

**HERITAGE IMPACT ASSESSMENT:**  
**PROPOSED DEVELOPMENT OF THE SPRINGHAAS SOLAR PV FACILITIES**  
**CONSISTING OF SEVEN NEW SOLAR PV FACILITIES AND ASSOCIATED**  
**INFRASTRUCTURE NEAR DEALESVILLE IN THE FREE STATE PROVINCE**

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

SAHRA Case Nos.:	SPH1:	SPH6:
	SPH3:	SPH8:
	SPH4:	SPH9:
	SPH5:	

*Report for:*

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## SUMMARY

ASHA Consulting (Pty) Ltd was appointed by ABO Wind renewable energies (Pty) Ltd to assess the potential impacts to heritage resources that might occur through the proposed development of seven solar energy facilities to be located to the southwest of Dealesville, Free State. A centre point for the study area is at S28° 48' 40" E25° 39' 35". The projects are to be known as the Springhaas (SPH) 1, 3, 4, 5, 6, 8 and 9 solar energy facilities.

The site was subjected to a survey prior to the development of the facility layouts. The survey revealed few Stone Age resources with these generally being likely Later Stone Age scatters associated with pans. Background scatter artefacts attributable to the Middle Stone Age were seen in very low densities in a few places. Most finds consisted of historical archaeological resources in various states of demolition and/or degradation. Surprisingly, ash and rubbish middens (with one modern exception) were absent, as were background scatter historical materials. A number of graves were also encountered in small informal graveyards.

SPH1 will impact a site of low cultural significance, while SPH3, 4, 5, 6, 8 and 9 are entirely clear of heritage resources.

It is recommended that all seven proposed SPH PV facilities should be authorised but subject to the conditions shown below.

- No materials may be removed from any of the ruined and/or demolished structures falling outside the various project and associated infrastructure footprints anywhere in the wider site;
- All known and unfenced graves within any farm portion affected by construction (waypoints 362, 404) must be fenced with farm-style fences and pedestrian gates with the fences located a minimum of 5 m from the graves;
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

## Glossary

**Background scatter:** Artefacts whose spatial position is conditioned more by natural forces than by human agency.

**Handaxe:** A bifacially flaked, pointed stone tool type typical of the Early Stone Age Acheulian Industry. It is also referred to as a large cutting tool.

**Holocene:** The geological period spanning the last approximately 10-12 000 years.

**Hominid:** a group consisting of all modern and extinct great apes (i.e. gorillas, chimpanzees, orangutans and humans) and their ancestors.

**Later Stone Age:** Period of the Stone Age extending over the last approximately 20 000 years.

**Middle Stone Age:** Period of the Stone Age extending approximately between 200 000 and 20 000 years ago.

**Pleistocene:** The geological period beginning approximately 2.5 million years ago and preceding the Holocene.

## Abbreviations

**APHP:** Association of Professional Heritage Practitioners

**ASAPA:** Association of Southern African Professional Archaeologists

**BA:** Basic Assessment

**BESS:** Battery Energy Storage System

**CRM:** Cultural Resources Management

**DFFE:** Department of Forestry, Fisheries and the Environment

**EA:** Environmental Authorisation

**EGI:** Electricity Grid Infrastructure

**GP:** General Protection

**GPS:** global positioning system

**HIA:** Heritage Impact Assessment

**HV:** High Voltage

**LSA:** Later Stone Age

**MSA:** Middle Stone Age

**NEMA:** National Environmental Management Act (No. 107 of 1998)

**NHRA:** National Heritage Resources Act (No. 25) of 1999

**REDZ:** Renewable Energy Development Zone

**SAHRA:** South African Heritage Resources Agency

**SAHRIS:** South African Heritage Resources Information System

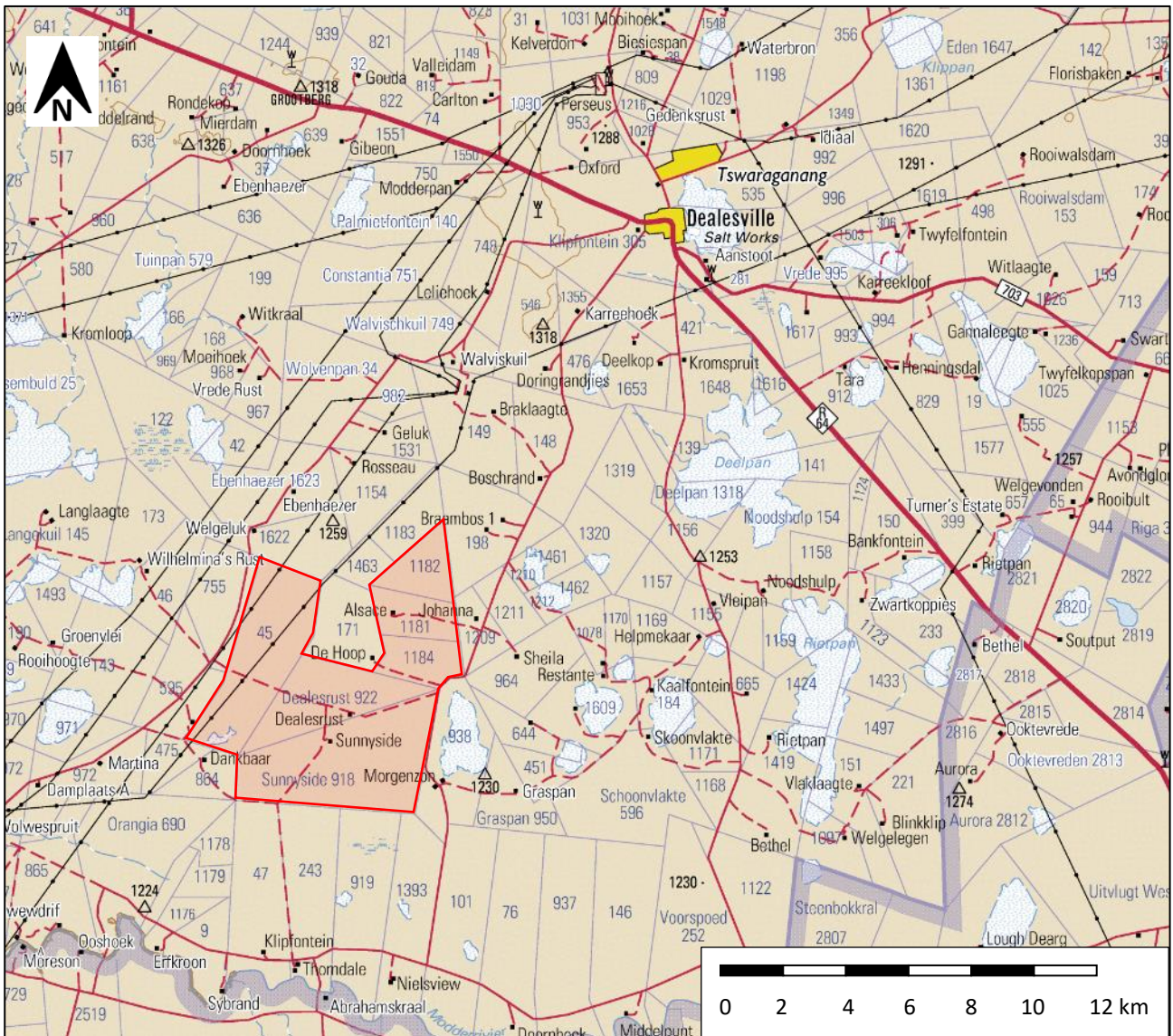
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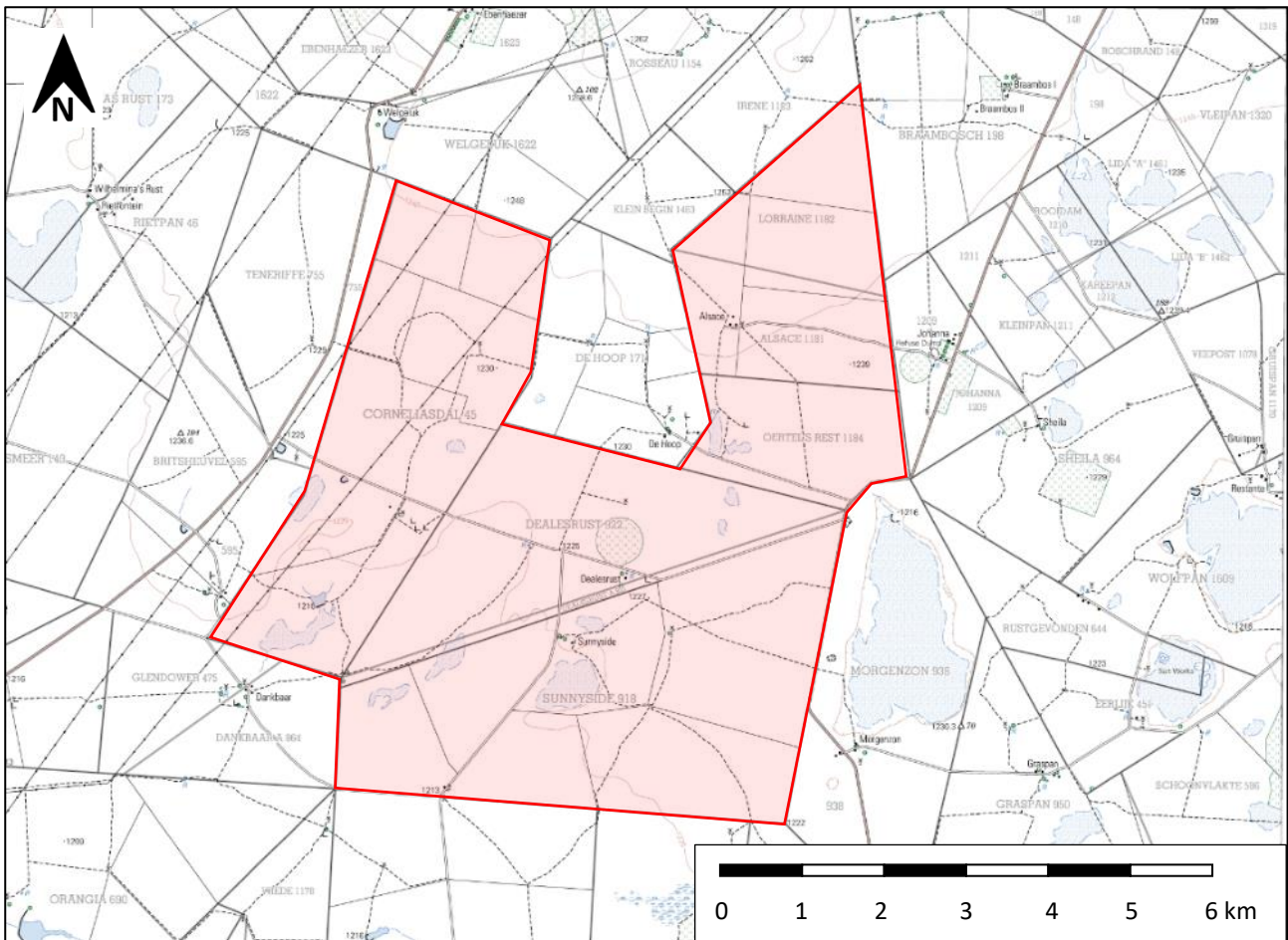
# 1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by the Applicant to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of seven solar energy facilities and associated infrastructure to be located to the southwest of Dealesville, Free State (Figures 1 & 2). A centre point for the study area is at S28° 48' 40" E25° 39' 35". The projects are to be known as the Springhaas (SPH) 1, 3, 4, 5, 6, 8 and 9 solar energy facilities.



**Figure 1:** Extract from 1:250 000 topographic map 2824 showing the location of the site (red shaded polygon) relative to Dealesville and the R64 in the northeast and the Modder River along the southern edge of the map. Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: [www.ngi.gov.za](http://www.ngi.gov.za).





**Figure 2:** Extract from 1:50 000 topographic map 2825FC showing the location of the affected properties (red shaded polygon). Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: [www.ngi.gov.za](http://www.ngi.gov.za).

## 1.1. The proposed project

### 1.1.1. Project description

Seven solar energy facilities and related infrastructure (Figure 3) as follows:

1. Springhaas Facility 1 and associated infrastructure (SPH1; up to 250 MW<sub>ac</sub>)
2. Springhaas Facility 3 and associated infrastructure (SPH3; up to 150 MW<sub>ac</sub>)
3. Springhaas Facility 4 and associated infrastructure (SPH4; up to 150 MW<sub>ac</sub>)
4. Springhaas Facility 5 and associated infrastructure (SPH5; up to 150 MW<sub>ac</sub>)
5. Springhaas Facility 6 and associated infrastructure (SPH6; up to 250 MW<sub>ac</sub>)
6. Springhaas Facility 8 and associated infrastructure (SPH8; up to 150 MW<sub>ac</sub>)
7. Springhaas Facility 9 and associated infrastructure (SPH9; up to 150 MW<sub>ac</sub>)

Each of the above seven facilities will require a stand-alone Environmental Authorisation (EA), thus requiring the submission of seven separate applications. The reporting and public participation process (PPP) for the statutory Basic Assessment process required to obtain the EAs will be combined. A summary of the various project components is shown in Table 1.

**Table 1:** Summary of project components and alternatives for each facility (filled cell indicates the components relevant to the facility).

Infrastructure	Facility						
	SPH1	SPH3	SPH 4	SPH5	SPH6	SPH8	SPH9
Solar Field/Arrays							
Internal Roads							
Main Access Road		There are 2 for this facility, 1 is temporary					
Electrical infrastructure compound complex (with collector sub-station, sub-station, and BESS infrastructure)	2 x alternatives for assessment						
Auxiliary buildings (operation and maintenance buildings, admin buildings, workshops, gatehouse, security building, control centre, offices, visitors centre, warehouses etc.)							
Collector Sub-station							
Temporary laydown area		2 x alternatives for assessment					
Perimeter Fencing							

Note that separate applications will be made for the grid connection options under consideration, however it is important to note that connection would be made to the existing 765 kV Eskom Beta sub-station, either by direct connection, or by connecting into either of the two (Beta/Delphi or Beta/Hydra) 400kV lines that feed the sub-station (alternatives will be assessed in the aforementioned separate process).

### **Project Description- Springhaas Solar Facility 1 and associated infrastructure**

Springhaas Solar Facility 1 (Pty) Ltd proposes the development of Springhaas 1, a photovoltaic (PV) solar energy generation facility, of up to 250MWac in capacity, and associated infrastructure located south-west of Dealesville, Free State on farms Lorraine no. 1182, Alsace No. 1181, and Oertel's Rest No. 1184. The study area falls within the jurisdiction of the Tokologo Local Municipality, within the Lejweleputswa District Municipality. It also falls entirely within the Kimberley Renewable Energy Development Zone (REDZ) and Central Electrical Grid Infrastructure (EGI) Corridor.

A development area has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected property and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this Basic Assessment process (which includes the independent specialists' assessments undertaken hereunder) and assessed in terms of the suitability from an environmental and social perspective.

The proposed facility would comprise the following:



- Solar Field/Solar Arrays (Note that the foundations, mounting structures and module types would be confirmed during detail design, however, would remain within the proposed development footprint and be up to approximately 3.5m in height)
- Associated internal underground electrical reticulation (i.e., low- and medium voltage lines)
- Internal access roads (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 5m)
- Main Access road (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 8m)
- On site electrical infrastructure compound (contained within the proposed up to 4Ha footprint) (note that there are two alternative locations for assessment) consisting of:
  - On site substation and associated infrastructure,
  - Additional collector infrastructure, and /or
  - Battery Energy Storage System (BESS)
- Perimeter fencing
- Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) buildings, admin buildings, workshops, gatehouse, security building, control centre, offices, visitor centre, warehouses, etc.)

Temporary laydown areas would also be established during the construction period with the location and extent thereof provided in the indicative layout.

The proposed facility would be accessed via an existing unnamed farm road, located to the south-east of the proposed facility. The details of the access would be as per the recommendations in the Transport Impact Assessment.

The operations of the proposed facility would require some servicing, noting that the operational electrical requirements would be nominal and would be supplied by the facility on site. Water would be required for sanitation use by operational staff, for washing the panels, as well as dust control on internal roads (where necessary). Water would ideally be sourced from the local municipality, in terms of a Service Level Agreement established between the Municipality and the Applicant. If this is not possible, then further options will be investigated. Where required, a storage tank (i.e., Jo-Jo tank) of up to approximately 10,000L may be used on site for temporary water storage. Sanitation requirements would be minimal, given that there would not be many operational staff. Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or have capacity for, such a connection, sewage would be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (Contractor) for treatment at a licensed disposal site. Alternatively, a standalone system would be used (i.e., porta-loos) which would be regularly serviced by an independent contractor. Note that it is **not** intended to make use of soakaways or on-site treatment solutions. Refuse/solid waste produced would also be nominal (approximately two wheelie bins per week) and would ideally be removed by the Municipality, however, if this is not possible, the Operator would employ private contractors to remove the refuse and dispose of it appropriately.

The construction phase would also require water and sanitation, with these aspects being the primary responsibility of the Contractor. However, it would be preferable for water to be sourced from the local Municipality (where available), with alternative arrangements (for example, bringing water in with trucks) being made where necessary. Solid waste would also be produced and would

be managed in accordance with the requirements in the Environmental Management Programme (EMPr).

In terms of connection to the grid, the proposed facility falls within approximately 4 969 m of the existing 765 kV Eskom Beta Sub-station. Grid connection alternatives are available (from a technical perspective) and application for grid connection will be made through a separate process.

There would be no specific stormwater and/or landscaping initiatives undertaken as part of the proposed solar facility, other than any interventions prescribed by the relevant specialist/s through the Basic Assessment process.

#### **Alternatives:**

The proposed development as described above has been assessed with the following alternatives:

- 1) Layout: Two electrical infrastructure compound location alternatives have been assessed.
- 2) Technology: With regard to the proposed BESS, the technology thereof is dynamic and so the specific type/technology to be developed would be selected based on market demands and technology availability at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technology alternatives, with Lithium-ion being the current preferred technology.

The No-go alternative has also been assessed, noting that the property does hold existing development rights and so not developing the proposed development does not necessarily mean that there would be no changes or impacts on the site.

#### **Project Description- Springhaas Solar Facility 3 and associated infrastructure**

Springhaas Solar Facility 3 (Pty) Ltd proposes the development of Springhaas 3, a photovoltaic (PV) solar energy generation facility, of up to 150MWac in capacity, and associated infrastructure located south-west of Dealesville, Free State on farms Alsace No. 1181 and Oertel's Rest No. 1184. The study area falls within the jurisdiction of the Tokologo Local Municipality, within the Lejweleputswa District Municipality. It also falls entirely within the Kimberley REDZ and Central Transmission Corridor.

A development area has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected property and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this Basic Assessment process (which includes the independent specialists' assessments undertaken hereunder) and assessed in terms of the suitability from an environmental and social perspective.

The proposed facility would comprise the following:

- Solar Field/Solar Arrays (Note that the foundations, mounting structures and module types would be confirmed during detail design, however, would remain within the proposed development footprint and be up to approximately 3.5m in height)
- Associated internal underground electrical reticulation (i.e., low- and medium voltage lines)
- Internal access roads (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 5m)

- Main Access roads (noting that existing farm roads would be used as far as possible, and the road widths would be up to approximately 8m- there would be two roads, the primary operational access, as well as a temporary construction access)
- On site electrical infrastructure compound (contained within the proposed up to 2Ha footprint) consisting of:
  - On site substation and associated infrastructure,
  - Additional collector infrastructure, and /or
  - Battery Energy Storage System (BESS)
- On site collector sub-station (of up to 400kV) and associated step-up infrastructure (it would collect multiple 132kV overhead lines and potentially step-up to 400kV (if required)), consolidated overhead lines would leave the collector sub-station for connection to any one of the proposed grid connection options (which would then connect to the Eskom grid), but note that grid connection and associated 132kV lines would be applied for under a separate application.
- Perimeter fencing
- Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) buildings, admin buildings, workshops, gatehouse, security building, control centre, offices, visitor centre, warehouses, etc.)

A temporary laydown area would also be established during the construction period with the location and extent thereof provided in the indicative layout. Alternatives are assessed in this process.

The proposed facility would be accessed via an existing unnamed farm road, located to the south-east of the proposed facility. The details of the access would be as per the recommendations in the Transport Impact Assessment. Note that there are two main access roads proposed namely, a shorter construction-phase access road (to the temporary lay down area) and a permanent operational phase road (to the entrance to the proposed facility). The construction-phase access road would be rehabilitated once it is no longer in use (noting that it may still be used during operation if other facilities are constructed nearby).

The operations of the proposed facility would require some servicing, noting that the operational electrical requirements would be nominal and would be supplied by the facility on site. Water would be required for sanitation use by operational staff, for washing the panels, as well as dust control on internal roads (where necessary). Water would ideally be sourced from the local municipality, in terms of a Service Level Agreement established between the Municipality and the Applicant. If this is not possible, then further options will be investigated. Where required, a storage tank (i.e., Jo-Jo tank) of up to approximately 10,000L may be used on site for temporary water storage. Sanitation requirements would be minimal, given that there would not be many operational staff. Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or have capacity for, such a connection, sewage would be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (Contractor) for treatment at a licensed disposal site. Alternatively, a standalone system would be used (i.e., porta-loos) which would be regularly serviced by an independent contractor. Note that it is **not** intended to make use of soakaways or on-site treatment solutions. Refuse/solid waste produced would also be nominal (approximately two wheelie bins per week) and would ideally be removed by the Municipality, however, if this is not possible, the Operator would employ private contractors to remove the refuse and dispose of it appropriately.

The construction phase would also require water and sanitation, with these aspects being the primary responsibility of the Contractor. However, it would be preferable for water to be sourced from the local Municipality (where available), with alternative arrangements (for example, bringing water in with trucks) being made where necessary. Solid waste would also be produced and would be managed in accordance with the requirements in the Environmental Management Programme (EMPr).

In terms of connection to the grid, the proposed facility falls within approximately 6 938 m of the existing 765 kV Eskom Beta Sub-station. Grid connection alternatives are available (from a technical perspective) and application for grid connection will be made through a separate process.

There would be no specific stormwater and/or landscaping initiatives undertaken as part of the proposed solar facility, other than any interventions prescribed by the relevant specialist/s through the Basic Assessment process.

#### **Alternatives:**

The proposed development as described above has been assessed with the following alternatives:

- 1) Layout: Two temporary laydown area location alternatives have been assessed.
- 2) Technology: With regard to the proposed BESS, the technology thereof is dynamic and so the specific type/technology to be developed would be selected based on market demands and technology availability at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technology alternatives, with Lithium-ion being the current preferred technology.

The No-go alternative has also been assessed, noting that the property does hold existing development rights and so not developing the proposed development does not necessarily mean that there would be no changes or impacts on the site.

#### **Project Description- Springhaas Solar Facility 4 and associated infrastructure**

Springhaas Solar Facility 4 (Pty) Ltd proposes the development of Springhaas 4, a photovoltaic (PV) solar energy generation facility, of up to 150MWac in capacity, and associated infrastructure located south-west of Dealesville, Free State on farms Corneliassdal No. 45 and Dealesrust No. 922. The study area falls within the jurisdiction of the Tokologo Local Municipality, within the Lejweleputswa District Municipality. It also falls entirely within the Kimberley REDZ and Central Transmission Corridor.

A development area has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected property and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this Basic Assessment process (which includes the independent specialists' assessments undertaken hereunder) and assessed in terms of the suitability from an environmental and social perspective.

The proposed facility would comprise the following:

- Solar Field/Solar Arrays (Note that the foundations, mounting structures and module types would be confirmed during detail design, however, would remain within the proposed development footprint and be up to approximately 3.5m in height)
- Associated internal underground electrical reticulation (i.e., low- and medium voltage lines)
- Internal access roads (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 5m)
- Main Access road (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 8m)
- On site electrical infrastructure compound (contained within the proposed up to 2Ha footprint) consisting of:
  - On site substation and associated infrastructure,
  - Additional collector infrastructure, and /or
  - Battery Energy Storage System (BESS)
- On site collector sub-station (of up to 400kV) and associated step-up infrastructure (it would collect multiple 132kV overhead lines and potentially step-up to 400kV (if required)), consolidated overhead lines would leave the collector sub-station for connection to any one of the proposed grid connection options (which would then connect to the Eskom grid), but note that grid connection and associated 132kV lines would be applied for under a separate application.
- Perimeter fencing
- Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) buildings, admin buildings, workshops, gatehouse, security building, control centre, offices, visitor centre, warehouses, etc.)

A temporary laydown area would also be established during the construction period with the location and extent thereof provided in the indicative layout.

The proposed facility would be accessed via an existing unnamed farm road, located to the south of the proposed facility (and which transects the greater area from west to east). Access from the broader road network would be taken either from the N-S road connected to the R64 to the West of the proposed facility or to the N-S road connected to the R64 to the East of the facility. The road to the East would be re-aligned to abled a gentle curve for vehicles to access safely from the South. The details of the access would be as per the recommendations in the Transport Impact Assessment. The operations of the proposed facility would require some servicing, noting that the operational electrical requirements would be nominal and would be supplied by the facility on site. Water would be required for sanitation use by operational staff, for washing the panels, as well as dust control on internal roads (where necessary). Water would ideally be sourced from the local municipality, in terms of a Service Level Agreement established between the Municipality and the Applicant. If this is not possible, then further options will be investigated. Where required, a storage tank (i.e., Jo-Jo tank) of up to approximately 10,000L may be used on site for temporary water storage. Sanitation requirements would be minimal, given that there would not be many operational staff. Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or have capacity for, such a connection, sewage would be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (Contractor) for treatment at a licensed disposal site. Alternatively, a standalone system would be used (i.e., porta-loos) which would be regularly serviced by an independent contractor. Note that it is **not** intended to make use of soakaways or on-site treatment solutions. Refuse/solid waste produced would also be nominal (approximately two wheelie bins per week) and would ideally be

removed by the Municipality, however, if this is not possible, the Operator would employ private contractors to remove the refuse and dispose of it appropriately.

