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1st phase H.I.A. of a 35 ha study area on portion 18 of the farm Dufield 35 IR, Lichtenburg district, North-western Province.

For: AfriSam (South Africa) (Pty) Ltd. – Dudfield.

Date. August 2021.

Project coordinator: - Shangoni management services. ***(For contact details see page 3.)***

Report prepared by: -

SIDNEY MILLER.
B.Sc (Engineering) Civil, M. (Architecture) Conservation. Asapa member no 087.

Index.

1.1. Contact Details.

Client	**Representative**	**Contact details**
AfriSam (South Africa) (Pty.) Ltd: Dudfield Cement Factory, Lichtenburg.	Riaan Koekemoer.	018 633 6026 071 359 1826 Riaan.Koekemoer@za.afrisam.com
Shangoni Management Services.	Lesley Keay.	Unit C8, Block@Nature, 472 Botterklapper Street, The Willows, 0081. 012 807 7036. lesley@shangoni.co.za
SIDNEY MILLER Architectural and Archaeological Conservation Consultant.	Sidney Miller.	Physical address. 34a Keurboom Ave, Vastfontein Tshwane Rural. 082 939 6536. sidneymears@gmail.com

1.2. Zoning of Site.
Mining.

1.3. Type of Development.
A photovoltaics ("PV") solar plant. ("Mining" Solar Energy)

2.1. Location of the study area.

Figs. 01. *The location of the study area. The green line indicates the extent of the area investigated, and the yellow markers define the GPS demarcation of the study area. The red markers are the positions from where photographic recording was done.* ***(Google Earth 2021.)***

2.2. G.P.S. Coordinates of the site under assessment.

Beacon	**Degrees south**	**Degrees east**	**Beacon**	**Degrees south**	**Degrees east**
1	26°10'31.09"S	26° 0'0.54"E	2	26°10'50.26"S	26° 0'10.90"E
3	26°10'53.43"S	26° 0'6.84"E	4	26°10'54.98"S	25°59'59.41"E
5	26°10'53.09"S	25°59'58.78"E	6	26°10'55.67"S	25°59'53.43"E
7	26°10'36.94"S	25°59'44.36"E			

Fig. 02. *GPS coordinates that define the study area.* ***(Google Earth, 2021.)***

2.3. Historical location of the site under investigation.

Fig. 03. *The* ***1899 Jeppe's Map of the Transvaal*** *shows the farm names west of Lichtenburg at that time. In later years Vogelfontein 20 became Hibernia 52 IP and Olievenhoutspruit 56 and Biesjesbult 2 became Dudfield 35 IP. Also note Kalkfontein 29 that shows early awareness of the presence of lime in the area.*

3. Executive Summary.

3.1. Description of the site.

The Mine is located near the town of Lichtenburg in the North West Province of South Africa. Since the Second World War the area became known as the "centre of the Maize Triangle" of the then Transvaal. During the last 80 years most arable land in this area was ploughed over and maize was produced for both local consumption and export.

The proposed area (35 ha)[1] for this project is located partially within a rehabilitated ploughed pasture consisting of secondary grasslands (16.3 ha), a portion that is disturbed due to mining activities (6.2 ha) and a portion that was planted during pre-mining days with invasive Eucalyptus trees (12.5 ha) for a source for firewood.

3.2. Intent of AfriSam - Dudfield.

AfriSam (South Africa) (Pty.) Ltd; Dudfield Cement Factory (also referred to as "the applicant") is located near Lichtenburg on Portion 18 of Farm Dudfield in the Northwest Province. The mine proposes to construct a photovoltaics ("PV") solar plant adjacent to the existing cement factory for a supplement power supply to the limestone mine and cement factory.

For the proposed solar plant, PV panels will be used to capture solar energy and convert it into electrical current. A set of PV inverters will be installed to convert the variable direct current output of the PV solar panels into a utility frequency alternating current that will feed into a 6.6 kV line for use on the mine.

[1] ***Legally known as portion 18 of the farm Dudfield 35 IR.***

3.3 The project description. (Expanded Motivation.)

AfriSam (South Africa) (Pty) Ltd: Dudfield Cement Factory ("Dudfield") is an existing mine and cement factory located within the North-West Province in South Africa and falls under the jurisdiction of the Ditsobotla Local Municipality ("DLM"). The mine is situated approximately 18 km west of Lichtenburg and 64 km south-east of Mafikeng. Dudfield proposes to construct a photovoltaics ("PV") solar plant on the eastern side of the existing cement factory, which falls within the approved Mining Right Area ("MRA").

The proposed area (35 ha) for this project is located partially within a rehabilitated ploughed pasture consisting of secondary grasslands (16.3 ha), a portion that is disturbed due to mining activities (6.2 ha) and a portion that is invaded by invasive Eucalyptus trees (12.5 ha). For the proposed solar plant, PV panels will be used to capture the solar energy and convert it into an electrical current. A set of PV inverters will be installed to convert the variable direct current ("DC") output of the PV solar panels into a utility frequency alternating current that will feed into a 6.6 kV line. The electricity output of the solar plant will be less than 20 MW. Transformers will be installed to increase the voltage coming from the inverters. The PV modules that are going to be used, consist of thin film solar module technology certified for use in 1000 V DC systems. The PV modules are manufactured off site and certified for reliability and safety by international institutes.

The existing internal gravel road, proposed to be upgraded, extends approximately 630 m in length and 6 m in width. The existing gravel road will be regraded, levelled (using limestone) and compacted. The upgrade activities are proposed to remain within the existing gravel road footprint. The site will be fenced, and security facilities will be erected to reduce the risk of theft. Minor details of the construction methodology will be refined upon appointment of the contractors. It is not anticipated that any changes to the scope of the activity will occur. If any amendments constituted in Section 29 or Section 31 of the NEMA EIA Regulations are anticipated after receipt of the Environmental Authorisation, the necessary amendment application will be submitted.

