HERITAGE IMPACT ASSESSMENT FOR A PROPOSED WIND ENERGY FACILITY ON FARM 397/1 & 397/2, GOUDA, TULBAGH MAGISTERIAL DISTRICT, WESTERN CAPE

(Assessment conducted under Section 38 (8) of the
National Heritage Resources Act (No. 25 of 1999) as part of an EIA)

Prepared for

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EXECUTIVE SUMMARY

The UCT Archaeology Contracts Office was requested by Aurecon South Africa (Pty) Ltd to assess the impacts to heritage resources that might occur through construction of a wind energy facility (WEF) on Portions 1 and 2 of Farm 397 near Gouda in the Swartland area of the Western Cape. The two farm portions are approximately 860 ha in extent. The project would comprise of ten turbines between 60 m and 100 m high with blades of up to 50 m long, two 66 kV power lines linking to a substation scheduled to be built alongside the Gouda substation, roads and underground power lines between the turbines, a substation and site buildings, and concrete foundations and laydown areas at each turbine.

This assessment is part of an Environmental Impact Assessment and, as such, Heritage Western Cape is required to provide comment in order to facilitate final decision making by the Department of Environmental Affairs.

The site was surveyed on 26th January 2012 and finds were photographed and recorded by GPS. No power line routes were available and these have thus not been surveyed. The site consists of gently undulating wheat lands with a large mountain range some way to the east and several gum tree lines located on and near the site. The surface is shale gravel and sand.

No palaeontological impacts are expected and impacts to archaeological heritage will be of very low significance. The latter consisted only of scattered Early Stone Age artefacts but with no hand-axes noted. No buildings occur on the surveyed property and none were visible in the surrounding landscape during the survey. The nearest are on the farm to the east and are in the region of 100 years old. No impact of any sort to the built environment is expected.

Visual impacts are far more significant and the general landscape setting of the proposed WEF has been deemed inappropriate. However, the fact that Heritage Western Cape has already agreed to a much larger WEF in a far more visually sensitive location does nullify this conclusion. This WEF has also received authorisation.

Given the earlier decisions by HWC and the DEA, the present proposed project should be allowed to proceed but visual mitigation as proposed by Hansen (2012) should be enforced to reduce the impacts to visual heritage:

- Revegetation of the turbine foundations to reduce the amount of surface disturbance;
- Careful placement of the substation and buildings to reduce visual impacts to the R44;
- Appropriate colouring of the turbines; and
- Avoiding road crossings and new servitudes for the power line route.

Contents

1. INTRODUCTION

The UCT Archaeology Contracts Office was requested by Aurecon South Africa (Pty) Ltd to assess the impacts to heritage resources that might occur through construction of a wind energy facility (WEF) on Portions 1 and 2 of Farm 397 near Gouda in the Swartland area of the Western Cape (Figure 1). The two farm portions are approximately 860 ha in extent.

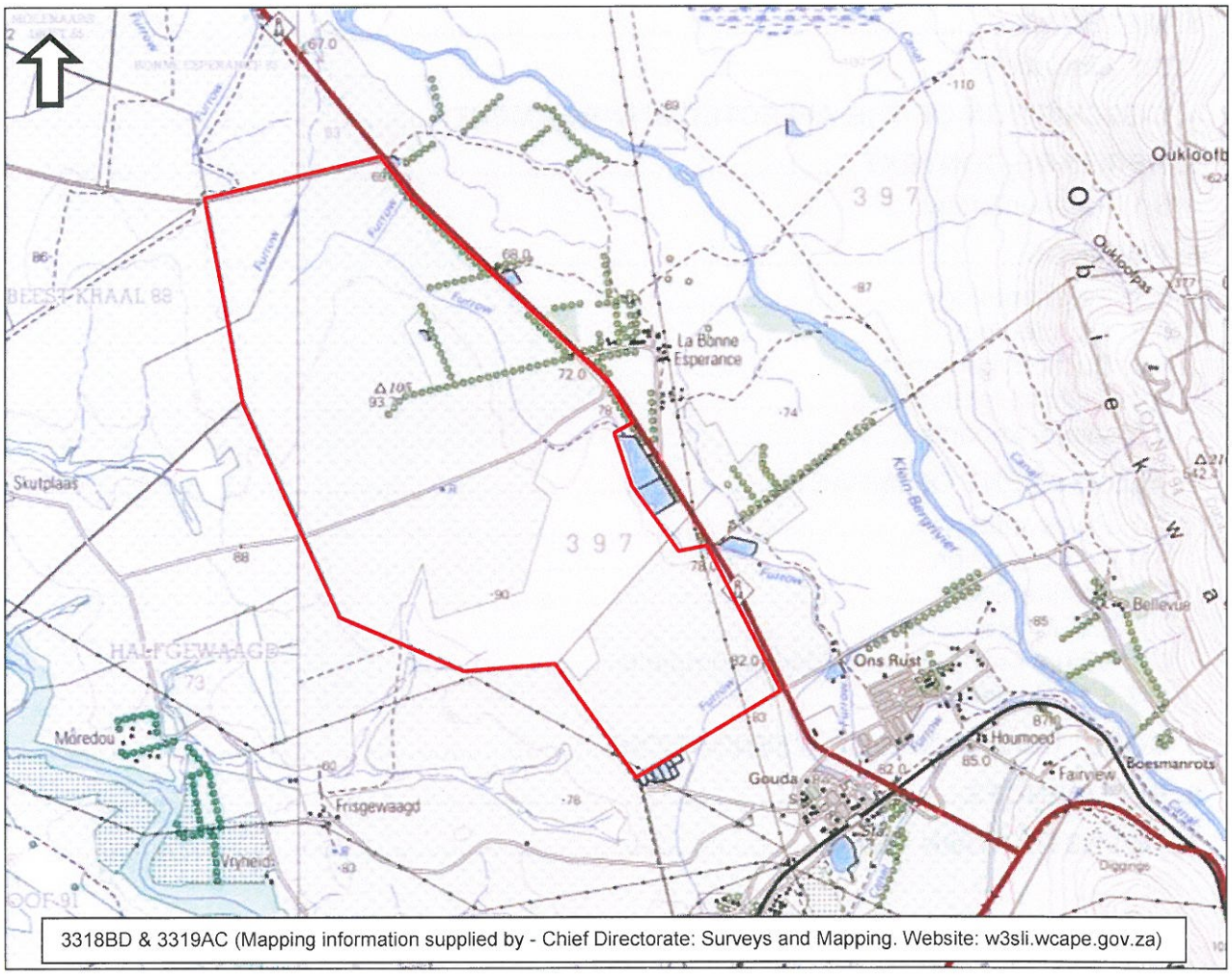

Figure 1: Map showing the location of Farm 397/1 & 397/2 (red polygon) just northwest of the town of Gouda.

The project is proposed by iNca Gouda Wind (Pty) Ltd and comprises of the following components:

- Ten wind turbines generating a total of approximately 30 MW of energy. The towers will be between 60 m and 100 m high with blades of up to 50 m length;
- Two 66 kV overhead power lines will connect to the proposed Nuwekloof Substation which is scheduled to be built alongside the existing Gouda substation;
- Underground power lines would be laid between the turbines;
- Roads will be upgraded or constructed between the turbines to 6 m width as required;
- A substation and small buildings will be built;
- Concrete foundations of 20 m by 20 m and 3 m deep will be cast for each 6 m diameter tower. They will be covered with topsoil to allow vegetation growth; and

- A 20 m by 6 m laydown area of concrete or tar will be built at the base of each turbine.

2. HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA) No. 25 of 1999 protects a variety of heritage resources including palaeontological, prehistoric and historical material (including ruins) more than 100 years old (Section 35), human remains older than 60 years and located outside of a formal cemetery administered by a local authority (Section 36) and non-ruined structures older than 60 years (Section 34). Landscapes with cultural significance are also protected under the definition of the National Estate (Section 3 (3.2d)). Section 38 (2a) states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted. A Notification of Intent to Develop form was submitted to Heritage Western Cape (HWC) and, because impacts were considered likely, a heritage impact assessment including specialist paleontological, archaeological and visual studies was requested along with an assessment of the impacts to historic structures. This report fulfils that requirement.

Since the project is subject to an Environmental Impact Assessment, HWC is required to provide comment on the proposed project in order to facilitate final decision making by the Department of Environmental Affairs (DEA).