The construction phase would also require water and sanitation, with these aspects being the primary responsibility of the Contractor. However, it would be preferable for water to be sourced from the local Municipality (where available), with alternative arrangements (for example, bringing water in with trucks) being made where necessary. Solid waste would also be produced and would be managed in accordance with the requirements in the Environmental Management Programme (EMPr).

In terms of connection to the grid, the proposed facility falls within approximately 7 674 m of the existing 765 kV Eskom Beta Sub-station. Grid connection alternatives are available (from a technical perspective) and application for grid connection will be made through a separate process.

There would be no specific stormwater and/or landscaping initiatives undertaken as part of the proposed solar facility, other than any interventions prescribed by the relevant specialist/s through the Basic Assessment process.

#### **Alternatives:**

The proposed development as described above has been assessed with the following alternatives:

- 1) Technology: With regard to the proposed BESS, the technology thereof is dynamic and so the specific type/technology to be developed would be selected based on market demands and technology availability at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technology alternatives, with Lithium-ion being the current preferred technology.

The No-go alternative has also been assessed, noting that the property does hold existing development rights and so not developing the proposed development does not necessarily mean that there would be no changes or impacts on the site.

#### **Project Description- Springhaas Solar Facility 5 and associated infrastructure**

Springhaas Solar Facility 5 (Pty) Ltd proposes the development of Springhaas 5, a photovoltaic (PV) solar energy generation facility, of up to 150MWac in capacity, and associated infrastructure located south-west of Dealesville, Free State on farms Corneliasdal No. 45, Dealesrust No.921 and Dealesrust No. 922. The study area falls within the jurisdiction of the Tokologo Local Municipality, within the Lejweleputswa District Municipality. It also falls entirely within the Kimberley REDZ and Central Transmission Corridor.

A development area has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected property and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this Basic Assessment process (which includes the independent specialists' assessments undertaken hereunder) and assessed in terms of the suitability from an environmental and social perspective.

The proposed facility would comprise the following:



- Solar Field/Solar Arrays (Note that the foundations, mounting structures and module types would be confirmed during detail design, however, would remain within the proposed development footprint and be up to approximately 3.5m in height)
- Associated internal underground electrical reticulation (i.e., low- and medium voltage lines)
- Internal access roads (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 5m)
- Main Access road (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 8m)
- On site electrical infrastructure compound (contained within the proposed up to 2Ha footprint) consisting of:
  - On site substation and associated infrastructure,
  - Additional collector infrastructure, and /or
  - Battery Energy Storage System (BESS)
- Perimeter fencing
- Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) buildings, admin buildings, workshops, gatehouse, security building, control centre, offices, visitor centre, warehouses, etc.)

A temporary laydown area would also be established during the construction period with the location and extent thereof provided in the indicative layout.

The proposed facility would be accessed via an existing unnamed farm road, located to the south of the proposed facility (and which transects the greater area from west to east). Access from the broader road network would be taken either from the N-S road connected to the R64 to the West of the proposed facility or to the N-S road connected to the R64 to the East of the facility. The road to the East would be re-aligned to abled a gentle curve for vehicles to access safely from the South. The details of the access would be as per the recommendations in the Transport Impact Assessment. The operations of the proposed facility would require some servicing, noting that the operational electrical requirements would be nominal and would be supplied by the facility on site. Water would be required for sanitation use by operational staff, for washing the panels, as well as dust control on internal roads (where necessary). Water would ideally be sourced from the local municipality, in terms of a Service Level Agreement established between the Municipality and the Applicant. If this is not possible, then further options will be investigated. Where required, a storage tank (i.e., Jo-Jo tank) of up to approximately 10,000L may be used on site for temporary water storage. Sanitation requirements would be minimal, given that there would not be many operational staff. Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or have capacity for, such a connection, sewage would be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (Contractor) for treatment at a licensed disposal site. Alternatively, a standalone system would be used (i.e., porta-loos) which would be regularly serviced by an independent contractor. Note that it is **not** intended to make use of soakaways or on-site treatment solutions. Refuse/solid waste produced would also be nominal (approximately two wheelie bins per week) and would ideally be removed by the Municipality, however, if this is not possible, the Operator would employ private contractors to remove the refuse and dispose of it appropriately.

The construction phase would also require water and sanitation, with these aspects being the primary responsibility of the Contractor. However, it would be preferable for water to be sourced from the local Municipality (where available), with alternative arrangements (for example, bringing

water in with trucks) being made where necessary. Solid waste would also be produced and would be managed in accordance with the requirements in the Environmental Management Programme (EMPr).

In terms of connection to the grid, the proposed facility falls within approximately 10 883 m of the existing 765 kV Eskom Beta Sub-station. Grid connection alternatives are available (from a technical perspective) and application for grid connection will be made through a separate process.

There would be no specific stormwater and/or landscaping initiatives undertaken as part of the proposed solar facility, other than any interventions prescribed by the relevant specialist/s through the Basic Assessment process.

#### **Alternatives:**

The proposed development as described above has been assessed with the following alternatives:

- 1) Technology: With regard to the proposed BESS, the technology thereof is dynamic and so the specific type/technology to be developed would be selected based on market demands and technology availability at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technology alternatives, with Lithium-ion being the current preferred technology.

The No-go alternative has also been assessed, noting that the property does hold existing development rights and so not developing the proposed development does not necessarily mean that there would be no changes or impacts on the site.

#### **Project Description- Springhaas Solar Facility 6 and associated infrastructure**

Springhaas Solar Facility 6 (Pty) Ltd proposes the development of Springhaas 6, a photovoltaic (PV) solar energy generation facility, of up to 250MWac in capacity, and associated infrastructure located south-west of Dealesville, Free State on farm Sunnyside No. 918. The study area falls within the jurisdiction of the Tokologo Local Municipality, within the Lejweleputswa District Municipality. It also falls entirely within the Kimberley REDZ and Central Transmission Corridor.

A development area has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected property and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this Basic Assessment process (which includes the independent specialists' assessments undertaken hereunder) and assessed in terms of the suitability from an environmental and social perspective.

The proposed facility would comprise the following:

- Solar Field/Solar Arrays (Note that the foundations, mounting structures and module types would be confirmed during detail design, however, would remain within the proposed development footprint and be up to approximately 3.5m in height)
- Associated internal underground electrical reticulation (i.e., low- and medium voltage lines)
- Internal access roads (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 5m)

- Main Access road (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 8m)
- On site electrical infrastructure compound (contained within the proposed up to 4Ha footprint) consisting of:
  - On site substation and associated infrastructure,
  - Additional collector infrastructure, and /or
  - Battery Energy Storage System (BESS)
- Perimeter fencing
- Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) buildings, admin buildings, workshops, gatehouse, security building, control centre, offices, visitor centre, warehouses, etc.)

A temporary laydown area would also be established during the construction period with the location and extent thereof provided in the indicative layout.

The proposed facility would be accessed via an existing unnamed farm road, located to the north of the proposed facility (and which transects the greater area from west to east). Access from the broader road network would be taken either from the N-S road connected to the R64 to the West of the proposed facility or to the N-S road connected to the R64 to the East of the facility. The road to the East would be re-aligned to abled a gentle curve for vehicles to access safely from the South. The details of the access would be as per the recommendations in the Transport Impact Assessment. The operations of the proposed facility would require some servicing, noting that the operational electrical requirements would be nominal and would be supplied by the facility on site. Water would be required for sanitation use by operational staff, for washing the panels, as well as dust control on internal roads (where necessary). Water would ideally be sourced from the local municipality, in terms of a Service Level Agreement established between the Municipality and the Applicant. If this is not possible, then further options will be investigated. Where required, a storage tank (i.e., Jo-Jo tank) of up to approximately 10,000L may be used on site for temporary water storage. Sanitation requirements would be minimal, given that there would not be many operational staff. Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or have capacity for, such a connection, sewage would be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (Contractor) for treatment at a licensed disposal site. Alternatively, a standalone system would be used (i.e., porta-loos) which would be regularly serviced by an independent contractor. Note that it is **not** intended to make use of soakaways or on-site treatment solutions. Refuse/solid waste produced would also be nominal (approximately two wheelie bins per week) and would ideally be removed by the Municipality, however, if this is not possible, the Operator would employ private contractors to remove the refuse and dispose of it appropriately.

The construction phase would also require water and sanitation, with these aspects being the primary responsibility of the Contractor. However, it would be preferable for water to be sourced from the local Municipality (where available), with alternative arrangements (for example, bringing water in with trucks) being made where necessary. Solid waste would also be produced and would be managed in accordance with the requirements in the Environmental Management Programme (EMPr).

In terms of connection to the grid, the proposed facility falls within approximately 9 528 m of the existing 765 kV Eskom Beta Sub-station. Grid connection alternatives are available (from a technical perspective) and application for grid connection will be made through a separate process.

There would be no specific stormwater and/or landscaping initiatives undertaken as part of the proposed solar facility, other than any interventions prescribed by the relevant specialist/s through the Basic Assessment process.

#### **Alternatives:**

The proposed development as described above has been assessed with the following alternatives:

- 1) Technology: With regard to the proposed BESS, the technology thereof is dynamic and so the specific type/technology to be developed would be selected based on market demands and technology availability at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technology alternatives, with Lithium-ion being the current preferred technology.

The No-go alternative has also been assessed, noting that the property does hold existing development rights and so not developing the proposed development does not necessarily mean that there would be no changes or impacts on the site.

#### **Project Description- Springhaas Solar Facility 8 and associated infrastructure**

Springhaas Solar Facility 8 (Pty) Ltd proposes the development of Springhaas 8, a photovoltaic (PV) solar energy generation facility, of up to 150MWac in capacity, and associated infrastructure located south-west of Dealesville, Free State on farm Corneliasdal No. 45. The study area falls within the jurisdiction of the Tokologo Local Municipality, within the Lejweleputswa District Municipality. It also falls entirely within the Kimberley REDZ and Central Transmission Corridor.

A development area has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected property and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this Basic Assessment process (which includes the independent specialists' assessments undertaken hereunder) and assessed in terms of the suitability from an environmental and social perspective.

The proposed facility would comprise the following:

- Solar Field/Solar Arrays (Note that the foundations, mounting structures and module types would be confirmed during detail design, however, would remain within the proposed development footprint and be up to approximately 3.5m in height)
- Associated internal underground electrical reticulation (i.e., low- and medium voltage lines)
- Internal access roads (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 5m)
- Main Access road (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 8m)
- On site electrical infrastructure compound (contained within the proposed up to 2Ha footprint) consisting of:
  - On site substation and associated infrastructure,
  - Additional collector infrastructure, and /or

- Battery Energy Storage System (BESS)
- On site collector sub-station (of up to 400kV) and associated step-up infrastructure (it would collect multiple 132kV overhead lines and potentially step-up to 400kV (if required)), consolidated overhead lines would leave the collector sub-station for connection to any one of the proposed grid connection options (which would then connect to the Eskom grid), but note that grid connection and associated 132kV lines would be applied for under a separate application.
- Perimeter fencing
- Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) buildings, admin buildings, workshops, gatehouse, security building, control centre, offices, visitor centre, warehouses, etc.)

A temporary laydown area would also be established during the construction period with the location and extent thereof provided in the indicative layout.

The proposed facility would be accessed via an existing unnamed farm road, located to the south of the proposed facility (and which transects the greater area from west to east). Access from the broader road network would be taken either from the N-S road connected to the R64 to the West of the proposed facility or to the N-S road connected to the R64 to the East of the facility. The road to the East would be re-aligned to abled a gentle curve for vehicles to access safely from the South. The details of the access would be as per the recommendations in the Transport Impact Assessment. The operations of the proposed facility would require some servicing, noting that the operational electrical requirements would be nominal and would be supplied by the facility on site. Water would be required for sanitation use by operational staff, for washing the panels, as well as dust control on internal roads (where necessary). Water would ideally be sourced from the local municipality, in terms of a Service Level Agreement established between the Municipality and the Applicant. If this is not possible, then further options will be investigated. Where required, a storage tank (i.e., Jo-Jo tank) of up to approximately 10,000L may be used on site for temporary water storage. Sanitation requirements would be minimal, given that there would not be many operational staff. Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or have capacity for, such a connection, sewage would be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (Contractor) for treatment at a licensed disposal site. Alternatively, a standalone system would be used (i.e., porta-loos) which would be regularly serviced by an independent contractor. Note that it is **not** intended to make use of soakaways or on-site treatment solutions. Refuse/solid waste produced would also be nominal (approximately two wheelie bins per week) and would ideally be removed by the Municipality, however, if this is not possible, the Operator would employ private contractors to remove the refuse and dispose of it appropriately.

The construction phase would also require water and sanitation, with these aspects being the primary responsibility of the Contractor. However, it would be preferable for water to be sourced from the local Municipality (where available), with alternative arrangements (for example, bringing water in with trucks) being made where necessary. Solid waste would also be produced and would be managed in accordance with the requirements in the Environmental Management Programme (EMPr).

In terms of connection to the grid, the proposed facility falls within approximately 7 085 m of the existing 765 kV Eskom Beta Sub-station. Grid connection alternatives are available (from a technical perspective) and application for grid connection will be made through a separate process.

There would be no specific stormwater and/or landscaping initiatives undertaken as part of the proposed solar facility, other than any interventions prescribed by the relevant specialist/s through the Basic Assessment process.

#### **Alternatives:**

The proposed development as described above has been assessed with the following alternatives:

- 1) Technology: With regard to the proposed BESS, the technology thereof is dynamic and so the specific type/technology to be developed would be selected based on market demands and technology availability at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technology alternatives, with Lithium-ion being the current preferred technology.

The No-go alternative has also been assessed, noting that the property does hold existing development rights and so not developing the proposed development does not necessarily mean that there would be no changes or impacts on the site.

#### **Project Description- Springhaas Solar Facility 9 and associated infrastructure**

Springhaas Solar Facility 9 (Pty) Ltd proposes the development of Springhaas 9, a photovoltaic (PV) solar energy generation facility, of up to 150MWac in capacity, and associated infrastructure located south-west of Dealesville, Free State on farms Dealesrust No.922, Dealesrust No. 921 and Sunnyside No.918. The study area falls within the jurisdiction of the Tokologo Local Municipality, within the Lejweleputswa District Municipality. It also falls entirely within the Kimberley REDZ and Central Transmission Corridor.

A development area has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected property and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this Basic Assessment process (which includes the independent specialists' assessments undertaken hereunder) and assessed in terms of the suitability from an environmental and social perspective.

The proposed facility would comprise the following:

- Solar Field/Solar Arrays (Note that the foundations, mounting structures and module types would be confirmed during detail design, however, would remain within the proposed development footprint and be up to approximately 3.5m in height)
- Associated internal underground electrical reticulation (i.e., low- and medium voltage lines)
- Internal access roads (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 5m)
- Main Access road (noting that existing farm roads would be used as far as possible, and the road width would be up to approximately 8m)
- On site electrical infrastructure compound (contained within the proposed up to 2Ha footprint) consisting of:



- On site substation and associated infrastructure,
- Additional collector infrastructure, and /or
- Battery Energy Storage System (BESS)
- Perimeter fencing
- Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) buildings, admin buildings, workshops, gatehouse, security building, control centre, offices, visitor centre, warehouses, etc.)

A temporary laydown area would also be established during the construction period with the location and extent thereof provided in the indicative layout.

The proposed facility would be accessed via an existing unnamed farm road, located to the north of the proposed facility (and which transects the greater area from west to east). Access from the broader road network would be taken either from the N-S road connected to the R64 to the West of the proposed facility or to the N-S road connected to the R64 to the East of the facility. The road to the East would be re-aligned to abled a gentle curve for vehicles to access safely from the South. The details of the access would be as per the recommendations in the Transport Impact Assessment. The operations of the proposed facility would require some servicing, noting that the operational electrical requirements would be nominal and would be supplied by the facility on site. Water would be required for sanitation use by operational staff, for washing the panels, as well as dust control on internal roads (where necessary). Water would ideally be sourced from the local municipality, in terms of a Service Level Agreement established between the Municipality and the Applicant. If this is not possible, then further options will be investigated. Where required, a storage tank (i.e., Jo-Jo tank) of up to approximately 10,000L may be used on site for temporary water storage. Sanitation requirements would be minimal, given that there would not be many operational staff. Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or have capacity for, such a connection, sewage would be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (Contractor) for treatment at a licensed disposal site. Alternatively, a standalone system would be used (i.e., porta-loos) which would be regularly serviced by an independent contractor. Note that it is **not** intended to make use of soakaways or on-site treatment solutions. Refuse/solid waste produced would also be nominal (approximately two wheelie bins per week) and would ideally be removed by the Municipality, however, if this is not possible, the Operator would employ private contractors to remove the refuse and dispose of it appropriately.

The construction phase would also require water and sanitation, with these aspects being the primary responsibility of the Contractor. However, it would be preferable for water to be sourced from the local Municipality (where available), with alternative arrangements (for example, bringing water in with trucks) being made where necessary. Solid waste would also be produced and would be managed in accordance with the requirements in the Environmental Management Programme (EMPr).

In terms of connection to the grid, the proposed facility falls within approximately 10 502 m of the existing 765 kV Eskom Beta Sub-station. Grid connection alternatives are available (from a technical perspective) and application for grid connection will be made through a separate process.

There would be no specific stormwater and/or landscaping initiatives undertaken as part of the proposed solar facility, other than any interventions prescribed by the relevant specialist/s through the Basic Assessment process.

### **Alternatives:**

The proposed development as described above has been assessed with the following alternatives:

- 1) Technology: With regard to the proposed BESS, the technology thereof is dynamic and so the specific type/technology to be developed would be selected based on market demands and technology availability at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technology alternatives, with Lithium-ion being the current preferred technology.

The No-go alternative has also been assessed, noting that the property does hold existing development rights and so not developing the proposed development does not necessarily mean that there would be no changes or impacts on the site.

#### **1.1.2. Identification of alternatives**

The alternatives available for assessment are as shown in the project descriptions. The main reason for so few alternatives, and especially no location alternatives, is that the overall site is large with all land being considered initially and the layouts having been designed after the specialist surveys to avoid impacts as far as possible.

The following notes from the perspective of heritage apply to the assessment:

- SPH1 has two electrical infrastructure compound location alternatives but neither contains any heritage resources. Both locations are thus equally acceptable and no separate assessments are provided.
- SPH3 has two laydown area alternatives but neither of them contains any heritage resources. Both locations are thus equally acceptable and no separate assessments are provided.
- Technology alternatives have no bearing on the assessment. Both battery types are equally acceptable and no separate assessments are provided.
- The No-Go alternative will also be assessed.

#### **1.1.3. Aspects of the project relevant to the heritage study**

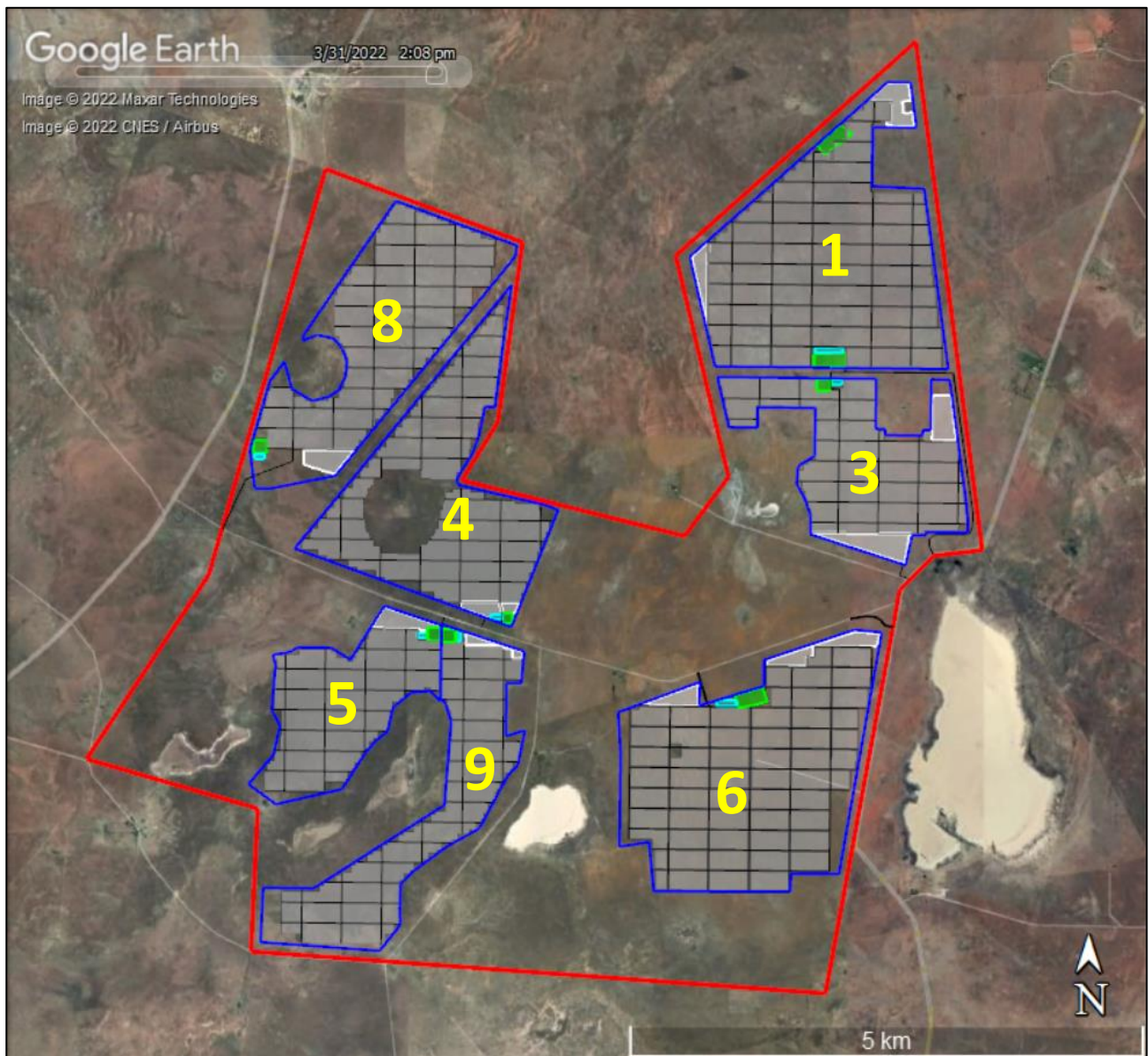
All aspects of the proposed development are relevant, since excavations for foundations and/or services may impact on archaeological and/or palaeontological remains, while all above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

### **1.2. Terms of reference**

ASHA Consulting was asked to conduct a field survey of the entire study area and to provide sensitivity data that could guide the development of layouts for the seven proposed solar energy facilities. The survey was to consider all relevant aspects of heritage.

Once the layouts were provided, a single consolidated heritage impact assessment (HIA) report was to be compiled assessing the potential impacts of all seven proposed facilities. The assessments and any recommendations stemming from them were to be clearly ringfenced per project.

ASHA was also asked to subcontract a palaeontological specialist to provide a separate palaeontological assessment.



**Figure 3:** Aerial view of the study area (red) showing the proposed layouts of the seven solar energy facilities (numbered in yellow). Blue = fenced areas, grey = solar panels, black = roads, green = electrical infrastructure compound (there are two options for SPH1), turquoise = buildings, white = laydown areas (there are two options for SPH3).

### 1.3. Scope and purpose of the report

An HIA is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This HIA report aims to fulfil the

requirements of the heritage authorities such that a comment can be issued by them for consideration by the National Department of Forestry, Fisheries and Environment (DFFE) who will review the Basic Assessment (BA) and grant or refuse authorisation. The HIA report will outline any management and/or mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation should this be granted.

#### **1.4. The author**

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting Heritage Impact Assessments and archaeological specialist studies in South Africa (primarily in the Western Cape and Northern Cape provinces) since 2004 (please see curriculum vitae included as Appendix 1). He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP; Member #43) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

- Principal Investigator: Stone Age, Shell Middens & Grave Relocation; and
- Field Director: Colonial Period & Rock Art.

#### **1.5. Declaration of independence**

ASHA Consulting (Pty) Ltd and its consultants have no financial or other interest in the proposed development and will derive no benefits other than fair remuneration for consulting services provided.

## **2. LEGISLATIVE CONTEXT**

### **2.1. National Heritage Resources Act (NHRA) No. 25 of 1999**

The NHRA protects a variety of heritage resources as follows:

- Section 34: structures older than 60 years;
- Section 35: prehistoric and historical material (including ruins) more than 100 years old as well as military remains more than 75 years old, palaeontological material and meteorites;
- Section 36: graves and human remains older than 60 years and located outside of a formal cemetery administered by a local authority; and
- Section 37: public monuments and memorials.

Following Section 2, the definitions applicable to the above protections are as follows:

- Structures: “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”;
- Palaeontological material: “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”;
- Archaeological material: a) “material 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”; b) “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, including any area within 10m of such representation”; c) “wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation”; and d) “features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found”;

- Grave: “means a place of interment and includes the contents, headstone or other marker of such a place and any other structure on or associated with such place”; and
- Public monuments and memorials: “all monuments and memorials a) “erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government”; or b) “which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual.”

