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## APPENDIX 1: Archaeological Assessment

# ARCHAEOLOGICAL SPECIALIST STUDY

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

**PROPOSED DEVELOPMENT OF  
3 X 350MW AND 6 x100MW PV FACILITIES WITHOUT BATTERY STORAGE  
AND 1 X 350MW CSP FACILITY (TOWER),  
NEAR UPINGTON,**

**NORTHERN CAPE PROVINCE**

Prepared by



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In Association with

**Savannah**

November 2019

Updated January 2020



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## THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I Nic Wiltshire and Jenna Lavin, as the appointed independent specialists hereby declare that we:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at our disposal regarding the application, whether such information is favourable to the applicant or not; and
- are aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Nic Wiltshire and Jenna Lavin

**Signature of the specialist**

CTS Heritage

**Name of company**

October 2019

**Date**



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## EXECUTIVE SUMMARY

Emvelo Capital Projects is proposing the construction and operation of nine Solar PV Facilities and a CSP facility on a site located within the Upington renewable energy development zones (REDZ), east of Upington in the Northern Cape. The facility complex would include a power line of up to 15 km, a pipeline of up to 20 km and an access road of up to 15 km in length. The location of the project site within a REDZ and Power Corridor makes it possible to undertake Basic Assessment (BAR) processes for the projects in support of the application for authorisation. Separate applications for Authorisation are to be made for each solar energy facility.

The archaeological field assessment covered the area proposed for development (approximately 60km<sup>2</sup>, linear access roads and pipeline totalling ~40km) thoroughly. Stone Age archaeological resources were identified within the development footprint, however these are considered to be not conservation-worthy as they are widely scattered and have no associated contextual material. Over 200 observations were made and the only area holding higher densities of material was found around a shallow pan in the northeastern corner of area 4 designated for a 350MW solar installation.

The findings made during the field assessment were consistent with previous work undertaken in the area. Larger quantities of debitage were found where quarrying of quartz and quartzite had taken place, hornfels percentages climbed in areas closer to the Orange River to the north and east of the study site and almost all of the observations were of Middle Stone Age material. Later Stone Age remains were very sparse and limited across the study site.

No engravings, formal or informal graves were identified within the development footprint and the only built structures included modern cattle farming kraals, jeep tracks and fences.

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits.

- No mitigation is required for archaeological material recorded in the footprint areas of the proposed 350MW and 100MW solar PV facilities, or the 350MW CSP, or the proposed powerline, access roads and pipeline. Despite the high number of observations of artefacts, the grading was not conservation worthy as they are common and representative of similar scatters across widespread areas of the Northern Cape.
- The westernmost access route option is not the preferred option as it does not follow an existing jeep track. If possible, the access route about 1.5km east of the westernmost route should be used as it follows an already impacted road.
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories



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of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted.

- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist must be contracted as soon as possible to inspect the findings. A Phase 2 rescue excavation operation may be required subject to permits issued by SAHRA



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## 1. INTRODUCTION

### 1.1 Background Information on Project

Emvelo Capital Projects is proposing the construction and operation of nine Solar PV Facilities and a CSP facility on a site located within the Upington renewable energy development zones (REDZ), east of Upington in the Northern Cape. The projects will each include 9 Basic Assessment Reports and 1 Scoping and EIA report:

1. Tower Complex – PVs (surrounding the approved sites)
  - a. Site 3: 1 x 350 MW (BA Process)
  - b. Site 4: 1 x 350 MW (BA Process)
  - c. Site 5: 1 x 350 MW (BA Process)
2. Tower Complex – CSPs
  - a. Site 3: 1 x 350 MW
3. Trough Complex – PVs (below the approved sites)
  - a. Site 1: 1 x 100 MW (BA Process)
  - b. Site 2: 1 x 100 MW (BA Process)
4. PV Complex (below the trough complex PVs)
  - a. Site 6-9: 4 x 100 MW (BA Processes).

It is understood that the facility complex would include the following infrastructure:

1. Power line of up to 15 km
2. Pipeline of up to 20 km
3. Access road of up to 15 km in length.

The location of the project site within a REDZ and Power Corridor makes it possible to undertake Basic Assessment (BAR) processes for the projects in support of the application for authorisation. Separate applications for Authorisation are to be made for each solar energy facility.

### 1.2 Description of Property and Affected Environment

Ilanga 1 at the existing Karoshoek Solar Farm was completed towards the end of 2018 and lies to the north and north east of the proposed areas surveyed for the new solar installations. It covers an area of roughly 4.147 km<sup>2</sup> and holds a large array of curved mirrors that heat up piped water which in turn is fed into a steam turbine system to generate electricity. This has advantages over conventional solar farms which can only generate electricity during daylight hours as the heat from the piped water continues to generate electricity through the course of the night. Two large previously authorised sites abut the current facility on their southern end as well as the main powerline connecting Ilanga 1 to the national grid. This power line runs due west of the facility and along the northern boundary of the study site.

The area chosen for the proposed solar facilities is nearly entirely level and flat apart from a low dune cordon in the far southwestern end of areas 6-9. Quartzite dominated higher ground lies to the north and is situated between the areas surveyed and the N10 highway running between Upington and Groblershoop. This will provide much of the visual cover



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for the new facilities from the northern end. The vegetation is predominantly Bushmanland Arid Grassland vegetation in the Nama-Karoo biome (Mucina & Rutherford 2006) which consists of Karoo scrub and grass and a few isolated Acacia karoo trees. Red Kalahari aeolian sands cover most of the site and there are many areas where the calcrete beneath the Kalahari sands is exposed. Dolerite sills, exposed quartz veins and quartzitic bedrock outcrops in low (40cm high) formations occur sporadically across the study site.

Only one shallow natural pan was encountered in the study area. A cattle kraal has been built here and a few other cattle kraals are dotted around the farms selected for the solar facilities. No running streams were found but a few dry stream beds crisscross the study site.

