wind farm developments.

Degree of Confidence in Prediction

Moderate because of "the low levels of bedrock exposure in the study area, so formation mapping is unreliable; the paucity of paleontological field studies in the Humansdorp region; the uncertainty concerning levels of cleavage formation and chemical weathering of potentially fossil-rich marine rock units" (Almond 2011b pg 20).

Provided that the below recommended mitigation measures and additional assessments are considered and/or implemented, there are no fatal flaws on heritage grounds, and therefore, there are no further objections to the proposed Alternative 1 power line route for the Gibson Bay Grid Connection.

Table 3. Summary of impacts during the operational phase: Pre-Colonial Cultural Landscape.

Alternative	Nature of impact	Extent of impact	Duration of impact	Intensity	Probability of occurrence	Status of the impact	Degree of confidence	Level of significance	Significance after mitigation
Alternative 1	aesthetic	Local	Long term to permanent	Low	Definite	Negative	High	Low	Low
Alternative 2	aesthetic	Regional to National	Long term to permanent	Medium to high	Definite	Negative	High	High	High
NO-GO	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4. Summary of impacts during the construction phase: Alternative 1 - Heritage and Archaeological Resources.

Alternative	Nature of impact	Extent of impact	Duration of impact	Intensity	Probability of occurrence	Status of the impact	Degree of confidence	Level of significance	Significance after mitigation
Alternative 1	Vegetation clearing & foundation excavations	Local	Permanent	Low	Low to Medium	Positive & Negligibly negative	High	Medium	Low
Alternative 2	NA	NA	NA	NA	NA	NA	NA	NA	NA
NO-GO	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5. Summary of impacts during the construction phase: Palaeontological Resources.

Alternative	Nature of impact	Extent of impact	Duration of impact	Intensity	Probability of occurrence	Status of the impact	Degree of confidence	Level of significance	Significance after mitigation
Alternative 1	foundation excavations into relevant virgin geological units	Local	Permanent	Low	Probable	Negative & Positive	Medium	Medium	Low
Alternative 2	NA	NA	NA	NA	NA	NA	NA	NA	NA
NO-GO	NA	NA	NA	NA	NA	NA	NA	NA	NA

6. Recommended and Required Mitigation Measures

Recommended mitigation measures:

- In order to preserve the aesthetic value of the relatively unspoilt pre-colonial cultural landscape in the immediate surroundings of the study area, it is recommended that the Alternative 2 power line option should be eliminated and that the Alternative 1 option is preferred.
- A 50m buffer (100m across) should be observed - by means of a fence - around the Stone Age quarry site identified at waypoint 20 to ensure that the site is avoided during the construction and operational phases. If the overhead power line must straddle or span / cross over the site, then the pylon structures and maintenance or access tracks should be kept outside the 50m buffer zone.
- Although no significant archaeological resources were identified in the dunes extending to the west from Brandewynkop, it is recommended that an archaeological micrositing study be undertaken - prior to the construction phase - at proposed pylon localities in this zone to ensure that no significant archaeological resources are negatively impacted. Alternatively, test excavations can be done with a mechanical excavator at proposed pylon localities, but such excavations must be conducted in the presence of a suitably accredited professional archaeologist. Where possible, pylons should be placed in previously disturbed areas such as existing vehicle tracks and the sand borrow pit at waypoint 3.
- Due to the presence of potentially fossiliferous geological units occurring in the northern portion along the alignment of Alternative 1, a Phase 1 pre-construction field assessment must be conducted in that portion of the affected area by a professional palaeontologist to identify areas of potential palaeontological sensitivity and to make recommendations in mitigation where necessary.

Required Mitigation Measures:

- In the event that vegetation clearing and earthmoving activities expose archaeological or palaeontological resources, then such activities must stop and SAHRA and/or ECPHRA must be notified immediately. These heritage resources are protected by the NHRA and may not be damaged or disturbed in any way without a permit from the relevant heritage authorities.
- If archaeological or palaeontological materials are exposed during vegetation clearing and/or earth moving activities, then they must be dealt with in accordance with the National Heritage Resources Act (No. 25 of 1999) and at the expense of the developer.
- In the event of exposing human remains older than 60 years during construction, the matter will fall into the domain of South African Heritage Resources Agency (Mrs Collette Scheermeyer) and will require a professional archaeologist to undertake mitigation if needed. Such work will also be at the cost of the developer.

7. References

ACO UCT. 2010. Environmental Impact Assessment for three proposed nuclear power station sites and associated infrastructure – Heritage Impact Assessment. Prepared for Arcus Gibb Engineering and Science, Johannesburg.

Almond, J.E. 2011a. Palaeontological Specialist Study: Desktop Assessment. Proposed Oyster Bay Wind Energy Facility near Humansdorp, Kouga Local Municipality, Eastern Cape.

Almond, J.E. 2011b. Palaeontological Specialist Study: Desktop Assessment. Proposed Tsitsikamma Community Wind Energy Facility near Humansdorp, Kouga Local Municipality, Eastern Cape.

Binneman, J. 2010. Archaeological Desktop Study for the Proposed Oyster Bay Wind Energy Facility, Local Kouga Municipality, Humansdorp District, Eastern Cape Province.

Binneman, J. 2011a. An Archaeological Desktop Study for the Construction of the Proposed Tsitsikamma Community Wind Energy Facility, Kouga Local Municipality, Humansdorp District, Eastern Cape Province.

Binneman, J. 2011b. A Phase 1 Archaeological Impact Assessment for the Proposed Oyster Bay Wind Energy Facility, Kouga Local Municipality, Humansdorp District, Eastern Cape Province.

Binneman, J. 2011c. A Phase 1 Archaeological Impact Assessment for the Proposed Tsitsikamma Community Wind Energy Facility, Kouga Local Municipality, Humansdorp District, Eastern Cape Province.

Binneman, J. 2012. A Phase 1 Archaeological Impact Assessment for the Proposed 132kV Power Line Linking the Tsitsikamma Community Wind Energy Facility to the Proposed Extension of the Dieprivier Substation, Kouga Local Municipality, Humansdorp District, Eastern Cape Province.

Deacon, H.J and V. B. Geleijnse, 1988 The Stratigraphy and Sedimentology of the Main Site Sequence, Klasies River, South Africa. The South African Archaeological Bulletin, Vol. 43, No. 147, pp. 5-14.

DEA&DP, 2005. Guidelines for Involving Specialists in EIA Processes.

De Klerk, W.J. 2010. Palaeontological Heritage Impact Assessment of the proposed wind farms in the coastal region of the Kouga Local Municipality near the villages of Oyster Bay and St Francis Bay. Assessment conducted in terms of Section 38 (8) of the National Heritage Resources Act (Act 25 of 1999). Prepared for: Arcus GIBB, Engineering & Science

Heritage Western Cape (HWC), 2007 (draft). Minimum Standards for Phase 1 Archaeological Impact Assessment (AIA) Reports.

