



**ADDENDUM REPORT TO THE ORIGINAL APPROVED HERITAGE IMPACT
ASSESSMENT REPORT**

**Proposed construction of a 132kV transmission line from the Longyuan
Mulilo De Aar Maanhaarberg Wind Energy Facility near De Aar, Northern
Cape – DATED 10 APRIL 2014**

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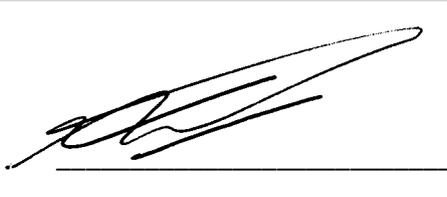
Declaration of Independence

PGS Heritage (Pty) Ltd an appointed Heritage Specialist for Holland & Associates Environmental Consultants compiled this report. The views stipulated in this report are purely objective and no other interests are displayed during the decision making processes discussed in the Heritage Impact Assessment Process

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A handwritten signature in black ink, appearing to read 'Wouter Fourie', is written over a horizontal line. The signature is contained within a white rectangular box.

Report Title	<i>ADDENDUM REPORT TO THE ORIGINAL APPROVED HERITAGE IMPACT ASSESSMENT REPORT TITLED: Proposed construction of a 132kV transmission line from the Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility near De Aar, Northern Cape– Heritage Impact Report – Dated 10 April 2014</i>		
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Author	W Fourie		Project Coordinator/Heritage Specialist
Reviewed	N Holland		Holland and Associates

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by Holland & Associates Environmental Consultants to undertake an additional study as part of the Addendum to the approved Heritage Impact Assessment (HIA) that formed part of approved Basic Environmental Assessment report (BAR) for the construction of a 132kV transmission line from the Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility to the Eskom Hydra Substation near De Aar, Northern Cape.

Archaeological finds

The assessment of the area at the Hydra substation where the final entrance to the substation by the power line is to be determined yielded 2 archaeological sites (**LMM/WEF-4** and **LMM/WEF-6**) of medium to high heritage significance. Both the sites are associated with herders from the Later Stone Age (LSA) as shown by the lithics, decorated pottery and structures present on site.

Two additional archaeological sites were identified in the assessed area of the proposed amended Option. These have much higher heritage significance ratings as the other sites identified along the whole of the alignment starting at Maanhaarberg. Site **LM/WEF-5** falls directly in the corridor of the proposed amended Option and will require the implementation of the required mitigation measures during construction. This single site is of such heritage significance that it raises the cumulative impact on archaeological resources from Low to Medium.

Mitigation for these two sites must include as a minimum:

- The placement of the pylons must be done in such a way as to avoid the structure;
- The site needs to be demarcated as a no-go area with a 20 meter buffer;
- The site must be monitored for any damage during construction.
- If it is impossible to avoid the site, extensive documentation and excavation of the site will need to be done before construction.

The HIA has focused on a 500 meter assessment corridor and the archaeological component on the centre alignment of the 500 meter corridor as well as switching station positions. Because of subsurface and localised nature of archaeological remains, any deviation or changes within

the corridor to the initial layout alignment or switching station positions will require an archaeological walk-down of the new alignment after pylons placement positions have been confirmed to identify any possible archaeological and heritage structures and sites before construction commences.

Heritage Structures

The fieldwork has identified 1 structure (**LMM/WEF-4**) that is most probably older than 60 years. These structures are protected under Section 34 of the national Heritage Resources Act and will require a permit from the Provincial Heritage Authority in the Northern Cape, Ngwao-Boswa Jwa Kapa Bokone, for any alterations to the structure.

The proposed amended Option has a negative medium impact on the additional heritage structures identified however the cumulative impact on heritage structures will remain the same as with the Authorised alignment with the implementation of the proposed mitigation measures.

It is recommended that:

- The placement of the pylons must be done in such a way as to avoid the structure;
- The sites must be demarcated with a fence prior to construction and a buffer of at least 10 meters kept, during construction.

Cultural Landscape

Views in the region are extensive and unobstructed for kilometres. The Kasarm Mountains in the western section of the alignment makes way for a large open landscape with low vegetation towards De Aar. The open landscape is however already broken with numerous 132kV and 400kV lines coming from the west and south through the study area at the Hydra Substation at De Aar.

It was found that the cultural landscape around the Hydra substation has been desensitized over the years with the additions of numerous power and transmission lines meeting at the substation. The new proposed amended option will not make a significant change to the cultural landscape and the impact is seen as low.

Palaeontology

There is a high possibility that fossils could be encountered during excavation of the Abramskraal Formation. These fossil finds would be of international significance. The damage and/or loss of these fossils due to inadequate mitigation would be a highly negative palaeontological impact. The exposure and subsequent reporting of fossils (that would otherwise have remained undiscovered) to a qualified palaeontologist for excavation will be a beneficial palaeontological impact.

The proposed amended Option traverses the same palaeontological substrata as the Authorised alignment and the possible impact on the palaeontological resources is rated the same being High Negative. However, with the implementation of the proposed management measures, this impact can be converted to a Medium positive impact, with the possible exposure of new palaeontological finds and the scientific curation of such finds.

The recommendations as set out in the original HIA stands for this addendum report:

- A Palaeontologist should be appointed as part of the Environmental Construction Team for preferably all identified palaeontological sensitive areas but definitely for the identified high sensitive areas.
- If required a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist.
- The Palaeontologist accompanying the surveyor and foundation teams during the pylon construction phase should advise on pylon positions. If possible, pylons located within potential fossil bearing areas should be moved. If not possible, any fossils found should be rescued from the construction footprint.
- Compile a Phase 2 report to the Heritage Authority responsible after palaeontological construction inputs.

