

NATURA VIVA cc
Natural History Education, Tourism, Research

Attn: Ms Caroline Evans
 CES - Environmental and social advisory services
 67 African Street
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Date: 19 August 2020

Palaeontological heritage comment:

**PART 2 ENVIRONMENTAL AUTHORISATION AMENDMENT FOR THE
 HAGA HAGA WIND ENERGY FACILITY NEAR EAST LONDON,
 KOMGA DISTRICT, EASTERN CAPE**

Combined desktop and field-based Palaeontological Heritage Assessments (PIAs) for the proposed Haga Haga Wind Farm (WEF) near East London, Komga District, Eastern Cape as well as the associated gridline connection to the Chaba Substation have been submitted by the author (Almond 2017a, 2017b, 2017c).

The original Haga Haga Wind Farm project proposal received authorisation from the Department of Environmental Affairs on 5 September 2019 (DEA Ref. No: 14/12/16/3/3/2/1087).

A revised layout for the Haga Haga Wind Farm has now been proposed as a Part 2 Amendment to the existing Environmental Authorisation. The proposed changes to the layout are summarized in Table 1 with key elements shown in the Google Earth© satellite image shown in Figure 1.

1. Effect on assessed impacts on palaeontological heritage

On the basis of the original combined field scoping survey and desktop study, the impact significance of the construction phase of the authorised Haga Haga Wind Farm development was assessed as MEDIUM (negative) without mitigation and LOW (positive & negative) after mitigation, adopting a precautionary approach (Almond 2017a; Table 2 herein). A concentration of recorded fossil wood sites on Farm 447 was proposed as a no-go area, to be protected by a 20 m-wide peripheral buffer zone demarcated by security tape during construction (*ibid.* Figs. 44 and 45).

In terms of local palaeontological heritage resources, most of the proposed changes in the amended WEF layout would have no significant impact on the anticipated impact of the project. The increased footprint of the access roads implies increased potential impacts on near-surface fossil heritage but these are in part offset by (1) the reduced number of turbines (and hence volume of bedrock excavations for turbine footings) and (2) the slightly lower total footprint of the WEF. The revised layout (shown in Figure 1), including turbine locations and access road routes as well as other WEF infrastructure, does not overlap with palaeontologically sensitive areas defined in the original PIA report (*ibid.*, Figs. 44 & 45).

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It is concluded that anticipated impacts on local palaeontological heritage of the construction phase of the amended Haga Haga Wind Farm remain as originally assessed, viz. MEDIUM (negative) before mitigation and LOW (negative and positive) after mitigation. Significant further palaeontological impacts during the operational and decommissioning phases are unlikely.

2. Effect on mitigation measures

The proposed mitigation measures for the amended Haga Haga Wind Farm remain unchanged. Pending the potential discovery of substantial new fossil remains during construction, no further specialist palaeontological studies or mitigation are considered necessary for this renewable energy development. A tabulated Chance Finds Fossil Procedure is appended to this document.

- The Environmental Control Officer (ECO) responsible for the development should be alerted to the possibility of important fossil remains being found either on the surface or exposed by fresh excavations during construction. This applies especially, but not exclusively, to petrified wood remains with whose appearance the ECO should familiarise themselves, based on illustrations in the PIA report and / or museum material.
- Should new fossil remains - such as blocks or logs of petrified wood, vertebrate bones and teeth, plant-rich fossil lenses or dense fossil burrow assemblages - be exposed during construction, the responsible Environmental Control Officer should alert the Eastern Cape Provincial Heritage Resources Authority, ECPHRA, as soon as possible so that appropriate action can be taken in good time by a professional palaeontologist at the developer's expense. Palaeontological mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as of associated geological data (*e.g.* stratigraphy, sedimentology, taphonomy) by a professional palaeontologist. The palaeontologist concerned with mitigation work will need a valid fossil collection permit from ECPHRA and any material collected would have to be curated in an approved depository (*e.g.* museum or university collection).
- All palaeontological specialist work should 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 recently developed by SAHRA (2013).
- These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the amended Haga Haga WEF project and be made conditions for its authorisation.

3. Effect on current EA Conditions

Condition No. 40 of the Environmental Authorisation for the Haga Haga Wind Farm requires the exclusion of sensitive heritage areas from the construction footprint. This condition has been met (Section 1 above). **There are no proposed changes to the conditions for Environmental Authorisation of the amended WEF regarding palaeontological heritage.**

4. Effect on cumulative impacts

Cumulative palaeontological impacts posed by the original (authorised) Haga Haga WEF in the context of other renewable energy developments in the broader region were assessed by Almond (2017a) as being of MEDIUM (negative) significance without mitigation, but of LOW (positive and negative) significance if the recommended mitigation measures are followed through. Since this study, no further palaeontological heritage assessments for renewable energy (or other major relevant) developments within a radius of 30 km of the Haga Haga Wind Farm project area have become available (SAHRIS website).

It is concluded that anticipated cumulative impacts for the amended WEF project remain unchanged.