Nilssen, P.J. 2010. St Francis Links - Golf Estate. Phase 2 Archaeological Mitigation. Preliminary report prepared for Mr. Frank Silberbauer, on behalf of Mr. Michael Simpson of WBHO, and Mrs Mary Leslie and Mrs Colette Scheermeyer of the South African Heritage Resources Agency (SAHRA permit No. 80/04/08/032/51)

SAHRA APM, 2007. Guidelines: Minimum Standards for Archaeological & Palaeontological Components of Impact Assessment Reports.

SAHRA APM, 2010. Review comments on the Environmental Impact Assessment for three proposed nuclear power station sites and associated infrastructure: Heritage Impact Assessment: Archaeological Component.

UNESCO, 2008. Operational guidelines for the implementation of the World Heritage Convention, 2008.

Van Ryneveld, K. 2010. Cultural Heritage Impact Assessment: Establishment of a Commercial Wind Farm, Kouga Local Municipality, Eastern Cape, South Africa. Prepared for Arcus Gibb Engineering and Science and the South African Heritage Resources Agency – SAHRA, APM Unit.

8. **Figures and Plates** (on following pages)

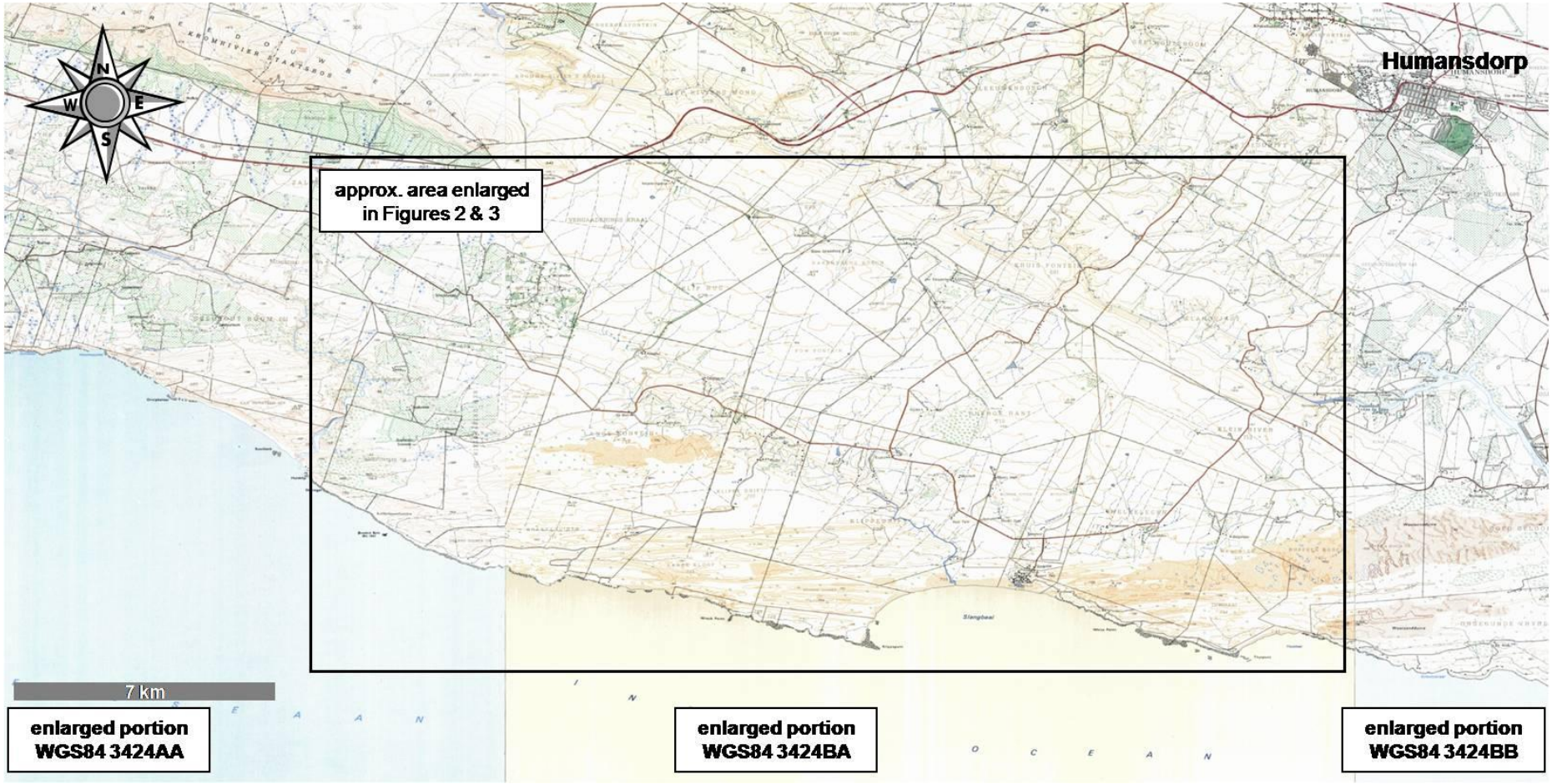

Figure 1. Location of larger study area relative to Humansdorp, Eastern Cape Province. (Map - The Chief Directorate, Surveys & Mapping, Mowbray).