3.4. Mandate of the Shangoni Management Services.

Shangoni has been tasked to procure the Environmental Authorisations for the proposed development of a solar farm.

3.5. Mandate of the Heritage Consultant.

The heritage Consultant has been contracted by Shangoni to compile a first phase heritage impact assessment for the proposed solar farm.

3.6. Historical milieu.[2]

A. The greater area is known to contain both Early as well as Later Stone Age sites as well as engraving sites.

On the study area no Stone Age (either Early, Middle or Later) artefacts were observed. Neither were there any engravings or other rock art observed.

B. The greater area is known to contain both Moloko as well as Later Iron Age sites as well as large historical tribal sites.

The area investigated revealed no indication of Iron Age or tribal settlement.

C. The greater area was sparsely settled by white pioneer farmers from 1850 onwards, and impacted on by Missionaries from the same period. There were also military engagements

[2] ***For full description see chapter 8.***

between the ZAR and Mzilikazi during the late 1830's and during the Second South African war of 1899 to 1902.

The area investigated revealed no remain from the Historical Period.

D. Limestone mining and cement production was initiated in the 1950's.

The area investigated revealed no indication from historical cement production.

E. There are no sites of cultural/spiritual significance located on or near the property under investigation.

F. There are no sites connected to slavery located on or near the property under investigation.

G. There are no people of importance connected to the history of the study area.

H. There is no special technological or scientific advancement of standing that can be linked to the property under investigation.

3.7. Environmental milieu.[3]

Geology. The geology of the Northern Cape and North West Provinces is possibly of the best known in the world owing to its diamondiferous nature especially around the Kimberley and Lichtenburg areas. The extended deposit of limestone in the general area is also well-known. These accrued from the leaching of dolomite structures and or the deposit from large masses of aquatic bodies caused either directly or indirectly by living organisms and their skeletal remains.

The development of a photovoltaics ("PV") solar plant will not impact on the geology of the region.

Vegetation. The site under investigation is located at a focal point of the veld type zone 50, northern variation. Acocks describes this as the northern variation of dry Cymbopogon – Themeda veld. Owing to the fact that the Lichtenburg region is known as the centre of the maize triangle, very little of the original veld survives.

The development of a photovoltaics ("PV") solar plant will not impact on the vegetation of the region.

3.6. Summary of findings.

During the fieldwork undertaken, no evidence was found that is protected by Act 25 of 1999 known as the National Heritage Act.

3.8. Recommendation.

The development of the proposed solar plant may proceed as no evidence of heritage remains were encountered during the fieldwork.

Sidney Miller
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[3] ***For full description see chapter 7.***

4. Definitions.

The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of paleontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

5. Protected Sites in Terms of the National Heritage Act, Act. 25 of 1999.

The following are the most important sites and objects protected by the National Heritage Act:

a. Structures or parts of structures older than 60 years
b. Archaeological sites and objects
c. Paleontological sites
d. Meteorites
e. Ship wrecks
f. Burial grounds
g. Graves of victims of conflict
h. Public monuments and memorials
i. Structures, places and objects protected through the publication of notices in the Gazette and Provincial Gazette
j. Any other places or object which are considered to be of interest or of historical or cultural significance
k. Geological sites of scientific or cultural importance
l. Sites of significance relating to the history of slavery in South Africa
m. Objects to which oral traditions are attached
n. Sites of cultural significance or other value to a community or pattern of South African history

6. Methodology.

6.1. The study area was visited on the 24th of August 2021. The route taken during the vehicle and on-foot inspection was recorded in the Google Earth Image ***Fig. 04 on page 8.***

6.2. The author was accompanied on site by Mr. R. Koekemoer ***(Environmental Practitioner),*** Mr. C. Meyer ***(Energy Manager)*** and Mr. G. Uys. ***(Security Manager).***

6.3. The site was traversed in an appropriate manner so as to collect data for the evaluation of the potential heritage remains on the farm.

6.4. It was clear that the area was totally disturbed and no heritage remains were observed.

6.5. This fact was also substantiated by the desktop study in section 8 that shows the low probability of heritage remains on this site.

6.6. Finds (or the absence of such) were recorded by GPS readings and photography.

6. 7. The above information was recorded and collated in section 9 of this report.

6.8. Background information concerning the geology and vegetation of the region was collected from reliable resources and is presented in section 7 of this report.

6.9. Background information concerning the archaeology and historical milieu of the region was collected from reliable resources, and is presented in section 8 of this report.

6.10. In sections 10 and 11 field ratings (SAHRA minimum standards May 2007) and statements of significance (SAHRA minimum standards May 2007) were attributed as necessitated by situation. (In this case not applicable.)

6.11. Section 12 contains a summary of the research results with a recommendation in section 13.

6.12. The collective gist of the information collated in the report is summarised in the executive summary in section 3.

Fig. 04. *The site was accessed by vehicle along the dirt road and short excursions was made on foot into the study area from positions "a" to "d".* ***(Google Earth 2021.)***