3. METHODS

A field survey of the site was conducted on 26th January 2012. It consisted of both driving and walking. Finds and track paths were recorded on a hand-held GPS-receiver set to the WGS84 datum and photographs were taken.

3.1. Limitations

The power line routes were not known at the time of the survey and could not be assessed in the field. Given the finds made elsewhere, this is not expected to be a significant limitation. Ground conditions were excellent with no visual constraints to the survey.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The site consists of gently undulating wheat lands and, at the time of the survey, was clear of crops (Figures 2 & 3). Farm roads and fences cross the site and a long row of gum trees is present in one area. The ground surface is generally covered by wheat stubble on shale gravel and sand (Figure 4).

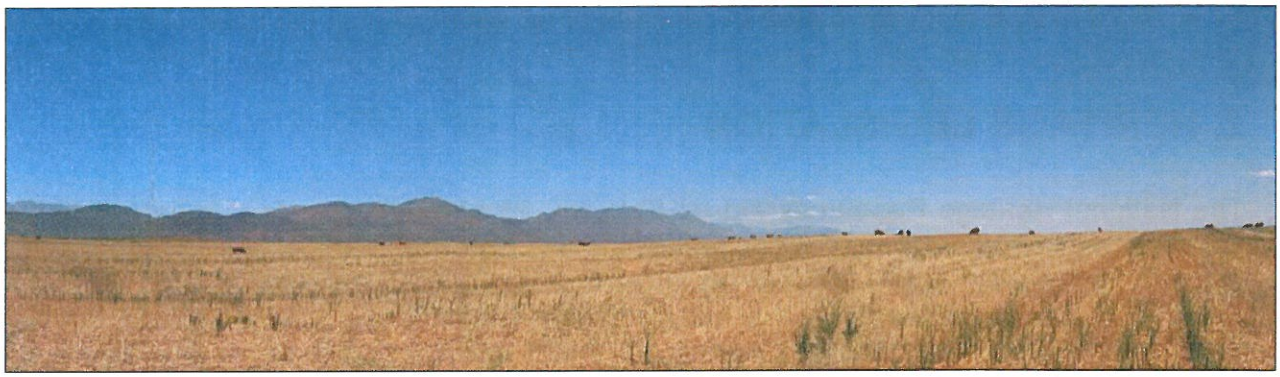

Figure 2: View towards the southeast showing wheat lands and grazing cattle.

Figure 3: View towards the northeast showing wheat lands and the line of gum trees in the distance.

Figure 4: View of the ground surface showing the usual shale gravel and wheat stubble.

5. HERITAGE CONTEXT

5.1. Palaeontology

The study area is underlain by deposits of the Malmesbury Group. According to Almond and Pether (2008) the Malmesbury Group is of low palaeontological significance with no fossils recorded as yet.

5.2. Pre-colonial archaeology

Only two archaeological research projects have been carried out in the nearby vicinity. One involved a survey of the Swartland area around Porterville (Hart 1984, 1987), while the second saw two small rock shelters being excavated near Voëlvlei Dam (Smith *et al.* 1991) with a view to exploring the relationship between hunter-gatherers and herders in the south-western Cape. A few impact assessments have also been conducted (Orton, 2008a, 2008b, 2010; Webley & Hart, 2010). These studies inform the following archaeological review.

The earliest period of pre-colonial archaeology present in the region is the Early Stone Age (ESA) which occurred until about 200 000 years ago. Artefacts pertaining to this period of prehistory are commonly encountered all along the western edge of the Cape Fold Belt Mountains. Most often they are associated with river terraces where the cobbles served as a source of stone material for making artefacts. Such artefacts have been recorded in the vicinity of the study area where Hart (1984, 1987) found ESA artefacts to be closely associated with rivers and focused on stony hills and ridges. Orton (2008b, 2010) found ESA artefacts scattered in farmland on the lower mountain slopes north of Saron as well as on the farm immediately east of the present study area. Most were likely in secondary context with some in the latter area associated with a large mound of alluvial gravel. Closer to the study area, Webley and Hart (2010) found no archaeology in an area to the southwest of Gouda, but in the town Orton (2008a) found a large number of ESA artefacts. These artefacts were suggested to be in primary context with many exposed by the excavation of the canal system in the area. As such they are of greater research value.

After 200 000 years ago and extending up until some 40 000 to 20 000 years ago is the Middle Stone Age (MSA). Hart (1984, 1987) records the occurrence of MSA artefacts in similar contexts to ESA ones throughout his study area. No other reports of MSA artefacts are known in the vicinity.

The Later Stone Age (LSA) extends from the end of the MSA until the arrival of European colonists some 350 years ago. By far the majority of archaeological sites found in South Africa pertain to the last 5000 years. The two small rock shelter excavations conducted by Smith *et al.* (1991) yielded material demonstrating that the area was certainly used by the San and the Khoekhoen. The latter only appeared in South Africa within the last 2000 years, although the exact time of arrival is still very much under debate. The Voelvlei rock shelter had three radiocarbon dates conducted with the upper two being in the 15th and 16th centuries and the oldest one, from the base of the site, falling within the 2nd century AD. This last is claimed by the authors to be from a level predating the introduction of pottery to the site. The Driebos deposits were never dated but the finds suggest material of a similar age (Smith *et al.* 1991).

The rock shelter excavations were conducted as part of Smith's wider interest in the origins of the herding economy in the Western Cape. He proposed that the Khoekhoen moved

between winter pastures at the coast (specifically the Vredenburg Peninsula) to summer pastures inland (Smith 1983, 1984). The latter would have been on the Malmesbury shales where the nutritious Renosterveld vegetation grew. His cycle of transhumance passed through the Gouda area, following the course of the Great Berg River (Figure 5).

It was largely to test Smith's (1983, 1984) hypothesis that Hart (1984) conducted his extensive survey of the region around Porterville and Saron. He was not very successful, with just 16 usually very ephemeral LSA sites being found and mostly in ploughed land. The artefacts were generally very informal. Few conclusions could be drawn from the results of the survey, but they do show quite clearly that LSA material is widely found out in the open, away from rock shelters.

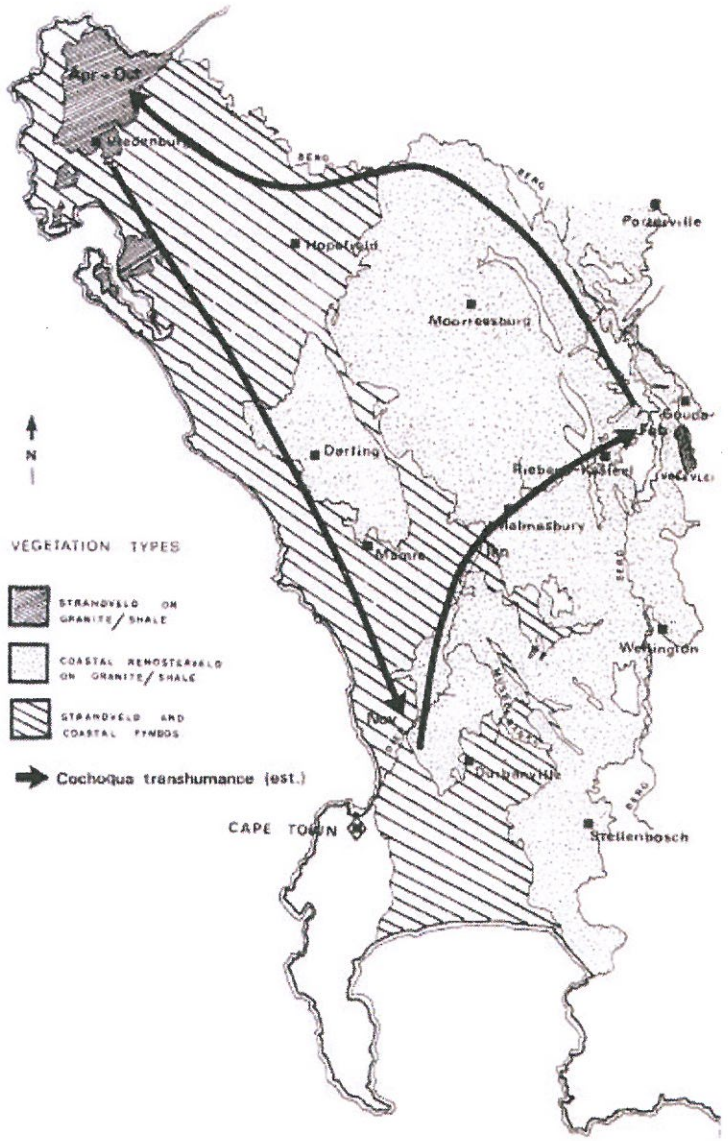

Figure 5: Estimation of the route of seasonal transhumance used by the south-western Cape Khoekhoen. The stippled area denotes Renosterveld which was suggested to have been important for summer grazing. Gouda and the Voelvlei Dam lie at middle right (source: Smith 1984: fig. 1).