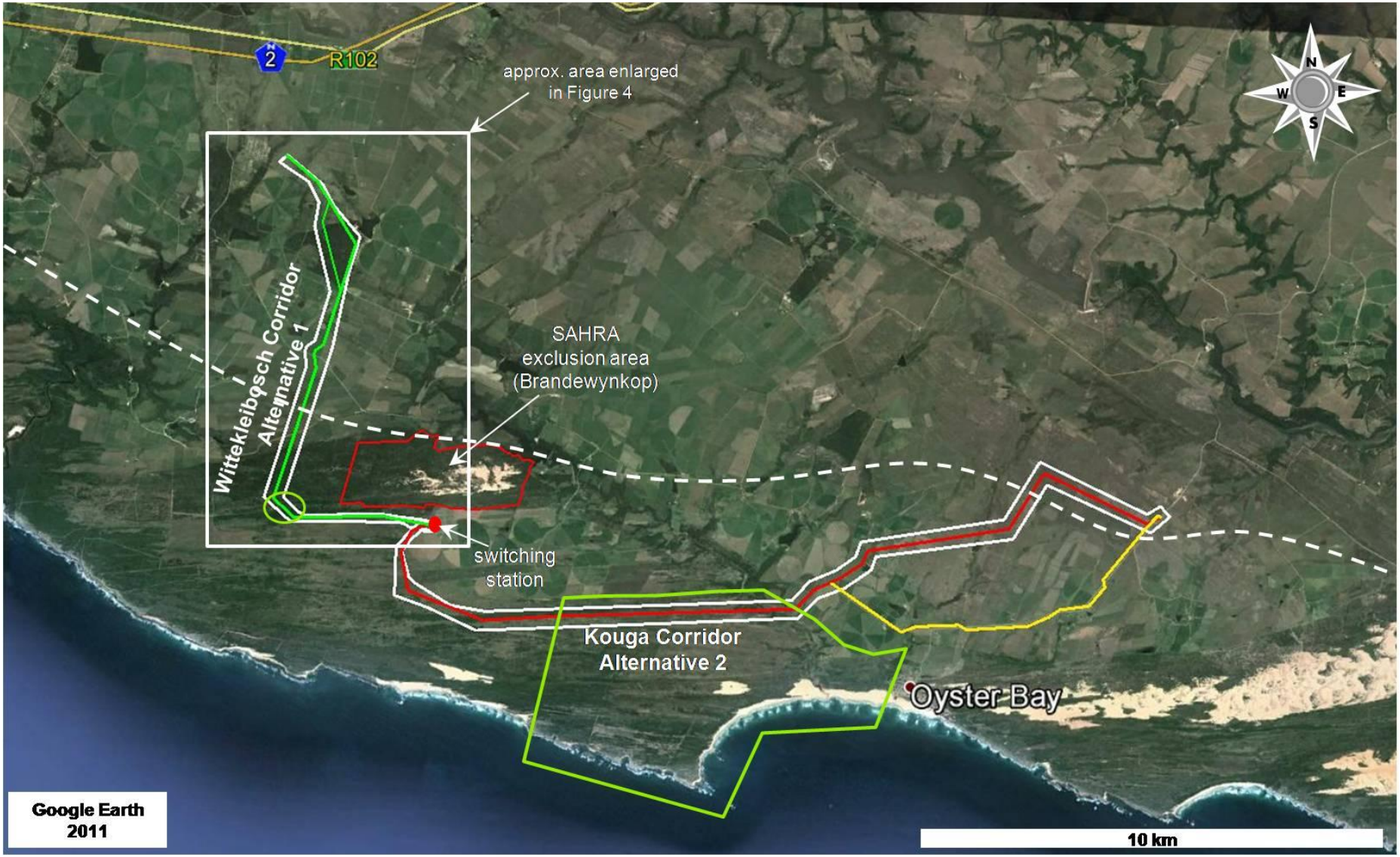

Figure 2. Area enlarged from Figure 1 showing proposed development alternatives, Brandewynkop, pre-colonial cultural landscape (south of dashed white line), relatively undeveloped stretch of pre-colonial cultural landscape (green polygon) and Alternative 2 mitigated option (yellow line). (development alternatives provided by Cape Environmental Assessment Practitioners (Pty) Ltd [Cape EAPrac]).

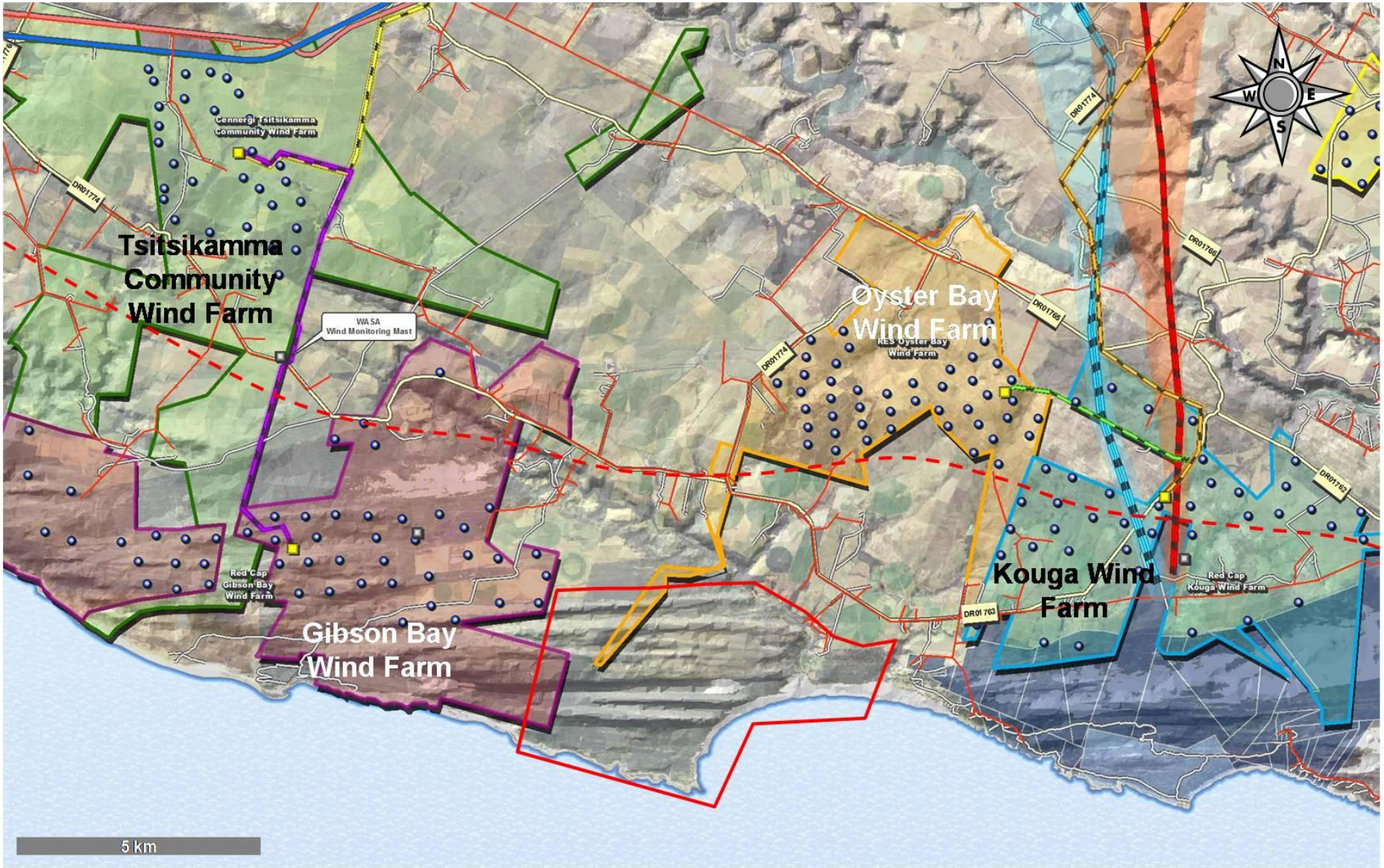

Figure 3. Area enlarged from Figure 1 showing nearby approved (bold white text) and construction phase (bold black text) wind farms, pre-colonial cultural landscape (south of dashed red line) and relatively unspoilt portion of pre-colonial cultural landscape (red polygon). (re-annotated from Figure provided by Cape EAPrac).