7. Environment.

7.1. Geology.[4]

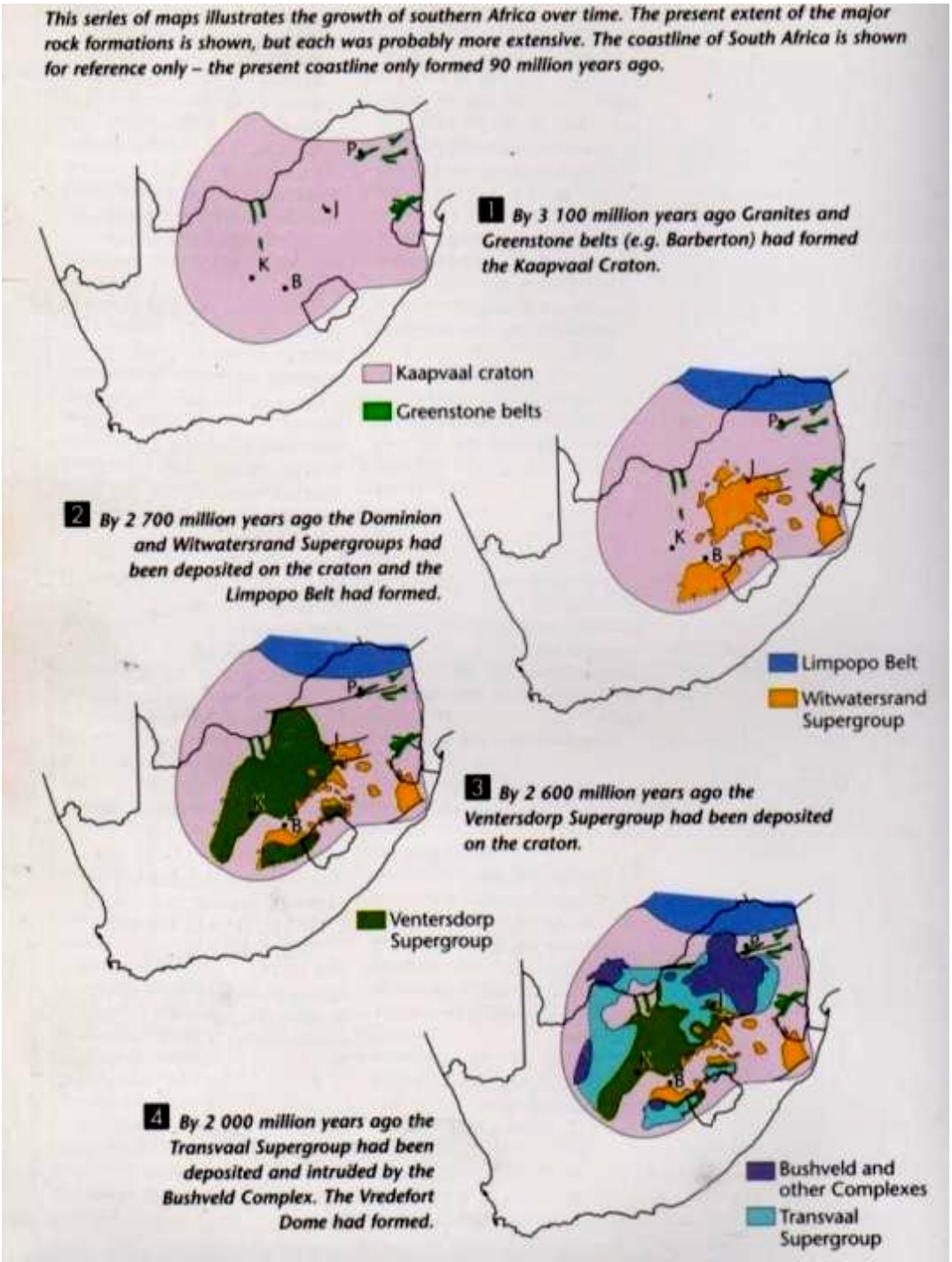


Fig. 05. *Above is illustrated the formation of the South African geological substructure between 3100 million years ago and 2000 million years ago. In our present study area the Kaapvaal Craton had formed and the Transvaal Supergroup had been deposited. The Bushveld Complex*

[4] ***See McCarthy & Rubidge 2005 and Haughton 1940 for full description.***

had appeared and the Vredefort meteorite impact had occurred. K in the illustrations marks Kimberly, to the south of the study area. ***(McCarthy& Rubidge: 334.)***

