

## HERITAGE IMPACT ASSESSMENT

In terms of Section 38(8) of the NHRA for the

**Proposed part 2 amendment to the existing Environmental  
Authorisation for the Modderfontein WEF, near Victoria West located in  
both the Northern and Western Cape**

Prepared by CTS Heritage



For  
**Terramanzi Group**

**July 2021**



CTS HERITAGE

## EXECUTIVE SUMMARY

### 1. Site Name:

Modderfontein Wind Energy Facility

### 2. Location:

On the boundary of the Western and Northern Cape Provinces, approximately 20km northeast of Three Sisters

### 3. Locality Plan:

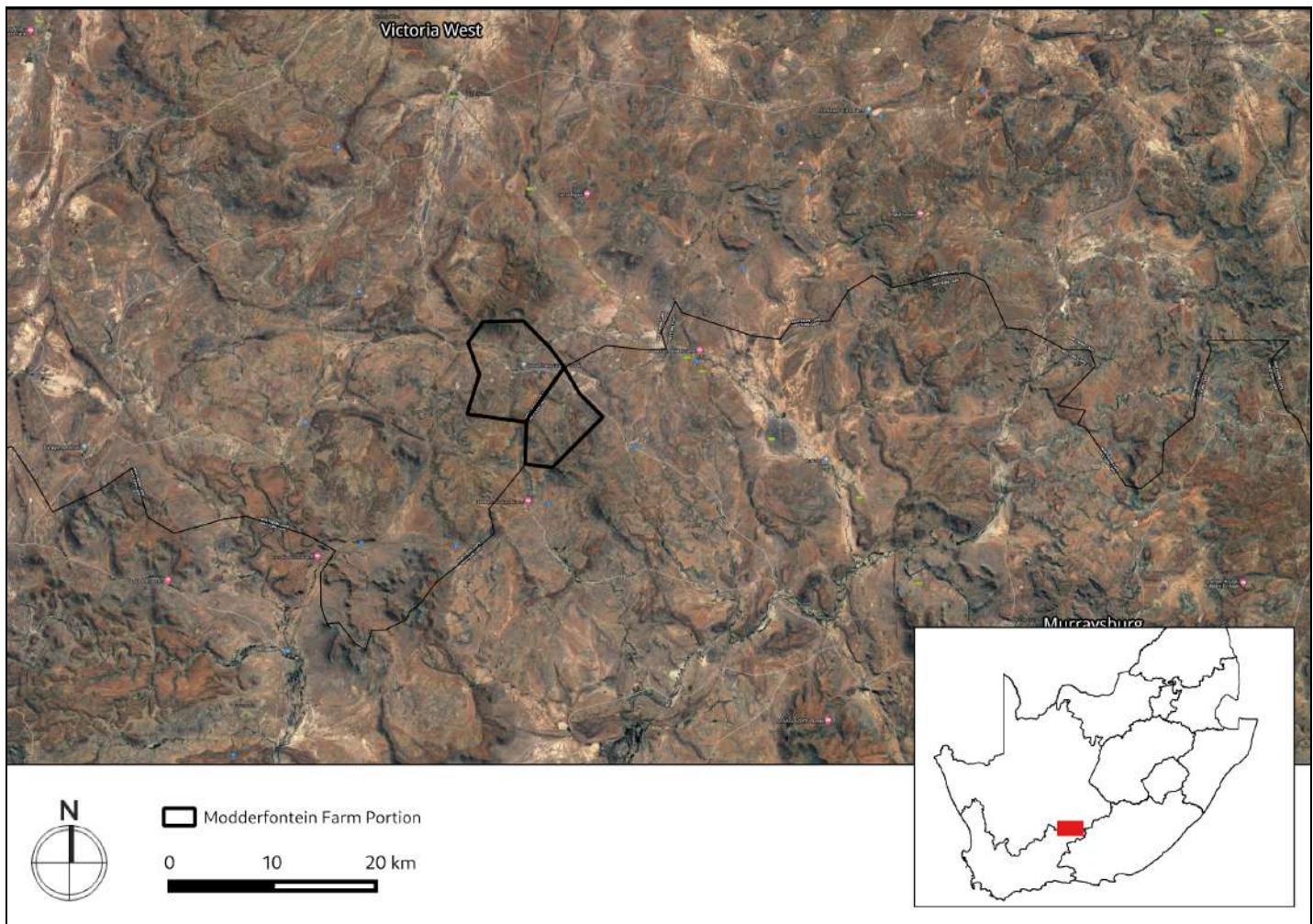


Figure 1: Location of the proposed development area



#### 4. Description of Proposed Development:

This application is for a proposed amendment to the layout of the authorised Modderfontein Wind Energy Facility located in both the Northern and Western Cape. The original Environmental Authorisation has authorised up to 67 wind turbines for the Modderfontein WEF with a total generating capacity of 201 MW using turbines with a generating capacity of up to 3 MW.

The Applicant has proposed the following amendment to the existing Authorisation:

- Up to 34 WTGs with a total generating capacity of 140MW (cluster 1) and 50.4MW (cluster 2)
- A total output of 190.4MW
- WTGs with a generating capacity of up to 5.6 MW
- *The proposed development will be an approximately 50% reduction in turbine density*

#### 5. Heritage Resources Identified:

The field assessment was carried out by the archaeologist to cover both the original layout as well as the amended layout (May 2021). A total of 85 additional observations were made during the field assessment and these were dominated by MSA open air artefact scatters. The MSA artefacts were predominantly derived from local hornfels and quarries at the base of the ridges and small hills were observed where exposures of rock were readily available.

LSA material was virtually absent on the farm but where it was found the bulk of the source material was sourced from elsewhere and introduced into the area rather than being sourced locally. The engravings found by Binneman (2011) and during this survey were historic and likely date to the 19th century when the diamond rush created a large increase in migrant work seeking opportunities in Kimberley.

A few built environment structures were found such as the ruined shepherd's building at site MDF 002 and the beautiful stonework found at the kraal and dipping pen at site MDF 020. Previously recorded structures by Binneman have already been reported on with the main cluster located at SAHRIS Site ID 34629. While none of our recent findings contradicted the work done by Binneman (2011), it seems the original layout had not been provided for in the previous assessment and his study therefore provided a very good characterisation of the overall archaeological resources of the farm rather than an exhaustive survey of the impacted footprint of the original layout. This study has therefore filled the gaps in the survey of the original layout as well as firming up the sites that may be impacted by the revised and reduced layout.



### ***Palaeontology***

Almond's findings (2021) are summarised here:

"The palaeosensitivity of the Modderfontein WEF project area is provisionally rated as Very High in standard screening studies. A three-day palaeontological site visit, focussing mainly on the limited areas with good Teekloof mudrock exposure, shows that vertebrate fossils are locally common here with over 50 new fossil sites recorded. Some of the stratigraphically lower mudrock horizons are apparently only sparsely fossiliferous, however well-exposed, while most of the fossils recorded comprise common forms of small-bodied dicynodonts of limited scientific interest. Other fossil groups recorded include fragmentary material of larger therapsids (mostly unidentified), various vertebrate burrows, low-diversity invertebrate trace fossil assemblages and very occasional plant material (moulds of glossopterid leaves, equivocal woody plant stems). Fossils are rare within sandstone facies while those recorded within thermally metamorphosed ("baked") Teekloof Formation bedrocks adjacent to dolerite intrusions are very poorly preserved. The Karoo dolerites, where a high proportion of wind turbines will be sited, are unfossiliferous and most lower-lying areas are mantled by thin to thick alluvial and colluvial deposits of Late Caenozoic age that are of low palaeosensitivity.

It is concluded that the majority of the Modderfontein WEF project area is, in practice, of Low palaeosensitivity with scattered, and to some extent unpredictable, islands of High sensitivity."

### ***Cultural Landscapes***

A VIA was conducted in 2011 assessing the Visual Impacts of the authorised layout (ie. 67 turbines, each wind turbine was expected to consist of a concrete foundation, a steel tower, a hub (placed at approximately 125m above ground level) and three 55m long blades attached to the hub.) In summary, the VIA (2011) found that:

- The anticipated visual impact of the facility on the regional visual character, and by implication, on the sense of place, is expected to be ***moderate***.
- The aesthetic appeal of the local natural features (scenic mountains), the remote location of the area, its undeveloped nature and its unique sense of place afford the area a level of tourism potential. Although this tourism potential has not yet been realised or optimised, the N1 and N12 represent national tourist access routes which are fully optimised and utilised by tourists. In this respect, reference is made to the Three Sisters, a cluster of hills which is visible from the national road, and which has come to be a tourist attraction and landmark in the area. This landmark lies to the south of the N1 (i.e. in a direction opposite to that of the proposed facility), and the viewing position does not lie within the anticipated viewshed.



- Visual intrusion through the development of industrial type infrastructure within this environment could jeopardise the area's tourism value and potential.
- The anticipated visual impact of the facility on existing tourist routes, as well as on the tourism potential of the region, is expected to be *low*.

The Cultural Landscape Assessment (2021) notes that the site forms part of a broader cultural landscape representative of the Great Karoo region possessing heritage value for historical, aesthetic, architectural, social, scientific reasons. The site possesses a number of landscape qualities, which are representative of this cultural landscape or regional morphological zone. However, the site does not possess particular heritage significance in its own right to warrant formal protection or grading from a cultural landscape perspective. Notwithstanding this, there are two aspects, in addition to the archaeological resources identified, with heritage management implications from a cultural landscape perspective:

- The site's location in relation to the national and regional route network has significance in terms of the experiential qualities of the broader landscape traversed by the N1, N12 and R63.
- As noted in the VIA (2011), there is a significant presence of a number of tall hills and mountains with steep elevated slopes with an inherent scenic quality making them visually sensitive, as illustrated below.

## 6. Anticipated Impacts on Heritage Resources:

### *Impacts of the Authorised Layout*

According to Binneman et al (2011), "It is highly likely that the surface scatters of Middle Stone Age stone artefacts encountered occur in a disturbed context owing to water runoff, wash and erosion along the floodplains as well as being washed down the slopes of rocky outcrops and ridges". Similarly the occurrence of Later Stone Age stone artefacts may have been disturbed by erosion as well as natural and animal disturbances. Documented areas containing rock engravings on boulders should be avoided and further investigation into the areas containing boulders surrounding the points of the proposed turbines should be investigated for further possible occurrences of rock engravings. The stone wall structures must be avoided during the construction phase of the proposed development." Based on the location of known archaeological heritage located within the proposed development area, the amended layout will not impact on any known heritage resources and all proposed turbines are located more than 100m from any known resources. There is no objection to the proposed amended layout on condition that the recommendations included in the assessment completed by Binneman (2011) are adhered to. These are -



1. The exposed human remains must be reported to the South African Heritage Resources Agency (SAHRA) so that they may appoint the relevant archaeologist/s to remove the exposed human remains.
2. No construction activities may take place within 100m of the documented rock shelters containing rock paintings and boulders containing rock engravings.
3. The ridges and rocky outcrops surrounding the locations of the turbines and solar panels must be investigated prior to construction to establish whether undocumented rock shelters contain rock paintings and rocky outcrops contain boulders with rock engravings. If any are encountered the recommendations in point 2 will be implemented.
4. No construction activities may take place within 100m of the documented stone-wall structures.
5. If it is inevitable that construction activities must take place within 100m of any documented and undocumented rock shelters containing paintings, rocky outcrops with boulders containing rock engravings and stone-wall structures a perimeter fence must be erected to protect the sensitive area from any possible negative impact.
6. It is possible that in situ archaeological sites/remains, and human remains may be uncovered during construction. Therefore, a professional archaeologist should be appointed during the vegetation removal and construction phases of the development.

The 100m buffer zones recommended by Binneman (2011) are mapped in the figures below. As per Figures 6, 6a, 7 and 7a, the authorised layout complies with these recommendations as well as the recommendations from SAHRA for the Northern Cape component of the proposed development.

In their response to the Karoo Renewable Wind Energy project, SAHRA specifically requested that the Later Stone Age sites S31, S32 and S39 (SAHRIS IDs 34718, 34719 and 34737) must be mitigated with a Phase 2 Archaeological Impact Assessment. S31 and S32 (SAHRIS IDs 34718 and 34719) are described simply as LSA artefact scatters and S39 (SAHRIS ID 34737) is described as “Is located adjacent to the farm road and may have been disturbed when the road was being constructed, however, a small concentration of Later Stone Age stone artefacts were observed comprising 17 mainly cores, flakes, a grinding/digging stone and a scraper manufactured on hornfels.” However, as indicated in Figure 6 and 7 below, none of these sites is likely to be negatively impacted by the authorised layout.

A number of additional archaeological and palaeontological resources were identified in the 2021 field assessments. Of the resources identified that have heritage significance, sites MDF 047 (hornfels scatter) and MDF



072 (stone kraal) are located in close proximity to authorised turbine positions (Figure 6 and 7). The proposed turbines at these locations are more than 50m away from the identified resources but closer than 100m. It is unlikely that these resources will be negatively impacted by the authorised turbine layout.

In the Western Cape, Sites S7 and S8 (SAHRIS IDs 34634 and 34636) are located in close proximity to proposed turbines, however these sites fall more than 100m away from the nearest turbine and as such, impact is unlikely. S7 (SAHRIS Site ID 34634) is described as “located on a rocky dolerite outcrop and contains four engraved boulders distributed within an area of approximately 50m x 50m. The boulders contained deep scratches approximately 25cm in length, relatively patinated cross-hatching images that resemble nets, two images of European settlers one image of a male figure dressed in a top hat and heeled boots standing in a hands-on-hips posture and the other sitting on a horse. Isolated scatters of Middle Stone and Later Stone Age stone artefacts were documented within the vicinity of the rock engravings. A semi-circle stone wall structure approximately 5m x 3m in extent and 1m in height was located within the area of the boulders and stone artefacts.” S8 (SAHRIS Site ID 34636) is described simply as “stone walled structures”.

A number of fossils were identified by Almond (2021) within the development area however none of the identified fossil locations are situated within 50m of the authorised layout. However, the underlying geology of the whole area remains sensitive for impacts to significant palaeontology except for the dolerite ridges.

The Cultural Landscape Assessment (2021) notes that the overall impact of the proposed development on the regional cultural landscape is anticipated as **moderate** before and after mitigation. However, at a local scale the impact is anticipated as **high**. In this regard, the primary cultural landscape receptors are the N1, N12 and R63. The impact on the regional cultural landscape is considered acceptable given the broad expansive nature of the landscape and thus its ability to absorb the nature and scale of development. The site and its immediate context does not possess particular heritage significance in its own right to warrant formal protection or grading from a cultural landscape perspective.

No other known heritage resources from within the development area in the Western Cape are located in close proximity to any turbines in the authorised layout.



### ***Impacts of the Proposed Amended Layout***

The proposed amended turbine layout is greatly reduced compared to the authorised layout, with only 34 turbines proposed as opposed to the 67 turbines in the authorised layout. The anticipated impact to archaeological heritage resources is therefore greatly reduced.

A number of identified archaeological resources are located in very close proximity to proposed infrastructure in the revised amended layout. Sites identified in the assessment completed by Binneman (2011) that are likely to be impacted by the revised amended layout in the Northern Cape include MOD29, MOD10 and MOD11 (SAHRIS Site IDs 34716, 34631 and 34632), all graded IIIB. According to SAHRIS, MOD29 is described as a possible stone quarry artefact site and is located immediately adjacent to a proposed road (Figure 8b). It is recommended that a 100m no-go buffer area be implemented around these sites to ensure that no impact takes place. The proposed road will therefore require realignment.

According to SAHRIS, MOD10 is described as “Rock engraving images of an antelope, approximately 20cm x 10cm, a male figure dressed in a top hat possibly holding a rifle with one arm stretched out sitting on a horse, a signature done in cursive, as well as abstract and geometric patterns. Middle Stone Age stone artefacts also occurred within the immediate rocky outcrop area surrounding the engravings.” and MOD 11 is described as “Gong rock. Hammering is evident on the top of two of the boulders, and a metallic sound is made when beaten with hands. The location of the gong rock is ideal, as it has a good view down the two valleys. The gong rock is in close proximity to the engraved boulders at S10. A few Middle Stone Age flakes were observed in front of the rock gong next to the farm road.” Both of these sites are located within 100m of a proposed road in the revised amended layout (Figure 8a). It is recommended that a 100m no-go buffer area be implemented around these sites to ensure that no impact takes place. The proposed road will therefore require realignment.

Of the sites identified in the 2021 archaeological field assessment, Sites MDF\_WEF 40 (historical scratched graffiti, graded IIIB) and MDF\_WEF 68 (hornfels flakes, hornfels thin burin bladelet, graded IIIA) are likely to be impacted by the revised amended layout (Figure 8a and 8c). It is recommended that a 100m no-go buffer area be implemented around these sites to ensure that no impact takes place. The proposed road will therefore require realignment.

A number of fossils were identified by Almond (2021) within the development area and three of these identified fossil sites are located in very close proximity to the revised amended layout, Sites 395, 396 and 397 (Figure 8b).



These sites describe the fossils of a small tetrapod and are graded IIIB. These sites are located more than 10m from the proposed development and as such, no direct impact is anticipated. Palaeontological site 417 is graded IIIC and is located within 50m of proposed infrastructure development as per the revised amended layout however no further mitigation is recommended for this site (Figure 8a). It must be noted that the underlying geology of the whole area remains sensitive for impacts to significant palaeontology except for the dolerite ridges.

In their response to the Karoo Renewable Wind Energy project, SAHRA specifically requested that the Later Stone Age sites S31, S32 and S39 (SAHRIS IDs 34718, 34719 and 34737) located in the Northern Cape must be mitigated with a Phase 2 Archaeological Impact Assessment. However, as indicated in Figures 8a, b and c below, none of these sites is likely to be negatively impacted by the proposed amended layout. As such, it is rather recommended that these sites be avoided and that no impact should take place.

In the proposed amended layout, only 7 turbines are proposed within the Western Cape. No archaeological resources were identified within the vicinity of the five southern-most turbines located in the Western Cape however a proposed road is anticipated to impact directly on of two significant archaeological resources - MDF 028 and MDF 029 (Figure 9 and 9a). Both of these sites are historic rock art sites and have been determined to have high local significance (grade IIIA). In the proposed amended layout, these resources are likely to be negatively impacted and as such, it is recommended that a 100m no-go buffer area be implemented around these sites to ensure that no impact takes place. The proposed road will therefore require realignment.

The Cultural Landscape Assessment (2021) notes that the overall impact of the proposed development on the regional cultural landscape is anticipated as **moderate** before and after mitigation. However, at a local scale the impact is anticipated as **high**. In this regard, the primary cultural landscape receptors are the N1, N12 and R63. The impact on the regional cultural landscape is considered acceptable given the broad expansive nature of the landscape and thus its ability to absorb the nature and scale of development. The site and its immediate context does not possess particular heritage significance in its own right to warrant formal protection or grading from a cultural landscape perspective.



## 7. Recommendations:

It must be noted that the provisions related to impacts to heritage in the existing Environmental Authorisation detailed in section 1.2 above are wholly inadequate and will not mitigate the anticipated negative impacts to heritage resources. It is recommended that these provisions are amended to reflect the following conditions.

### ***Northern Cape (Revised Amended Layout)***

The submitted HIA satisfies the requirements of section 38(3) of the NHRA. There is no objection to the proposed development on heritage grounds on condition that:

- The revised amended layout is preferred as an alternative
- A no-go development buffer of 100m must be implemented around SAHRIS Sites 34716, 34631 and 34632, and archaeological sites MDF\_WEF 40 and MDF\_WEF 68. This will require an amendment to the proposed revised layout of the roads.
- A Heritage Management Plan for rock engravings, rock painting and gong rocks must be compiled and submitted to SAHRA
- A pre-construction walkdown of the final authorised layout including the powerline route must be conducted by both an archaeologist and a palaeontologist to identify any areas requiring targeted mitigation in the form of excavation or removal of heritage resources. A walkdown report detailing the findings of the walkdown and the final layout must be submitted to SAHRA.
- The attached Chance Fossil Finds Procedure must be implemented for the duration of the construction phase
- The mitigation recommendations included in the VIA (2011 and 2021) must be implemented
- Should any previously undocumented heritage resources be identified during the course of the construction, operation or decommissioning of the project, work must cease in the area of the find and SAHRA must be contacted regarding a way forward.

### ***Western Cape (Authorised Layout)***

The submitted HIA satisfies the requirements of section 38(3) of the NHRA.

- A no-go development buffer of 100m must be implemented around sites S7 and S8 (SAHRIS IDs 34634 and 34636).
- A Heritage Management Plan for rock engravings, rock painting and gong rocks must be compiled and submitted to SAHRA



- A pre-construction walkdown of the final authorised layout including the powerline route must be conducted by both an archaeologist and a palaeontologist to identify any areas requiring targeted mitigation in the form of excavation or removal of heritage resources. A walkdown report detailing the findings of the walkdown and the final layout must be submitted to SAHRA.
- The attached Chance Fossil Finds Procedure must be implemented for the duration of the construction phase
- The mitigation recommendations included in the VIA (2011) must be implemented
- Should any previously undocumented heritage resources be identified during the course of the construction, operation or decommissioning of the project, work must cease in the area of the find and HWC must be contacted regarding a way forward.

#### ***Western Cape (Revised Amended Layout)***

The submitted HIA satisfies the requirements of section 38(3) of the NHRA. There is no objection to the proposed development on heritage grounds on condition that:

- The revised amended layout is preferred as an alternative
- A no-go development buffer of 100m must be implemented around Sites MDF 028 and MDF 029. This will require an amendment to the proposed revised layout of the roads.
- A Heritage Management Plan for rock engravings, rock painting and gong rocks must be compiled and submitted to SAHRA
- A pre-construction walkdown of the final authorised layout including the powerline route must be conducted by both an archaeologist and a palaeontologist to identify any areas requiring targeted mitigation in the form of excavation or removal of heritage resources. A walkdown report detailing the findings of the walkdown and the final layout must be submitted to SAHRA.
- The attached Chance Fossil Finds Procedure must be implemented for the duration of the construction phase
- The mitigation recommendations included in the VIA (2011 and 2021) must be implemented
- Should any previously undocumented heritage resources be identified during the course of the construction, operation or decommissioning of the project, work must cease in the area of the find and HWC must be contacted regarding a way forward.

#### **8. Author/s and Date:**

Jenna Lavin, July 2021



#### **Details of Specialist who prepared the HIA**

**Jenna Lavin**, an archaeologist with an MSc in Archaeology and Palaeoenvironments, and currently completing an MPhil in Conservation Management , heads up the heritage division of the organisation, and has a wealth of experience in the heritage management sector. Jenna's previous position as the Assistant Director for Policy, Research and Planning at Heritage Western Cape has provided her with an in-depth understanding of national and international heritage legislation. Her 8 years of experience at various heritage authorities in South Africa means that she has dealt extensively with permitting, policy formulation, compliance and heritage management at national and provincial level and has also been heavily involved in rolling out training on SAHRIS to the Provincial Heritage Resources Authorities and local authorities.

Jenna is on the Executive Committee of the Association of Professional Heritage Practitioners (APHP), and is also an active member of the International Committee on Monuments and Sites (ICOMOS) as well as the International Committee on Archaeological Heritage Management (ICAHM). In addition, Jenna has been a member of the Association of Southern African Professional Archaeologists (ASAPA) since 2009. Recently, Jenna has been responsible for conducting training in how to write Wikipedia articles for the Africa Centre's WikiAfrica project.