Whether the Nuwekloof was used in pre-colonial times as a major thoroughfare is unknown, but the one clue we do have is that Pieter Potter, the first European to set foot in the kloof, was unable to find his way through and reported that no path existed (Mossop 1927).

Rock art is present in the area with both the shelters documented by Smith *et al.* (1991) containing art. Furthermore, although this is subject to confirmation in the field, there is a rocky outcrop labelled on maps as "Boesmanrots[1]" just east of the town and which may contain rock art. Mossop (1927) describes the rock but mentions no art. Several rock art sites are reported to occur in the region around Porterville (SA-Venues 2012) with the famous European galleon being a notable inclusion (Parkington 2003). It is reported that Thomas Bain discovered rock art sites in the vicinity of Nuwekloof when he was building the pass (Storrar & Komnick 1984). The precise age of rock paintings is unknown but those with European content, such as the galleon, clearly indicate that the tradition of painting on the walls of rock shelters and boulders continued into the colonial period.

5.3. Colonial period

5.3.1. Regional development

The distinct character and vast amount of heritage present in Tulbagh generally overshadows the history of the smaller surrounding towns. Tulbagh was founded in 1743 when a church was built at the suggestion of Baron Gustaf Willem van Imhoff, the newly appointed governor of the Netherlands Indies, who was visiting the Cape. It was several generations, though, until the settlement developed into a town (Fransen 2006). The name "Tulbagh" was only given in 1805 to replace the original "Roodezand" (Ross 2002). The smaller towns to the west all came about in later years as shown in Table 1.

Table 1: Origins of towns in the vicinity of Gouda (Fransen 2006).

Town	Founding date	Type of town
Tulbagh	1743	Church town
Saron	1846	Mission settlement
Riebeek-West	1855	Church town
Porterville	1863	Church town
Riebeek Kasteel	1863	Church town

5.3.2. Development of Gouda

Gouda does not feature in Fransen's (2006) list of towns originating prior to 1900 and a map of the south-western Cape dating from circa 1902 shows nothing in the vicinity of Gouda[2]. The town started on a farm named Gouda and various origins of the name have been suggested. All share the notion of the word being Khoekhoen. It may have been from a word

[1] But see an alternative origin of this name alluded to in Section 5.3.2 below.

[2] Untitled map held in the UCT Dept of Archaeology collection.

meaning "antelope" or "honey kloof" (Western Cape Tourism 2007). The former meaning is also mentioned by Nienaber and Raper (1977) who mention the use of the "Bushman Rock[3]" as a lookout point to scan the area for antelope to hunt. Other sources point towards a meaning along the lines of a dirty road or one with dung or faeces on it. They are certain, however, that the name does not relate to the town of that name in the Netherlands.

A precise date for the beginnings of the settlement at Gouda is unknown but it initially served as a railhead for Porterville until the new line linking Porterville with Riebeek West through Hermon was constructed in 1929 (Siyabona Africa Travel 2012). Prior to this the settlement was known as Porterville Road[4]. While all of the northern part of the town is relatively recent, a number of the houses in the southern part are likely more than 60 years of age and thus included as protected heritage.

In recent years the town has been used as a centre for fruit packing with a large warehouse having been built in the eastern part.

5.3.3. Roads and railways

Although this aspect of heritage predates the establishment of the town, it is probably for reasons of transport that the vicinity of Gouda is most significant in heritage terms. Ross (2002) describes several early passes that existed between the Swartland and the Tulbagh Valley, which was originally known as "Roodezand". The first of these stemmed from the need to find the Khoekhoe people and their herds of domestic stock for trading purposes. An expedition in 1658 was sent out by Van Riebeeck. On this expedition a surveyor named Pieter Potter became the first European to see the Tulbagh Valley when he climbed a ridge some miles north of the Little Berg River and gained a view into the valley. He had previously tried to walk through the kloof but found the going too difficult along the river (Mossop 1927).

In 1699 Willem Adriaan van der Stel, then governor at the Cape, opened the Roodezand valley to farming, naming it "Land van Waveren" after a place in the Netherlands. In order to provide access to the valley a new pass some 4 km to the north of the kloof was made (Ross 2002). Mossop (1927) suggests this new pass to have been somewhere near the spot where Potter had ascended. Despite W.A. van der Stel's new name, the name "Roodezand" was still in common use for the Tulbagh valley and the pass became known as "Roodezand Pass". A rather poor pass, it had a very steep slope on its eastern side, was narrow and in places thickly wooded. Ross (2002) notes Kolbe's statement in 1731 that for these reasons wagons were frequently taken apart and carried over the pass before being reassembled on the other side. The base of this pass lies on the eastern part of the farm presently under study.

As a result of the difficulties associated with the Roodezand Pass, the local farmers tried to improve its quality but no satisfactory solution was forthcoming. They then turned their attention to the river valley and succeeded in creating a road along the northern side of the river that was not too steep. Since it afforded access to the Roodezand, it took on the name of Roodezand Kloof. To avoid confusion the old pass became known as Oude Roodezand Kloof and the new one Nieuwe Roodezand Kloof. The abbreviations Oudekloof and Nieuwekloof soon followed. By the 1760s Nieuwekloof had become the primary means of

[3] Referred to in Section 5.2 above.

[4] A 1910 survey diagram that will be discussed below mentions 'Porterville Road Station'.

access to the Tulbagh valley (Ross 2002). A toll was levied as a contribution towards maintenance of the road and this resulted in some farmers still driving their cattle over the old pass to avoid the toll fee (Burchell 1822). Burchell illustrated the pass as it appeared in 1811 (Figure 6).

Two early travellers who used the pass left descriptions of it. Carl Thunberg (1793 in Ross 2002) passed through in 1772 stating that:

> "the cleft through which we passed from the sandy plain that lies towards the Cape, but gradually rises until it comes to Roodezand, is one of the few chasms left by the long range of mountains through which it is possible for a wagon to pass, though possibly not entirely without danger. In some places it is so narrow two wagons could not pass each other."

William Burchell (1822:137-138), passing through in 1811, described the kloof as:

> "a narrow winding defile of about three miles in length, just enough to allow passage for the Little Berg River on each side of which the mountains rise up abruptly and lofty. Their rocky sides are thickly clothed with bushes and trees from their summits down to the water... Along the steep and winding sides, a road has been cut, which follows the course of the river, at a height above it generally between fifty and a hundred feet; in one part rising much higher, and in another, descending to the bottom, and leading through the river, which, at this time, was not more than three feet deep, although often so much swollen by the rains, as to be, for a day or two, quite impassable."

The remains of this pass were found to be still in existence by Burman (1963), although it was in a very poor state with low-lying sections washed away and others blocked by tumbled rocks. He also notes the scars of "remskoene"[5] to be present in places on this pass.

With the renaming of Tulbagh, the pass changed names again, becoming "Tulbagh Kloof". The drifts that had to be crossed were problematic and in 1855 Thomas Bain examined the kloof recommending an alternative route on the south-western side of the river. This road was built between 1859 and 1860 and carried road traffic for more than a century thereafter. Bain was also asked to plan a railway through the kloof which he did in 1873 and 1874 (Ross 2002). The newly appointed railway engineer for the Cape Colony, William Brounger, oversaw the construction of this railway and its extension into the Karoo (Hart 1998). The section designed by Bain and Brounger was part of the Cape Town to Kimberley railway that was constructed in sections up until 1885 (Table 2). Although originally intended to serve the Western Cape farming community, the railway was rapidly extended to Kimberley as a result of the diamond rush. The Nuwekloof section followed a very similar line to the road (Figure 7) and was opened on 1st September 1875, while the final leg to Kimberley was opened prior to final completion on 28 November 1885 (Walker 2001). The modern road through the kloof was constructed in the 1960s and opened in 1968. The name "Nuwekloof Pass" was chosen for the new road (Ross 2002).