Section 3(3) describes the types of cultural significance that a place or object might have in order to be considered part of the national estate. These are as follows:

- a) its importance in the community, or pattern of South Africa’s history;
- b) its possession of uncommon, rare or endangered aspects of South Africa’s natural or cultural heritage;
- c) its potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage;
- d) its importance in demonstrating the principal characteristics of a particular class of South Africa’s natural or cultural places or objects;
- e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- i) sites of significance relating to the history of slavery in South Africa.

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list “historical settlements and townscapes” and “landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, some of the points in Section 3(3) speak directly to cultural landscapes.

Section 38(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of S.38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision. Under the National Environmental

Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to a BA. The present report provides the heritage component. Free State Heritage Resources Authority (FSHRA; for built environment and cultural landscapes) and the South African Heritage Resources Agency (SAHRA; for archaeology and palaeontology) are required to provide comment on the proposed projects in order to facilitate final decision making by the DFFE.

### 3. METHODS

#### 3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. The information sources used in this report are presented in Table 2. Data were also collected via a field survey. The data used is deemed of suitable quality to provide meaningful input into the study.

**Table 2:** *Information sources used in this assessment.*

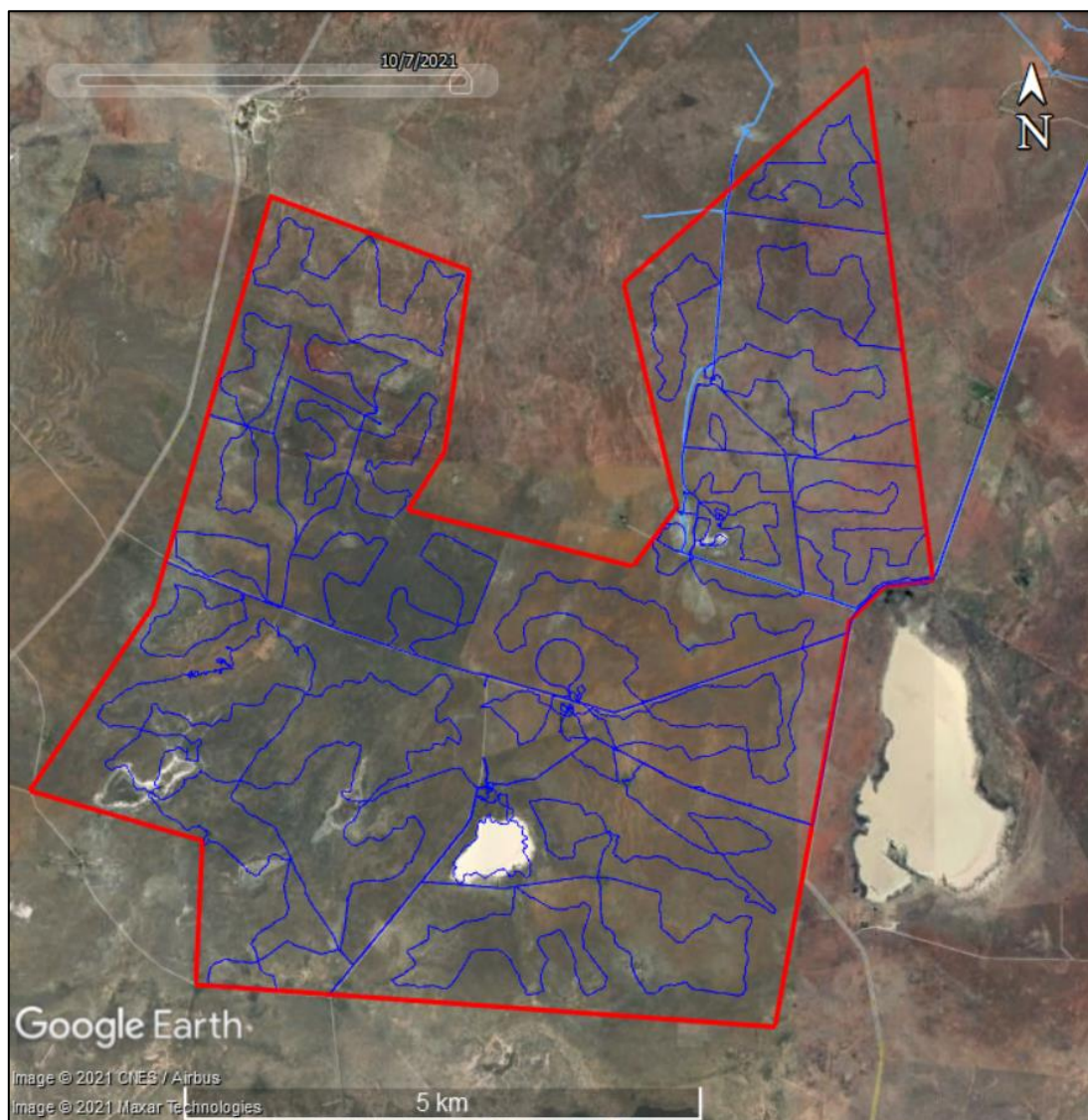
Data / Information	Source	Date	Type	Description
Maps	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical and current 1:50 000 topographic maps of the study area and immediate surrounds
Aerial photographs	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical 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	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. Refer to Section 10 for further details
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.



				Refer to Section 10 for further details
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### 3.2. Field survey

The site was subjected to a detailed foot survey on 3 to 7 October 2021. This was during spring and before the summer rains had set in which meant that ground visibility for the archaeological survey was slightly better than in summer when the grass gets denser. Parts of the area had recently burned which also offered improved visibility. Other heritage resources are not affected by seasonality. During the survey the positions of finds and survey tracks were recorded on a hand-held Garmin Global Positioning System (GPS) receiver set to the WGS84 datum (Figure 3). Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.



**Figure 3:** Aerial view of the study area (red polygon) showing the survey tracks (blue lines).

It should be noted that amount of time between the dates of the field inspection and final report do not materially affect the outcome of the report.

### **3.3. Specialist studies**

A separate palaeontological specialist study was commissioned. The palaeontological report is submitted separately, but should be read in tandem with the present report.

### **3.4. Impact assessment**

For consistency among specialist studies, the impact assessment was conducted through application of a scale supplied by GIBB Environmental.

### **3.5. Grading**

S.7(1) of the NHRA provides for the grading of heritage resources into those of National (Grade I), Provincial (Grade II) and Local (Grade III) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade I and II resources are intended to be managed by the national and provincial heritage resources authorities respectively, while Grade III resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to happen. SAHRA (2007) has formulated its own system<sup>1</sup> for use in provinces where it has commenting authority. In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having 'General Protection' (GP) and rated as GP A (high/medium significance, requires mitigation), GP B (medium significance, requires recording) or GP C (low significance, requires no further action).

### **3.6. Consultation**

The NHRA requires consultation as part of an HIA but, since the present study falls within the context of an EIA which includes a public participation process (PPP), no dedicated consultation was undertaken as part of the HIA. Interested and affected parties would have the opportunity to provide comment on the heritage aspects of the project during the PPP. The basic assessment report and HIA will be made available for a period of 30 days for interested and affected parties to review and provide comment on. Any comments received related to the HIA will be included in the final HIA.

### **3.7. Assumptions and limitations**

The field study was carried out at the surface only and hence any completely buried archaeological sites would not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. The site is very large and coverage is low, although it is assumed that all the main heritage features will have been located and recorded. There is, however, always the chance that other finds will be made later such as the graves reported by the

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<sup>1</sup> The system is intended for use on archaeological and palaeontological sites only.

environmental consultant after the heritage survey. Nonetheless, the level of confidence in the findings remains high.

## 4. PHYSICAL ENVIRONMENTAL CONTEXT

### 4.1. Site context

The site lies in a rural context dominated by the raising of livestock. Farm complexes and their associated tree clusters occur sporadically in the landscape, and local roads south of the R64 are all gravel. Electrical infrastructure is abundant and consists of many high voltage (HV) powerlines and two large substations. Beta Substation is located 4.5 km north of the study area, while Perseus is 14 km to the north. Two HV lines cross the western part of the study area and another runs past its eastern edge (Figure 4).



**Figure 4:** Existing HV lines (green) and substations (dots) in the Dealesville area.



## 4.2. Site description

The site is generally flat and coated in grass (although part of it had burnt prior to the site visit). Trees are largely absent from the area but dense clusters do occur at the farm complexes. Areas of water ponding were observed with some of these looking like semi-permanent wetland areas. Rock outcrops are minimal with occasional patches of ephemeral dolerite gravel visible at the surface and just one low dolerite ridge being present (in the west of the study area). Several pans occur in the southern part of the site and a number of natural swales were also seen. The swales and some pans had grassed bases, while other pans had mud bases. Figures 5 to 16 show a selection of views to characterise the study area.



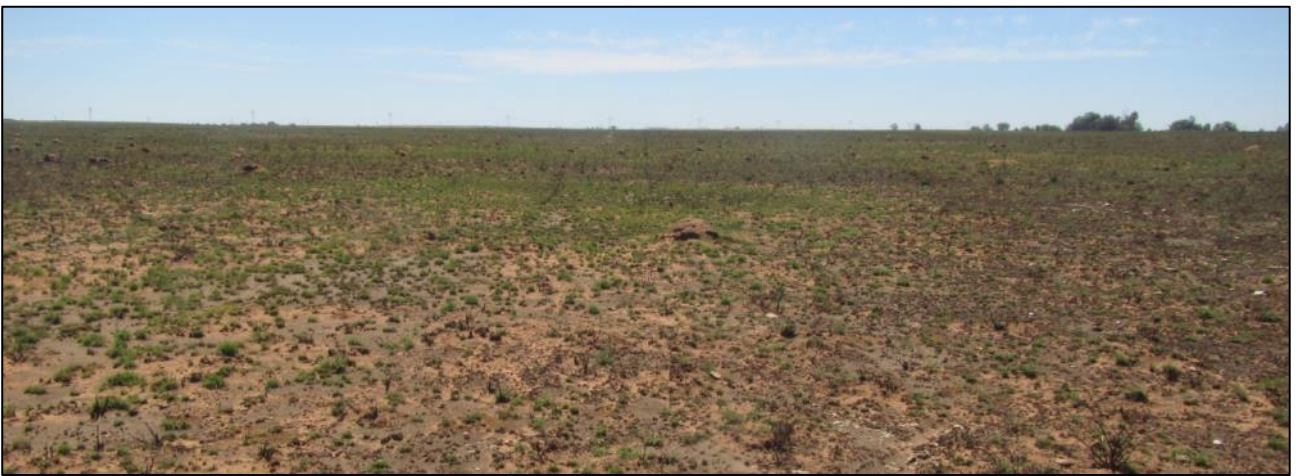
**Figure 5:** View towards the east through the north-eastern part of the study area.



**Figure 6:** View towards the northwest through the north-eastern part of the study area and showing ponding after rain.



**Figure 7:** View towards the northwest from the south-eastern corner of the study area showing a recently burned landscape.



**Figure 8:** View towards the north from the southern corner of the study area showing a recently burned landscape.



**Figure 9:** View towards the east along the southern margin of the largest pan in the southern part of the study area.





**Figure 10:** View towards the northeast along the western edge of the study area.



**Figure 11:** View towards the east through the southern half of the study area with the tree clusters marking the farm complexes on site.



**Figure 12:** View towards the north through the north-western part of the study area.





**Figure 13:** View towards the southwest from the north-western part of the study area.



**Figure 14:** View towards the northeast from the south-western end of the only dolerite ridge in the study area.



**Figure 15:** View towards the north through the central part of the study area.



**Figure 16:** View towards the south in the western part of the study area across an area showing as ploughed land on an 11 February 2019 aerial view. The photo location is shown on the inset (Source Google Earth).

## 5. FINDINGS OF THE HERITAGE STUDY

This section describes and illustrates a selection of the heritage resources recorded in the study area during the course of the project. Appendix 2 lists and describes all resources and they are mapped in Appendix 3.

### 5.1. Palaeontology

The SAHRIS PalaeoSensitivity map shows the site to be largely of high palaeontological sensitivity (Figure 17). This sensitivity is likely linked to the calcrete that underlies the surface over much of the study area. No fossils were seen on site and it is unlikely that any would be visible at the surface in this environment. A desktop palaeontological study has been undertaken to determine what measures may need to be incorporated into the Environmental Management Program (EMPr) for the project. Palaeontology will not affect the feasibility or layout of the project.



**Figure 17:** Extract from the SAHRIS PalaeoSensitivity map showing the study area (red polygon) to be of variably of zero (grey), moderate (green) and high (orange) sensitivity (source: <https://sahris.sahra.org.za/map/palaeo>).

## 5.2. Archaeology

### 5.2.1. Desktop study

Stone Age material occurs widely across southern Africa, while the Iron Age, which only occurred within the last 2000 years, is present only in the eastern parts where summer rainfall allowed for the cultivation of summer crops. Stone-walled settlements dating to the Iron Age have been widely documented in parts of the Free State and adjacent Northern Cape (Maggs 1976a, 1976b) but, from the many Cultural Resources Management (CRM) surveys in the area, the Iron Age appears to be absent from the vicinity of Dealesville. Later Stone Age stone-built dwellings are known from along the Riet River about 100 km to the southwest (Humphreys 1972, 2009). With the exception of the rich Middle Stone Age (MSA) deposits of Florisbad (36 km east of the present study area; Kuman *et al.* 1999) and the MSA and Later Stone Age (LSA) stone artefact assemblages from Erfkroon (along the Modder River some 4.5 km south of the study area, Churchill *et al.* 2000), significant archaeological resources appear to be quite rare in this flat, open and well-grassed landscape. Archaeological material is, however, more common along the major rivers where artefacts are revealed in the river terrace gravels (e.g, Erfkroon).

Webley (2010) surveyed an area to the east of the present development area and reported a complete absence of archaeological material. She further noted that stone suitable for the manufacture of flaked tools was not present and that the quantity of other rock available on the surface was insufficient to allow for the construction of stone dwellings. Hutten's (2011) survey of



land to the north of Boshof showed similar results but in that case a pan was present with a large scatter of MSA and LSA artefacts present alongside it. The same applied to a survey close to the R64 to the north of the present study area where many thousands of artefacts were found adjacent to a pan (Orton 2016a). This demonstrates the preference to settle close to water sources that is prevalent across much of the relatively dry interior of southern Africa. Orton's (2015) survey of large areas to the north of the present development area showed heritage resources to be quite common. They included built structures, artefact scatters and a number of rock engravings. The vast majority of resources were located in close proximity to the rock outcrop areas closer to Dealesville, while further south into the grasslands (and towards the present study area) the archaeology dropped off significantly. The majority of artefacts located by Orton (2015) were attributable to Pleistocene-aged MSA background scatter and were associated with gravel exposures. They did not constitute *in situ* living sites. However, some artefacts dating to the Holocene LSA were also noted. Just north of the R64, Orton (2021) located a scatter of artefacts that appeared to be from the early part of the MSA since it included several small handaxes. This early part of the MSA is often referred to as the 'Fauresmith' period, and is generally thought to be characterised by small handaxes (Underhill 2011). The site lay at the edge of a wide, low dolerite hill. Even further north, Kaplan (2020, 2021) also found artefacts ascribable to the MSA, with higher densities being present alongside pans.

Rock engravings occur widely in the interior of South Africa where suitable rock exists. Many sites are located in the Free State with the National Museum, Bloemfontein (2014) listing numerous examples that may be visited by the public. However, no sites seemed to be on record for the Dealesville area prior to Orton's (2015; see also Orton 2016b) survey. He located engravings dating within the last 2000 years and attributable by their geometric style to the Khoekhoe as well as figurative engravings done by the San. The former were found on a small dolerite hill 11.5 km north of the present study area where flaked stone artefacts and ground patches on the dolerite were also recorded. Dolerite rocks with shallow grinding grooves and ground cupules have also been recorded in the area (Orton 2016a, 2016b).

The remains of a historical stone-walled kraal also occur alongside the engraved outcrop described above (Orton 2015). Another stone-walled kraal and house ruin were recorded by Orton (2016a, b) close to the R64, while Kaplan (2020) found historical stone-walled ruins further to the north.

#### 5.2.2. Site visit

Stone artefacts were seen in a number of places but these were almost all associated with water sources. In only one place (waypoint 402) were three background scatter artefacts seen away from a water source. There were only three artefacts, they were associated with dolerite gravel, and they are likely MSA in age. A single such artefact was also seen on the dolerite ridge in the western part of the study area. All other artefacts seen were younger, and, although partially weathered, they still retained some dark grey colouring and are likely to be LSA in age. Few fresh, black hornfels artefacts were seen which is somewhat surprising. Figures 18 and 19 show examples of these probable LSA materials. Although some artefacts are black, close inspection showed that they are somewhat weathered and are certainly not very recent. Only one diagnostic artefact was seen and this was a 'duckbill endscraper', a type typically found in early Holocene assemblages. Although not definitive, this piece could suggest that the LSA materials present relate to occupation of the area between about 10 000 and 6000 years ago.



**Figure 18:** Hornfels artefacts from waypoint 308. Scale in cm.



**Figure 19:** Hornfels artefacts found alongside a natural swale at waypoint 311. The lower right hand artefact is a 'duckbill endscraper'. Scale in 1 and 5 cm intervals.

The dolerite ridge in the western part of the study area was expected to contain LSA resources but surprisingly few were found. Two ephemeral clearings in the boulders and cobbles were seen on the western end of this ridge (Figure 20) but, surprisingly, there were no artefacts associated with them other than the single MSA flake noted above. Also seen on this ridge, and probably ascribable to the LSA, were a number of rocks with evidence of grinding on them (e.g. Figure 21).



**Figure 20:** An ephemeral clearing in the dolerite cobbles on top of a low ridge at waypoint 328.



**Figure 21:** One of many ground patches on the low dolerite ridge. This is at waypoint 337. Scale in 1 and 5 cm intervals.

More commonly encountered were historical archaeological sites. Surprisingly, artefacts were almost entirely absent from these sites. One site to reveal some historical glass and ceramics was an unexpected one. A historical earthen-walled dam has an animal burrow in it and this burrow has pulled artefacts out (Figures 22 & 23). The dam was across an inlet to a large pan and from aerial photography it is evident that a large area drains into this inlet. A number of ephemeral remains of older structures were also seen. These varied in nature but all would have related to the earlier farm complexes of the area. Most are likely 19<sup>th</sup> century in age, but it is possible that some might be from



the early 20<sup>th</sup> century. Figure 24 shows a stone mound of unknown function but it is a historical feature (its orientation is incorrect for a grave and it lacks any other grave features). Figure 25 shows an example of a remnant calcrete foundation from which the entire wall has been removed. Smaller fragments of calcrete that would have been placed between the larger stones are lying on the ground but the larger rocks have all been robbed for reuse elsewhere – this is a common practice due to the high labour cost of obtaining new stones.



**Figure 22:** A historical dam wall at waypoints 315-6.



**Figure 23:** Artefacts excavated from the dam wall at waypoints 315-6 by an animal.

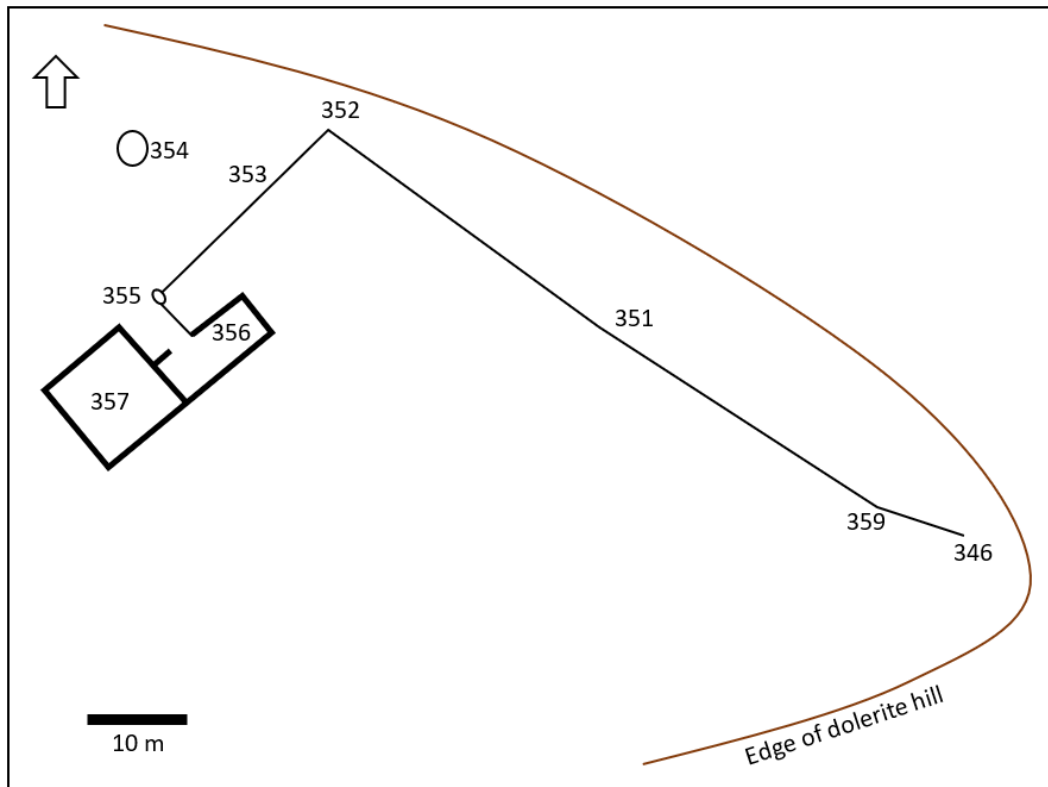


**Figure 24:** A mound of stones at waypoint 322 that might appear grave-like but is almost certainly not one.



**Figure 25:** Foundation stones of a structure at waypoints 318-321.

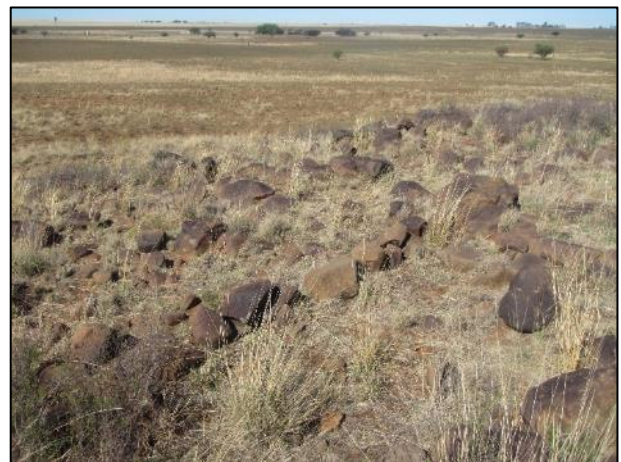
A more ephemeral site on the dolerite ridge has fairly extensive stone walling (waypoints 346, 351-7, 359; Figure 26). Much of the walling is quite ephemeral due to being made of dolerite and being quite well tumbled. Two enclosures on the highest part of the hill were made with double skin stone walls (Figure 27), while the rest were largely just single lines of stones (Figure 28).



**Figure 26:** Plan of the ephemeral stone-walled complex at the waypoints as indicated in the diagram.



**Figure 27:** A stone-walled enclosure at waypoint 357. An adjacent overgrown enclosure at waypoint 356 had a case bottle base associated with it. Scale in 1 and 5 cm intervals.



**Figure 28:** Ephemeral stone walling at waypoints 351-352 and forming part of a larger complex.

A number of water reservoirs were seen. These are hollows in the ground that have been lined with rocks, and presumably also clay which has now weathered away. Figure 29 shows one of the better preserved examples and which, unusually, had its inner surface coated with dolerite cobbles while its outer wall was built from of calcrete. Some of these reservoirs had defunct wind pumps standing



alongside them which, in the absence of any other source of water, is an indication of their age post-dating the mid-19<sup>th</sup> century introduction of wind pumps to South Africa (Walton & Pretorius 1998).



**Figure 29:** *The remains of a stone-lined water reservoir at waypoint 378.*

Several historical farm complexes were seen in varying states of repair, with a few of the structures perhaps better suited to reporting as built environment features. However, to keep them together, they will all be discussed together here. These are undoubtedly the most significant archaeological remains in the study area and illustrate the traditional building techniques and styles of the 19<sup>th</sup> and early 20<sup>th</sup> century. Figure 30 shows a small cottage at waypoint 293 built with the typical double skin method. Interestingly, while the outer skin is made almost entirely from dolerite cobbles with rare calcrete inclusions, the inner skin is the reverse pattern (Figure 31). This may have been due to the availability of stone but, given that calcrete does appear in the outer skin of this and a number of other ruins, it seems more likely to have been a stylistic decision. The door frame is missing but the wooden window frame survives. The flat roof is entirely missing.



**Figure 30:** *Stone ruin at waypoint 293.*

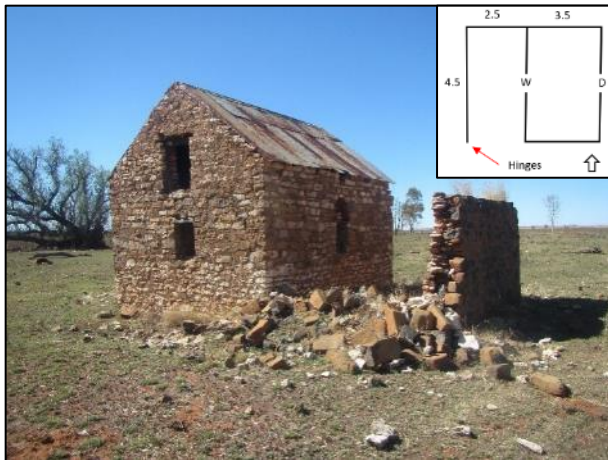


**Figure 31:** *Detail at waypoint 293.*

Another small gabled stone cottage with a loft under a tin roof was better preserved, although an addition to its west face was partially collapsed (waypoint 294; Figure 32). There are again patterns in the walling. The lowermost 1 m is almost all of calcrete, while above this there is a mix of calcrete, dolerite and shale. Shale blocks have been used for the windowsill and display some wear (Figure 33). Alongside this cottage was a brick ruin with at least half its walls collapsed and its roof missing (waypoint 295; Figures 34 to 36). This was undoubtedly the main house of this farm



complex. The bricks, being softer than stone, have dissolved in the rain with the result that this ruin is far more poorly preserved than the stone ruins. Nearby is another outbuilding built of calcrete. Its function is indeterminate as it is too poorly preserved but it may have been a kraal (waypoint 298; Figure 37).