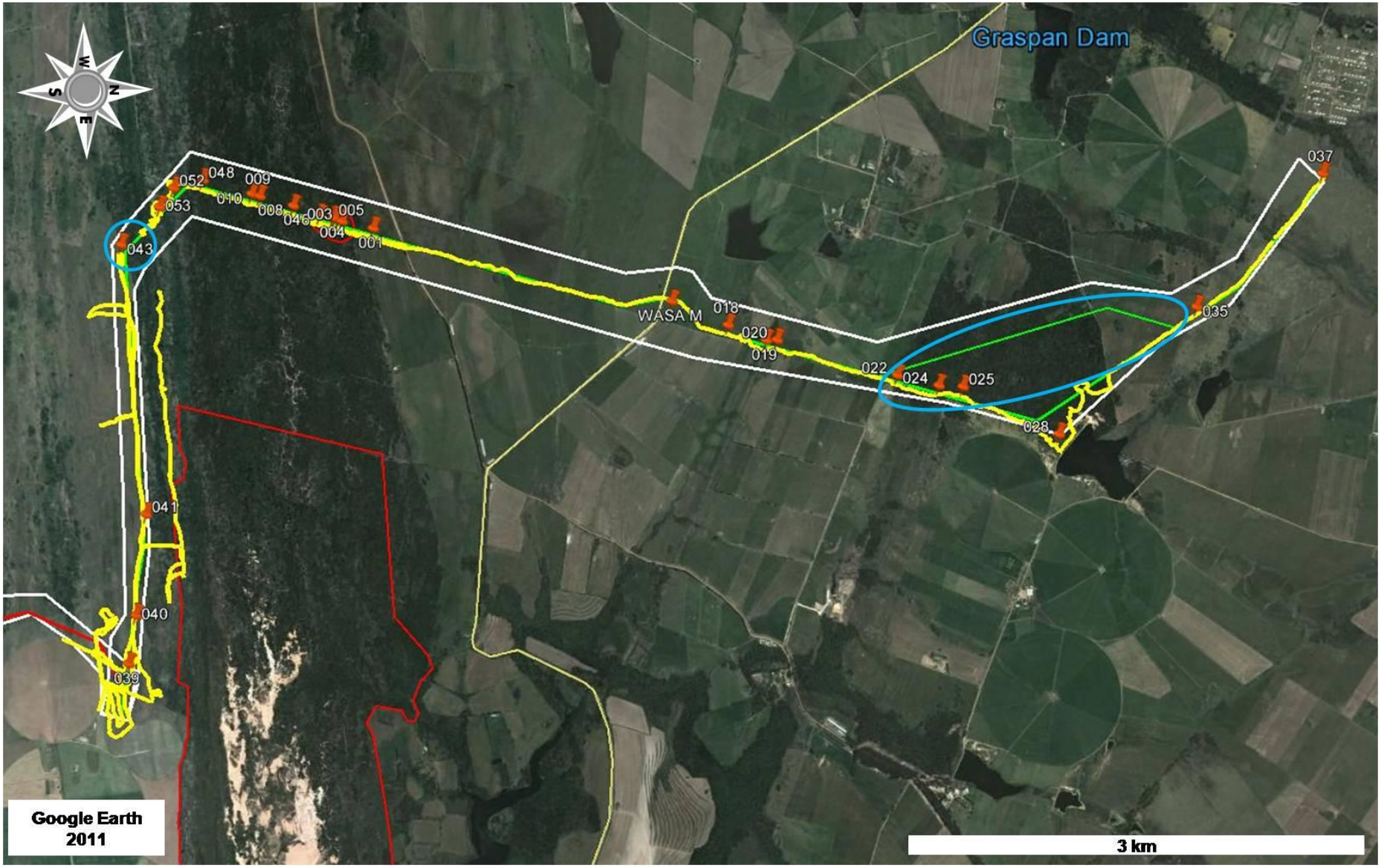

Figure 4. Area enlarged from Figure 2 showing Wittekleibosch Corridor (white polygon and green line), survey walk tracks (yellow), archaeological observations and photo locations (labelled orange markers), inaccessible areas (blue ellipses) and SAHRA exclusion area (red polygon).

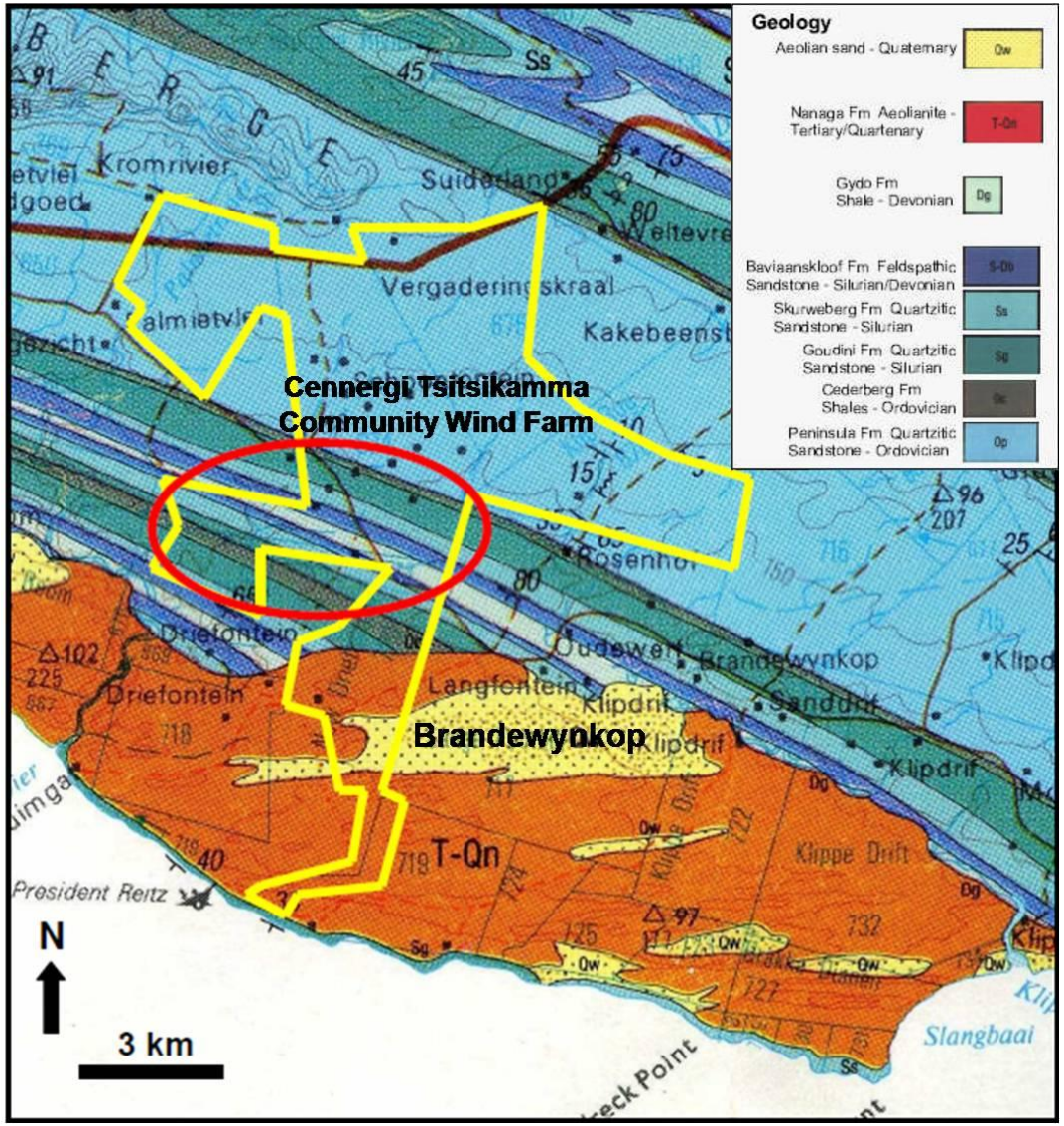

Figure 5. "Extract from 1:250 00 geology sheet 3324 Port Elizabeth (Council for Geoscience, Pretoria) showing *approximate* outline of the Tsitsikamma study area near Humansdorp (yellow polygons)" (re-annotated from Almond 2011b Fig. 4 pg 12 and Almond 2011a Fig. 4 pg 14). The red ellipse encloses the portion of the study area where palaeontologically most sensitive geological units occur. Note the location of the Brandewynkop exclusion area and that Alternative 1 will traverse potentially fossiliferous geological units.