All other recommendations as made in the approved HIA of 1 April 2014 still stand, with the additional recommendations made in this report.

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1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by Holland & Associates Environmental Consultants to undertake an additional study as part of the Addendum to the approved Heritage Impact Assessment (HIA) that formed part of approved Basic Environmental Assessment report (BAR) of the construction of a 132kV transmission line from the Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility to the Eskom Hydra Substation near De Aar, Northern Cape.

1.1 Scope of the Study

The aim of the study is to identify possible heritage sites and finds that occur in the proposed new alignment as described in Section 2 of this report, to determine the implications, if any, of the proposed amendments in terms of potential heritage impacts. The Addendum report aims to inform the report on the Application for Amendment of the Environmental Authorisation and update of the Environmental Management Programme (EMP), if required, to assist the developer in managing the identified heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

PGS Heritage (Pty) Ltd (PGS) compiled this Heritage Impact Addendum Report. The personnel at PGS has a combined experience of nearly 70 years in the heritage consulting industry. PGS will only undertake heritage assessment work where their personnel have the relevant expertise and experience to undertake that work competently.

Wouter Fourie, the Principal Heritage Specialist, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners – Western Cape (APHP).

1.3 Assumptions and Limitations

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the

subterranean nature of some archaeological sites. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must be contacted immediately.

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

The fieldwork, for this addendum report, focussed on the final approach area at the Hydra substation comprising of approximately 120 hectares which was surveyed to address any possible realignments at the substation. Because of subsurface and localised nature of archaeological remains, any deviation or changes within the corridor to the initial layout alignment will require an archaeological walkdown of the new alignment after pylon placement positions have been finalised to identify any possible archaeological and heritage structures and sites before construction commence.

Table 1 - Terminology

ABBREVIATIONS	DESCRIPTION
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age

MIA	Middle Iron Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
ROD	Record of Decision
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

The following definitions are taken from the National Heritage Resources Act, No 25 of 1999 (Section 2. Definitions):

Archaeological resources

This includes:

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

Cultural significance

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

Development

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

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

Earlier Stone Age

The archaeology of the Stone Age between 400 000 and 2500 000 years ago.

Heritage

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

Heritage resources

This means any place or object of cultural significance

Holocene

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

Later Stone Age

The archaeology of the last 30 000 years, associated with fully modern people, or the 1800's, associated with iron working and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age between 30-300 000 years ago, associated with early modern humans.

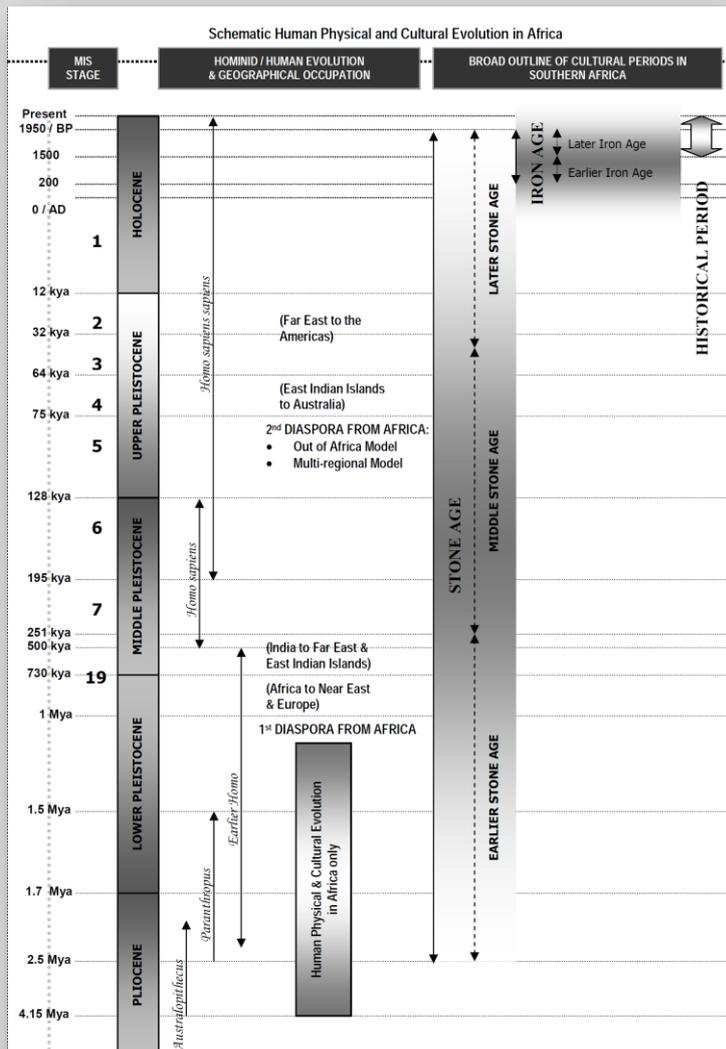


Figure 1 – Human and Cultural Time line in Africa (Morris, 2008)

2 BACKGROUND

The Basic Assessment process for the proposed project was completed by Aurecon South Africa (Pty) Ltd in June 2014 and the Department of Environmental Affairs (DEA) granted Environmental Authorisation (EA) for the proposed project on 11 August 2014. The Basic Assessment listed activities for which environmental authorisation has been granted includes Items 10, 11 and 18 of GN R.544, and Item 14 of GN R.546 published in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) Environmental Impact Assessment Regulations (2010). The EA was amended on 2 December 2014 by DEA to correct an error made by their Department in the original EA.