Since 2016, Jenna has drafted over 50 Heritage Impact Assessments throughout South Africa.



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## 1. INTRODUCTION

### 1.1 Background Information on Project

This application is for a proposed amendment to the authorised Modderfontein Wind Energy Facility (WEF) located approximately 45km south-east of Victoria West, which straddles the Northern and Western Cape provinces and located in the Beaufort West REDZ. The original Environmental Authorisation (EA) allowed for up to 67 wind turbine generators (WTG) for the Modderfontein WEF with a total generating capacity of 201MW using turbines with a generating capacity of up to 3MW. The applicant, South African Renewable Green Energy (Pty) Ltd (SARGE) along with technical partner Modderfontein (Pty) Ltd, proposes amending the existing EA by decreasing the number of WTG from 67 to 34. The 34 WTG will be divided into two clusters to allow the applicant and technical partner to be granted separate EAs for the proposed developments as agreed upon. Cluster B (25 WTG) will be managed by Modderfontein (Pty) Ltd, and Cluster A (9 turbines) will be managed by the applicant, SARGE. The generating capacity of the WTG will be upgraded from 3MW to 5.6MW and the hub height will be up to 119m with a rotor diameter of 162m with a total generating capacity of 190.4MW.

The Applicant has proposed the following amendment to the existing Authorisation:

- Up to 34 WTGs with a total generating capacity of 140MW (cluster 1) and 50.4MW (cluster 2)
- A total output of 190.4MW
- WTGs with a generating capacity of up to 5.6 MW
- *The proposed development will be an approximately 50% reduction in turbine density*

### 1.2 Previous Heritage Processes

At the time of the original EIA process for the Karoo Renewable Wind Energy Facility which included the proposed Modderfontein WEF as well as other properties including the Noblesfontein Wind Energy Facility, Binneman et al. (2011) completed an archaeological assessment. This assessment was submitted to both Heritage Western Cape and SAHRA (SAHRIS Case ID 2005).

In response to the Karoo Renewable Wind Energy Facility, application, SAHRA made the following comments (it is important to note that some of these recommendations pertain to sites located within the authorised Noblesfontein Wind Energy Facility, and are therefore not pertinent to this application):

- The Later Stone Age sites S31, S32 and S39 (SAHRIS IDs 34718, 34719 and 34737) must be mitigated with a Phase 2 Archaeological Impact Assessment. Mitigation in the form of recording, sampling and a photographic record must be undertaken before trenching and any other earth-moving activity resulting



from this proposed project commences. The archaeologist will require a mitigation permit from SAHRA in terms of s. 35 of the National Heritage Resources Act (Act 25 of 1999). On receipt of a satisfactory mitigation (Phase 2) permit report from the archaeologist, SAHRA will make further recommendations in terms of the site such as its final destruction or additional sampling.

- The proposed final position of wind turbines and solar panels must be investigated for the presence of possible rock engravings and rock paintings.
- No construction activity is allowed within 100m of rock paintings, rock engravings, rock shelters where rock art material is preserved and sites with stone walls and kraals. If this distance cannot be avoided and the development has to occur within 100m from any of these sites, a temporary fence must be erected around the site (in consultation with the archaeologist) and foremen and workmen educated about its significance.
- In no circumstances will development be allowed within 50m from stone walls and kraals and from rock art sites.
- All newly identified rock paintings and rock engravings in the area should be recorded, if this has not been done yet, through photographic record and GPS position. These recordings (which may require involvement of a rock art specialist) should be included in the report to be submitted to SAHRA after the micro-siting survey is undertaken.
- A Heritage Management Plan for rock engravings, rock painting and gong rocks must be compiled and submitted to SAHRA for revision.
- The Khoekhoen pottery at site S40 should be collected and recorded. The archaeologist will apply for a collection permit from SAHRA (*S40 is located within the Noblesfontein property*)
- Destruction of the sites S46, GPS 48 must be permitted by SAHRA through a destruction permit. The developer, or their archaeologist, must apply to SAHRA for the permit. A single application (destruction permit) might be used for all sites (*S46 is located within the Noblesfontein property*).
- A Phase II HIA is required for the area of the remains (*S45 which describes the location of the human remains is located within the Noblesfontein property*.) This should define the area of the burial ground and include archival research to investigate if there is a possible link between the burials and the construction of the railway line. When a Phase II report is received by the SAHRA Burial Grounds and Graves Unit, further recommendations will be made in relation to a possible relocation or preservation of the graves. Provisions stipulated in section 36 of the National Heritage Resources Act (Act No. 25 of 1999) are applicable (see Appendix 1 and SAHRA Regulations).
- A Phase 1 Palaeontological Impact Assessment in the form of a field survey of the area is requested, the



assessment must be then submitted to SAHRA for comments. If deemed necessary after the survey, a Phase 2 rescue operation might also be requested.

- A palaeontologist must inspect fresh excavations undertaken in the fossil-bearing Teekloof Formation.
- As stated also in the Archaeological Impact Assessment, Substation 1 option 1 and substation 2 option 1 are the preferred options for two substations.

As a portion of the Modderfontein WEF project falls within the Western Cape, Heritage Western Cape (HWC) who is the heritage authority that manages the heritage resources in the Western Cape was also consulted in the original application. HWC replied that they are “satisfied with the reports being referenced and that Section 38 comments and decisions whether under a NID or HIA phase still stands therefore the requirements of 2011 stated in the NID (if one was done) still stands. However an integrated HIA (including integrated recommendation) which fulfils the requirement of Section 38(3) of the NHRA still needs to be submitted with the AIA, EA and other associated reports.”

According to the Environmental Authorisation granted for the original layout of the Modderfontein WEF (22 February 2012, Authorisation ref: 12/12/20/1993/3) the following requirements in terms of impacts to heritage are applicable:

- A heritage specialist must ground-truth every infrastructure footprint and their recommendations must inform the final layout
- If there are any changes to the layout of the turbines from the approved plan, the additional survey work will be required in order to ensure that no sites are directly impacted and/or to identify the need for an excavation permit
- Should any graves be found, all construction activities must be suspended and an archaeologist or SAHRA must be contacted immediately. The discovered graves must be cordoned off.
- A walkthrough survey of the powerline corridor must be undertaken by a heritage specialist

### **1.3 Description of Property and Affected Environment**

The area proposed for the Modderfontein Wind Farm lies south and southeast of the Biesiespoort dirt road that links the N1 to the Biesiespoort railway junction and station. The topography of the farm consists of low hills and ridges that are overlooked by the much larger Horseshoe mountain formation north of the area. The owners farmhouse and guest house (Desert Dew Guesthouse) is located along the northern boundary of the study area, more or less equidistant from the western and eastern boundaries. The vegetation is dominated by typical karoo



shrublands that are the source of grazing for sheep and cattle on the farm and a number of antelope species were encountered in varying numbers during the survey such as springbok, rhebuck and steenbuck.

A large valley occupies the central zone surveyed, surrounded by a low plateau to the north, hills and ridges to the south, west and east. The Noblesfontein Wind Farm, already constructed, lies immediately to the west on the neighbouring property and a 765kV powerline traverses the eastern portion of the study area. A few windmills and small dams, many not in working order, dot the farm besides a few jeep tracks used for mountain biking and managing the stock farming activities.

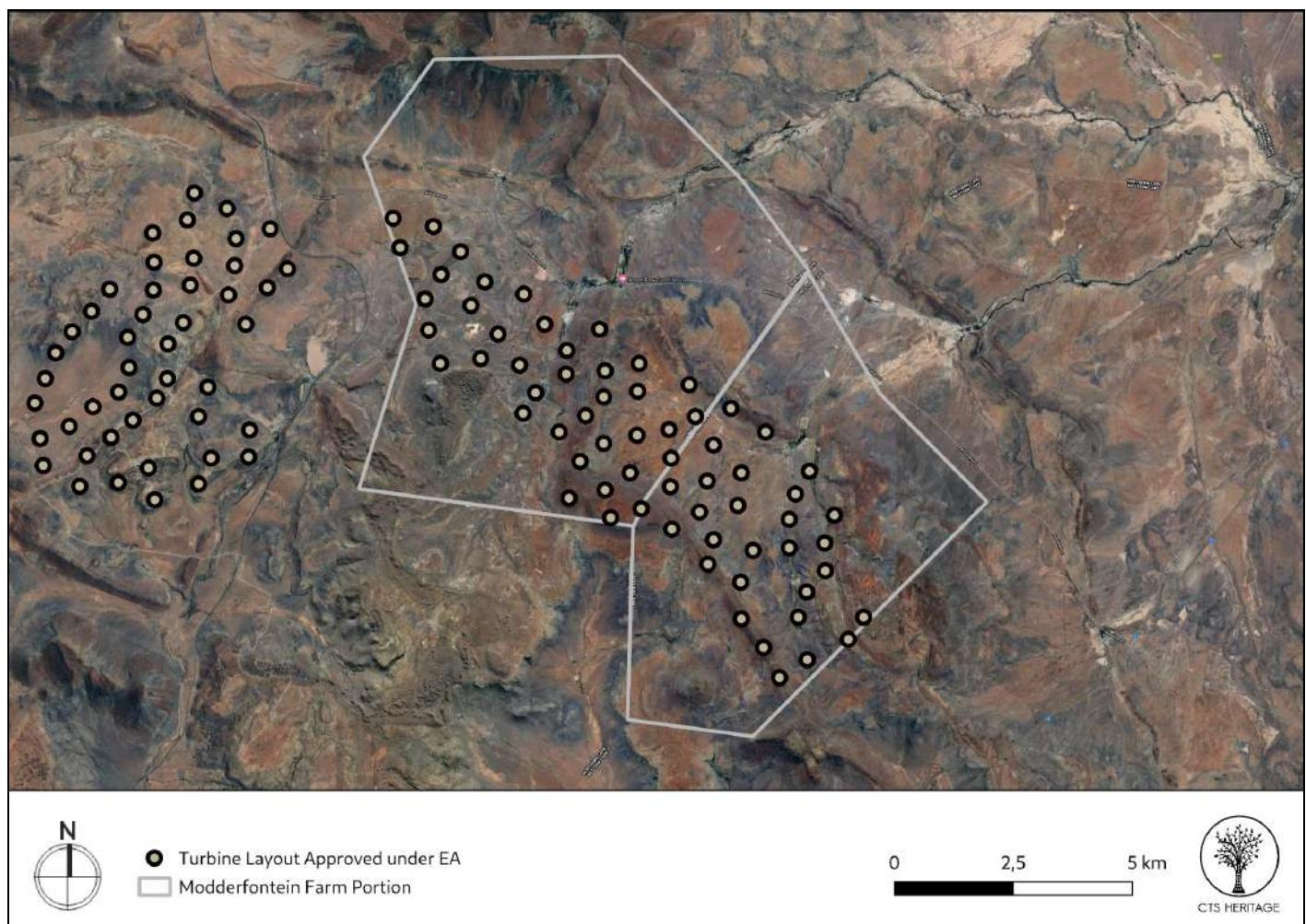


Figure 1a: Approved turbine layout for the Modderfontein WEF

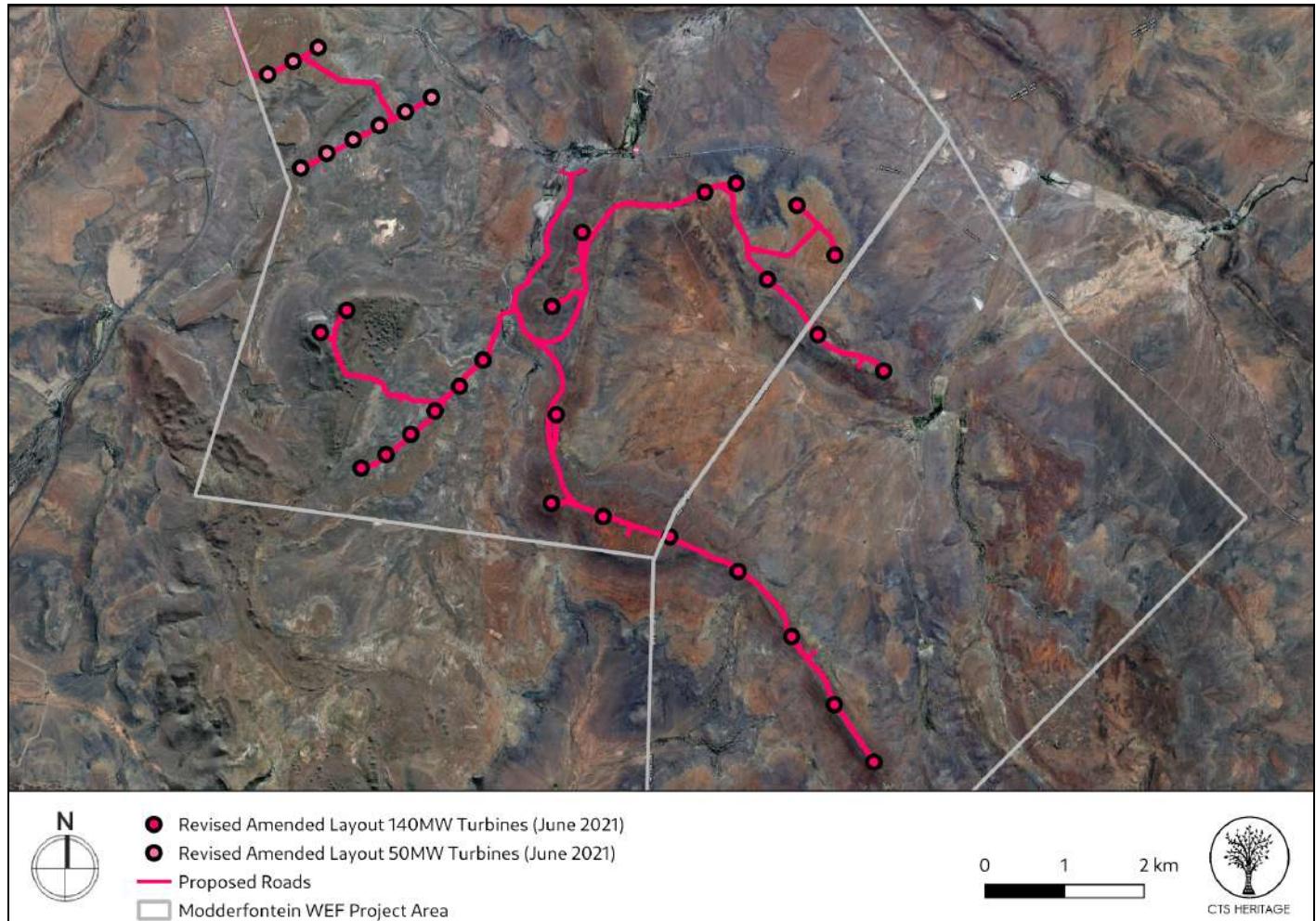


Figure 1b: Proposed amended turbine layout for the Modderfontein WEF (June 2021)

## 2. METHODOLOGY

### 2.1 Purpose of HIA

This Heritage Impact Assessment is drafted to achieve the following:

- Ensuring that the proposed amended layout conforms with SAHRA's requirements indicated above
- To satisfy HWC's requirements for an integrated HIA in terms of section 38(3) for the original layout as the original authorised layout was never subject to a process in terms of section 38(8) with HWC
- To assess the impact to heritage resources posed by the proposed amended layout to inform the HIA for the proposed amended layout



The purpose of this Heritage Impact Assessment (HIA) is therefore to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999).

## 2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- An archaeologist (Mr N. Wiltshire) conducted an assessment of archaeological resources likely to be disturbed by the authorised layout and proposed amended layout. The archaeologist conducted his site visit from 28 April to 1 May 2021
- A palaeontologist (Dr J. Almond) conducted an assessment of palaeontological resources likely to be disturbed by the authorised turbine layout and preliminary proposed amended turbine layout. The palaeontologist conducted his site visit from 20 to 24 May 2021.
- A Cultural Landscape Specialist (Ms S. Winter) conducted a desktop review of anticipated impacts of the amended layout to significant heritage resources
- The identified resources were assessed to evaluate their heritage significance
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

## 2.3 Assumptions and uncertainties

- The *significance* of the sites and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.
- It should be noted that archaeological and palaeontological deposits often occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted, and it would be required that the heritage consultants are notified for an investigation and evaluation of the find(s) to take place.

However, despite this, sufficient time and expertise was allocated to provide an accurate assessment of the heritage sensitivity of the area.



## 2.4 Constraints & Limitations

The sparse vegetation cover did not inhibit the survey in any way and full coverage of all the turbine positions was obtained by assessing Binneman's report (2011) and the sites identified during his survey, with nearly every single turbine location in the original layout being resurveyed. While interconnecting jeep tracks were used to move the 4x4 vehicle around the property, the entire survey was conducted on foot as the turbines are proposed on the ridges, elevated plateaus and small hills.

The field assessments for impacts to archaeology and palaeontology were conducted based on a preliminary proposed amended layout provided by the client (May 2021). This layout consisted of 25 proposed turbines. Subsequent to the completion of the field assessments, a new revised amended layout was provided (June 2021) consisting of 34 proposed turbines. As such, the layout maps included in the field assessments for archaeology and palaeontology do not match the layout maps included in this HIA. See Figure X below indicating the difference between the assessed layout (May 2021) and the revised amended layout (June 2021).

To the best of our ability, we have used the information gathered during the archaeology and palaeontology field assessments to inform the outcomes of this HIA. It must be noted that due to the late change in the layout, the revised amended layout has not been thoroughly assessed. However, the experience of the heritage practitioner, and observations made during the study, allow us to predict with some accuracy the archaeological and palaeontological sensitivity of the receiving environment. This has informed the recommendations provided below.



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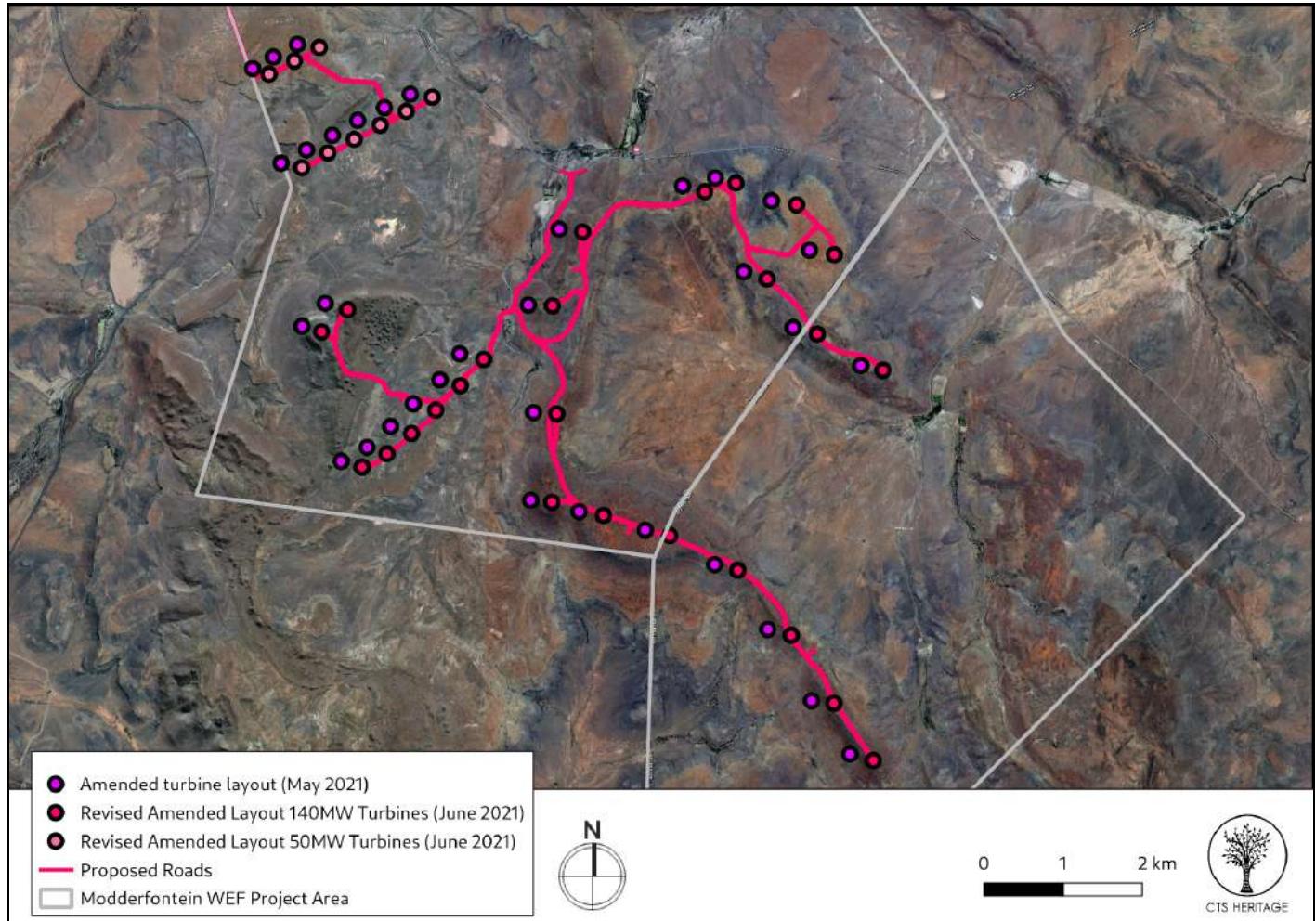


Figure 2: Proposed revised amended turbine layout for the Modderfontein WEF (pink, June 2021) overlaid with the amended turbine layout assessed in the Appendices (purple, May 2021)



## 2.5 Terramanzi Impact Assessment Methodology

Table 1: Definitions of terminology

ITEM	DEFINITION
<i>Extent</i>	
<b>Local</b>	Extending only as far as the boundaries of the activity, limited to the site and its immediate surroundings
<b>Regional</b>	Impact on the broader region
<b>National</b>	Will have an impact on a national scale or across international borders
<i>Duration</i>	
<b>Short-term</b>	0-5 years
<b>Medium- Term</b>	5-15 years
<b>Long-Term</b>	>15 years, where the impact will cease after the operational life of the activity
<b>Permanent</b>	Where mitigation, either by natural process or human intervention, will not occur in such a way or in such a time span that the impact can be considered transient.
<i>Magnitude or Intensity</i>	
<b>Low</b>	Where the receiving natural, cultural or social function/environment is negligibly affected or where the impact is so low that remedial action is not required.
<b>Medium</b>	Where the affected environment is altered, but not severely and the impact can be mitigated successfully and natural, cultural or social functions and processes can continue, albeit in a modified way.
<b>High</b>	Where natural, cultural or social functions or processes are substantially altered to a very large degree. If a negative impact then this could lead to unacceptable consequences for the cultural and/or social functions and/or irreplaceable loss of biodiversity to the extent that natural, cultural or social functions could temporarily or permanently cease.
<i>Probability</i>	
<b>Improbable</b>	Where the possibility of the impact materialising is very low, either because of design or historic experience
<b>Probable</b>	Where there is a distinct possibility that the impact will occur
<b>Highly Probable</b>	Where it is most likely that the impact will occur
<b>Definite</b>	Where the impact will undoubtedly occur, regardless of any prevention measures
<i>Significance</i>	
<b>Low</b>	Where a potential impact will have a negligible effect on natural, cultural or social environments and



	the effect on the decision is negligible. This will not require special design considerations for the project
<b>Medium</b>	Where it would have, or there would be a moderate risk to natural, cultural or social environments and should influence the decision. The project will require modification or mitigation measures to be included in the design
<b>High</b>	Where it would have, or there would be a high risk of, a large effect on natural, cultural or social environments. These impacts should have a major influence on decision making.
<b>Very High</b>	Where it would have, or there would be a high risk of, an irreversible negative impact on biodiversity and irreplaceable loss of natural capital that could result in the project being environmentally unacceptable, even with mitigation. Alternatively, it could lead to a major positive effect. Impacts of this nature must be a central factor in decision making.
<i>Status of Impact</i>	
Whether the impact is positive (a benefit), negative (a cost) or neutral (status quo maintained)	
<i>Degree of confidence in predictions</i>	
The degree of confidence in the predictions is based on the availability of information and specialist knowledge (e.g. low, medium or high)	
<i>Mitigation</i>	
Mechanisms used to control, minimise and or eliminate negative impacts on the environment and to enhance project benefits. Mitigation measures should be considered in terms of the following hierarchy: (1) avoidance, (2) minimisation, (3) restoration and (4) off-sets.	