The No-Go Option (no WEF development) would probably have a neutral impact on local fossil heritage; fewer fossils would be disturbed or destroyed by construction but, on the other hand, natural destruction of fossils by weathering and erosion would continue and the potential benefits of new fossil data obtained through professional palaeontological mitigation would be lost.

Provided that the mitigation measures for chance fossil finds outlined by Almond (2017a) and reiterated above are followed through in full, there are no objections on palaeontological heritage grounds to the amended Haga Haga Wind Farm development.



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Key references

ALMOND, J.E. 2017a. Proposed Haga Haga Wind Farm near East London, Komga District, Eastern Cape. Palaeontological heritage: desktop & field-based scoping assessment, 60 pp. Natura Viva cc, Cape Town.

ALMOND, J.E. 2017b. Proposed 132 kV overhead powerline between the Chaba Substation and the Haga Haga Wind Energy Facility near East London, Komga District, Eastern Cape. Palaeontological heritage: basic assessment, 35 pp. Natura Viva cc, Cape Town.

ALMOND, J.E. 2017c. Revised route for the proposed 132 kV overhead powerline between the Chaba Substation and the Haga Haga Wind Energy Facility near East London, Komga District, Eastern Cape. Palaeontological heritage comment, 3 pp. Natura Viva cc, Cape Town.

COMPONENT	CURRENTLY AUTHORISED	PROPOSED AMENDMENT
Facility Output	150 MW	No change requested
Number of Turbines	42	36 turbines
Hub Height	134 m	180 m
Rotor Diameter	150 m	200 m
Tip Height	200 m	280 m
Turbine Output	3.2 MW to 5 MW	No change requested
Turbine Base Footprint (per turbine)	996 m ²	No change requested
Hard Stand Area (per turbine)	3 700 m ²	No change requested
Storage Area	140 000 m ²	No change requested
Roads	410 000 m ² (6 m wide roads)	425 000m ² (8 m wide roads)
Substation	11 000 m ²	No change requested
Laydown Area	10 000 m ²	No change requested
Permanent Office Space and Workshop Space	5 000 m ²	No change requested
Temporary Construction Areas	10 000 m ²	No change requested
Remainder of Storage Area	104 000 m ²	No change requested
Total Footprint	74.7232 ha	73.4056HA
Battery Storage	None	**New Addition on "Remainder of Storage Area" Footprint

Table 1: Summary of proposed amendments for the authorised Haga Haga WEF near East London

Impact Phase: Construction								
Nature of Impact: Potential disturbance, damage or destruction of fossil heritage resources preserved at or beneath the ground surface due to surface clearance as well as excavations (e.g. for wind turbine footings, underground cables, access roads, building foundations).								
	Severity	Extent	Duration	Consequence	Probability	Confidence	Status	Significance
Without Mitigation	Medium	Low	High	Medium	Medium	Medium	Negative	Medium
With Mitigation	Low	Low	High	Medium	Low	Medium	Negative & Positive	Low
Reversibility of impacts			Irreversible – palaeontological heritage resources are non-renewable and key contextual data for fossils (sedimentology, taphonomy) is difficult or impossible to reconstruct following disturbance.					
Loss of irreplaceable resources			Possible – well-preserved, scientifically valuable vertebrate fossils are scarce within the project area but well-preserved fossil wood does occur here. Many of the fossils concerned are probably of widespread occurrence outside the project area.					
Possibility of avoidance, management or mitigation of potential impacts			YES – effective mitigation of known fossil sites and chance fossil finds during the construction phase is feasible.					
Mitigation measures:								
1) Protection of recorded fossil sites (<i>donga</i> exposures of ancient colluvial deposits) within a no-go area with a 20 m peripheral buffer.								
2) Safeguarding of chance fossil finds (preferably <i>in situ</i>) during the construction phase by the responsible ECO, followed by reporting of finds to ECPHRA.								
3) Recording and judicious sampling of significant chance fossil finds by a qualified palaeontologist, together with pertinent contextual data (stratigraphy, sedimentology, taphonomy).								
4) Curation of sampled fossil material within an approved repository (museum / university fossil collection) by a qualified palaeontologist.								

Table 2: Palaeontological heritage impact assessment table for the construction phase of the authorised as well as the amended Haga Haga Wind Farm (Significant further impacts are not anticipated in the operational and de-commissioning phases).