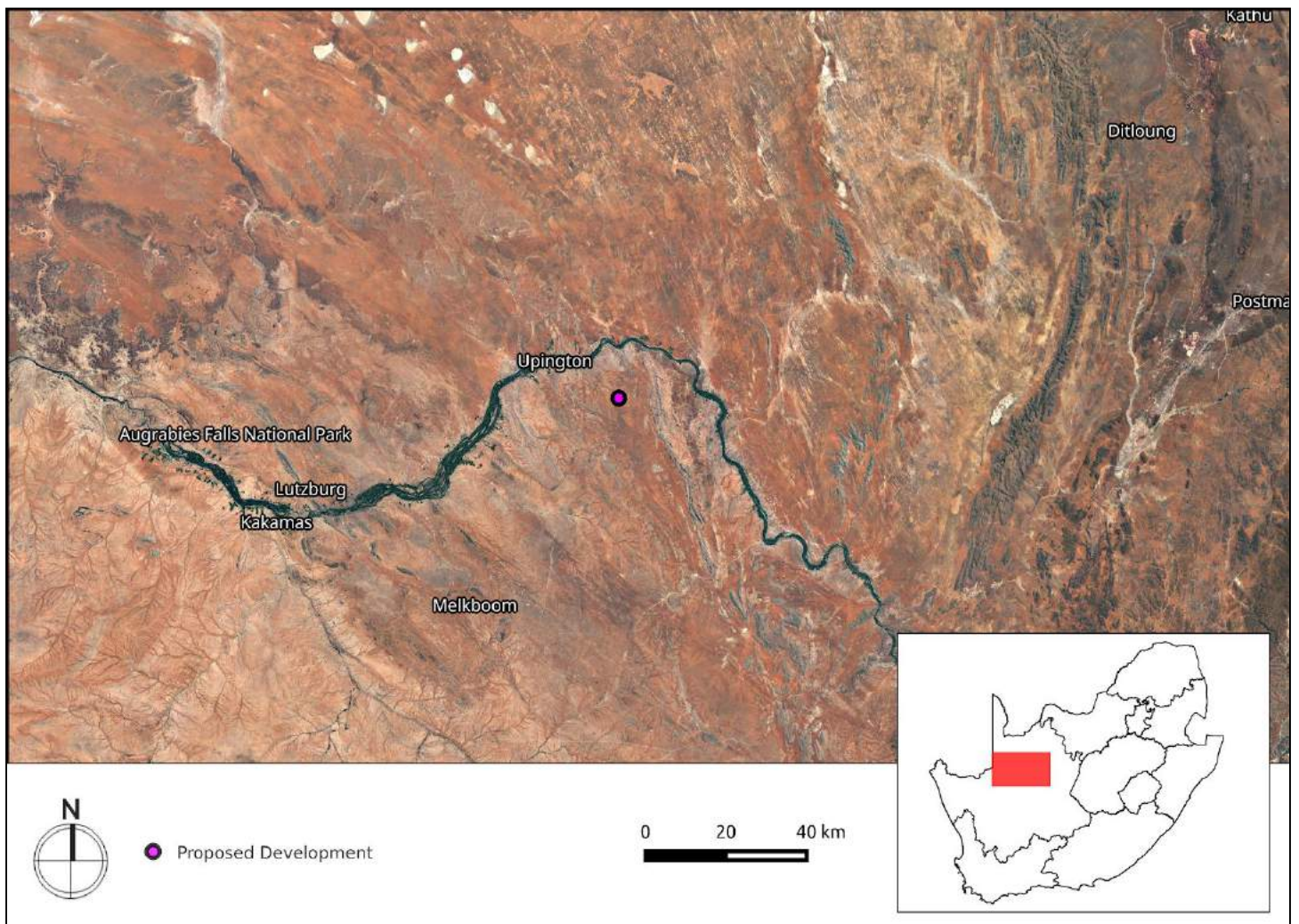


Figure 1.1: Close up satellite image indicating proposed location of development



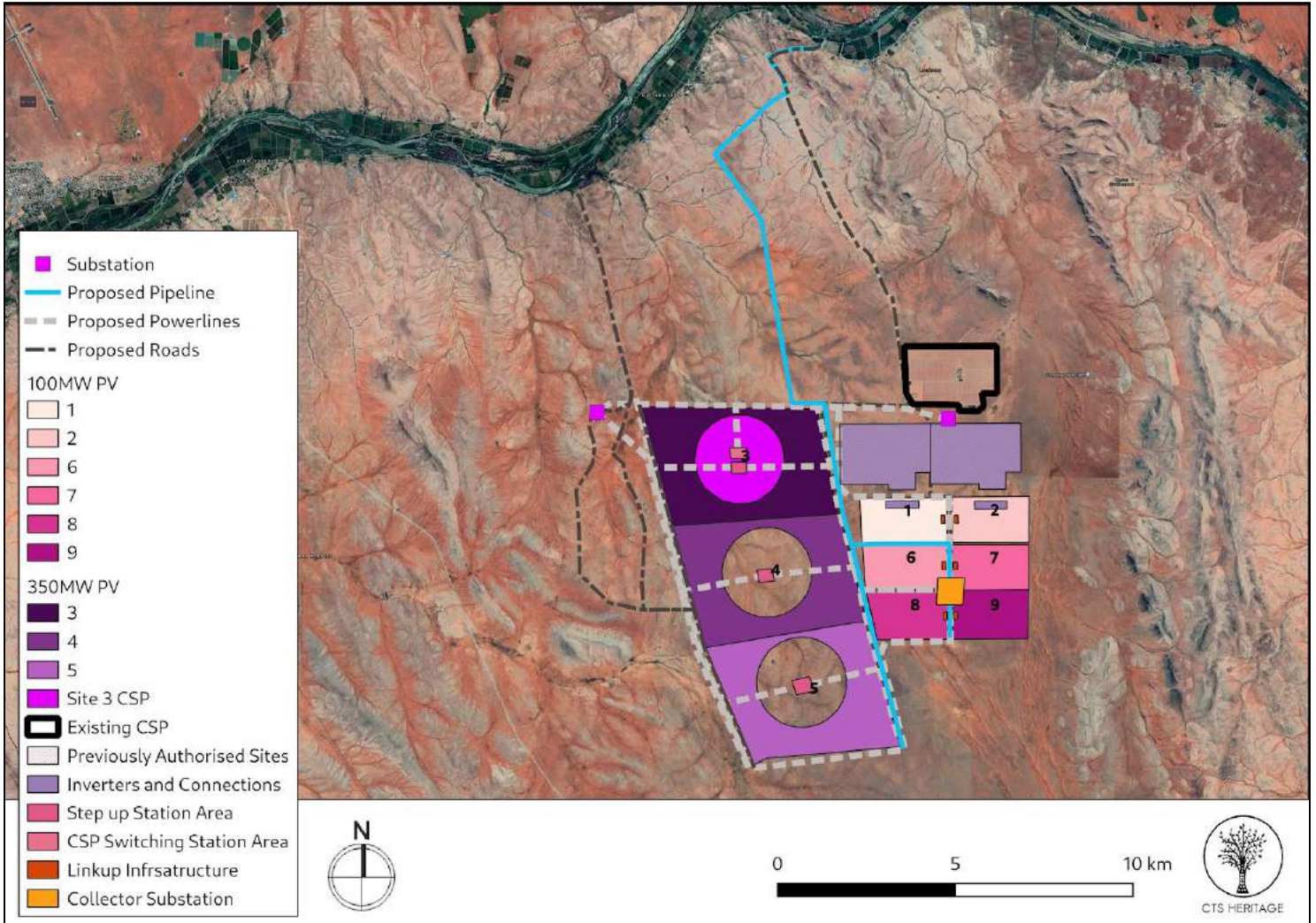


Figure 1.2: Proposed layout of the development from Savannah

## 2. METHODOLOGY

### 2.1 Purpose of Archaeological Study

The purpose of this archaeological study is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999) in terms of impacts to archaeological resources.

### 2.2 Summary of steps followed

- An archaeologist conducted a survey of the site and its environs from 21 to 25 October 2019 to determine what archaeological resources are likely to be impacted by the proposed development.
- The area proposed for development was assessed on foot, photographs of the context and finds were taken, and tracks were recorded using a GPS.
- The identified resources were assessed to evaluate their heritage significance in terms of the grading system outlined in section 3 of the NHRA (Act 25 of 1999).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner.



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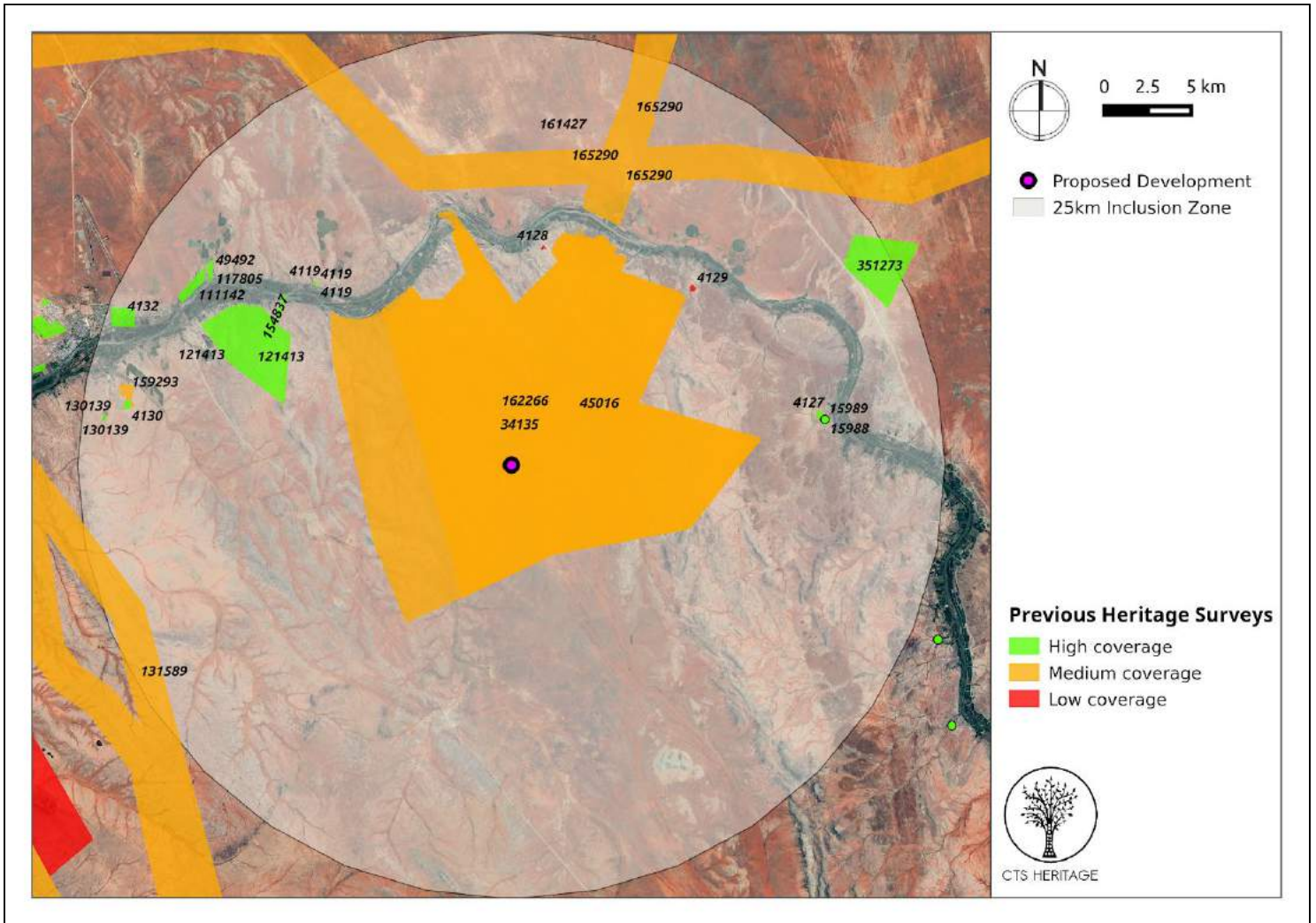


Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

### 2.3 Constraints & Limitations

The final layout for the proposed facilities had not been provided until the morning of the first day of the survey. As a result, the full desktop screening assessment of areas already surveyed could not be completed and this had to be done on site by the archaeologist. This was particularly relevant to the footprints chosen for the pipeline and new access routes. However, the area was covered thoroughly during the survey on foot and in a vehicle where possible. The ground is particularly easy to survey given the low vegetation cover and flat terrain and the number of observations made was high as a result. Previous HIAs (SAHRIS NID 45016, 34135, 162266) for the Ilanga I Solar Project overlapped in some areas, in particular the power line, eastern access route and the southern end of the pipeline (See Figure 2).