### ***Scoring System for Impact Assessment Ratings***

To comparatively rank the impacts, each impact has been assigned a score using the scoring system outlined in the Table below. This scoring system allows for a comparative, accountable assessment of the indicative cumulative positive or negative impacts of each aspect assessed.

**Table 2: Scoring system for impacts**

<i>Impact Parameter</i>	<i>Score</i>
<b>Extent (A)</b>	<b>Rating</b>
Local	1
Regional	2
National	3
<b>Duration (B)</b>	<b>Rating</b>



Short term		1
Medium term		2
Long term		3
Permanent		4
<b>Probability (C)</b>	<b>Rating</b>	
Improbable		1
Probable		2
Highly probable		3
Definite		4
<b>Magnitude/Density (D)</b>	<b>Negative Impact Score</b>	<b>Positive Impact Score</b>
Low	-1	1
Medium	-2	2
High	-3	3
<b>SIGNIFICANCE RATING (F) = (A*B*D)*C</b>	<b>Rating</b>	<b>Rating</b>
Low	0 to -40	0 to 40
Medium	-41 to -80	41 to 80
High	-81 to -120	81 to 120
Very High	>-120	>120



### **3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT**

#### **3.1 Cultural Landscape (adapted from Winter, 2021)**

The area proposed for development is located approximately 35km south southeast of Victoria West in the Central Karoo region of the Northern Cape. Victoria West was established by the Dutch Reformed Church in 1843 along the banks of the Brakrivier watercourse. In 1859, the town became a municipality. The name 'Karoo' has its roots in the Khoisan word meaning 'place of great dryness'. It once supported large grassy flatlands and the San and Khoekhoen migrated across the region for hunting and gazing purposes. Less than two hundred years ago large herds of antelope still roamed the grass plains. With the occupation of the area by stock farmers the sheep gradually replaced the game and the grass receded along with changing grazing and weather patterns (Winter et al 2009; Winter & Oberholzer 2013). By the late 17th century, the Khoekhoen had moved from the region into the more water rich southern Karoo and the coastal plains. Numerous rock paintings and engravings have been recorded in the region some dating to the 19<sup>th</sup> century, e.g. the engravings at Nelspoort as well as on Modderfontein (Winter et al 2009).

During the early colonial period, the harshness of the Karoo region formed an almost impenetrable barrier from the Cape to the interior for colonial explorers, hunters and travellers. The 18th century was characterized by a marked increase in the rate of expansion of the boundaries of the settlement at the Cape. This was associated with the emergence of the migrant stock farmer (trekboer) (Guelke 1982 In Winter et al 2009).

By 1745 freeburgher farmers had expanded into the Bokkeveld and Hantam regions beyond the Witzenberg Mountains. By 1770, two thirds of the freeburgher farmers were migrant stock farmers who subsisted through stock farming alone. These farmers were in direct competition with the Khoekhoen for grazing and water. By the end of the 18th century, the Khoekhoen were no longer the major suppliers of fresh meat to the refreshment station: this role having been taken over by certain freeburgher stock farmers (Guelke 1982 In Winter et al 2009).

The expansion of the stock farmers into the Karoo was fiercely resisted by the San. In the Kou (area surrounding Merweville) the San successfully managed to resist the presence of stock farmers until the early 1800s. The crux of this resistance was the alienation of indigenous groups from water sources (Penrith 1974; Viviers 1968 In Winter et al 2009).

Early routes into the interior largely followed the tracks initially used by migrating herds of game or the cattle herds and sheep flocks of the Khoekhoen on their seasonal route between coastal and inland grazing grounds.



These routes were later reinforced by generations of trek farmers moving between the markets at the Cape and their farms (Winter et al 2009).

Permanent settlement of the region only really occurred in the 19th century with towns being established near permanent water sources. It was during this period that Beaufort West was established as a drosdy in 1818 on the farm Hooyvlakte. In the same year, a mission station was established at Kookfontein, just outside Beaufort West (Winter et al 2009).

### 3.2 Archaeology

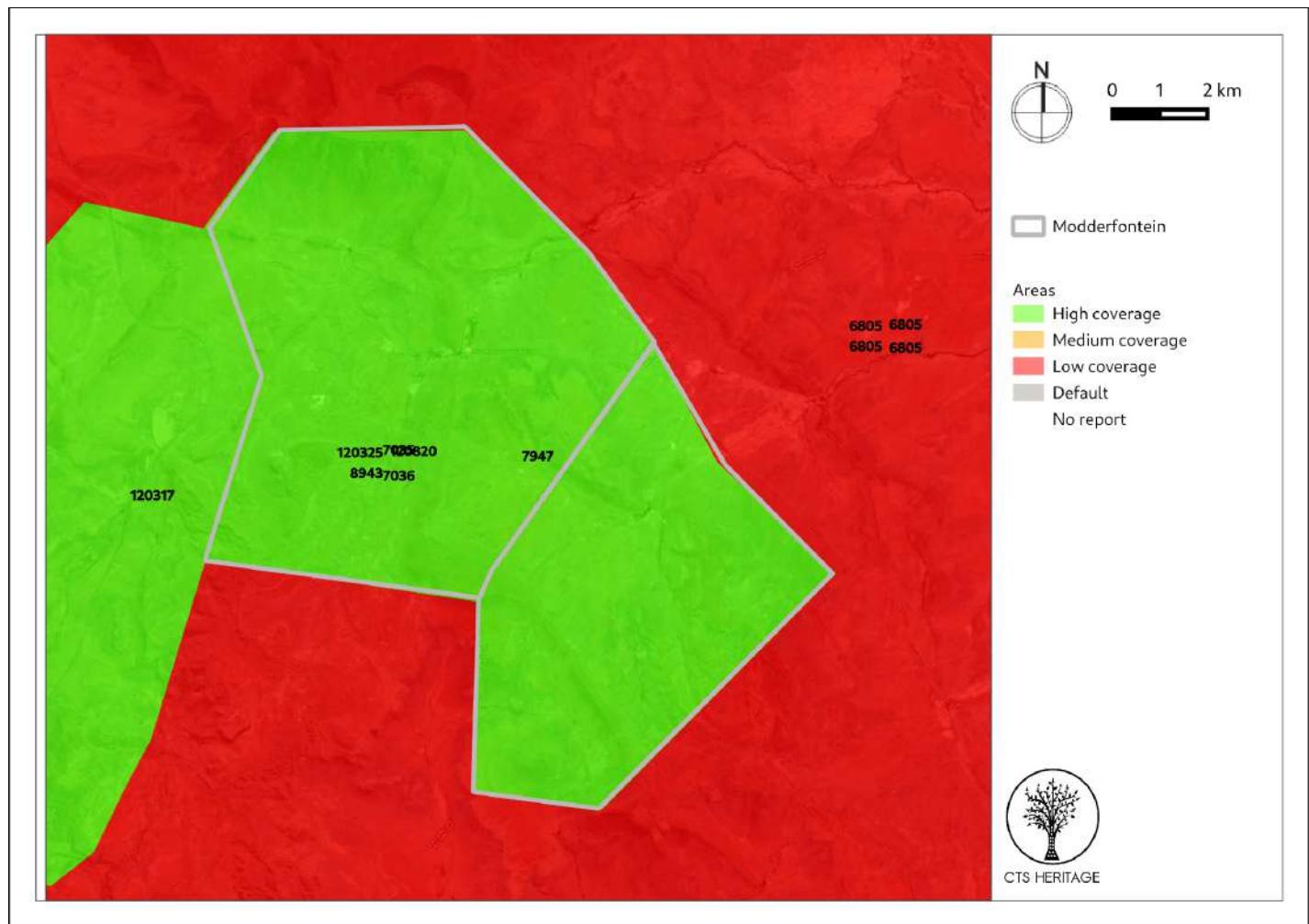
According to the Desktop Assessment completed by Booth et al. (2010, SAHRIS ID 7036), the records of early colonial travellers through the area and from Victoria West note interactions with San people who inhabited the area up until the late 19th century. In the mid-1920s, archaeologists identified a stone tool technological industry from the area and along the Vaal River known as the Victoria West Industry. Further evidence of San persistence in this landscape comes from the Later Stone Age archaeology and the rock engravings found throughout the Karoo, and on this farm.

In March 2011, Binneman et al. (SAHRIS ID 7035) completed an archaeological impact assessment that includes the area assessed in this report. Binneman et al. (2011) describe the farm as consisting of a varied landscape, including “flat, open floodplains, ridges, rocky outcrops and hillocks or koppies... The farm also consists of natural springs and dams. Disturbances owing to the construction of farm roads, fences, powerlines, telephone lines, windmills and dams, as well as domestic stock grazing and other farming activities occur throughout the area.” Binneman et al (2011) identified surface scatters of Middle Stone Age (MSA) artefacts throughout the farm, primarily located in flat floodplains at the base of rocky outcrops. Binneman et al (2011) also identified a possible purple mudstone quarry next to a river and small rocky outcrop. According to Binneman et al (2011) this quarry may have been the source for some of the MSA artefacts identified on the property. Later Stone Age (LSA) scatters were also identified on the property, however these are not as prevalent as the MSA artefacts. SAHRIS Site ID 34718 (MOD31) represents one of the more dense LSA sites on the property, including *in situ* bone. A stone kraal (Site ID 34719, MOD32) is located in close proximity to the LSA site and may even overlap it. Binneman et al (2011) also identified two areas of rock engravings (SAHRIS Site ID 34631, MOD10), some in close proximity to MSA artefacts, as well as a rock gong (SAHRIS Site ID 34632, MOD11). Binneman et al (2011) also identified several stone wall structures on the property including a large stone wall complex consisting of three large kraals and a small pen and occupation area at SAHRIS Site ID 34720 (MOD33). It must be noted that it is unclear from the report by Binneman et al (2011) whether the whole of the farm was surveyed for archaeology, or if only the area proposed



for turbines was assessed as no track paths are included in the assessment. Booth (2012) completed a walkdown assessment of the neighbouring farms in order to ground-truth the proposed WEF turbine locations, however no such walkdown has taken place on the farms included in this assessment as yet.

A list of the sites located within the Modderfontein Development Area that were identified by Binneman (2011) are recorded on SAHRIS and are included in the table in Appendix 1 of the AIA. These sites are considered in the assessment of impact in this report and are included in the recommendations proposed.



Map 3a: Spatialisation of heritage assessments conducted in proximity to the proposed development



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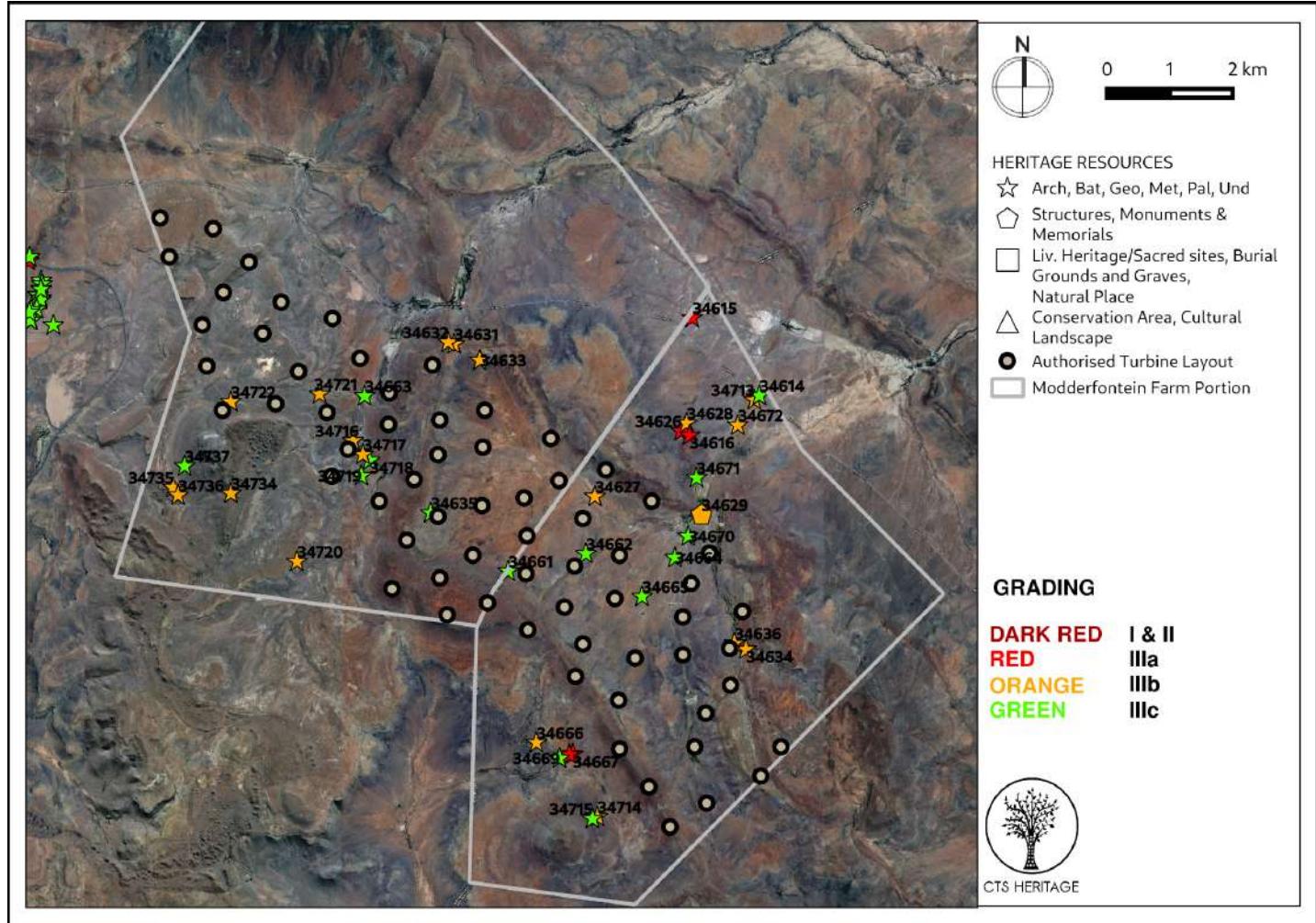


Figure 3b. Heritage Resources Map. Heritage Resources previously identified in and near the study area by Binneman (2011), with SAHRIS Site IDs indicated overlying the authorised turbine layout



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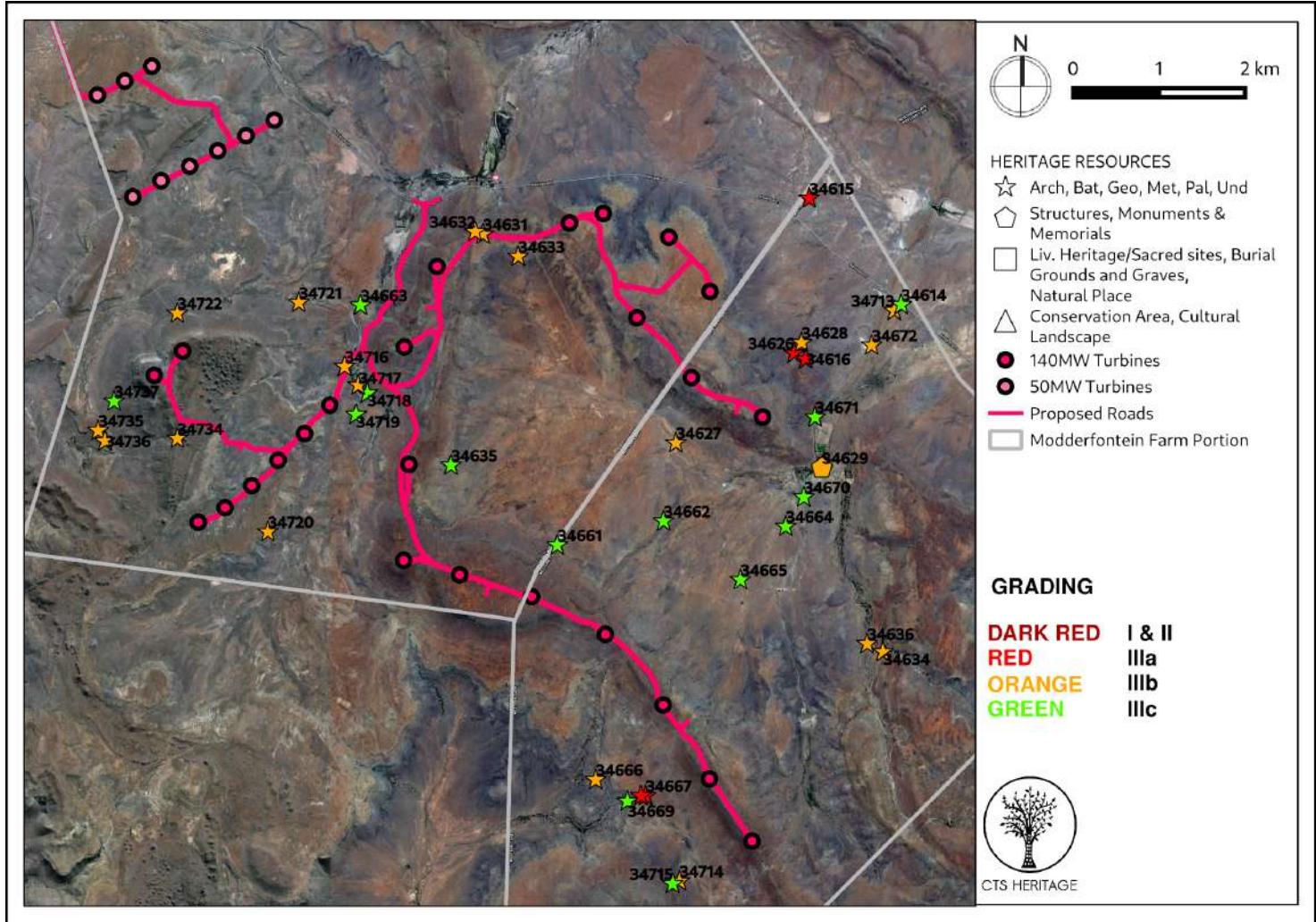


Figure 3c. Heritage Resources Map. Heritage Resources previously identified in and near the study area by Binneman (2011), with SAHRIS Site IDs indicated overlying the proposed revised amended turbine layout (June 2021)

### 3.3 Geology

*Geology (from Almond, 2021)*

The Modderfontein WEF project area on farms Modderfontein 228 and Phaisant Kraal 1 lies within the semi-arid Upper Karoo region of the RSA and features scenically attractive, dissected, mountainous to hilly terrain with rocky doleritic ridges, stepped sandstone surfaces and intervening gravelly to sandy vlates or alluvial plains. The vegetation is typical karroid bossieveld vegetation, often grassy in doleritic areas, while trees are largely restricted



to intermittently-flowing watercourses. The Modderfontein Farm is a site presently utilised for palaeontological research and is therefore highly sensitive for impacts to palaeontology.

The highest terrain lies in the north, outside the WEF project area, where the Horse Shoe reaches elevations of 1813 at Gys Roosberg while the conical peak of Rondekop in the southwest lies at 1587 m amsl. Doleritic ridges and narrow plateaux traversing the area lie up to c. 1500 m amsl. The area is drained towards the east and northeast by shallowly incised tributaries of the Brakrivier including the Gabrielspruit. Proposed WEF infrastructure is confined to the region due south of the unpaved road from the N1 trunk road to Biesiespoort railway station. Sedimentary bedrock exposure levels – especially as far as the potentially fossiliferous mudrocks are concerned – are variable and usually low due to extensive, thick alluvial sands and gravels in the lower-lying areas plus colluvium (scree) and eluvial (downwasted / relictual) gravels on steeper hillslopes and their marginal alluvial fans. However, occasional good exposures of potentially fossiliferous bedrocks are present locally, as indicated by dark grey areas on satellite images.

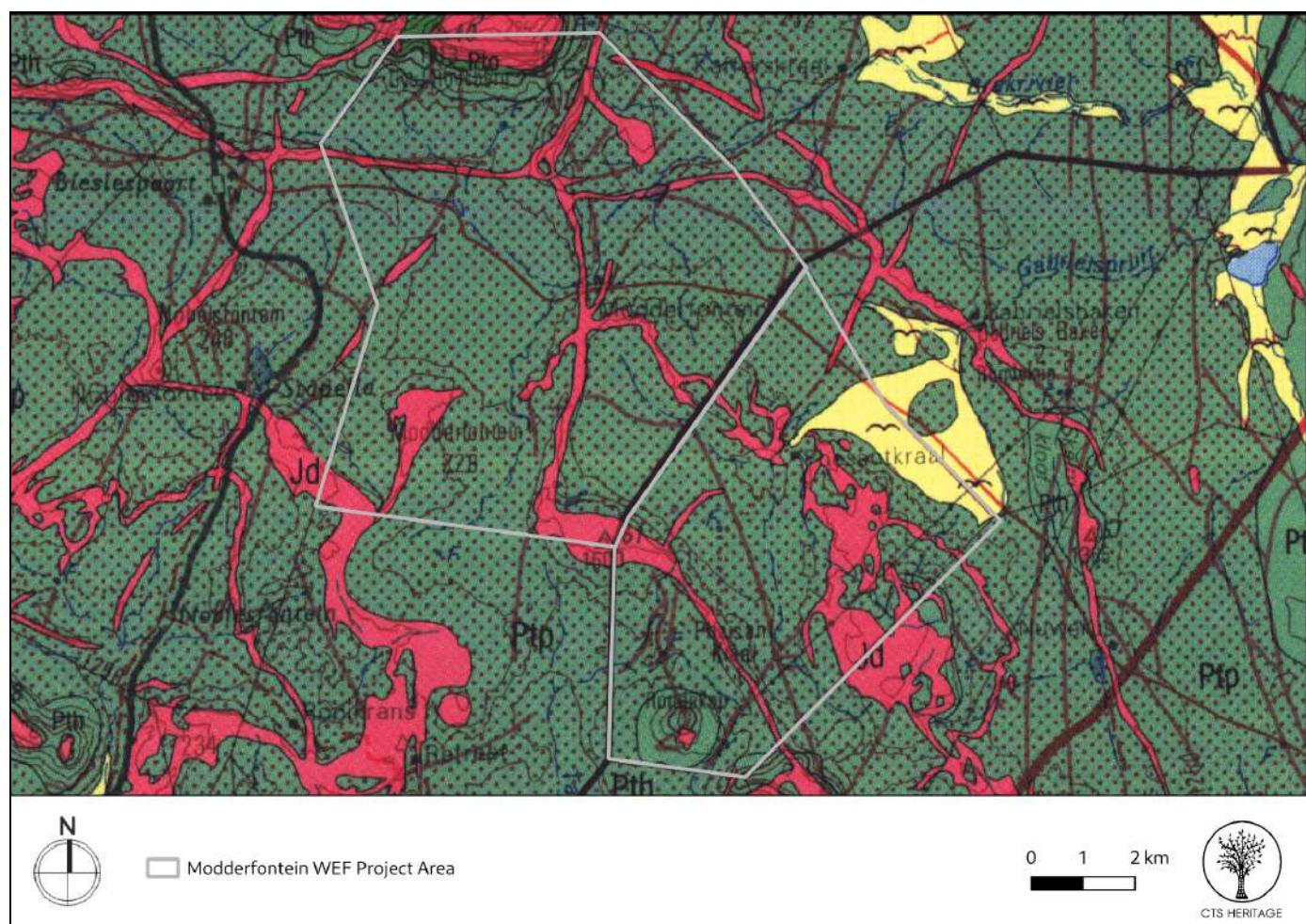
The geology of the Modderfontein WEF project area is outlined on the 1: 250 000 geology sheet 3122 Victoria West (Figure 4b) with a short accompanying sheet explanation by Le Roux & Keyser (1988). The project area is almost entirely underlain by Late Permian continental sediments of the Lower Beaufort Group (Adelaide Subgroup, Karoo Supergroup) (Johnson et al. 2006). According to the published geological map two subunits or members of the Teekloof Formation are represented within the study area, namely the basal sandstone-dominated Poortjie Member (Ptp) and the overlying mudrock-dominated Hoedemaker Member (Pth). The Poortjie Member mainly crops out in lower-lying terrain and builds the lower portions of stepped hillslopes, low-lying sandstone plateaux and their fringing escarpments. The Hoedemaker Member, as mapped, builds the smoother slopes of Rondekop in the southwest as well as the lower slopes (largely obscured by colluvium) of the Horse Shoe range on the northern margins of Farm Modderfontein 228.