The start, middle and end coordinates and properties through which the transmission line corridor (500m wide) should traverse were specified in the EA. Figure 2 illustrates the authorised transmission line corridor (blue line) focusing on the portion of the line within the property Portion 3 of the Farm Wagt en Bittje No. 5 and registered in the name of Eskom Holdings SOC Limited. As is evident in the map, the authorised transmission line (blue) crosses a number of existing Eskom lines (green) before connecting to the Hydra substation (on Farm Hydra No. 144).



Figure 2 – Authorised transmission line alignment within the property Portion 3 of the Farm Wagt en Bittje No. 5 and registered in the name of Eskom Holdings SOC Limited

3 MOTIVATION FOR APPLICATION FOR AMENDMENT OF THE EA (PROVIDED BY THE APPLICANT) AND PROPOSED AMENDMENTS

3.1 Proposed re-alignment of a section of the transmission line near the Hydra Substation

According to Longyuan Mulilo De Aar Wind Power (Pty) Ltd (hereafter referred to as the Applicant), Eskom have requested that the crossing of the existing Eskom lines (indicated by the green lines in Figure 2) by

the proposed transmission line (indicated by the blue line in Figure 2) occurs further away from Hydra substation.

In light of the above, the Applicant proposes to amend (re-align) the eastern extent of the transmission line alignment near to the Hydra Substation, i.e. from co-ordinate 30°43'15.76"S 24°4'28.13"E until it reaches its entering point on the eastern side of the Hydra Substation at the now proposed co-ordinate 30°42'56.995"S 24°05' 36.266"E. The proposed amendment route is further away from Hydra Substation than the authorised corridor (as requested by Eskom), but still within Eskom Hydra Substation Land (Portion 3 of the Farm Wagt en Bittje No. 5). The proposed re-aligned section is approximately 3km in length (whilst the authorised alignment from the abovementioned co-ordinate to the Hydra substation was approximately 2.5km in length). Figure 3 illustrates the proposed route, which Eskom has requested (red), which, together with the assessment corridor, forms the subject of the proposed application for amendment of the EA.

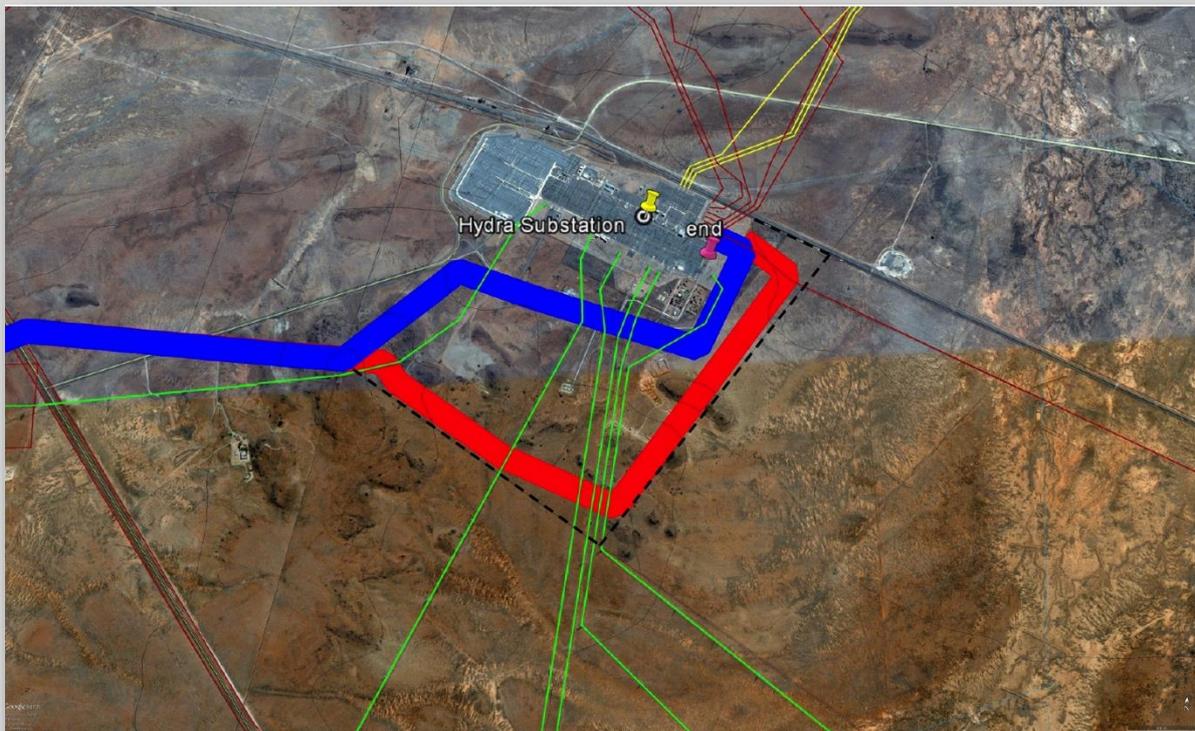


Figure 3 - Proposed route, which Eskom has requested (red). The area between the blue line and property boundary (black dashed line) is the assessment "corridor" which forms the subject of this application for amendment of the EA, with the red line being the likely amended route of the transmission line. (A "corridor" is being assessed and applied for to accommodate further possible requests from Eskom to shift the line again within the subject area, before construction commences).

Note: The Applicant has requested that the entire area between the property boundary fence (indicated by the black dashed line) and blue line indicated in Figure 3 be assessed by the specialists, to accommodate further possible requests from Eskom to shift the line again within the subject area, before construction commences. It is evident from the property boundaries that this amendment is within the same property being Portion 3 of the Farm Wagt en Bittje No. 5. However, the proposed re-alignment falls outside of the 500m-assessment corridor (distance between the two lines varies from 0m to 500m), but within a property which was assessed during the Basic Assessment and which has extensive Eskom infrastructure.