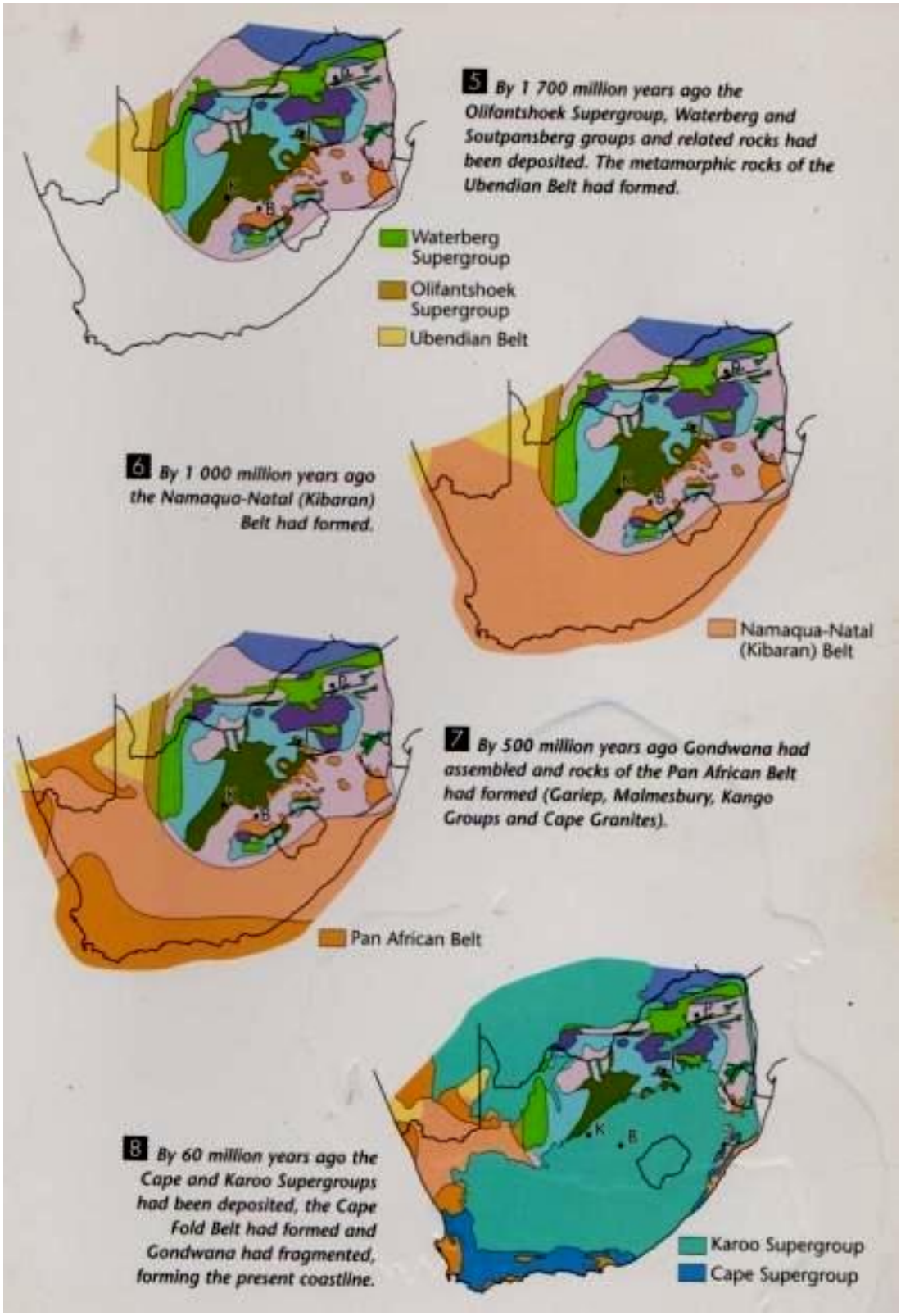


Fig. 06. *Right is illustrated the formation of the South African geological substructure between 2000 million years ago and 60 million years ago. As can be seen above it is only the Karoo*

Supergroup that had `any further significant impact on the study area. K, in the illustrations, marks Kimberly. ***(McCarthy& Rubidge: 335.)***

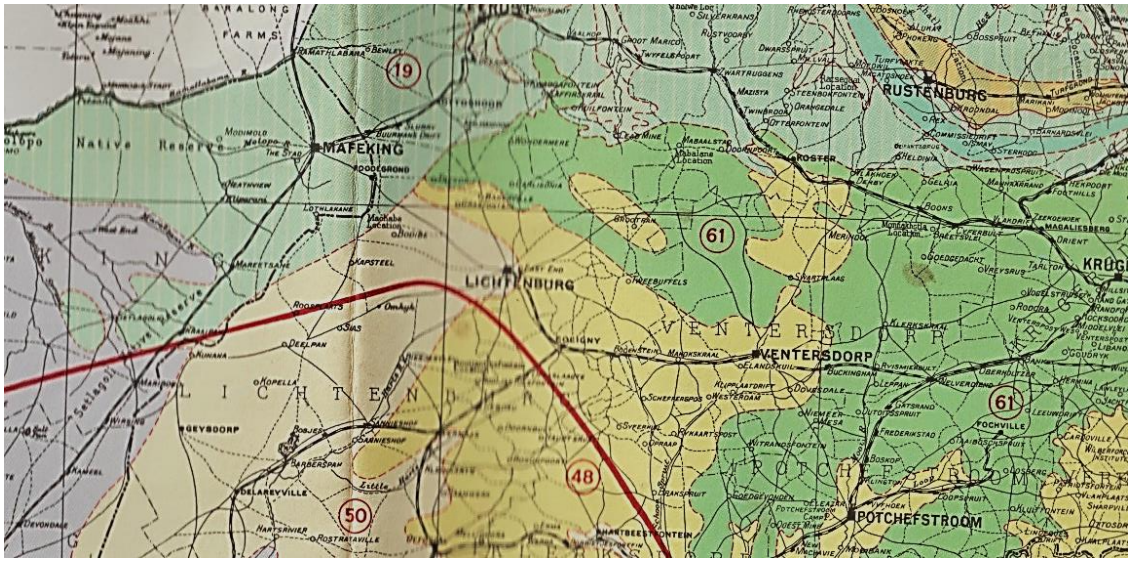
Limestone[5] is a relatively young sedimentary formation that consists mainly of calcium carbonate with varying quantities of magnesium iron alumina and silica. With the increase of magnesium carbonate limestone eventually occurs as dolomite. Dolomite is a formation that contains a minimum of 45.65% of magnesium carbonate.

Limestone is formed by the precipitation of calcium carbonate from bodies of water either sweet or salty. This precipitation is caused either directly or indirectly by living organisms. It can also be formed by the accumulation of calcareous organic remains. According to ***Haughton*** ‘‘primary limestone” is limestone sediments that have already partially metamorphosed and belongs to the older family of geological formations. “Secondary limestone” on the other hand is of more recent origin normally as the result of erosion of older limestone and dolomite and any other formations containing lime.

According to ***Haughton*** two thirds of South Africa’s geological structure consists of sedimentary rock formations. Even so limestone layers that present our limestone resources are relatively rare. Dolomite formations on the other hand occur more frequently and the erosion of these represent the origin of most of our South African “secondary” limestone sources.

According to ***Haughton’s*** estimates approximately 85% of all limestone utilised in South African economy is for the production of cement: -The rest is being utilised for the production of fertiliser, other chemical additives and the fabrication of fireproof ware. At the time of his writing he also mentioned the problem of its distribution in South Africa. The location of lucrative limestone deposits does not overlap centres of high population. Access to sites and the transportation of the product often limits the exploitation of such mineral bodies.