An irregular network of resistant-weathering Karoo dolerite bodies intrude the Beaufort Group sedimentary country rocks within the WEF project area. Areas of dolerite intrusion are typically associated with ferruginous lateritic soils and calcrete formation. In upland areas rounded dolerite corestones often display a very dark brown to black patina of desert varnish which has often been exploited by rock engravers in pre-historic as well as early historical times.



Various types of superficial deposits of Late Caenozoic (Miocene / Pliocene to Recent) age occur widely throughout the Great Karoo region, including the present study area. They include pedocretes (e.g..calcretes or soil limestones), colluvial slope deposits (sandstone and dolerite scree, downwasted or eluvial gravels etc), sheet wash, river channel alluvium and terrace gravels, soils, as well as spring and pan sediments (Johnson & Keyser 1979, Le Roux & Keyser 1988, Cole et al., 2004, Partridge et al. 2006).

The intervening lower-lying areas are for the most part thickly blanketed in Quaternary alluvium but, apart from a small area due east of Pheasantkraal homestead associated with the Gabrielespruit drainage line, these younger superficial deposits are not mapped at 1: 250 000 scale.



**Map 4a: Geology Map.** Extract from the CGS 3122 Victoria West Map indicating that the development area is underlain by sediments of the Karoo Supergroup assigned to the Beaufort group, within the Poortjie Member of the Teekloof Formation of the Adelaide Subgroup.



### 3.4 Palaeontology

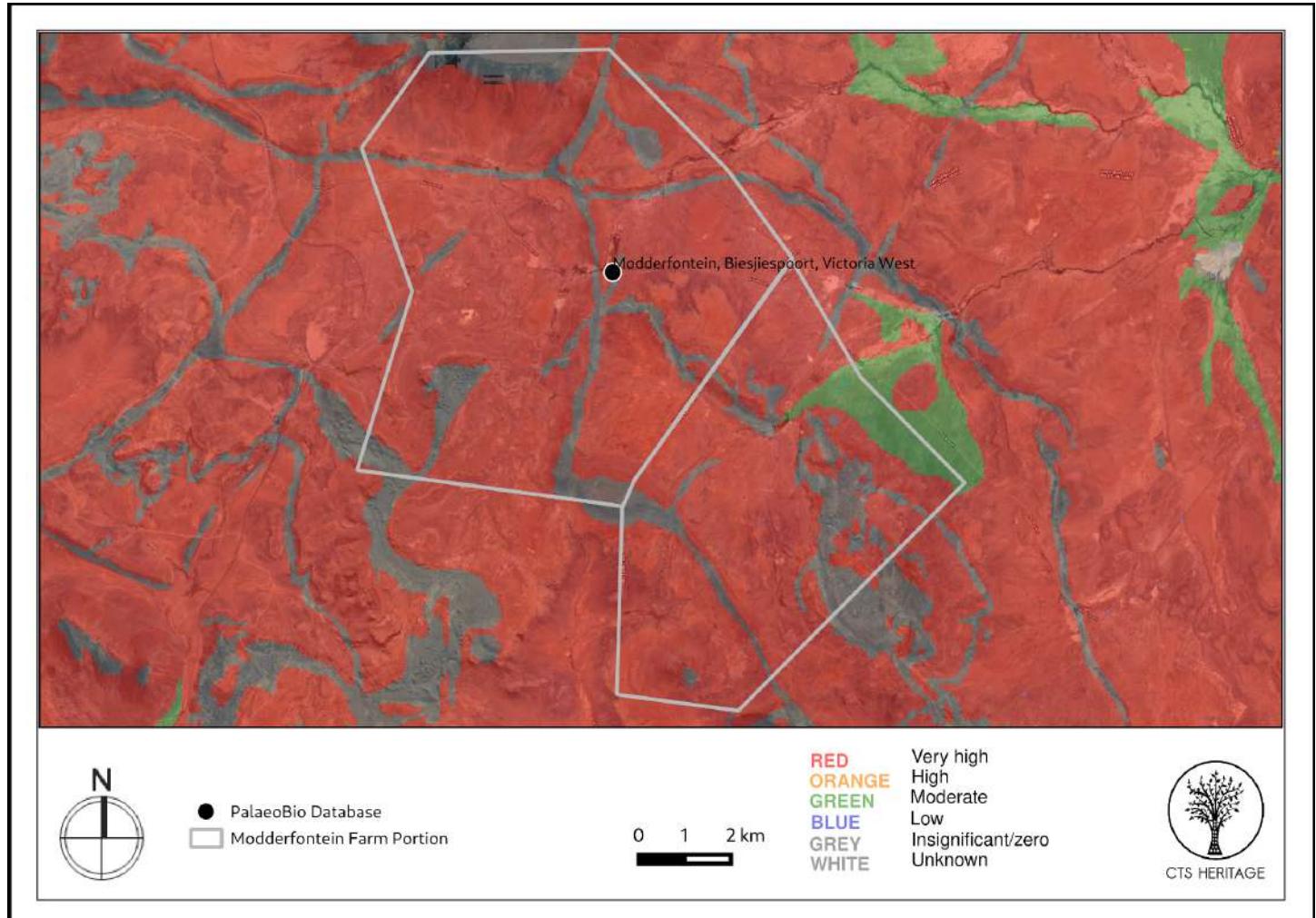
According to the SAHRIS Palaeosensitivity Map, the area under assessment is underlain by sediments of very high palaeontological sensitivity. The sediments underlying the development area include sediments of the Karoo Supergroup assigned to the Beaufort group, within the Poortjie Member of the Teekloof Formation of the Adelaide Subgroup (Council of GeoScience Map 3122, Victoria West). Rossouw (2011) conducted a desktop Palaeontological Assessment for an area that includes the area assessed in this report (SAHRIS ID 8943). According to Rossouw, the Teekloof Formation bedrock sediments located in this area have high palaeontological significance for the potential to impact on terrestrial tetrapods, plants, silicified wood and trace fossils. Rossouw (2011) further notes that Quaternary alluvial deposits in the area, especially near water courses and drainage lines, are of medium palaeontological sensitivity and have the potential to yield microfossils and fossil mammal remains as well as Early Stone Age artefacts.

Furthermore according to the PalaeoBio Database (a non-governmental, non-profit public resource for palaeontological data), a palaeontological collection is known from this farm (Figure 4a). Reference to this collection is made by Broom (1903) and it is likely that this collection is housed with the Karoo Vertebrate Palaeontology collection at the University of the Witwatersrand, however this will require confirmation. The Modderfontein Fossil Collection speaks to the high palaeontological sensitivity of this farm. Due to this high sensitivity, Rossouw (2011) recommends that a palaeontological field assessment be undertaken to mitigate impacts to palaeontological heritage. SAHRA agreed with this recommendation in their comment dated 4 June 2013 indicating that a palaeontological field assessment is required (attached correspondence).

According to Almond (2021), “The Modderfontein WEF project area is underlain by continental sediments of the Teekloof Formation (Lower Beaufort Group, Karoo Supergroup) of Late Permian age. These sedimentary bedrocks have yielded important fossil vertebrate faunas of the Endothiodon Assemblage Zone (incorporating the previous Pristerognathus and Tropidostoma Assemblage Zones) plus younger assemblages in the area south of Victoria West. In particular, vertebrate fossil sites in the vicinity of Biesiespoort railway station (Farm Noblesfontein 227, Matjiesfontein 220 and Modderfontein 228), situated just west of the present WEF project area, have been studied by several prominent Karoo palaeontologists since the early C20. Fossils collected here include several holotype specimens of herbivorous and carnivorous therapsids (“mammal-like reptiles”) and continue to make a key contribution to the biostratigraphic zonation of the Beaufort Group (Day & Rubidge 2020a).”



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Map 4b: Palaeontological sensitivity of the proposed development area



## 4. IDENTIFICATION OF HERITAGE RESOURCES

### 4.1 Summary of findings of Specialist Reports (2021)

The summaries below pertain to the specialist assessments conducted in 2021 unless indicated otherwise. The results of the assessments of impacts to archaeological and palaeontological resources anticipated by the authorised layout are summarised in section 3 above.

#### *Archaeology*

The field assessment was carried out by the archaeologist to cover both the original layout as well as the amended layout (May 2021). A total of 85 additional observations were made during the field assessment and these were dominated by MSA open air artefact scatters. The MSA artefacts were predominantly derived from local hornfels and quarries at the base of the ridges and small hills were observed where exposures of rock were readily available.

LSA material was virtually absent on the farm but where it was found the bulk of the source material was sourced from elsewhere and introduced into the area rather than being sourced locally. The engravings found by Binneman (2011) and during this survey were historic and likely date to the 19th century when the diamond rush created a large increase in migrant work seeking opportunities in Kimberley.

A few built environment structures were found such as the ruined shepherd's building at site MDF 002 and the beautiful stonework found at the kraal and dipping pen at site MDF 020. Previously recorded structures by Binneman have already been reported on with the main cluster located at SAHRIS Site ID 34629. While none of our recent findings contradicted the work done by Binneman (2011), it seems the original layout had not been provided for in the previous assessment and his study therefore provided a very good characterisation of the overall archaeological resources of the farm rather than an exhaustive survey of the impacted footprint of the original layout. This study has therefore filled the gaps in the survey of the original layout as well as firming up the sites that may be impacted by the revised and reduced layout.

#### *Palaeontology*

Almond's findings (2021) are summarised here:

"The palaeosensitivity of the Modderfontein WEF project area is provisionally rated as Very High in standard screening studies. A three-day palaeontological site visit, focussing mainly on the limited areas with good Teekloof mudrock exposure, shows that vertebrate fossils are locally common here with over 50 new fossil sites recorded.



Some of the stratigraphically lower mudrock horizons are apparently only sparsely fossiliferous, however well-exposed, while most of the fossils recorded comprise common forms of small-bodied dicynodonts of limited scientific interest. Other fossil groups recorded include fragmentary material of larger therapsids (mostly unidentified), various vertebrate burrows, low-diversity invertebrate trace fossil assemblages and very occasional plant material (moulds of glossopterid leaves, equivocal woody plant stems). Fossils are rare within sandstone facies while those recorded within thermally metamorphosed (“baked”) Teekloof Formation bedrocks adjacent to dolerite intrusions are very poorly preserved. The Karoo dolerites, where a high proportion of wind turbines will be sited, are unfossiliferous and most lower-lying areas are mantled by thin to thick alluvial and colluvial deposits of Late Caenozoic age that are of low palaeosensitivity.

It is concluded that the majority of the Modderfontein WEF project area is, in practice, of Low palaeosensitivity with scattered, and to some extent unpredictable, islands of High sensitivity.”

### *Cultural Landscapes*

A VIA was conducted in 2011 assessing the Visual Impacts of the authorised layout (ie. 67 turbines, each wind turbine was expected to consist of a concrete foundation, a steel tower, a hub (placed at approximately 125m above ground level) and three 55m long blades attached to the hub.) In summary, the VIA (2011) found that:

- The anticipated visual impact of the facility on the regional visual character, and by implication, on the sense of place, is expected to be **moderate**.
- The aesthetic appeal of the local natural features (scenic mountains), the remote location of the area, its undeveloped nature and its unique sense of place afford the area a level of tourism potential. Although this tourism potential has not yet been realised or optimised, the N1 and N12 represent national tourist access routes which are fully optimised and utilised by tourists. In this respect, reference is made to the Three Sisters, a cluster of hills which is visible from the national road, and which has come to be a tourist attraction and landmark in the area. This landmark lies to the south of the N1 (i.e. in a direction opposite to that of the proposed facility), and the viewing position does not lie within the anticipated viewshed.
- Visual intrusion through the development of industrial type infrastructure within this environment could jeopardise the area’s tourism value and potential.
- The anticipated visual impact of the facility on existing tourist routes, as well as on the tourism potential of the region, is expected to be **low**.



The Cultural Landscape Assessment (2021) noted that there is no substantial difference between the authorised and amended layout in terms of impacts to the cultural landscape. While there is a significant reduction in the number of turbines from 67 to 34 in the amended layout this is offset by the extent of the viewsheds being similar and by the height of the turbines being slightly taller in the amended layout. In both layouts, the overall impact on the regional cultural landscape is anticipated as **moderate** before and after mitigation. However, at a local scale the impact is anticipated as **high**. In this regard, the primary cultural landscape receptors are the N1, N12 and R63. The impact on the regional cultural landscape is considered acceptable given the broad expansive nature of the landscape and thus its ability to absorb the nature and scale of development.

## 4.2 Heritage Resources identified

### *Archaeology*

The sites listed in the table below are the sites with some heritage significance identified in the 2021 field assessment and are recorded in addition to the sites recorded by Binneman (2011). The sites from Binneman (2011) are recorded on SAHRIS, are listed in Appendix A of the Archaeology Report (2021) and are included in the mapping assessments conducted below.

**Table 3: Heritage resources identified during the archaeological field assessment**

POINT ID	Area	Description	Co-ordinates	Grading	Mitigation	
<i>Western Cape</i>						
MDF WEF 2	Modderfontein WEF 2	Slate walled ruin square no roof, some glass and tin	-31.78466	23.31264	IIIC	100m Buffer
MDF WEF 20	Modderfontein WEF 20	Some walled kraal, dipping pen	-31.77638	23.29163	IIIC	100m Buffer
<b>MDF WEF 28</b>	<b>Modderfontein WEF 28</b>	<b>Historical scratches names and lines</b>	<b>-31.75658</b>	<b>23.29067</b>	<b>IIIA</b>	<b>100m Buffer</b>
MDF WEF 29	Modderfontein WEF 29	Wagon and horses scene, scratched, incised	-31.75667	23.29072	IIIA	100m Buffer
<i>Northern Cape</i>						
<b>MDF WEF 40</b>	<b>Modderfontein WEF 40</b>	<b>Historical scratched graffiti</b>	<b>-31.73825</b>	<b>23.26693</b>	<b>IIIB</b>	<b>100m Buffer</b>
MDF WEF 47	Modderfontein WEF 47	Lots of MSA blades hornfels	-31.75398	23.25765	IIIB	100m Buffer
<b>MDF WEF 68</b>	<b>Modderfontein WEF 68</b>	<b>hornfels flakes, hornfels thin burin bladelet</b>	<b>-31.76789</b>	<b>23.22403</b>	<b>IIIA</b>	<b>100m Buffer</b>
MDF WEF 72	Modderfontein WEF 72	Stone kraal walling	-31.76035	23.24769	IIIB	100m Buffer
MDF WEF 78	Modderfontein WEF 78	Various hornfels flakes, LSA and MSA, quartzite flake and core	-31.74503	23.23312	IIIC	100m Buffer
MDF WEF 79	Modderfontein WEF 79	Binneman site, scratched and incised engravings, hard to make out the older figures. Msa and historic artefacts	-31.74646	23.22203	IIIA	100m Buffer



### ***Palaeontology***

It is important to note that the fossil sites recorded in the palaeontological assessment represent only a representative fraction of the sites present at surface. The absence of recorded sites in an area does not imply that no fossils are present here, at or beneath the land surface. Furthermore, given current uncertainties concerning the mapping and lithostratigraphy of the Lower Beaufort Group bedrocks in the project area (cf Day & Rubidge 2020a), the fossils listed here are not referred to a specific subunit or member of the Teekloof Formation.

### ***Cultural Landscape***

As noted above, despite the location of the development area within the Beaufort West REDZ, the site forms part of a broader cultural landscape representative of the Great Karoo region possessing heritage value for historical, aesthetic, architectural, social, scientific reasons. The site possesses a number of landscape qualities, which are representative of this cultural landscape or regional morphological zone. However, the site does not possess particular heritage significance in its own right to warrant formal protection or grading from a cultural landscape perspective. Notwithstanding this, there are two aspects, in addition to the archaeological resources identified, with heritage management implications from a cultural landscape perspective:

- Impacts to the scenic routes of the N1, N12 and R63.
- Impacts to the number of tall hills and mountains with steep elevated slopes with an inherent scenic quality
- Impacts to the conservation worthy archaeological and built features including rock engravings and stone structures,



**Table 4: Fossil resources identified during the palaeontological field assessment**

Loc.	Latitude	Longitude	Comments	Grading
<b>Western Cape</b>				
340	S31° 45' 19.0"	E23° 18' 04.8"	Phaisant Kraal 1. Partial snout of small dicynodont. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
343	S31° 45' 18.7"	E23° 18' 02.0"	Phaisant Kraal 1. Small palaeocalcrete concretion containing the tusk of a small therapsid (probably dicynodont). Proposed Field Rating IIIC. No mitigation recommended.	IIIC
344	S31° 45' 18.6"	E23° 18' 01.4"	Phaisant Kraal 1. Small dicynodont skull preserved ventral side upwards within palaeocalcrete concretion. Also possible (but equivocal) vertebrate burrow cast c. 15-20 cm wide. Proposed Field Rating IIIB. <b>Skull specimen to be collected if it falls within 10 m of development footprint.</b>	IIIB
347	S31° 45' 26.0"	E23° 18' 04.0"	Thick (up to 6m) Late Caenozoic alluvial deposits, the older horizons partially calcretised with dispersed cylindrical calcretised rhizoliths (root casts). Proposed Field Rating IIIC. No mitigation recommended.	IIIC
352	S31° 47' 40.3"	E23° 16' 30.3"	Phaisant Kraal 1. Package of medium-bedded, interbedded, baked, mottled mudrocks and pale yellowish sandstones. Poorly-preserved bones (probably ribs) of small-bodied tetrapod within speckled sandstone. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
353	S31° 47' 40.7"	E23° 16' 30.4"	Phaisant Kraal 1. Incomplete skull table and two other incomplete skulls of small-bodied therapsids (probably dicynodonts) within mottled, baked mudrocks. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
356	S31° 47' 49.6"	E23° 16' 41.5"	Phaisant Kraal 1. Partial, fragmented skull (c. 7 cm long) and some postcrania of a small-bodied therapsid, possibly not dicynodont, preserved within mottled, baked mudrock. Proposed Field Rating IIIB. <b>Specimen to be collected if it falls within 10 m of development footprint.</b>	IIIB
357	S31° 47' 50.4"	E23° 16' 41.1"	Phaisant Kraal 1. Curled-up skeleton of small-bodied tetrapod embedded within mottled, baked mudrock. Possibly includes skull with teeth (unconfirmed). Proposed Field Rating IIIB. <b>Specimen to be collected if it falls within 10 m of development footprint.</b>	IIIB
359	S31° 47' 43.5"	E23° 16' 23.6"	Phaisant Kraal 1. Skull including articulated lower jaw of small-bodied dicynodont preserved within ferruginised palaeocalcrete concretion, in float. Second small concretion containing disarticulated postcrania of a small tetrapod. Proposed Field Rating IIIB. <b>Specimens to be collected if they fall within 10 m of development footprint.</b>	IIIB
362	S31° 47' 15.1"	E23° 17' 08.7"	Phaisant Kraal 1. Baked pedocrete concretion containing unidentified white bones. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
363	S31° 46' 51.1"	E23° 17' 41.6"	Phaisant Kraal 1. Occipital region of skull of small dicynodont weathered out in float. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
364	S31° 46' 51.2"	E23° 17' 41.1"	Phaisant Kraal 1. Thin (c. 5-10 cm), greenish breccio-conglomerate of reworked pedocrete concretions, mudflakes and sparse bone material (fragmentary, sun-cracked) within thin-bedded, purple-brown mudrock succession. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
365	S31° 46' 50.8"	E23° 17' 39.3"	Phaisant Kraal 1. Skull (with articulated lower jaw) and associated postcrania of small-bodied dicynodont embedded within grey-green mudrock. Proposed Field Rating IIIB	IIIB

