HERITAGE IMPACT ASSESSMENT: PROPOSED SOYUZ 3 SOLAR PHOTOVOLTAIC PARK, OUTSIDE BRITSTOWN, NORTHERN CAPE PROVINCE

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

Prepared for:

Terramanzi Group (Pty) Ltd

On behalf of:

Soyuz 3 Solar PV Park (Pty) Ltd

Draft for Comment: 3 July 2023

ACO Associates cc
Archaeology and Heritage Specialists

Prepared by

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EXECUTIVE SUMMARY

Project Name:
Soyuz 3 Solar Energy Facility

Location:
The approximate centrepoint of the project area is:

-30.652954°S / 23.583092°E

Locality Plan

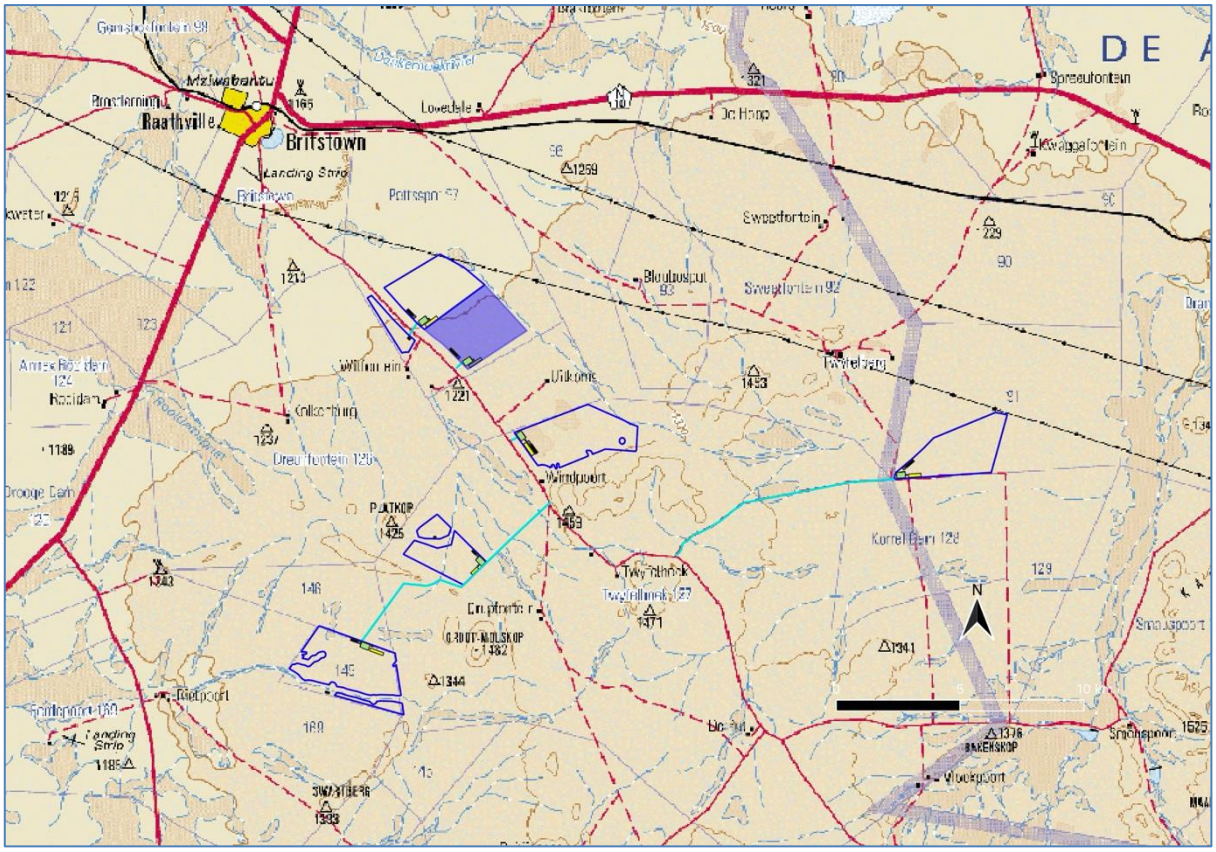

Figure 1: Extract from 1:250 000 topographical map sheet showing the location of the Soyuz 3 Solar Photovoltaic Park (solid blue polygon). The other blue polygons represent the Soyuz 1, 2 and 4-6 SPVs. Britstown is located approximately 8.6 km north of the Soyuz 3 SPV park (Source: 1:250 000 chart 3022, National Geo-spatial Information, http://www.ngi.gov.za).

Description of Proposed Development:
ACO Associates cc was appointed by the Terramanzi Group (Pty) Ltd, on behalf of Soyuz 3 Solar PV Park (Pty) Ltd, to undertake a heritage impact assessment for the proposed Soyuz 3 solar photovoltaic park south of Britstown in the Northern Cape.

This heritage impact assessment represents the heritage input that is required as part of the EIA for the project.

This report has relied on a range of primary and secondary information to provide an assessment of the potential heritage sensitivity of the development site. The desk-based

assessment was supplemented by a site inspection of the Soyuz 1-6 SPV cluster project areas conducted by ACO Associates between 7 and 11 January 2023. Together, these information sources have allowed a description of the heritage potential of the project site, the identification of potential heritage impacts and in some cases, the identification of sensitive areas that should be avoided in the planning of the project.

Findings:
The palaeontological impact assessment conducted by Dr Marion Bamford of the University of the Witwatersrand, indicates that the Soyuz 3 SPV park lies in the north-western part of the main Karoo Basin where fossiliferous Ecca and lower Beaufort Group rocks are exposed. The palaeontological sensitivity of the Soyuz 3 SPV development area is mostly moderate, with the site covered by relatively recent, Quaternary sediments.

The January 2023 survey of the Soyuz 3 SPV project area found no archaeological material apart from occasional isolated MSA lithics and no other heritage resources in the flat grasslands that comprise the site. This accords with what is known from the wider area where archaeological sites tend to be found on and around the rocky outcrops and other features in the landscape like rivers, streams, springs, pans and sources of the stone raw material used for making tools. It is possible, however, that currently unknown archaeological sites and material may be present either on or below the surface within the development area.

There are no historical built structures within the Soyuz 3 SPV project footprint and the nearest historical farm complexes still in use are at Witfontein, between 1,2 and 1,5 km west of the project area.

No graves or burial grounds were recorded within the Soyuz 3 SPV project footprint.

The cultural landscape within which the Soyuz 3 SPV park will be situated is not well developed but reflects the recent historical use of the land for stock farming. Its main features are fences, water troughs, wind pumps and occasional farm complexes.

Recommended Mitigation Measures:
The following findings made in this HIA are pertinent:

Palaeontology: The PIA states that it is extremely unlikely that any fossils would be preserved in the sands and alluvium of the Quaternary within the Soyuz 3 SPV park but recommends that:

- A Fossil Chance Find Protocol is included in the Environmental Management Programme (EMPr);
- If fossils are found during construction then they should be rescued and a palaeontologist called to assess and collect a representative sample.

Archaeology: It is recommended that:

- Any chance finds of archaeological material must be reported to SAHRA and/or an archaeologist.

Graves and Burials: No graves or burial grounds have been recorded within the Soyuz 3

SPV development area, but it is possible that unmarked burials could be present on the site. Such, usually pre-colonial graves, are an extremely sensitive and often contested heritage resource, and it is generally impossible to predict their presence in advance of development.

It is recommended therefore that the following measures are included in the EMPr:

- In the event of the discovered of human remains, work in the immediate area must cease, the remains must be made safe and left in situ and the find must be reported immediately to SAHRA and/or an appropriately experienced archaeologist so that a decision can be made about how to mitigate with the discovery.

Cultural Landscape: The cultural landscape within which the Soyuz 3 SPV park will be located is not well developed but reflects the recent historical use of the land for stock farming. The construction of the SPV park will alter the character of this rural landscape and will contrast with the typical land use and historical form of human elements that are present in the landscape. However, the cultural landscape of the Soyuz 3 SPV park is of low cultural significance and the impacts will be low.

To mitigate potential impacts, it is recommended that:

- The disturbance footprint of the project during construction is kept to a minimum and all disturbed areas that will not be needed during operation are rehabilitated;
- At decommissioning, all areas are rehabilitated following an approved rehabilitation plan.

Visual: Visual Impacts to the two Witfontein farm complexes, arising from the Soyuz 3 SPV park are assessed to be moderate, with the view towards the SPV park largely obscured by trees surrounding the farm complexes. While users of the gravel road between Britstown and Windpoort will have a temporary view of the SPV park, the visual impact is assessed to be moderate to low.

Cumulative Impacts:
Although the region is generally palaeontologically sensitive, the occurrence of fossils is not consistent. While impacts across the area are possible, the mixed nature of the regional geology, and the low level of surface and near surface exposure of fossil-bearing rocks where they do occur, means that cumulative impacts on palaeontological resources are not likely.

Archaeological material and sites are potentially at risk from cumulative impacts, given their widespread occurrence and exposure across the area but their relatively thin spread suggests that while impacts are possible, they are unlikely to be cumulatively significant.

The implementation of measures at individual project level can do much to mitigate and reduce cumulative impacts to heritage resources.

Cumulative impacts to the cultural landscape are likely as industrial elements are introduced into the generally lightly used, organically evolved, and largely relict cultural landscape of the region. The construction of the Soyuz 1-6 SPV cluster and other mainly renewable energy projects in the region will alter the character of the rural landscape and will contrast with the typical land use and historical form of human elements that are present in the landscape.

Conclusion:
This assessment has found that the area identified for the proposed Soyuz 3 SPV park is a heritage environment of relatively low sensitivity and that significant impacts to heritage resources arising from the construction of the project are unlikely.

If the project were not implemented, the site would stay as it currently is with a neutral impact significance.

It is our considered opinion, therefore, that provided the recommended mitigation measures are implemented, the overall impact and significance of the proposed Soyuz 3 SPV park on heritage resources will be low and the proposed activity is acceptable from a heritage perspective.

Author/s and Date
Heritage Impact Assessment: John Gribble, ACO Associates, 2023.

Archaeological Impact Assessment: Incorporated in the HIA.

Palaeontological Impact Assessment: Marion Bamford, University of the Witwatersrand, 2023.

Visual Impact Assessment: Stephen van Staden and Sanja Erwee, Scientific Aquatic Services, 2023.

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CONTENTS OF THE SPECIALIST REPORT – CHECKLIST

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	Section 4 and Appendix B
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix A
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Sections 2 and 3
(cA) an indication of the quality and age of base data used for the specialist report;	Section 6
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 8
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 6.4
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 6
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Sections 7 and 8
(g) an identification of any areas to be avoided, including buffers;	Section 9
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figures 5, 7, 8, 9, 10
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 6.6
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment, or activities;	Section 8
(k) any mitigation measures for inclusion in the EMPr;	Section 9
(l) any conditions for inclusion in the environmental authorisation;	Section 9
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 9
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure	Section 10

plan;	
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 6.8
(p) any other information requested by the competent authority	Section 7
Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

GLOSSARY

Archaeology: Remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Early Stone Age: Period of the Stone Age extending between approximately 2 million and 200 000 years ago**.**

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage: That which is inherited and forms part of the National Estate, as defined by the National Heritage Resources Act 25 of 1999.

Later Stone Age: The archaeology of the last 20,000 years associated with fully modern people.

Middle Stone Age: The archaeology of the Stone Age between approximately 200,000 and 20,000 years ago, associated with early modern humans.

Palaeontology: Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Quaternary: The geologic time period that encompasses the most recent 2.6 million years. It comprises the Pleistocene (2.6 Ma – 10,000 years ago) and the Holocene (10,000 years ago to the present) and is characterised by a series of global glacial cycles.

SAHRA: South African Heritage Resources Agency – the compliance authority which protects national heritage.

Structure (historic): Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.

ABBREVIATIONS

BESS	Battery Energy Storage System
DSR	Draft Scoping Report
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
kV	Kilovolt
LSA	Later Stone Age
Ma	Million years
MSA	Middle Stone Age
MW	Megawatts
MWh	Megawatt hours
MVA	Megavolt Ampere
NHRA	National Heritage Resources Act (No 25 of 1999)
OHPL	Overhead powerline
REEA	Renewable Energy EIA Application
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SPV	Solar Photovoltaic
ZVAP	Zeekoe Valley Archaeological Project

1 INTRODUCTION

ACO Associates cc (ACO) was appointed by the Terramanzi Group (Pty) Ltd, on behalf of Soyuz 3 Solar PV Park (Pty) Ltd, to undertake a heritage impact assessment (HIA) as part of the Environmental Impact Assessment (EIA) process for the proposed Soyuz 3 Solar Photovoltaic (SPV) park, to be located south of Britstown in the Northern Cape (Figure 1 and Figure 2).

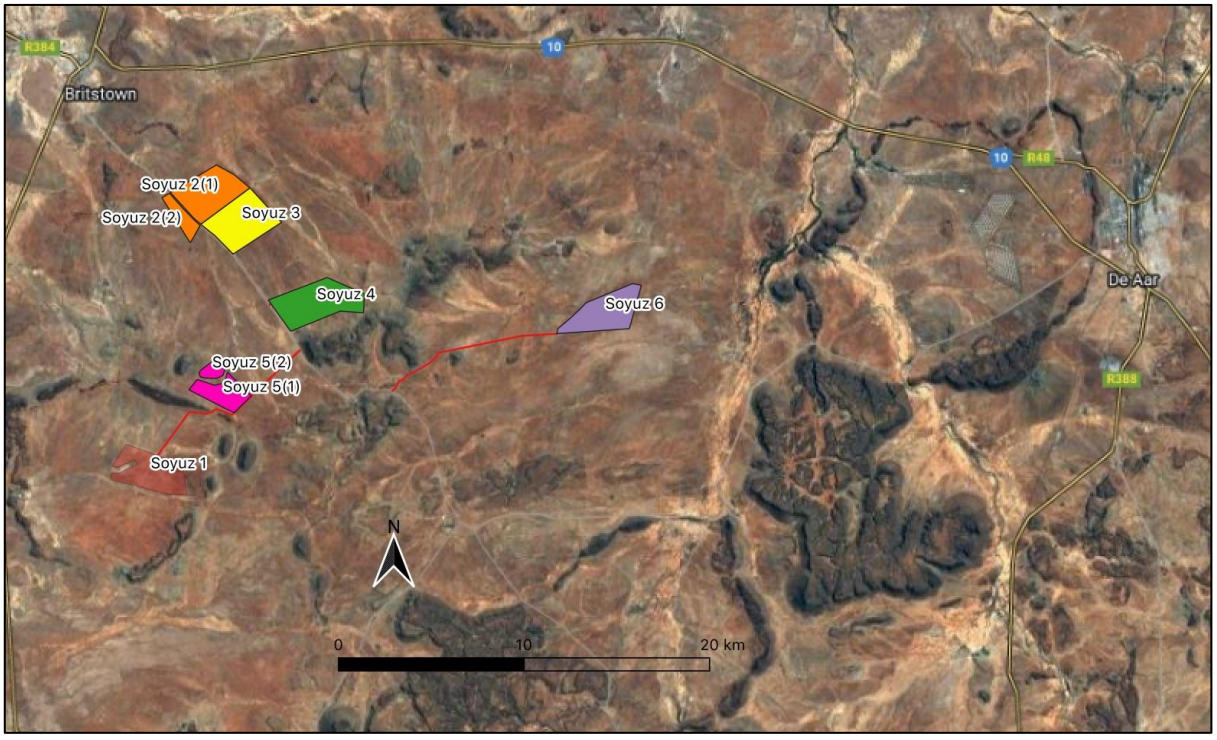

Figure 2: Locations of the proposed Soyuz 1-6 SPV parks (coloured polygons) with Britstown to the north-west and De Aar to the east (Source: Google Earth).