The experience of the heritage practitioner, and observations made during the study, allow us to predict with some accuracy the archaeological sensitivity of the receiving environment.



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

The area proposed for development is located approximately 20km east of Upington. Upington originated as a mission station established along the banks of the Orange River in 1871 and run by Reverend Christiaan Schröder, and was founded as a town in 1873. According to Gaigher (2012, SAHRIS ID 34135), prior to colonial settlement, this area was occupied by the Korana who had been forced to the outskirts of the Cape Colony along the Gariep River. When this area was eventually settled by colonists, war broke out between the colonial settlers and the Korana, who were then dispersed upon their defeat.

Upington has been noted as being the sunniest location on the planet for three months of the year, from November through to January, which is likely why this area has been earmarked for the development of renewable energy facilities as part of the Karoshoek Solar Valley development. The geomorphology of the area has been described by Van Schalkwyk (2011, SAHRIS ID 162266) as irregular plains with hills occurring to the south. The vegetation is described as Orange River Nama Karoo. Van Schalkwyk (2011) further notes that the area proposed for development were used for grazing purposes and no farmsteads were constructed this far from the Orange River.

Numerous Renewable Energy developments have been proposed for this area as part of the Karoshoek Solar Valley development and each of these proposed developments have undergone assessments for impacts to archaeological resources (Figure 2). Areas located to the south-east of the study area were surveyed by Sampson (1985), revealing a number of Karoo stone age sites, however similar densities of stone age sites are not known from the proposed development area. In his assessment, Van Schalkwyk (2011) identified a number of Later Stone Age artefacts associated with a non-perennial stream that traverses the development area, as well as along the outer edges of a pan (graded III). He also identified two small historic structures in the study area made of clay bricks of low heritage significance. Gaigher (2012, SAHRIS ID 34135) also assessed this area for impacts to archaeological resources. Gaigher identified “limited scatterings of Middle to Later Stone Age tools found in various areas”. He notes that these finds in themselves do not constitute sites, but do indicate the possible occurrence of such sites. The heritage resources identified in these reports have been extracted and mapped in Figures 3a to 3e. Further archaeological impact assessment work has been completed in this area by Van der Walt (2015 and 2016 - see Appendix 2). Van der Walt notes that the various assessments conducted in this area provide a robust baseline for the archaeology expected in this area. “These studies show that almost no significant archaeological sites occur within the immediate vicinity of the Ilanga Solar Facility. Although artefacts dating to the Early, Middle and Later Stone Age were recorded in the larger area, they occur as isolated finds that are temporally mixed, in deflated and un-stratified contexts without organic remains and other cultural materials. As a result, the archaeological record of the larger area is considered to be of low significance.”

However, as the previous archaeological assessments completed in this area do not have their track paths included in their reports, it is impossible to determine which areas have been thoroughly surveyed. As such, the entire area proposed for development was surveyed for this archaeological specialist report.





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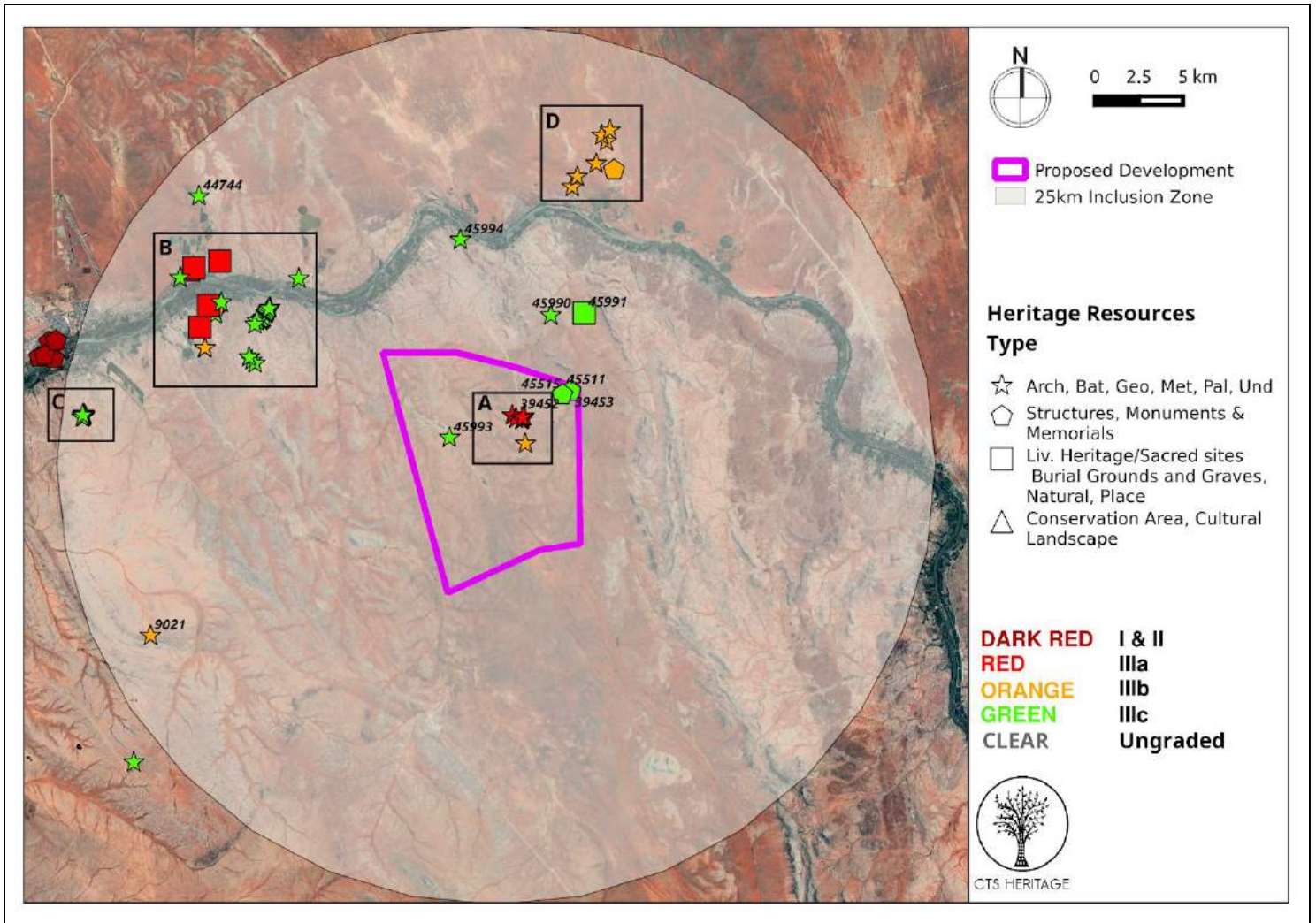


Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SahrIs Site IDs indicated



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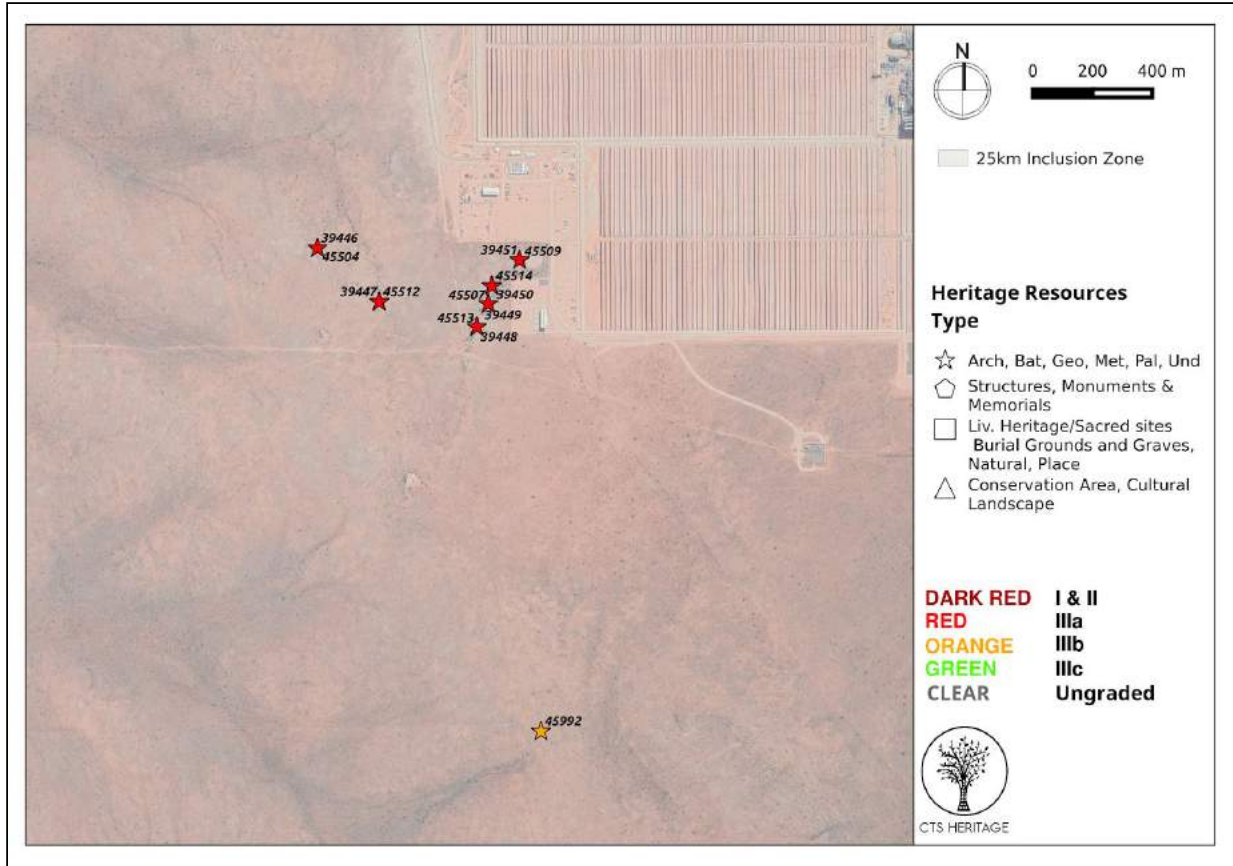