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			<b>IIIB. Specimen to be collected if it falls within 10 m of development footprint.</b>	
<b>366</b>	S31° 46' 50.9"	E23° 17' 39.2"	Phaisant Kraal 1. Pedocrete concretion containing disarticulated postcrania of small tetrapod. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>367</b>	S31° 46' 51.9"	E23° 17' 39.4"	Phaisant Kraal 1. Isolated skull with articulated deep lower jaw of small dicynodont preserved side-upwards within grey-green overbank mudrocks, somewhat laterally compressed. Proposed Field Rating IIIB. <b>Specimen to be collected if it falls within 10 m of development footprint.</b>	IIIB
<b>368</b>	S31° 46' 51.9"	E23° 17' 38.6"	Phaisant Kraal 1. Several small blocks of mudrock and pedogenic concretion containing very fragmentary skeletal remains of small tetrapods. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>370</b>	S31° 46' 50.2"	E23° 17' 39.4"	Phaisant Kraal 1. Isolated lower jaw of small dicynodont embedded within grey-green mudrock. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>372</b>	S31° 47' 08.9"	E23° 17' 46.4"	Phaisant Kraal 1. Small pedogenic calcrete nodule with disarticulated postcranial remains of a small-bodied tetrapod. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>373</b>	S31° 47' 09.8"	E23° 17' 46.1"	Phaisant Kraal 1. Isolated snout of small-bodied dicynodont. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>374</b>	S31° 47' 10.1"	E23° 17' 46.3"	Phaisant Kraal 1. Skull of small dicynodont embedded within grey-green mudrock and partially exposed in lateral view. Proposed Field Rating IIIB. <b>Specimen to be collected if it falls within 10 m of development footprint.</b>	IIIB
<b>375</b>	S31° 47' 09.8"	E23° 17' 46.5"	Phaisant Kraal 1. Possible, but equivocal. Sandstone cast of curved vertebrate burrow (c. 15 cm wide). Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>376</b>	S31° 47' 11.0"	E23° 17' 45.7"	Phaisant Kraal 1. Bioturbated "lumpy-weathering" purple-brown and grey-green mudrock horizon with several equivocal casts of vertebrate burrows, including possible helical burrows (requires confirmation). Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>377</b>	S31° 47' 11.5"	E23° 17' 44.7"	Phaisant Kraal 1. Poorly-preserved skull of small dicynodont, side-upwards, within grey-green, possibly vertebrate-burrowed mudrock horizon. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>379</b>	S31° 47' 17.4"	E23° 17' 51.7"	Phaisant Kraal 1. Possible, but equivocal, inclined, grey-green vertebrate burrow cast (c. 5 cm wide) within purple-brown mudrocks. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>380</b>	S31° 47' 17.8"	E23° 17' 51.2"	Phaisant Kraal 1. Float blocks of grey-green siltstone with fragmentary postcrania (backbone, pelvis) of a small-bodied tetrapod. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>384</b>	S31° 45' 31.9"	E23° 12' 45.5"	Modderfontein 228. Small dicynodont skull, lateral side upwards, embedded within grey-green siltstone bedrocks in stream gully. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>385</b>	S31° 45' 31.9"	E23° 12' 45.5"	Modderfontein 228. Probable skull and postcrania (ribs, vertebrae) of small tetrapod (probably dicynodont) within grey-green siltstone bedrocks, poorly preserved. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>386</b>	S31° 45' 31.9"	E23° 12' 45.4"	Modderfontein 228. Poorly-preserved dicynodont skull within loose palaeocalcrete concretion. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
<b>387</b>	S31° 45' 31.8"	E23° 12' 44.8"	Modderfontein 228. Two loose palaeocalcrete nodules in surface float containing	IIIC

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			postcrania of small tetrapods. Proposed Field Rating IIIC. No mitigation recommended.	
388	S31° 45' 37.7"	E23° 12' 40.3"	Modderfontein 228. Gentle low hillslope exposure of purple-brown and grey-green overbank mudrocks with probable vertebrate burrow cast, several fossil bone scraps. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
392	S31° 45' 34.8"	E23° 12' 46.2"	Modderfontein 228. Small dicynodont skull exposure dorsum-up in stream gully exposure of grey-green mudrocks. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
393	S31° 45' 34.7"	E23° 12' 46.2"	Modderfontein 228. Poorly-preserved skull of small tetrapod within ferruginous calcite concretion, stream gully exposure of grey-green mudrocks. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
398	S31° 45' 17.3"	E23° 14' 14.4"	Modderfontein 228. Scrap of fossil bone within siltstone float. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
399	S31° 45' 17.1"	E23° 14' 14.0"	Modderfontein 228. Several small, loose float fragments of medium-sized tetrapod, including a partial tooth row, probably of a theropcephalian therapsid. Proposed Field Rating IIIB. <b>Specimens to be collected if they fall within 10 m of development footprint.</b>	IIIB
400	S31° 45' 16.6"	E23° 14' 12.7"	Modderfontein 228. Several disarticulated fine ribs of small-bodied tetrapod preserved within sandstone. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
405	S31° 43' 56.6"	E23° 16' 35.8"	Modderfontein 228. Float specimen of small dicynodont skull. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
406	S31° 44' 09.0"	E23° 16' 50.0"	Modderfontein 228. Float specimen of small dicynodont snout. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
407	S31° 44' 09.3"	E23° 16' 50.2"	Modderfontein 228. Float block of mudflake basal channel breccia containing isolated fossil tusk. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
413	S31° 44' 05.5"	E23° 16' 18.8"	Modderfontein 228. Float fragment of palaeocalcrete concretion containing sun-cracked tetrapod bone. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
414	S31° 44' 06.4"	E23° 16' 18.6"	Modderfontein 228. Snout of small-bodied dicynodont. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
416	S31° 44' 05.9"	E23° 16' 27.3"	Modderfontein 228. Snout (palatal view) of small tetrapod skull, possibly with tiny teeth, probably sun-cracked and associated with mudflakes within float block of grey-green sandstone. Simple horizontal cylindrical burrows associated with wave-rippled palaeosurface. Probable sandstone cast of vertebrate burrow with elliptical cross-section (c. 15-20 cm wide). Proposed Field Rating IIIC. No mitigation recommended.	IIIC
417	S31° 44' 07.4"	E23° 16' 27.6"	Modderfontein 228. Fragment of well-preserved, partially crushed rib or limb bone of medium-sized tetrapod among float. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
418	S31° 44' 05.7"	E23° 16' 29.8"	Modderfontein 228. Incomplete glossipterid leaf with clear midrib but indistinct venation, preserved within yellowish sandstone float block. Proposed Field Rating IIIC. No mitigation recommended.	IIIC
428	S31° 45' 47.7"	E23° 17' 58.4"	Phaisant Kraal 1. Pale brown, fine-grained tabular sandstones with local wave rippling, showing areas of smooth surfaces within fine mud cracking, wrinkled microbial mat textures, small-scale invertebrate burrows (possibly undermat miners such as insects), probable casts of reedy plant stems. Proposed Field Rating IIIB. <b>Specimens already</b>	IIIB

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			<b>protected within riverine area downstream of farm dam.</b>	
429	S31° 45' 49.6"	E23° 17' 57.0"	Phaisant Kraal 1. Same setting as above with several probable tetrapod burrows (c. 15-20 cm across), variously preserved as shallow troughs, low ridges or smooth, straight to sinuous strips on sandstone bed tops. Proposed Field Rating IIIB. <b>Specimens already protected within riverine area downstream of farm dam.</b>	IIIB
<i>Northern Cape</i>				
383	S31° 45' 33.2"	E23° 12' 46.4"	Modderfontein 228. Well-preserved skull of small-bodied dicynodont with articulated lower jaw, second incomplete skull and postcrania, all preserved within palaeocalcrete concretions. Proposed Field Rating IIIB. <b>Specimens to be collected if they fall within 10 m of development footprint.</b>	IIIB
389	S31° 45' 38.1"	E23° 12' 41.0"	Modderfontein 228. Probable partial skull of medium-sized therapsid embedded within mudrock. Proposed Field Rating IIIB. <b>Specimen to be collected if it falls within 10 m of development footprint.</b>	IIIB
395	S31° 45' 17.9"	E23° 14' 23.0"	Modderfontein 228. Skull (ventral-up) and curved vertebral column of small dicynodont embedded within grey-green mudrock (possibly preserved within a burrow). Proposed Field Rating IIIB. <b>Specimen to be collected if falls within 10 m of development footprint.</b>	IIIB
396	S31° 45' 18.0"	E23° 14' 22.9"	Modderfontein 228. Several palaeocalcrete concretions with fragmentary / disarticulated bony remains of small- to medium-sized tetrapods. Proposed Field Rating IIIB. <b>Specimens to be collected if they fall within 10 m of development footprint.</b>	IIIB
397	S31° 45' 16.8"	E23° 14' 23.2"	Modderfontein 228. Isolated vertebra (centrum plus incomplete neural arch) of medium-sized tetrapod. Proposed Field Rating IIIB. <b>Specimen to be collected if it falls within 10 m of development footprint.</b>	IIIB
403	S31° 46' 08.0"	E23° 14' 00.3"	Modderfontein 228, pale cross-bedded sandstone krans near kraal complex with (1) mottled, bioturbated textures; (2) subparallel, longitudinally striated / ridged and grooved negative features – possibly moulds of large woody plant stems or soft-sediment deformation structures, (3) local development of smoothed surfaces (possibly floors of vertebrate burrows), (4) mud-lined elongate structures with transverse, comb-like ridges (possibly casts of burrow scratches). Proposed Field Rating IIIB. <b>Features to be recorded if they fall within 10 m of development footprint.</b>	IIIB
408	S31° 44' 09.4"	E23° 16' 50.8"	Modderfontein 228. Partial snout and skull roof of small-bodied dicynodont showing broad intertemporal region. Proposed Field Rating IIIB. <b>Specimen to be collected if it falls within 10 m of development footprint.</b>	IIIB
411	S31° 44' 03.9"	E23° 16' 19.7"	Modderfontein 228. Two small pedogenic calcrete nodules respectively containing postcrania of small tetrapod as well as skull of small dicynodont (latter almost completely enveloped by calcrete). Proposed Field Rating IIIB. <b>Specimens to be collected if they fall within 10 m of development footprint.</b>	IIIB



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#### 4.3 Mapping and spatialisation of heritage resources

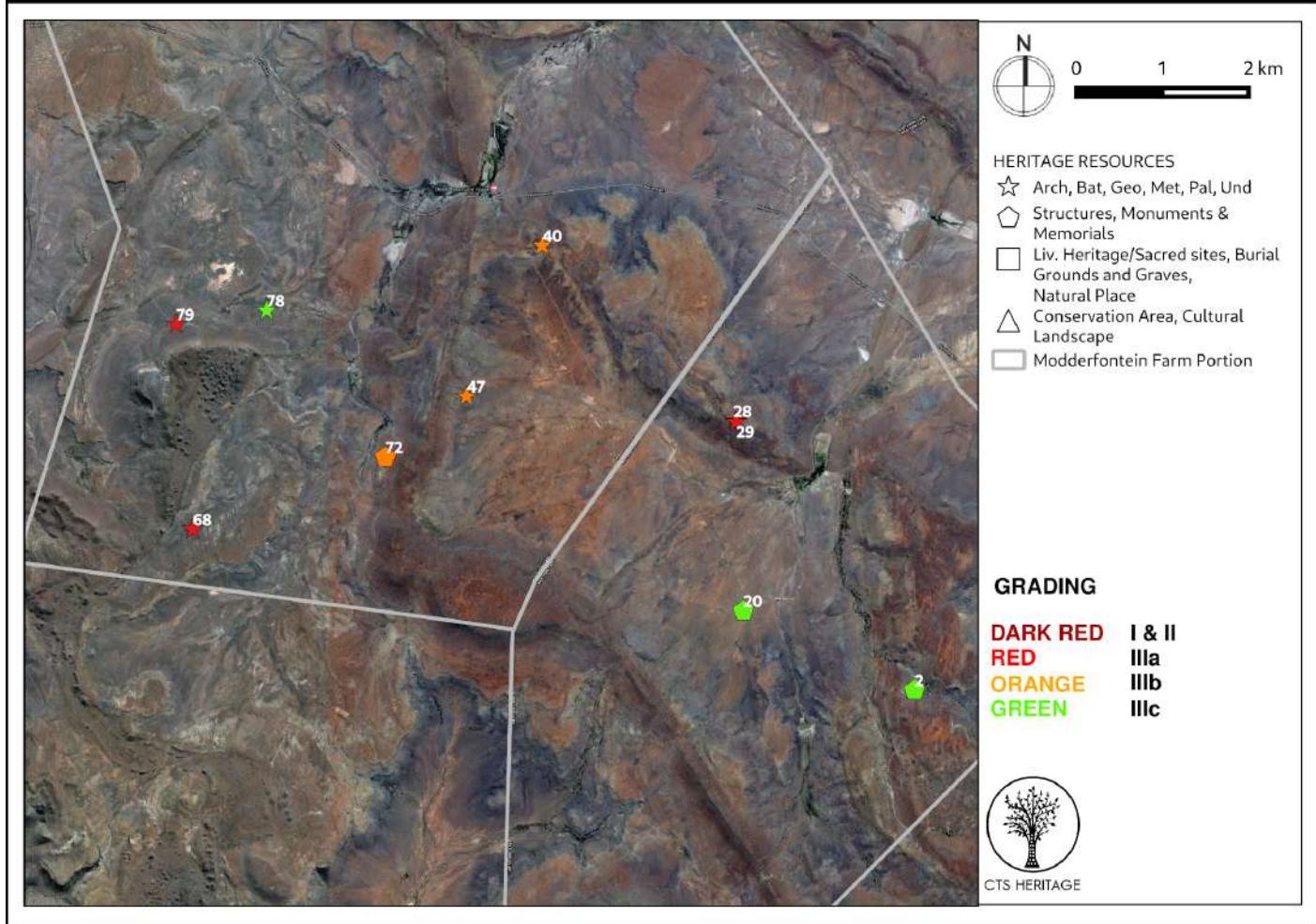


Figure 5a: Heritage resources of significance observed in the archaeology assessment 2021



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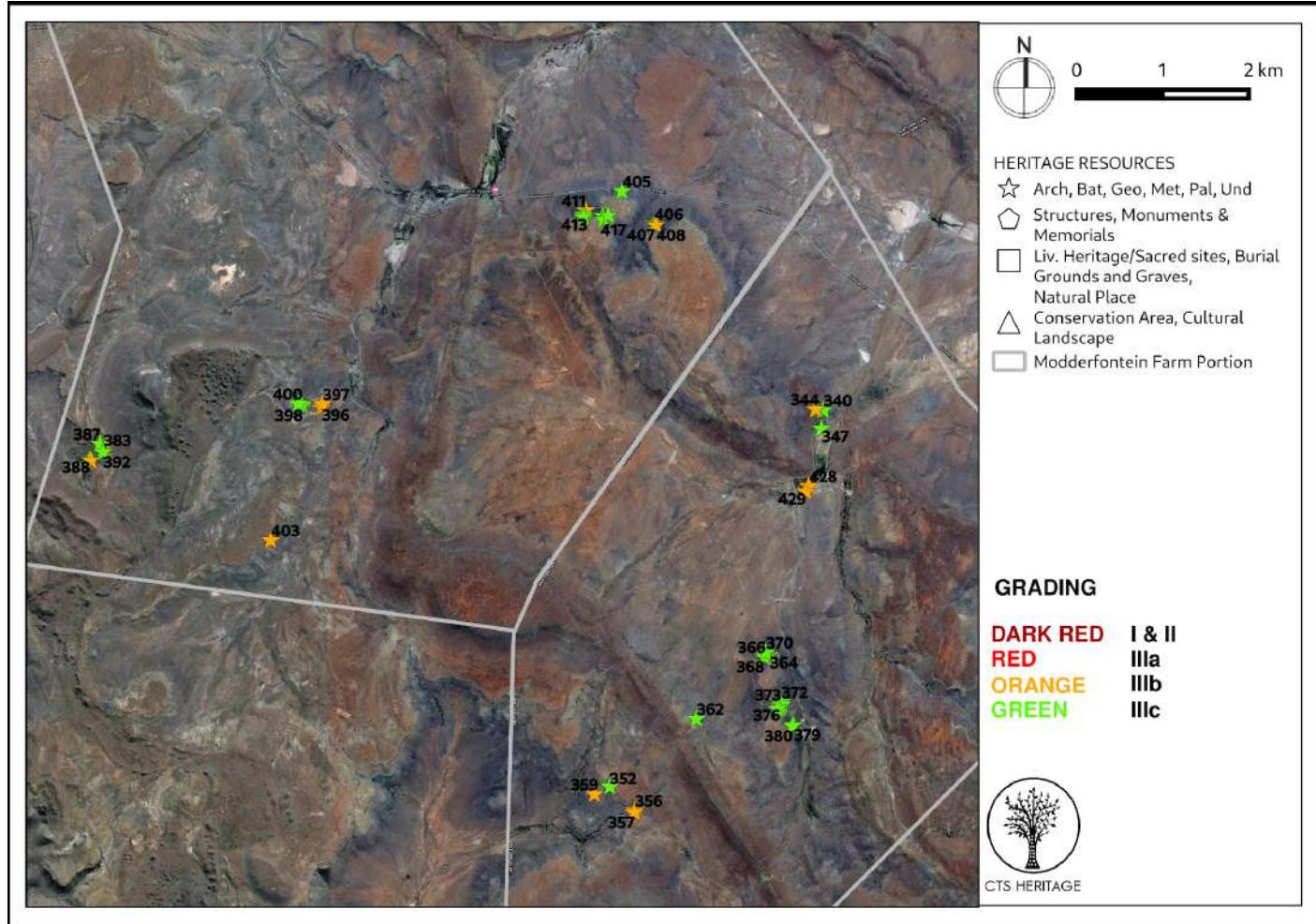


Figure 5b: Fossil resources observed in the palaeontology assessment 2021



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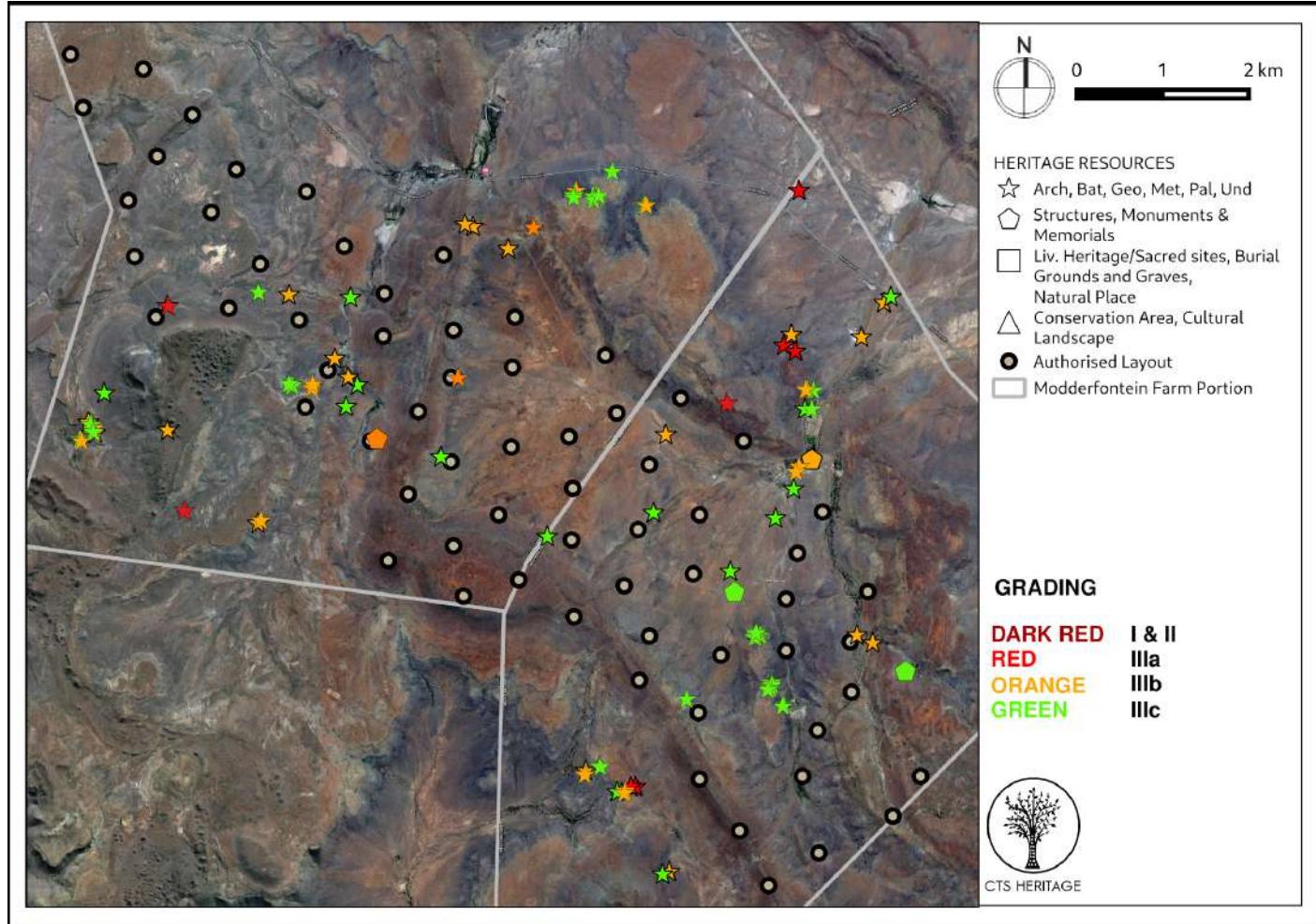


Figure 5c: All known heritage resources relative to the Authorised layout (#1)



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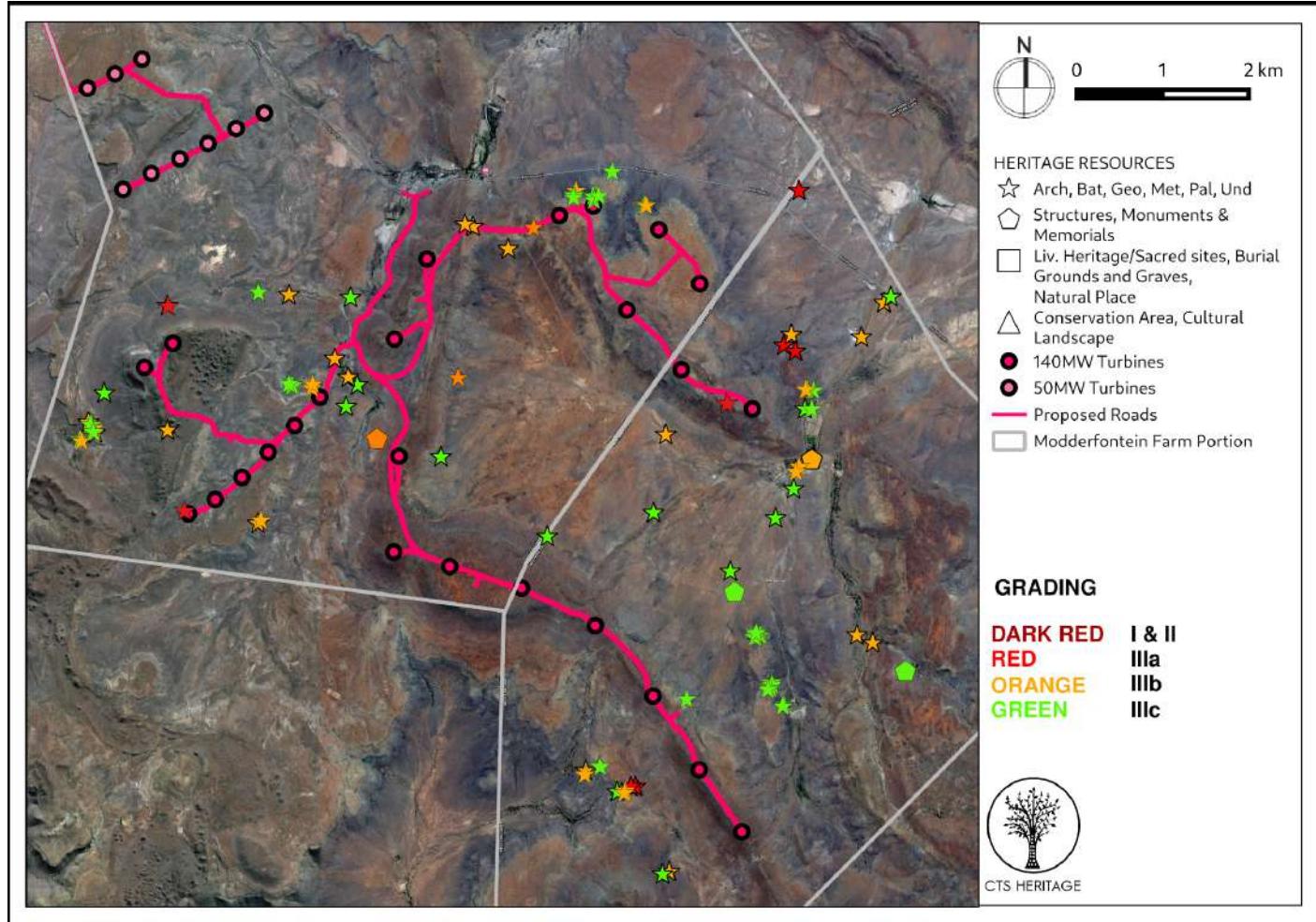


Figure 5d: All known heritage resources relative to the revised amended layout (June 2021)



## 5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

### 5.1 Assessment of impact to Heritage Resources

#### *Impacts of the Authorised Layout*

According to Binneman et al (2011), “It is highly likely that the surface scatters of Middle Stone Age stone artefacts encountered occur in a disturbed context owing to water runoff, wash and erosion along the floodplains as well as being washed down the slopes of rocky outcrops and ridges”. Similarly the occurrence of Later Stone Age stone artefacts may have been disturbed by erosion as well as natural and animal disturbances. Documented areas containing rock engravings on boulders should be avoided and further investigation into the areas containing boulders surrounding the points of the proposed turbines should be investigated for further possible occurrences of rock engravings. The stone wall structures must be avoided during the construction phase of the proposed development.” Based on the location of known archaeological heritage located within the proposed development area, the amended layout will not impact on any known heritage resources and all proposed turbines are located more than 100m from any known resources. There is no objection to the proposed amended layout on condition that the recommendations included in the assessment completed by Binneman (2011) are adhered to. These are -

1. The exposed human remains must be reported to the South African Heritage Resources Agency (SAHRA) so that they may appoint the relevant archaeologist/s to remove the exposed human remains.
2. No construction activities may take place within 100m of the documented rock shelters containing rock paintings and boulders containing rock engravings.
3. The ridges and rocky outcrops surrounding the locations of the turbines and solar panels must be investigated prior to construction to establish whether undocumented rock shelters contain rock paintings and rocky outcrops contain boulders with rock engravings. If any are encountered the recommendations in point 2 will be implemented.
4. No construction activities may take place within 100m of the documented stone-wall structures.
5. If it is inevitable that construction activities must take place within 100m of any documented and undocumented rock shelters containing paintings, rocky outcrops with boulders containing rock engravings and stone-wall structures a perimeter fence must be erected to protect the sensitive area from any possible negative impact.
6. It is possible that in situ archaeological sites/remains, and human remains may be uncovered during construction. Therefore, a professional archaeologist should be appointed during the vegetation removal and construction phases of the development.