2 DEVELOPMENT PROPOSAL

Soyuz 3 Solar PV Park (Pty) Ltd proposes the development of six new solar photovoltaic (SPV) facilities to be known as Soyuz 1-6 SPV Parks with a combined capacity of 1470 megawatts (MW). The purpose of these facilities is to generate clean electricity from a renewable energy source (i.e., solar radiation) to contribute to the national energy grid and/or to serve any private off takers.

The Soyuz 3 SPV park and associated infrastructure will be located on Portion 2 of Farm 97 approximately 8,6 km south of Britstown in the Emthanjeni Local Municipality, Northern Cape (**Error! Reference source not found.**).

The land is currently zoned agricultural and is used for stock farming.

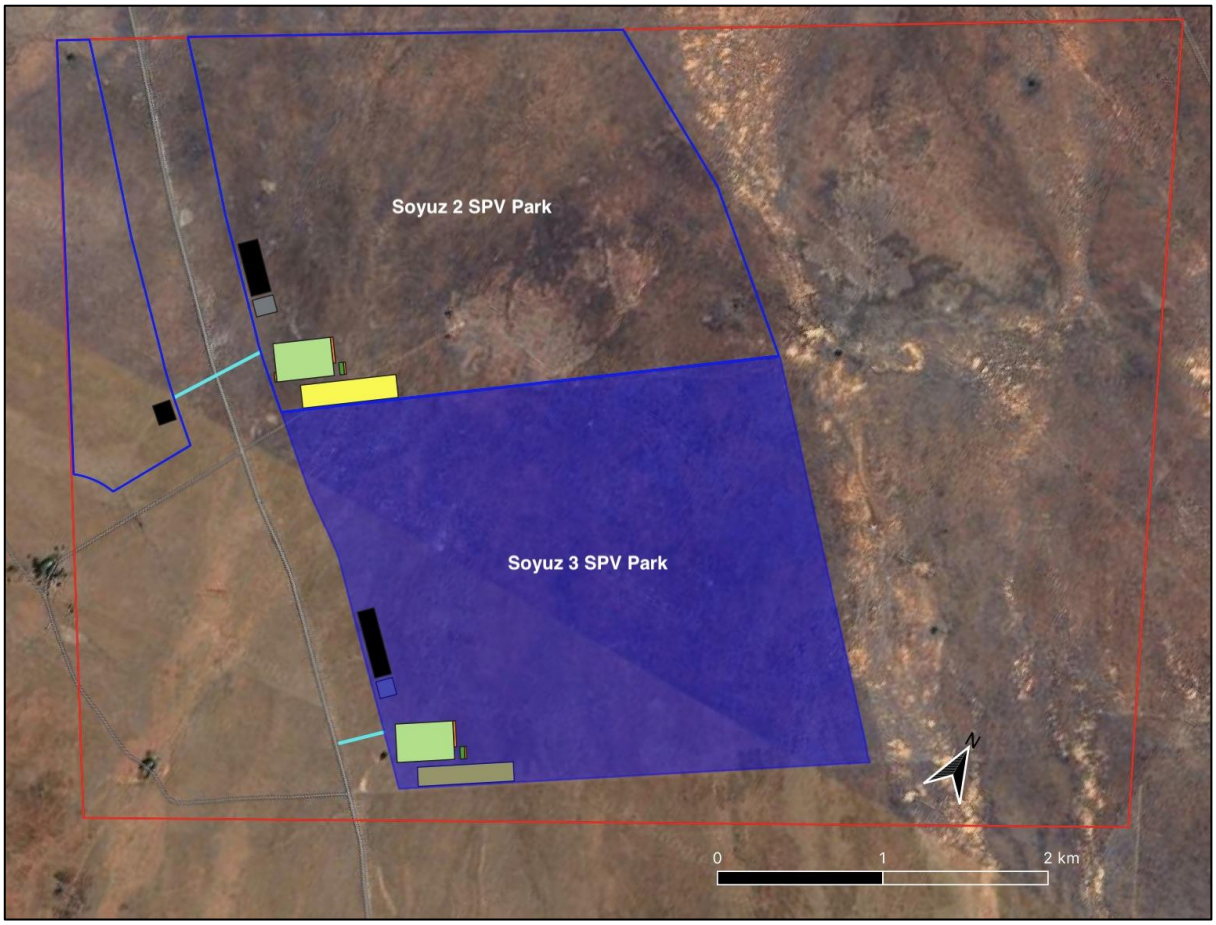

Figure 3: The Soyuz 3 SPV park site (blue shaded polygon) within the boundary of Portion 2 of Farm 97 (red polygon). The proposed access road is marked by the pale blue line. The adjacent Soyuz23 SPV park is shown to the north-west (Source: Google Earth).

The project will have a generating capacity of up to 240 MW and a Battery Energy Storage System (BESS) capacity of 1000 megawatt hours (MWh).

Bi-facial, single axis trackers will be utilised for the SPV panels and an on-site substation with a capacity of 240 Megavolt Ampere (MVA), will enable the connection of a 132 kV overhead powerline (OHPL).

The project specifications are shown in Table 1 below:

Table 1: Soyuz 3 SPV Park project specifications

SOYUZ 3 SOLAR PV PARK	
Contracted Capacity of Facility	240 MW
Infrastructure Proposed	• Bifacial SPV modules, single axis tracker mounting structures at a height of up to 6m above ground level • Inverters and transformers • Underground and overhead cabling up to 33kV between project components • 1,500 m² O&M building • 2,500 m² paved areas • 50,000 m² Battery Energy Storage System (1000 MWh) • 15,000 m² back to back substation (including facility substation, and Eskom

	collector/switching station with feeder bays) (240MW) • Access and internal roads • Fencing around development area • 8,000 m² temporary construction camp • 32,000 m² temporary laydown areas
Lifespan of the project	30 years

3 TERMS OF REFERENCE

ACO Associates was commissioned to produce this HIA as part of an Environmental Impact Assessment (EIA) process for the proposed Soyuz 3 SPV Park, as required by the National Environmental Management Act (No. 107 of 1998), as amended.

The HIA aims to identify heritage resources which may be impacted during the *construction*, *operation* and *decommissioning* phases of the project, assess their significance and provide recommendations for mitigation.

This document therefore includes the following:

- A desk-top level literature review to assess the potential for archaeological, cultural and historic sites in the proposed development area;
- Archaeological field work to identify and document (collect GPS coordinates and photograph) heritage resources, that may be affected by the project, on the ground; and
- A desk-top palaeontological impact assessment (PIA) to assess whether palaeontological features will be affected by the project.

The results of the studies listed above are integrated in this HIA report along with an assessment of the sensitivity and significance of any heritage resources, an evaluation of the potential impacts on them of the construction, operation and decommissioning of the project, and recommendations for measures to mitigate any negative impacts of the project on them.

The HIA must be submitted for comment to the South African Heritage Resources Agency (SAHRA) and the Northern Cape Provincial Heritage Resources Authority (Ngwao-Boswa Jwa Kapa Bokone), the relevant statutory commenting bodies under the National Environmental Management Act, as amended.

4 DETAILS OF THE SPECIALIST

This study was undertaken by John Gribble BA Hons, MA (ASAPA) of ACO Associates CC, Archaeologists and Heritage Consultants.

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Phone: 078 616 2961

John Gribble has an MA in archaeology (UCT, 1989) and has been working in cultural resource management since the early 1990s. He has worked in both the regulatory and commercial heritage management fields: the former during 13 years at the National Monuments Council /

South African Heritage Resources Agency (SAHRA), and the latter as both a terrestrial and maritime archaeological consultant in South Africa and the United Kingdom.

He is a member of the Association of Southern African Professional Archaeologists (Member #43) and is accredited by ASAPA's CRM section as:

- Principal Investigator: Maritime Archaeology and Colonial Archaeology; and
- Field Director: Stone Age Archaeology.

A signed and certified specialist statement of independence is attached to this HIA report as Appendix A and the author's CV is attached as Appendix B.

5 RELEVANT LEGISLATION, POLICY & GUIDELINES

5.1 National Heritage Resources Act (No 25 of 1999)

The National Heritage Resources Act (NHRA) came into force in 2000 with the establishment of the SAHRA, replacing the National Monuments Act (No 28 of 1969 as amended) and the National Monuments Council as the national agency responsible for the management of South Africa's cultural heritage resources.

The NHRA reflects the tripartite (national/provincial/local) nature of public administration under the South African Constitution and makes provision for the devolution of cultural heritage management to the appropriate, competent level of government. In the Northern Cape this is the Northern Cape Provincial Heritage Resources Authority, Ngwao-Boswa Jwa Kapa Bokone. At present, however, archaeological and palaeontological heritage management in the Northern Cape is managed on an agency basis by SAHRA.

The NHRA gives legal definition to the range and extent of what are considered to be South Africa's heritage resources. According to Section 2(xvi) of the Act a heritage resource is "any place or object of cultural significance". This means that the object or place has aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

In terms of the definitions provided in Section 2 of the NHRA, heritage resources potentially relevant to this assessment are:

- Material remains of human activity which are in a state of disuse and are in or on land [which includes land under water] and which are older than 100 years, including artefacts, human and hominid remains and artificial features;
- Rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years;
- Any fossilised remains or fossil trace of animals or plants which lived in the geological past [other than fossil fuels or fossiliferous rock intended for industrial use] and any site which contains such fossilised remains or trace;
- Any movable property of cultural significance which may be protected in terms of any provisions of the NHRA, including any archaeological artefact or palaeontological specimen; and

- Intangible heritage such as traditional activities, oral histories and places where significant events happened.

As per the definitions provided above, these cultural heritage resources are protected by the NHRA and a permit from SAHRA (currently) is required to destroy, damage, excavate, alter, deface or otherwise disturb any such site or material.

It is also important to be aware that in terms of Section 35(2) of the NHRA, all archaeological objects and palaeontological material is the property of the State and must, where recovered from a site, be lodged with an appropriate museum or other public institution.

Section 38 of the NHRA requires a HIA for certain kinds of development. In relation to this project, the relevant activities are:

- A development which will change the character of a site exceeding 5000 m^2 in extent (Section 38(1)(c)(i)); and
- The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length (Section 38(1)(a)).

5.1.1 Grading of Heritage Resources

The South African heritage resources management system is based on grading, by means of which the appropriate level of management responsibility is assigned to any heritage resource.

Grading, according to Winter & Oberholzer (2013) is "generally based on the intactness, rarity and representivity of the resource, as well as its role in the larger landscape or cultural context".

Each heritage resource identified in this HIA was assessed according to criteria, specified in Section 3 of the NHRA, for assigning heritage significance. These are:

- Importance in the community or pattern in South Africa's history;
- Possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Importance in demonstrating a high degree of creative or technical achievement during a particular period;
- Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- Significance in relating to the history of slavery in South Africa.

The generally accepted heritage resource grades are shown in Table 2 below.

Table 2: Grading of heritage resources (Source: Baumann & Winter 2005: Box 5).

Grade	Level of significance	Description
1	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
2	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
3A	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3A heritage resources.
3B	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.
3C	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources.

5.1.2 Minimum Standards for Heritage Specialist Studies in terms of Section 38 of the National Heritage Resources Act (No. 25 of 1999)

SAHRA has published minimum standards for heritage studies which have been applied to this HIA (see SAHRA, no date). The minimum standards indicate which specialist studies should form part of a HIA, discuss impact assessment methodologies, set out the requirements for heritage-related consultation as part of heritage assessments, and provide generic report templates for the various reports required by SAHRA in terms of Section 38 of the NHRA.

This HIA complies with SAHRA's minimum standards and is based on the report template for Section 38 (1 and 8) HIAs set out in Section 9.2. of that document.

5.2 National Environmental Management Act (No 107 of 1998)

The National Environmental Management Act (NEMA), as amended, provides a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals that are likely to have a negative effect on the environment.

Regulations governing the environmental authorisation process have been promulgated in terms of NEMA and include the EIA Regulations, 2014 as amended (GNR R326/2017) and Listing Notices 1 – 3 (GNR 324, 325 and 327/2017). These regulations were amended in April 2017 by Government Notices 324, 325, 326 and 327.

This project triggers a number of activities in the Listing Notices and will thus, in terms of GNR 325, be subject to an EIA process and Soyuz 3 Solar PV Park (Pty) Ltd will be required to obtain a positive Environmental Authorisation (EA) from the Department of Fisheries, Forestry and the Environment (DFFE) prior to commencement of the proposed activities.

6 METHODOLOGY

This HIA aims to provide a general description of the known and potential heritage sensitivities

of the project site and wider area, to assess the impacts of the proposed Soyuz 3 SPV park on heritage resources and to make recommendations to mitigate any such impacts. The following sections provide an outline of the approach and methodology used in the study.

In terms of the definitions provided in Section 2 of the NHRA, heritage resources potentially present on the Soyuz 3 SPV site which may be impacted by the proposed development include:

- Palaeontological resources;
- Pre-colonial archaeological sites and materials;
- Colonial era archaeological sites and materials;
- Rock paintings and / or rock engravings;
- Historical built structures; and
- Graves and burials.

6.1 Study Area

The study area for all the proposed Soyuz SPV facilities comprises the twelve farm portions shown in Table 3 and Figure 4 below. Although, according to the current proposed project footprints two of the properties (Farm 1/126 and Farm 1/97) will not be directly affected by the projects, they have nevertheless been included in this HIA.