7.2. Vegetation.



[5] ***For a full description see McCarthy and Rubidge, 2005 page 335 and Haughton, 1940 pages 391 to 394***

Fig. 07. *The site under investigation is located in the area described by Acocks as* veld type zone 50a, the northern variation of dry *Cymbopogon – Themeda* veld. *(Acocks, 1988.)*[6]

7.2. Type 50. DRY CYMBOPOGON-THEMEDA VELD. ***(Acocks, pp103.)***

According to Acocks this veld type lies to the west and south of the Transitional Cymbopogon-Themeda Veld, at lower elevation, and is drier. It has four different variations: 50a, Northern, north of the Vaal River on sandy soil; 50b, Central, between the Vaal and Orange Rivers as far south as Bloemfontein, mostly on sandy soil; 50c, Southern, mostly on heavier soils, and distinguished by the presence of *Tetrachne dregei* although this grass is now rare; 50d, South-eastern, in the upper White and Black Kei basin, mostly on sandy soils and lacking *Tetrachne.* All four variations are dominated by *Themeda triandra* with Cymbopogon plurinodis the tallest grass. But normally not common; all are relatively sparse, especially the Northern Variation.

The Northern Variation lies at altitudes ranging from 1 300 to 1 350 m above sea level. It is flat, sandy country receiving a summer rainfall of 45 – 60 mm per annum, and has frosty winters. Upwards it merges into normal *Cymbopogon-Themeda* Veld and downwards into the bushveld and Kalahari Thornveld, with the appearance of stunted shrubs widely scattered in the open veld (mainly *Grewia flava* and *Diospyros pallens*), and bush on rocky outcrops.

Acocks lists more than thirty[7] grass species, the dominant species being *Themeda triandra, Setaria flabellate, Cymbopogon plurinodis, Eragrostis lehmanniana, Elionurus muticus and Anthosprmun pumilum* subs *rigidum. For the listed species see page 103.*

Fig. 08. *From this image one can see clearly the immense impact of farming in the region, especially maize production. Although the Harts River supplies some form of irrigation water supply, most of the farming is dependent on the annual rainfall.* Owing to this massive farming impact very little undisturbed land remains where heritage remains may still be located. ***(Google Earth 2021.)***

7.3. Environmental information from Jeppe's 1899 Map of the Transvaal.

[6] The author is aware of the updated version of Acocks's work by Mucina &Rutherford, 2010, but for the purposes of this investigation Acocks version is preferred by the present author.
[7] As a footnote Acocks states that the number of species in the Relative Abundance Table is 140.

The farm names on Jeppe's map ***(Fig. 09 on page 13)*** tells its own story of the environment surrounding the study area 130 years ago. It was water-rich with fountains and pans in abundance. Woody areas were scarce, and the animals listed, Springbuck, Eland and "Wolven" (Hyena), indicated that it was/is a cold savanna-type environment, generally not suited for human occupation during the Stone and Iron Ages.