[5] Remskoene are the iron shoes fitted to the wheels to act as brakes and to protect the wooden wheels from damage on the rough rocks on steep sections of the pass.

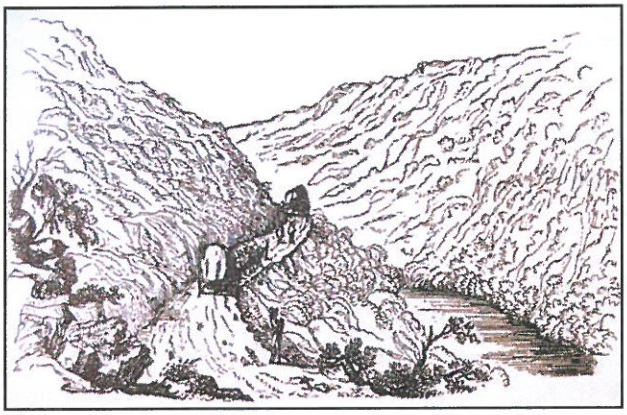

Figure 6: Burchell's sketch of the Nuwekloof Pass from his 1811 travels (Source: Ross 2002:3).

Figure 7: View of Thomas Bain's road and railway alignments running side-by-side through Nuwekloof (Source: Ross 2002:4).

Table 2: Development of the Cape Town to Kimberley railway line (Walker, 2001).

Town	Date opened
Paarl	18-03-1863
Wellington	04-11-1863
Tulbagh	01-09-1875
Worcester	16-06-1876
Kimberley	28-11-1885

As stated earlier, Gouda originally served as the railhead for Porterville and was known for this reason as Porterville Road. A new line running from Hermon through Riebeeck Kasteel and Riebeeck West and on to Porterville was opened in 1929 (Siyabona Africa Travel 2011).

An extensive history of the various passes into the Tulbagh Valley has also been compiled by Joanna Marx (2009) and incorporates much of the above information along with other information.

5.3.4. Water infrastructure

A multitude of canals and lei water furrows surround Gouda. The Voëlvlei Dam to the south of the town was built in 1952 and some of the canals and furrows post-date its construction. These include the long channel that runs from a kloof northeast of Saron bringing water to Voelvlei Dam as well as the shorter one that brings water from a weir on the Klein Berg River. Although their precise age is unknown, they post-date 1952 and are thus not of heritage concern. Some may be as recent as the 1980s.

Others, however, are related to the earlier agricultural activities and many were present already on aerial photographs dating from 1938 (Orton 2008a). Although not structures in the usual sense, they are man-made, greater than 60 years of age and should be considered as protected heritage.

5.4. Built environment

The town of Gouda is not particularly old but it is quite likely that structures greater than 60 years of age and of heritage conservation value will be present in the older (southern) part of the town. Farming has certainly been taking place in the region for a long time and farm complexes will certainly include buildings of value.

6. FINDINGS

6.1. Palaeontology

Almond (2011), through a desktop assessment of the study area has declared it to be of very low palaeontological sensitivity, since the Malmesbury formation is not known to be fossiliferous.

6.2. Archaeology

The only archaeological resources encountered pertained to the Early Stone Age. Figure 8 shows the distribution of recorded artefacts, but no doubt many more occur scattered widely throughout the area as was generally the case with the neighbouring property to the east. Unlike on the latter property, and unusually, no hand-axes were found. Figures 9 to 15 show a selection of these finds. Most were found in a context of shale gravel but in one instance, at point '007', the artefacts were located within a sandy area with fine river gravel. Unusually, the artefacts here were much smaller than those found elsewhere (Figures 13 & 14). Aside from one very crude biface at point '010' (Figure 15), all the artefacts consisted of flakes, chunks and cores. Several large piles of stones cleared from fields were examined for artefacts but none were found in them. None of these occurrences is deemed to be an archaeological site in the strictest sense.

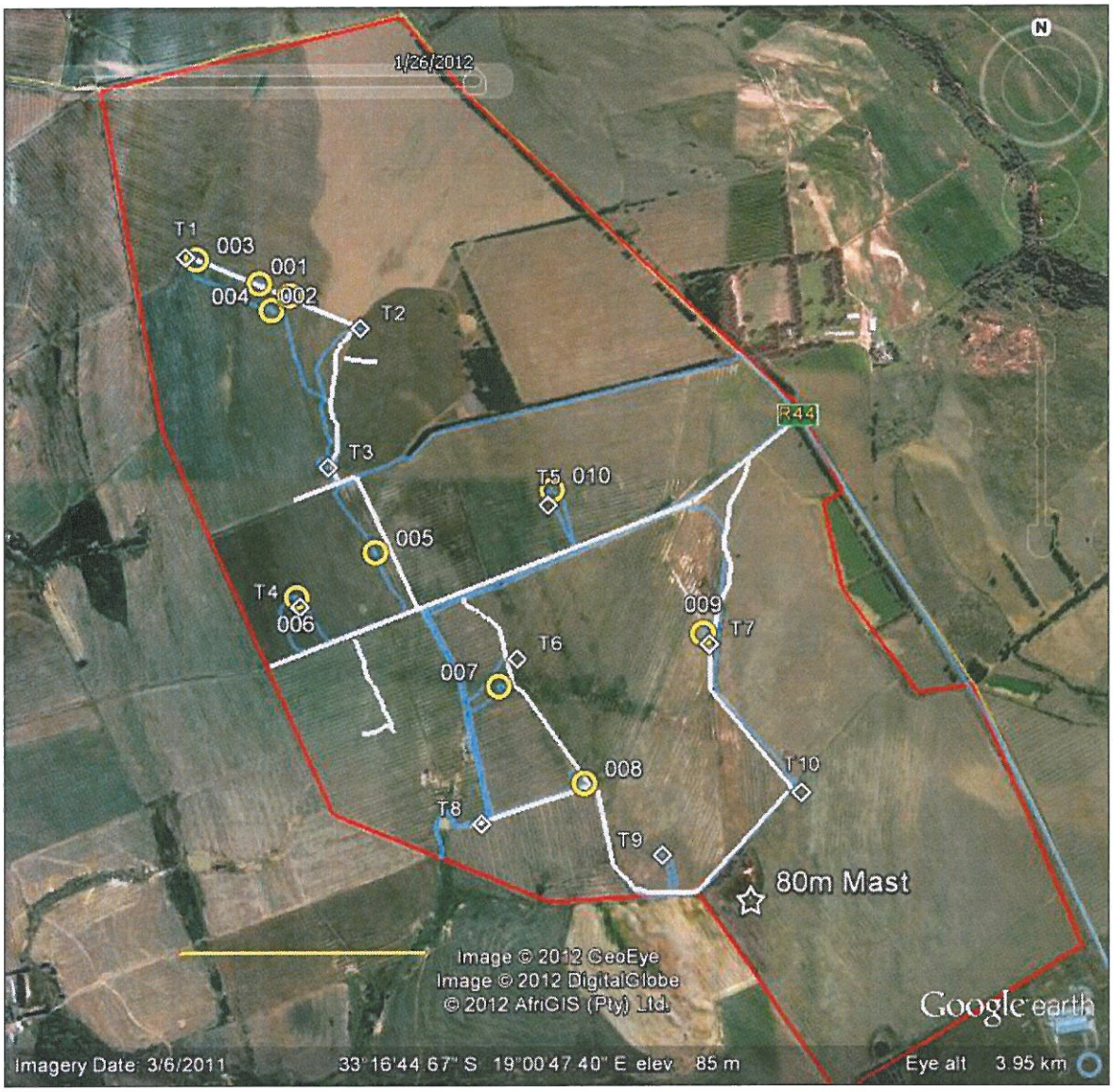

Figure 8: Aerial view of the study area showing the position of tracks paths (blue lines), proposed roads, (white lines), proposed turbines (white diamonds) and archaeological finds (yellow circles). Tree lines are obvious as dark lines and not labelled on the image.

Figure 9: Artefacts found at point '001'.