Table 3: Farm portions in the study area

Farm Number	Portion	Landowner	SPV Project
Farm 97	Portion 1	Witfontein Trust	None
Farm 97	Portion 2	Witfontein Trust	Soyuz 2 & 3
Farm 126	Portion 1	Witfontein Trust	None
Farm 91	Portion 1	JC Paul Familie Trust	Soyuz 6
Farm 127	Portion 5	JC Paul Familie Trust	Soyuz 4
Farm 127	Portion 1	Andrie Grove	Soyuz 5
Farm 127	Portion 9	Andrie Grove	Soyuz 1 & 5 Access Road
Farm 127	Remainder		Soyuz 6 Access Road
Farm 127	Portion 7		Soyuz 6 Access Road
Farm 92	Portion 6		Soyuz 6 Access Road
Farm 145	Portion 3	Andrie Grove	Soyuz 1
Farm 146	Remainder	Andrie Grove	Soyuz 1 Access Road

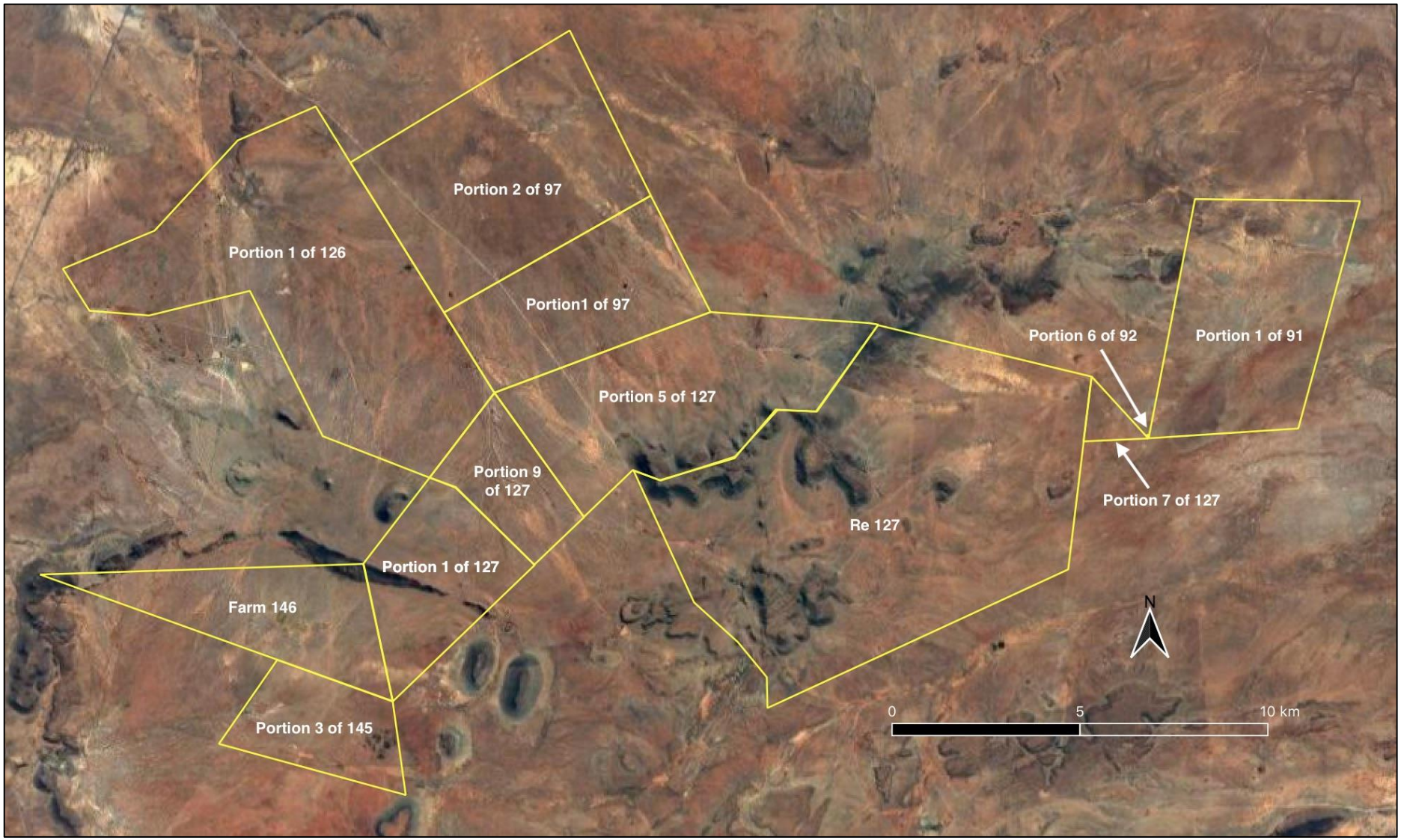

Figure 4: Farm portions affected by the proposed Soyuz 1-6 SPV cluster (Source: Google Earth).

The assessment of the full extents of the affected farms, rather than just the proposed project footprints, allows the identification and assessment of less immediate heritage sensitivities such as potential visual impacts on the cultural landscape.

The total study area for all the Soyuz SPV facilities is approximately 14,930 hectares (ha).

6.2 Sources of Information

A survey of available and relevant heritage literature was carried out to assess the general heritage context within which the Soyuz 3 SPV park will be set. This included a review of published material and available unpublished reports, including those generated for previous archaeological assessments and heritage studies that have been conducted in the vicinity of the project site, available on the SAHRIS online platform (https://sahris.sahra.org.za/) or in ACO's project archive.

The sources of information used are shown in Table 4 below and include published archaeological papers and reports for the general project area and unpublished archaeological and heritage impact assessments that have been undertaken in the vicinity of the project site.

Table 4: Information sources used in this assessment

Data/Information	Source	Date	Type	Description
Maps	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical and current 1:50 000 topographic maps of the study area and immediate surrounds
Geological chart	Council for Geoscience	Various	Spatial	Current 1:250 000 geological survey chart for the area
Aerial photographs	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical aerial photography of the study area and immediate surrounds
Aerial photographs	Google Earth	Various	Spatial	Recent and historical aerial photography of the study area and immediate surrounds
Cadastral data	Northern Cape Farm Portions	Current	Spatial	Cadastral boundaries, extents and aerial photography
Cadastral data	Chief Directorate: National Geo-Spatial Information	Various	Survey diagrams	Historical and current survey diagrams, property survey and registration dates
Background data	South African Heritage Resources Information System (SAHRIS)	Various	Reports	Previous impact assessments for any developments in the vicinity of the study area
Palaeontological sensitivity	South African Heritage Resources Information System (SAHRIS)	Current	Spatial	Map showing palaeontological sensitivity and required actions based on the sensitivity.
Background data	Books, journals, websites	Various	Books, journals, websites	Historical and current literature describing the study area and any relevant aspects of cultural heritage.

Important, detailed information about the archaeology of the Karoo was provided by

publications generated by the Zeekoei Valley Archaeological Project (ZVAP), whose study area lies south-east of the Soyuz 3 SPV project area. The ZVAP surveyed almost 5 000 square kilometres of the catchment of the Zeekoei River (from the Sneeuberg Mountains to the Gariep River Valley) (Figure 5) and recorded some 14 000 archaeological sites representing a history of human occupation covering at least 250 000 years (Sampson, 1985).

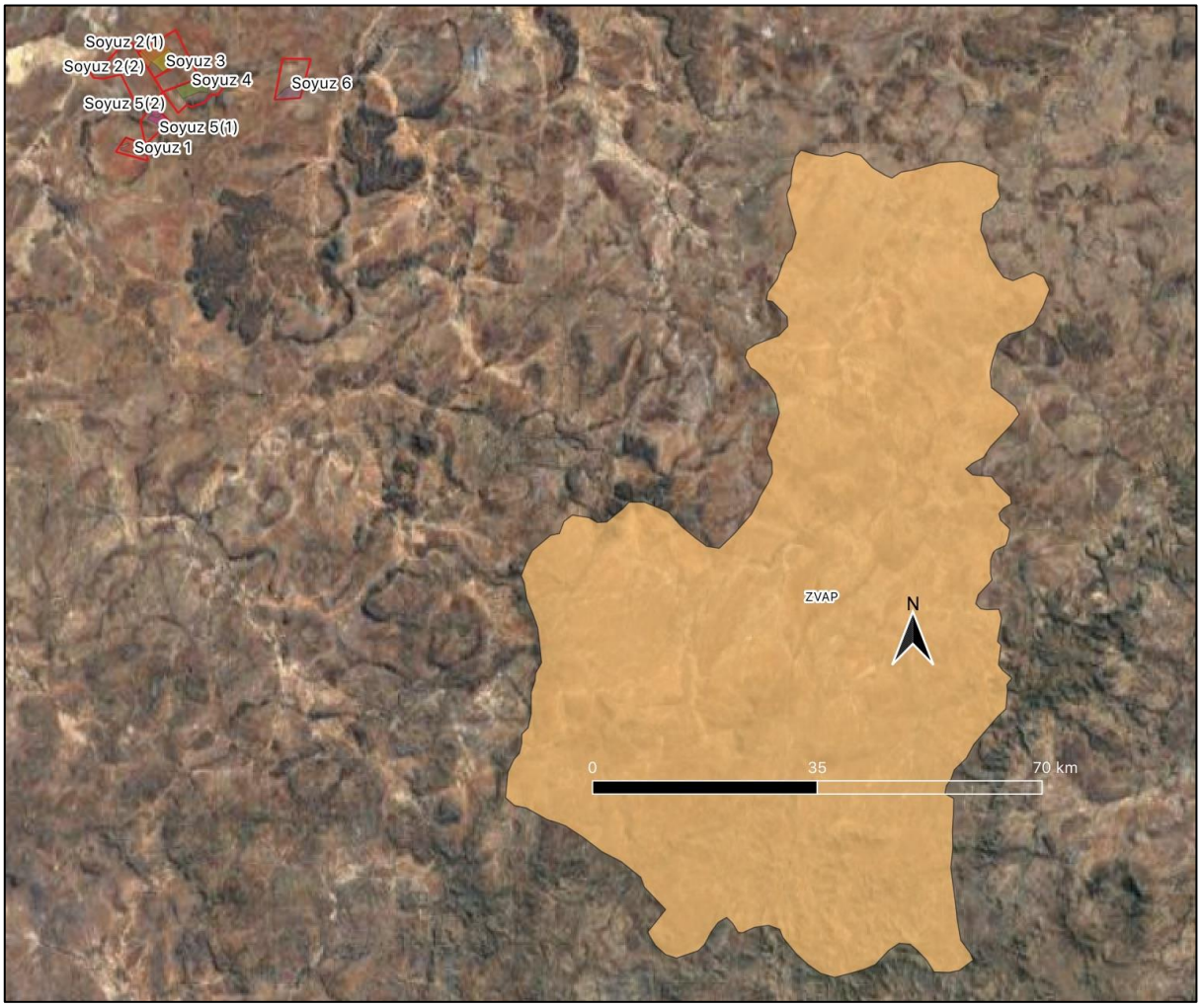

Figure 5: Extent of the Zeekoei Valley Archaeological Project (ZVAP) study area (orange polygon) in relation to the Soyuz 1-6 SPV project areas shown at top left.

6.3 Desktop Palaeontological Assessment

According to the SAHRIS palaeosensitivity map the Soyuz 3 SPV park is in an area with a range of moderate palaeontological sensitivity and a desktop palaeontological study is required.

The desktop palaeontological impact assessment (PIA) to support this HIA was commissioned from Dr Marion Bamford of the University of the Witwatersrand and is attached as Appendix C (Bamford, 2023c). The PIA comprised consultation of geological maps, literature, palaeontological databases, and published and unpublished records to determine the likelihood of fossils occurring in the Soyuz 3 SPV project area. Sources consulted included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases.

6.4 Archaeological Field Assessment

A physical heritage survey of the Soyuz 1-6 SPV project areas was undertaken by John Gribble and Gail Euston-Brown of ACO Associates on five days between 7 and 11 January 2023.

The field team each carried a hand-held GPS receiver, set to the WGS84 datum and loaded with the Soyuz 1-6 SPV project areas outlines, local roads and farm tracks captured from Google Earth and any points of potential heritage interest identified from Google Earth or other mapping sources. The travelled tracks of the field team were logged by the GPS units (Figure 10) and any identified heritage resources were entered as waypoints.

Photographs were taken of sites and heritage resources located, of examples of artefacts seen and of the landscape setting, to provide context.

The ACO field team are familiar with the standard classification systems for this artefactual material and can roughly date and characterise an archaeological site based on its visible content and artefacts.

No archaeological material was removed from the project site, and all observations were based on visible surface material.

The survey took place in mid-summer and although much of the study area was covered in Karoo grasses, ground visibility was sufficient for survey purposes and did not negatively affect the outcome of the survey.

6.5 Grading and Site Sensitivity

The survey protocol required the grading in the field of any finds of heritage resources, using the table in Baumann and Winter (2005) referred to above.

Sites of local heritage significance form the Grade 3 tier of the system, with those of high local significance designated as Grade 3A. Those of medium or low local significance are designated Grades 3B and 3C respectively. It is generally assumed that Grade 3A heritage resources should be preserved in their entirety, while Grade 3B and 3C sites can be mitigated or part preserved, as appropriate.

Resources which do not meet the Grade 3 criteria are referred to as Not Conservation-Worthy, although this author prefers the term “Ungradable” and this is used in this report. Generally, ungradable resources require no further action or mitigation in respect of development proposed on a site.

6.6 Restrictions and Assumptions

The January 2023 field survey was carried out at the surface only and any completely buried archaeological sites or material will not have been recorded.

Survey coverage was good and although some portions of the project area were not reached

in the time available, the survey team's specialist knowledge and experience in this area of the Karoo with respect to the spatial distribution of heritage resources means that we are confident that a sound baseline has been created against which to assess the development proposals.

Recent good rain in the area meant that the project site was well vegetated. This limited artefact visibility but based on the archaeological material that was noted during the survey, it is unlikely that significant archaeological occurrences were present. Landscape features such as rocky hills and outcrops, which are known to be the focus of heritage resources in this area, could be easily identified and visited.

Although we believe that most of the relevant archaeological assessments and HIAs from the area have been located and reviewed, it is acknowledged that some reports may not have been identified for review.

No palaeontological field survey of the Soyuz 3 SPV project site has been conducted but based on the geology of the area and the palaeontological record as we know it, it has been assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and mostly do not contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils of their own. Transported fossils might be trapped in palaeo-pans or palaeo-springs but no such features are evident in the satellite imagery.

The assessment of cumulative impacts is based on the list of approved Wind and Solar PV projects in the Renewable Energy EIA Application (REEA) Database (2023_Q1) within 30 km of the Soyuz 1-6 SPV project areas.

6.7 Impact Assessment

Potential impacts of the proposed project were assessed using an impact assessment methodology supplied by Terramanzi. This is discussed further in Section 8 below and the methodology is attached as Appendix D.

6.8 Public Participation

As required by the NEMA, a Scoping Phase public participation process was conducted between 20 March and 21 April 2023, during which public comment was sought on the draft Soyuz 3 SPV scoping report (DSR). The DSR included a heritage scoping report for the Soyuz 3 project, produced by ACO Associates.

The DSR was submitted to SAHRA and to the Northern Cape Provincial Heritage Resources Authority for comment via the SAHRIS online heritage management portal (SAHRIS Case 21133) and SAHRA responded with the following comment:

> "*The SAHRA notes the submitted DSR and Heritage Scoping Report. The pending HIA must comply with section 38(3) of the NHRA, and the SAHRA 2007 Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports. The desktop PIA must comply with the 2012 Minimum Standards: Palaeontological Components of Heritage Impact Assessments. The*

HIA must also include the results of the Visual Impact Assessment.

SAHRA will provide further comments upon receipt of the pending heritage reports, Draft EIA and associated appendices".

The Comments and Responses Report for the Soyuz SPV 1-6 Cluster indicates that the I&APs to whom the DSR was submitted for comment include the Pixley Ka Seme District Municipality and the Emthanjeni Local Municipality but that no heritage-related comments were received from either organisation.