Figure 3a. Inset

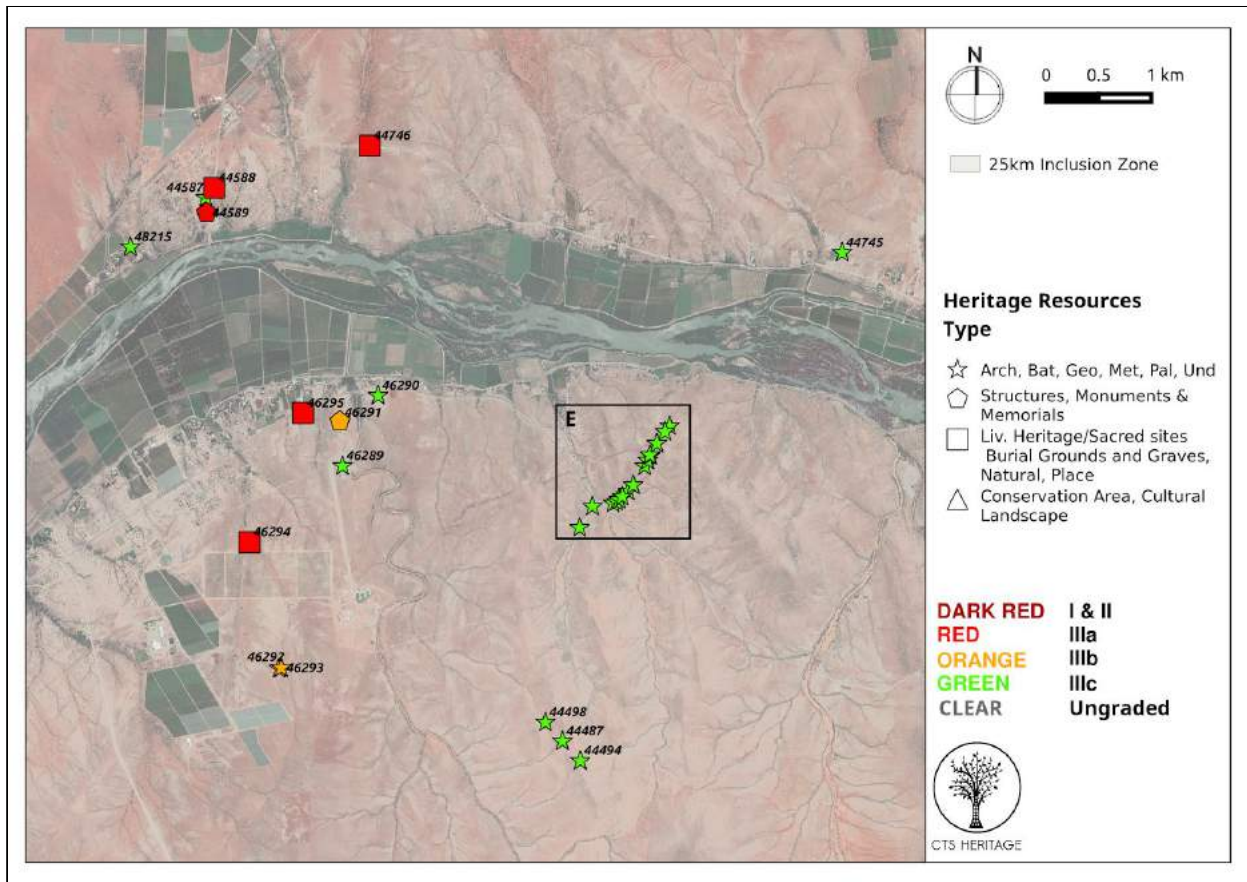


Figure 3b. Inset





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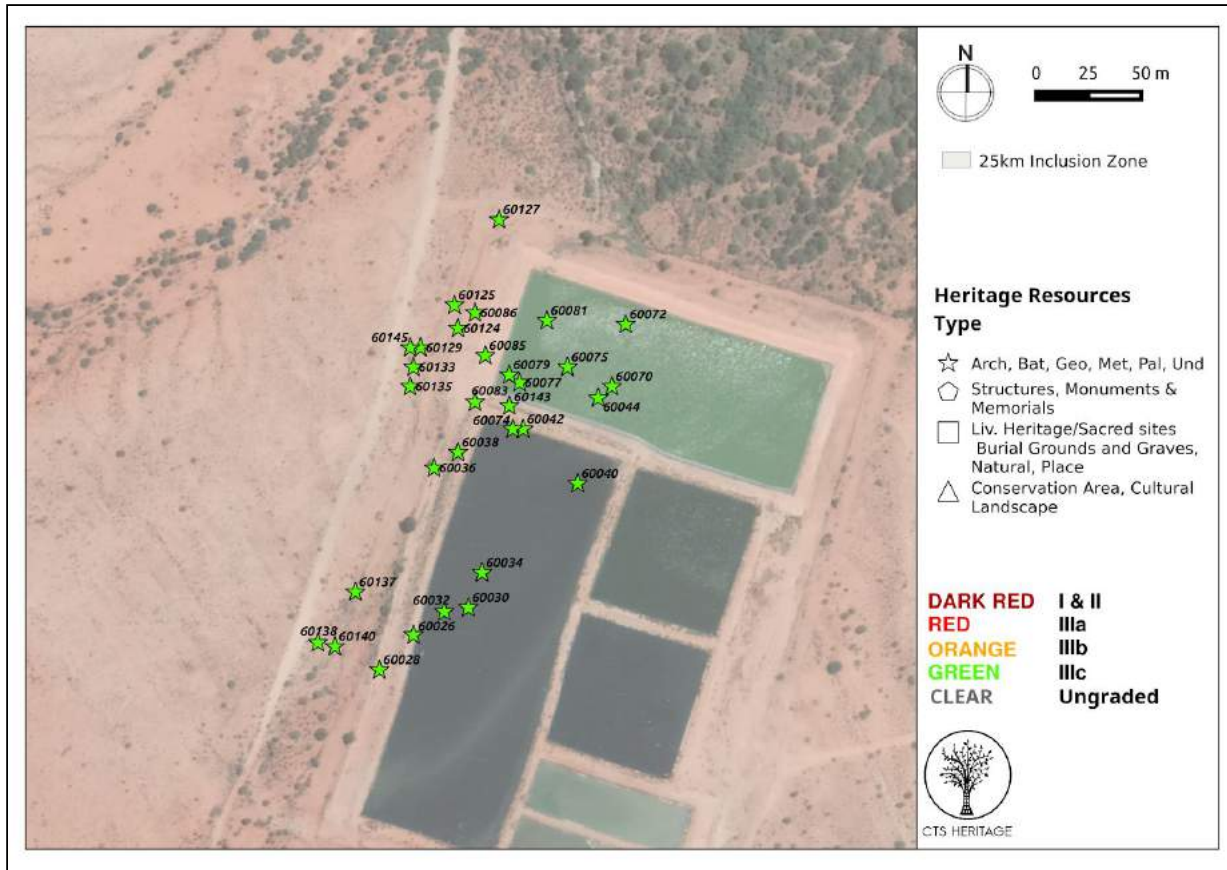