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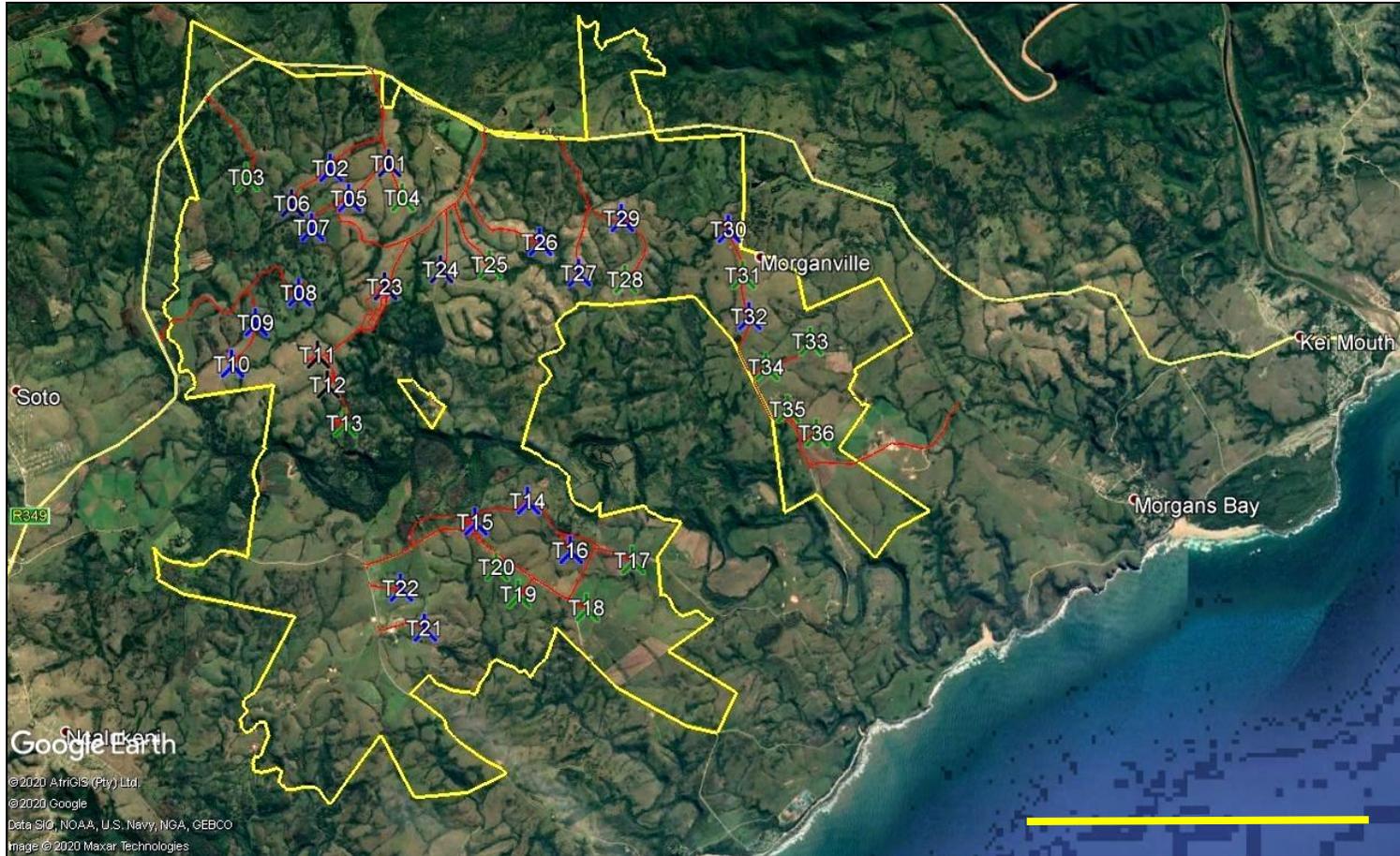


Figure 1: Google Earth© satellite image showing the Haga Haga project area (yellow polygon, unchanged) as well as the proposed amended layout of the wind turbine positions (numbered) and access road network (red and green lines). Scale bar = 6 km. N towards the top of the image.

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APPENDIX - CHANCE FOSSIL FINDS PROCEDURE: Haga Haga Wind Farm near East London	
Province & region:	EASTERN CAPE: Komga District
Responsible Heritage Resources Authority	ECPHRA (Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; smokhanya@ecphra.org.za)
Rock unit(s)	Balfour Formation (Beaufort Group), Masotcheni Formation (Pleistocene – Holocene)
Potential fossils	Fossil bones, teeth of vertebrates, petrified wood, trace fossils (e.g. vertebrate burrows) in the Balfour Formation. Fossil teeth, bones and horn cores of mammals, calcretised trace fossils and reworked petrified wood in Pleistocene and younger colluvial and alluvial deposits.
ECO protocol	1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (<i>N.B.</i> safety first!), safeguard site with security tape / fence / sand bags if necessary.
	2. Record key data while fossil remains are still <i>in situ</i> : Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo Context – describe position of fossils within stratigraphy (rock layering), depth below surface Photograph fossil(s) <i>in situ</i> with scale, from different angles, including images showing context (e.g. rock layering)
	3. If feasible to leave fossils <i>in situ</i> : <ul style="list-style-type: none"> • Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation • Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Authority for work to resume
	3. If <i>not</i> feasible to leave fossils <i>in situ</i> (emergency procedure only): <ul style="list-style-type: none"> • <i>Carefully</i> remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock) • Photograph fossils against a plain, level background, with scale • Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags • Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist • Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation
	4. If required by Heritage Resources Authority, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.
5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Authority	
Specialist palaeontologist	Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Authority. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Authority minimum standards.

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