Comments received from the DFFE included the requirement that as part of the ongoing public participation process under the EIA, this HIA must be submitted to SAHRA for comment. The HIA must also be submitted to the Northern Cape Provincial Heritage Resources Authority and to the relevant local municipalities for comment. Any comments received will need to be dealt with and incorporated into the revised HIA.

7 BASELINE

7.1 Receiving Environment

The Soyuz 1-6 SPV parks are proposed in an area whose topography is characterized by wide, undulating plains and valley floors criss-crossed by dolerite dykes and sills, which form swarms of low hills and ridges, and occasional larger, flat-topped mountains

The property on which the Soyuz 3 SPV facility is being proposed is rural farmland and is zoned agricultural. Historically the land has been and continues to be used for stock farming.

The Soyuz 3 SPV project site is situated on a largely flat plain which slopes gently from west to east (Plate 1).

Plate 1: View south across the Soyuz 2 and 3 SPV areas from the north. Note the thick grass covering the area (Photo: J Gribble).

The Soyuz 3 SPV development site is almost entirely covered in the red alluvial sands typical of this part of the Northern Cape. Although the depth of the sand varies, animal burrows noted during the survey indicate that it can be more than a metre thick., No exposures of bedrock were noted during the ACO walkover survey. The vegetation is a grass dominated dwarf shrubland typical of the Nama-Karoo biome (Plate 1).

7.2 Regional Context

7.2.1 Palaeontology

The flat plains of the modern Karoo are a vast palaeontological landscape underlain by multiple layers of shale and mudstone strata which represent some 120 million years (300 – 183Ma) of depositional history and which that contain an array of fossils, ranging from fish, early vertebrates, plant remains to trace fossils. It is one of the most complete fossil repositories on the planet (Visser et al, 1977).

The Karoo Supergroup rocks cover a very large proportion of South Africa and extend from the northeast (east of Pretoria) to the southwest and across to almost the KwaZulu Natal south coast. They are bounded along the southern margin by the Cape Fold Belt and along the northern margin by the much older Transvaal Supergroup rocks.

During the Carboniferous Period South Africa was part of the huge continental landmass known as Gondwanaland and it was positioned over the South Pole. As a result, there were several ice sheets that formed and melted, and covered most of South Africa (Visser, 1986, 1989; Isbell et al., 2012). Gradual melting of the ice as the continental mass moved northwards and the earth warmed, formed fine-grained sediments in the large inland sea. These are the oldest rocks in the system and are exposed around the outer part of the ancient Karoo Basin and are known as the Dwyka Group (Johnson et al., 2006).

Overlying the Dwyka Group sediments are rocks of the Ecca Group that are Early Permian in age and all of which have varying proportions of sandstones, mudstones, shales and siltstones. These sediments represent shallow to deep water settings, deltas, rivers, streams and overbank depositional environments (Bamford, 2023c).

The Ecca Group is overlain by the rocks of the Beaufort Group that has been divided into the lower Adelaide Subgroup for the Upper Permian strata, and the Tarkastad Subgroup for the Early to Middle Triassic strata. As with the older Karoo sediments, the formations vary across the Karoo Basin (Bamford, 2023c). These shales are a rich, stratified sequence of fish, reptilian and amphibian remains that are fossilized in Permian and Triassic period swamp deposits (Truswell, 1977; Visser et al., 1977; Oelofsen and Loock, 1987).

In the part of the basin in which the Soyuz 1-6 SPV parks are proposed, three formations are recognised in the Adelaide Subgroup: the basal Koonap Formation, the Middleton Formation and the thick Balfour Formation (Smith et al., 2020). From the recent map provided in Smith et al. (2020), it is likely that the Koonap Formation is present in the Britstown area (see Figure 6).

Large exposures of Jurassic dolerite occur throughout the area. This igneous rock intruded through the Karoo sediments around 183 million years ago, at about the same time as the Drakensberg basaltic eruption and formed vertical dykes and horizontal sills following the bedding planes of the shales. These geological structures give rise to a very characteristic topography of the Karoo with its mesas, hillocks and sharp ridges (Visser, 1986; Bamford, 2023c).

In the water courses of the area much younger sands and alluvium of the Quaternary Kalahari Sands have been deposited. These sediments were transported from farther north in the past when there was likely much more rainfall in the system, and more recently with flash flooding. Their composition and origin can be very mixed (Figure 6) (Bamford, 2020).

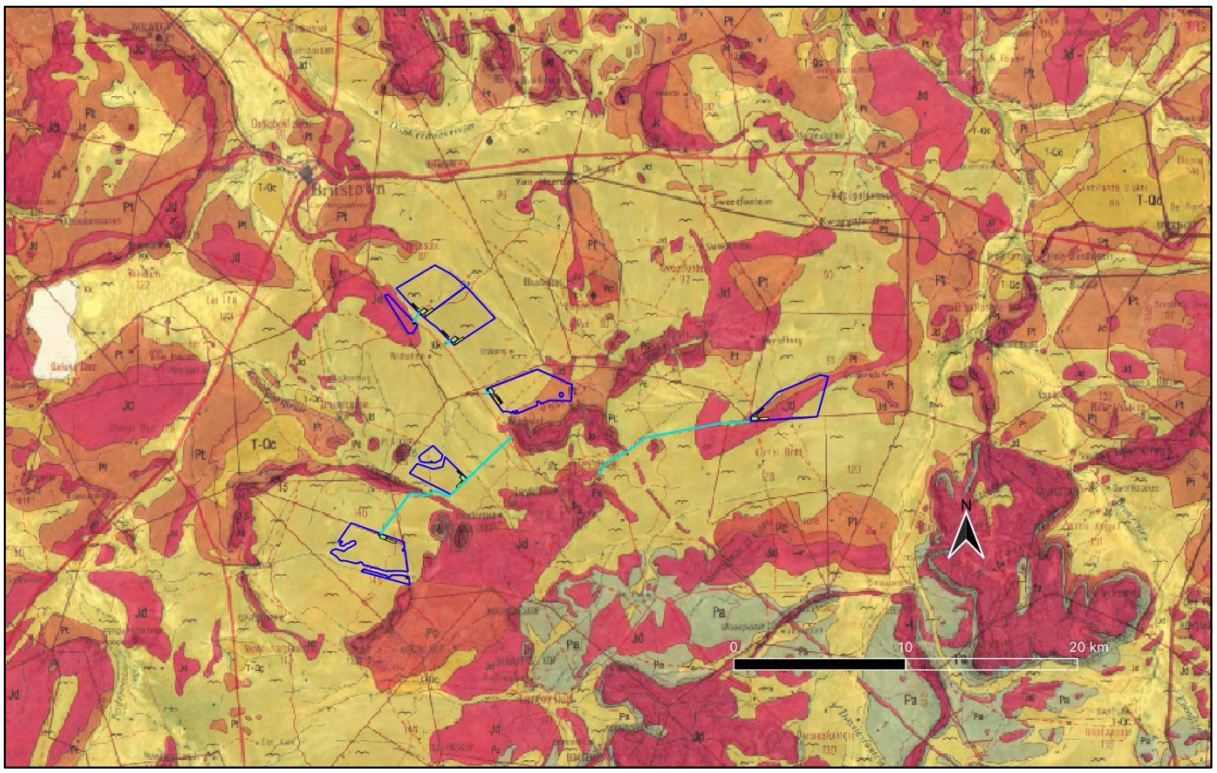

Figure 6: Geology of the Soyuz 1-6 SPV Cluster (blue polygons) and wider region are underlain by sedimentary rocks of the Adelaide Subgroup (orange) and Jurassic dolerite (red) and mantled in Quaternary alluvia (yellow) (Source: Geological Chart 3022 Britstown).

7.2.2 Archaeology

The Karoo has been occupied by people for hundreds of thousands of years as testified by the vast "litter" of stone artefacts that blanket the land and which range from heavily weathered Early (ESA) and Middle Stone Ages (MSA) lithics, the former dating back as much as half a million years ago, to the more recent Later Stone Age (LSA) artefacts deposited within the last 30,000 years.

Our understanding of the pre-colonial archaeology of the Upper Karoo is founded on the early work by two of the fathers of South African archaeology, John Goodwin and Clarence van Riet Lowe (Goodwin and Van Riet Lowe, 1929). This was substantially enhanced in large part by an exhaustive archaeological survey of a portion of the Zeekoe River Valley, south of De Aar, by Prof Garth Sampson (1985). Between 1979 and 1981 a team of archaeologists working on the Zeekoe Valley Archaeological Project (ZVAP), intensively surveyed 4,954 km^2 of the Zeekoe River drainage, between the Sneeuberg in the south and Hanover in the north, recording more than 14,000 sites and archaeological stone tool occurrences (Sampson, 1985; 1992; Sampson et al, 2015) (see Figure 5 above).

The ZVAP recorded a long sequence of archaeological material in the Upper Karoo indicating the occupation of the region by our forebears since the ESA Acheulian, through multiple MSA phases, four LSA phases to herder sites, many with low stone-walled kraals and Khoekhoe-

like, thin-walled ceramics, dating to within the last 2,000 years (Sampson 1985, Sampson et al, 2015:3).

Since the completion of the ZVAP, a substantial number of archaeological impact assessments have been conducted in the this part of the Karoo in recent years to support wind and SPV projects around De Aar to the east of the Soyuz 1-6 SPV project areas (see Figure 7 below) (see, for example, Kaplan, 2010a, 2010b; Bekker, 2012a, 2012b; Fourie, 2012; Kruger, 2012; Huffman, 2013; Orton & Webley, 2013a, 2013b; Fourie, 2014, Gribble and Euston-Brown, 2020, 2021; Webley and Orton, 2011).

The ZVAP results and those from the recent impact assessment surveys referred to above have allowed the development of a good understanding of the pre-colonial, Stone Age archaeology of this area of the Karoo and of the likely locations and distribution of sites of different periods within the landscape.

Due to the geology of the Karoo, caves and rock shelters are very rare. This means that most pre-colonial archaeology is found on open sites and comprises principally stone artefacts. Ostrich eggshell is sometimes preserved, and occasionally pottery on sites that are less than 2,000 years old, but bone and other organic material is rarely preserved on Karoo sites, except in rare, stratified contexts.

The rarity of organic archaeological material in this area means that dating of sites and material can be difficult, but the ZVAP noted an important correlation between stone tool age and the patina on the hornfels, the fine-grained metamorphic rock (also called lydianite and indurated shale) which is the dominant Stone Age raw material used in the Karoo. The ZVAP found that lithics patinated dark brown to yellow = ESA; red = MSA; grey to grey brown = LSA (Lockshoek); light brown/tan = LSA (Interior Wilton); and black = LSA (Smithfield). This culture-history sequence forms a basis for identifying stone tool industries and historic occupations over the entire region (Huffman, 2013).

Dolerite, in the form of dykes and sills, plays a significant role in the archaeology of the Karoo. Not only is it the source of hornfels, which occurs in the contact zone between intrusive magma and shale beds, but these dolerite intrusions also served as foci for pre-colonial campsites and provided the palettes for the rock engravings that largely replace painted rock art in this cave- and rock shelter-poor environment (Huffman, 2013; Palaeo Field Services, 2014).

With respect to the archaeological sequence of the Upper Karoo as we understand it from the results of the ZVAP and other studies, Sampson (1985) reported that ESA Acheulian sites tend to cluster close to sources of tool-making stone raw material, rather than close to sources

of water and are generally to be found on the flats rather than on ridges and hills. This means that these sites and artefacts are often buried under the more recent sediments and, as a result, ESA lithics and sites have seldom been reported by the various surveys undertaken in the region.

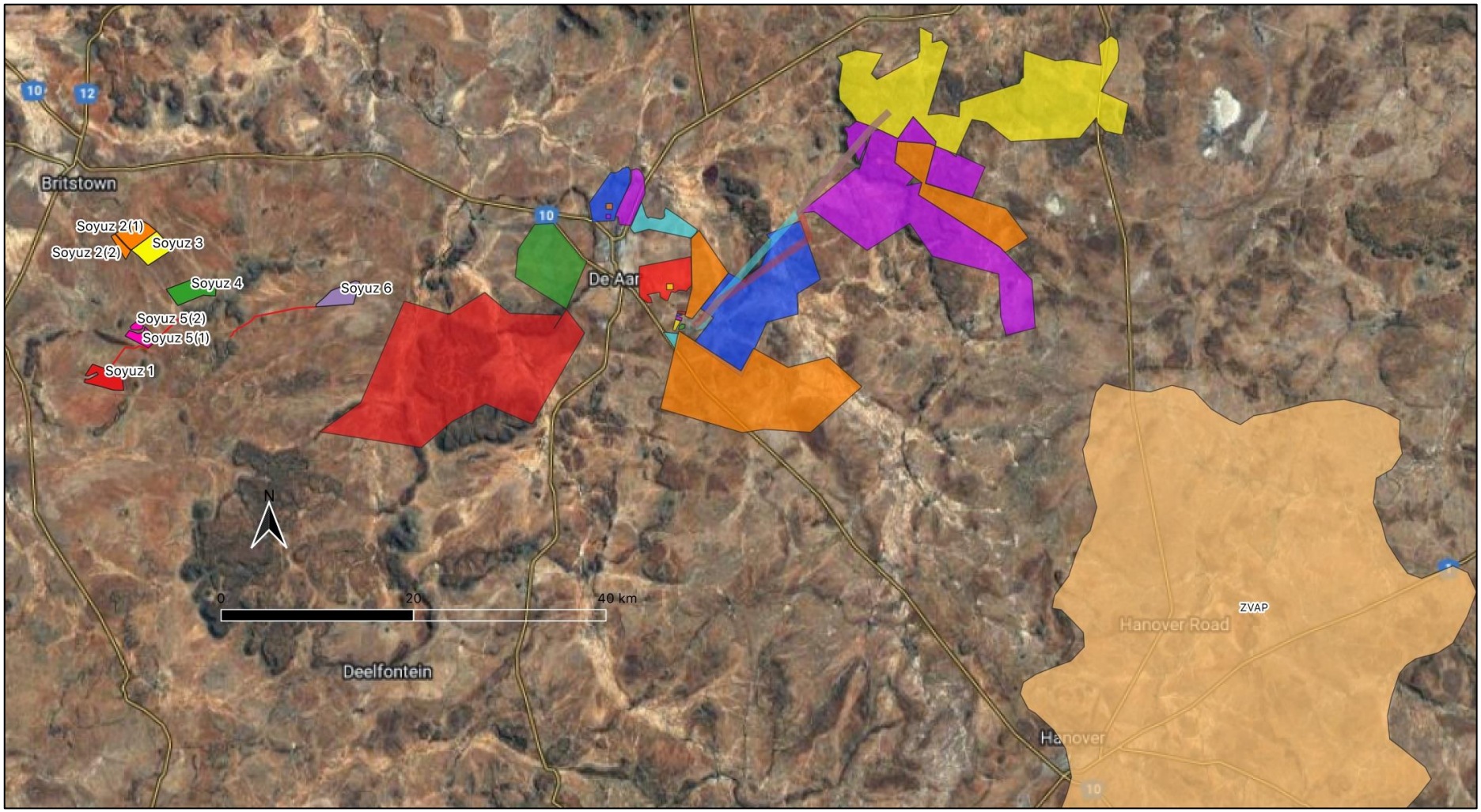

Figure 7: Previous heritage assessments in the vicinity of the Soyuz SPV cluster. The Soyuz project areas are shown on the left of the image. Part of the ZVAP survey area is visible on the right (Source: Google Earth).