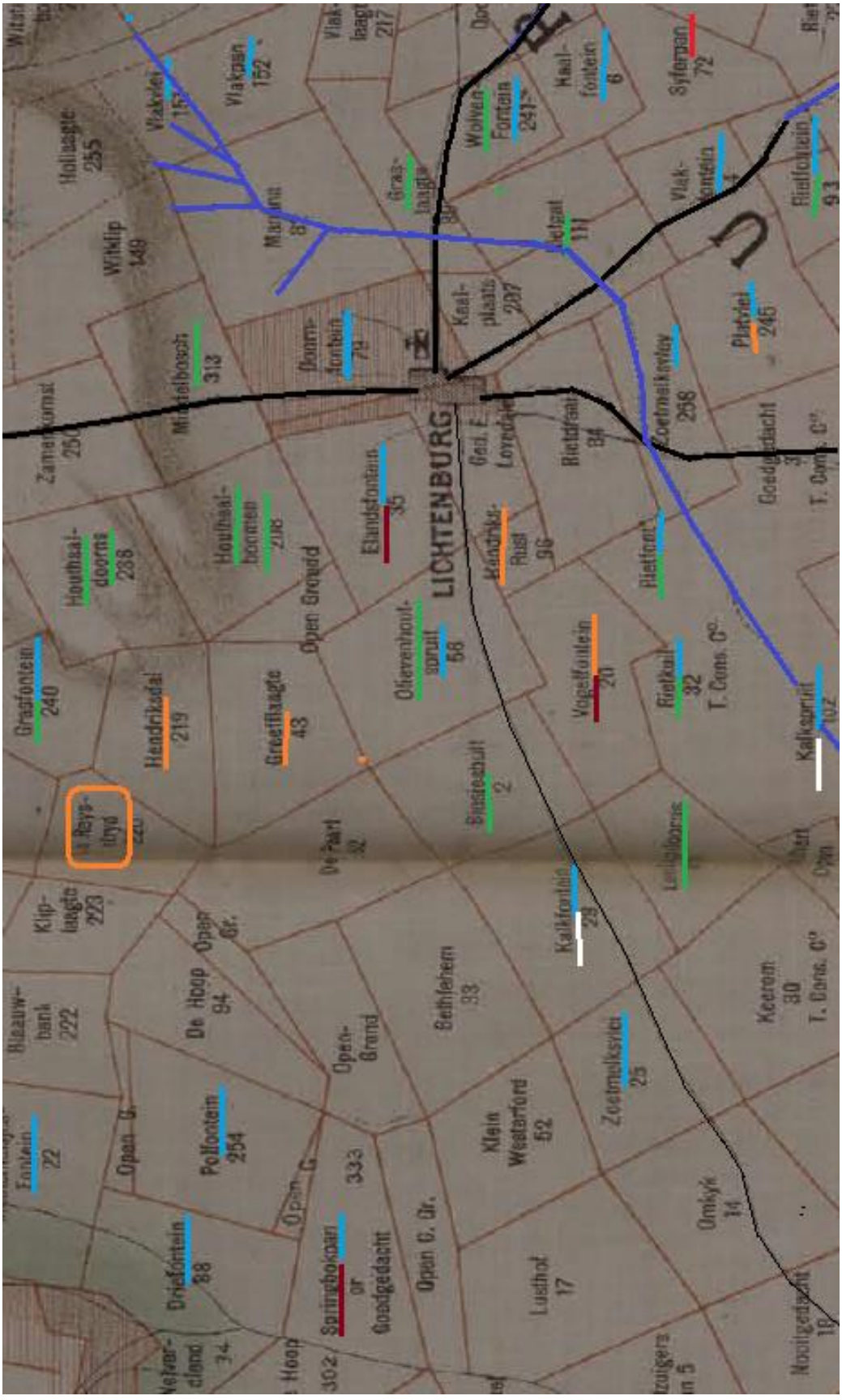


Fig. 09. *The **1899 Jeppe's Map of the Transvaal** shows the farm names west of Lichtenburg at that time. This gives much valuable information regarding the environment of a hundred and thirty years ago.*

8. Archaeological and Historical Background.

8.1. Stone Age. *(Deacon, 1999 &Mason, 1969.)*

Early proto-human presence in the region is captured at Taung to the north but no major Early Stone Age site is present around Lichtenburg itself. Along the Vaal River numbers of Early Stone Age artifacts may be found in numerous sites, but seldom in stratified deposits that assist archaeologists in adding to dated data. The only rock art in the region is engraving sites along the Vaal River and at Wildebeest Kuil, Kimberly. In the direct Lichtenburg area there are no recorded Stone Age sites of significance.

From a geological point of view there exist a lot of life-giving water sources in the area. The farm names given by the European settlers also reflect the situation regarding water sources in the area during the near distant past such as Driefontein, Polfontein, Kalkfontein, Vogelfontein Rietfontein, Kaalfontein, Wolvenfontein, Vlakpan, Syferpan, Springbokpan, Rietkuil, Zoetmelksvlei, Platvlei, Kalkspruit and many others. Last but not least one has to mention the Vaal and Harts Rivers all of which presents the presence of life-giving water in this relatively dry area. This would have brought animals to the area, on which the Later Stone Age peoples could prey and exist. The rock-art sites of Driekopseiland and Wildebeestfontein show places of ceremony associated with Later Stone Age people. This reality is then also reflected in the presence of numbers of stone tools from that period in the general region. Owing to the vigorous mining and other related activities associated with the Lichtenburg lime industry none of this survives in disturbed areas.

Regarding the study area it is expected that no Stone Age remains may be encountered.

8.2. Iron Age. *(Mason, 1969, Boeyens, 1998 & Huffman, 2007.)*

The nature of Iron Age settlement in southern Africa is well understood and well documented. Iron Age settlers were not only users of the natural environment's resources, but they were essentially farmers. They raised stock and also planted crops that needed specific environmental conditions such as summer rainfall deep red loam soils suited for cultivation and grazing and temperatures suitable for animal husbandry. Owing to the large tracts of "suitable environmental conditions" land available to the north, northeast and southeast of this region during their migrations, they seldom utilized this region. No sites of importance are known in the Lichtenburg area.

Regarding the study area it is expected that no Iron Age remains may be encountered.

8.3. Historical Period.

The arrival of Europeans in the region was possibly heralded by the notorious Coenraad Buis early in the nineteenth century, first in the modern Klerksdorp area and then later amongst the Basotho and Batswana to the west and the Northwest. This was soon followed up by missionaries such as Burchell in 1811, Campbell in the 1820's and in May 1821 the notorious Reverend Robert Moffat established himself at Kuruman. Later, in 1834, Moffat accompanied the explorer Smith on his journey to Mzilikazi then living just north of the Magaliesberg along the Crocodile River. Soon after, the Great Trek followed in 1836, and Natal, the Freestate and the Transvaal were settled in with various levels of success for the Europeans from the Cape Colony.

In 1866 the *Hopetown Diamond* was found by one Schalk Van Niekerk on the farm of the Boer family named Jacobs, a prospective buyer for the farm, *De Kalk*. In March 1869 Van Niekerk had acquired an 83.5 carats stone from a man named *Swartbooi* that became the *Star of South Africa*.[8] These events set in motion the first "Diamond Rush" of 1870 in search of alluvial

[8] ***See Roberts 1984***

diamonds in the region with attention being focussed on the drainage lines of the major rivers. The rest is well known history.

Lichtenburg is a town situated in the North West Province of South Africa. It is the administrative center of Ditsobotla Local Municipality.

The town was established in 1873 and was named by Transvaal President Thomas François Burgers as ***Lichtenburg*** (Town of Light). On the 13 March 1926, Jacobus Voorendyk, discovered a diamond on his family farm and within 12 months there were 108,000 fortune seekers on the scene. The resulting diamond rush lasted ten years.

The main economic activity is the production of maize (corn) and meat. Lichtenburg lies in the heart of the maize triangle, which is the main maize growing area in South Africa. Another major economic activity is the production of cement. Within an 80-kilometre (50 mi) radius of Lichtenburg there are three major cement producers, which creates opportunities for long-distance transport and related businesses.

AfriSam (South Africa) (Pty) Ltd: Dudfield Cement Factory ("Dudfield") is an existing lime-stone mine and cement factory located within the North-West Province in South Africa and falls under the jurisdiction of the Ditsobotla Local Municipality ("DLM"). The mine lies approximately 18 km west of Lichtenburg and 64 km south-east of Mafikeng and has been part of the AfriSam family of companies since 1965.