Figure 3c. Inset

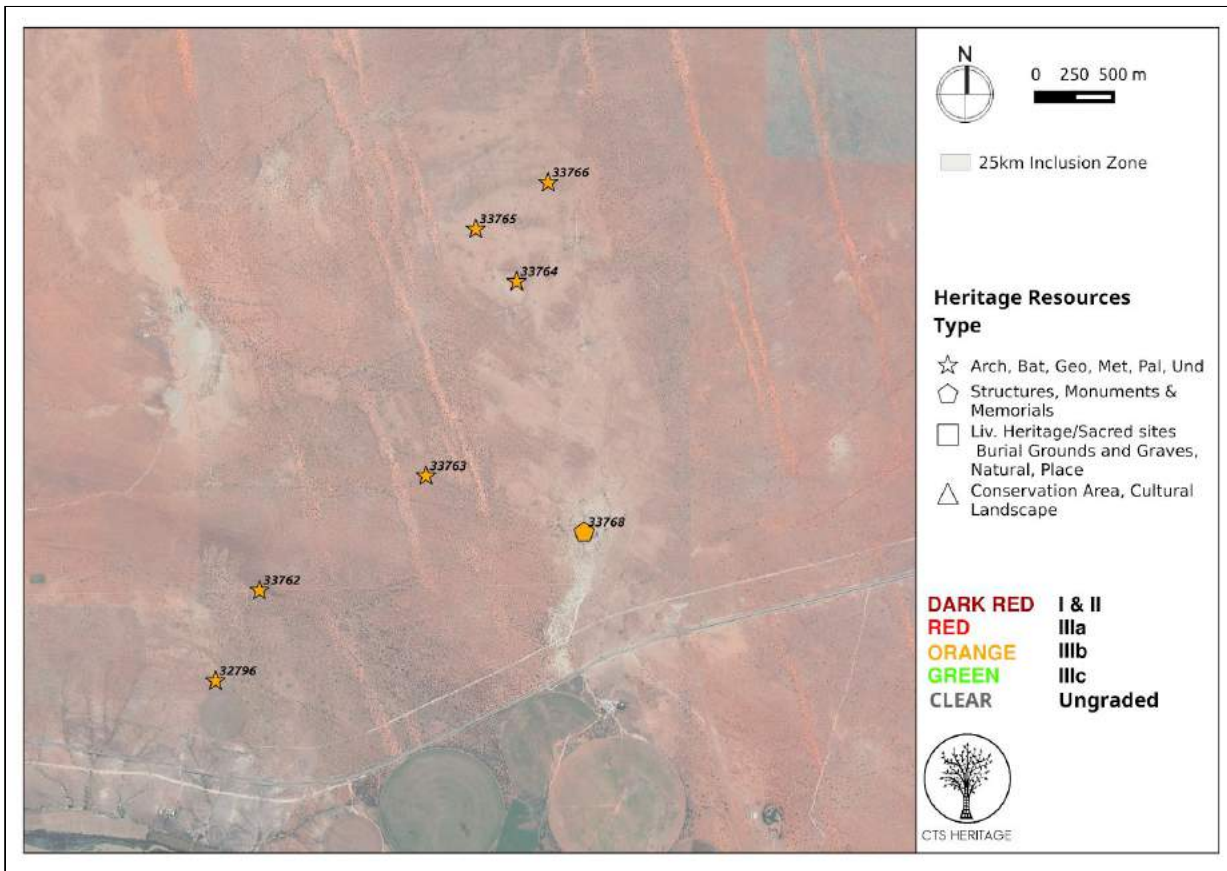


Figure 3d. Inset



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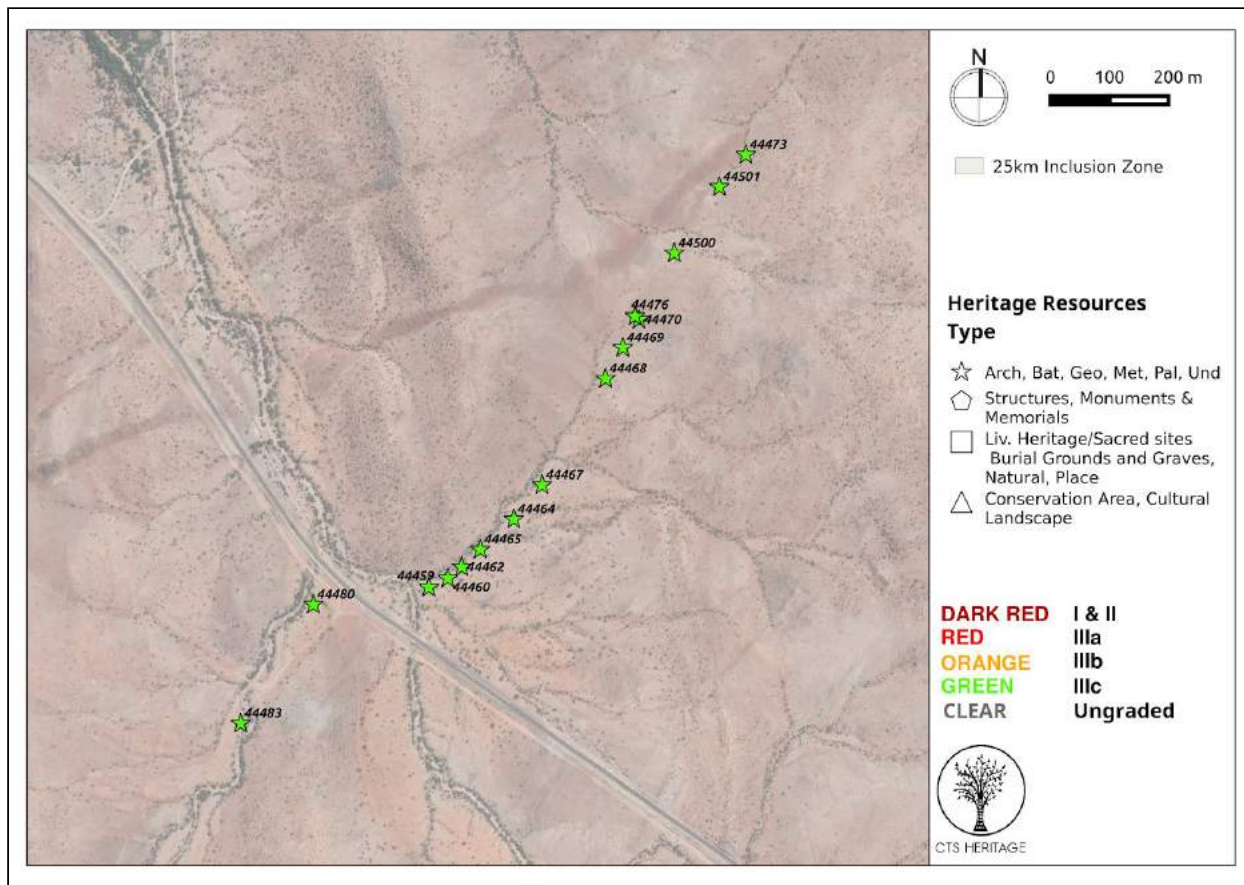


Figure 3e. Inset

#### 4. IDENTIFICATION OF HERITAGE RESOURCES

##### 4.1 Field Assessment

The archaeological field assessment covered the area proposed for development (approximately 60km<sup>2</sup>, linear access roads and pipeline totalling ~40km) thoroughly. Stone Age archaeological resources were identified within the development footprint, however these are considered to be not conservation-worthy as they are widely scattered and have no associated contextual material. Over 200 observations were made and the only area holding higher densities of material was found around a shallow pan in the northeastern corner of area 4 designated for a 350MW solar installation.

The findings made during the field assessment were consistent with previous work undertaken in the area. Larger quantities of debitage were found where quarrying of quartz and quartzite had taken place, hornfels percentages climbed in areas closer to the Orange River to the north and east of the study site and almost all of the observations were of Middle Stone Age material. Later Stone Age remains were very sparse and limited across the study site.

No engravings, formal or informal graves were identified within the development footprint and the only built structures included modern cattle farming kraals, jeep tracks and fences.





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Figure 4.1: Contextual Images of Areas 1 and 2



Figure 4.2: Contextual Images Areas 1 and 2



Figure 4.3: Contextual Images of Areas 1 and 2



Figure 4.4: Contextual Images of Development Area





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Figure 4.5: Contextual Images - Panoramic of Development Area



Figure 4.6: Cattle Kraal



Figure 4.7: Contextual Images of landscape



Figure 4.8: Contextual Images of Landscape





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Figure 4.9: Contextual Images of Linear Route



Figure 4.10: Contextual Images of Landscape



Figure 4.11: Contextual Images of powerline route



Figure 4.12: Pipeline route along fence





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Figure 4.13: Pipeline route along fence



Figure 4.14: Existing Access Route



Figure 4.15: Existing Access Route





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Figure 4.15: Servitude already disturbed for powerline and access roads