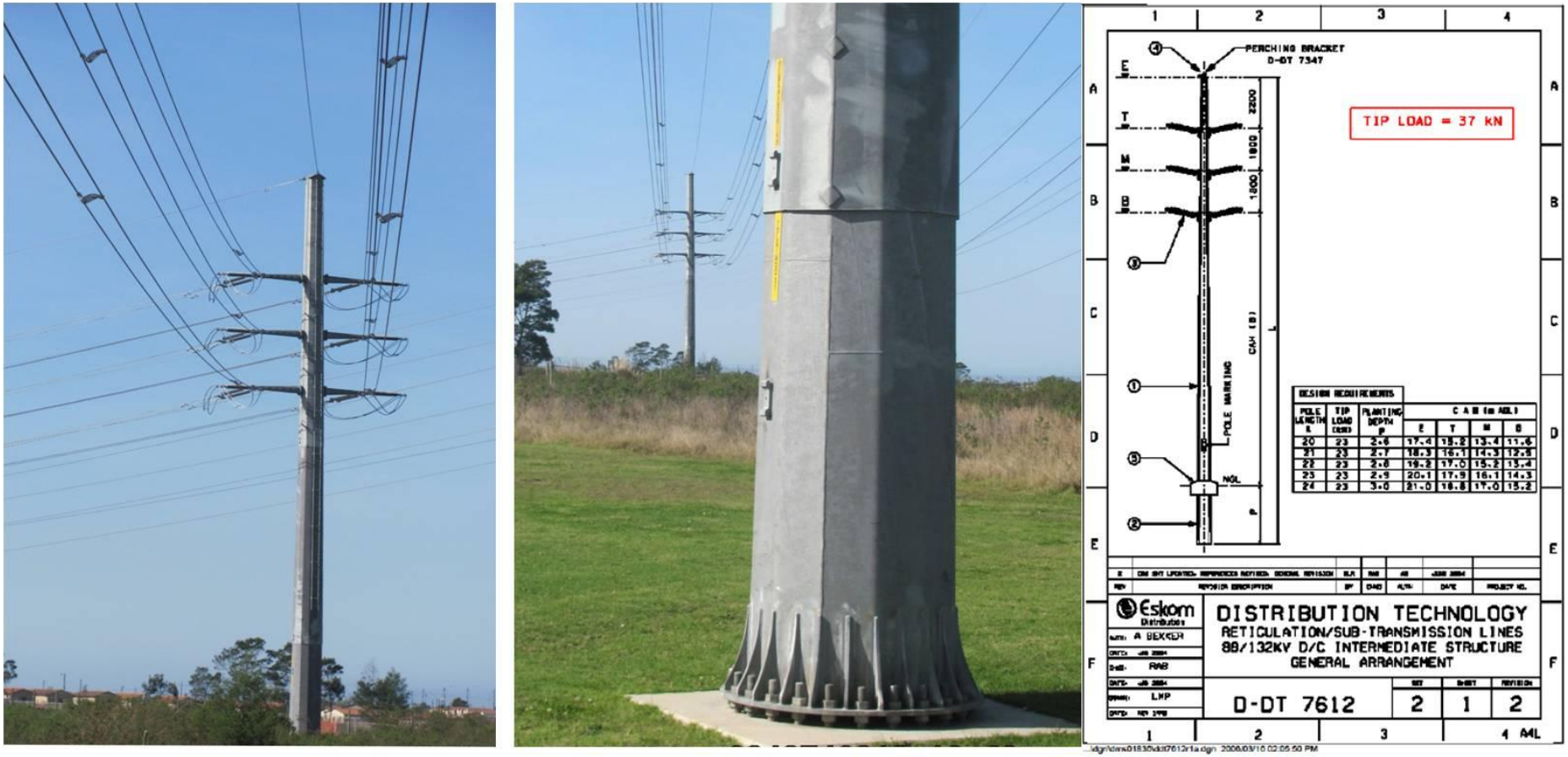

Plate 1. Example of 132kV monopole (double circuit version). Concrete foundation +/- 2.5mx2.5m, up to maximum depth of about 3m and maximum height of about 21m).