The 100m buffer zones recommended by Binneman (2011) are mapped in the figures below. As per Figures 6, 6a, 7 and 7a, the authorised layout complies with these recommendations as well as the recommendations from SAHRA for the Northern Cape component of the proposed development.

In their response to the Karoo Renewable Wind Energy project, SAHRA specifically requested that the Later Stone Age sites S31, S32 and S39 (SAHRIS IDs 34718, 34719 and 34737) must be mitigated with a Phase 2 Archaeological Impact Assessment. S31 and S32 (SAHRIS IDs 34718 and 34719) are described simply as LSA artefact scatters and S39 (SAHRIS ID 34737) is described as “Is located adjacent to the farm road and may have been disturbed when the road was being constructed, however, a small concentration of Later Stone Age stone artefacts were observed comprising 17 mainly cores, flakes, a grinding/digging stone and a scraper manufactured on hornfels.” However, as indicated in Figure 6 and 7 below, none of these sites is likely to be negatively impacted by the authorised layout.

A number of additional archaeological and palaeontological resources were identified in the 2021 field assessments. Of the resources identified that have heritage significance, sites MDF 047 (hornfels scatter) and MDF 072 (stone kraal) are located in close proximity to authorised turbine positions (Figure 6 and 7). The proposed turbines at these locations are more than 50m away from the identified resources but closer than 100m. It is unlikely that these resources will be negatively impacted by the authorised turbine layout.

In the Western Cape, Sites S7 and S8 (SAHRIS IDs 34634 and 34636) are located in close proximity to proposed turbines, however these sites fall more than 100m away from the nearest turbine and as such, impact is unlikely. S7 (SAHRIS Site ID 34634) is described as “located on a rocky dolerite outcrop and contains four engraved boulders distributed within an area of approximately 50m x 50m. The boulders contained deep scratches approximately 25cm in length, relatively patinated cross-hatching images that resemble nets, two images of European settlers one image of a male figure dressed in a top hat and heeled boots standing in a hands-on-hips posture and the other sitting on a horse. Isolated scatters of Middle Stone and Later Stone Age stone artefacts were documented within the vicinity of the rock engravings. A semi-circle stone wall structure approximately 5m x 3m in extent and 1m in height was located within the area of the boulders and stone artefacts.” S8 (SAHRIS Site ID 34636) is described simply as “stone walled structures”.



A number of fossils were identified by Almond (2021) within the development area however none of the identified fossil locations are situated within 50m of the authorised layout. However, the underlying geology of the whole area remains sensitive for impacts to significant palaeontology except for the dolerite ridges.

The Cultural Landscape Assessment (2021) notes that the overall impact of the proposed development on the regional cultural landscape is anticipated as **moderate** before and after mitigation. However, at a local scale the impact is anticipated as **high**. In this regard, the primary cultural landscape receptors are the N1, N12 and R63. The impact on the regional cultural landscape is considered acceptable given the broad expansive nature of the landscape and thus its ability to absorb the nature and scale of development. The site and its immediate context does not possess particular heritage significance in its own right to warrant formal protection or grading from a cultural landscape perspective.

No other known heritage resources from within the development area in the Western Cape are located in close proximity to any turbines in the authorised layout.



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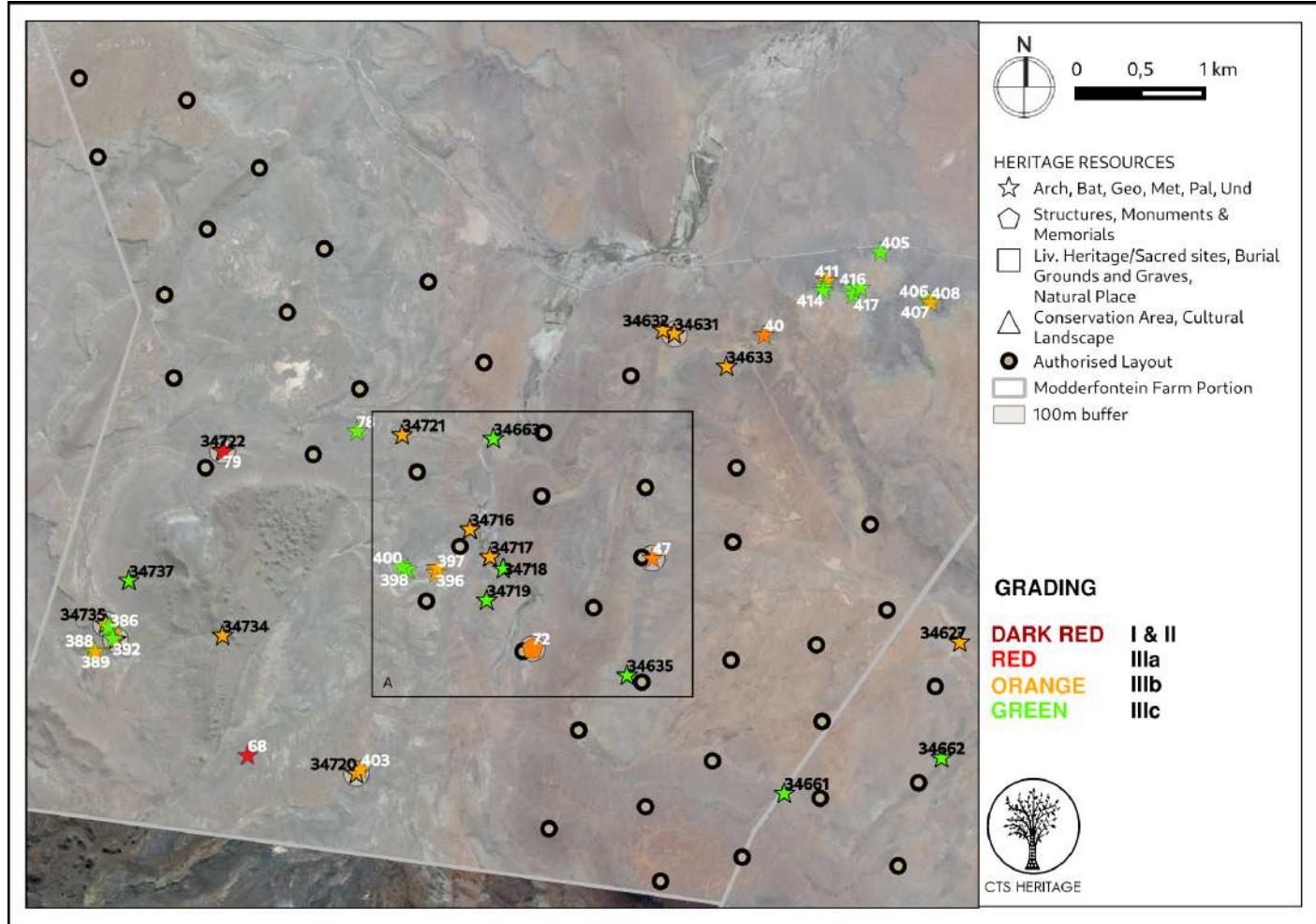


Figure 6: All known heritage resources mapped relative to the authorised layout in the Northern Cape (white labels - 2021 assessments, black labels from SAHRIS)



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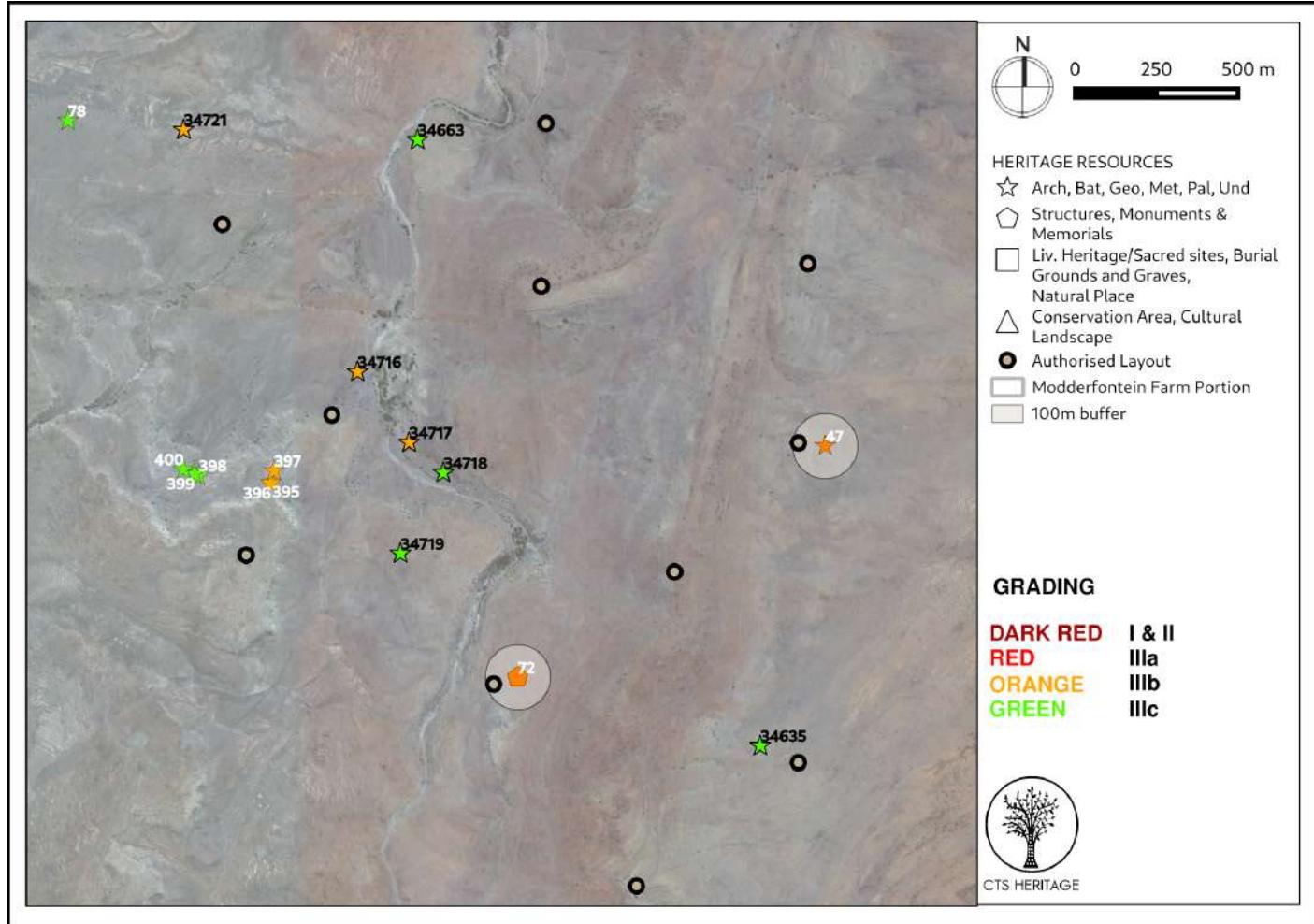


Figure 6a: Inset A



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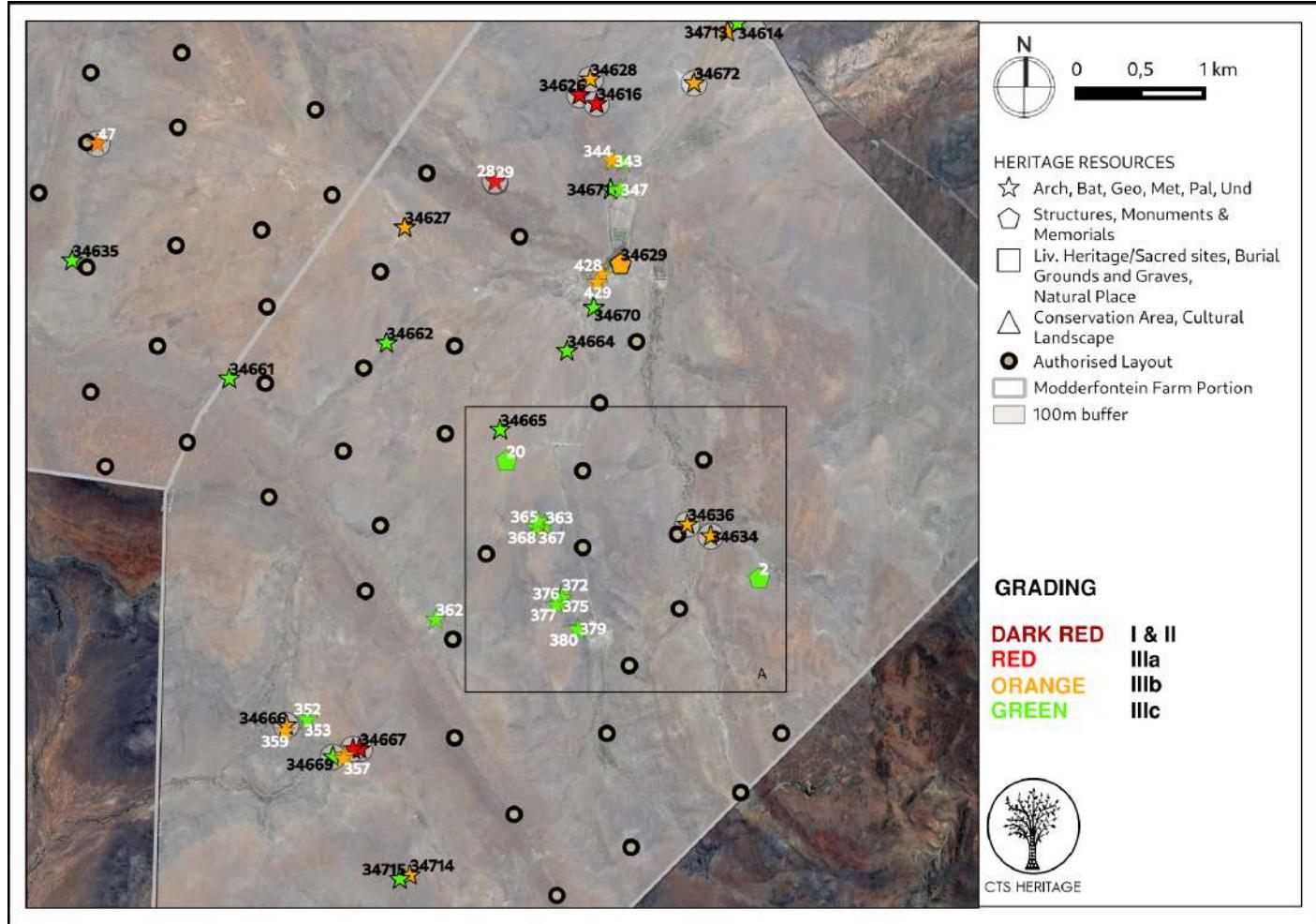


Figure 7: All known heritage resources mapped relative to the authorised layout in the Western Cape (white labels - 2021 assessments, black labels from SAHRIS)



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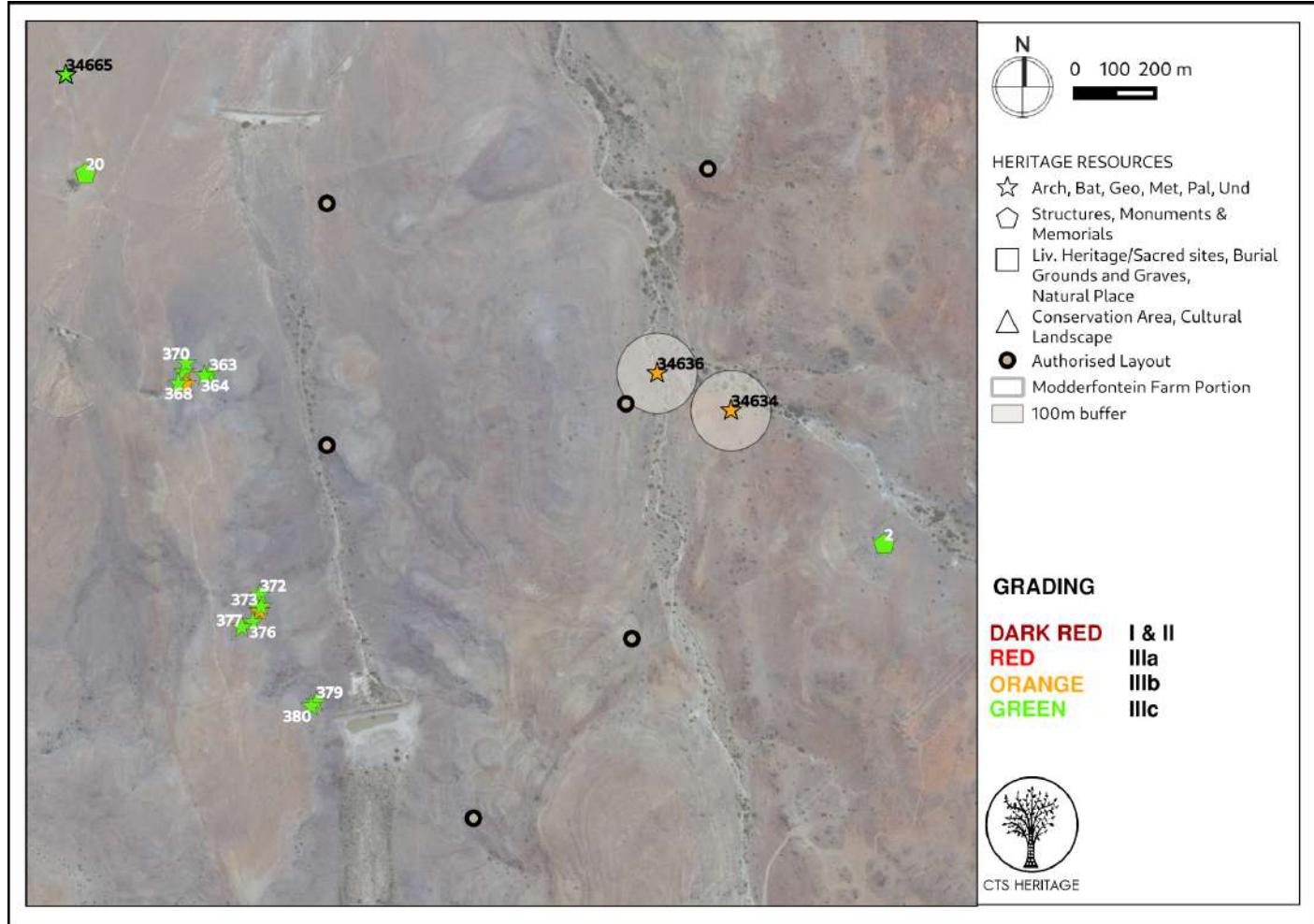


Figure 7a: Inset A

Table 5.1: Impacts of the authorised layout and associated infrastructure to archaeological resources ie. No-Go Alternative

IMPACT NATURE	Destruction of archaeological heritage		STATUS	NEGATIVE
Impact Description	Destruction of significant archaeological heritage resources during the construction phase			
Impact Source	Construction activities			
Receptors	Significant archaeological heritage resources			
PARAMETER	WITHOUT MITIGATION		WITH MITIGATION	
Extent (A)	1		1	
Duration (B)	4		4	



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Probability (C)	3	2
Intensity or Magnitude (D)	-3	-1
SIGNIFICANCE RATING (F) = (A*B*D)*C	<b>-36</b>	<b>-8</b>
Cumulative Impacts	None anticipated	
Confidence	High	
Mitigation Measures	<ul style="list-style-type: none"> <li>- A no-go development buffer of 100m must be implemented around sites S7 and S8 (SAHRIS IDs 34634 and 34636).</li> <li>- A Heritage Management Plan for rock engravings, rock painting and gong rocks must be compiled and submitted to SAHRA</li> <li>- A pre-construction walkdown of the final authorised layout including the powerline route must be conducted by an archaeologist to identify any areas requiring targeted mitigation in the form of excavation or removal of heritage resources. A walkdown report detailing the findings of the walkdown and the final layout must be submitted to SAHRA/HWC</li> <li>- Should any previously undocumented heritage resources be identified during the course of the construction, operation or decommissioning of the project, work must cease in the area of the find and SAHRA must be contacted regarding a way forward.</li> </ul>	

Table 5.2: Impacts of the authorised layout and associated infrastructure to palaeontological resources ie. No-Go Alternative

IMPACT NATURE	Destruction of palaeontological heritage		STATUS	NEGATIVE		
Impact Description	Destruction of significant palaeontological heritage resources during the construction phase					
Impact Source	Construction activities					
Receptors	Significant palaeontological heritage resources					
PARAMETER	WITHOUT MITIGATION		WITH MITIGATION			
Extent (A)	1		1			
Duration (B)	4		4			
Probability (C)	3		1			
Intensity or Magnitude (D)	-3		-1			
SIGNIFICANCE RATING (F) = (A*B*D)*C	<b>-36</b>		<b>-4</b>			
Cumulative Impacts	Medium (-ve) significance without mitigation. Low significance with mitigation.					
Confidence	Medium					
Mitigation Measures	<ul style="list-style-type: none"> <li>- A pre-construction walkdown of the final authorised layout including the powerline route must be conducted by a palaeontologist to identify any areas requiring targeted mitigation in the form of excavation or removal of heritage resources. A walkdown report detailing the findings of the walkdown and the final layout must be submitted to SAHRA/HWC</li> </ul>					

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	<ul style="list-style-type: none"> <li>- The attached Chance Fossil Finds Procedure must be implemented for the duration of the construction phase</li> </ul>
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**Table 5.3: Impacts of the authorised layout and associated infrastructure to cultural landscape resources ie. No-Go Alternative**

IMPACT NATURE	Destruction of cultural landscape heritage	STATUS	NEGATIVE
<b>Impact Description</b>	Destruction of significant cultural landscape heritage resources		
<b>Impact Source</b>	Operational phase of WEF		
<b>Receptors</b>	The significant Cultural Landscape		
PARAMETER	<b>WITHOUT MITIGATION</b>		<b>WITH MITIGATION</b>
<b>Extent (A)</b>	2		2
<b>Duration (B)</b>	3		3
<b>Probability (C)</b>	4		4
<b>Intensity or Magnitude (D)</b>	-2		-2
<b>SIGNIFICANCE RATING (F) = (A*B*D)*C</b>	<b>-36</b>		<b>-36</b>
<b>Cumulative Impacts</b>	The proposed WEF is located within a REDZ area and as such, cumulative impacts to the cultural landscape are anticipated.		
<b>Confidence</b>	High		
<b>Mitigation Measures</b>	<ul style="list-style-type: none"> <li>- Implementation of the recommendations in the VIA will assist, however the negative impact remains high and the significance rating for impact to the cultural landscape remains unchanged.</li> </ul>		

#### *Impacts of the Proposed Amended Layout*

The proposed amended turbine layout is greatly reduced compared to the authorised layout, with only 34 turbines proposed as opposed to the 67 turbines in the authorised layout. The anticipated impact to archaeological heritage resources is therefore greatly reduced.