Figure 10: Artefacts found at point '002'.

Figure 11: Artefacts found at point '006'.

Figure 12: The context in which artefacts at point '006' were found.

Figure 13: Artefacts found at point '007.

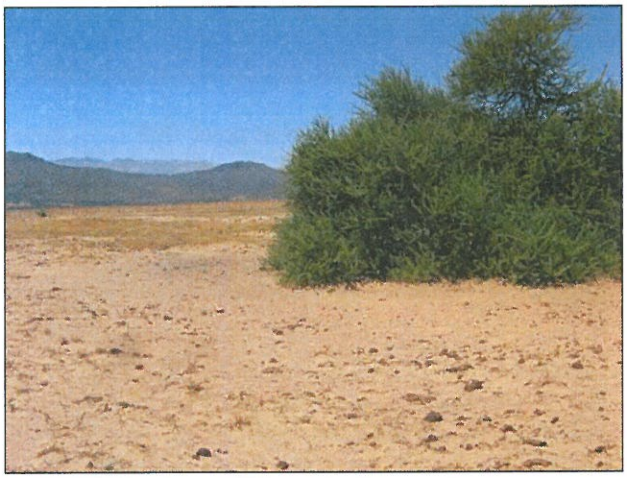

Figure 14: The context in which artefacts at point '007' were found.

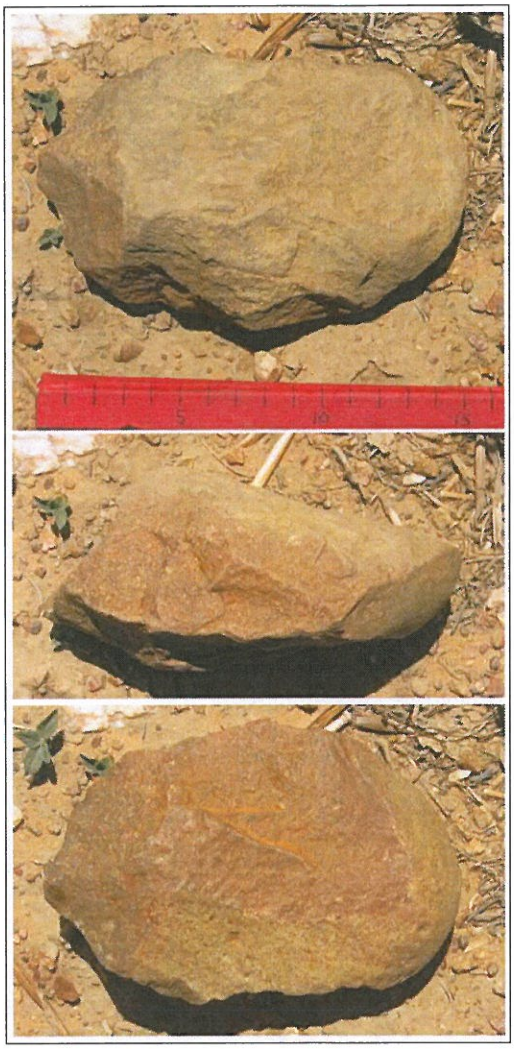

Figure 15: The crude bifacial artefact found at point '010'.

6.3. Built environment

No buildings occur in close proximity to any of the turbines. The layout has specifically excluded all land within approximately 1000 m of any buildings and none were visible in the surrounding landscape from the site during the survey. The farm complex for Farm 397 lies to the east of the R44 among rows of tall trees and is well shielded from view. It is called Bonne Esperance on maps ("A" on Figure 16). A survey map of the farm in 1910 shows that at that time there were no buildings to the west of the R44 (Figure 16). Also, Farm 397 was still part of the larger Farm 83 and there were in fact three farm complexes present. One, Nooitgedaght, was demolished between 1973 and 1987 and lay just north of the present study area ("B" on Figure 16). This complex was also known as Middelplaas as indicated on a 1945 topographic map. The northernmost complex, La Gratitude, is still present but quite far from the study area ("C" on Figure 16).

Figure 16: A 1910 survey map of what was then Farm 83 showing the present project area (red dashed polygon extending off the map to the south) and homesteads existing at that time (A – C).

The primary complex was described in detail by Orton (2011) and found to contain mostly recent structures. The oldest building appears to have functioned as a stable (Figure 17) and may date to the late 19th century. The only other building of any heritage concern was a house with roots probably in the early 20th century (Figure 18). Both are in excess of 1.2 km from the nearest turbines (#7 & # 10).

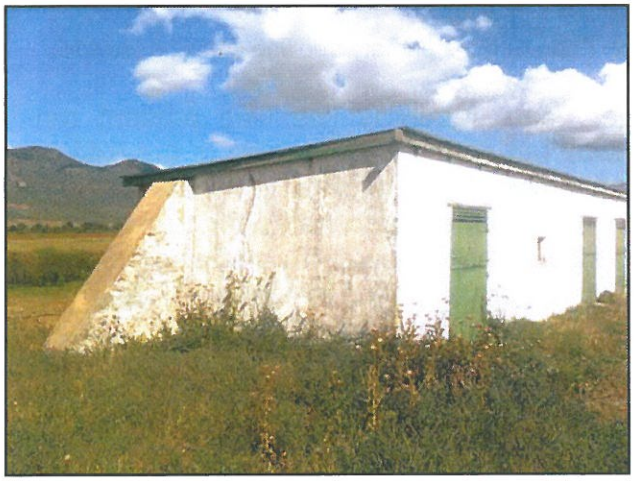

Figure 17: View of the old stable on the neighbouring farm to the east (Source: Orton 2010).

Figure 18: View of the early 20th century house on the neighbouring farm to the east (Source: Orton 2010).

6.4. Cultural landscapes

The site is generally just open wheat fields and contains no real cultural landscape elements of concern. The one exception, however, is the large gum tree line that extends from west to east across the site. This tree line is part of a larger complex of tree lines planted at some point in the early 20th century, certainly well before 1942 (Figure 19). Many have already been removed but the primary structure created back then has been retained in the tree lines that remain (Figure 20).

Figure 19: Aerial photograph from 1942 of the main farm werf and associated tree lines alongside its modern equivalent. The study area lies to the west (left) of the R44 road.

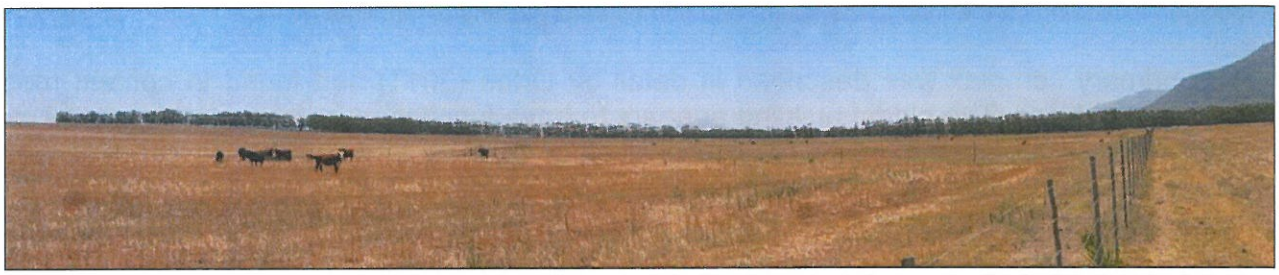

Figure 20: View to the north from the position of Turbine 7 showing the primary tree line crossing the site.

In the past this farm functioned as a piggery and a railway line was present running northwards into the farm. From Gouda the railway ran on the western side of the R44, along the edge of the present study area, and then crossed the road to terminate in the farm complex where, it is assumed, pigs (or pork) were loaded onto trains for transport to the markets. This train line is evident on the 1910 survey map (Figure 16) and also on the 1945 topographic map but had disappeared by 1971 (Figure 21). The presence of cold storage facilities suggests a butchery to have been located on the farm as well.