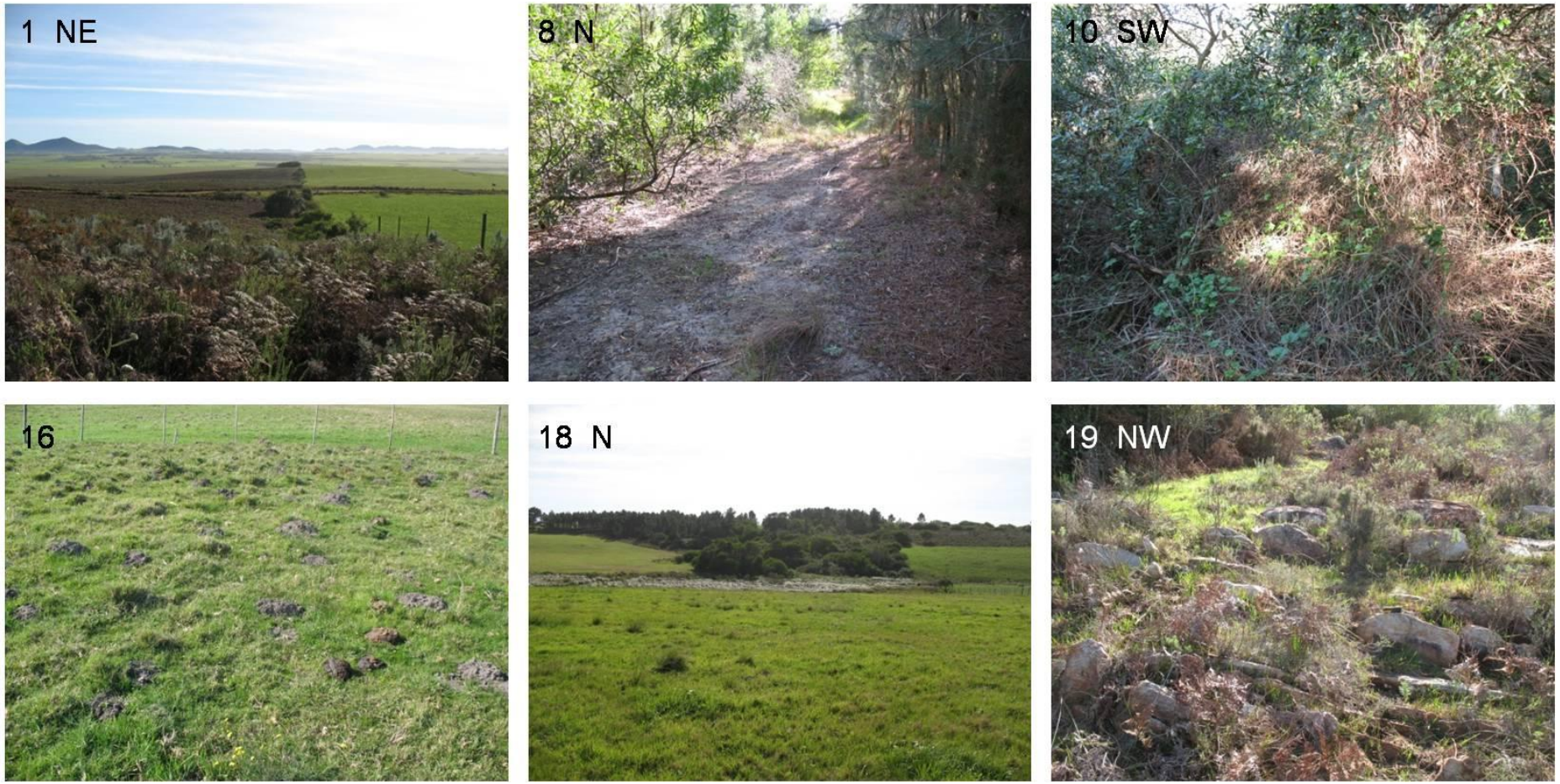

Plate 2. Examples of the affected environment showing topography, vegetation cover, exposed dune surfaces (8), mole heaps and a quartzite outcrop (19) (see Figure 4).

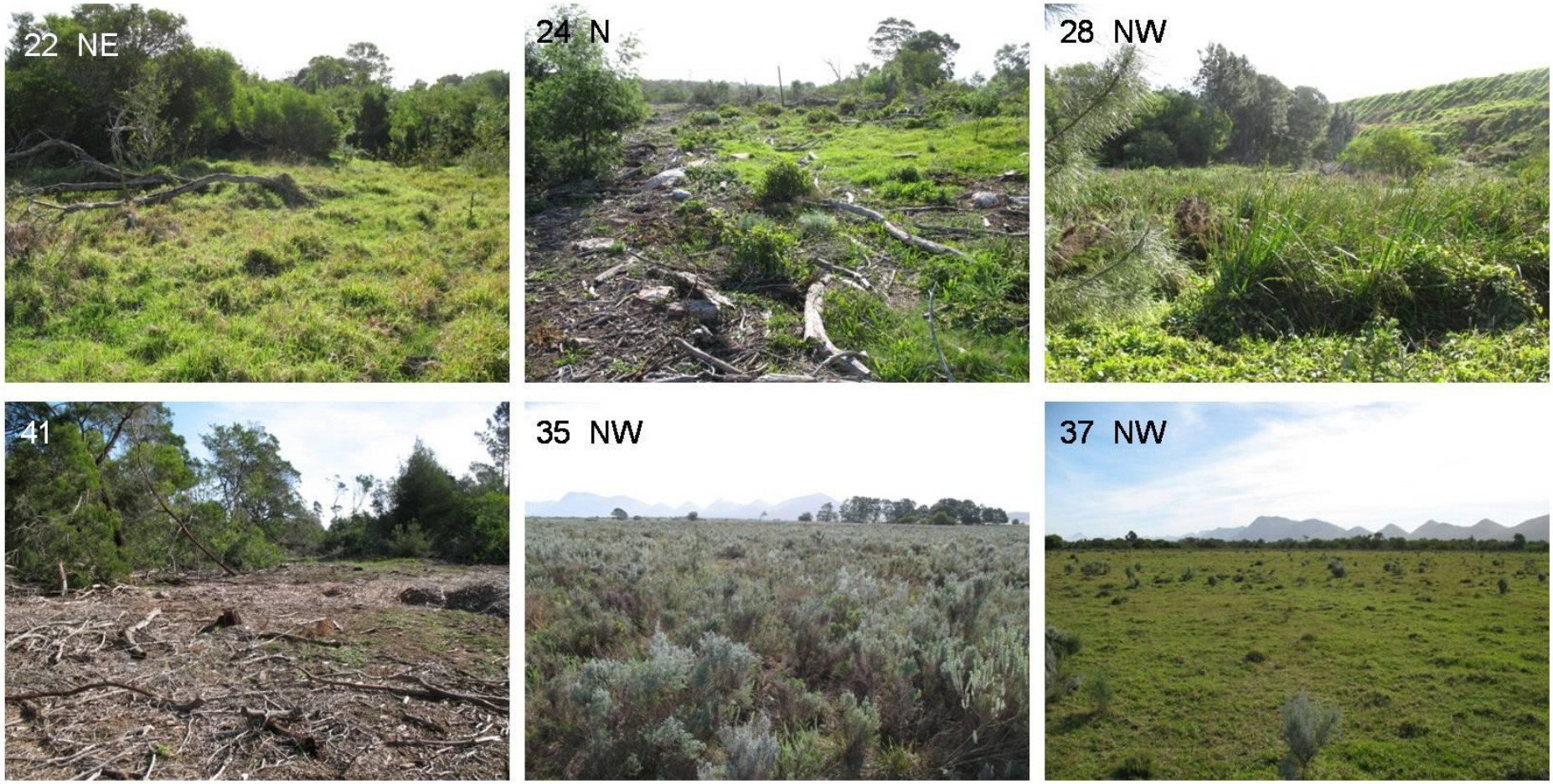

Plate 3. Examples of the affected environment showing topography, vegetation cover, exposed surfaces and quartzite outcrops (24), dam wall (28) and deforested area (41) (see Figure 4).