The many MSA artefact occurrences in the region are almost exclusively open sites, and tend to be visible as dense clusters of lithics in erosion features along stream banks, as scatters of tools on the edges of pans and at the base of small hills or koppies, or as a wide and persistent scatter or “litter” of lithics across the landscape, which are particularly visible on gravel lag surfaces where the overlying coversands have been removed by erosion (Sampson, 1985)
Thousands of LSA sites have been recorded in the region and these are attributed to the ancestors of the San peoples and, after 2,000 years ago, to Khoekhoen pastoralists (Sampson, 1985; Webley and Orton, 2011). As with the MSA sites, the LSA material is generally found in the open due to the scarcity of rock shelters and often comprise large scatters of stone tools.

Although there are several temporal subdivisions of the LSA which are described below, the San in general were nomadic hunter-gatherers who moved between temporary campsites, re-occupying some places from time to time. As a result, LSA sites in this region, often contain more than one industry (Sampson, 1972, 1974).

The earliest phase of the LSA dates to around 10,000 years ago and is described by Sampson (1985) as the Lockshoek. In broad terms, the Lockshoek is one of the terminal Pleistocene / early Holocene, non-microlithic industries that belong to the Oakhurst complex, and it is the oldest archaeological unit (about 12,000 to 8,000 years ago) that can be confidently associated with the San (i.e. Bushmen).

The entire Later Stone Age sequence afterwards is commonly credited to ancestral San (Deacon, 1984; Huffman, 2013). The Lockshoek is characterised by large sidescrapers, frontal scrapers, endscrapers, thick backed adzes and a wide variety of ground stone implements, and sites are overwhelmingly found near water points (Webley and Orton, 2011).

The Lockshoek is followed by the Interior Wilton which Sampson (1985) describes as including small convex scrapers, adzes, drills, reamers, as well as ceramics in its final phase. Unlike the Lockshoek, Interior Wilton sites are found on hills and ridges with commanding views of rivers and valleys (Webley and Orton, 2011).

The Interior Wilton is succeeded by the Smithfield which is characterised by abundant endscrapers made on elongated flakes, often with extensive trimming down the margins. Sampson’s Smithfield is generally associated with ceramics (Webley and Orton, 2011). In a typical Karoo setting, Smithfield surface sites are concentrated on low dolerite hills and ridges, but not in the mountains or out on the flats. They occur in dense clusters each composed of several sites no more than a few hundred metres apart. Most clusters are found near waterholes on adjacent hills or ridges and clusters near both water and hornfels quarries tend to contain more sites. Clusters form around hornfels quarries only rarely. Sites with ceramics cluster tightly on the landscape, mainly near waterholes, and are assumed to be the residues of camps (Sampson, 1984).

The introduction of pastoralism (sheep, goats and, later, cattle) roughly 2,000 years along with the arrival of the Khoekhoen may have resulted in changes in land use. The Khoekhoen followed a transhumant lifestyle and are likely to have utilized the grazing opportunities of the Karoo on a seasonal basis (Webley and Orton, 2011).

By the early 18th century, the San appear to have retreated to the Great Karoo ahead of the expansion north and east from the Dutch settlement around the Cape of mobile colonial stock farmers or trekboers. Here they managed to eke out an existence which includes hunting, gathering, and raiding the livestock of the trekboers, resulting in the "Bushman War". Eventually kommandos dispatched from regional centres such as Graaff Reinet prevailed and the "wild bushman" of the Karoo were rendered extinct by the early 19th century (Webley and Orton, 2011:14).

7.2.3 Historical Period

The most recent archaeological layer in the Karoo landscape relates to the historical occupation of the area by stock farmers of European descent from the late 18th century but is a layer which is not well-documented. These European pastoralists were highly mobile – hence the name trekboers – moving between winter and summer grazing on and off the Great Escarpment. Land ownership was informal and only became regulated after the implementation of the quitrent system of the 19th century used by the Government to control the lives and activities of the farmers.

However, judging by the kinds of artefacts and structures found on the landscape, many of the farms in the Upper Karoo are likely to have been used before land was formally granted or loaned in the early 19th century (Sampson et al, 1994).

Britstown was the local urban centre and is named after Hans Brits who settled here after accompanying David Livingstone on a venture into the interior. The town formed around a community centre and a church that were built on a section of Brits' farm in 1877 (https://en.wikipedia.org/wiki/Britstown).

7.3 Site Specific Baseline

7.3.1 Palaeontology

The Soyuz 3 SPV park lies in the north-western part of the main Karoo Basin where fossiliferous Ecca and lower Beaufort Group rocks are exposed. The SPV development area is in the Quaternary sands and alluvium (Bamford, 2023c) (Figure 8 and Table 5).

Sands of the Quaternary period do not preserve fossils but might obscure fossil traps such as palaeo-pans, palaeo-springs or tufas. Most pans in the Kalahari Basin are filled by a layer of clayey sand or calcareous clays and are flanked by lunette dunes formed as a result of deflation of the pan floor during arid periods (Lancaster, 1978a,b; Haddon and McCarthy, 2005).

At some localities in the south western Kalahari spring-fed tufas have formed at the margins of pans during periods where groundwater discharge was high (Lancaster, 1986). These tufas may contain evidence of algal mats and stromatolites and may also be associated with calcified reed and root tubes (Lancaster, 1986). Many of the pans are characterised by diatomaceous earth, diatomite or kieselguhr, a white or grey, porous, light-weight, fine-grained sediment composed mainly of the fossilised skeletons of diatoms. Associated with some palaeo-pans and palaeo-springs are fossil bones, root casts, pollen and archaeological artefacts (Bamford, 2023c).

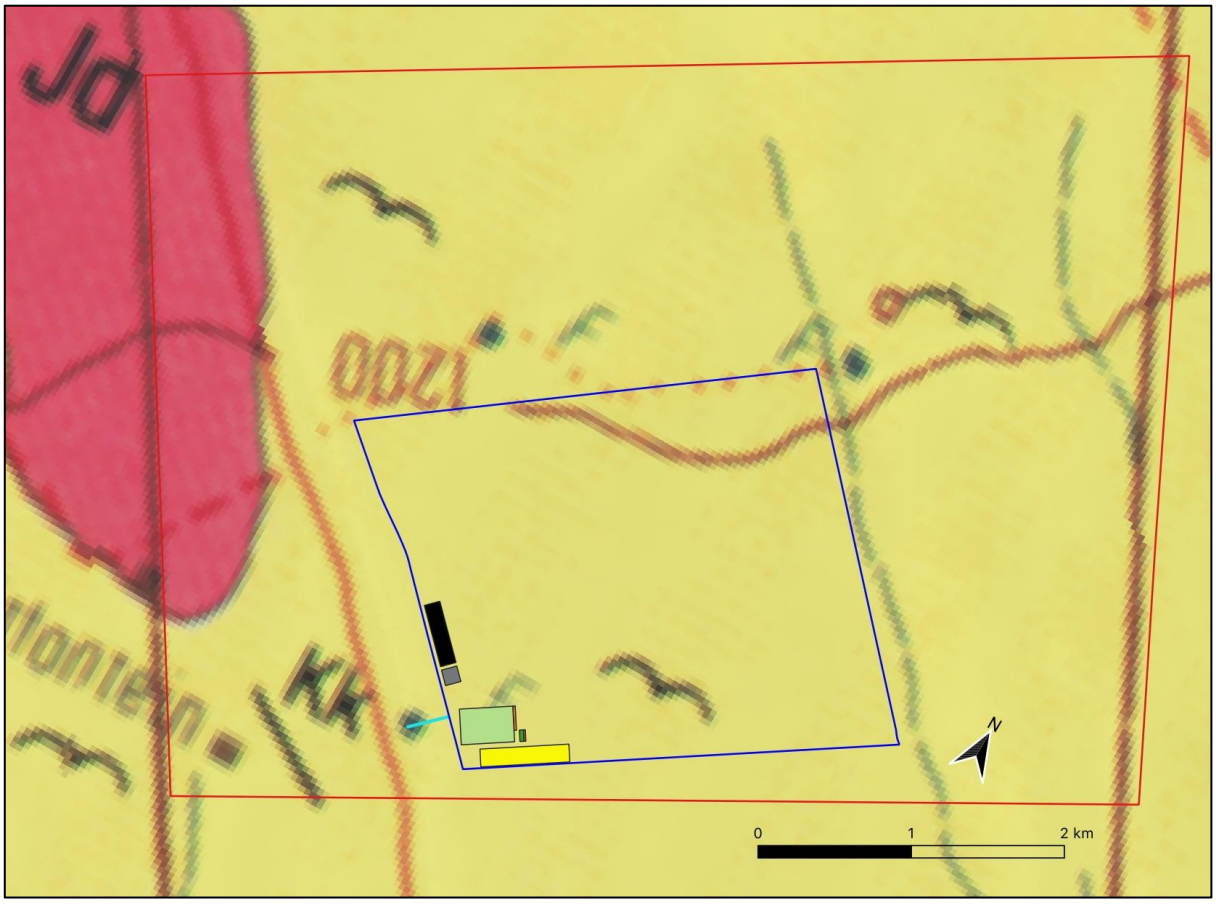

Figure 8: Geological map of the area of the Soyuz 3 SPV Park (blue polygons). Abbreviations of the rock types are explained in Table 6 below. (Source: 1: 250 000 map 3022 Britstown, Geological Survey).

Table 5: Explanation of symbols for the geological map and approximate ages (Eriksson et al., 2006. Johnson et al., 2006; Partridge et al., 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Quaternary Ca 1.0 Ma to present
T-Qc	Tertiary calcrete	Sand, Calcrete	Tertiary
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 183 Ma
Pa	Koonap Fm, Adelaide Subgroup, Beaufort Group, Karoo SG	Mudstone, sandstone	Late Permian, ca 266 - 260 Ma
Pc/Pwa	(Carnarvon) Waterford Fm, Ecca Group, Karoo SG	Sandstone, shale	Middle Permian ca 269 – 266 Ma
Pt	Tierberg/Fort Brown Fm, Ecca Group, Karoo SG	Brown to grey shale	Middle Permian ca 269 – 266 Ma

The Quaternary sand and alluvium may also contain transported fossils that originated in the source area of the sediments or have been trapped in palaeo-channels along the modern river valleys. This fossil material will be fragmentary and out of its original context but may, nevertheless preserve important palaeontological information (Bamford, 2023c).

The SAHRIS palaeo-sensitivity map (see https://sahris.sahra.org.za/map/palaeo) indicates that the Soyuz 3 SPV park is mostly located in an area of moderate palaeontological

sensitivity, with the smaller portion of the development site in an area of low sensitivity as shown in Figure 9.

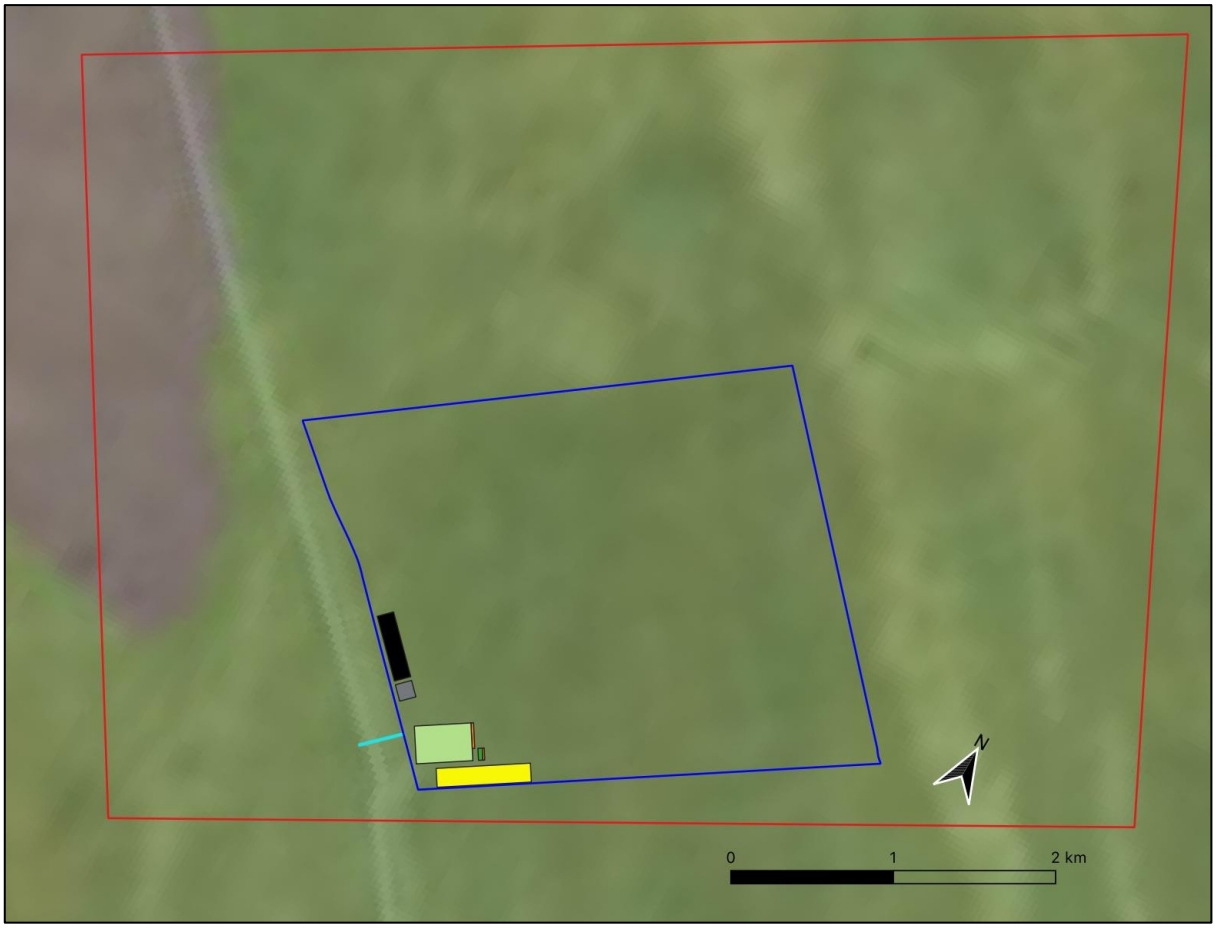

Figure 9: Palaeontological sensitivity indicated on the SAHRIS palaeo-sensitivity map for the Soyuz 3 SPV park. Green shading = moderate, grey = zero (Source: https://sahris.sahra.org.za/map/palaeo)..

7.3.2 Archaeology

The survey of the Soyuz 3 project area found very little archaeological material and no other heritage resources in the flat grasslands that comprise the site (Figure 10). Occasional isolated, heavily patinated MSA hornfels lithics were noted but not recorded. No ESA or LSA lithics were seen. This type of archaeological occurrence is very common across much of the Karoo and is generally regarded as background scatter of very low cultural significance.