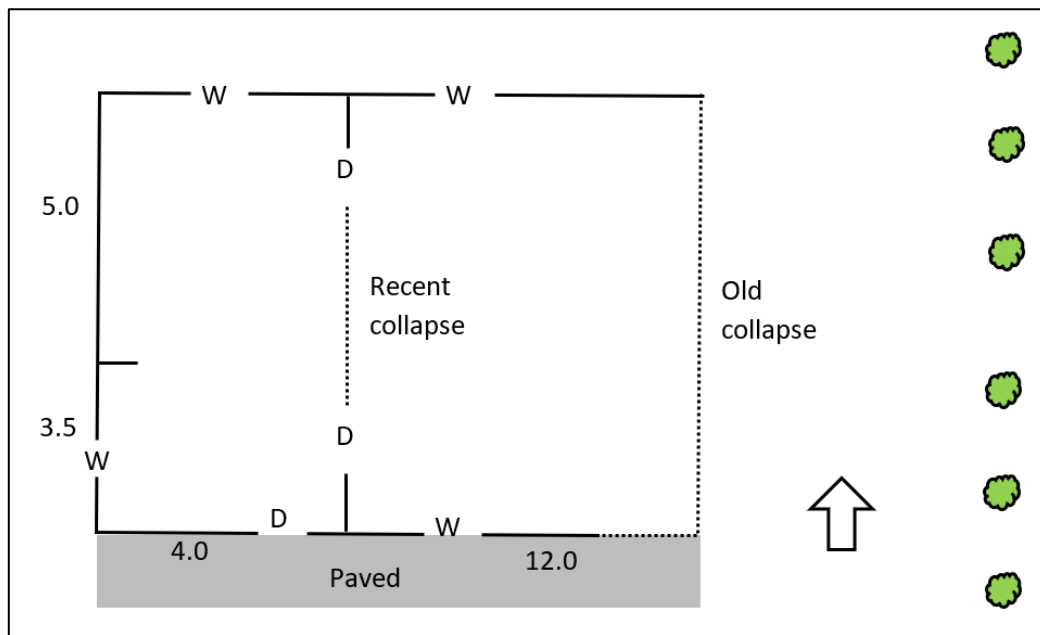
**Figure 32:** Stone ruin at waypoint 294. Inset: plan view showing door hinge location.



**Figure 33:** Windowsill in the cottage at waypoint 294.



**Figure 34:** View of the farm complex with associated trees at waypoint 294 (roofed ruin) and 295 (red brick ruin). A line of cypress trees stands in the foreground, just behind the fence. Left inset: Brick wall on stone plinth. Right inset: southwest corner of house.



**Figure 35:** Plan of the remains of the house at waypoint 295. Six cypress trees (now dead) stand to the east of the house.



**Figure 36:** Interior of the brick house at waypoint 295.



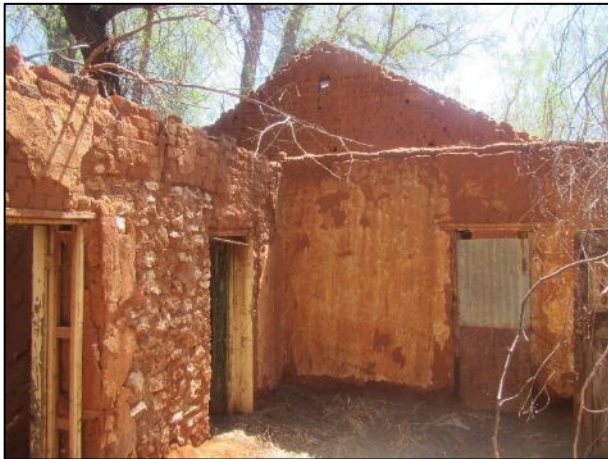
**Figure 37:** The remains of a calcrete-walled structure at waypoint 298.

Another farm complex that was heavily surrounded by trees also has a main house of brick. It is ruined with its roof missing and some walls damaged (Figure 38). One gable has collapsed. It appears to be a late 19<sup>th</sup> century structure, perhaps having been built just at the start of the Victorian period. Some joinery is missing, while other items are still present. The extant windows show some variety. Most are wooden sash windows, but two wooden casement windows occur and there are three steel casement windows (Figures 39 to 40). Figure 41 shows that the house had a living room (voorkamer) with most other rooms leading off it. The bathroom to the north was a later addition, presumably added once sanitary ware became easily available. Also part of this complex is a brick-walled shed which has had one of its gabled end walls collapse entirely; the wall has been replaced with corrugated iron (Figure 42). This shed adjoins a stone kraal which is also somewhat damaged but which has been made useable by the addition of some brickwork and internal wooden fences.





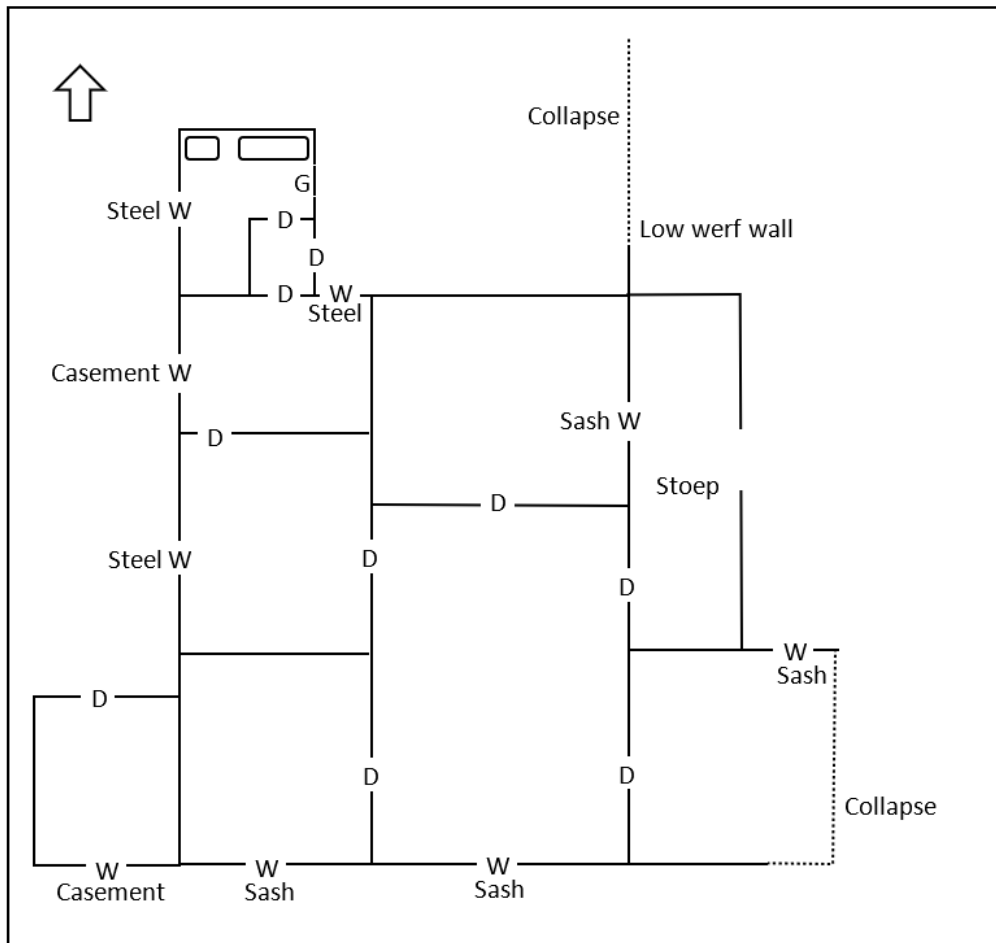
**Figure 38:** Façade of the house at waypoint 301. The newer bathroom addition is just visible at far right.



**Figure 39:** Interior view in what must have been the living room/voorkamer of the house at waypoint 301.



**Figure 40:** North end wall (left) and newer bathroom addition (right) at waypoint 301.



**Figure 41:** Floor plan of the house at waypoint 301. D = door, W = window, G = gas geyser.



**Figure 42:** Brick shed with an end wall missing at waypoint 300. Inset: the south wall with several small opening and the western gable intact.



Another complex in the west contained a ruin with further evidence of stylistic influence in stone choice. While the outside has dolerite at the bottom and up the corners and calcrete above (waypoint 368; Figure 43), the inner walls have a mix but with calcrete and dolerite in clusters (Figure 44). The end result, especially on the outside, is very striking. A shallow water well lies nearby (waypoint 369; Figure 45). Although only 1.5 m deep now, this well might have been deeper originally. Wells often had rubbish disposed of in them and can prove to be valuable repositories of archaeological information.



**Figure 43:** *Calcrete- and dolerite-walled ruin at waypoint 368.*



**Figure 44:** *Interior of the ruin at waypoint 368.*



**Figure 45:** *A water well cut into the calcrete and dolerite at waypoint 369.*

Another very poorly preserved complex lies just north of the pan in the western part of the study area. Three structures appear to have been present here, with two of them (waypoints 398 & 399) built in the same alignment. Figure 46 shows one of these two and is assumed to have been a house. Just to their south lies a kraal that has a main enclosure and two smaller ones (waypoint 401; Figure 47).



**Figure 46:** The poorly preserved remains of what was likely a house at waypoint 399.



**Figure 47:** Remains of a stone-walled kraal at waypoint 401. The main enclosure stretches to the right in this view. Inset: Plan view rotated to match the orientation of the photograph.

A short distance further north again is another small farm complex comprised of a modern shed, a modern cottage and a historical cottage. The latter is in very poor condition with some internal walls demolished, some external walls crumbling, all joinery removed and some roof sheets missing (waypoint 388; Figure 48 & 49).





**Figure 48:** *View of the south end and east side of the ruin at waypoint 388.*



**Figure 49:** *View of the north end and west side of the ruin at waypoint 388.*

The last aspect of historical archaeology to consider is the various engravings/graffiti that were located on the dolerite ridge. Whether these are related to the stone ruins there can never be known, but the spatial relationship makes this quite possible. The engravings include names (e.g. waypoints 343 & 344; Figures 50 & 51), initials (e.g. waypoint 348; Figure 52) and an indeterminate motif (waypoint 344; Figure 53). These engravings were made by either pecking or scratching. The age of these engravings is also unknown. If younger than 100 years – which seems quite possible – then they would not be archaeology under the NHRA.



**Figure 50:** Example of historical pecked graffiti at waypoint 343.



**Figure 51:** Example of historical pecked graffiti at waypoint 344.



**Figure 52:** Historical scratched initials at waypoint 348. Scale in 1 and 5 cm intervals.



**Figure 53:** Indeterminate pecked motif at waypoint 344. Scale in 1 and 5 cm intervals.

### 5.3. Graves

Graves were seen in four locations, with another marked as a possible grave (waypoint 384; Figure 52). Figures 54 to 62 show the graves recorded during the survey. It is evident that there is plenty of variety with some being simple stone-packed mounds with no head- or footstones, others are similar but have relatively informal headstones, while still others are properly formalised with grave surrounds and carved headstones. Some graves have been affected by animal burrowing.





**Figure 54:** Possible grave at waypoint 384.



**Figure 55:** Graves at waypoint 362.



**Figure 56:** Grave at waypoint 362 with an illegible inscription.



**Figure 57:** Grave at waypoint 362 possibly dated 1923.



**Figure 58:** Graves at waypoint 376 with dates of 1935 & 1928.



**Figure 59:** Graves at waypoint 381.



**Figure 60:** Grave at waypoint 381 dated 1914.





**Figure 61:** Poorly visible graves at waypoint 404.



**Figure 62:** Grave at waypoint 404 dated 1915, but this may be a date of birth.

## 5.4. Historical aspects and the Built environment

### 5.4.1. Desktop study

Historical resources will be primarily associated with farmsteads, although most are likely to be fairly recent, perhaps dating to the late 19<sup>th</sup> or early 20<sup>th</sup> centuries. Several such resources – buildings, ruins and artefact scatters (the latter two both covered under archaeology) were located in the area by Orton (2015). The town of Dealesville is relatively recent, dating to 1899 (Raper n.d.). It was laid out on the farm Klipfontein belonging to John Henry Deale and was awarded municipal status in 1914.

The second Anglo-Boer War (1899-1902) played a significant role in South African History, particularly in the interior of the country. Many battles were fought between the British and Boer forces. Significant battles in proximity to the present development area include the Battles of Modder River and Magersfontein 100 km to the southwest and west respectively, the Battle of Paardeberg 60 km to the southwest and the Battle of Driefontein just outside Bloemfontein, some 60 km to the southeast. Graves, graveyards and memorials across the central interior of South Africa serve as reminders of the war.

### 5.4.2. Site visit

Other than the partially to fully ruined structures described above, no historical structures were found to occur within the study area and, aside from two modern buildings (shed and labourer's cottage) within the eastern part of the site, all intact standing structures are at least 300 m beyond the boundary. None of these structures outside the site was examined, but it is noted that they are generally located within well-established groves of mature trees.

## 5.5. Cultural landscapes and scenic routes

As described above, the landscape is strongly rural in nature. Occasional arable lands occur, including a centre pivot field within the study area, but the vast majority is grassland used for grazing. Aerial imagery indicates that many areas were ploughed in the recent past and have

probably been left to recover naturally due to drought conditions over the last several years. No evidence of this ploughing was seen on the ground though, with the only arable land inside the study area being the centre pivot. The cultural landscape features scattered homesteads – either occupied, unoccupied and derelict, or completely ruined archaeological sites – in a sea of grass. These homesteads are often, but not always, marked by groves of trees (Figures 63 to 65). The older and more ruined ones do not always have associated trees, such as is the case at the 398 to 401 complex.



**Figure 63:** View of the farm complex at waypoints 291-298 showing the mature trees which mark the existence of the complex.



**Figure 64:** Tree grove in the southern part of the waypoint 291-298 complex.



**Figure 65:** Trees on the southern side of the farmstead at waypoints 299 to 307.



Figures 66 and 67 show aerial views of the study area from 1956. Some change is evident over the last 65 years. The ruin at waypoint 388 was still in use and the modern house and shed were not yet built. The waypoint 399-401 complex was already disused (as indicated by the lack of desire lines in the grass) and had probably already been in ruin for some time. The same applies to the one at waypoints 315-324, although its dam was still intact. The complexes at waypoints 368-377, 299-307 and 291-298 appear to have been still fully functional. All three of these are now completely ruined. The latter is shown as having had a single labourer's cottage to the west with another to the north and a third to the east. While a ruin marks the location of the eastern one, the other two have both been completely removed. The stone-walled features on the dolerite ridge are not at all visible on the 1956 imagery. It is evident from these images that structures built without cement can deteriorate very quickly once their roofs are removed. It is likely that joinery and rocks were frequently removed for reuse elsewhere which greatly exacerbates the degradation.



**Figure 66:** Aerial photograph from 1956 (377\_002\_05062) showing four farmsteads in the north-eastern part of the study area (waypoint numbers indicated).

It should be noted that the site falls within a Renewable Energy Development Zone (REDZ) and within an Electricity Grid Infrastructure (EGI) corridor. With the approval of many solar energy facilities in the area and the current existence of two large substations and many HV powerlines, electrical infrastructure should thus be an expected component of the landscape. There is going to be an inevitable shift in the nature of the landscape towards one increasingly dominated by electrical infrastructure.

There are no scenic or tourist routes in the vicinity of the study area. The R64 is located too far to the north to be of concern and, in any case, there are many HV lines and a large substation visible

in that area with many solar energy facilities approved on both sides of the road. However, the small, private Nielsview Nature Reserve abuts the site immediately to the south of its eastern part and extends to the Modder River. The Visual Impact Assessment does not identify this site as a significant visitor attraction to the area in its own right and has proposed a 500 m buffer to ensure that views from the reserve will not be dominated by the proposed developments (Afzelia 2021).



**Figure 67:** Aerial photograph from 1956 (377\_003\_05103) showing four farmsteads in the southern part of the study area (waypoint numbers indicated).

## 5.6. Statement of significance and provisional grading

Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), “cultural significance” means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. The reasons that a place may have cultural significance are outlined in Section 3(3) of the NHRA (see Section 2 above).

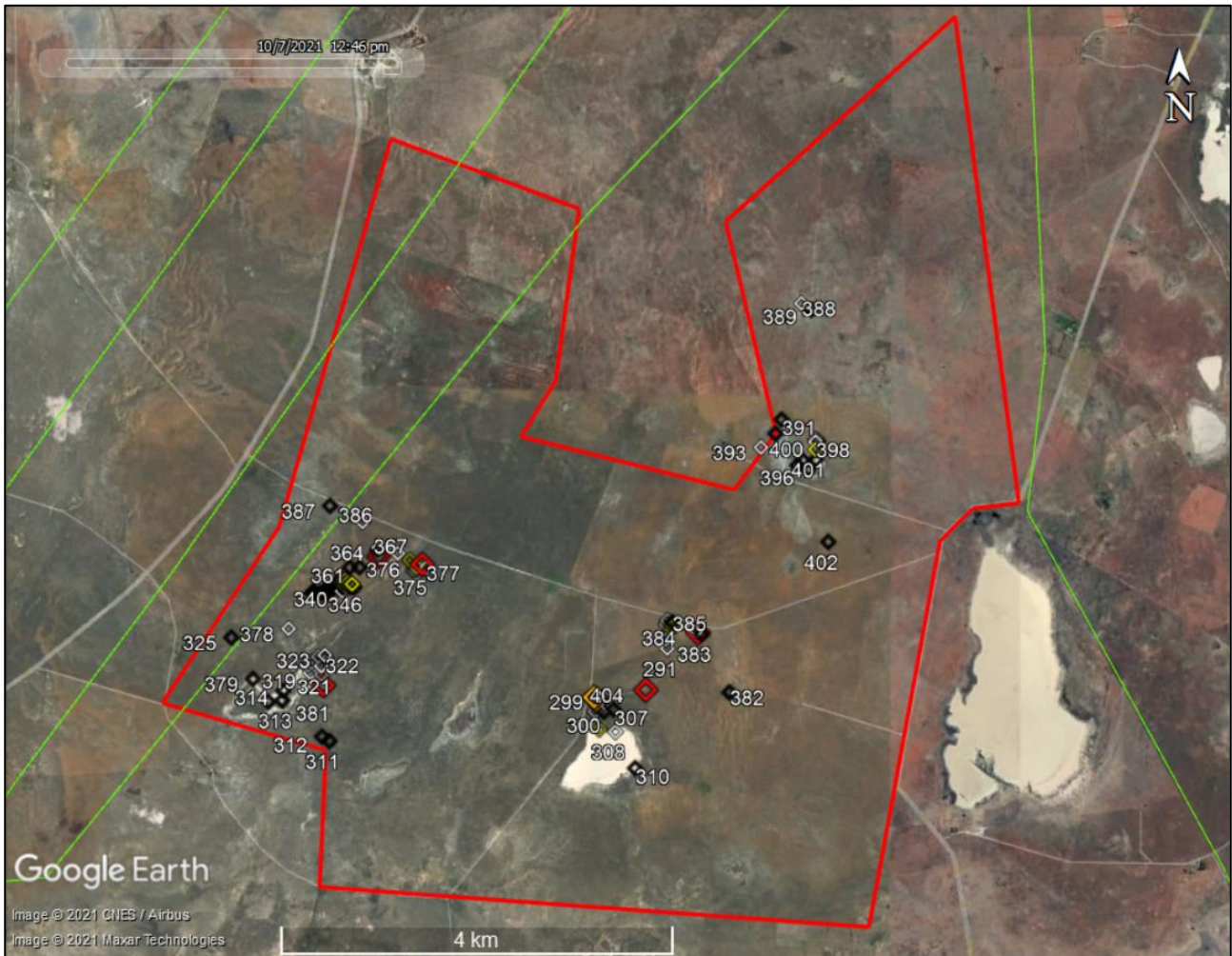
The archaeological resources (including those few ruins that may be complete enough to describe as structures) are deemed to have up to medium-high cultural significance at the local level for their architectural, historical, scientific, social and technological values. The most significant is graded IIIB, although, despite its ruinous state, this one may be seen by some as a building.

Graves are deemed to have high cultural significance at the local level for their social value. They are allocated a grade of IIIA.



The cultural landscape is a rural landscape with aesthetic value and is rated as having medium cultural significance at the local level. Closer to Dealesville where the density of electrical infrastructure increases, the landscape is of lesser significance.

Mapping of all the heritage resources by grade is shown in Figure 68.



**Figure 68:** Aerial view of the study area showing all heritage resources locations colour coded to their grades. Red = IIIA, orange = IIIB, yellow = GPA, white = GPB, black = GPC.

## 5.7. Summary of heritage indicators

The archaeological resources within the study area are fragile and easily susceptible to damage. The ruined farm complexes are best avoided by the development since mitigation would be time consuming.

- Indicator: No significant archaeological sites should be damaged or destroyed prior to appropriate study and recording as appropriate beforehand.

Graves are of high significance and must be protected *in situ*.

- Indicator: All graves should be avoided with a buffer of at least 30 m around them.

The cultural landscape is generally susceptible to change through the addition of inappropriate development. However, the REDZ and other approved electrical facilities in the area are acknowledged.

- Indicator: The proposed facilities should not dominate views from multiple viewpoints.

## 6. ASSESSMENT OF IMPACTS

Impacts to heritage resources graded GPB or higher will only occur from one of the seven proposed PV facilities. At SPH 1 a single partially ruined structure graded GPB will be directly impacted. All other identified archaeological resources in the wider study area have been avoided. As such, the assessments of impacts to archaeology for SPH 3, 4, 5, 6, 8 and 9 are all the same, while those for SPH1 are assessed separately. Note that sites graded GPC are not specifically considered in the assessments as these sites carry very little cultural significance and impacts are considered similar to impacts to background scatter artefacts.

No known graves will be impacted and all seven assessments of potential impacts to graves are thus the same.

No built heritage resources will be impacted. The structures in the study area were generally in very poor condition and were regarded as sufficiently ruined to be regarded as archaeological resources in terms of the NHRA definitions (see Section 2).

From the cultural landscape point of view, no specific features will be impacted during construction. All seven projects thus have the same assessments.

All aspects of heritage can potentially be impacted during the construction phase, but only the cultural landscape can be impacted during operation and decommissioning.

As noted in Section 1.1.2, none of the identified alternatives makes any difference to the heritage impacts and thus each project assessment applies equally to both alternatives where these exist.

### 6.1. Construction Phase

#### 6.1.1. Impacts to archaeological resources – SPH1

Impacts to archaeological resources at SHP1 are limited to one site of low significance (Grade GPB, but which might not even be 100 years old) and the associated remnants of a small dam (Grade GPC). Impacts will be direct and permanent but because of the low cultural significance the severity is low. The calculated impact significance is **very low negative**. Because of the low cultural significance, no mitigation measures are suggested and the post mitigation assessment thus remains at the **very low negative** level (Table 3). The likelihood of a pre-construction survey revealing further archaeological heritage is minimal and such a survey is thus not recommended. The low cultural significance means that the cumulative impact is of no concern. There are no fatal flaws from the point of view of impacts to archaeology.

**Table 3:** *Assessment of construction phase impacts to archaeological sites for SPH1.*

Archaeological impacts				
PROJECT PHASE	Construction Phase			
DIRECT IMPACT	Destruction of a ruined historical cottage (already in very poor condition)			
INDIRECT IMPACT	None			
CUMULATIVE IMPACT	Increased loss of vernacular architecture			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-6	3
EXTENT	1	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected	Negligible	Definite
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted.		
SIGNIFICANCE	-18	very low negative		
PROPOSED MITIGATION MEASURES				
None required as the ruin is in poor condition and does not have any special architectural qualities that need to be further recorded.				
No materials to be removed from any other ruins in the wider project area.				
POST-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-6	3
EXTENT	1	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected	Negligible	Definite
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted.		



<b>SIGNIFICANCE</b>	<b>-18</b>	<b>very low negative</b>
<b>CONFIDENCE LEVEL</b>		
<i>High</i>		

#### 6.1.2. Impacts to archaeological resources – SPH3, 4, 5, 6, 8 and 9

Impacts to archaeological resources at SPH3, 4, 5, 6, 8 and 9 are limited to the possible destruction of isolated background scatter artefacts which have very low to no cultural significance. Impacts will be direct and permanent but because of the very low cultural significance the extent and severity are low. The calculated impact significance is **very low negative**. Because of the low cultural significance, no mitigation measures are suggested and the post mitigation assessment thus remains at the **very low negative** level (Table 5). The likelihood of a pre-construction survey revealing further archaeological heritage is minimal and such a survey is thus not recommended. The very low cultural significance means that there are no cumulative impact concerns. There are no fatal flaws from the point of view of impacts to archaeology.