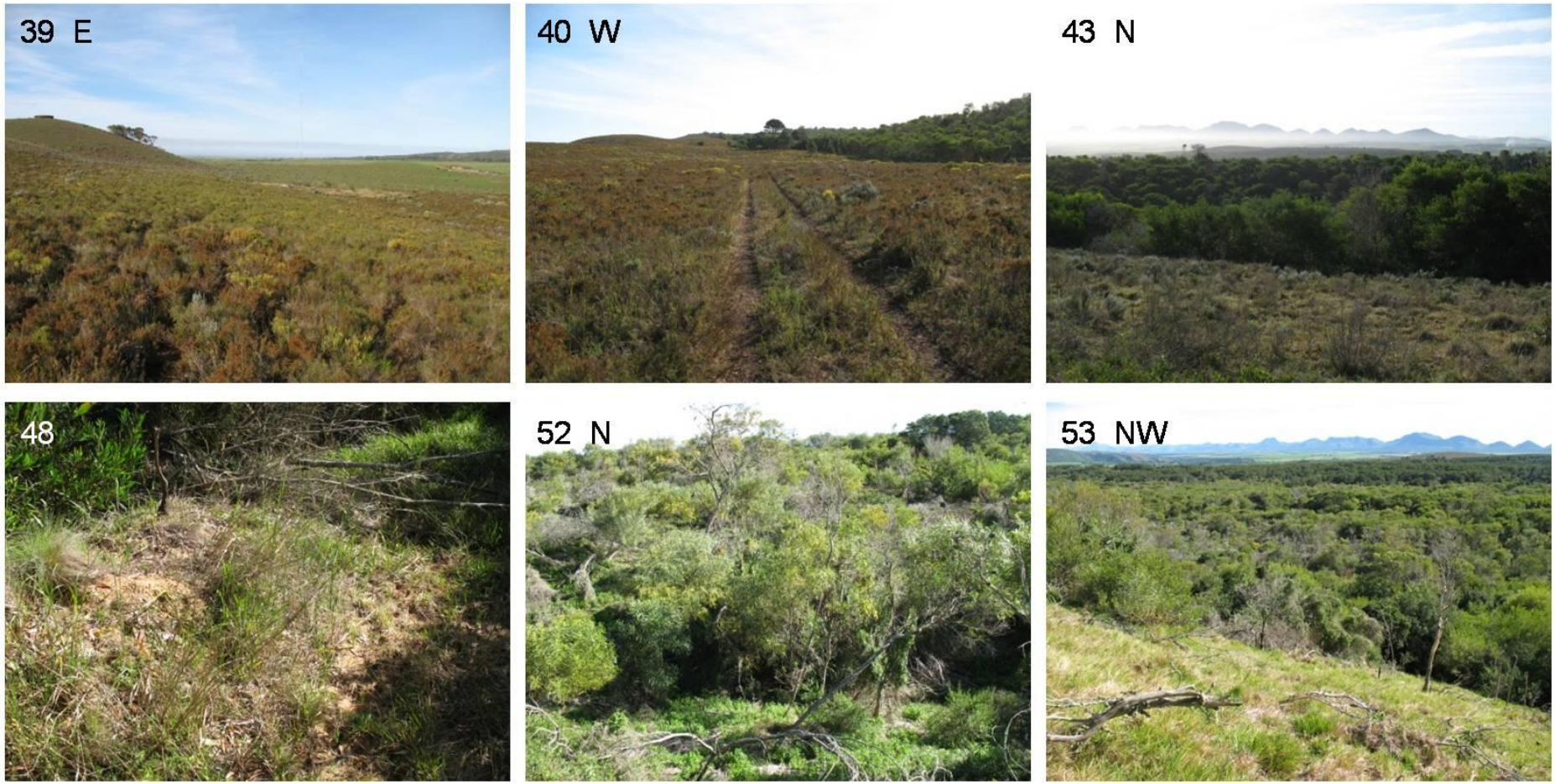

Plate 4 Examples of the affected environment showing topography, vegetation cover, exposed surfaces in vehicle track, exposed dune sands (48), impenetrable thicket and forest (43, 52, 53) (see Figure 4).

Plate 5 Examples of exposed surfaces and archaeological occurrences - mostly MSA specimens. Note younger (beige sands) and older dune (reddish sands) in top middle image. Note exposed older palaeosol or dune (reddish sands) in bottom right image (5). Scale in cm. (see Figure 4 and Table 2).

Plate 6 Examples of exposed surfaces and archaeological occurrences. Mix of MSA and ESA specimens and Fauresmith type hand axe or cleaver (5), hammer stone (46) and MSA disc or radial core (56). Scale in cm. (see Figure 4 and Table 2).

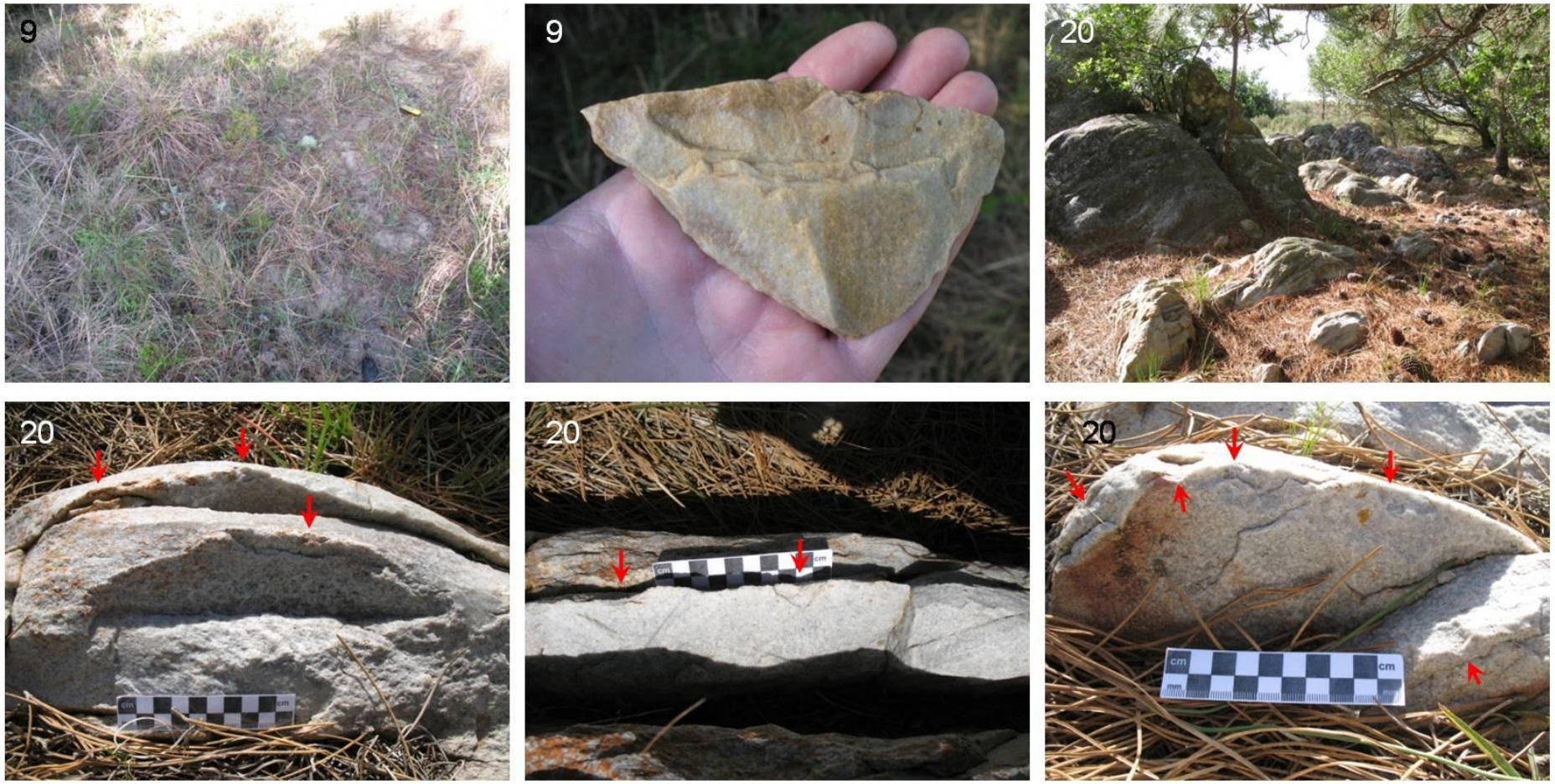

Plate 7 Example of exposed surface and isolated side struck flake (9). Stone Age quarry site at waypoint 20 with obvious flake scars indicated with red arrows. Scale in cm. (see Figure 4 and Table 2).