3.2 Amendments to monopole footprints

The Applicant has refined the potential development footprints associated with the monopoles of the transmission line subsequent to the Basic Assessment Process. In this regard, the BAR and specialists originally assessed a footprint ranging from 0.6 m x 0.6 m (0.36m²) to 1.5 m x 1.5 m (2.25m²) associated with each monopole, with the larger footprint associated with the guyed suspension and angle strain pole used as bend/strain structures. The Applicant wishes to amend the project description to update the potential footprints associated with each monopole, i.e. each having a footprint ranging from 0.49m² to 3.61m².

In terms of the motivation for the proposed amendment of the monopole footprints, the Applicant noted that each structure installed along the 132kV transmission line has various forces associated with it depending on the location of the structure on the line. The forces are in the form of the conductor weight, depending on the span length associated with the structure, as well as other forces such as the angle of the conductor and the wind loading. These forces determine the structure type as well as the foundation footprint size, in order to counter act those forces.

The other factor, which determines the foundation size and strength, is the soil type at the position of the structure. For these reasons the foundation footprint and dimensions can vary significantly. For example, if a foundation is placed in sandy and loose soil and the angle of the line is between 61-90 degrees the foundation dimensions will be 1.9m x 1.9m (3.61m²) with an excavation volume of approximately 17.496 m³. On the other hand if the structure, which is not heavily, loaded the foundation dimension can be 0.7m x 0.7m (0.49m²) with an excavation volume of approximately 1.27m³. In light of the above, the design engineers have indicated that the monopole footprints included in the BAR and EA (i.e. 0.6m x 0.6m to 1.5m x 1.5m per monopole) need to be refined to include a broader range of potential footprints for each

monopole, i.e. ranging from 0.49m² to 3.61m², to adequately accommodate the various forces and soil types at the position of the structures during the construction phase.

Furthermore, given that the proposed re-alignment will result in a longer total length of the transmission line, the Applicant is applying for the length of the transmission line to be amended in the EA from approximately 17.5km/ 18km to 18.4km), and to include the additional monopoles required as a result of the proposed re-alignment (i.e. the EA specified that there would be 82 monopoles, however the Applicant wishes to amend this to “80 – 95 monopoles”).

3.3 Heritage Assessment Methodology

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

The Heritage Impact Assessment - Addendum (HIA) report was compiled by PGS Heritage (PGS) for the proposed project to assess the heritage resources found on site. This addendum will contain the applicable maps, tables and figures as stipulated in the NHRA (no 25 of 1999), the National Environmental Management Act (NEMA) (no 107 of 1998). The HIA process consisted of three steps:

- Step I – Literature Review: The background information to the field survey leaned greatly on the initial Heritage Impact Assessment Report completed by PGS Heritage in 2014. No additional literature review has been included in the addendum.
- Step II – Physical Survey: A physical survey was conducted on foot through the proposed project area by a qualified archaeologist, aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.
- Step III – The final step involved the recording and documentation of relevant heritage resources, as well as the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and constructive recommendations

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

- **site integrity** (i.e. primary vs. secondary context),
- **amount of deposit, range of features** (e.g., stonewalling, stone tools and enclosures),
 - Density of scatter (dispersed scatter)

- Low - <10/50m²
- Medium - 10-50/50m²
- High - >50/50m²
- **uniqueness** and
- **potential** to answer present research questions.

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

A - No further action necessary;

B - Mapping of the site and controlled sampling required;

C - No-go or mitigation

D - Preserve site, or extensive data collection and mapping of the site; and

E - Preserve site

3.3.1 Site Significance

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

Table 2: Site significance classification standards as prescribed by SAHRA

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

3.4 Methodology for Impact Assessment

3.4.1 Impact Rating

VERY HIGH

These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or social) environment, and usually result in severe or very severe effects, or beneficial or very beneficial effects.

Example: The loss of a species would be viewed by informed society as being of VERY HIGH significance.

Example: The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with a VERY HIGH significance.

HIGH

These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and usually long term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light.

Example: The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated.

Example: The change to soil conditions will impact the natural system, and the impact on affected parties (in this case people growing crops on the soil) would be HIGH.

MODERATE

These impacts will usually result in medium- to long-term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by society as constituting a fairly important and usually medium term change to the (natural and/or social) environment. These impacts are real but not substantial.

Example: The loss of a sparse, open vegetation type of low diversity may be regarded as

MODERATELY significant.

Example: The provision of a clinic in a rural area would result in a benefit of MODERATE significance.

LOW

These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by the public and/or the specialist as constituting a fairly unimportant and usually short term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect.

Example: The temporary change in the water table of a wetland habitat, as these systems is adapted to fluctuating water levels.

Example: The increased earning potential of people employed as a result of a development would only result in benefits of LOW significance to people who live some distance away.

NO SIGNIFICANCE

There are no primary or secondary effects at all that are important to scientists or the public.

Example: A change to the geology of a particular formation may be regarded as severe from a geological perspective, but is of NO significance in the overall context.

3.4.2 Certainty

DEFINITE: More than 90% sure of a particular fact. Substantial supportive data exists to verify the assessment.

PROBABLE: Over 70% certainty of a particular fact, or of the likelihood of an impact occurring.

POSSIBLE: Only over 40% certainty of a particular fact or of the likelihood of an impact occurring.

UNSURE: Less than 40% certainty of a particular fact or likelihood of an impact occurring.