A number of identified archaeological resources are located in very close proximity to proposed infrastructure in the revised amended layout. Sites identified in the assessment completed by Binneman (2011) that are likely to be impacted by the revised amended layout in the Northern Cape include MOD29, MOD10 and MOD11 (SAHRIS Site IDs 34716, 34631 and 34632), all graded IIIB. According to SAHRIS, MOD29 is described as a possible stone quarry artefact site and is located immediately adjacent to a proposed road (Figure 8b). It is recommended that a 100m



no-go buffer area be implemented around these sites to ensure that no impact takes place. The proposed road will therefore require realignment.

According to SAHRIS, MOD10 is described as “Rock engraving images of an antelope, approximately 20cm x 10cm, a male figure dressed in a top hat possibly holding a rifle with one arm stretched out sitting on a horse, a signature done in cursive, as well as abstract and geometric patterns. Middle Stone Age stone artefacts also occurred within the immediate rocky outcrop area surrounding the engravings.” and MOD 11 is described as “Gong rock. Hammering is evident on the top of two of the boulders, and a metallic sound is made when beaten with hands. The location of the gong rock is ideal, as it has a good view down the two valleys. The gong rock is in close proximity to the engraved boulders at S10. A few Middle Stone Age flakes were observed in front of the rock gong next to the farm road.” Both of these sites are located within 100m of a proposed road in the revised amended layout (Figure 8a). It is recommended that a 100m no-go buffer area be implemented around these sites to ensure that no impact takes place. The proposed road will therefore require realignment.

Of the sites identified in the 2021 archaeological field assessment, Sites MDF\_WEF 40 (historical scratched graffiti, graded IIIB) and MDF\_WEF 68 (hornfels flakes, hornfels thin burin bladelet, graded IIIA) are likely to be impacted by the revised amended layout (Figure 8a and 8c). It is recommended that a 100m no-go buffer area be implemented around these sites to ensure that no impact takes place. The proposed road will therefore require realignment.

A number of fossils were identified by Almond (2021) within the development area and three of these identified fossil sites are located in very close proximity to the revised amended layout, Sites 395, 396 and 397 (Figure 8b). These sites describe the fossils of a small tetrapod and are graded IIIB. These sites are located more than 10m from the proposed development and as such, no direct impact is anticipated. Palaeontological site 417 is graded IIIC and is located within 50m of proposed infrastructure development as per the revised amended layout however no further mitigation is recommended for this site (Figure 8a). It must be noted that the underlying geology of the whole area remains sensitive for impacts to significant palaeontology except for the dolerite ridges.

In their response to the Karoo Renewable Wind Energy project, SAHRA specifically requested that the Later Stone Age sites S31, S32 and S39 (SAHRIS IDs 34718, 34719 and 34737) located in the Northern Cape must be mitigated with a Phase 2 Archaeological Impact Assessment. However, as indicated in Figures 8a, b and c below, none of



these sites is likely to be negatively impacted by the proposed amended layout. As such, it is rather recommended that these sites be avoided and that no impact should take place.

In the proposed amended layout, only 7 turbines are proposed within the Western Cape. No archaeological resources were identified within the vicinity of the five southern-most turbines located in the Western Cape however a proposed road is anticipated to impact directly on two significant archaeological resources - MDF 028 and MDF 029 (Figure 9 and 9a). Both of these sites are historic rock art sites and have been determined to have high local significance (grade IIIA). In the proposed amended layout, these resources are likely to be negatively impacted and as such, it is recommended that a 100m no-go buffer area be implemented around these sites to ensure that no impact takes place. The proposed road will therefore require realignment.

The Cultural Landscape Assessment (2021) notes that the overall impact of the proposed development on the regional cultural landscape is anticipated as **moderate** before and after mitigation. However, at a local scale the impact is anticipated as **high**. In this regard, the primary cultural landscape receptors are the N1, N12 and R63. The impact on the regional cultural landscape is considered acceptable given the broad expansive nature of the landscape and thus its ability to absorb the nature and scale of development. The site and its immediate context does not possess particular heritage significance in its own right to warrant formal protection or grading from a cultural landscape perspective.



CTS HERITAGE

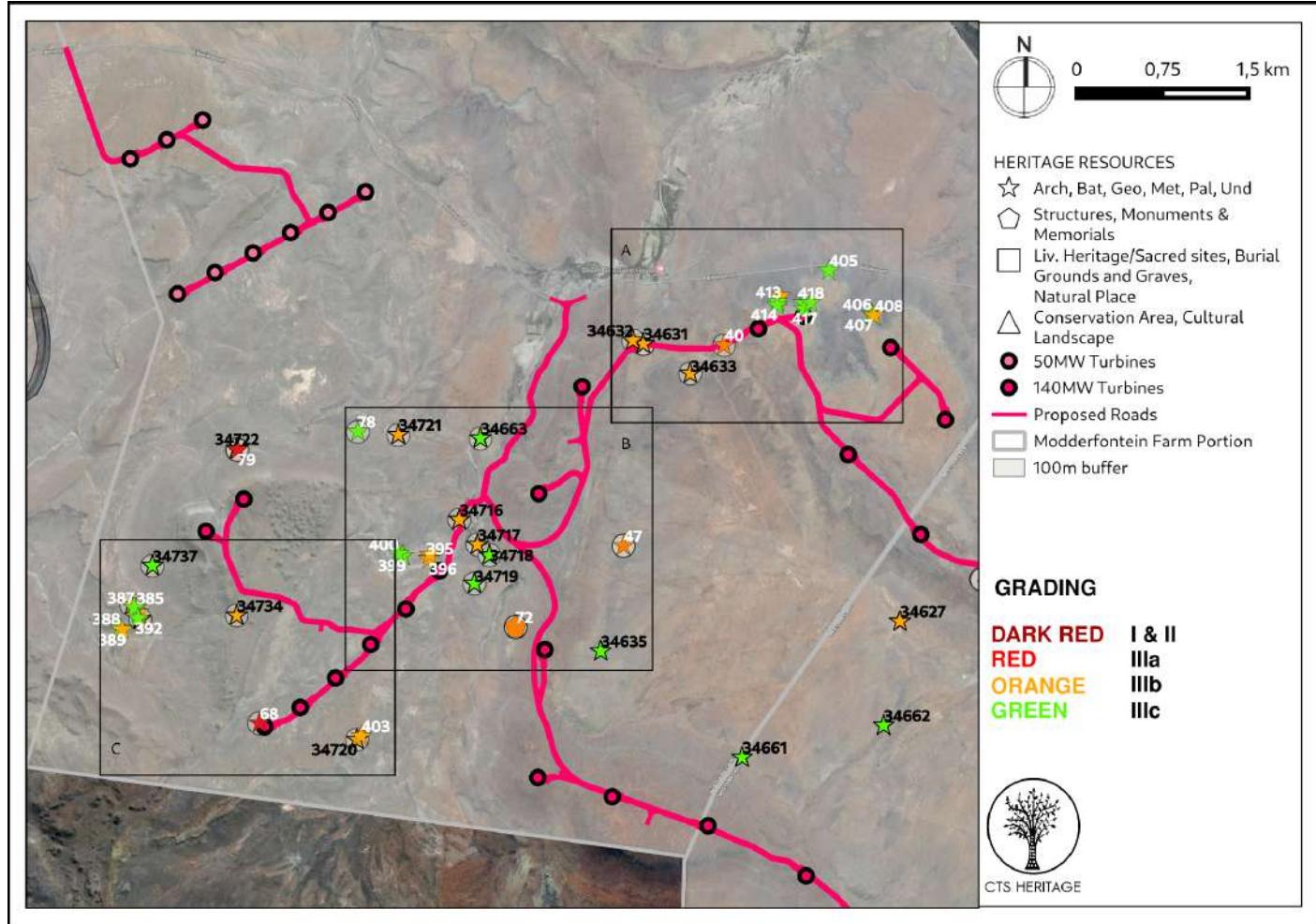


Figure 8: All known heritage resources mapped relative to the revised amended layout in the Northern Cape (white labels - 2021 assessments, black labels from SAHRIS)



CTS HERITAGE

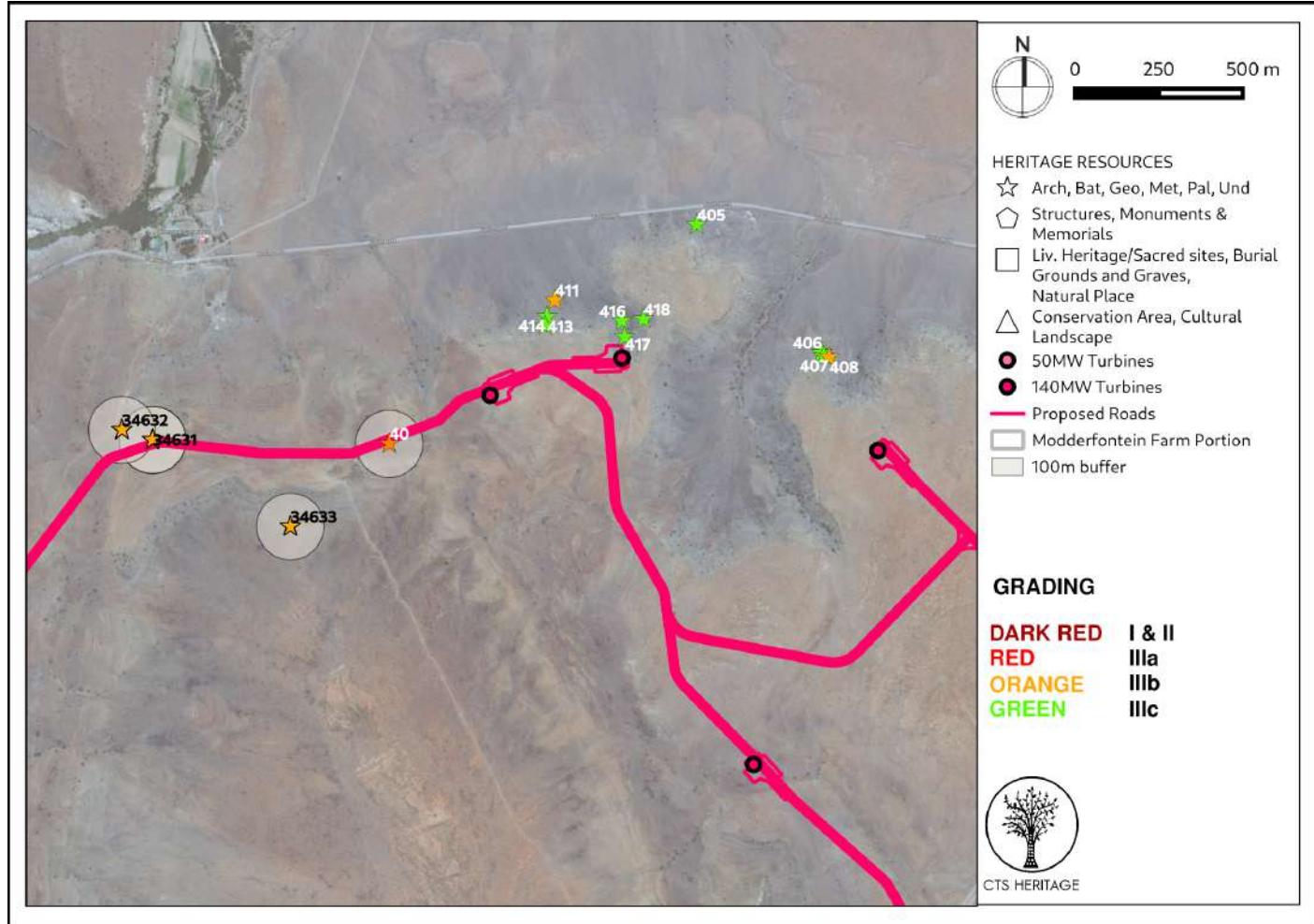


Figure 8a: Inset A



CTS HERITAGE

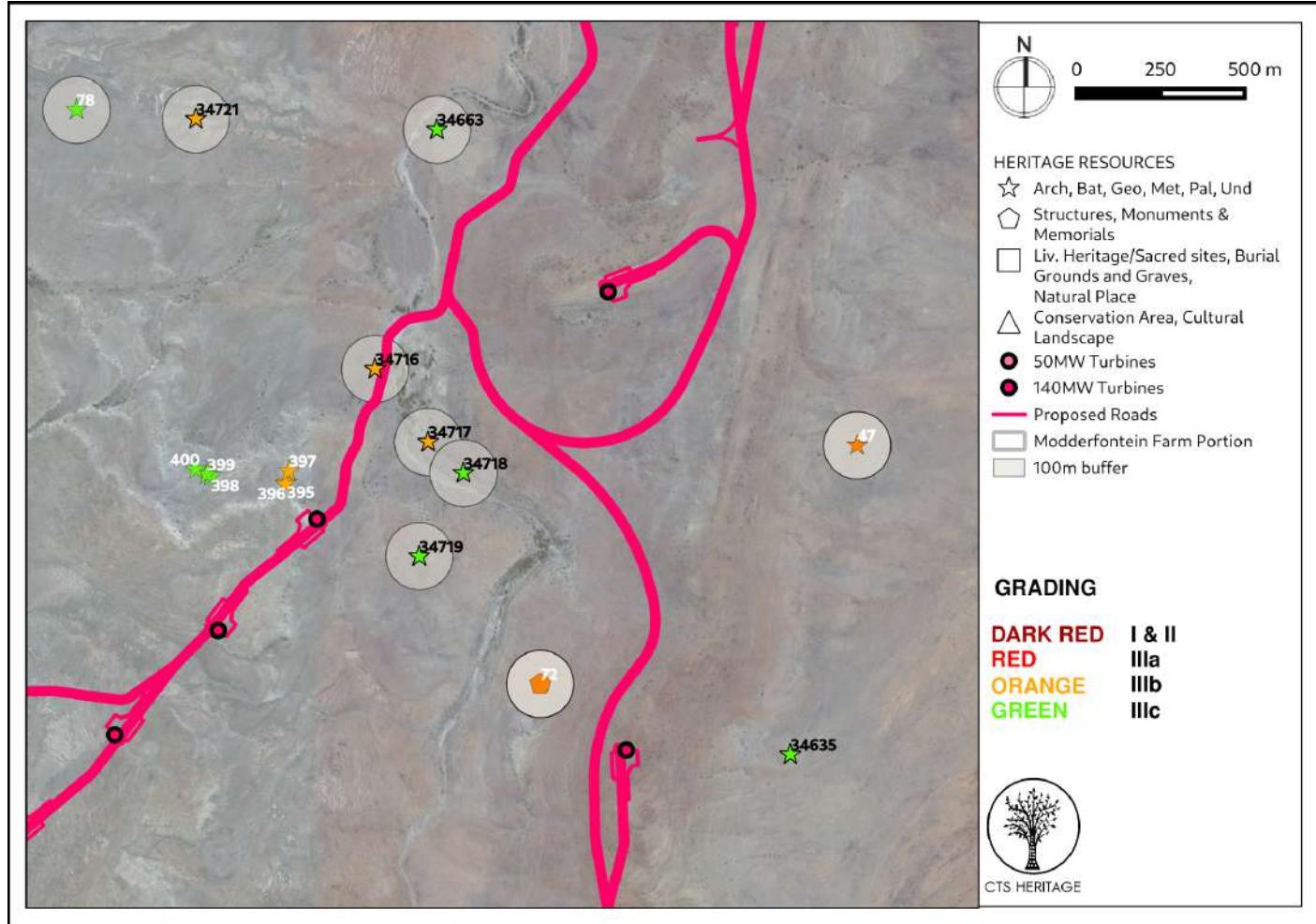


Figure 8b: Inset B



CTS HERITAGE

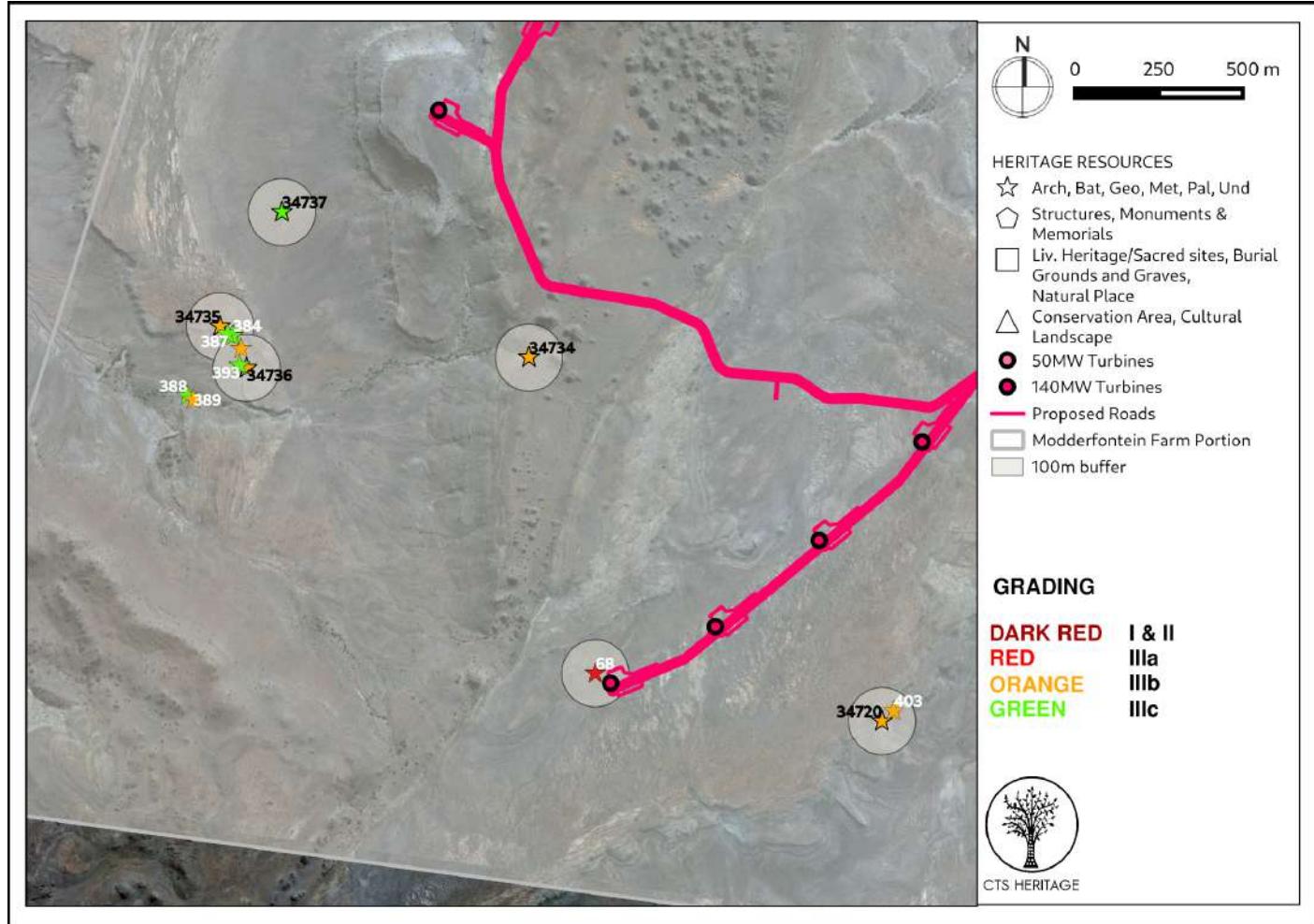


Figure 8c: Inset C



CTS HERITAGE

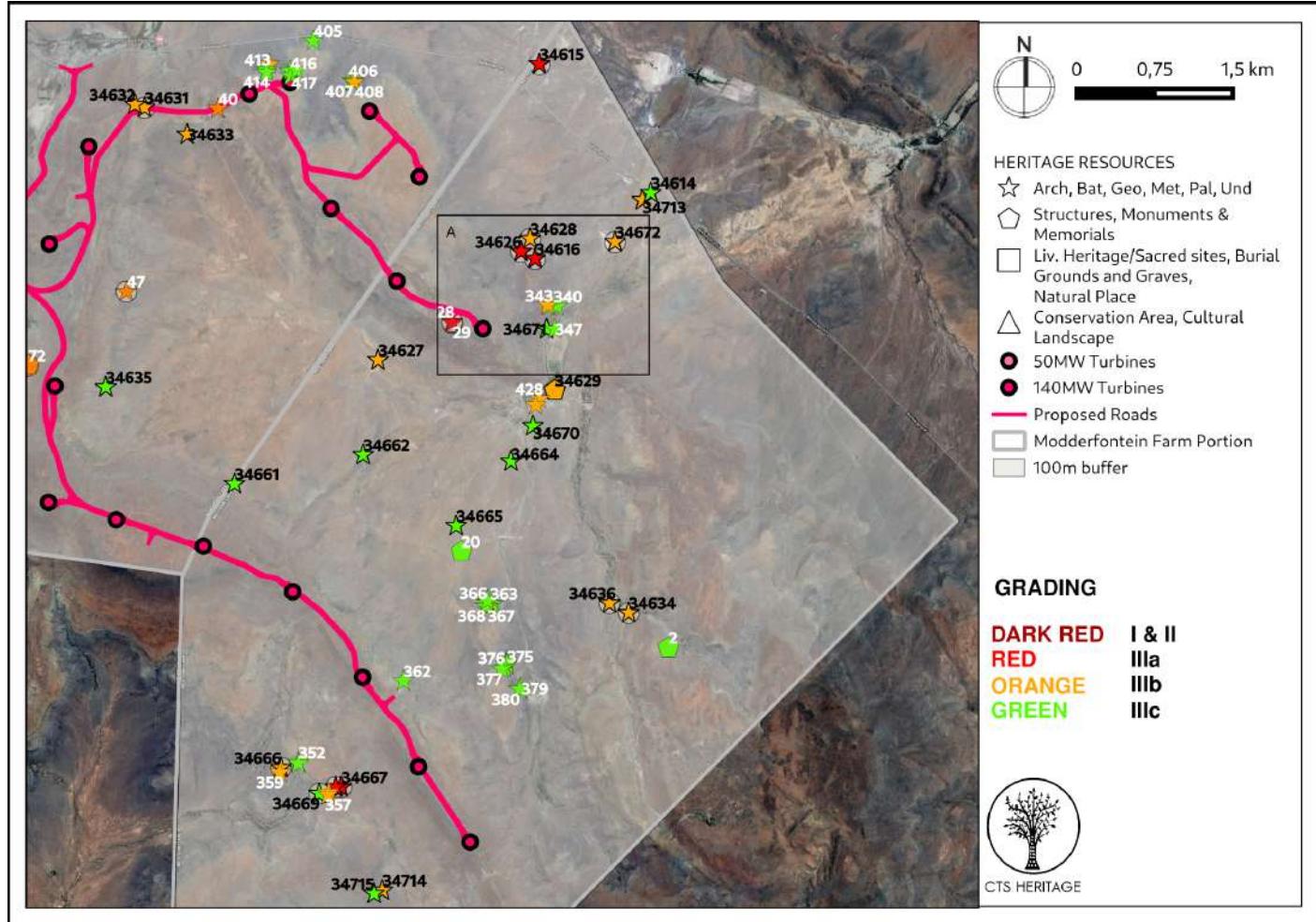


Figure 9: All known heritage resources mapped relative to the revised amended layout in the Western Cape (white labels - 2021 assessments, black labels from SAHRIS)