AfriSam is South Africa's second-largest cement producer, and its Ulco cement plant in the Northern Cape is one of the company's two fully integrated cement plants operating in the country. First established in 1936 to manufacture industrial lime, today the plant has an annual cement production capacity of 1 250 000 tonnes.

Over the past nine decades, the global demand for cement has increased 50-fold, from 100 million tonnes in 1926 to around five billion tonnes in 2016, with the majority of this demand being from China (56%, or 2.8 billion tonnes). In comparison, estimated cement demand in Africa in 2016 was 240 million tonnes (4.8% of global demand), with South Africa accounting for 5.4% of that amount (13 million tonnes).

Regarding the study area it is expected that no historical period remains may be encountered.

9. Documentation of Data on the Premises under Investigation.

Fig. 10. *The above image shows the location from which positions photographs were taken during investigation of the study area.* ***(Google Earth 2021.)***

G.P.S. Coordinates of the limits of the site under assessment.

Beacon	Degrees south	Degrees east	Beacon	Degrees south	Degrees east
a	26°10'52.88"S	25°59'57.74"E	b	26°10'48.52"S	25°59'55.44"E
c	26°10'44.07"S	25°59'53.21"E	d	26°10'54.98"S	25°59'50.44"E

Fig. 11. *Above table shows G.P.S. coordinates from which photographs were taken, showing the disturbed condition of the study area.* ***(GPS coordinates from Google Earth.)***

9.1. Possible layout of the solar panels on portion 18 of Dudfield 35 IR.

Fig. 12. *One possible layout of the proposed solar farm on Dudfield Mine.*

9.2. Images taken during the site visit. ***(It is important to note that no heritage remains were encountered. The following photographs are included to illustrate the general condition of the site under investigation.)***

Fig. 13. *Looking east from point a.* ***(Photo, S.M. Miller August 2021.)***

Fig. 14. *Looking south from point a.* ***(Photo, S.M. Miller August 2021.)***

Fig. 15. *Looking north from point a.* ***(Photo, S.M. Miller August 2021.)***

Fig. 16. *Looking west from point a.* ***(Photo, S.M. Miller August 2021.)***

Fig. 17. *Looking south from point b.* ***(Photo, S.M. Miller August 2021.)***

Fig. 18. *Looking east from point b.* ***(Photo, S.M. Miller August 2021.)***

Fig. 19. *Looking northwest from point b.* ***(Photo, S.M. Miller August 2021.)***

Fig. 20. *Looking west from point c.* ***(Photo, S.M. Miller August 2021.)***

Fig. 21. *Looking east from point c.* ***(Photo, S.M. Miller August 2021.)***

Fig. 21. *Looking south from point c.* ***(Photo, S.M. Miller August 2021.)***

Fig. 22. *Looking west from point c.* ***(Photo, S.M. Miller August 2021.)***

Fig. 23. *General ploughing disturbances east of point d.* ***(Photo, S.M. Miller August 2021.)***

Fig. 24. *General mining exploration disturbances east of point d.* ***(Photo, S.M. Miller August 2021.)***

Fig. 25. *General mining exploration disturbances east of point d.* ***(Photo, S.M. Miller August 2021.)***

Fig. 26. *General mining exploration disturbances, ploughing and planting of eucalyptus east of point d.* ***(Photo, S.M. Miller August 2021.)***

Fig. 27. *Lime outcropping on surface near point d.* ***(Photo, S.M. Miller August 2021.)***

Fig. 28. *Looking north of point d.* ***(Photo, S.M. Miller August 2021.)***

9. 3. Discussion of finds.
No heritage remains were encountered during the field survey or desktop studies undertaken. It is also clear from environmental evidence that from pre-historic peoples it would have possibly only been very small bands of later Stone Age hunters that may have utilized the region on a marginal scale.

10. Field Rating. (SAHRA minimum standards May 2007.)
Not applicable.

11. Statements of Significance. (SAHRA minimum standards May 2007.)
Not applicable.

12. Summary.

12.1. Description of the site.
The Mine is located near the town of Lichtenburg in the North West Province of South Africa. Since the Second World War the area became known as the "centre of the Maize Triangle" of the then Transvaal. During the last 80 years most arable land in this area was ploughed over and maize was produced for both local consumption and export.

The proposed area (35 ha)[9] for this project is located partially within a rehabilitated ploughed pasture consisting of secondary grasslands (16.3 ha), a portion that is disturbed due to mining activities (6.2 ha) and a portion that was planted during pre-mining days with invasive Eucalyptus trees (12.5 ha) for a source for firewood.

12.2. Intent of AfriSam - Dudfield.
AfriSam (Properties) (Pty.) Ltd; Dudfield Cement Factory (also referred to as "the applicant") is located near Lichtenburg on Portion 18 of Farm Dudfield in the Northwest Province. The mine proposes to construct a photovoltaics ("PV") solar plant adjacent to the existing cement factory for power supply to the cement factory.

For the proposed solar plant, PV panels will be used to capture the solar energy and convert it into electrical current. A set of PV inverters will be installed to convert the variable direct current output of the PV solar panels into a utility frequency alternating current that will feed into a 230 m long, 6.6 kV line for use on the mine.

12.3. The project description. Expanded Motivation.
AfriSam South Africa (Pty) Ltd: Dudfield Cement Factory ("Dudfield") is an existing mine and cement factory located within the North-West Province in South Africa and falls under the jurisdiction of the Ditsobotla Local Municipality ("DLM"). The mine lies approximately 18 km west of Lichtenburg and 64 km south-east of Mafikeng. Dudfield proposes to construct a photovoltaics ("PV") solar plant on the eastern side of the existing cement factory, which falls within the approved Mining Right Area ("MRA").