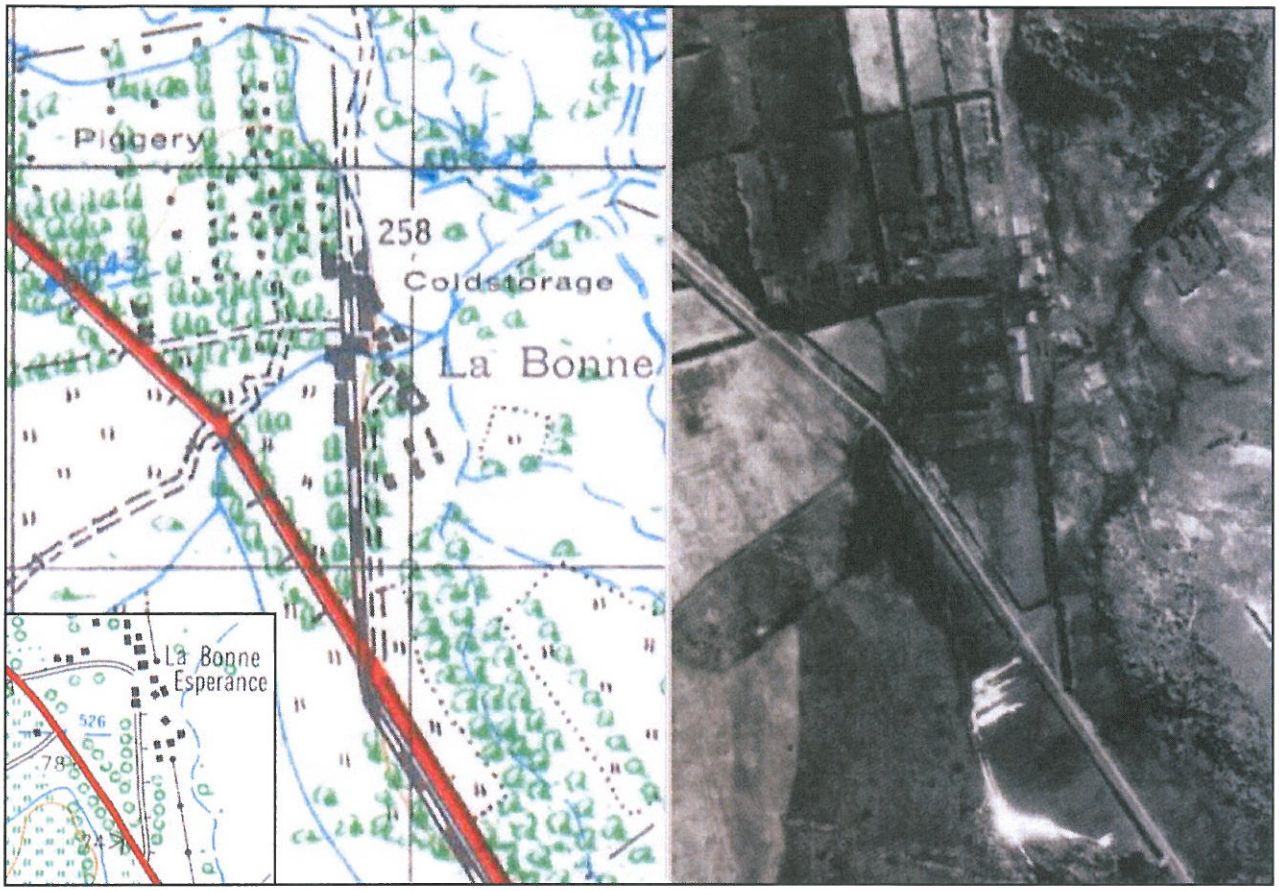

Figure 21: 1945 topographic map and 1949 aerial photograph showing the private train line running onto the farm. In the latter, the line is less easily visible. The inset at lower left shows the 1971 topographic map with no train line present.

Another cultural landscape feature that characterises the local region is the presence of leiwater furrows. These are shallow furrows excavated into the landscape to carry water from a source to places where it was needed for irrigation. Examination of aerial photography shows furrows to have crossed this farm but they have been ploughed over now and are no longer evident.

The general landscape is one of wheat farming and livestock grazing and to this end the entire study area has been transformed into agricultural land.

6.5. Visual impacts

A separate specialist visual assessment has been conducted by Hansen (2012) and important points related to heritage are extracted and paraphrased here.

The site's sense of place is said to derive from the agricultural landscape, the gum trees in the area and the proximity to Gouda and the R44. The general character of the site is defined by its location on a gently undulating plain with a range of mountains to the east and with high ground also present in the west. Existing vertical elements in the landscape include grain silos, power line pylons and gum trees. Hansen (2012) sees the landscape as being moderately cluttered.

The viewshed analysis presented by Hansen (2012: figs 5.1 & 5.2) indicates that almost the entire area stretching between Hermon in the south and Saron in the north will experience visual impacts with only very small areas shielded by minor topographical features. Relative visibility of four individual turbines shows that all are similarly visible and that no part of the proposed development is any more or less visible than other parts. Overall, visibility may extend as far as 25 km from the development site but the degree of visibility is moderated by the distance, the weather and seasonal conditions and the background. Night time impacts would relate only to the presence of aircraft warning lights on top of the turbines.

Hansen (2012) identifies numerous localities from which the WEF will be visible. These include Gouda, Saron, Riebeek West, Riebeek Kasteel, Hermon, Farmsteads, the R44, the R46, the R311, other local roads, the railway line, the river corridors and the wider landscape. Those to the north and south would experience marginally greater impacts due to the turbines usually facing into the prevailing winds that come from those directions. The land beneath the turbines will likely continue in its agricultural use and will probably not change significantly from a visual perspective.

Construction period impacts would differ from the operational impacts since construction activities and related traffic would occur on the site.

The overall impact of the WEF with 100 m high turbines is considered to be regional in extent (up to 25 km).

The site has a high degree of visual exposure due to the relatively flat landscape and the fact that the tallest elements currently existing on the site, gum trees, are only some 20 m high. The trees along the R44 road will have a partial screening effect to users of that road.

The zone of visual influence defines how prominent the development would be and how strongly it acts as a visual focus. For most of the study area this is rated as being moderate (partial shielding) or less, but the R44 and certain local farmsteads would experience high zones of visual influence. The most significant receptor, the town of Gouda, is rated as moderate to high due to the partial screening effect of the surrounding buildings and trees.

Due to the gently undulating agricultural landscape and its rural character, the visual absorption capacity is rated as low, i.e. the landscape is not able to easily absorb the proposed WEF. The proposed semi-industrial use of the land for a WEF is seen as inappropriate to the current agro-pastoral setting.

The magnitude of the impact is rated as high within 5 km of the site and moderate up to 15 km distant, whereas beyond this distance the magnitude will be low due to the effects of distance and topography. The duration of the visual impact is considered to be long term.

Hansen rates significance through a combination of extent, duration and intensity and arrives at a rating of 'high' for either the 100 m or the slightly lower turbines and the power lines would be moderate to high depending on the selected route.

7. ASSESSMENT OF IMPACTS

Assessment of impacts to heritage resources is considered only for the operational phase since many impacts would be similar during both construction and operation. However, the

overall impacts of the completed WEF are most significant and it is these that are tabled and discussed below. The rating scale used is that provided by Aurecon for use by their appointed specialists.

7.1. Palaeontology

The Malmesbury Group of geological sediments are regarded as being of very low palaeontological sensitivity and thus any impacts would likely be of very low significance (Table 3).

Table 3: Assessment of palaeontological impacts for the proposed WEF.

	Before mitigation	**After mitigation**
Extent	Regional	Site
Intensity	Negligible	Negligible
Duration	Permanent	Permanent
Probability	Improbable	Improbable
Confidence	Unsure	Unsure
Significance	Very low	Very low
Status	Negative	Negative
Reversible	No	
Cumulative impacts	No palaeontological resources are known from the area so cumulative impacts are not expected.	

7.1.1. Mitigation

No mitigation is suggested prior to construction but in the unlikely event that fossils are found then mitigation may need to be considered during construction.

7.2. Archaeology

The archaeological resources encountered on the site are of little significance due to their context and distribution. No proper sites were found and, unlike the farm to the east, no hand-axes that can offer statistical data were noted. The significance of impacts is thus very low (Table 4).

Table 4: Assessment of archaeological impacts for the proposed WEF.

	Before mitigation	**After mitigation**
Extent	Site specific	n/a
Intensity	Low	n/a
Duration	Long term	n/a
Probability	Probable Improbable	n/a
Confidence	Certain	n/a
Significance	Very low	n/a
Status	Negative	n/a
Reversible	No	
Cumulative impacts	The archaeological material present in the immediate vicinity is of very low significance and the loss of larger areas containing such material is not significant.	