3.4.3 Duration

SHORT TERM: 0 to 5 years

MEDIUM: 6 to 20 years

LONG TERM: more than 20 years

PERMANENT: site will be demolished or is already demolished

An example of a ratings table:

Impact Grading

Impact	Impact Significance	Heritage Significance	Certainty	Duration	Mitigation
Negative	Moderate	Grade GP.C	Possible	Permanent	C

4 SITE EVALUATION

Due to the nature of cultural remains, with the majority of artefacts occurring below surface, a controlled-exclusive surface survey of the new proposed alignment at the Hydra substation as well the area as described in Section 3.1 of this addendum report. An experienced field archaeologist from PGS completed the survey on foot over the extent of the area.

The following archaeological sites were identified during the fieldwork:

4.1 Additional alignment changes – August 2015

4.1.1 Site LMM/WEF-3

GPS: E24.09183 S30.72154

Another low-density scatter of lithics was identified here (\pm 2-5 artefacts in 10m x10m). The site was situated at the foot of a hill just east of the De Aar shooting range. The stone tools consisted mostly of Later Stone Age (LSA) blades, scrapers (mostly lideanite)

Site size: Approximately 50m x 10m.



Figure 4 – Lithic scatter on site

Mitigation:

- The placement of the pylons must be done in such a way as to avoid the site;
- The site (referred to as Site **LMM/WEF-3**) must be demarcated with a fence prior to construction and a buffer of at least 10 meters kept, during construction, if the proposed alignment will be closer than 50 meters from the site.

4.1.1 Site LMM/WEF-4

GPS: E24.09016 S30.72227

A small, circular shaped, stone walled enclosure was identified at this location (Figure 5). The enclosure was situated on top of a hill overlooking the De Aar shooting range and Hydra substation. The enclosure was in a ruined state and measured approximately 5m in diameter. The walls of the enclosure measured approximately 0.75m and approximately 1.0 m high. The position of the enclosure could indicate that it was utilised as look out over the railway line just to the north of the site, and thus possibly associated with the South African War.

Site size: Approximately 5m in diameter.



Figure 5 – View of stonewall enclosure

Mitigation:

- The placement of the pylons must be done in such a way as to avoid the structure;
- The site (referred to as Site **LMM/WEF-4**) must be demarcated with a fence prior to construction and a buffer of at least 10 meters kept, during construction, if the proposed alignment will be closer than 50 meters from the site

4.1.2 Site LM/WEF-5

GPS: E24.08876 S30.72516

The identified site is situated at the foot of a small hill. The area is characterised by fan of red soils dipping slightly to the east. The site is characterised by LSA lithics consisting of cores, chips and flakes predominantly manufactured from lideanite. A number of blades, bladelette cores and scrapers were observed. The densities of artefacts vary from medium to high all over the sight and some activity areas are characterised by mixed scatters of lithics, potsherds and ostrich egg shell (Figure 12).

A large number of decorated potsherds were observed with decorations that include comb stamping (Figure 8), grass rope stamping (Figure 9) and rope rolling dominating the sherds.

A single structure that is most probably a hearth was identified on site (Figure 10).

The preliminary assessment of the lithics and pottery found on site indicates an association with herder activity and settlement. Some of the sherds show evidence of grit tempering as part of the manufacturing process, which indicates an association with herder (Khoi) (Sampson & Vogel, 1995).

The site is a unique example of an archaeological site associated with herder activities from the LSA period, and is graded as having a high local significance and given a Grade 3A rating

Site size: Approximately 50m x 50m.



Figure 6 – General view of site LM/WEF-5



Figure 7 – Potsherds found at LM/WEF-5



Figure 8 – Close-up of decorated potsherd with comb stamp motive



Figure 9 – Close-up of potsherd with grass-rope motives



Figure 10 – Stone structure at LM/WEF-5



Figure 11 – Retouched flakes at site



Figure 12 – Lithic (green arrows), potsherd (red arrows) and ostrich egg shell (yellow arrow) scatter at LM/WEF-5

Mitigation:

- The placement of the pylons must be done in such a way as to avoid the structure;
- The site needs to be demarcated as a no-go area with a 20 meter buffer;
- The site must be monitored for any damage during construction.
- If it is impossible to avoid the site, extensive documentation and excavation of the site will need to be done before construction.

4.1.3 Site LMM/WEF-6

GPS: E24.08460 S30.72394 (Stonewalling)
E 24.08408 S30.72367 (Lithic scatter)

A small, circular shaped, stone walled enclosure (Figure 13) with an additional larger stonewall slightly to its west was identified at this location (Figure 14). The enclosure was situated on the southern slope of a low ridge overlooking the De Aar shooting range and Hydra substation. The enclosure was in a ruined state and measured approximately 5m in diameter. The walls of the enclosure measured approximately 1.0 m high. On the top of the ridge less than 15 meters to the north a scatter of LSA material as well as some decorated ceramics were also found (Figure 15). The combination of the LSA material, ceramics and stonewalling indicates herder occupation and could most probably be contemporary with site **LM/WEF-5**.

Site size: Approximately 5m in diameter.



Figure 13 – View of small stone enclosure at LM/WEF-6



Figure 14 – View of stonewalling at LM/WEF-6



Figure 15 – Ceramics and lithics found on top of ridge at LM/WEF-6

Mitigation:

- The placement of the pylons must be done in such a way as to avoid the structure;
- The site needs to be demarcated as a no-go area with a 20 meter buffer;
- The site must be monitored for any damage during construction.
- If it is impossible to avoid the site, extensive documentation and excavation of the site will need to be done before construction.

4.1.4 Combined Impact Assessment table for archaeological sites on assessed area

<i>Archaeological Sites</i>	Proposed amended Option	
	Without mitigation	With mitigation
Status (Positive or negative)	Negative	Negative
Extent	Site	Site
Duration	Permanent	Permanent
Magnitude/Significance	High	Low
Certainty	Definite	Definite
Reversibility	Very Low	Very low
Degree to which the impact may cause irreplaceable loss of resources	High	Low
Cumulative Impact	Medium	Low

The proposed new alignment will have a **definite high negative** impact on the identified archaeological resources as documented in this report. These impacts are only envisaged during construction. The impacts can be mitigated by implementing the proposed management measures, which will reduce the possible impacts on the archaeological resources to a **Low negative** magnitude of impact.