The proposed area (35 ha) for this project is located partially within a rehabilitated ploughed pasture consisting of secondary grasslands (16.3 ha), a portion that is disturbed due to mining activities (6.2 ha) and a portion that is invaded by invasive Eucalyptus trees (12.5 ha). For the proposed solar plant, PV panels will be used to capture the solar energy and convert it into an electrical current. A set of PV inverters will be installed to convert the variable direct current ("DC") output of the PV solar panels into a utility frequency alternating current that will feed into a 6.6 kV line. The electricity output of the solar plant will be less than 20 MW. Transformers will be installed to increase the voltage coming from the inverters. The PV modules that are going to be used, consist of thin film solar module technology certified for use

[9] ***Legally known as portion 18 of the farm Dudfield 35 IR.***

in 1000 V DC systems. The PV modules are manufactured off site and certified for reliability and safety by international institutes.

The existing internal gravel road, proposed to be upgraded, extends approximately 630 m in length and 6 m in width. The existing gravel road will be regraded, levelled (using limestone) and compacted. The upgrade activities are proposed to remain within the existing gravel road footprint. The site will be fenced, and security facilities will be erected to reduce the risk of theft. Minor details of the construction methodology will be refined upon appointment of the contractors. It is not anticipated that any changes to the scope of the activity will occur. If any amendments constituted in Section 29 or Section 31 of the NEMA EIA Regulations are anticipated after receipt of the Environmental Authorisation, the necessary amendment application will be submitted.

12.4. Mandate of the Shangoni Management Services.
Shangoni has been tasked to procure the Mining and Environmental Authorisation for the proposed development of a solar farm.

12.5. Mandate of the Heritage Consultant.
The heritage Consultant has been contracted by Shangoni to compile a first phase heritage impact assessment for the proposed solar farm.

12.6. Historical milieu.[10]
A. The greater area is known to contain both Early as well as Later Stone Age sites as well as engraving sites.

On the study area though no Stone Age (either Early, Middle or Later) artefacts were observed. Neither were there any engravings or other rock art observed.

B. The greater area is known to contain both Moloko as well as Later Iron Age sites as well as large historical tribal sites.

The area investigated revealed no indication of Iron Age or tribal settlement.

C. The greater area is was sparsely settled by white pioneer farmers from 1850 onwards, and impacted on by Missionaries from the same period. There were also military engagements between the ZAR and Mzilikazi during the late 1830's and during the Second South African war of 1899 to 1902.

The area investigated revealed no remain from the Historical Period.

D. Limestone mining and cement production was initiated in the 1950's by the then Roodepoort Cement Kilns.

The area investigated revealed no indication from historical cement production.

E. There are no sites of cultural/spiritual significance located on or near the property under investigation.

F. There are no sites connected to slavery located on or near the property under investigation.

G. There are no people of importance connected to the history of the study area.

[10] ***For full description see chapter 8.***

H. There is no special technological or scientific advancement of standing that can be linked to the property under investigation.

12.7. Environmental milieu.[11]

Geology. The geology of the Northern Cape and North West provinces is possibly of the best known in the world owing to its diamondiferous nature especially around the Kimberley area. The extended deposit of limestone in the general area is also well-known. These accrued from the leaching of dolomite structures and or the deposit from large masses of aquatic bodies caused either directly or indirectly by living organisms and their skeletal remains.

The development of a photovoltaics ("PV") solar plant will not impact on the geology of the region.

Vegetation. The site under investigation is located at a focal point of the veld type zone 50, northern variation. Acocks describes this as the northern variation of dry Cymbopogon – Themeda veld. Owing to the fact that the Lichtenburg region is known as the centre of the maize triangle, very little of the original veld survives.

The development of a photovoltaics ("PV") solar plant will not impact on the vegetation of the region.

13.1. Summary of findings.

During the fieldwork undertaken no evidence was found that is protected by Act 25 of 1999 known as the National Heritage Act.

13.2. Recommendation.

The development of the proposed solar plant may proceed as no evidence of heritage remains were encountered during the fieldwork.

Sidney Miller

B.Sc. (Engineering) Civil, M. (Architecture) Conservation. Asapa no 087

[11] ***For full description see chapter 7.***

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Guidelines.

SAHRA.	Mar. 2006 and edtd May 2007.	*Guideline:* - Minimum standards for the Archaeological & Paleontological Components of Impact Assessment Reports

Appendix 1: Declaration of Independence.

I, Sidney Mears Miller (ID 5412135029082) declare that:
I act as an independent environmental practitioner in this application;
I will perform the work relating to the application in an objective manner, even if this result in views and findings that is not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting environmental impact assessments, including knowledge of the National Heritage Resources Act (No 25 of 1999) and any guidelines that have relevance to the proposed activity;
I will comply with the Act, regulations and all other applicable legislation;
I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing
- any decision to be taken with respect to the application by the competent authority; and
- the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
I will keep a register of all interested and affected parties that participated in a public participation process;
I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.
All the particulars furnished by me in this form are true and correct.
I will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations;
I realize that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest
I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity AND OR proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations.

SIDNEY MEARS MILLER.

Appendix 2: Provisional indemnity.

Declaration by author.

I Sidney Miller hereby declare that all reasonable steps were taken to identify the heritage resources on portion 18 of the farm Dudfield 35 IR. For obvious reasons heritage remains that occurred underground cannot be vouched for. In the event of such remains being uncovered during the proposed work, work should be halted and a heritage practitioner or the heritage authorities must be informed. The cost of such new investigation will be for the account of the client.

SIDNEY MEARS MILLER.

Appendix 3: Shangoni impact and mitigation monitoring analysis.

No.	Aspect affected	Activity	Potential Impact	Phase	Mitigation type	Impact management actions / Mitigation measures	Impact management outcome	Standard to be Achieved	Time period for implementation
	Dudfield Solar farm.	Development of solar farm.	No impact.	Not applicable	No Mitigation	No Impact management	Not applicable	No standards to be achieved.	Not applicable