7.2.1. Mitigation

Due to the low significance of the archaeological resources, no mitigation is suggested.

7.3. Visual and cultural landscape impacts

Due to the degree to which these impacts are related they are considered here as one. The proposed WEF is not considered an appropriate new land use for the present agricultural landscape since it will result in the imposition of significant vertical elements which will completely dominate the existing landscape elements including structures (silos and power lines) and gum tree lines. The impacts could be reversed if the WEF is decommissioned, disassembled and the land rehabilitated to its current form. Cumulative impacts will occur should both this and the already authorised WEF (*c.* 60 turbines) be constructed, though the latter will result in the more significant impacts due to its size and position relative to the exit from the historic Nuwekloof Pass. The after mitigation impacts are deemed similar here (Table 5), since the overall visual impact cannot be reduced through mitigation. Mitigation will, however, slightly reduce certain of the minor impacts.

Table 5: Assessment of visual impacts for the proposed WEF.

	Before mitigation	**After mitigation**
Extent	Regional	Regional
Intensity	Medium to High	Medium to High
Duration	Long term	Long term
Probability	Definite	Definite
Confidence	Certain	Certain
Significance	High	High
Status	Negative	Negative
Reversible	Yes	
Cumulative impacts	Another WEF with *c.* 55 turbines has been proposed and authorised immediately east of the present site. That one will have a greater impact on the quality of the receiving environment but the present WEF would certainly result in further deterioration of the visual environment.	

7.3.1. Mitigation

Visual mitigation would include:

- Revegetation of the turbine foundations to reduce the amount of surface disturbance;
- Careful placement of the substation and buildings to reduce visual impacts to the R44;
- Appropriate colouring of the turbines;
- Avoiding road crossings and new servitudes for the power line route; and
- Retention of all gum trees, both along the R44 and within the farm area.

The latter mitigation measure is considered important as it will result in the retention of as many existing vertical elements as possible and not leave the turbines standing isolated on the landscape.

8. CONCLUSIONS & RECOMMENDATIONS

This assessment finds that only one aspect of heritage would be subjected to significant impacts – the visual environment. Other aspects have either no impact or else only very low rated impacts. The chosen location is deemed to be visually unsuitable to the proposed development and Hansen (2012) has recommended that it not proceed.

However, the fact that HWC have already approved construction of a much larger facility in a far more visually sensitive location does, to some degree, nullify this visual recommendation. This latter facility has also received environmental authorisation from the Department of Environmental Affairs (Savannah Environmental, n.d.).

It is considered likely that, should the larger facility be constructed, then the addition of this new one would not cause highly significant cumulative visual impacts. As such, and based on the earlier HWC comment and DEA authorisation, it seems that this project too should be allowed to proceed. However, visual mitigation should be enforced to reduce the impacts to visual heritage:

- Revegetation of the turbine foundations to reduce the amount of surface disturbance;
- Careful placement of the substation and buildings to reduce visual impacts to the R44;
- Appropriate colouring of the turbines;
- Avoiding road crossings and new servitudes for the power line route; and
- No trees may be cut down either along the R44 or within the farm area.

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10. INVESTIGATION TEAM

Fieldwork:	J. Orton D. Halkett
Report:	J. Orton

RECOMMENDED EXEMPTION FROM FURTHER PALAEONTOLOGICAL STUDIES:

Proposed iNca Gouda wind energy facility, Gouda, Malmesbury Magisterial District, Western Cape

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1. OUTLINE OF DEVELOPMENT

The company iNca Gouda Wind (Pty) Ltd is proposing to construct a wind energy facility to generate approximately 30 Megawatts (MW) on Portion 1 of Farm No. 397 and Portion 2 of Farm No. 397, Gouda. The study area is about 860 ha in area and is situated approximately one kilometre north-west of Gouda in the Western Cape (Figs. 1 & 2). Associated infrastructure would include access roads between the turbines and two new 66kV overhead powerlines to connect the wind farm to the Eskom grid at the Gouda Substation.

Specialist comment on the potential impact of the proposed development on palaeontological heritage has been commissioned on behalf of the client by Aurecon, Aurecon Centre, 1 Century City Drive, Waterford Precinct, Century City I South Africa (Contact: Ms Nicole Petersen).

2. GEOLOGICAL BACKGROUND

The development site comprises fairly flat-lying agricultural land at *c.* 70-80m amsl on the western side of the R44 tar road, between the Berg River and the Klein Berg River. Satellite images show that the level of bedrock outcrop here is very low (Fig. 2).

The geology of the study area is shown on 1: 250 000 sheet 3319 Worcester (Fig. 3). It is entirely underlain by subunits of the Late Precambrian **Malmesbury Group**, namely the **Noree Formation** (Nn) and the **Porterville Formation** (Npo). Brief descriptions of these Malmesbury Group rocks are given by Gresse and Theron (1992), Gresse *et al.* (2006) and Almond (2010). It should be noted that the lithostratigraphic subdivision of the Malmesbury Group *sensu lato* has recently been revised, with the recognition of a separate highly deformed Swartland Group (Early Ediacaran) that is unconformably overlain by a younger, less deformed Malmesbury Group *sensu stricto* (Late Ediacaran; Belcher & Kisters 2003, Buggisch *et al.* 2010, Rowe *et al.* 2010).

The Malmesbury Group *sensu lato* comprises a wide range of near-coastal marine, shallow shelf and submarine fan sediments of Late Precambrian age that crop out on the coastal plain and in the Tulbagh Valley. Due to the recessive weathering of most Malmesbury Group rocks, the topographically subdued, gently hilly coastal plain features very few natural exposures of fresh bedrock. These rocks display evidence of extensive deformation, including intense folding, faulting, quartz veining and cleavage development, as well as regional metamorphism during the Late Proterozoic to Cambrian Saldanian Orogeny (mountain-building event). The more pelitic (clay-rich) Malmesbury rocks have in addition suffered extensive chemical weathering under humid tropical conditions during Cretaceous and Tertiary times so that fresh bedrock is almost universally covered with a deep mantle of multi-hued, kaolinitic and ochreous saprolite (*in situ* weathered rock) and surface gravels (sometimes silcretized) (Almond 2010). In the present study area

between the Berg and Klein Berg Rivers, it is likely that Quaternary to Recent alluvial deposits are also present locally above Malmesbury Group bedrocks.