7.3.3 Historical Built Environment

A comparison of the earliest 1:250,000 topographic map sheet for the area, which dates from 1966, with modern satellite imagery in a GIS indicates that there are no historical built structures within the Soyuz 3 SPV development areas.

However, there are two farm complexes at Witfontein, immediately south of the western project area, elements of which are more than 60 years of age and therefore considered to be historical (Figure 11).

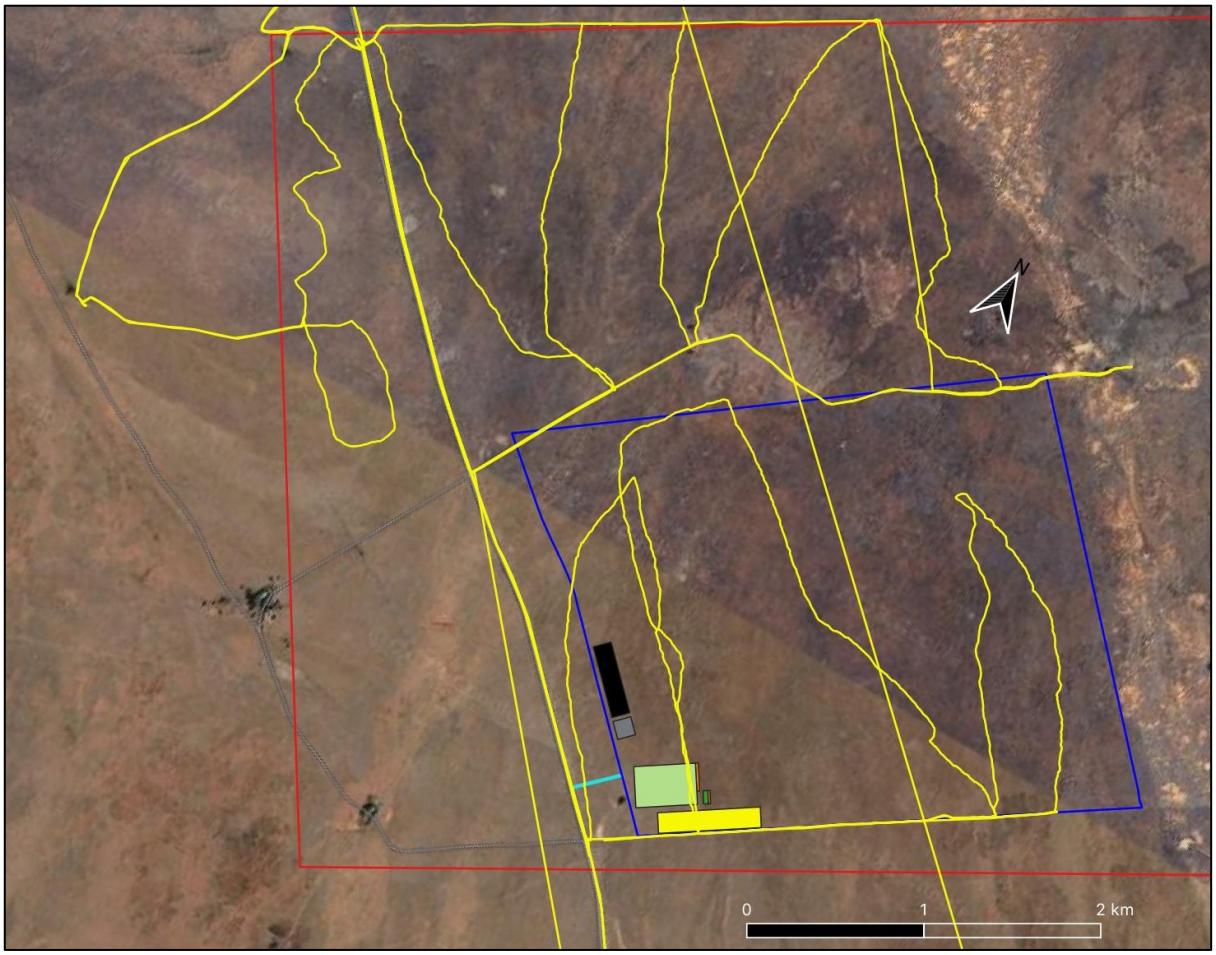

Figure 10: ACO Associates' survey tracks (yellow) overlaid with the Soyuz 3 SPV project areas (blue polygons) and the farm portion (red polygon) (Source: Google Earth).

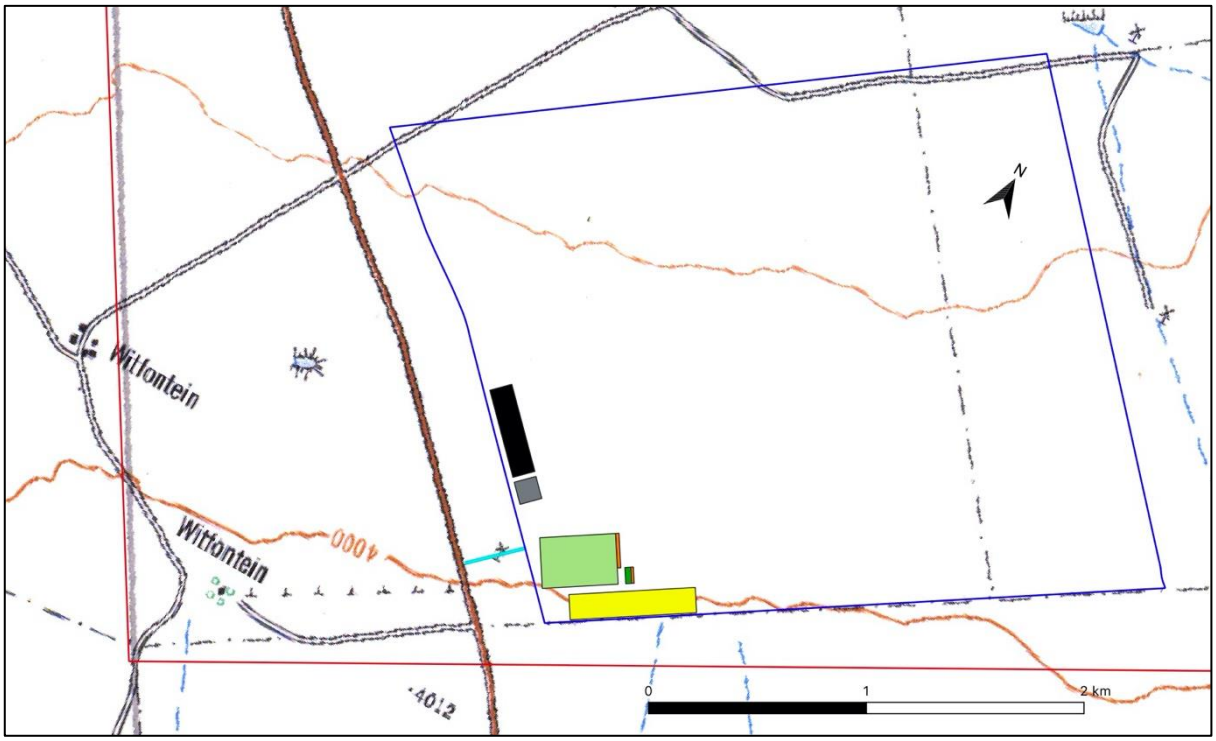

Figure 11: Location of Witfontein farmsteads to the west of the Soyuz 3 SPV project areas (Source: 1:50 000 chart 3023 DA, National Geo-spatial Information, http://www.ngi.gov.za). Graves and Burials

7.3.4 Graves and Burials

No graves or burial grounds were recorded within the Soyuz 3 SPV park project footprint.

7.3.5 Cultural Landscape

The concept of “cultural landscapes” finds expression in Article 1 of the World Heritage Convention 1972 where it is defined as a category of cultural heritage site which is representative of the "combined works of nature and of man”. Although not referenced in the NHRA, a consideration of any proposed development within the context of the cultural landscape within which it is proposed has become a standard requirement of HIA’s in South Africa.

The term "cultural landscape" embraces a diversity of manifestations of the interaction between humankind and its natural environment. Cultural landscapes are thus illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (https://whc.unesco.org/en/culturallandscape/#1).

The Operational Guidelines (2008) of the World Heritage Convention define three main categories of cultural landscape, namely:

- **Clearly defined landscapes designed and created intentionally by people**. This embraces garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.
- **Organically evolved landscapes**. These result from an initial social, economic, administrative, and/or religious imperative and have developed their present form by association with and in response to their natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two sub-categories:
    - **a relict (or fossil) landscape** in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.
    - **a continuing landscape**, which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time, it exhibits significant material evidence of its evolution over time.
- **Associative cultural landscapes**. The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic, or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent.

In respect of the landscape within which the Soyuz 3 SPV park will be constructed, the climate of the area and its geology has resulted in rugged landforms with low-growing, Karoo shrub and grasses extending over an expansive, undulating landscape broken by rocky intrusions.

The uninhabited nature of the wide-open spaces gives a feeling of remoteness and isolation to the Soyuz 3 SPV project site.

The land-use on the project site and in the surrounding area also does not significantly alter the natural character. The area is remote and sparsely populated and the patterns created by fences, farm tracks and windpumps, with few dwellings or other humanly-made structures add to the sense of remoteness and isolation.

The paucity of natural landscape features that could have served as foci for pre-colonial human activities and the apparent lack of archaeological and other heritage sites on the project site suggest that the landscape of the Soyuz 3 SPV project site was of limited significance to, and thus lightly used and occupied by, a succession of pre-colonial and, more recently, to colonial people.

The cultural landscape within which the Soyuz 3 SPV park will be located is not well developed but reflects the recent historical use of the land for stock farming. Its main features are fences, water troughs, wind pumps and occasional farm complexes and it can be described as a lightly used, organically evolved, largely relict landscape.

The construction of the Soyuz 3 SPV park will, as a result, alter the character of this rural landscape, and will contrast with the typical land use and historical form of human elements that are present in the landscape.

7.4 Visual Assessment

A visual assessment of the Soyuz 3 SPV park was conducted by Scientific Aquatic Services (Van Staden & Erwee, 2023c) as part of the EIA process. In its comments on the heritage Scoping report, SAHRA requested reference to the visual assessment in the HIA.

The Soyuz 3 SPV park is situated in an area whose arid nature restricts livestock densities. This has led to relatively large farms with a sparse human population.

The VIA identified four farm complexes and the local gravel road, which is used mostly only by the farmers, within 5 km of the development area. Because visual impacts are only experienced when there are receptors present to experience the impact, only the two Witfontein farm complexes and the local road will be subject to impacts (Figure 12) (Van Staden & Erwee, 2023c).

The Witfontein Trust Farm and other Witfontein farmstead located within 1,5 km of the Soyuz 3 SPV park have existing dense tree lines which may obscure the view towards facility. The local topography of the Soyuz 3 SPV park is relatively flat to gently sloping, with a mountainous backdrop, and is unlikely to assist in completely absorbing and/ or screening the Soyuz 3 SPV park. The mountain ranges in the background will however assist in absorbing the silhouettes of the PV panels and associated infrastructure (Van Staden & Erwee, 2023c).

The visual field assessment did indicate that from a distance of more than 1 km, the gently sloping topography does have an effect on the visibility of the Soyuz 3 SPV park, and the Visual Absorption Capacity of the area is therefore considered moderately low, indicating that the proposed PV structures will stand out, to a degree (Van Staden & Erwee, 2023c).

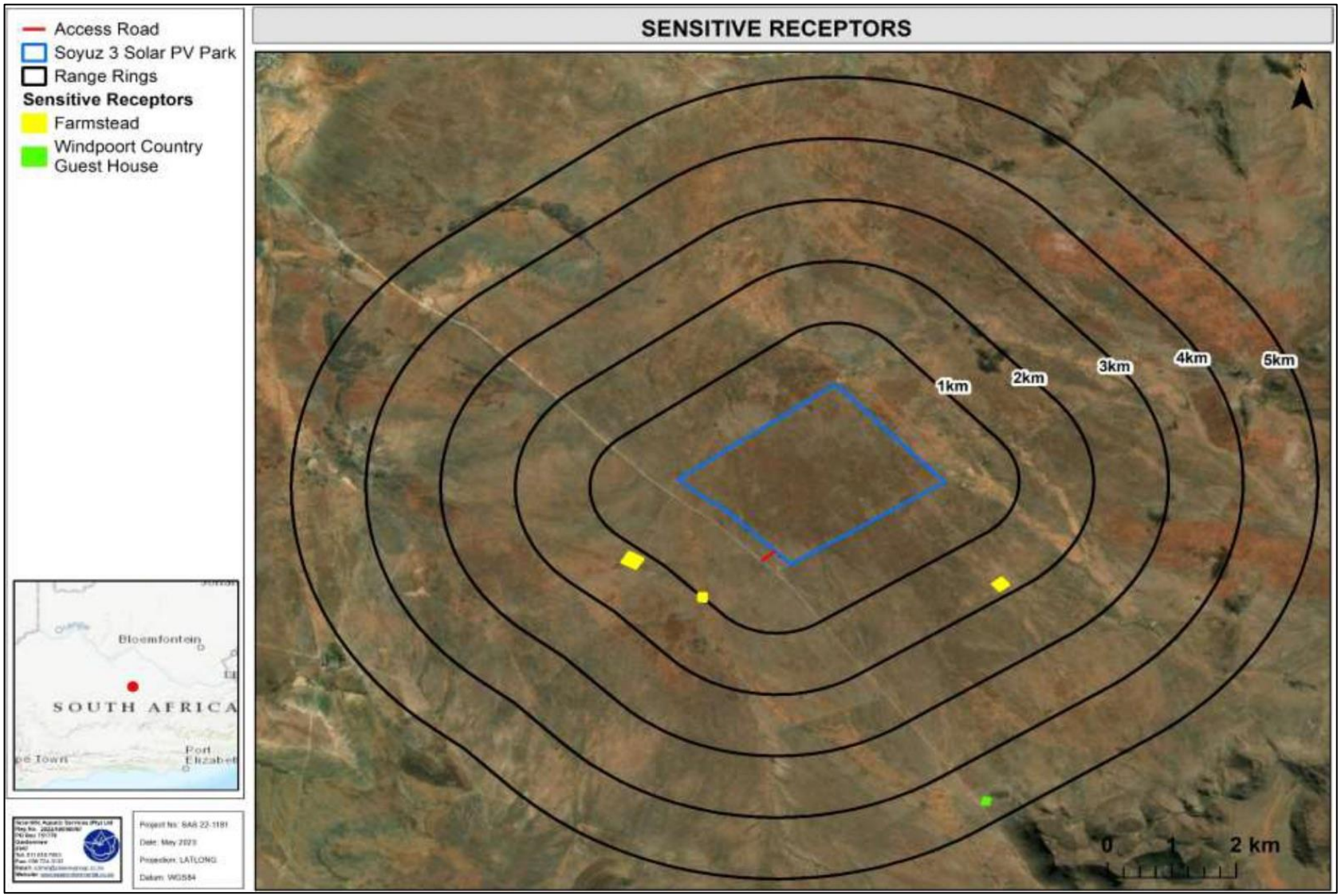

Figure 12: Map indicating the location of potential sensitive receptors within 5 km of the Soyuz 3 SPV park. The Witfontein farmsteads are the two yellow polygons closest to the SPV development areas (After Van Staden & Erwee, 2023c).