4.1.1 Combined Impact Assessment table for heritage structures on assessed area

Heritage structures	Proposed amended Option	
	Without mitigation	With mitigation
Status (Positive or negative)	Negative	Negative
Extent	Site	Site
Duration	Permanent	Permanent
Magnitude/Significance	Medium	Low
Certainty	Definite	Definite
Reversibility	Low	Low
Degree to which the impact may cause irreplaceable loss of resources	High	High
Cumulative Impact	Medium	Low

The proposed new alignment will have a **definite medium negative** impact on the identified heritage structures as documented in this report. These impacts are only envisaged during construction. The impacts can be mitigated by implementing the proposed management measures, which will reduce the possible impacts on the heritage structures to a **Low negative** magnitude of impact.

4.2 Palaeontological Sensitivity

The palaeontological sensitivity is predicted after identifying potentially fossiliferous rock units; ascertain the fossil heritage from the literature and evaluating the nature and scale of the development itself. The palaeontological sensitivity is summarised in **Table 3** and illustrated in Figure 16 below.

Table 3 - Palaeontological Sensitivity of Geological Units on Site

Geological Unit	Rock Type and Age	Fossil Heritage	Vertebrate Biozone	Palaeontological Sensitivity
Abramskraal Formation Adelaide Subgroup BEAUFORT GROUP	Blue-grey mudstone, sandstone and siltstone LATE PERMIAN	Vertebrate fossils of the <i>Therapsids</i> group e.g. <i>Gorgonopsian</i> and <i>Dicynodonts</i> and Plant fossils e.g. <i>Glossopteris</i> trees and leaves.	<i>Dicynodon</i> Assemblage Zone	High sensitivity

The study area is mainly underlain by Permian sedimentary rocks of the Abramskraal Formation of the Adelaide Subgroup of the Beaufort Group of the Karoo Supergroup. Jurassic Dolerite sills dominate the high laying areas while recent Quaternary Alluvium deposits occur in the river valleys.

During the construction phase, there is a high and moderate possibility that fossils could be encountered during excavation of the Abramskraal Formation. These fossil finds would be of international significance. The damage and/or loss of these fossils due to inadequate mitigation would be a highly negative palaeontological impact. The exposure and subsequent reporting of fossils (that would otherwise have remained undiscovered) to a qualified palaeontologist for excavation will be a beneficial palaeontological impact.

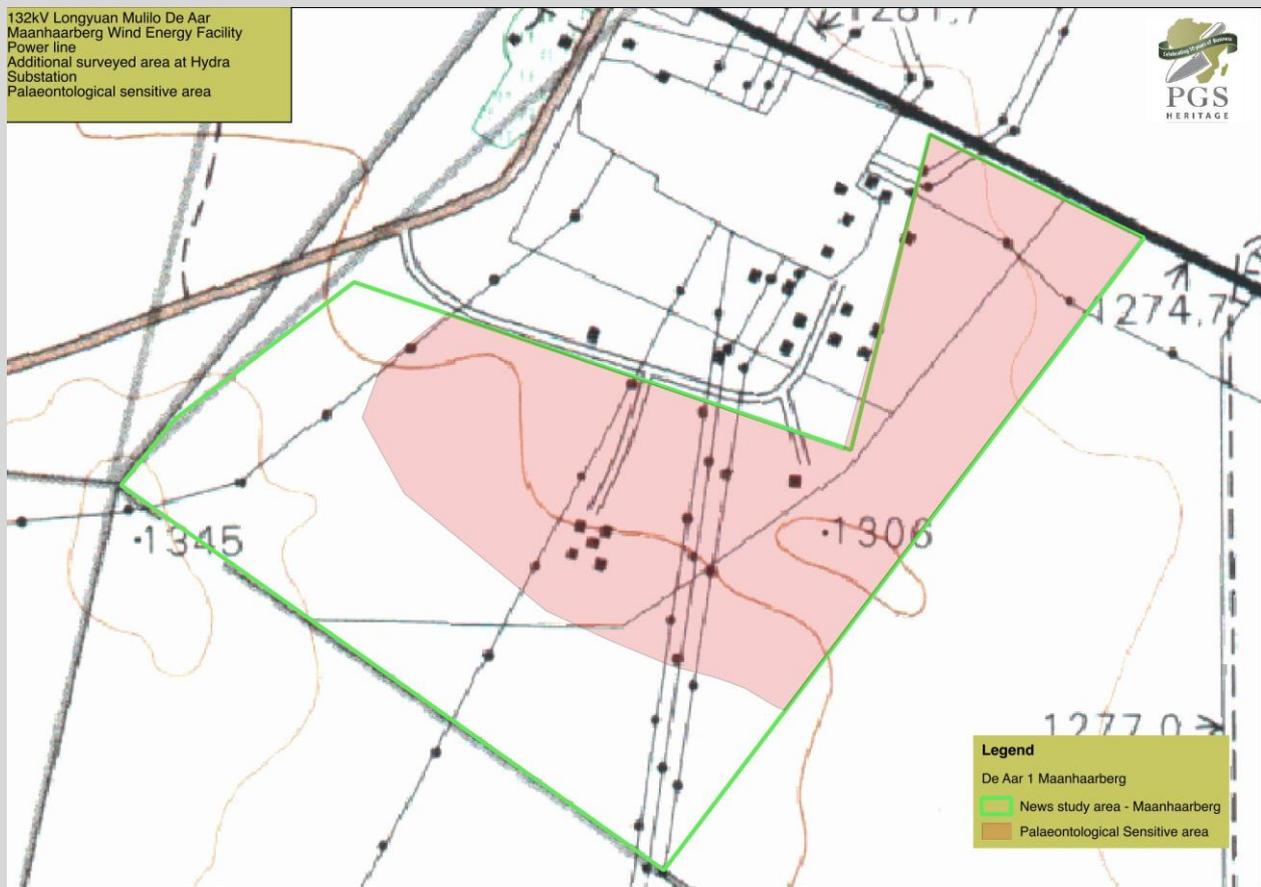


Figure 16 - Palaeontological Sensitivity Localities for the area as noted in the alignment Hydra substation