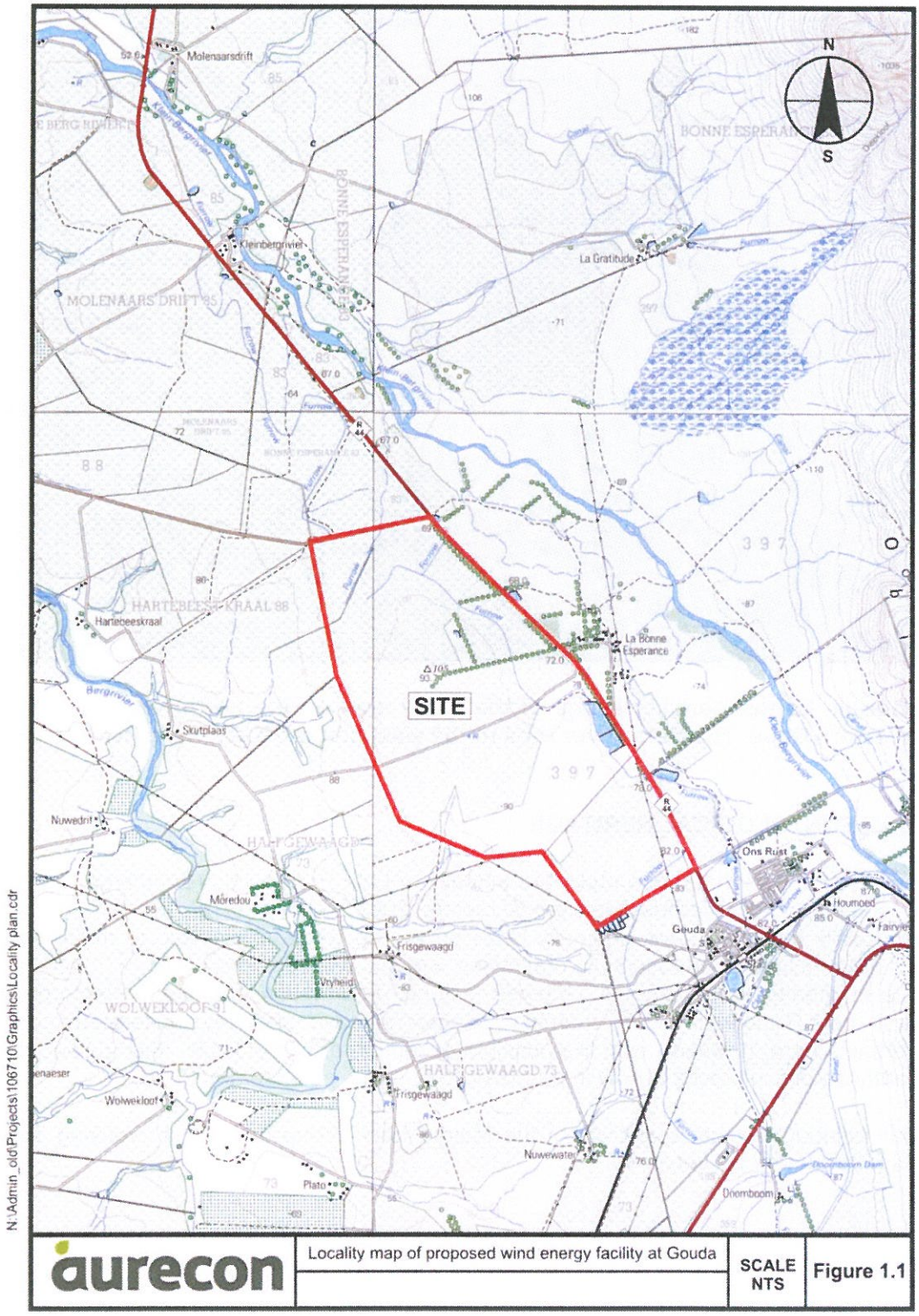

Fig. 1. Location (red polygon) of the proposed iNca Gouda wind energy facility about one kilometer north-west of the town of Gouda, Western Cape (Image kindly supplied by Aurecon).

Fig. 2. Google Earth© satellite image of the study area on the north-western outskirts of Gouda, Western Cape. The Berg River runs to the west and the Klein Berg River to the east.

3. PALAEONTOLOGICAL HERITAGE

Recent research shows that these rocks are actually of Late Proterozoic (Ediacaran) age and are therefore potentially fossiliferous (Belcher & Kisters 2003, Gresse *et al.* 2006, Almond 2008). Groups of fossils that may have originally been preserved within siliciclastic or minor carbonate sediments here include trace fossils, stromatolites, organic-walled microfossils (*e.g.* acritarchs) as well as the enigmatic vendobiontans. Intense tectonic deformation, regional metamorphism and subsequent, post-Gondwana deep chemical weathering have probably obliterated most or all organic remains here, however, with the possible exception of microfossils. Micropalaeontological analysis of these difficult rocks is now in progress (G. Germs, pers. comm. 2008).

The overall palaeontological sensitivity of the Malmesbury Group rocks and overlying superficial sediments (alluvium *etc*) is very low.

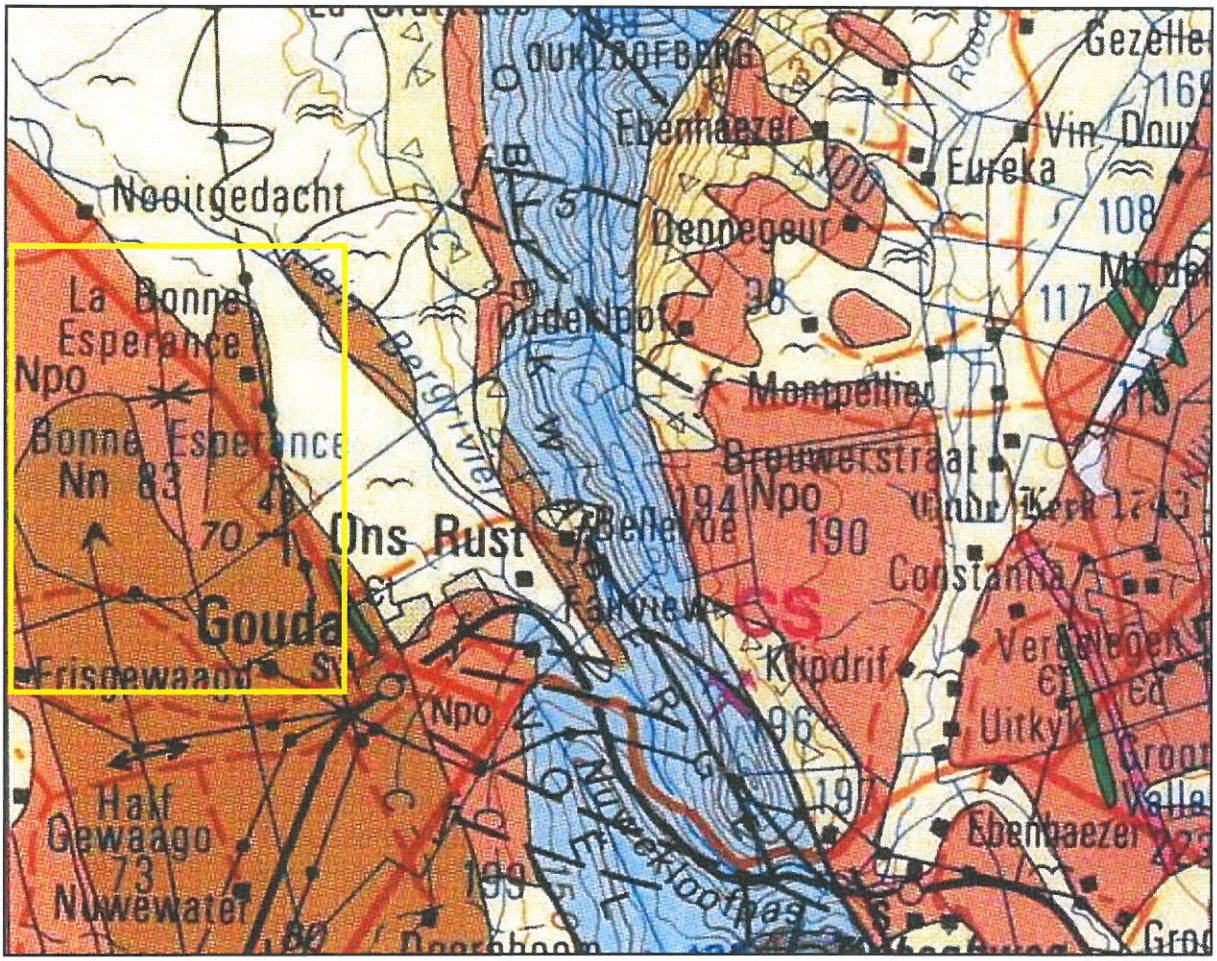

Fig. 3. Extract from 1: 250 000 geological map 3319 Worcester (Council for Geoscience, Pretoria) showing *approximate* location of the wind farm study area north-west of Gouda (yellow rectangle). Geological units represented in this area are the Noree Formation (Nn, brown) and the Porterville Formation (Npo, tan) of the Malmesbury Group as well as river alluvium (pale yellow with "flying bird" symbol).

4. CONCLUSIONS & RECOMMENDATIONS

The construction of the proposed iNca Gouda wind farm is not considered to pose a serious threat to local fossil heritage because the Malmesbury Group bedrocks and overlying mantle of Late Caenozoic superficial sediments (alluvium, soils *etc*) are of very low palaeontological sensitivity.

It is therefore recommended that exemption from further specialist palaeontological studies and mitigation be granted for this alternative energy development.

Should any substantial fossil remains (*e.g.* stromatolites, trace fossils, shells) be encountered during excavation, however, these should be reported to Heritage Western Cape for possible mitigation by a professional palaeontologist.

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6. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape under the aegis of his Cape Town-based company *Natura Viva* cc. He is a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape as well as Limpopo, Free State and Gauteng for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHAP (Association of Professional Heritage Assessment Practitioners – Western Cape).

Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

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