CTS HERITAGE

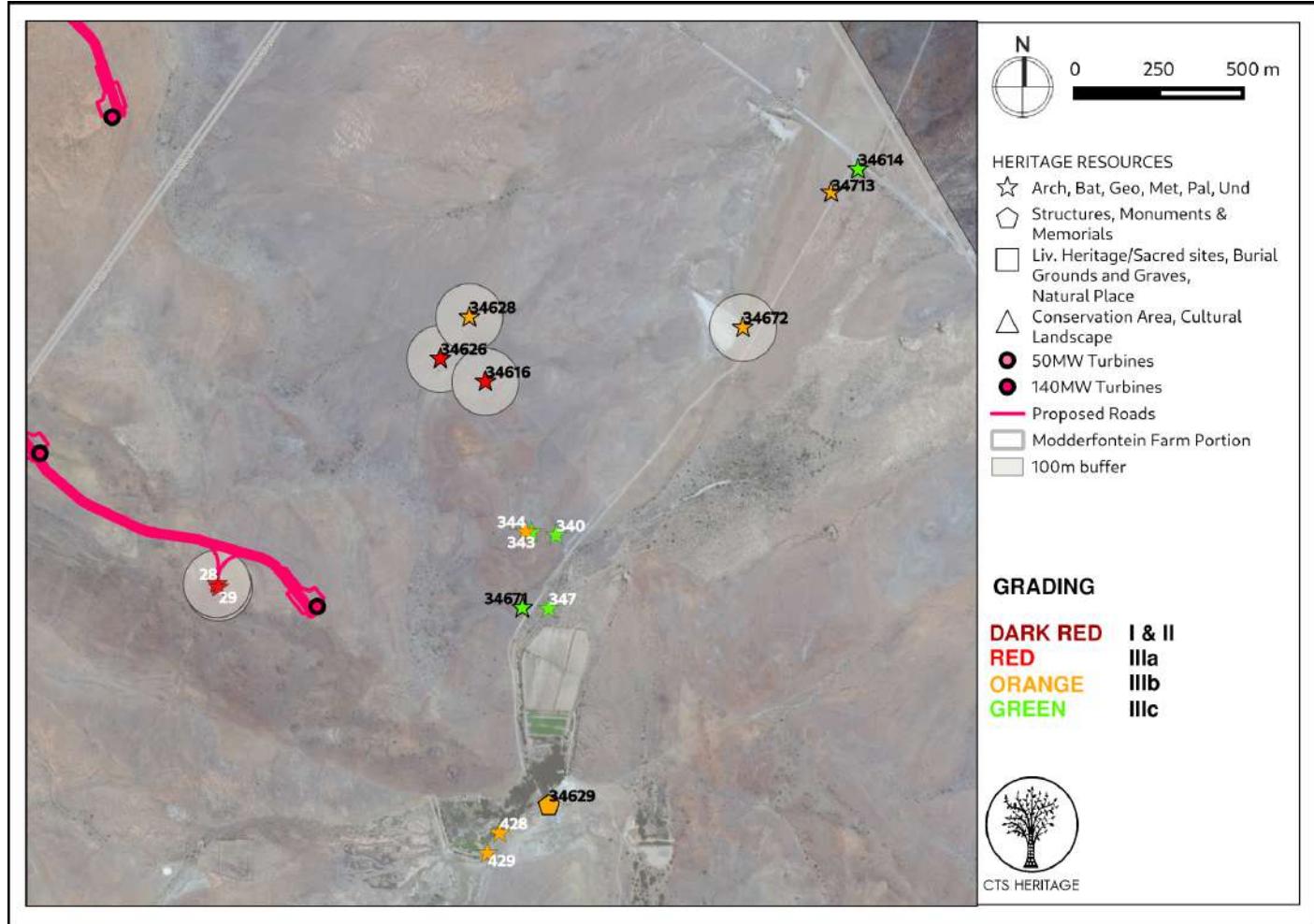


Figure 9a: Inset A

Table 6.1: Impacts of the authorised layout and associated infrastructure to archaeological resources ie. Preferred Alternative

IMPACT NATURE	Destruction of archaeological heritage		STATUS	NEGATIVE
Impact Description	Destruction of significant archaeological heritage resources during the construction phase			
Impact Source	Construction activities			
Receptors	Significant archaeological heritage resources			
PARAMETER	WITHOUT MITIGATION		WITH MITIGATION	
Extent (A)	1		1	
Duration (B)	4		4	



CTS HERITAGE

Probability (C)	3	1
Intensity or Magnitude (D)	-3	-1
SIGNIFICANCE RATING (F) = (A*B*D)*C	<b>-36</b>	<b>-4</b>
Cumulative Impacts	None anticipated	
Confidence	High	
Mitigation Measures	<ul style="list-style-type: none"> <li>- A no-go development buffer of 100m must be implemented around SAHRIS Sites 34716, 34631 and 34632, and archaeological Sites MDF 028, MDF 029, MDF_WEF 40 and MDF_WEF 68. This will require an amendment to the proposed revised layout of the roads.</li> <li>- A Heritage Management Plan for rock engravings, rock painting and gong rocks must be compiled and submitted to SAHRA</li> <li>- A pre-construction walkdown of the final authorised layout including the powerline route must be conducted by an archaeologist to identify any areas requiring targeted mitigation in the form of excavation or removal of heritage resources. A walkdown report detailing the findings of the walkdown and the final layout must be submitted to SAHRA.</li> <li>- Should any previously undocumented heritage resources be identified during the course of the construction, operation or decommissioning of the project, work must cease in the area of the find and SAHRA must be contacted regarding a way forward.</li> </ul>	

Table 6.2: Impacts of the authorised layout and associated infrastructure to palaeontological resources ie. Preferred Alternative

IMPACT NATURE	Destruction of palaeontological heritage	STATUS	NEGATIVE
Impact Description	Destruction of significant palaeontological heritage resources during the construction phase		
Impact Source	Construction activities		
Receptors	Significant palaeontological heritage resources		
PARAMETER	WITHOUT MITIGATION	WITH MITIGATION	
Extent (A)	1	1	
Duration (B)	4	4	
Probability (C)	3	2	
Intensity or Magnitude (D)	-3	-1	
SIGNIFICANCE RATING (F) = (A*B*D)*C	<b>-36</b>	<b>-8</b>	
Cumulative Impacts	Medium (-ve) significance without mitigation. Low significance with mitigation.		
Confidence	High		
Mitigation Measures	<ul style="list-style-type: none"> <li>- A pre-construction walkdown of the final authorised layout including the powerline route must be conducted by a palaeontologist to identify any areas requiring targeted mitigation in the form of excavation or removal of heritage resources. A walkdown report detailing the findings of the walkdown and the final layout must be submitted to SAHRA.</li> </ul>		



	<ul style="list-style-type: none"> <li>- The attached Chance Fossil Finds Procedure must be implemented for the duration of the construction phase</li> </ul>
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**Table 6.3: Impacts of the authorised layout and associated infrastructure to cultural landscape resources ie. Preferred Alternative**

IMPACT NATURE	Destruction of cultural landscape heritage	STATUS	NEGATIVE
<b>Impact Description</b>	Destruction of significant cultural landscape heritage resources		
<b>Impact Source</b>	Operational phase of WEF		
<b>Receptors</b>	The significant Cultural Landscape		
PARAMETER	<b>WITHOUT MITIGATION</b>		<b>WITH MITIGATION</b>
<b>Extent (A)</b>	2		2
<b>Duration (B)</b>	3		3
<b>Probability (C)</b>	4		4
<b>Intensity or Magnitude (D)</b>	-2		-2
<b>SIGNIFICANCE RATING (F) = (A*B*D)*C</b>	<b>-36</b>		<b>-36</b>
<b>Cumulative Impacts</b>	The proposed WEF is located within a REDZ area and as such, cumulative impacts to the cultural landscape are anticipated.		
<b>Confidence</b>	High		
<b>Mitigation Measures</b>	Implementation of the recommendations in the VIA will assist, however the negative impact remains high and the significance rating for impact to the cultural landscape remains unchanged.		

## 5.2 Sustainable Social and Economic Benefit

According to the Social Impact Assessment completed for the proposed Amendment application, “Based on the concise desktop assessment of the receiving environment and the anticipated impacts associated with the Modderfontein WEF, it is concluded that there are no socio-economic impacts of a high significance associated with the project at this stage. There are a range of positive impacts associated with the proposed project, such as the creation of employment and income generation, local procurement and social development and services support, as well as the stimulation of local economic growth. Another positive impact is the positive impact on the improved electricity supply.

There are however several potential negative socio-economic impacts of the proposed project that may affect surrounding landowners and residential areas. These would mostly materialise during the construction phase and



are thus of a short duration. These impacts would further respond to mitigation. The negative impacts associated with the proposed project include the intrusions on the daily living and movement patterns (inflow of workers and possibly jobseekers), increased nuisance factors (dust levels, noise and traffic movement) and impact on sense of place."

As such, the negative impacts to heritage resources are unlikely to outweigh the anticipated socio-economic benefits of the project on condition that the recommendations made below are implemented.

### **5.3 Proposed development alternatives**

As this application is for an amendment to an existing Environmental Authorisation, the following alternatives are considered:

- ***No-Go Alternative (Figure 1a)***

This alternative will see the existing authorised development proceed ie. the authorised layout consisting of 67 turbines

- ***Revised Amended Layout Alternative (Figure 1b)***

Due to the reduced number of turbines proposed as part of this amendment, the impact anticipated to heritage resources is greatly reduced.

This alternative is proposed from a heritage perspective on condition that the recommendations indicated below are implemented.

## **6. RESULTS OF PUBLIC CONSULTATION**

There are no Heritage Conservation Bodies registered on the HWC database for the area proposed for development. As such, in terms of the HWC Guidelines for Heritage Impact Assessments which apply to this application, the relevant Local Authorities - Beaufort West in the Western Cape and Ubuntu in the Northern Cape - are provided with 30 days in which to comment on the HIA.

As this application is an amendment application made in terms of NEMA, the public consultation on the HIA will take place with the broader public consultation process required for the Basic Assessment process and will be managed by the lead consultants on the project.



## 7. DISCUSSION AND CONCLUSION

As this project has a complex history and spans two provinces and therefore two heritage authorities, this discussion section will be divided into sections dealing with the authorised layout and revised amended layout in each Province.

### ***Northern Cape (SAHRA)***

SAHRA's responses to the previous heritage assessments conducted for the Karoo Renewable Wind Energy Facility are directly applicable to this assessment as these comments informed the EA granted for the authorised layout of the Modderfontein WEF.

In response to the Karoo Renewable Wind Energy Facility application, SAHRA made the following comments that apply to the Modderfontein WEF in terms of impacts to archaeological and other heritage resources:

- The Later Stone Age sites S31, S32 and S39 (SAHRIS IDs 34718, 34719 and 34737) must be mitigated with a Phase 2 Archaeological Impact Assessment. Mitigation in the form of recording, sampling and a photographic record must be undertaken before trenching and any other earth-moving activity resulting from this proposed project commences. The archaeologist will require a mitigation permit from SAHRA in terms of s. 35 of the National Heritage Resources Act (Act 25 of 1999). On receipt of a satisfactory mitigation (Phase 2) permit report from the archaeologist, SAHRA will make further recommendations in terms of the site such as its final destruction or additional sampling.
- The proposed final position of wind turbines and solar panels must be investigated for the presence of possible rock engravings and rock paintings.
- No construction activity is allowed within 100m of rock paintings, rock engravings, rock shelters where rock art material is preserved and sites with stone walls and kraals. If this distance cannot be avoided and the development has to occur within 100m from any of these sites, a temporary fence must be erected around the site (in consultation with the archaeologist) and foremen and workmen educated about its significance.
- In no circumstances will development be allowed within 50m from stone walls and kraals and from rock art sites.
- All newly identified rock paintings and rock engravings in the area should be recorded, if this has not been done yet, through photographic record and GPS position. These recordings (which may require involvement of a rock art specialist) should be included in the report to be submitted to SAHRA after the micro-siting survey is undertaken.



- A Heritage Management Plan for rock engravings, rock painting and gong rocks must be compiled and submitted to SAHRA for revision.

Many of these comments and recommendations remain applicable and should also be applied to the revised amended layout. However, as it is unlikely that sites S31, S32 and S39 (SAHRIS IDs 34718, 34719 and 34737) will be negatively impacted by the revised amended layout, it is the opinion of this author that mitigation of these sites with a Phase 2 Archaeological Impact Assessment is not necessary. It is rather recommended that these sites be avoided and that no impact should take place.

In response to the Karoo Renewable Wind Energy Facility application, SAHRA made the following comments that apply to the Modderfontein WEF in terms of impacts to archaeological and other heritage resources:

- A Phase 1 Palaeontological Impact Assessment in the form of a field survey of the area is requested, the assessment must be then submitted to SAHRA for comments. If deemed necessary after the survey, a Phase 2 rescue operation might also be requested.
- A palaeontologist must inspect fresh excavations undertaken in the fossil-bearing Teekloof Formation.

A field-based palaeontological specialist assessment was undertaken as part of this heritage assessment and as such, the above comments from SAHRA pertaining to impacts to palaeontology are no longer applicable. No identified fossil remains are located within 10m of the proposed development as indicated in the revised amended layout and as such, no mitigation by removal is recommended.

The Cultural Landscape Assessment (2021) completed for this project found that the overall impact on the regional cultural landscape is anticipated as **moderate** before and after mitigation. However, at a local scale the impact is anticipated as **high**. In this regard, the primary cultural landscape receptors are the N1, N12 and R63. The impact on the regional cultural landscape is considered acceptable given the broad expansive nature of the landscape and thus its ability to absorb the nature and scale of development.

Please see section 8 below for updated and revised recommendations pertaining to the anticipated impacts to heritage resources in the Northern Cape resulting from the revised amended layout.



### ***Western Cape (Heritage Western Cape)***

As a portion of the Modderfontein WEF project falls within the Western Cape, Heritage Western Cape (HWC) who is the heritage authority that manages the heritage resources in the Western Cape was also consulted in the original application. HWC replied that they are “satisfied with the reports being referenced and that Section 38 comments and decisions whether under a NID or HIA phase still stands therefore the requirements of 2011 stated in the NID (if one was done) still stands. However an integrated HIA (including integrated recommendation) which fulfils the requirement of Section 38(3) of the NHRA still needs to be submitted with the AIA, EA and other associated reports.” Based on available evidence, it appears that no HIA for the authorised layout that satisfies section 38(3) of the NHRA was ever submitted to HWC for comment.

This HIA is therefore drafted in order to satisfy the requirements of HWC for an integrated HIA that satisfies section 38(3) that assesses the 2011 authorised layout.

The drafting of the HIA for the authorised layout in the Western Cape is largely a box-checking exercise as Environmental Authorisation has already been granted for this development. However, in order to ensure compliance with all relevant legislation which is required in order to be eligible for the next round of the Renewable Energy Independent Power Producer Programme (REIPPPP), HWC must provide comment on the authorised layout. Recommendations pertaining to the authorised layout are included in section 8 below.

However, it is not the intention of the client to implement the authorised layout, and as such, the revised amended layout is also assessed in this HIA in order to satisfy the requirements of HWC as articulated in their response to NID dated 21 May 2021 (Ref: 20210416SB0416E). Recommendations pertaining to the revised amended layout are included in section 8 below.

## **8. RECOMMENDATIONS**

It must be noted that the provisions related to impacts to heritage in the existing Environmental Authorisation detailed in section 1.2 above are wholly inadequate and will not mitigate the anticipated negative impacts to heritage resources. It is recommended that these provisions are amended to reflect the following conditions.

### ***Northern Cape (Revised Amended Layout)***

The submitted HIA satisfies the requirements of section 38(3) of the NHRA. There is no objection to the proposed development on heritage grounds on condition that:



- The revised amended layout is preferred as an alternative
- A no-go development buffer of 100m must be implemented around SAHRIS Sites 34716, 34631 and 34632, and archaeological sites MDF\_WEF 40 and MDF\_WEF 68. This will require an amendment to the proposed revised layout of the roads.
- A Heritage Management Plan for rock engravings, rock painting and gong rocks must be compiled and submitted to SAHRA
- A pre-construction walkdown of the final authorised layout including the powerline route must be conducted by both an archaeologist and a palaeontologist to identify any areas requiring targeted mitigation in the form of excavation or removal of heritage resources. A walkdown report detailing the findings of the walkdown and the final layout must be submitted to SAHRA.
- The attached Chance Fossil Finds Procedure must be implemented for the duration of the construction phase
- The mitigation recommendations included in the VIA (2011 and 2021) are implemented
- Should any previously undocumented heritage resources be identified during the course of the construction, operation or decommissioning of the project, work must cease in the area of the find and SAHRA must be contacted regarding a way forward.

#### ***Western Cape (Authorised Layout)***

The submitted HIA satisfies the requirements of section 38(3) of the NHRA.

- A no-go development buffer of 100m must be implemented around sites S7 and S8 (SAHRIS IDs 34634 and 34636).
- A Heritage Management Plan for rock engravings, rock painting and gong rocks must be compiled and submitted to SAHRA
- A pre-construction walkdown of the final authorised layout including the powerline route must be conducted by both an archaeologist and a palaeontologist to identify any areas requiring targeted mitigation in the form of excavation or removal of heritage resources. A walkdown report detailing the findings of the walkdown and the final layout must be submitted to SAHRA.
- The attached Chance Fossil Finds Procedure must be implemented for the duration of the construction phase
- The mitigation recommendations included in the VIA (2011) are implemented



- Should any previously undocumented heritage resources be identified during the course of the construction, operation or decommissioning of the project, work must cease in the area of the find and HWC must be contacted regarding a way forward.

#### ***Western Cape (Revised Amended Layout)***

The submitted HIA satisfies the requirements of section 38(3) of the NHRA. There is no objection to the proposed development on heritage grounds on condition that:

- The revised amended layout is preferred as an alternative
- A no-go development buffer of 100m must be implemented around Sites MDF 028 and MDF 029. This will require an amendment to the proposed revised layout of the roads.
- A Heritage Management Plan for rock engravings, rock painting and gong rocks must be compiled and submitted to SAHRA
- A pre-construction walkdown of the final authorised layout including the powerline route must be conducted by both an archaeologist and a palaeontologist to identify any areas requiring targeted mitigation in the form of excavation or removal of heritage resources. A walkdown report detailing the findings of the walkdown and the final layout must be submitted to SAHRA.
- The attached Chance Fossil Finds Procedure must be implemented for the duration of the construction phase
- The mitigation recommendations included in the VIA (2011 and 2021) are implemented
- Should any previously undocumented heritage resources be identified during the course of the construction, operation or decommissioning of the project, work must cease in the area of the find and HWC must be contacted regarding a way forward.



## 9. REFERENCES

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
7035	AIA Phase 1	Johan Binneman, Celeste Booth, Natasha Higgitt	05/03/2011	A Phase 1 Archaeological Impact Assessment (AIA) for the proposed Karoo Renewable Energy Facility on a site south of Victoria West, Northern and Western Cape Province on the farms Phaisantkraal 1, Modderfontein 228, Nobelsfontein 227, Annex Nobelsfontein
7036	AIA Desktop	Celeste Booth, Natasha Higgitt	19/11/2010	An Archaeological Desktop Study for the proposed Karoo Renewable Energy Facility on a site south of Victoria West, Northern and Western Cape
7947	AIA Desktop	Frans Prins	05/02/2011	DRAFT Technical Report in support of the EMP for the South Western Karoo Basin Gas Exploration Application Project: CULTURAL HERITAGE: CENTRAL PRECINCT
8943	PIA Phase 1	Lloyd Rossouw	24/03/2011	Palaeontological desktop assessment of a commercial renewable energy facility site located approximately 34km south of Victoria West in the Western Cape Province (and Northern Cape)
120317	HIA Phase 1	Celeste Booth, Sholeen Shanker	01/12/2012	An archaeological ground-truthing walk-through for the proposed substation and associated overhead power line for the Nobelsfontein Wind Energy Facility situated on a site south of Victoria West on the Farm Nobelsfontein 227, Northern Cape Province
120325	HIA Phase 1	Celeste Booth, Sholeen Shanker	01/12/2012	An archaeological ground-truthing walk-through for the proposed substation and associated overhead power line for the Nobelsfontein Wind Energy Facility situated on a site south of Victoria West on the Farm Nobelsfontein 227, Northern Cape Province
120820	HIA Phase 1	Celeste Booth	01/12/2012	An Archaeological Ground-Truthing Walk-Through For The Nobelsfontein Wind Energy Facility Situated On A Site South Of Victoria West On The Farms Nobelsfontein 227, Annex Nobelsfontein 234, Ezelsfontein 235, And Rietkloofplaatten 239, Northern Cape Province



## APPENDICES



#### APPENDIX 1: Archaeological Assessment (2021)



## APPENDIX 2: Palaeontological Assessment (2021)



### APPENDIX 3: Cultural Landscape Assessment 2021



#### APPENDIX 4: VIA for the Authorised Layout 2011 and 2021



## APPENDIX 5: Heritage Screening Assessment and NID