4.2.1 Impact Assessment for Palaeontology on assessed area

<i>Palaeontology</i>	Proposed amended Option	
	Without mitigation	With mitigation
Status (Positive or negative)	Negative	Positive
Extent	Site	Site
Duration	Permanent	Permanent
Magnitude/Significance	High	Medium
Certainty	Probable	Probable
Reversibility	Low	Low
Degree to which the impact may cause irreplaceable loss of resources	High	Low
Cumulative Impact	Medium	Low

The proposed new alignment will have a **probable high negative** impact on the palaeontological substrata as documented in this report. These impacts are only envisaged during construction. The impacts can be mitigated by implementing the proposed management measures, which will reduce the possible impacts on the palaeontological resources to a **Medium positive** magnitude of impact.

The recommendations as set out in the original HIA stands for this addendum report:

- A Palaeontologist should be appointed as part of the Environmental Construction Team for preferably all identified palaeontological sensitive areas but definitely for the identified high sensitive areas.
- If required a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist.
- The Palaeontologist accompanying the surveyor and foundation teams during the pylon construction phase should advise on pylons positions. If possible, pylons located within potential fossil bearing areas should be moved. If not possible, any fossils found should be rescued from the construction footprint.
- Compile a Phase 2 report to the Heritage Authority responsible after palaeontological construction inputs.

4.3 Cultural Landscape

Heritage significance of the cultural landscape is derived from the interaction between the natural landscape, and access routes, human settlements and farmsteads. Also interacting with these physical entities are intangible and historic landscapes and events that are known to have added to the cultural fabric of a place or area.

Views in the region are extensive and unobstructed for kilometres. The Kasarm Mountains in the western section of the original approved alignment makes way for a large open landscape with low vegetation towards De Aar. The open landscape is however already broken with numerous 132kV and 400kV lines coming from the west and south through the addendum study area at the Hydra Substation at De Aar.

The area addendum study area has a highly disturbed cultural landscape due to the numerous power lines traversing the area, as well as the shooting range present in the study area.

4.2.1 Impact Assessment for Cultural landscape on assessed area

<i>Cultural Landscape</i>	Proposed amended Option	
	Without mitigation	With mitigation
Status (Positive or negative)	Negative	Negative
Extent	Site	Site
Duration	Permanent	Permanent
Magnitude/Significance	Low	Low
Certainty	Definite	Definite
Reversibility	Low	Low
Degree to which the impact may cause irreplaceable loss of resources	Low	Low
Cumulative Impact	Low	Low

The proposed new alignment will have a **definite Low negative** impact on the cultural landscape as documented in this report. These impacts are envisaged during **construction** and will continue in to the **operational** phase of the project. No mitigation measures are recommended.

4.4 Comparison of impacts between the Authorised Alignment and the proposed amended Option

As part of the assessment in this addendum document a comparison between the Authorised alignment and the proposed amended Option are provided in the tables below. Specific attention is given to the assessed areas in this report. The only impacts foreseen during the operation phase of the project are on the cultural landscape, however the impact rating is the same as during the construction phase.

4.4.1 Cultural Landscape

It was found that the cultural landscape around the Hydra substation has been desensitized over the years with the additions of numerous power and transmission lines meeting at the substation. The new proposed amended option will not make a significant change to the cultural landscape and the impact seen as low.

<i>Cultural Landscape</i>	Authorized Option		Proposed amended Option	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Status (Positive or negative)	Negative	Negative	Negative	Negative
Extent	Site	Site	Site	Site
Duration	Permanent	Permanent	Permanent	Permanent
Magnitude/Significance	Low	Low	Low	Low
Certainty	Definite	Definite	Definite	Definite
Reversibility	Low	Low	Low	Low
Degree to which the impact may cause irreplaceable loss of resources	Medium	Low	Low	Low
Cumulative Impact	Low	Low	Low	Low

4.4.2 Archaeological Resources

Two additional archaeological sites were identified in the assessed area of the proposed amended Option. These have much higher heritage significance ratings as the other sites identified along the whole of the alignment starting at Maanhaarberg. Site **LM/WEF-5** falls directly in the corridor of the proposed

amended Option and will require the implantation of the required mitigation measures during construction. This single site is of such heritage significance that it raises the cumulative impact on archaeological resources from Low to Medium.

<i>Archaeological Sites</i>	Authorized Option		Proposed amended Option	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Status (Positive or negative)	Negative	Negative	Negative	Negative
Extent	Site	Site	Site	Site
Duration	Permanent	Permanent	Permanent	Permanent
Magnitude/Significance	Medium-Low	Low	High	Low
Certainty	Definite	Definite	Definite	Definite
Reversibility	Low	Low	Very Low	Very low
Degree to which the impact may cause irreplaceable loss of resources	High	Low	High	Low
Cumulative Impact	Low	Low	Medium	Low

4.4.3 Heritage Structures

The proposed amended Option has a negative medium impact on the additional heritage structures identified however the cumulative impact on heritage structures will remain the same as with the Authorised alignment with the implementation of the proposed mitigation measures.