**Table 5:** Assessment of construction phase impacts to archaeological sites for SPH3, 4, 5, 6, 8 and 9.

ARCHAEOLOGICAL IMPACTS				
PROJECT PHASE	Construction Phase			
DIRECT IMPACT	Destruction of isolated artefacts			
INDIRECT IMPACT	None			
CUMULATIVE IMPACT	None			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-6	3
EXTENT	1	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected	Negligible	Definite
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted.		
SIGNIFICANCE	-18	very low negative		
PROPOSED MITIGATION MEASURES				

None required.				
No materials to be removed from any ruins in the wider project area.				
POST-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-6	3
EXTENT	1	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected	Negligible	Definite
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted.		
SIGNIFICANCE	-18	very low negative		
CONFIDENCE LEVEL				
High				

#### 6.1.3. Impacts to graves – SPH1, 3, 4, 5, 6, 8 and 9

Impacts to graves are not expected for any of the seven facilities because all identified graves have been avoided. There is still the chance of an unmarked grave being present, or even a marked grave that was not found during the survey. The chances are considered low, however. Impacts would be direct and permanent and because graves have very high cultural significance the severity is rated as high. Because of the low chance of impacts to known or unknown graves occurring, the calculated impact significance is **low negative**. Mitigation measures involve installing small farm-style wire fences with pedestrian gates around all known graves within the farm portion affected by construction (where not already fenced) and treating all graves as No-Go areas (signage can be installed during the construction phase as required). Note that the possible grave at waypoint 384 can be omitted from this requirement, since the chances of it being a grave are small. The post mitigation assessment would be **very low negative** (Table 6). Graves are generally identified and avoided by developments which means that cumulative impacts are unlikely. There are no fatal flaws from the point of view of impacts to graves.

**Table 6:** Assessment of construction phase impacts to graves for SPH1, 3, 4, 5, 6, 8 and 9.

IMPACTS TO GRAVES	
PROJECT PHASE	Construction Phase
DIRECT IMPACT	Destruction of graves, including their coverings and possibly human remains
INDIRECT IMPACT	None

CUMULATIVE IMPACT	Destruction of graves, including their coverings and possibly human remains			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-18	2
EXTENT	1	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur		
SEVERITY	-3	The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.	Moderately Detrimental	Likely
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted.		
SIGNIFICANCE	-36	low - negative		
PROPOSED MITIGATION MEASURES				
Farm-style wire fences should be erected around all known and unfenced graves (i.e. waypoints 362 & 404) within the farm portion affected by construction. Pedestrian access gates must be provided and the fences must be located a minimum of 5 m away from all graves.				
All graves to be treated as no-go areas with temporary signage as required.				
POST-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-18	1
EXTENT	1	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur		
SEVERITY	-3	The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.	Moderately Detrimental	Unlikely
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted.		
SIGNIFICANCE	-18	very low negative		

CONFIDENCE LEVEL
High

#### 6.1.4. Impacts to the cultural landscape – SPH1, 3, 4, 5, 6, 8 and 9

Because no landscape features such as hills and pans will be impacted by any of the seven facilities, the impacts will be the same for all of them and relate to the presence in the rural landscape of construction equipment and vehicles, as well as to all the expected activity. Note that the VIA finds the impacts to the nature reserve to be of low significance (Afzelia 2021), so this aspect is not considered separately from the general landscape impacts discussed here. Impacts to the cultural landscape will occur during the construction phase and last as long as construction lasts (anticipated to be about 12 months). Because of the flat terrain, the impacts would not be experienced over great distances because intervening vegetation and buildings would offer partial screening. Nonetheless, the immediately surrounding area will experience a considerable change in landscape character and sense of place. The impact significance is rated to **low negative** before mitigation. Mitigation measures essentially only involve best practice measures such as minimising construction duration and ensuring that rehabilitation of any areas not needed during operation happens timeously and effectively. These measures are not expected to lower the significance which thus remains **low negative** after mitigation (Table 7). Because of the many electrical features already in the landscape (substations and powerlines) and the fact that the study area falls within a REDZ and EGI Corridor (with the implication that such features are to be expected), the cumulative impacts are of limited concern. There are no fatal flaws in terms of construction phase impacts to the landscape.

**Table 7:** Assessment of construction phase impacts to the cultural landscape for SPH1, 3, 4, 5, 6, 8 and 9.

CULTURAL LANDSCAPE IMPACTS				
PROJECT PHASE	Construction Phase			
DIRECT IMPACT	Alteration of the rural landscape character through the introduction of construction equipment and vehicles and all the associated activities on site			
INDIRECT IMPACT	None			
CUMULATIVE IMPACT	Impacts will be greater with multiple facilities being constructed at once			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term	-10	3
EXTENT	3	The extent of the impact is rated as Local as it affects the development area and adjacent properties		

SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>	Slightly Detrimental	Definite
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-30	low - negative		
PROPOSED MITIGATION MEASURES				
Keep construction period as short as possible.				
Rehabilitate any areas not needed during operation as soon as possible.				
POST-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term</i>	-10	3
EXTENT	3	<i>The extent of the impact is rated as Local as it affects the development area and adjacent properties</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>	Slightly Detrimental	Definite
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-30	low - negative		
CONFIDENCE LEVEL				
High				

## 6.2. Operation Phase

### 6.2.1. Impacts to the cultural landscape – SPH1, 3, 4, 5, 6, 8 and 9

Because any physical impacts to the landscape would already have occurred during the construction phase, landscape impacts during operation are the same for all seven facilities and relate only to the presence of the facilities in what is otherwise a rural landscape. Impacts to the cultural landscape will occur during the operation phase and last as long as the lifetime of the facility. Because of the flat terrain, the impacts would not be experienced over great distances because intervening vegetation and buildings would offer partial screening. Nonetheless, the immediately surrounding area will experience a degree of change in landscape character and sense of place. The impact

significance is rated to **low negative** before mitigation. Mitigation measures essentially only involve best practice measures such as ensuring that all maintenance work remains within the authorised footprint and minimising night-time light pollution. These measures are not expected to lower the significance which thus remains **low negative** after mitigation (Table 8). Because of the many electrical features already in the landscape (substations and powerlines) and the fact that the study area falls within a REDZ and EGI Corridor (with the implication that such features are to be expected), the cumulative impacts are of limited concern. There are no fatal flaws in terms of operation phase impacts to the landscape.

**Table 8:** Assessment of operation phase impacts to the cultural landscape for SPH1, 3, 4, 5, 6, 8 and 9.

CULTURAL LANDSCAPE IMPACTS				
PROJECT PHASE	Operation Phase			
DIRECT IMPACT	Alteration of the rural landscape character through the presence of a solar energy facility			
INDIRECT IMPACT	None			
CUMULATIVE IMPACT	Impacts will be greater with multiple facilities being present			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-7	3
EXTENT	3	The extent of the impact is rated as Local as it affects the development area and adjacent properties		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected	Slightly Detrimental	Definite
IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted.		
SIGNIFICANCE	-21	low - negative		
PROPOSED MITIGATION MEASURES				
Keep all maintenance work within the authorised footprint.				
Minimise night-time light pollution in the area (visual recommendations to be followed to achieve this).				
POST-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-7	3



EXTENT	3	<i>The extent of the impact is rated as Local as it affects the development area and adjacent properties</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>	<b>Slightly Detrimental</b>	<b>Definite</b>
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-21 low - negative			
CONFIDENCE LEVEL				
High				

### 6.3. Decommissioning Phase

#### 6.3.1. Impacts to the cultural landscape – SPH1, 3, 4, 5, 6, 8 and 9

Decommissioning phase impacts will be the same for all seven facilities and relate to the presence in the rural landscape of construction equipment and vehicles, as well as to all the expected activity. Impacts to the cultural landscape will occur during the decommissioning phase and last as long as decommissioning lasts (anticipated to be up to about 12 months). Because of the flat terrain, the impacts would not be experienced over great distances because intervening vegetation and buildings would offer partial screening. Nonetheless, the immediately surrounding area will experience a considerable change in landscape character and sense of place. The impact significance is rated to **low negative** before mitigation. Mitigation measures essentially only involve best practice measures such as minimising decommissioning duration and ensuring that full and effective rehabilitation takes place with the present land use being reinstated. Because of the return to the current rural landscape, these measures are expected to lower the significance to **very low negative** after mitigation (Table 9). There are no cumulative impact concerns. There are no fatal flaws in decommissioning phase terms of impacts to the landscape.

**Table 9:** Assessment of construction phase impacts to the cultural landscape for SPH1, 3, 4, 5, 6, 8 and 9.

CULTURAL LANDSCAPE IMPACTS				
PROJECT PHASE	<i>Decommissioning Phase</i>			
DIRECT IMPACT	<i>Alteration of the rural landscape character through the presence of construction equipment and vehicles and all the associated activities on site</i>			
INDIRECT IMPACT	<i>None</i>			
CUMULATIVE IMPACT	<i>Impacts will be greater with multiple facilities being decommissioned at once</i>			
<b>DIMENSION</b>	<b>RATING</b>	<b>MOTIVATION</b>	<b>CONSEQUENCE</b>	<b>LIKELIHOOD</b>
<b>PRE-MITIGATION</b>				

DURATION	2	The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term	-10	3
EXTENT	3	The extent of the impact is rated as Local as it affects the development area and adjacent properties		
SEVERITY	-2	The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected	Slightly Detrimental	Definite
IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted.		
SIGNIFICANCE	-30	low - negative		
PROPOSED MITIGATION MEASURES				
Keep decommissioning period as short as possible.				
Remove all facilities and foundations and rehabilitate all areas on completion of decommissioning.				
Reinstate the present land use (grazing and/or agriculture).				
POST-MITIGATION				
DURATION	2	The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term	-5	3
EXTENT	3	The extent of the impact is rated as Local as it affects the development area and adjacent properties		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected	Negligible	Definite
IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted.		
SIGNIFICANCE	-15	very low negative		
CONFIDENCE LEVEL				
High				

#### 6.4. Cumulative impacts

Cumulative impacts can occur to all types of heritage during any phase of development. Many other solar PV developments and associated infrastructure have been proposed in the area. Such impacts are generally long term and affect the development sites and their immediate surroundings. Overall,

the cumulative impact significance is rated as **moderate negative**. The main driver of this is undoubtedly impacts to the landscape, although a good number of archaeological resources could easily be concealed by grass and be destroyed due to their remaining undiscovered during the impact assessment processes. Mitigation measures are the same as proposed in the SPH assessments above and would result in a reduction in the cumulative impact significance to **low negative** (Table 10).

**Table 10:** Assessment of cumulative impacts to all heritage and for all project phases for SPH1, 3, 4, 5, 6, 8 and 9.

HERITAGE IMPACTS				
PROJECT PHASE	All phases			
DIRECT IMPACT	Destruction of archaeological sites and graves and alteration of the cultural landscape			
INDIRECT IMPACT				
CUMULATIVE IMPACT	With multiple developments in a small area there is the potential to lose a larger number of heritage resources and for the landscape to be overwhelmingly altered.			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-16	3
EXTENT	3	The extent of the impact is rated as Local as it affects the development area and adjacent properties		
SEVERITY	-2	The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected	Moderately Detrimental	Definite
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted.		
SIGNIFICANCE	-48	moderate - negative		
PROPOSED MITIGATION MEASURES				
Avoid or sample archaeological sites as needed.				
Avoid and protect graves.				
Minimise construction periods.				
Ensure effective rehabilitation of any areas not needed during operation and after decommissioning.				
POST-MITIGATION				

DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term</i>	-7	3
EXTENT	2	<i>The extent of the impact is rated as site as it will affect only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>	<b>Slightly Detrimental</b>	<b>Definite</b>
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-21	low - negative		
CONFIDENCE LEVEL				
High				

## 6.5. Evaluation of impacts relative to sustainable social and economic benefits

Section 38(3)(d) of the NHRA requires an evaluation of the impacts on heritage resources relative to the sustainable social and economic benefits to be derived from the development.

The project would provide jobs to the local community during all phases of its lifetime. An estimated 300 jobs for SPH1 and 6 and 150 jobs for SPH3, 4, 5, 8 and 9 would be created at the peak of construction and 16 jobs for SPH1 and 6 and 8 jobs for SPH3, 4, 5, 8 and 9 would be created during the operational phase. The provision of a more reliable and diverse electricity supply is of considerable benefit to the country as a whole and, given the relatively limited expected impacts to heritage resources, these socio-economic benefits outweigh the impacts.

## 6.6. Existing impacts to heritage resources

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that will affect the ruins and archaeological materials. Trampling from grazing animals and/or farm/other vehicles could also occur. These impacts would be of **negligible negative** significance. There are existing electrical features in the landscape (substations and high voltage powerlines) and these do alter the sense of place to some degree. This impact can be considered to be of **low negative** significance.

## 6.7. The No-Go alternative

If the project were not implemented then the site would stay as it currently is with permitted agricultural uses continuing (impact significance of **very low negative**; Table 11). Although the heritage impacts with implementation would be greater than the existing impacts (but still generally low), the loss of socio-economic benefits is more significant and suggests that the No-Go option is less desirable.



**Table 11:** Assessment of the No-Go option.

HERITAGE IMPACTS				
PROJECT PHASE	n/a			
DIRECT IMPACT	Destruction of archaeological sites and graves and alteration of the cultural landscape			
INDIRECT IMPACT	None			
CUMULATIVE IMPACT	None expected			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-6	2
EXTENT	1	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected	Negligible	Likely
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted.		
SIGNIFICANCE	-12	very low negative		
PROPOSED MITIGATION MEASURES				
None required				
POST-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term	-6	2
EXTENT	1	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected	Negligible	Likely
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted.		
SIGNIFICANCE	-12 very low negative			
CONFIDENCE LEVEL				

## 6.8. Levels of acceptable change

Any impact to an archaeological or palaeontological resource or a grave is deemed unacceptable until such time as the resource has been inspected and studied further if necessary. Impacts to the landscape are difficult to quantify but in general a development that visually dominates the landscape from many publicly accessible vantage points is undesirable. Because of the height of the majority of the proposed development and the relatively limited use of the nearby gravel roads, such an impact to the landscape is not envisaged.

## 7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM

The actions recorded in Table 12 should be included in the environmental management program (EMPr) for the project.

**Table 12:** Heritage considerations for inclusion in the EMPr.

Impact	Mitigation / management objectives & outcomes	Mitigation / management actions	Monitoring	Frequency	Responsibility
			Methodology		
Impacts to archaeology and graves					
Impacts to archaeological sites or graves	Rescue information, artefacts or burials before extensive damage occurs	Reporting chance finds as early as possible, protect <i>in situ</i> and stop work in immediate area	Inform staff and carry out Inspections of new excavations	Ongoing basis	Construction Manager or Contractor
				Whenever on site (at least weekly)	ECO
	Preserve sites in current condition	Mark sensitive sites close to development areas as No-Go zones	Inform staff and carry out inspections of ruins to ensure no materials are being removed	Ongoing basis	Construction Manager or Contractor
				Whenever on site	ECO
Impacts to graves	Preserve graves in current condition	Install fencing and gates around graves with 5 m space between graves and fence	Inform staff and carry out inspections to ensure graves are not disturbed	Ongoing basis	Construction Manager or Contractor
				Whenever on site	ECO
Impacts to the cultural landscape					
Visible landscape scarring	Minimise landscape scarring	Ensure disturbance is kept to a minimum and does not exceed project requirements. Rehabilitate areas not needed during operation.	Monitoring of surface clearance relative to approved layout	Ongoing basis	Construction Manager or Contractor
				As required	ECO

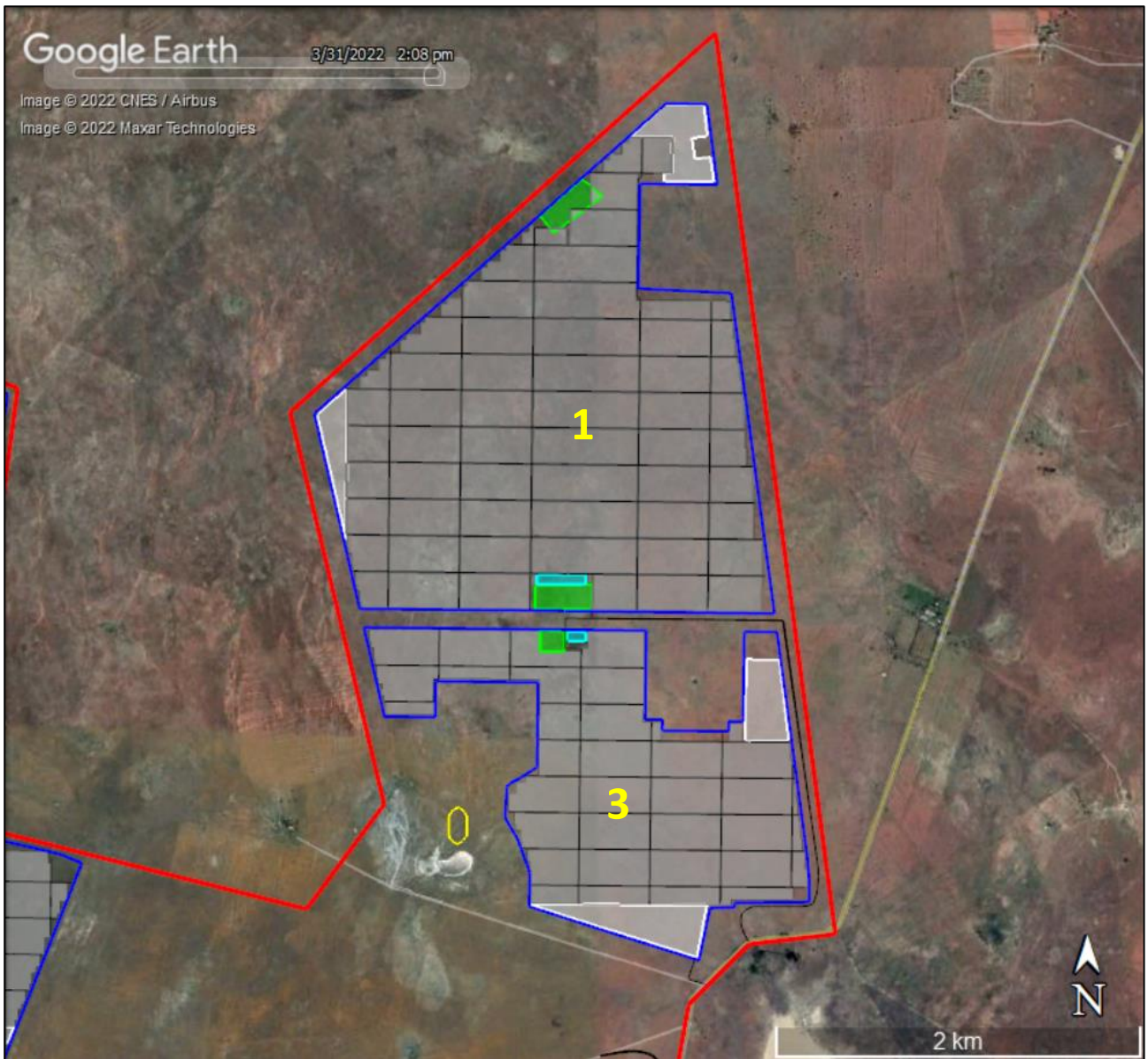
## 8. CONCLUSIONS

Due to the heritage survey being undertaken prior to the development of project layouts, almost all heritage resources have been avoided by all seven facilities. One possible resource of low cultural significance falls within the SPH1 footprint and will be impacted. This site does not require further attention. The other six facility footprints are entirely clear of heritage resources. There are no highly significant heritage issues for this project. Table 12 indicates how the project has responded to the heritage indicators.

**Table 12:** *Heritage indicators and project responses.*

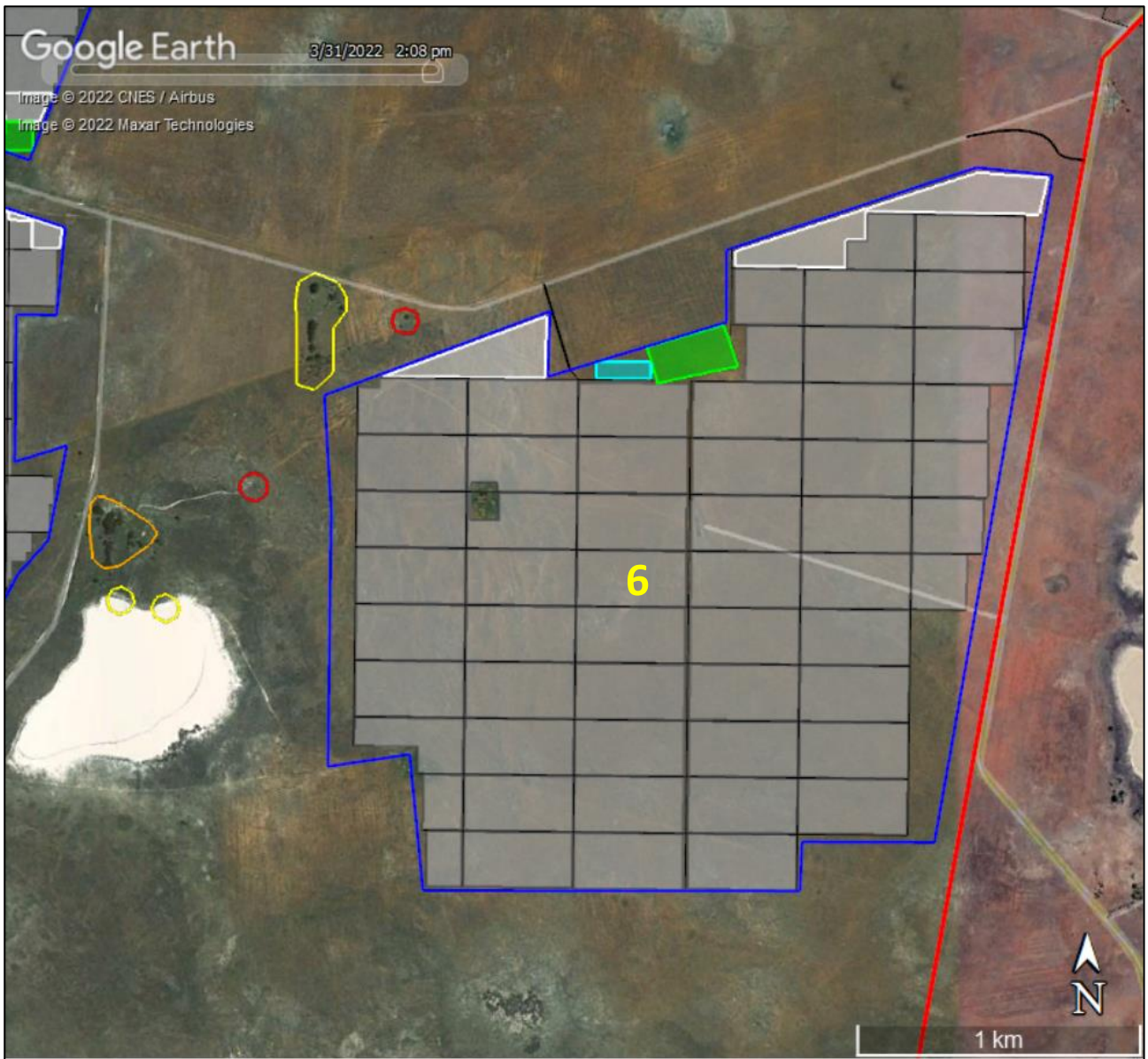
Indicator	Project Response
No significant archaeological sites should be damaged or destroyed prior to appropriate study and recording as appropriate beforehand.	All significant sites have been avoided by the proposed facilities (see Figures 69 to 72).
All graves should be avoided with a buffer of at least 30 m around them.	All graves have been avoided by more than 30 m.
The proposed facilities should not dominate views from multiple viewpoints.	Given the flat landscape and lack of main roads in the immediate area, such impacts are not expected.

None of the alternatives listed in Section 1.1 affects any known heritage resources and thus all alternatives are equally acceptable from a heritage point of view.

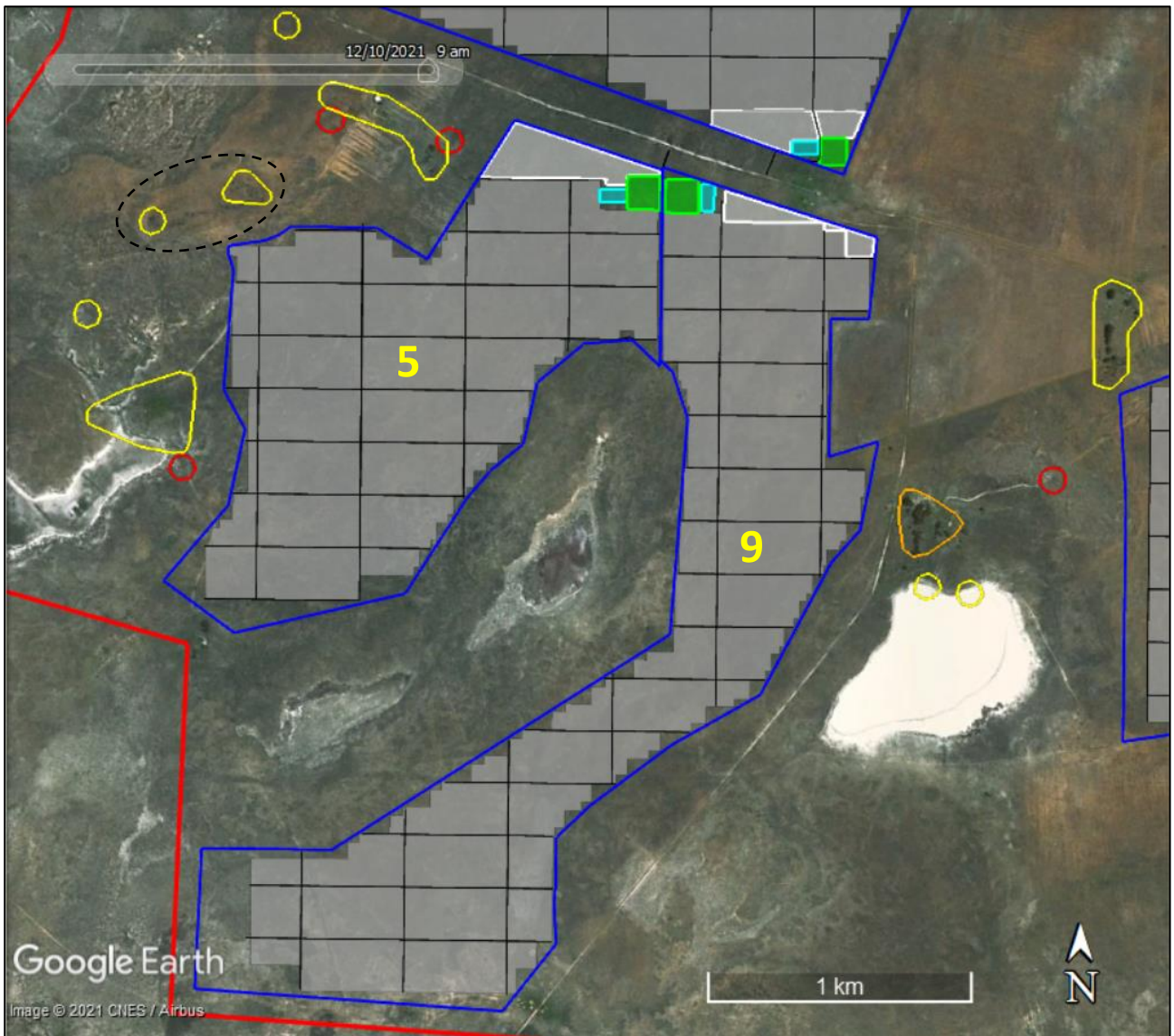


**Figure 69:** Aerial view of the proposed development (SPH project numbers in yellow) with all heritage sensitivity polygons shown. Yellow = medium sensitivity (Grades GPA and/or GPB).