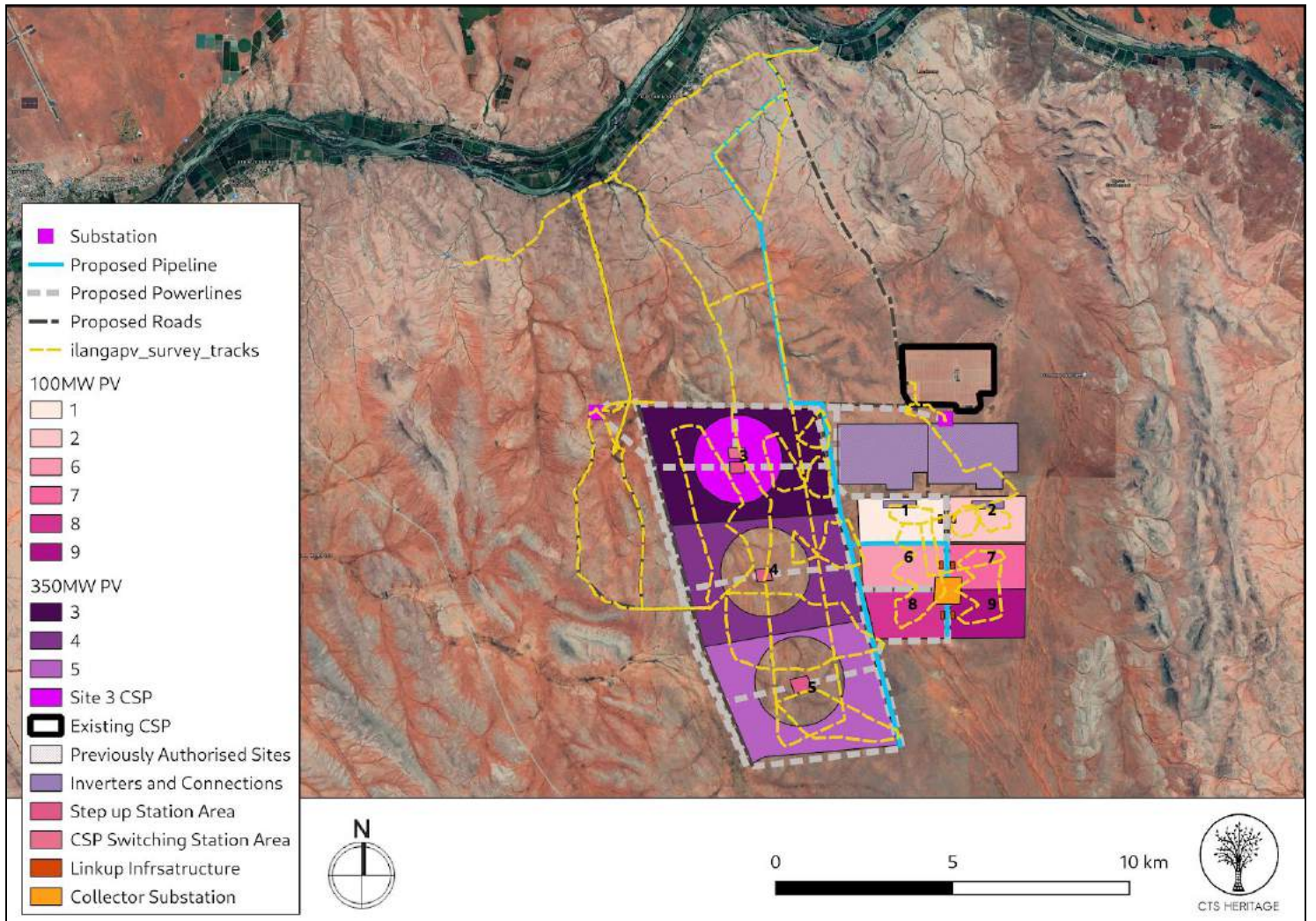


Figure 5: Overall track paths of foot survey



## 4.2 Archaeological Resources identified

**Table 1: Observations noted during the field assessment**

POINT ID	Area	Site Name	Description	Co-ordinates		Grading	Mitigation
14	1	100MW - 1	silcrete core, MSA	-28.5246733	21.5194367	NCW	None
15	1	100MW - 1	silcrete flake, MSA	-28.5223067	21.51659	NCW	None
16	1	100MW - 1	yellow silcrete flaked, MSA	-28.5208833	21.5214733	NCW	None
17	1	100MW - 1	silcrete flake and chunk, MSA	-28.5225317	21.5288767	NCW	None
18	1	100MW - 1	blue Quartzite flakes and biface MSA	-28.5239867	21.5288533	NCW	None
19	1	100MW - 1	radial core silcrete, MSA	-28.524045	21.5288383	NCW	None
20	1	100MW - 1	radial core silcrete, MSA	-28.5245933	21.5287683	NCW	None
21	1	100MW - 1	silcrete flake, MSA	-28.52637	21.5288117	NCW	None
22	1	100MW - 1	hornfels flake retouched, MSA	-28.52637	21.5288317	NCW	None
23	1	100MW - 1	patinated silcrete long flake, MSA	-28.52752	21.5290333	NCW	None
89	1	100MW - 1	quartzite and silcrete flakes, MSA	-28.5304133	21.50768	NCW	None
90	1	100MW - 1	Hornfels flakes, MSA	-28.5295967	21.5072217	NCW	None
91	1	100MW - 1	blue Quartzite flake, MSA	-28.5284683	21.506555	NCW	None
2	2	100MW - 2	single MSA Quartz flake retouched	-28.521835	21.5456317	NCW	None
3	2	100MW - 2	Quartzite MSA cores and flakes, local	-28.5219683	21.5468617	NCW	None
4	2	100MW - 2	Quartz MSA flake retouched	-28.5220933	21.5488833	NCW	None
5	2	100MW - 2	pink Quartzite MSA flake, prepared platform	-28.52529	21.5512817	NCW	None
6	2	100MW - 2	silcrete MSA blade flake	-28.5255317	21.5512667	NCW	None
7	2	100MW - 2	another MSA silcrete flake	-28.5260383	21.5512167	NCW	None
8	2	100MW - 2	two blue Quartzite MSA flakes	-28.525165	21.5432133	NCW	None
9	2	100MW - 2	banded Quartzite MSA and landscape	-28.5281883	21.5389467	NCW	None
10	2	100MW - 2	relatively dense open scatter of MSA silcrete flakes, blades, retouch	-28.528475	21.5379567	NCW	None
11	2	100MW - 2	radial core quartz, MSA	-28.528445	21.53632	NCW	None
12	2	100MW - 2	silcrete MSA core flakes patinated	-28.5272983	21.534975	NCW	None
13	2	100MW - 2	pink granite MSA large platform	-28.5206817	21.54054	NCW	None
104	3	350MW - 3	quartzite flake, MSA	-28.5177283	21.49427	NCW	None
105	3	350MW - 3	Hornfels core, MSA	-28.5170617	21.4994517	NCW	None
106	3	350MW - 3	Hornfels retouched, MSA	-28.51621	21.49926	NCW	None
107	3	350MW - 3	silcrete core flake and stands of quartzite outcrops, MSA	-28.5114433	21.4990167	NCW	None
108	3	350MW - 3	LSA Hornfels	-28.5088867	21.4979183	NCW	None
109	3	350MW - 3	quartzite core, debris field, MSA	-28.5098383	21.4941383	NCW	None
110	3	350MW - 3	Blue quartzite flake, MSA	-28.51617	21.4903767	NCW	None
111	3	350MW - 3	quartz core, quartzite and silcrete flakes, MSA	-28.51691	21.4857967	NCW	None
112	3	350MW - 3	quartzite flake, MSA	-28.5164583	21.48462	NCW	None
118	3	350MW - 3	quartzite flake, MSA	-28.5098683	21.489345	NCW	None
119	3	350MW - 3	quartz, silcrete, Hornfels flakes LSA	-28.504785	21.4917783	NCW	None





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120	3	350MW - 3	quartzite flake, MSA	-28.50583	21.4943217	NCW	None
121	3	350MW - 3	silcrete flake, MSA	-28.5059633	21.4984733	NCW	None
124	3	350MW - 3	Hornfels flake, MSA	-28.4991883	21.4939783	NCW	None
125	3	350MW - 3	quartzite flake, MSA	-28.49986	21.4934883	NCW	None
147	3	350MW - 3	unifacial silcrete flake, MSA	-28.5242017	21.460575	NCW	None
148	3	350MW - 3	quartz core quartzite flake, MSA	-28.51953	21.4593733	NCW	None
149	3	350MW - 3	Hornfels flake, prepared platform, MSA	-28.5157683	21.458345	NCW	None
150	3	350MW - 3	quartz and Hornfels flakes, MSA	-28.51277	21.4574317	NCW	None
151	3	350MW - 3	Hornfels flake, MSA	-28.50692	21.45569	NCW	None
152	3	350MW - 3	silcrete, Hornfels, quartz flakes in gravels, MSA	-28.5039567	21.4546033	NCW	None
153	3	350MW - 3	dolerite sill, lower grindstone, LSA	-28.5019017	21.4537583	NCW	None
155	3	350MW - 3	Hornfels flake in shallow dry pan, MSA	-28.5007933	21.4619583	NCW	None
163	3	350MW - 3	silcrete core, MSA	-28.5201933	21.4742167	NCW	None
113	3	CSP - 3	quartzite flake, MSA	-28.51566	21.4829483	NCW	None
114	3	CSP - 3	Hornfels cores, MSA	-28.5134567	21.4827017	NCW	None
115	3	CSP - 3	quartzite flake, MSA	-28.5076867	21.4808667	NCW	None
116	3	CSP - 3	Hornfels radial core, MSA	-28.50615	21.4803983	NCW	None
156	3	CSP - 3	Hornfels core, MSA	-28.5038783	21.4640383	NCW	None
157	3	CSP - 3	exposed quartz outcrop and cores, flakes, MSA	-28.5069133	21.4660733	NCW	None
158	3	CSP - 3	silcrete flake, MSA	-28.509145	21.4677017	NCW	None
159	3	CSP - 3	quartzite flake, MSA	-28.51312	21.4701467	NCW	None
160	3	CSP - 3	quartzite hammerstone, MSA	-28.51508	21.4712717	NCW	None
161	3	CSP - 3	silcrete and Quartzite flakes, cores, MSA	-28.51748	21.4729783	NCW	None
45993	3	CSP - 3	Karoshhoek004 LSA Scatter	-28.50373	21.47926	IIIC	None
67	4	350MW - 4	silcrete core and flakes, MSA	-28.5454667	21.5020533	NCW	None
68	4	350MW - 4	granite flake, MSA	-28.5458	21.4986483	NCW	None
69	4	350MW - 4	quartzite flakes and silcrete cores, MSA	-28.5456883	21.4940967	NCW	None
70	4	350MW - 4	various debitage in quartz, quartzite, silcrete, MSA	-28.5433917	21.4909783	NCW	None
71	4	350MW - 4	heavily patinated hornfels, MSA	-28.543435	21.490315	NCW	None
72	4	350MW - 4	blue Quartzite flake, purple Hornfels core, MSA	-28.5430283	21.484805	NCW	None
73	4	350MW - 4	blue Quartzite flake, MSA	-28.5428583	21.479675	NCW	None
75	4	350MW - 4	silcrete flake, MSA	-28.5437867	21.4693433	NCW	None
76	4	350MW - 4	Hornfels flake, MSA	-28.5447567	21.469275	NCW	None
77	4	350MW - 4	Hornfels flake, MSA	-28.547325	21.4691833	NCW	None
86	4	350MW - 4	silcrete flake, MSA	-28.5350783	21.4995233	NCW	None
92	4	350MW - 4	quartzite flakes, MSA	-28.5246883	21.5018517	NCW	None
93	4	350MW - 4	Hornfels flakes, MSA	-28.524835	21.5013783	NCW	None
95	4	350MW - 4	Hornfels patinated, MSA	-28.5252317	21.4980667	NCW	None
96	4	350MW - 4	ccs and Hornfels LSA	-28.5259917	21.49809	NCW	None