<i>Heritage structures</i>	Authorized Option		Proposed amended Option	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Status (Positive or negative)	Negative	Negative	Negative	Negative
Extent	Site	Site	Site	Site
Duration	Permanent	Permanent	Permanent	Permanent

Magnitude/Significance	Medium	Low	Medium	Low
Certainty	Definite	Definite	Definite	Definite
Reversibility	Low	Low	Low	Low
Degree to which the impact may cause irreplaceable loss of resources	High	High	High	High
Cumulative Impact	Medium	Low	Medium	Low

4.4.4 Palaeontology

The proposed amended Option traverses the same palaeontological substrata as the Authorised alignment and the possible impact on the palaeontological resources is rated the same being High Negative. However with the implementation of the proposed management measures, this impact can be converted to a Medium positive impact, with the possible exposure of new palaeontological finds and the scientific curation of such finds.

<i>Palaeontology</i>	Authorized Option		Proposed amended Option	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Status (Positive or negative)	Negative	Positive	Negative	Positive
Extent	Site	Site	Site	Site
Duration	Permanent	Permanent	Permanent	Permanent
Magnitude/Significance	High	Medium	High	Medium
Certainty	Definite	Definite	Definite	Definite
Reversibility	Low	Low	Low	Low
Degree to which the impact may cause irreplaceable loss of resources	High	Low	High	Low
Cumulative Impact	Medium	Low	Medium	Low

5 CONCLUSIONS

The proposed amendments:

- Proposed re-alignment of a section of the transmission line near the Hydra Substation; and
- Amendments to monopole footprints;

will possibly impact on the heritage resources identified during the fieldwork and listed in this addendum report.

These impacts can however be mitigated by implementing the recommendations made in the approved HIA and this addendum report.

5.1 Archaeological finds

The assessment of the area at the Hydra substation where the final entrance to the substation by the power line is to be determined yielded 2 archaeological sites (**LMM/WEF-4** and **LMM/WEF-6**) of medium to high heritage significance. Both the sites are associated with herders from the Later Stone Age (LSA) as shown by the lithics, decorated pottery and structures present on site.

Two additional archaeological sites were identified in the assessed area of the proposed amended Option. These have much higher heritage significance ratings as the other sites identified along the whole of the alignment starting at Maanhaarberg. Site **LM/WEF-5** falls directly in the corridor of the proposed amended Option and will require the implementation of the required mitigation measures during construction. This single site is of such heritage significance that it raises the cumulative impact on archaeological resources from Low to Medium.

Mitigation for these two sites must include as a minimum:

- The placement of the pylons must be done in such a way as to avoid the structure;
- The site needs to be demarcated as a no-go area with a 20 meter buffer;
- The site must be monitored for any damage during construction.
- If it is impossible to avoid the site, extensive documentation and excavation of the site will need to be done before construction.

The HIA has focused on a 500 meter assessment corridor and the archaeological component on the centre alignment of the 500 meter corridor as well as switching station positions. Because of subsurface and localised nature of archaeological remains, any deviation or changes within the corridor to the initial layout alignment or switching station positions will require an archaeological walk-down of the new alignment after pylons placement positions have been confirmed to identify any possible archaeological and heritage structures and sites before construction commences.

5.2 Heritage Structures

The fieldwork has identified 1 structure (**LMM/WEF-4**) that is most probably older than 60 years. These structures are protected under Section 34 of the national Heritage Resources Act and will require a permit from the Provincial Heritage Authority in the Northern Cape, Ngwao-Boswa Jwa Kapa Bokone, for any alterations to the structure.

The proposed amended Option has a negative medium impact on the additional heritage structures identified, however the cumulative impact on heritage structures will remain the same as with the Authorised alignment with the implementation of the proposed mitigation measures.

It is recommended that:

- The placement of the pylons must be done in such a way as to avoid the structure;
- The sites must be demarcated with a fence prior to construction and a buffer of at least 10 meters kept, during construction.

5.3 Cultural Landscape

It was found that the cultural landscape around the Hydra substation has been desensitized over the years with the additions of numerous power and transmission lines meeting at the substation. The new proposed amended option will not make a significant change to the cultural landscape and the impact seen as low.

5.4 Palaeontology

There is a high possibility that fossils could be encountered during excavation of the Abramskraal Formation. These fossil finds would be of international significance. The damage and/or loss of these fossils due to inadequate mitigation would be a highly negative palaeontological impact. The exposure and subsequent reporting of fossils (that would otherwise have remained undiscovered) to a qualified palaeontologist for excavation will be a beneficial palaeontological impact.

The proposed amended Option traverses the same palaeontological substrata as the Authorised alignment and the possible impact on the palaeontological resources is rated the same being High Negative. However with the implementation of the proposed management measures, this impact can be converted to a Medium positive impact, with the possible exposure of new palaeontological finds and the scientific curation of such finds.

The recommendations as set out in the original HIA stands for this addendum report:

- A Palaeontologist should be appointed as part of the Environmental Construction Team for preferably all identified palaeontological sensitive areas but definitely for the identified high sensitive areas.
- If required a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist.
- The Palaeontologist accompanying the surveyor and foundation teams during the pylon construction phase should advise on pylons positions. If possible, pylons located within potential fossil bearing areas should be moved. If not possible, any fossils found should be rescued from the construction footprint.
- Compile a Phase 2 report to the Heritage Authority responsible after palaeontological construction inputs.

All other recommendations as made in the approved HIA of 1 April 2014 still stand, with the additional recommendations made in this report.

6 LIST OF PREPARERS

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7 REFERENCES

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APPENDIX A
SITE DISTRIBUTION MAP