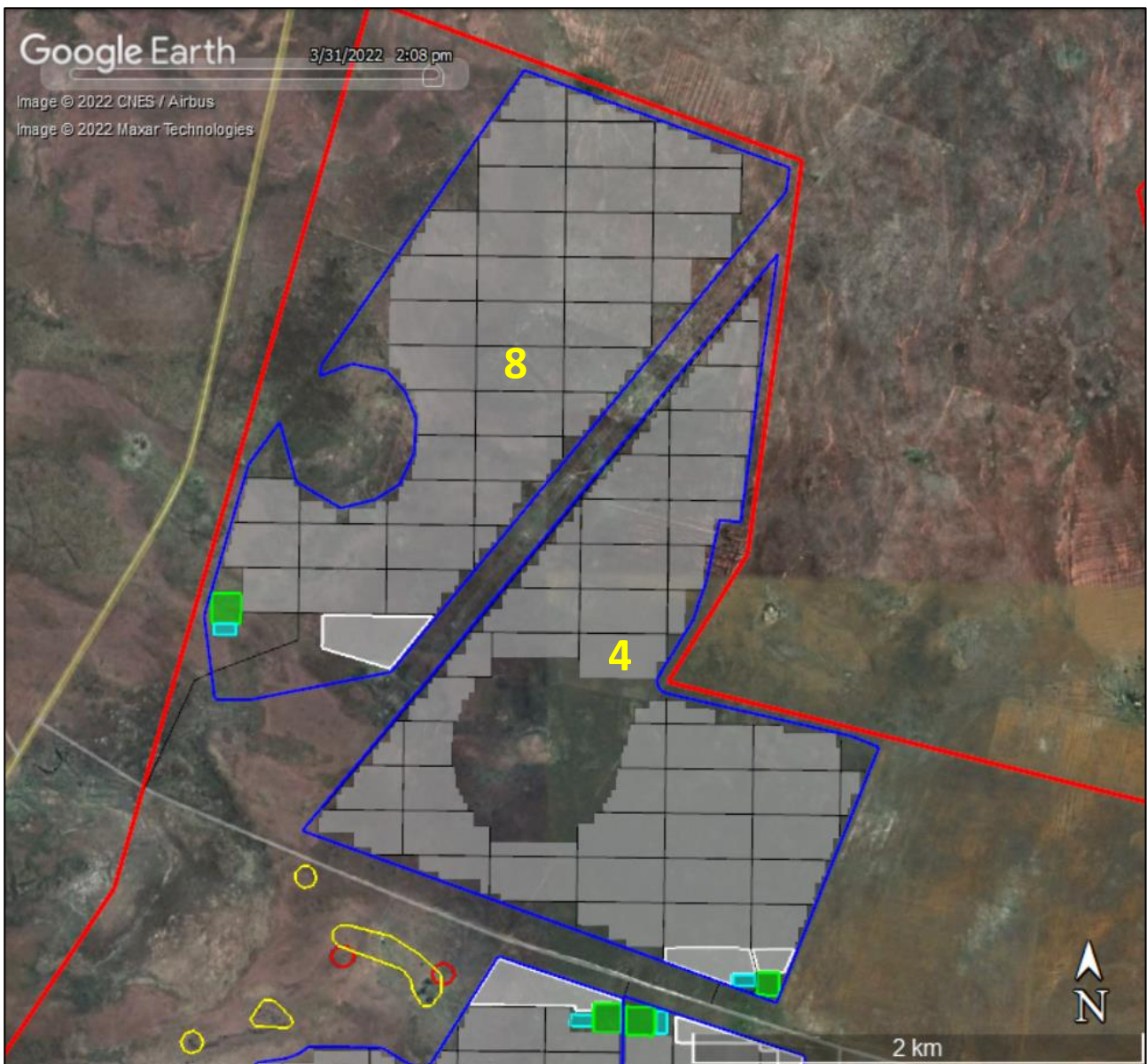


**Figure 70:** Aerial view of the proposed development (SPH project numbers in yellow) with all heritage sensitivity polygons shown. Yellow = low sensitivity (Grades GPA and/or GPB), orange = medium sensitivity (Grade IIIB), red = high sensitivity (Grade IIIA).



**Figure 71:** Aerial view of the proposed development (SPH project numbers in yellow) with all heritage sensitivity polygons shown. Yellow = low sensitivity (Grades GPA and/or GPB), orange = medium sensitivity (Grade IIIB), red = high sensitivity (Grade IIIA).





**Figure 72:** Aerial view of the proposed development (SPH project numbers in yellow) with all heritage sensitivity polygons shown. Yellow = low sensitivity (Grades GPA and/or GPB), red = high sensitivity (Grade IIIA).

## 8.1. Reasoned opinion of the specialist

### 8.1.1. SPH1

The project has avoided most known heritage resources, with the only sites to be impacted being of low cultural significance. Significant heritage impacts are therefore not expected to occur and it is thus the opinion of the heritage specialist that the proposed SPH1 project may be authorised in full, including any of the development-related alternatives.

### 8.1.2. SPH3, 4, 5, 6, 8 and 9

Due to the projects having avoided all known heritage resources, significant heritage impacts are not expected to occur and it is thus the opinion of the heritage specialist that the proposed SPH3,

4, 5, 6, 8 and 9 projects may be authorised in full, including any of the development-related alternatives (SPH3 only).

## 9. RECOMMENDATIONS

It is recommended that all seven proposed SPH PV facilities should be authorised but subject to the conditions shown below.

- No materials may be removed from any of the ruined and/or demolished structures falling outside the various project and associated infrastructure footprints anywhere in the wider site;
- All known and unfenced graves within any farm portion affected by construction (waypoints 362, 404) must be fenced with farm-style fences and pedestrian gates with the fences located a minimum of 5 m from the graves;
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

## 10. REFERENCES

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## APPENDIX 1 – Curriculum Vitae



### *Curriculum Vitae*

**Jayson David John Orton**

ARCHAEOLOGIST AND HERITAGE CONSULTANT

#### Contact Details and personal information:

**Address:** 23 Dover Road, Muizenberg, 7945  
**Telephone:** (021) 788 1025  
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**Email:** jayson@asha-consulting.co.za  
  
**Birth date and place:** 22 June 1976, Cape Town, South Africa  
**Citizenship:** South African  
**ID no:** 760622 522 4085  
**Driver's License:** Code 08  
**Marital Status:** Married to Carol Orton  
**Languages spoken:** English and Afrikaans

#### Education:

SA College High School	Matric	1994
University of Cape Town	B.A. (Archaeology, Environmental & Geographical Science) 1997	
University of Cape Town	B.A. (Honours) (Archaeology)*	1998
University of Cape Town	M.A. (Archaeology)	2004
University of Oxford	D.Phil. (Archaeology)	2013

\*Frank Schweitzer memorial book prize for an outstanding student and the degree in the First Class.

#### Employment History:

Spatial Archaeology Research Unit, UCT	Research assistant	Jan 1996 – Dec 1998
Department of Archaeology, UCT	Field archaeologist	Jan 1998 – Dec 1998
UCT Archaeology Contracts Office	Field archaeologist	Jan 1999 – May 2004
UCT Archaeology Contracts Office	Heritage & archaeological consultant	Jun 2004 – May 2012
School of Archaeology, University of Oxford	Undergraduate Tutor	Oct 2008 – Dec 2008
ACO Associates cc	Associate, Heritage & archaeological consultant	Jan 2011 – Dec 2013
ASHA Consulting (Pty) Ltd	Director, Heritage & archaeological consultant	Jan 2014 –

#### Professional Accreditation:

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233

CRM Section member with the following accreditation:

- Principal Investigator: Coastal shell middens (awarded 2007)  
Stone Age archaeology (awarded 2007)  
Grave relocation (awarded 2014)
- Field Director: Rock art (awarded 2007)  
Colonial period archaeology (awarded 2007)

Association of Professional Heritage Practitioners (APHP) membership number: 43

- Accredited Professional Heritage Practitioner

### ➤ **Memberships and affiliations:**

South African Archaeological Society Council member	2004 – 2016
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 –
UCT Department of Archaeology Research Associate	2013 –
Heritage Western Cape APM Committee member	2013 –
UNISA Department of Archaeology and Anthropology Research Fellow	2014 –
Fish Hoek Valley Historical Association	2014 –
Kalk Bay Historical Association	2016 –
Association of Professional Heritage Practitioners member	2016 –

### **Fieldwork and project experience:**

Extensive fieldwork and experience as both Field Director and Principle Investigator throughout the Western and Northern Cape, and also in the western parts of the Free State and Eastern Cape as follows:

#### Feasibility studies:

- Heritage feasibility studies examining all aspects of heritage from the desktop

#### Phase 1 surveys and impact assessments:

- Project types
  - Notification of Intent to Develop applications (for Heritage Western Cape)
  - Desktop-based Letter of Exemption (for the South African Heritage Resources Agency)
  - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
  - Archaeological specialist studies
  - Phase 1 archaeological test excavations in historical and prehistoric sites
  - Archaeological research projects
- Development types
  - Mining and borrow pits
  - Roads (new and upgrades)
  - Residential, commercial and industrial development
  - Dams and pipe lines
  - Power lines and substations
  - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

#### Phase 2 mitigation and research excavations:

- ESA open sites
  - Duinefontein, Gouda, Namaqualand
- MSA rock shelters
  - Fish Hoek, Yzerfontein, Cederberg, Namaqualand
- MSA open sites
  - Swartland, Bushmanland, Namaqualand
- LSA rock shelters
  - Cederberg, Namaqualand, Bushmanland
- LSA open sites (inland)
  - Swartland, Franschhoek, Namaqualand, Bushmanland
- LSA coastal shell middens
  - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
- LSA burials
  - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
- Historical sites
  - Franschhoek (farmstead and well), Waterfront (fort, dump and well), Noordhoek (cottage), variety of small excavations in central Cape Town and surrounding suburbs
- Historic burial grounds
  - Green Point (Prestwich Street), V&A Waterfront (Marina Residential), Paarl

### **Awards:**

Western Cape Government Cultural Affairs Awards 2015/2016: Best Heritage Project.



## APPENDIX 2 – List of heritage resources

Note that where doubt as to the age if a site exists it has been given a heritage grade for precautionary reasons.

Waypoint	Location	Description	Significance (grade)
291	S28 48 58.6 E25 39 57.2	A gum tree grove, probably seeded from the tree line at 292.	Low-medium
292	S28 48 55.7 E25 39 56.7	A double windrow of large gum trees.	Low-medium
293	S28 48 52.2 E25 39 58.7	A rectangular one-room cottage of 2.5 x 3 m with a door facing east and a window in the west wall. The door frame has been removed but the window frame is still present. The walls are built of calcrete, and both dressed and undressed dolerite. The walls are of two skins and the outside one has very little calcrete included while the inside has very little dolerite. The wall blocks have mud mortar in between them but some cement has been applied to the outside in places. The inside is plastered with mud mortar. The flat roof slopes down towards the west.	Medium (GPA)
294	S28 48 51.3 E25 39 59.1	A rectangular cottage with a pitched roof with gables to north and south. The door faces east and there are windows to the north and west. There is also a small loft door in the northern gable. The walls are a mix of calcrete, shale and dolerite but the lowermost 1 m is mostly calcrete. The walls are made with mud mortar but some cement has been applied to the outside as well. The inside walls are plastered with mud mortar to ceiling height only. The front door frame is gone but the other three openings still have their frames. The southern gable is severely cracked and will collapse soon. There are seven beams inside with two being planed and the other five rough, thin gum poles. There is a small wooden corner shelf in the south-western corner of the room. There are three small cavities in the southern inside wall which may have held fittings. The window sill is worm smooth and has a scratched section, possibly to smooth it deliberately. There is a corrugated iron roof. An L-shaped room has been added to the west side with its southern end open. Its floor is paved with dolerite and cement.	Medium (GPA)
295	S28 48 51.0 E25 39 59.6	A brick house ruin with about 50% of its walls collapsed. It is built on a dolerite plinth and had gables to north and south with a relatively low-angled pitched roof. The outside walls have grey cement plaster on them. There is dolerite paving along the southern side of the house. One small window facing south has a frame, while another window and a door in the south wall have wooden lintels but no frames. There are two windows in the north wall, one of which has only a wooden lintel remaining. The south-western room has a cement floor but the rest of the floor cannot be seen due to collapsed walling. The inside walls were plastered with mud mortar. The brick courses alternate at 90° to one another. The lower walls to	Medium (GPA)

Waypoint	Location	Description	Significance (grade)
		ceiling height are 1.5 brick-lengths thick, while the gable walls above are just one brick-length thick. The western part of the house was added to the rest but given that all materials are the same this must have happened soon after the original construction. All bricks have frogs in the and look to have been locally made. The firing was variable as evidenced by the variability in the degree of weathering of the bricks. One commercially sourced "Coronation" brick was seen on the grass outside the house. A gigantic pepper tree to the north has partially collapsed onto the house. There are six cypress trees outside the front (east) side, equally spaced with three each side of where the front path would have been, assuming a central doorway. There is calcrete garden detailing around the trees. Five have died with just one retaining some small shoots. There is another large pepper tree about 35 m to the southeast of the house. It is notable that no glass or ceramics were seen anywhere around this complex.	
296	S28 48 50.0 E25 39 59.1	The ephemeral remains of a calcrete structure with wide walls, possibly a water reservoir.	Very low (GPC)
297	S28 48 49.4 E25 39 57.2	A set of five large gum trees that align with the double windrow at waypoint 292.	Low-medium
298	S28 48 50.7 E25 39 56.7	A stone structure of about 9 x 15 m built against a fence. There is a smaller room of 4 x 5 m built on the west side of the northern end wall. The fence and a pepper tree lie along the eastern wall. The structure was likely a kraal. It is built of calcrete blocks.	Low (GPB)
299	S28 49 14.5 E25 39 31.2	A low circular reservoir built of calcrete and dolerite.	Low (GPB)
300	S28 49 14.7 E25 39 29.8	A kraal built of calcrete and cement and with a corrugated iron pitched roof shed built on its southern edge. The eastern wall of the shed has collapsed and been removed and been replaced by a corrugated iron wall. The rest of its walls are of red brick. There are two sets of three small, loophole-type openings in the southern wall of the shed. The kraal is somewhat derelict with some damaged sections but wooden fences inside and a new brick and cement entrance at the north-eastern corner betray some more recent use. There is also a loading ramp.	Medium-high (IIIB)
301	S28 49 15.5 E25 39 30.8	A house ruin set amidst a grove of enormous pepper trees and one other species. The house layout is described via its plan drawing below. The stoep seems to have had its eastern enclosing wall built at a later date with newer materials, but the room to the south and the wall to the north are original walls. The stoep roof may have had other supports originally. The original walls are of locally made red frog bricks with mud mortar in between them. The outside is plastered with stippled cement. The inside walls are plastered with mud mortar over which whitewash has been painted. The original northwestern room has green painted walls over a soft grey plaster. The centre-western room has green paint around the window and the remnants of wallpaper in two places (one of which	Medium-high (IIIB)

Waypoint	Location	Description	Significance (grade)
		includes the word “wallpaper” which was left behind from the back of the paper. The front door of the house had a fanlight above it and there are vestiges of cement plaster over the mud plaster on the eastern wall of the voorkamer. There are the remains of metal gutters and downpipes in some places. The small outside room on the south-western corner appears to have been original, but the bathroom was added to the north-western corner at a later stage and was built using different materials and has slightly higher doors. The bathroom has a basin and bath in it and one can see where a gas water heater was mounted alongside the bath on the east wall of the bathroom. There is part of an ambulance behind the house and a small, circular calcrete structure with an entrance facing the house occurs right behind the back wall of the house.	
302	S28 49 17.0 E25 39 30.5	An outside toilet (long-drop)( built of red frog bricks, mud mortar and whitewash, although there is a thin band of cement around the base of the wall and around the top. It has a corrugated iron roof sloping down to the west and its door open to the east.	Low (GPB)
303	S28 49 19.2 E25 39 30.0	A stone feature of unknown function with a narrow, deep channel built of dolerite blocks and areas of calcrete paving at each end.	Low (GPB)
304	S28 49 19.8 E25 39 30.2	A line of huge pepper trees that have been badly burnt and largely killed in a recent fire.	Low
305	S28 49 19.4 E25 39 33.4	The ephemeral remains of a calcrete-walled water reservoir with a derelict wind pump alongside it. A hornfels flake and core were also seen here.	Very low (GPC)
306	S28 49 17.5 E25 39 34.8	A modern brick building with steel beam and IBR roof sheets. 1956 aerial photograph shows it present.	Low
307	S28 49 18.7 E25 39 37.2	A stone feature of dolerite amongst some trees. It likely represents a pile of rocks dumper there.	Very low (GPC)
308	S28 49 26.0 E25 39 37.8	A widespread, moderate density scatter of hornfels artefacts in the northern edge of a large pan. All are variably patinated but are still a shade of grey rather than red/brown. Age indeterminate but colour suggests more likely older LSA.	Low (GPB)
309	S28 49 25.2 E25 39 31.7	An area with high density hornfels artefact scatter inside the northern edge of the pan. All are variably patinated but are still a shade of grey rather than red/brown. Age indeterminate but colour suggests more likely older LSA. It is notable that around the north and west sides of the pan there are artefacts on the pan surface but minimal artefacts at the base of the slope leading out of the pan and none further up where the calcrete is or above the slope. In the south and east there is extensive pan dune accumulation and either the archaeology is buried or else this part of the pan was not favoured for occupation. There were very few artefacts in this area. The occupation seems to have focused in the north where the pan is deepest and water accumulates first. Just one ostrich eggshell fragment was seen on the pan dune in the southeast.	Medium (GPA)
310	S28 49 38.0 E25 39 45.2	A calcrete stone alignment on the pan dune and leading into the pan. It might once have been the base of a fence.	Very low (GPC)

Waypoint	Location	Description	Significance (grade)
311	S28 49 29.0 E25 37 50.4	An ephemeral scatter of LSA hornfels artefacts in an area near some natural swales. The scatter includes a lightly patinated duckbill endscraper and a rotated bipolar core.	Very low (GPC)
312	S28 49 27.6 E25 37 47.6	An ephemeral scatter of LSA hornfels artefacts in an area near some natural swales. There are also a few red-patinated background scatter artefacts.	Very low (GPC)
313	S28 49 15.7 E25 37 32.7	A U-shaped dolerite stone feature on the grassy base of a large pan. The walling has badly tumbled, or perhaps been deliberately pulled apart. The arms of the U are about 9 m long, while the section between them is about 22 m long. Historical aerial photography suggests that there was some activity here in the past, perhaps agriculture.	Very low (GPC)
314	S28 49 12.5 E25 37 33.2	An ephemeral scatter of hornfels artefacts along the northern edge of a large grassy pan. All are variably patinated but are still a shade of grey rather than red/brown.	Very low (GPC)
315	S28 49 04.1 E25 37 36.8	These points represent the ends of a large stone-lined dam wall that has breached in the middle. It dams the inlet to a large grassy pan. Some historical glass, ceramics and bone (mostly burnt) have been dug out of animal burrows in the middle of the wall.	Low (GPB)
316	S28 49 02.7 E25 37 40.6		
317	S28 49 04.2 E25 37 42.6	A rectangular foundation of calcrete blocks measuring 3 x 4 m and overlooking the pan. There is a scatter of calcrete and dolerite blocks and bricks around the foundation.	Low (GPB)
318	S28 49 03.3 E25 37 43.7	These four points represent a square stone foundation. The east and west walls are built of two skins of calcrete blocks, but the southern wall is just a single line of stones. The walling fades out at waypoints 318 and 321 but there are corners at 319 and 320.	Low (GPB)
319	S28 49 06.6 E25 37 43.3		
320	S28 49 07.2 E25 37 47.4		
321	S28 49 04.5 E25 37 47.4		
322	S28 49 01.6 E25 37 48.7	A calcrete and dolerite stone-packed mound measuring 1 x 2 m and aligned north-south.	Very low (GPC)
323	S28 49 00.8 E25 37 48.7	A calcrete and dolerite mound of rocks with ephemeral traces of walling measuring 3 x 3 m. There is also a piece of an iron bed amongst the rocks.	Low (GPB)
324	S28 49 01.3 E25 37 46.3	A rectangular structure of calcrete and dolerite measuring about 9 x 15 m and which was probably a water reservoir.	Low (GPB)
325	S28 48 55.0 E25 37 13.7	Ephemeral traces of an old track visible as a long, straight, shallow depression in the grass.	Very low (GPC)
326	S28 48 40.1 E25 37 44.4	A dolerite boulder on a dolerite dyke with very ephemeral traces of scratching on it.	Very low (GPC)
327	S28 48 40.3 E25 37 44.6	A dolerite boulder with a lightly ground patch on it.	Very low (GPC)
328	S28 48 40.7 E25 37 44.3	A circular stone enclosure of about 4 m diameter formed by clearing the dolerite rocks to the edge of the circle. One red-patinated background scatter artefact was seen inside. Otherwise no associated artefacts.	Low (GPB)



Waypoint	Location	Description	Significance (grade)
329	S28 48 40.7 E25 37 44.6	A circular stone enclosure of about 4 m diameter formed by clearing the dolerite rocks to the edge of the circle. No associated artefacts.	Low (GPB)
330	S28 48 40.3 E25 37 44.8	A dolerite boulder with a lightly ground patch on it.	Very low (GPC)
331	S28 48 40.5 E25 37 46.7	A dolerite cairn on the crest of the dyke.	Very low (GPC)
332	S28 48 40.4 E25 37 48.3	A dolerite boulder with three ground patches on it.	Very low (GPC)
333	S28 48 40.1 E25 37 48.6	A dolerite boulder with ephemeral unpatinated scratches on it.	Very low (GPC)
334	S28 48 39.8 E25 37 48.4	A dolerite boulder with a ground patch on it.	Very low (GPC)
335	S28 48 39.7 E25 37 49.9	A dolerite boulder with a ground patch on it.	Very low (GPC)
336	S28 48 40.1 E25 37 49.9	A stone feature made with seven dolerite rocks placed in a C-shape.	Very low (GPC)
337	S28 48 39.3 E25 37 51.5	A dolerite boulder with a ground patch on it, but it is well-enough ground that the patch is almost a shallow groove.	Very low (GPC)
338	S28 48 39.0 E25 37 54.0	A dolerite boulder with a ground patch on it.	Very low (GPC)
339	S28 48 38.9 E25 37 54.2	A dolerite boulder with a ground patch on it.	Very low (GPC)
340	S28 48 39.7 E25 37 55.3	A rectangular stone foundation of dolerite blocks measuring about 3.5 x 10 m. A dividing wall separates a 3 m long section in the south from a 7 m long section in the north. There was one plain white vitreous ceramic fragment alongside the ruin and several fragments of green, brown and pink glass were seen on the slope to the north.	Low (GPB)
341	S28 48 38.6 E25 37 55.9	A dolerite boulder with a ground patch on it.	Very low (GPC)
342	S28 48 38.4 E25 37 57.0	An overgrown enclosure built with large dolerite blocks. It is about 6 x 6 m.	Low (GPB)
343	S28 48 38.2 E25 37 58.1	Two dolerite rocks with pecked lettering about 15 cm high. One says "TAB" while the other is less well-preserved but probably says the same thing. Very likely not old enough to be archaeological.	Very low (GPC)
344	S28 48 38.3 E25 37 58.6	Two dolerite rocks, one with pecked lettering saying "TOMMY" and the other with an indeterminate motif. Very likely not old enough to be archaeological.	Very low (GPC)
345	S28 48 38.6 E25 37 59.8	A dolerite rock with "FN" scratched on it.	Very low (GPC)
346	S28 48 37.5 E25 37 59.1	The southern end of an ephemeral dolerite stone alignment/wall. This and next several points form a single stone-walled complex that is assumed to be historical in age.	Medium (GPA)
350	S28 48 37.2 E25 37 57.6	Ephemeral stone walling continuing on from 346.	
351	S28 48 36.7 E25 37 57.6	Ephemeral stone walling.	
352	S28 48 36.0 E25 37 56.4	Ephemeral stone walling. There is also a rock with a ground patch on it here.	
353	S28 48 36.2 E25 37 56.1	Stone walling.	