Plate 8 Example of exposed surface in deforested and disturbed area with archaeological occurrences consisting of mixed MSA, LSA and probable ESA implements (see Figure 4 and Table 2).

Appendix A

Legislation regarding the general protection of heritage resources taken from the National Heritage Resources Act (Act 25 of 1999)

Provisional protection

29. (1) SAHRA, or a provincial heritage resources authority, may, subject to subsection (4), by notice in the Gazette or the Provincial Gazette, as the case may be—

(a) provisionally protect for a maximum period of two years any—

(i) protected area;

(ii) heritage resource, the conservation of which it considers to be threatened and which threat it believes can be alleviated by negotiation and consultation; or

(iii) heritage resource, the protection of which SAHRA or the provincial heritage resources authority wishes to investigate in terms of this Act; and

(b) withdraw any notice published under paragraph (a).

(2) A local authority may, subject to subsection (4), by notice in the Provincial Gazette—

(a) provisionally protect for a maximum period of three months any place which it considers to be conservation-worthy, the conservation of which the local authority considers to be threatened and which threat it believes can be alleviated by negotiation and consultation; and

(b) withdraw any notice published under paragraph (a): Provided that it notifies the provincial heritage resources authority within seven days of such provisional protection.

(3) A provincial heritage resources authority may, by notice in the Provincial Gazette, revoke a provisional protection by a local authority under subsection (2) or provisionally protect a place concerned in accordance with subsection (1).

(4) A heritage resources authority or a local authority may not provisionally protect any heritage resource unless it has notified the owner of the resource in writing of the proposed provisional protection.

(5) A heritage resource shall be deemed to be provisionally protected for 30 days from the date of service of a notice under subsection (4) or until the notice is withdrawn or the resource is provisionally protected by notice in the Gazette or the Provincial Gazette, whichever is the shorter period.

(6) A heritage authority or a local authority may at any time withdraw a notice which it has issued under subsection (4).

(7) SAHRA shall inform the relevant provincial heritage authority and local authority within 30 days of the publication or withdrawal of a notice under subsection (1).

(8) A provincial heritage resources authority shall inform the relevant local authority within 30 days of the publication or withdrawal of a notice under subsection (1).

(9) A local authority shall inform the provincial heritage authority of the withdrawal of a notice under subsection (2)(b).

(10) No person may damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of a provisionally protected place or object without a permit issued by a heritage resources authority or local authority responsible for the provisional protection.

Legislation relevant to Heritage Areas taken from the National Heritage Resources Act (Act 25 of 1999)

Heritage areas

31. (1) A planning authority must at the time of revision of a town or regional planning scheme, or the compilation or revision of a spatial plan, or at the initiative of the provincial heritage resources authority where in the opinion of the provincial heritage resources authority the need exists, investigate the need for the designation of heritage areas to protect any place of environmental or cultural interest.

(2) Where the provincial heritage resources authority is of the opinion that the need exists to protect a place of environmental or cultural interest as a heritage area, it may request a planning authority to investigate its designation in accordance with proposals submitted by the provincial heritage resources authority with its request. The planning authority must inform the provincial heritage resources authority within 60 days of receipt of such a request whether it is willing or able to comply with the request.

(3) Where the planning authority informs the provincial heritage resources authority that it is willing and able, the provincial heritage resources authority must assist the planning authority to investigate the designation of the place as a heritage area.

(4) Where the planning authority does not so inform the provincial heritage resources authority, or informs the provincial heritage resources authority that it is not so willing and able, the provincial heritage resources authority may investigate the designation of the place as a heritage area and, with the approval of the MEC, designate such place to be a heritage area by notice in the Provincial Gazette.

(5) A local authority may, by notice in the Provincial Gazette, designate any area or land to be a heritage area on the grounds of its environmental or cultural interest or the presence of heritage resources, provided that prior to such designation it shall consult—

(a) the provincial heritage resources authority; and

(b) owners of property in the area and any affected community, regarding inter alia the provisions to be established under subsection (7) for the protection of the area.

(6) The MEC may, after consultation with the MEC responsible for local government, publish regulations setting out the process of consultation referred to in subsection (5).

(7) A local authority must provide for the protection of a heritage area through the provisions of its planning scheme or by-laws under this Act, provided that any such protective provisions shall be jointly approved by the provincial heritage resources authority, the provincial planning authority and the local authority, and provided further that—

(a) the special consent of the local authority shall be required for any alteration or development affecting a heritage area;

(b) in assessing an application under paragraph (a) the local authority must consider the significance of the area and how this could be affected by the proposed alteration or development; and

(c) in the event of any alteration or development being undertaken in a heritage area without the consent of the local authority, it shall have the power to require the owner to stop such work instantly and restore the site to its previous condition within a specified period. If the owner fails to comply with the requirements of the local authority, the local authority shall have the right to carry out such restoration work itself and recover the cost thereof from the owner.

(8) A local authority may erect signage indicating its status at or near a heritage area.

(9) Particular places within a heritage area may, in addition to the general provisions governing the area, be afforded further protection in terms of this Act or other heritage legislation.

Legislation relevant to archaeology and palaeontology taken from the National Heritage Resources Act (Act 25 of 1999)

Archaeology, palaeontology and meteorites

35. (1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.

(2) Subject to the provisions of subsection (8)(a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority—

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

(5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—

(a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;

(b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;

(c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and

(d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

(6) The responsible heritage resources authority may, after consultation with the owner of the land on which an archaeological or palaeontological site or a meteorite is situated, serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.

(7) (a) Within a period of two years from the commencement of this Act, any person in possession of any archaeological or palaeontological material or object or any meteorite which was acquired other than in terms of a permit issued in terms of this Act, equivalent provincial legislation or the National Monuments Act, 1969 (Act No. 28 of 1969), must lodge with the responsible heritage resources authority lists of such objects and other information prescribed by that authority. Any such object which is not listed within the prescribed period shall be deemed to have been recovered after the date on which this Act came into effect.

(b) Paragraph (a) does not apply to any public museum or university.

(c) The responsible authority may at its discretion, by notice in the Gazette or the Provincial Gazette, as the case may be, exempt any institution from the requirements of paragraph (a) subject to such conditions as may be specified in the notice, and may by similar notice withdraw or amend such exemption.

(8) An object or collection listed under subsection (7)—

(a) remains in the ownership of the possessor for the duration of his or her lifetime, and SAHRA must be notified who the successor is; and

(b) must be regularly monitored in accordance with regulations by the responsible heritage authority.

Legislation relevant to the proposed activity under consideration taken from the National Heritage Resources Act (Act 25 of 1999)

Heritage resources management

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

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

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

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

(i) exceeding 5 000 m2 in extent; or

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

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

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

(d) the re-zoning of a site exceeding 10 000 m2 in extent; or

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