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97	4	350MW - 4	Hornfels and Quartz flakes LSA	-28.5268967	21.4980567	NCW	None
98	4	350MW - 4	quartz core, MSA	-28.5351583	21.4893567	NCW	None
99	4	350MW - 4	various shades of silcrete flakes, MSA	-28.535135	21.4885967	NCW	None
101	4	350MW - 4	thin Hornfels flake, MSA	-28.528945	21.49106	NCW	None
102	4	350MW - 4	quartzite flake, MSA	-28.5318	21.4943667	NCW	None
138	4	350MW - 4	quartz and Quartzite flakes no retouch, MSA	-28.5467317	21.4603783	NCW	None
139	4	350MW - 4	quartz core, MSA	-28.546645	21.4628533	NCW	None
141	4	350MW - 4	silcrete and Quartzite flakes, MSA	-28.5425267	21.4643267	NCW	None
142	4	350MW - 4	quartz flake, MSA	-28.5364183	21.4651383	NCW	None
143	4	350MW - 4	quartz flake, MSA	-28.53442	21.4643583	NCW	None
144	4	350MW - 4	quartz flake, MSA	-28.5316583	21.463265	NCW	None
145	4	350MW - 4	Hornfels flake, MSA	-28.5287283	21.4624033	NCW	None
146	4	350MW - 4	quartz and silcrete flakes, MSA	-28.5261733	21.461225	NCW	None
164	4	350MW - 4	Hornfels and Quartzite flakes, MSA	-28.5275283	21.4723183	NCW	None
165	4	350MW - 4	local quarried quartzite flakes, MSA	-28.529065	21.4745533	NCW	None
166	4	350MW - 4	quartzite and Quartz flakes, MSA	-28.5300267	21.4751867	NCW	None
167	4	350MW - 4	dark quartzite flake, MSA	-28.5336767	21.47652	NCW	None
168	4	350MW - 4	silcrete, quartz, quartzite flakes, MSA	-28.53694	21.476385	NCW	None
169	4	350MW - 4	quartzite core, MSA	-28.5406983	21.4723283	NCW	None
170	4	350MW - 4	quartzite flake, MSA	-28.5437367	21.4681717	NCW	None
50	5	350MW - 5	quartz flake, MSA	-28.573025	21.486415	NCW	None
51	5	350MW - 5	silcrete flakes, MSA	-28.5735117	21.4869267	NCW	None
52	5	350MW - 5	quartz flake, MSA	-28.5795467	21.4976183	NCW	None
53	5	350MW - 5	quartzite flake, MSA	-28.579505	21.5018483	NCW	None
54	5	350MW - 5	quartz biface, Hornfels core, anvil, silcrete, MSA	-28.5794617	21.5023483	NCW	None
55	5	350MW - 5	silcrete flake, MSA	-28.580055	21.506385	NCW	None
58	5	350MW - 5	quartz flake, MSA	-28.5744883	21.5104067	NCW	None
59	5	350MW - 5	rough silcrete, MSA	-28.5739367	21.5092733	NCW	None
60	5	350MW - 5	quartz, quartzite, silcrete flakes, gravel of calcrete, MSA	-28.5700083	21.5011233	NCW	None
61	5	350MW - 5	quartz flake, MSA	-28.5677967	21.4965783	NCW	None
62	5	350MW - 5	quartzite cobbles next to broken calcrete, MSA	-28.5676117	21.4958267	NCW	None
63	5	350MW - 5	Hornfels flake retouched, MSA	-28.567745	21.4938283	NCW	None
78	5	350MW - 5	LSA Hornfels, quartz, silcrete flakes	-28.5553733	21.47035	NCW	None
79	5	350MW - 5	quartzite flake, MSA	-28.5559533	21.4702117	NCW	None
80	5	350MW - 5	quartz and Quartzite flakes, MSA	-28.5604433	21.4745267	NCW	None
81	5	350MW - 5	quartzite flake, MSA	-28.5621417	21.4862183	NCW	None
82	5	350MW - 5	purple Quartzite flakes, MSA	-28.5622383	21.4870133	NCW	None
83	5	350MW - 5	silcrete retouched right around, MSA	-28.5624533	21.4924917	NCW	None
84	5	350MW - 5	heavily patinated hornfels, MSA	-28.5621967	21.49401	NCW	None



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24	6	100MW - 6	quartz flake possibly hafted, MSA	-28.5313	21.5300417	NCW	None
25	6	100MW - 6	blue Quartzite core, MSA	-28.53424	21.5303883	NCW	None
31	6	100MW - 6	silcrete and Quartz flakes, MSA	-28.5391917	21.5194983	NCW	None
32	6	100MW - 6	silcrete biface and landscape, MSA	-28.53893	21.5189117	NCW	None
33	6	100MW - 6	quartzite flake, MSA	-28.5351233	21.5201983	NCW	None
34	6	100MW - 6	LSA Hornfels flake	-28.535005	21.5220817	NCW	None
35	6	100MW - 6	quartzite flake, MSA	-28.53259	21.5239333	NCW	None
87	6	100MW - 6	broken up silcrete, quartz flakes, MSA	-28.5350417	21.5089383	NCW	None
88	6	100MW - 6	Hornfels flakes, MSA	-28.5331333	21.50844	NCW	None
37	7	100MW - 7	quartz core, MSA	-28.53679	21.5486483	NCW	None
45	7	100MW - 7	quartz core LSA	-28.5357767	21.5367867	NCW	None
46	7	100MW - 7	quartz flake, MSA	-28.53294	21.5395933	NCW	None
47	7	100MW - 7	quartz debitage gravels, MSA	-28.5320517	21.5411167	NCW	None
48	7	100MW - 7	pink Quartzite radial core, MSA	-28.53222	21.5481417	NCW	None
26	8	100MW - 8	quartz flake, MSA	-28.5462783	21.52842	NCW	None
27	8	100MW - 8	silcrete core, MSA	-28.5484833	21.5261333	NCW	None
30	8	100MW - 8	quartzite flake, MSA	-28.5434	21.5221667	NCW	None
39	9	100MW - 9	dark blue Quartzite flake, MSA	-28.5482517	21.5489233	NCW	None
40	9	100MW - 9	white quartzite flake, MSA	-28.5503567	21.54081	NCW	None
41	9	100MW - 9	silcrete core flake, MSA	-28.5497783	21.5371867	NCW	None
42	9	100MW - 9	stone quarried pavement, MSA	-28.5494083	21.5366067	NCW	None
43	9	100MW - 9	quartz flake, MSA	-28.545045	21.5412883	NCW	None
129	10	Roads	access road route, quartzite, Hornfels, quartz flakes and cores, MSA	-28.445615	21.427785	NCW	None
131	10	Roads	Hornfels and views, MSA	-28.4739183	21.4363017	NCW	None
132	10	Roads	quartzite flakes, cores, MSA	-28.4894533	21.440945	NCW	None
135	10	Roads	quartzite flake, MSA	-28.5468883	21.446985	NCW	None
136	10	Roads	green quartzite, MSA	-28.5468067	21.4525667	NCW	None
137	10	Roads	quartzite flake, MSA	-28.54676	21.4555233	NCW	None
173	10	Roads	access road and Hornfels flake, MSA	-28.5381233	21.4266433	NCW	None
176	10	Roads	quartz unifacial, MSA	-28.5004717	21.42949	NCW	None
177	10	Roads	Hornfels flake, MSA	-28.499945	21.42959	NCW	None
178	10	Roads	quartzite core flake, MSA	-28.4987733	21.4297783	NCW	None
179	10	Roads	dark quartzite, MSA	-28.4977033	21.4299017	NCW	None
181	10	Roads	Hornfels flake, MSA	-28.4968333	21.43102	NCW	None
184	10	Roads	Hornfels flake, MSA	-28.4948283	21.4393383	NCW	None
185	10	Roads	Hornfels flakes, MSA	-28.4956	21.4386517	NCW	None
122	11	Pipelines	quartzite flake, MSA	-28.5014183	21.49935	NCW	None
123	11	Pipelines	silcrete core flake, Hornfels, debris field, MSA	-28.49831	21.4978433	NCW	None
191	11	Pipelines	quartzite core and Quartz source, MSA	-28.4169633	21.4844	NCW	None
192	11	Pipelines	Grey quartzite flakes, MSA	-28.4188633	21.481535	NCW	None