Waypoint	Location	Description	Significance (grade)
354	S28 48 36.2 E25 37 55.8	A large dolerite cairn on the summit of the dyke.	
355	S28 48 36.6 E25 37 55.7	The south-western end of the wall extending from 352, past 353 to this point. A stone mound/cairn forms a corner point for the stone-walled complex here.	
356	S28 48 36.6 E25 37 56.1	A heavily overgrown stone-walled structure with thick walls. The base of a black case bottle was seen just to the north.	
357	S28 48 36.9 E25 37 55.7	A 9 x 9 m square enclosure with thick walls of dolerite blocks. The walls are made with two skins and a rubble fill.	
359	S28 48 37.4 E25 37 58.7	Another point on the walling at a slight bend.	
347	S28 48 37.7 E25 37 58.8	A dolerite rock with a scratched indeterminate motif. Very likely not old enough to be archaeological.	Very low (GPC)
348	S28 48 37.9 E25 37 58.7	A dolerite rock with "JAB" pecked onto it in large lettering. There are also some scratches here. Another rock has "YP", "NB", "EP" and some other indeterminate letters scratched on it. Another rock has "N Blay" scratched on it and "TAB" pecked on it. The latter is poorly preserved. Very likely not old enough to be archaeological.	Very low (GPC)
349	S28 48 37.7 E25 37 58.2	A dolerite rock with "YP" scratched on it. Another rock has some scratches and peck marks. Very likely not old enough to be archaeological.	Very low (GPC)
358	S28 48 36.1 E25 37 54.3	A dolerite boulder with a ground patch on it.	Very low (GPC)
360	S28 48 32.0 E25 37 58.2	A dolerite boulder with a ground patch on it.	Very low (GPC)
361	S28 48 32.0 E25 38 01.8	A dolerite boulder with a ground patch on it.	Very low (GPC)
362	S28 48 28.4 E25 38 09.0	A set of six graves, one of them bearing a date of 1923 on its almost illegible inscription. Four of them are just stone-packed mounds. The other one's inscription is completely illegible.	High (IIIA)
363	S28 48 26.2 E25 38 08.6	A small enclosure made with various metal poles and pieces of metal including car parts and a spring mattress around the sides. Likely less than 100 years old.	Very low (GPC)
364	S28 48 25.5 E25 38 09.0	A brick ruin demolished to ground level built with red frog bricks and with some cement visible around the outside. Many bricks as well as some dolerite blocks and metal sheets are lying about. Likely less than 100 years old.	Low (GPB)
365	S28 48 24.2 E25 38 08.9	A dump of c. 1960s bottles, rocks and metal.	n/a
366	S28 48 23.0 E25 38 11.1	A modern brick and cement cottage with internal corner hearth, steel doorframe and a concrete plinth.	n/a
367	S28 48 27.3 E25 38 16.1	The ephemeral remains of a dolerite-lined water reservoir of about 20 x 30 m. There is a round, brick water tank on the eastern end. A newer cement and brick dam occurs alongside to the northwest and the 1956 aerial photograph shows it to have already been present at that time.	Low (GPB)
368	S28 48 29.5 E25 38 20.7	A dolerite- and calcrete-walled square ruin with several openings, some doors and some windows.	Medium (GPA)

Waypoint	Location	Description	Significance (grade)
		Some of them have been partially filled in. The walls are double skin walls and on the outside dolerite has been used around the bottom and up the corners with calcrete filling in the rest. Inside is mixed.	
369	S28 48 30.0 E25 38 20.7	A circular water well of about 3 m diameter. It is only about 1.5 m deep, perhaps filled in over the years. It is cut into the calcrete and dolerite. There is a potential for archaeology in the base of the well.	Medium (GPA)
370	S28 48 32.6 E25 38 22.1	A circular stone feature of about 5 m diameter and of indeterminate function. A copper plate with stamped text lies next to it.	Low (GPB)
371	S28 48 33.3 E25 38 22.2	A square stone ruin of 1.5 m diameter. The walls are built of dressed dolerite blocks.	Low (GPB)
372	S28 48 33.9 E25 38 23.2	A stone-line reservoir of about 20 x 25 m.	Low (GPB)
373	S28 48 32.6 E25 38 22.9	A poorly preserved dolerite and brick ruin. Just an L-shaped wall still standing with the lower half built of dolerite and the upper half of brick.	Low (GPB)
374	S28 48 32.0 E25 38 22.9	A very poorly preserved house ruin built with brick and dolerite. Wall sections are the same material to full height with brick and dolerite sections adjoining one another. The hearth area is still standing and the hearth has a reinforced concrete slab over it with a hole at the back, presumably indicating a dover stove with flue.	Low (GPB)
375	S28 48 31.9 E25 38 23.4	A dolerite and brick enclosure with poorly preserved internal plastering. It has no entrance and was probably a water reservoir. It is about 5 x 8 m. The lower walls are of dolerite and the upper walls are thinner and of brick. Fairly intact but for one damaged corner.	Medium (GPA)
376	S28 48 31.0 E25 38 25.3	Two fenced graves with the names Anna Elizabeth van Heerden (1858-1935) and Pieter Willem van Heerden (1854-1928).	High (IIIA)
377	S28 48 32.1 E25 38 26.6	A dolerite and calcrete ruin with two rooms and another wall extending off towards the east.	Low (GPB)
378	S28 48 52.1 E25 37 35.1	A dolerite and cement-lined water reservoir that has calcrete rocks around the outside. It is about 5 x 10 m in size.	Low (GPB)
379	S28 49 08.6 E25 37 21.7	A light hornfels scatter on the north edge of a pan. All are variably patinated but are still a shade of grey rather than red/brown.	Very low (GPC)
380	S28 49 16.1 E25 37 27.4	A widespread but very ephemeral scatter of hornfels artefacts occurs on the grassy surface of the pan. All are variably patinated but are still a shade of grey rather than red/brown. Age indeterminate but colour suggests more likely older LSA.	Very low (GPC)
381	S28 49 10.7 E25 37 48.2	A small fenced graveyard containing nine visible graves and possibly up to three more graves where isolated stones lie. One grave has no stones but a granite headstone is present with the name of Jacob Petrus Britz 1882-1914. One grave has some bricks on top of it and the other seven all have calcrete stone toppings. The graveyard is heavily burrowed and a scapula fragment lies on the surface. It is not possible to confirm whether it is human or not.	High (IIIA)

Waypoint	Location	Description	Significance (grade)
382	S28 49 13.0 E25 40 20.6	The remains of a dolerite-lined reservoir next to a wind pump. The reservoir is represented only by a depression with a single line of stones around it.	Very low (GPC)
383	S28 48 53.8 E25 40 10.0	A small enclosure of metal poles and wire fencing with piles of calcrete on two sides.	Very low (GPC)
384	S28 48 53.5 E25 40 08.8	An oval-shaped packed stone feature of about 1 m by 1.5 m. Its long axis is aligned east-west, but it is very close to a ruined structure, perhaps too close to be a grave. It is treated as IIIA for precautionary reasons but could be tested if necessary to determine whether it is indeed a grave or not.	High (IIIA)
385	S28 48 52.7 E25 40 08.2	A collapsed brick structure. There are also some calcrete rocks in amongst the bricks as well as three concrete lintels. One of them is broken and shows reinforcing with barbed wire, presumably suggesting that they were made locally. There is also a dolerite lower grindstone amongst the rubble. The bricks are red frog bricks of two types. One has "WEGO" on the frog.	Low (GPB)
386	S28 48 17.0 E25 38 03.0	The remains of a square stone structure about 6 x 6 m. The dolerite rocks are quite well dispersed, but one can still see the wall footing in places.	Low (GPB)
387	S28 48 11.8 E25 37 50.7	A shallow earth dam.	Very low (GPC)
388	S28 47 05.4 E25 40 47.4	A red brick and mud mortar cottage on a stone (shale) plinth and with a corrugated iron roof. There are reinforced cement lintels and windowsills. The inside and outside walls were plastered with mud mortar but there is almost nothing left on the outside. The door and window frames have been removed. The internal walls have largely been demolished, perhaps to facilitate use of the cottage as a store room. A short section of guttering sits above the east-facing front door. A door in the north gable has been filled in with the same materials as the walls suggesting it to have been done shortly after construction. The main cottage is rectangular and a smaller room has been built on the north end of the west side. The latter room is partly collapsed. 20 <sup>th</sup> century age built using more traditional methods to save costs.	Low (GPB)
389	S28 47 07.5 E25 40 51.1	The poorly preserved remains of a dolerite-lined dam.	Very low (GPC)
390	S28 47 07.3 E25 40 47.7	An ash and rubbish midden with only modern materials on it. There is a chance that there could be older material below but this seems unlikely given the dearth of historical artefacts throughout the study area. Not considered a heritage resource. The site is between a modern occupied cottage and a ruin that is likely early-20 <sup>th</sup> century.	---
391	S28 47 43.5 E25 40 40.0	A largely silted up earth dam alongside a now derelict wind pump.	Very low (GPC)
392	S28 47 48.1 E25 40 37.8	This seems like the site of an old spring. Some earthworks have been carried out to direct the flow of water and it seems that what was probably a pan in the past just to the east of the spring has been excavated out to result in a shallow dam.	Very low (GPC)



Waypoint	Location	Description	Significance (grade)
393	S28 47 52.6 E25 40 32.3	A small derelict cottage located just outside the study area. It was not visited but appears from a distance to have been built with cement blocks.	Low (GPB)
394	S28 47 58.5 E25 40 45.9	A light scatter of patinated, but still dark grey and black, hornfels flakes, chunks and a blade located in the north-western part of a pan. This area is grassy.	Very low (GPC)
395	S28 47 56.7 E25 40 52.8	Another concentration of hornfels flakes and chunks but in the north-eastern part of the pan where the surface is silty.	Very low (GPC)
396	S28 47 59.9 E25 40 50.1	Another concentration of hornfels flakes and chunks but this time on the southern part of the pan on the silty surface. Also an irregular core seen here.	Very low (GPC)
397	S28 47 56.9 E25 40 48.0	Another concentration of hornfels flakes and chunks but in the northern part of the pan where the surface is grassy.	Very low (GPC)
398	S28 47 50.8 E25 40 52.7	A very poorly preserved dolerite and calcrete ruin with its long axis north-south. A small piece of flat metal was present.	Low (GPB)
399	S28 47 50.0 E25 40 52.8	A very poorly preserved calcrete ruin lying immediately to the north of 398. It was made with two skins and a rubble fill and also has its long axis north-south. The two structures were built on the same alignment.	Low (GPB)
400	S28 47 50.6 E25 40 53.6	An oval-shaped mound capped with calcrete with its long axis east-west. There is a scattering of other rocks around the area and it is very close to the house ruin (about 20 m from where its front door would have been), both of which suggest the feature is not a grave. It was not photographed because of being heavily overgrown with grass.	Very low (GPC)
401	S28 47 53.3 E25 40 52.7	A calcrete and dolerite kraal with two primary enclosures and a very small one attached to the south-eastern corner. The main enclosure is about 26 x 15 m. The secondary one about 8 x 8 m and the smallest 2 x 2 m.	Medium (GPA)
402	S28 48 23.6 E25 40 57.5	Very ephemeral background scatter of hornfels artefacts in an area of dolerite gravel exposure. Only three artefacts seen. Probably MSA.	Very low (GPC)
403	S28 48 32.3 E25 40 41.7	Piles of dolerite rocks have been removed from the old ploughed lands and dumped in the pan at this location. Not a heritage resource.	---
404	28 49 12.2 25 39 49.2	Set of graves found by another consultant. From the photographs, four graves appear to be present. Two have dolerite cappings and two calcrete with one of the latter also having a small cement headstone with a date of 1915 on it (this might be a birth date though).	IIIA

## APPENDIX 3 – Mapping

### Key:

#### Project components:

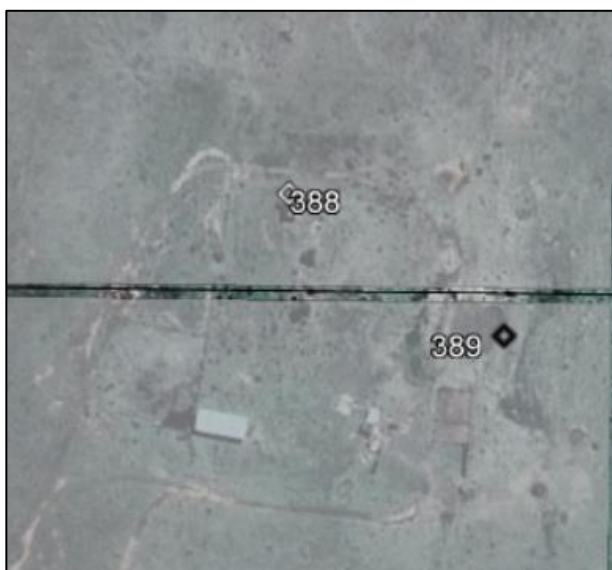
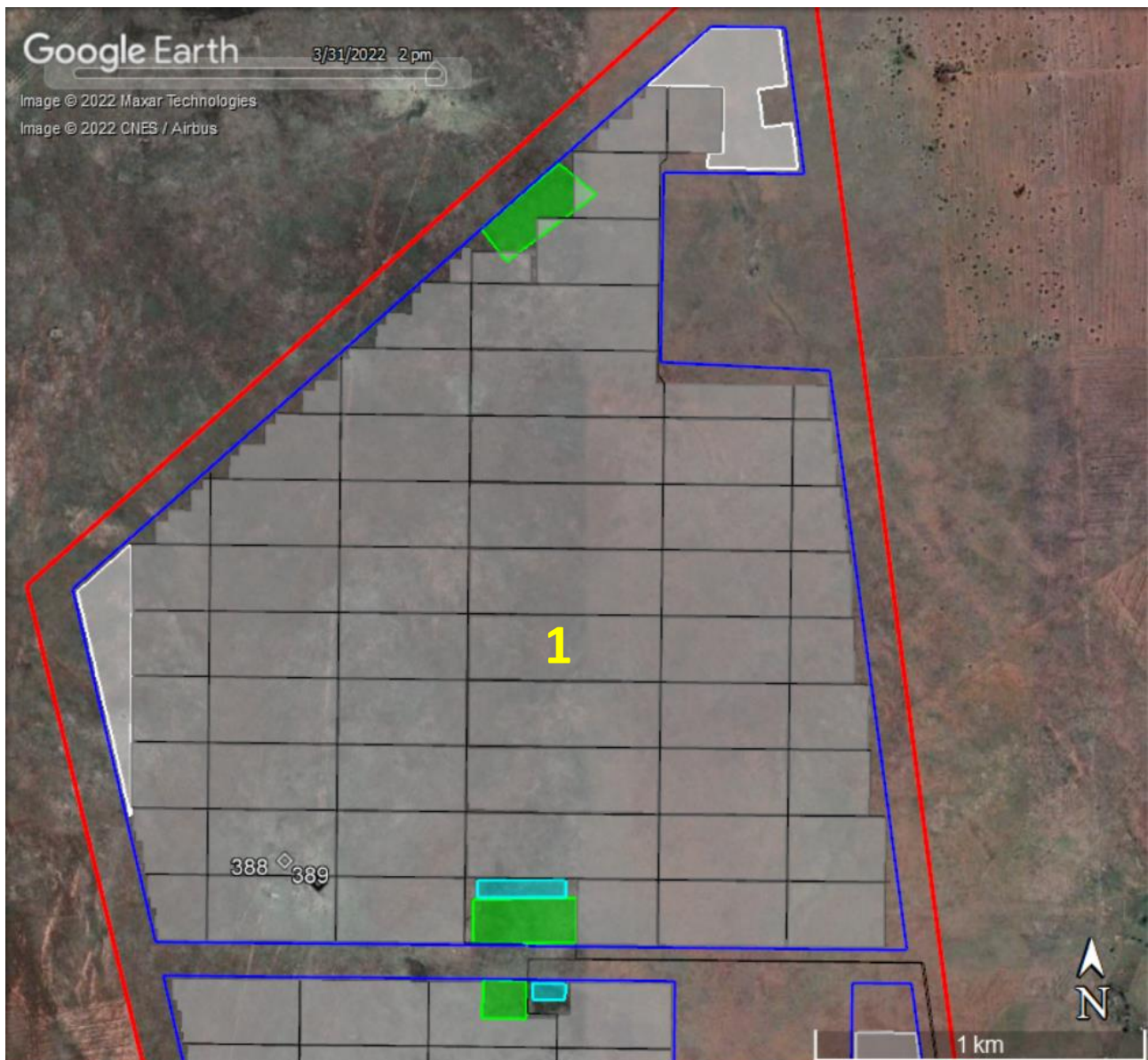
- Blue = fenced areas
- Grey = solar panels
- Black = roads
- Green = electrical infrastructure
- Turquoise = buildings
- White = laydown areas.

#### Heritage resources:

- Red diamonds = Grade IIIA
- Orange diamonds = Grade IIIB
- Yellow diamonds = Grade GPA
- White diamonds = Grade GPB
- Black diamonds = Grade GPC.

#### Heritage sensitivity:

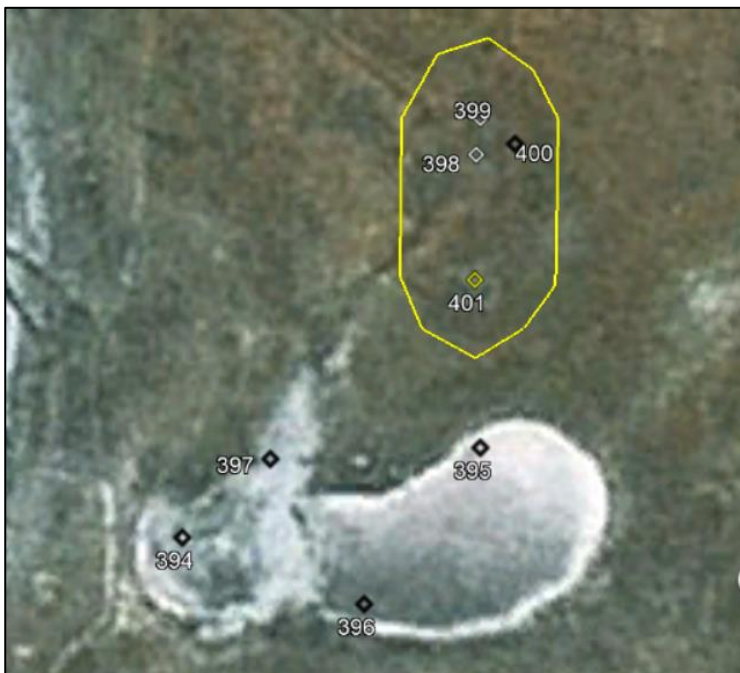
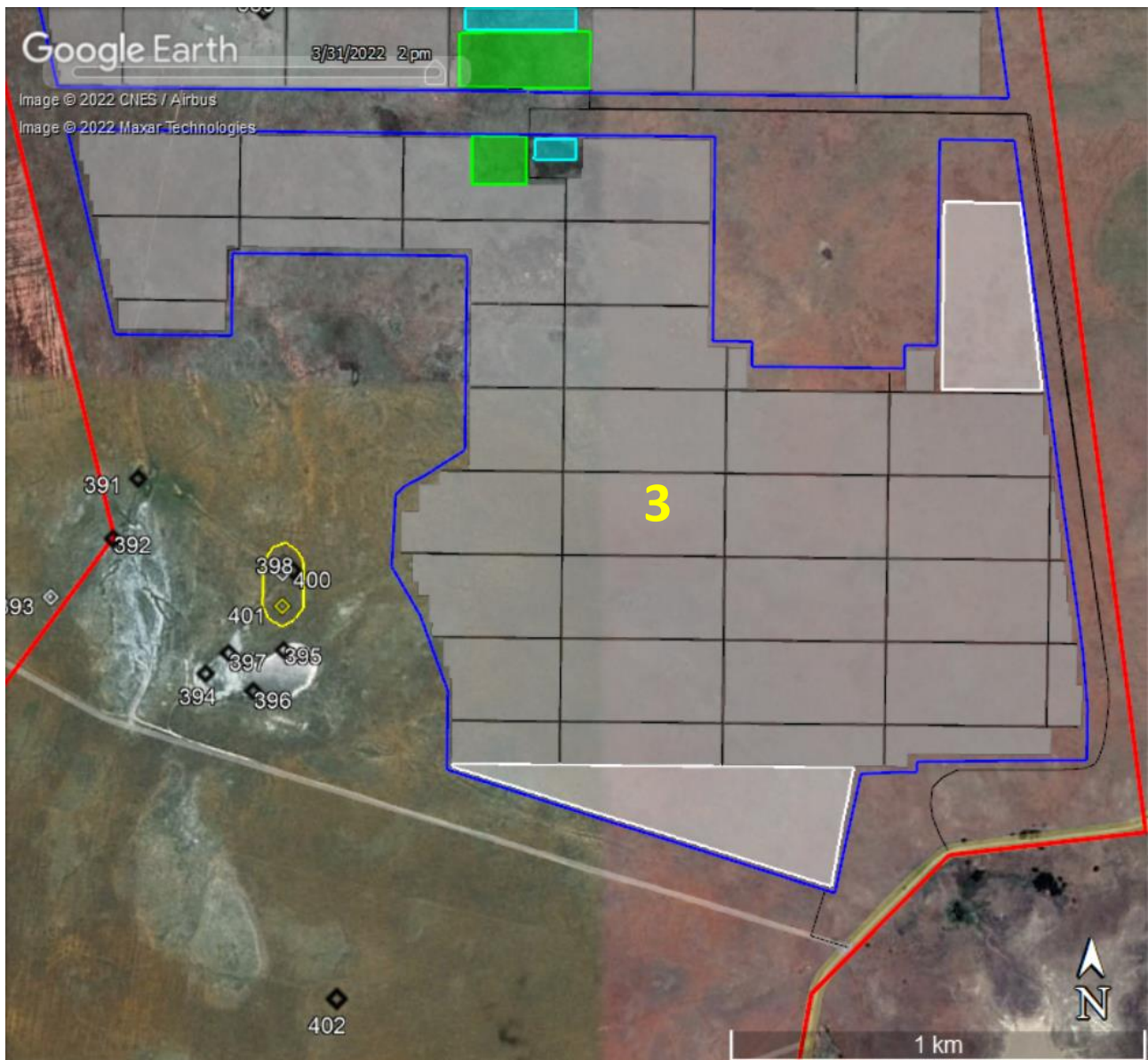
- Red polygons = high
- Orange polygons = medium
- Yellow polygons = low sensitivity



Layout of SPH1 with heritage sites (numbered diamonds).

SPH1 enlargement.