8 IMPACT ASSESSMENT

This impact assessment makes use of a methodology supplied by Terramanzi which is attached as Appendix D below.

The main impacts identified during the construction, operation and decommissioning of the Soyuz 5 SPV park are:

- Impacts to palaeontology;
- Impacts to archaeology;
- Impacts to graves and burials; and
- Impacts to the cultural landscape

The historical built environment has been scoped out of this assessment

8.1 Potential Impacts during the Construction, Operation or Decommissioning Phases

8.1.1 Palaeontology

Based on experience and the lack of any previously recorded fossils from the area, Bamnord (2023c) states that it is extremely unlikely that any fossils would be preserved in the overlying sands and alluvium of the Quaternary that are present across the Soyuz 3 SPV park development area because there are no fossil traps such as palaeo-pans or palaeo-springs evident in the satellite imagery. There is a very small chance that the sands might obscure such fossils traps.

Bamford (2023c) also indicates that activities associated with the operation or decommissioning of the project are unlikely to impact to palaeontological material.

Because the potential for fossils in the sediments is both low and very variable, the significance of impacts to palaeontological resources would be **low, negative**, but **very low, positive** with the implementation of mitigation measures

Table 6: Impacts on Palaeontology

IMPACT NATURE	Palaeontological Impact: Disturbance and/or destruction of palaeontological material during construction		STATUS	NEGATIVE
Impact Description	Excavations for foundations and infrastructure might destroy any fossils that are present			
Impact Source(s)	Excavations for foundations and infrastructure			
Receptor(s)	Fossils in the Quaternary sediment and underlying bedrock			
PARAMETER	WITHOUT MITIGATION	SCORE	WITH MITIGATION	SCORE
EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1

	No-Go Alternative:	0	No-Go Alternative:	0
DURATION (B)	Preferred Alternative:	4	Preferred Alternative:	4
	No-Go Alternative:	0	No-Go Alternative:	0
PROBABILITY (C)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	0	No-Go Alternative:	0
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-2	Preferred Alternative:	2
	No-Go Alternative:	0	No-Go Alternative:	0
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative:	-8	Preferred Alternative:	8
	No-Go Alternative:	-0	No-Go Alternative:	+0
CUMULATIVE IMPACTS	Cumulative impacts to palaeontological resources are difficult to assess due to the variable distribution and preservation of fossil material. However, location of this project and others approved or built within a 30 km radius on areas either largely underlain by dolerite or Quaternary sediments suggests that a cumulative impact on palaeontological resources is not likely.			
CONFIDENCE	High			
MITIGATION MEASURES	- Implement a Fossil Chance Find Protocol. - Environmental Compliance Officer to monitor earthworks for fossils. - Report any chance finds of palaeontological material to a palaeontologist who must collect a representative sample.			

8.1.2 Archaeology

Archaeological sites and/or materials may be affected during activities associated with the construction and decommissioning of the Soyuz 3 SPV park. Impacts arising from the operation of the SPV park are unlikely.

The occasional archaeological lithic material identified within the project footprint during the ACO survey is of very low significance and is ungradable.

The significance of impacts on the known archaeological would thus be **low negative**, but **very low negative** with the implementation of mitigation measures.

Table 7: Impacts on Archaeology

IMPACT NATURE	Archaeological Impact: Disturbance and/or destruction of archaeological sites and/or materials during construction and	STATUS	NEGATIVE

	decommissioning			
Impact Description	Disturbance and/or destruction of archaeological sites and/or materials			
Impact Source(s)	Activities associated with the construction and decommissioning of the Soyuz 3 SPV park			
Receptor(s)	Known and potential archaeological sites and/or materials			
PARAMETER	WITHOUT MITIGATION	SCORE	WITH MITIGATION	SCORE
EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	0	No-Go Alternative:	0
DURATION (B)	Preferred Alternative:	4	Preferred Alternative:	4
	No-Go Alternative:	0	No-Go Alternative:	0
PROBABILITY (C)	Preferred Alternative:	3	Preferred Alternative:	2
	No-Go Alternative:	0	No-Go Alternative:	0
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-2	Preferred Alternative:	1
	No-Go Alternative:	0	No-Go Alternative:	0
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative:	-24	Preferred Alternative:	8
	No-Go Alternative:	-0	No-Go Alternative:	+0
CUMULATIVE IMPACTS	Cumulative impacts to archaeological resources are difficult to assess due to the variable distribution and quality of archaeological surveys in the area. However, our cumulative knowledge of the archaeology of the Karoo suggests that the cumulative impact of the Soyuz 1-6 SPV Cluster and other projects within a 30 km on archaeological resources is likely to be low.			
CONFIDENCE	High			
MITIGATION MEASURES	- Report any chance finds of archaeological material to SAHRA and/or an archaeologist.			

8.1.3 Graves or Burials

The heritage survey identified no graves within the Soyuz 3 SPV development area, but it is possible that unmarked burials could be present on the site.

The probability of this happening during activities earthworks associated with the construction and decommissioning of the Soyuz 3 SPV park is extremely low and the significance rating is thus **very low negative**, both without and with the implementation of mitigation measures.

Table 8: Impacts on Graves or Burials

IMPACT NATURE	Graves and Burials Impact: Disturbance and/or destruction of graves or burials during construction and decommissioning		STATUS	NEGATIVE
Impact Description	Disturbance and/or destruction of graves or burials			
Impact Source(s)	Activities associated with the construction and decommissioning of the Soyuz 3 SPV park			
Receptor(s)	Potential human graves or burials			
PARAMETER	WITHOUT MITIGATION	SCORE	WITH MITIGATION	SCORE
EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	0	No-Go Alternative:	0
DURATION (B)	Preferred Alternative:	4	Preferred Alternative:	4
	No-Go Alternative:	0	No-Go Alternative:	0
PROBABILITY (C)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	0	No-Go Alternative:	0
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-2	Preferred Alternative:	1
	No-Go Alternative:	0	No-Go Alternative:	0
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative:	-8	Preferred Alternative:	4
	No-Go Alternative:	-0	No-Go Alternative:	+0
CUMULATIVE IMPACTS	Most historical graveyards are associated with farm complexes, whether still occupied or not, and are thus generally avoided in the planning and construction of project such as the Soyuz 3 SPV park. Although unmarked burials can occur anywhere within the landscape, the pre-colonial inhabitants of the area often buried their dead along river courses which are invariably excluded from developments due to their other environmental sensitivities. Overall, therefore, it is likely that the cumulative impacts of this project and others in the vicinity on graves and burials will be very low.			
CONFIDENCE	High			
MITIGATION MEASURES	- Cease work immediately in the immediate area if human remains are encountered. - Leave remains in situ and make site safe. - Report the finds to SAHRA and/or an archaeologist.			

8.1.4 Cultural Landscape

The cultural landscape is likely to be the heritage resource most affected by the construction of the Soyuz 3 SPV park, but given that it is of low cultural significance, the potential impact is assessed to be **low negative**.

Table 9: Impacts on the Cultural Landscape

IMPACT NATURE	Cultural Landscape Impact: Alteration of the cultural landscape due to the presence of the Soyuz 3 SPV project		STATUS	NEGATIVE
Impact Description	Alteration of the cultural landscape			
Impact Source(s)	Construction of the SPV facility			
Receptor(s)	Landscape in and around the SPV facility			
PARAMETER	WITHOUT MITIGATION	SCORE	WITH MITIGATION	SCORE
EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	0	No-Go Alternative:	0
DURATION (B)	Preferred Alternative:	3	Preferred Alternative:	3
	No-Go Alternative:	0	No-Go Alternative:	0
PROBABILITY (C)	Preferred Alternative:	3	Preferred Alternative:	3
	No-Go Alternative:	0	No-Go Alternative:	0
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-2	Preferred Alternative:	1
	No-Go Alternative:	0	No-Go Alternative:	0
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative:	-18	Preferred Alternative:	9
	No-Go Alternative:	-0	No-Go Alternative:	0
CUMULATIVE IMPACTS	Impacts on the cultural landscape could occur extensively if numerous projects are constructed in close proximity to one another and especially if these projects contain tall structural elements like turbines or powerlines. These impacts cannot be fully mitigated but the application of the recommendations of visual consultants would likely reduce the impacts from medium to low negative.			
CONFIDENCE	High			
MITIGATION MEASURES	- Minimise the disturbance footprint during construction and rehabilitate all disturbed areas that will not be needed during operation. - At decommissioning, rehabilitate all areas following an approved			

	rehabilitation plan.

The overall significance of impacts is summarised in Table 10 below:

Table 10: Summary overall impacts significance

DESCRIPTION OF IMPACT	Overall Significance with Mitigation	
	No-Go Alternative	Preferred Alternative
Disturbance and/or destruction of palaeontological material during construction and decommissioning	None – no change	Very Low +ve
Disturbance and/or destruction of archaeological sites and/or materials during construction and decommissioning		Very Low -ve
Disturbance and/or destruction of graves or burials during construction and decommissioning		Very Low -ve
Alteration of cultural landscape due to the presence of the Soyuz 3 SPV park		Low -ve

8.2 Visual Impact Assessment

According to Van Staden and Erwee (2023c), buffers recommended in the Scoping phase of the project around the gravel road and the four farmsteads that may be affected by the Soyuz 3 SPV park have been implemented in the optimised design of the layout of the SPV park.

The VIA found that with the optimised layout and the dense vegetation associated with the four farmsteads, including the two Witfontein farmsteads, the view towards the Soyuz 3 SPV park is largely obscured and the potential visual impact may be considered moderate.

With regard to the visual impacts on users of the gravel road between Britstown and Windpoort, Van Staden and Erwee (2023c) state that while they will have a temporary view of the SPV park, the visual impact is considered moderate to be low.

8.3 Cumulative Impacts

Cumulative impacts, or effects, can be described as “changes to the environment that are caused by an action in combination with other past, present and future human actions”. They are the result of multiple activities whose individual direct impacts may be relatively minor but which, in combination with others result are significant environmental effects (DEAT 2004:5).

For the most part, cumulative impacts or aspects thereof are too uncertain to be quantifiable, due mainly to a lack of data availability and accuracy. This is particularly true of cumulative impacts arising from potential or future projects, the design or details of which may not be finalised or available and the direct and indirect impacts of which have not yet been assessed.

For practical reasons, the identification and management of cumulative impacts is limited to those effects generally recognised as important on the basis of scientific concerns and/or concerns of affected communities.

8.3.1 Activities Considered

Activities within a 30 km radius of the Soyuz 3 SPV development area that potentially have cumulative impacts with the proposed project and which are included in the cumulative impact assessment are shown in Figure 13 below.

8.3.2 Cumulative Impact Analysis

The local and wider area within which the Soyuz 3 SPV park is set is a remote and evolving agricultural landscape which has undergone use and incremental alteration into its current form during the last two centuries.

The widespread but relatively thin spread of archaeological sites and material within the Soyuz 1-6 SPV cluster and in the wider region suggests that while impacts to the resource across the area are possible, they are unlikely to be cumulatively significant.

Although the region is generally palaeontologically sensitive, the occurrence of fossils within the relevant rock strata and the Quaternary sediments which cover much of the area is not consistent. Bamford (2023c) states, therefore, that while impacts to the resource across the area are possible, the mixed nature of the regional geology, and the low level of surface and near surface exposure of fossil-bearing rocks where they do occur, means that cumulative impacts on palaeontological resources are not likely.

Archaeological material and sites are potentially at risk from cumulative impacts, given their widespread occurrence and exposure across the area.

Multiple human activities in the landscape, of which the construction of the Soyuz 1-6 SPV parks is the latest, can erode the integrity of these resources through physical damage or destruction. At an individual project level these impacts may not appear to be significant, but the cumulative effects of multiple developments on archaeological resources can be high. The implementation of measures at individual project level can, however, do much to mitigate and reduce cumulative impacts.

For the cultural landscape, the renewable energy facilities shown as approved in the vicinity of the Soyuz 3 SPV park on South African Renewable Energy EIA Application Database (REEA, 2021) indicates that the region has been earmarked for renewable energy facilities, which may alter the landscape character which will add to the cumulative effects of modern development on the cultural landscape.

The projects considered here have and will, in the case of those that form the Soyuz 1-6 SPV cluster, follow a similar iterative impact assessment process and have, and will, be designed to reduce impacts to all heritage resources as far as practicably possible. The implementation of mitigation measures recommended for individual projects will ensure that possible cumulative impacts to heritage resources can be managed and reduced through mitigated.

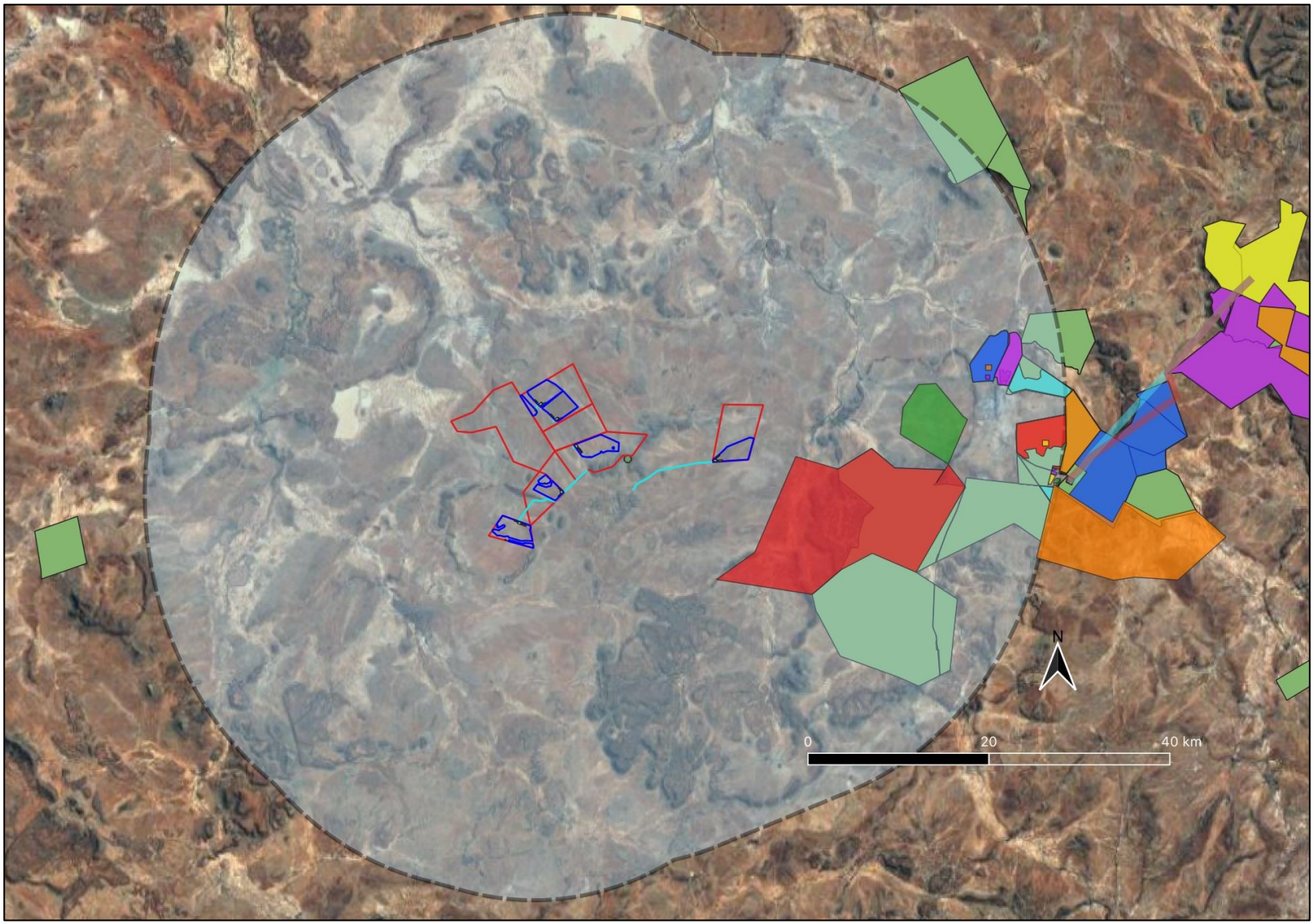

Figure 13: The location of other projects within 30 km (grey circle) of the Soyuz 1-6 SPV cluster (blue polygons) considered in the assessment of cumulative effects

8.4 The No-Go Alternative

Not implementing the proposal will result in no impacts to heritage resources beyond those attributable to current agriculture-related activities within the Soyuz 3 SPV development areas**.**

9 FINDINGS AND RECOMMENDED MITIGATION MEASURES

The following findings made in this HIA are pertinent:

9.1 Palaeontology

The palaeontological sensitivity of the Soyuz 3 SPV development area is moderate with a large portion of the site covered by relatively recent, Quaternary sediments. In the smaller, western portion of the site the palaeontological sensitivity is low as the area is underlain by igneous dolerite.