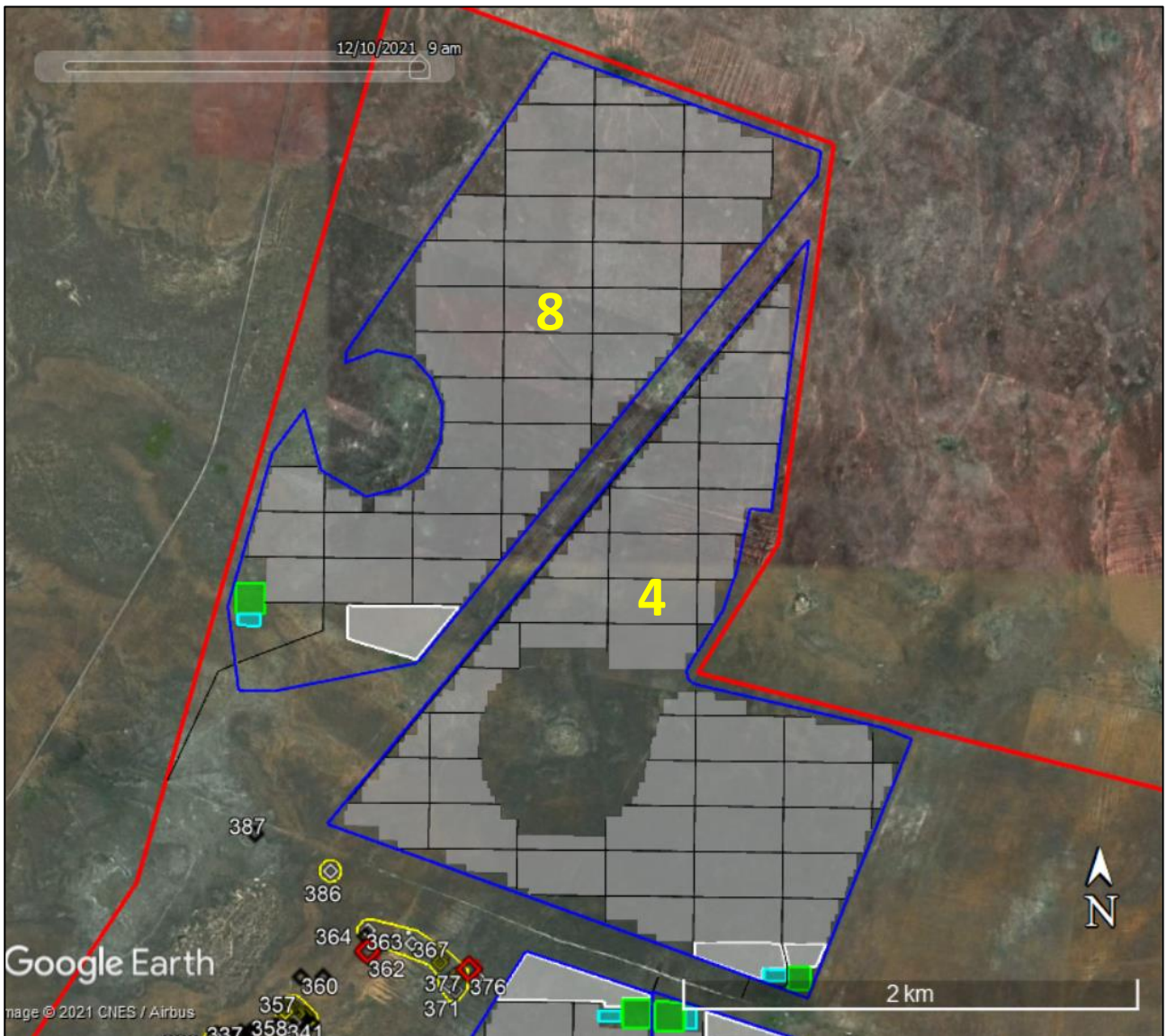




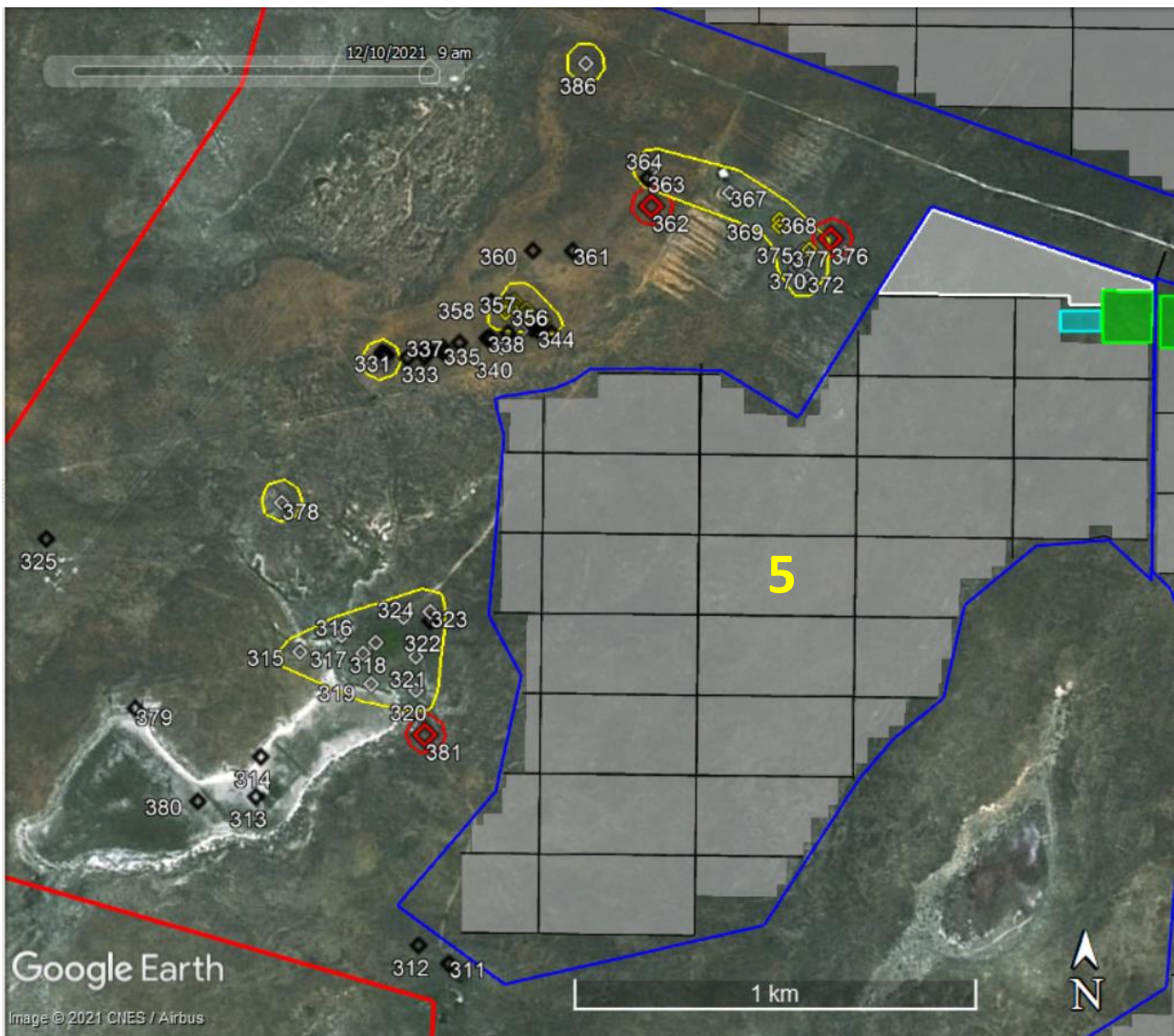
Layout of SPH3 with heritage sites (numbered diamonds).

SPH3 enlargement.



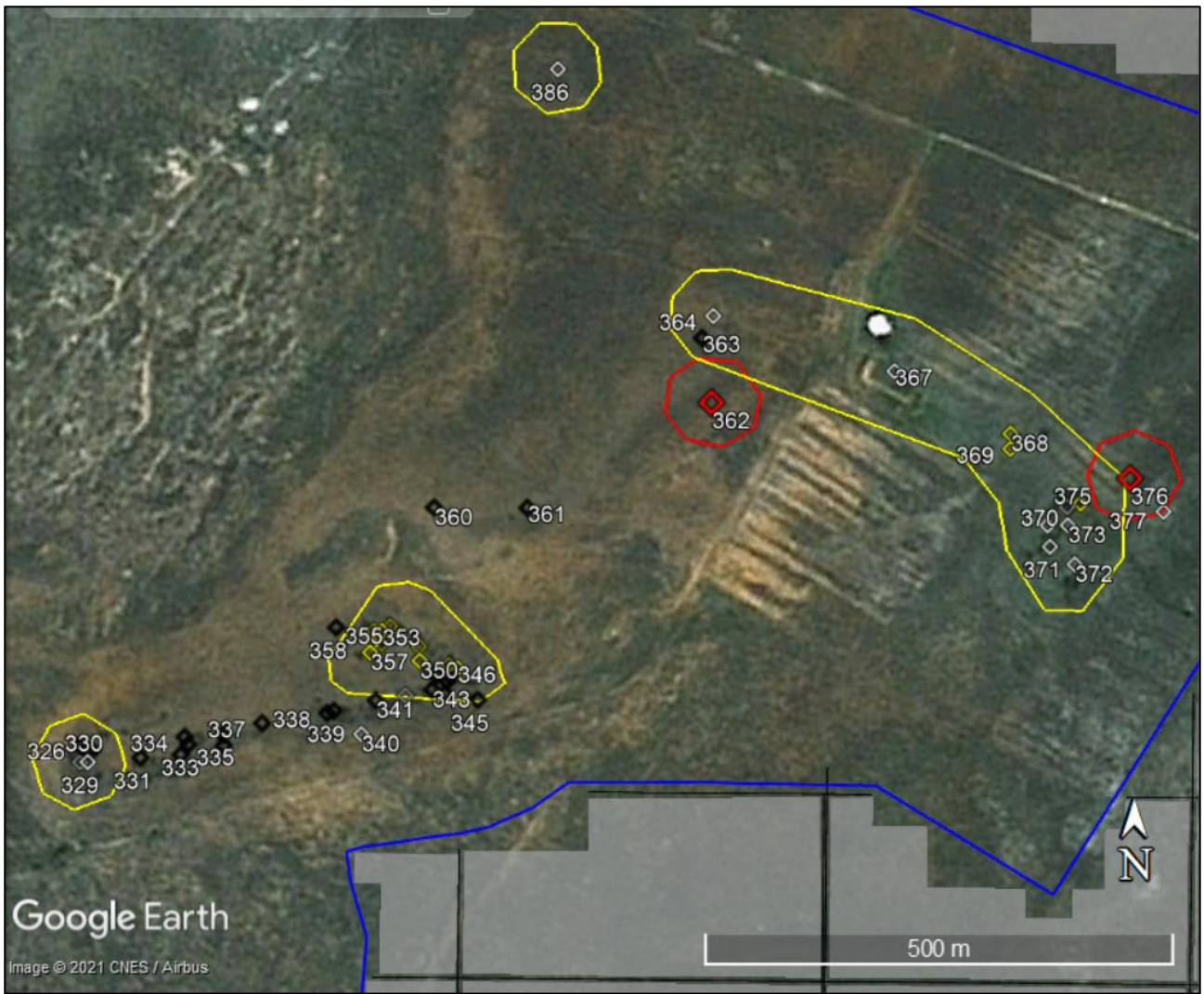


Layout of SPH4 and SPH8 with heritage sites (numbered diamonds).

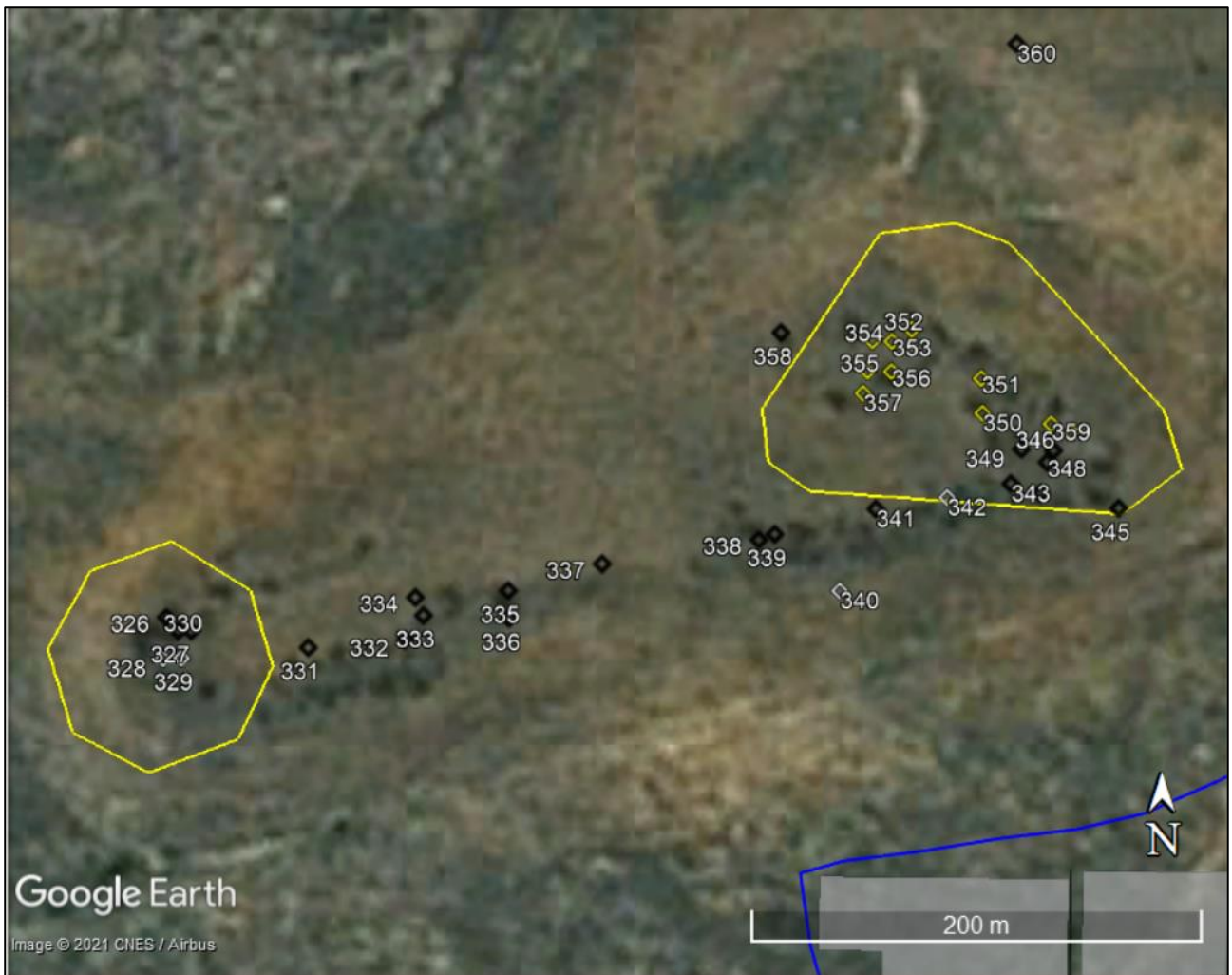


Layout of SPH5 with heritage sites (numbered diamonds).





SPH5 enlargement.

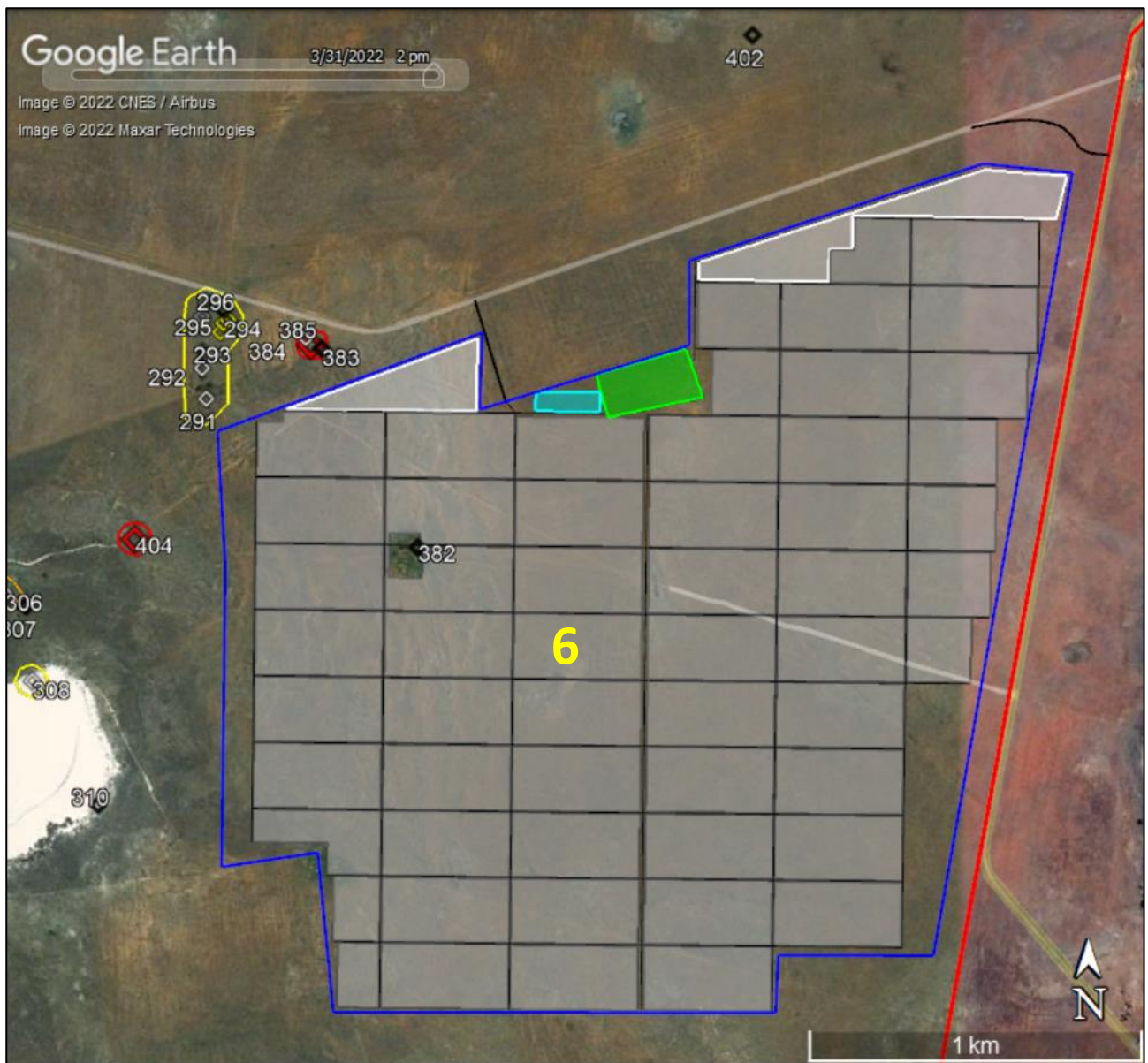


SPH5 enlargement.





SPH5 enlargement.

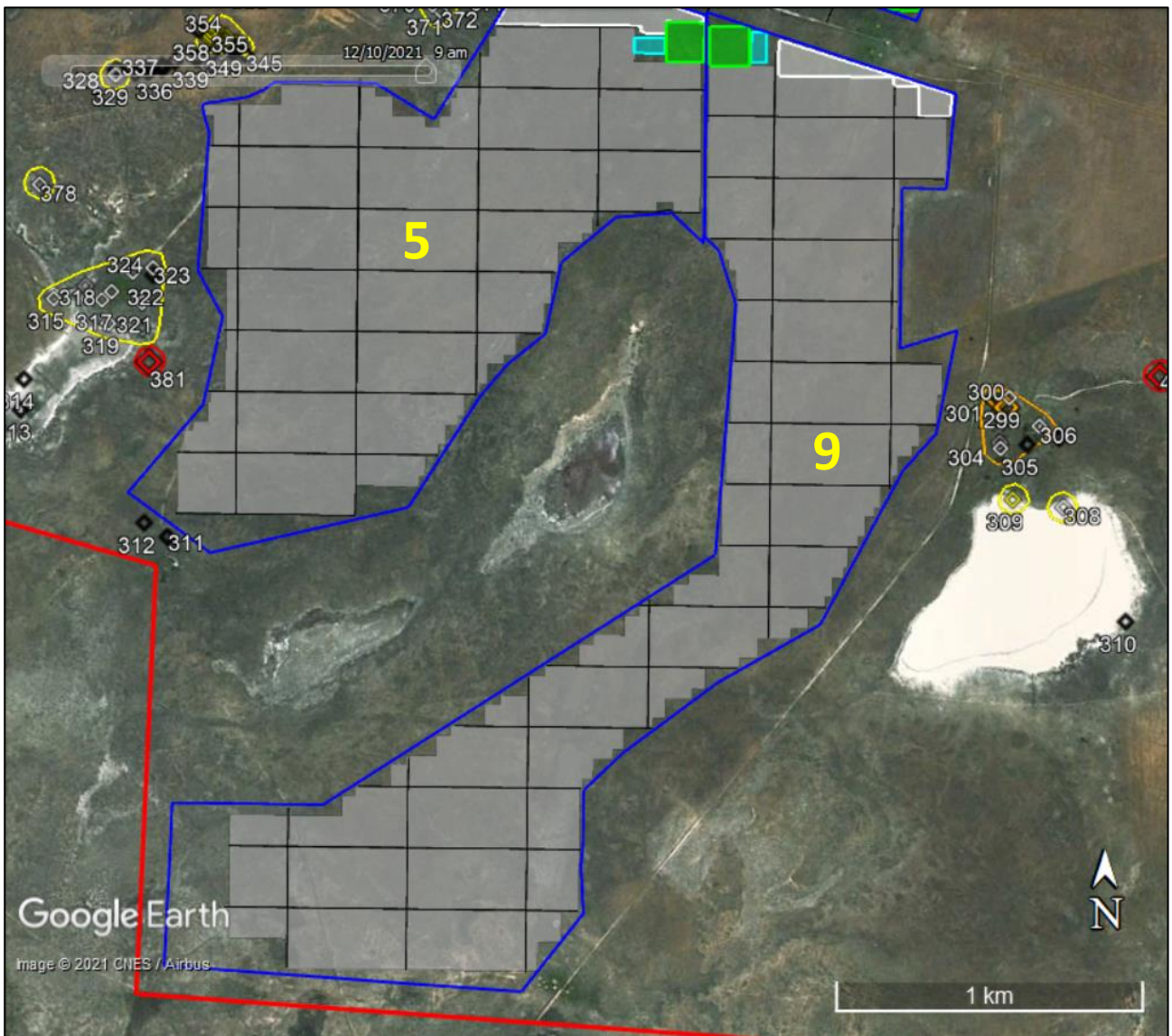


Layout of SPH6 with heritage sites (numbered diamonds).



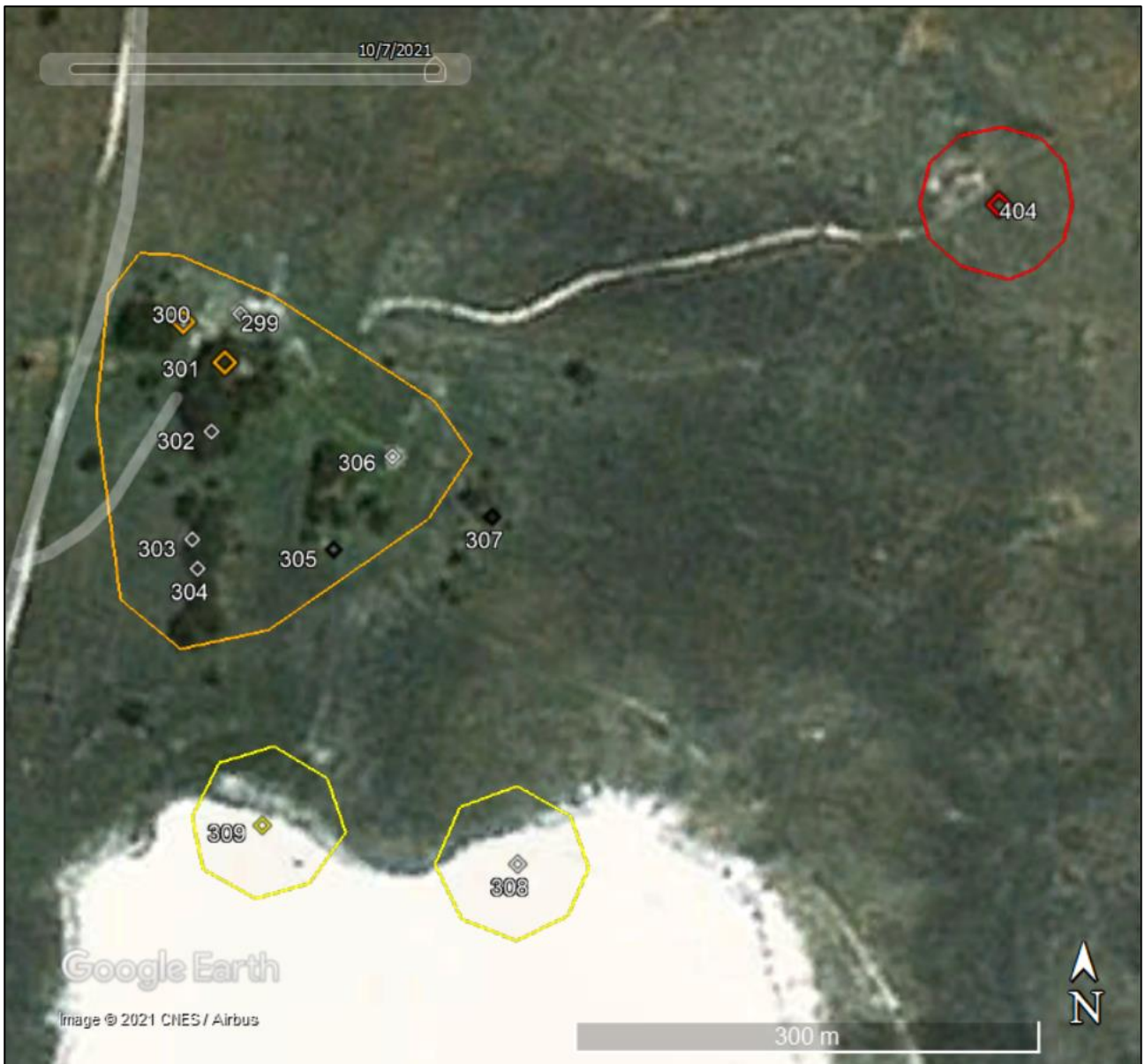
SPH6 enlargement.





Layout of SPH9 with heritage sites (numbered diamonds).





SPH9 enlargement.

## APPENDIX 4 – Site Sensitivity Verification

A site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area. The details of the site sensitivity verification are noted below:

<b>Date of Site Visit</b>	3 to 7 October 2021
<b>Specialist Name</b>	Dr Jayson Orton
<b>Professional Registration Number</b>	ASAPA: 233; APHP: 043
<b>Specialist Affiliation / Company</b>	ASHA Consulting (Pty) Ltd

- Provide a description on how the site sensitivity verification was undertaken using the following means:

- (a) desk top analysis, using satellite imagery;
- (b) preliminary on -site inspection; and
- (c) any other available and relevant information.

Initial work was carried out using satellite aerial photography in combination with the author's accumulated knowledge of the local landscape. This was used to identify potentially sensitive locations in the landscape. Subsequent fieldwork served to ground truth the site, including those areas identified as potentially sensitive. Desktop research was also used to inform on the heritage context of the area. Both the field and desktop data are presented in the report (Section 5).

- Provide a description of the outcome of the site sensitivity verification in order to:

- (a) confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.; and
- (b) include a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity.

The map below is extracted from the screening tool report and shows the archaeological and heritage sensitivity to be low. The site visit showed that in fact the majority of the site is of low sensitivity but with several pockets (where archaeological resources and graves were found) considered to be of medium and high sensitivity. Figures 69 to 72 in the report show the areas considered to be archaeologically sensitive. A photographic record and description of the relevant heritage resource is contained within the impact assessment report (Section 5 and Appendix 2). The heritage specialist thus disputes the screening tool report since there are a number of areas of medium to high sensitivity scattered through the site, but largely within its southern half.