The PIA states that “based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying sands and alluvium of the Quaternary because there are no palaeo-pans evident in the satellite imagery” (Bamford, 2023c:17).

The PIA recommends that:

- A Fossil Chance Find Protocol is included in the Environmental Management Programme (EMPr);
- If fossils are found during construction then they should be rescued and a palaeontologist called to assess and collect a representative sample.

9.2 Archaeology

The archaeological sensitivity of the Soyuz 3 SPV development area is low. The occasional isolated, heavily patinated MSA hornfels lithics noted in the development area are very common across much of the Karoo and are generally regarded as background scatter of very low cultural significance.

It is possible, however, that currently unknown archaeological sites and material may be present either on or below the surface within the development area.

It is recommended that:

- Any chance finds of archaeological material must be reported to SAHRA and/or an archaeologist.

9.3 Graves and Burials

No graves or burial grounds have been recorded within the Soyuz 3 SPV development area, but it is possible that unmarked burials could be present on the site. Such, usually pre-colonial graves, are an extremely sensitive and often contested heritage resource, and it is generally impossible to predict their presence in advance of development.

It is recommended therefore that the following measures are included in the EMPr:

- In the event of the discovered of human remains, work in the immediate area must

cease, the remains must be made safe and left in situ and the find must be reported immediately to SAHRA and/or an appropriately experienced archaeologist so that a decision can be made about how to mitigate with the discovery.

9.4 Cultural Landscape

The cultural landscape within which the Soyuz 3 SPV park will be located is likely to be the heritage resource most affected by its construction. However, it is of low cultural significance and the impacts will be low.

To mitigate potential impacts, it is recommended that:

- The disturbance footprint of the project during construction is kept to a minimum and all disturbed areas that will not be needed during operation are rehabilitated;
- At decommissioning, all areas are rehabilitated following an approved rehabilitation plan.

9.5 Visual

Visual impacts to the two Witfontein farm complexes, arising from the Soyuz 3 SPV park are assessed to be moderate, with the view towards the SPV park largely obscured by trees surrounding the farm complexes.

While users of the gravel road between Britstown and Windpoort will have a temporary view of the SPV park, the visual impact is assessed to be moderate to low.

9.6 Cumulative Impacts

Although the region is generally palaeontologically sensitive, the occurrence of fossils is not consistent. While impacts across the area are possible, the mixed nature of the regional geology, and the low level of surface and near surface exposure of fossil-bearing rocks where they do occur, means that cumulative impacts on palaeontological resources are not likely.

Archaeological material and sites are potentially at risk from cumulative impacts, given their widespread occurrence and exposure across the area but their relatively thin spread suggests that while impacts are possible, they are unlikely to be cumulatively significant.

The implementation of measures at individual project level can do much to mitigate and reduce cumulative impacts to heritage resources.

Cumulative impacts to the cultural landscape are likely as industrial elements are introduced into the generally lightly used, organically evolved, and largely relict cultural landscape of the region. The construction of the Soyuz 1-6 SPV cluster and other mainly renewable energy projects in the region will alter the character of the rural landscape and will contrast with the typical land use and historical form of human elements that are present in the landscape.

10 CONCLUSION

This assessment has found that the area identified for the proposed Soyuz 3 SPV park is a heritage environment of relatively low sensitivity and that significant impacts to heritage

resources arising from the construction of the project are unlikely.

If the project were not implemented, the site would stay as it currently is with a neutral impact significance.

It is our considered opinion, therefore, that provided the recommended mitigation measures are implemented, the overall impact and significance of the proposed Soyuz 3 SPV park on heritage resources will be low and the proposed activity is acceptable from a heritage perspective.

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APPENDIX A: SPECIALIST DECLARATION

(See separate PDF file)

APPENDIX B: CURRICULUM VITAE – JOHN GRIBBLE

(Last updated – 12 January 2023)

Name:	John Gribble
Profession:	Archaeologist (Maritime)
Date of Birth:	15 November 1965
Parent Firm:	ACO Associates cc
Position in Firm:	Senior Archaeologist
Years with Firm:	5+
Years of experience:	33
Nationality:	South African
HDI Status:	n/a

Education:

1979-1983	Wynberg Boys' High School
1986	BA (Archaeology), University of Cape Town
1987	BA (Hons) (Archaeology), University of Cape Town
1990	Master of Arts, (Archaeology) University of Cape Town

Employment:

- September 2017 – present: ACO Associates, Senior Archaeologist and Consultant
- 2014-2017: South African Heritage Resources Agency, Manager: Maritime and Underwater Cultural Heritage Unit
- 2012-2018: Sea Change Heritage Consultants Limited, Director
- 2011-2012: TUV SUD PMSS (Romsey, United Kingdom), Principal Consultant: Maritime Archaeology
- 2009-2011: EMU Limited (Southampton, United Kingdom), Principal Consultant: Maritime Archaeology
- 2005-2009: Wessex Archaeology (Salisbury, United Kingdom), Project Manager: Coastal and Marine
- 1996-2005: National Monuments Council / South African Heritage Resources Agency, Maritime Archaeologist
- 1994-1996: National Monuments Council, Professional Officer: Boland and West Coast, Western Cape Office

Professional Qualifications and Accreditation:

- Member: Association of Southern African Professional Archaeologists (ASAPA) (No. 043)
- Principal Investigator: Maritime and Colonial Archaeology, ASAPA CRM Section
- Field Director: Stone Age Archaeology, ASAPA CRM Section
- Class III Diver (Surface Supply), Department of Labour (South Africa) / UK (HSE III)

Experience:

I have more than 30 years of professional archaeological and heritage management experience. After completing my postgraduate studies and a period of freelance archaeological work in South Africa and aboard, I joined the National Monuments Council

(NMC) (now the South African Heritage Resources Agency (SAHRA)) in 1994. In 1996 I become the NMC's first full-time maritime archaeologist and in this regulatory role was responsible for the management and protection of underwater cultural heritage in South Africa under the National Monuments Act, and subsequently under the National Heritage Resources Act.

In 2005 I moved to the UK to join Wessex Archaeology, one of the UK's biggest archaeological consultancies, as a project manager in its Coastal and Marine Section. In 2009 I joined Fugro EMU Limited, a marine geosurvey company to set up their maritime archaeological section. I then spent a year at TUV SUD PMSS, an international renewable energy consultancy, where I again provided maritime archaeological consultancy services to principally the offshore renewable and marine aggregate industries.

In August 2012 I established Sea Change Heritage Consultants Limited, a maritime archaeological consultancy. Sea Change traded until 2018, providing archaeological services to a range of UK maritime sectors, including marine aggregates and offshore renewable energy.

In the UK I was also involved in strategic projects which developed guidance and best practice for the UK offshore industry with respect to the marine historic environment. This included the principal authorship of two historic environment guidance documents for COWRIE and the UK renewable energy sector (*Historical Environment Guidance for the Offshore Renewable Energy Sector* (2007) and *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (2010)). I was also manager and lead author in the development of the archaeological elements of the first Regional Environmental Assessments for the UK marine aggregates industry, and in the 2009 *UK Continental Shelf Offshore Oil and Gas and Wind Energy Strategic Environmental Assessment* for Department of Energy and Climate Change. In 2013-14 I was lead author and project co-ordinator on *The UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001: An Impact Review for the United Kingdom* and in 2016 I was co-author of a Historic England / Crown Estate / British Marine Aggregate Producers Association funded review of marine historic environment best practice guidance for the UK offshore aggregate industry.

I returned to South African in mid-2014 where I was re-appointed to my earlier post at SAHRA: Manager of the Maritime and Underwater Cultural Heritage Unit. In July 2016 I was appointed as Acting Manager of SAHRA's Archaeology, Palaeontology and Meteorites Unit.

I left SAHRA in September 2017 to join ACO Associates as Senior Archaeologist and Consultant. Since being at ACO I have carried out a wide range of terrestrial and maritime archaeological assessments, many of which are listed in the following section.

In 2018 of the potential impacts of marine mining on South Africa's palaeontological and archaeological heritage for the Council for Geoscience, on behalf of the Department of Mineral Resources.

I have been a member of the Association of Southern African Professional Archaeologists (No. 043) for more than thirty years and am accredited by ASAPA's Cultural Resource Management section.

I have been a member of the ICOMOS International Committee for Underwater Cultural Heritage since 2000 and served as a member of its Bureau between 2009 and 2018.

Since 2010 I have been a member of the UK's Joint Nautical Archaeology Policy Committee.

I am a member of the Advisory Board of the George Washington University / Iziko Museums of South Africa / South African Heritage Resources Agency / Smithsonian Institution 'Southern African Slave Wrecks Project'.

I have served on the Heritage Western Cape Archaeology, Palaeontology and Meteorites Committee since 2014.

Selected Project Reports:

Gribble, J. 2017. *Archaeological Assessment of Farm No 8/851, Drakenstein*. Unpublished report prepared for Balwin Properties Pty Ltd. ACO Associates.

Gribble, J. 2017. *Archaeological Assessment of Bosjes Phase 2, Farm 218 Witzenberg*. Unpublished report prepared for Farmprops 53 (Pty) Ltd. ACO Associates.

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Gribble, J. 2018. Archaeological Assessment: Erven 11122, 11123, 11124, 11125, 11126, 11127 and Re 11128, Corner Frere Street and Albert Road, Woodstock, Cape Town. Unpublished report prepared for Johan Cornelius. ACO Associates.

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Gribble, J. and Hart, T.G. 2018. Initial Assessment Report and Motivation for Exploratory Permit, Erf 4995, corner of Waterfall and Palace Hill Roads, Simonstown. Unpublished report prepared for Regent Blue Sayers' Lane (Pty) Ltd. ACO Associates.

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APPENDIX C: PALAEONTOLOGICAL IMPACT ASSESSMENT

(See separate PDF file)

APPENDIX D: IMPACT ASSESSMENT METHODOLOGY

11.2 Definitions of Terminology

ITEM	DEFINITION
EXTENT	
Local	Extending only as far as the boundaries of the activity, limited to the site and its immediate surroundings
Regional	Impact on the broader region
National	Will have an impact on a national scale or across international borders
DURATION	
Short-term	0-5 years
Medium-Term	5-15 years
Long-Term	>15 years, where the impact will cease after the operational life of the activity
Permanent	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.
MAGNITUDE OR INTENSITY	
Low	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.
Medium	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.
High	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.
PROBABILITY	
Improbable	Where the possibility of the impact materialising is very low, either because of design or historic experience
Probable	Where there is a distinct possibility that the impact will occur
Highly Probable	Where it is most likely that the impact will occur
Definite	Where the impact will undoubtedly occur, regardless of any prevention measures
SIGNIFICANCE	
Low	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
Medium	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
High	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.
Very High	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.
STATUS OF IMPACT	
Whether the impact is positive (a benefit), negative (a cost) or neutral (status quo maintained)	
DEGREE OF CONFIDENCE IN PREDICTIONS	
The degree of confidence in the predictions is based on the availability of information and specialist knowledge (e.g. low, medium or high)	
MITIGATION	
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.	

11.3 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.

IMPACT PARAMETER	SCORE	
Extent (A)	Rating	
Local	1	
Regional	2	
National	3	
Duration (B)	Rating	
Short term	1	
Medium Term	2	
Long Term	3	
Permanent	4	
Probability (C)	Rating	
Improbable	1	
Probable	2	
Highly Probable	3	
Definite	4	
IMPACT PARAMETER	NEGATIVE IMPACT SCORE	POSITIVE IMPACT SCORE
Magnitude/Intensity (D)	Rating	Rating
Low	-1	1
Medium	-2	2
High	-3	3

SIGNIFICANCE RATING (F) = (A*B*D)*C	Rating	Rating
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

Please complete the following Tables for EACH IDENTIFIED IMPACT.

IMPACT NATURE	Impact – Nature of Impact Eg. Botanical Impact – Loss of natural vegetation		STATUS	POSITIVE/NEGATIVE
Impact Description				
Impact Source(s)				
Receptor(s)				
PARAMETER	WITHOUT MITIGATION	SCORE	WITH MITIGATION	SCORE
EXTENT (A)	Preferred Alternative:		Preferred Alternative:	
	No-Go Alternative:		No-Go Alternative:	
DURATION (B)	Preferred Alternative:		Preferred Alternative:	
	No-Go Alternative:		No-Go Alternative:	
PROBABILITY (C)	Preferred Alternative:		Preferred Alternative:	
	No-Go Alternative:		No-Go Alternative:	
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:		Preferred Alternative:	
	No-Go Alternative:		No-Go Alternative:	
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative:		Preferred Alternative:	
	No-Go Alternative:		No-Go Alternative:	
CUMULATIVE IMPACTS				
CONFIDENCE				
MITIGATION MEASURES				

Summary table of overall significance:

DESCRIPTION OF IMPACT	Overall Significance	
	No-Go Alternative	Preferred Alternative

Examples for Table 2:
Description of impact: Loss of endangered vegetation types and plant species
Overall Significance with mitigation: Low/Moderate/High/Very High +/- (eg. High +)