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193	11	Pipelines	radial core quartzite, MSA	-28.4232683	21.4759783	NCW	None
195	11	Pipelines	quartzite cores, MSA	-28.4259567	21.4724717	NCW	None
198	11	Pipelines	heavily patinated Hornfels, MSA	-28.4334983	21.4674367	NCW	None
200	11	Pipelines	quartzite core and flake, MSA	-28.44203	21.474215	NCW	None

### 4.3 Selected photographic record

(a full photographic record is available upon request)



Figure 6.1: Observations from Area 1 (14, 15, 16 and 18)



Figure 6.2: Observations from Area 1 (17, 18, 19)



Figure 6.3: Observations from Area 2 (2,3)



Figure 6.4: Observations from Area 2 (7, 8, 9)



Figure 6.5 Observations from Area 3 (104, 105, 106)



Figure 6.6 Observations from Area 3 (148, 149, 151)





Figure 6.7 Observations from Area 3 CSP (113, 116, 156)



Figure 6.8 Observations from Area 3 CSP (157, 158, 160)



Figure 6.9: Observations from Area 4 (70, 76, 169)



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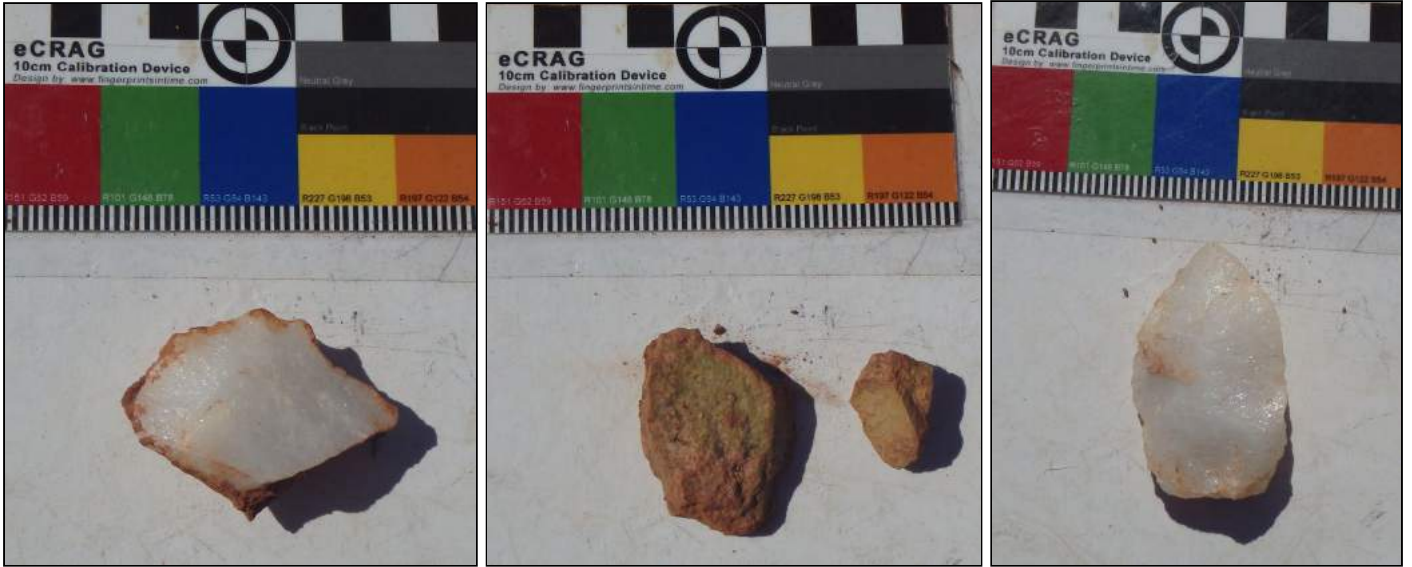


Figure 6.10: Observations from Area 5 (50, 51, 54)



Figure 6.11: Observations from Area 6 (24, 25)



Figure 6.12: Observations from Area 7 (45, 48)





Figures 6.13: Observations from Area 8 (26, 27, 30)



Figure 6.14: Observations from Area 9 (39, 40, 43)



Figure 6.15: Observations from proposed roads (129, 132, 184)



Figure 6.16: Observations from proposed pipeline (122, 191, 192)

## 5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

### 5.1 Assessment of impact to Archaeological Resources

The proposed development will not have a negative impact on the heritage resources identified within the Ilanga PV facilities' footprint. The lithic material identified is of low significance (not conservation-worthy), and even though the resources may be destroyed during construction, the impact is inconsequential. No mitigation is required for archaeological material recorded in the footprint areas of the proposed 350MW and 100MW solar PV facilities. Despite the high number of observations of artefacts, these resources are common and representative of similar scatters across widespread areas of the Northern Cape.

One Grade IIIC archaeological site that falls within the proposed Site 3 CSP was previously recorded by Gaigher (2012). This site (KAROS004, SAHRIS Site ID) is described as "a loose scattering of LSA tools... There is no indication that this site extends underground and there are also no indications that this was a manufacturing site. The material used seems to be hornfels and no local source could be identified on site. These tools are most likely out of context and were deposited by means of alluvial action." In terms of possible impact to this site, Gaigher provided no recommendations in terms of mitigation options and indicated that no site specific recommendations are necessary.

There is no impact anticipated to significant archaeological resources from the proposed pipeline. The archaeological resources identified along this route are not conservation-worthy. The westernmost access route option (Figure 1.2) is not the preferred option as it does not follow an existing jeep track. If possible, the access route about 1.5km east of the westernmost route should be used as it follows an already impacted jeep track.





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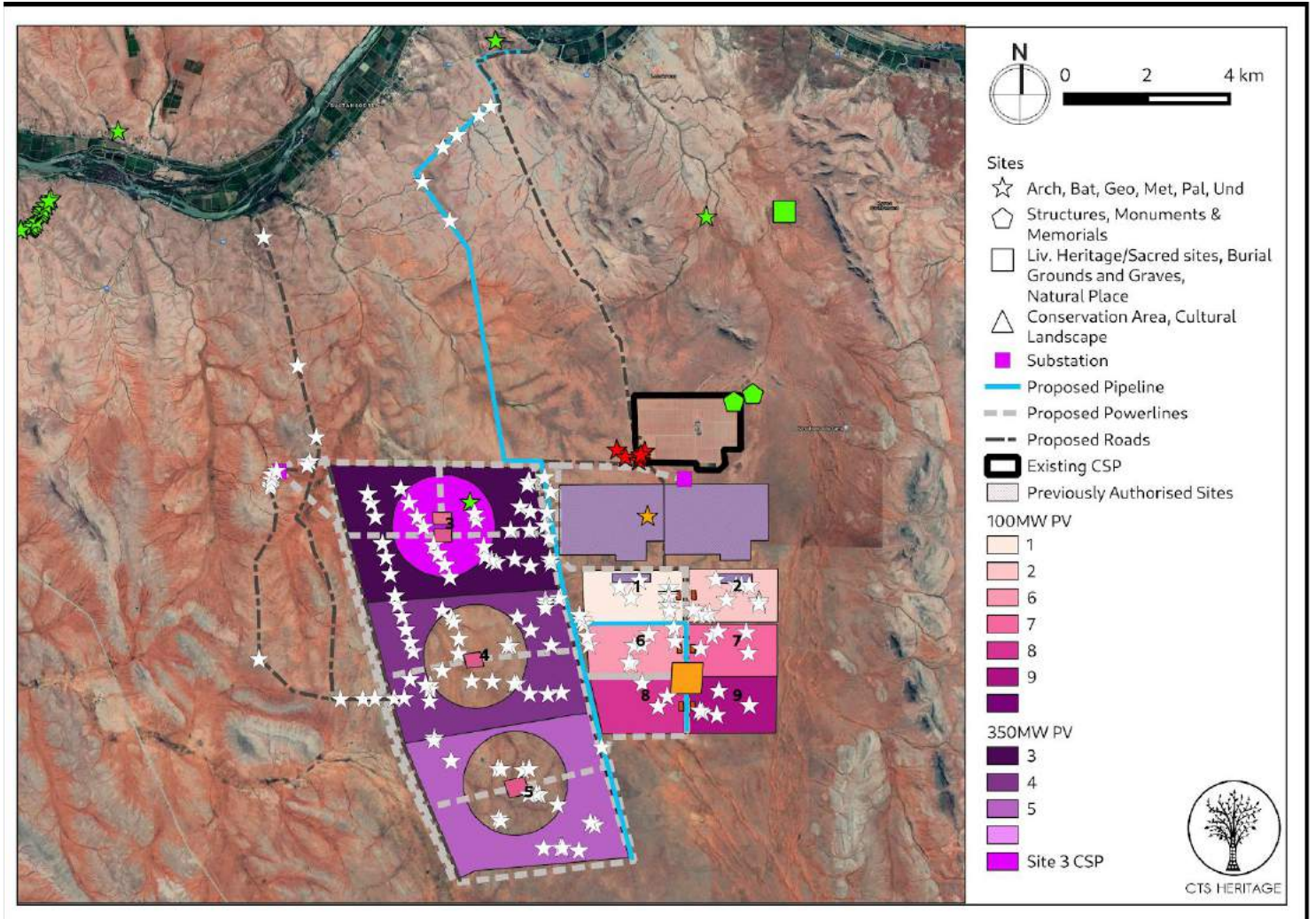


Figure 7: Map of heritage resources identified during the field assessment relative to the proposed development footprint

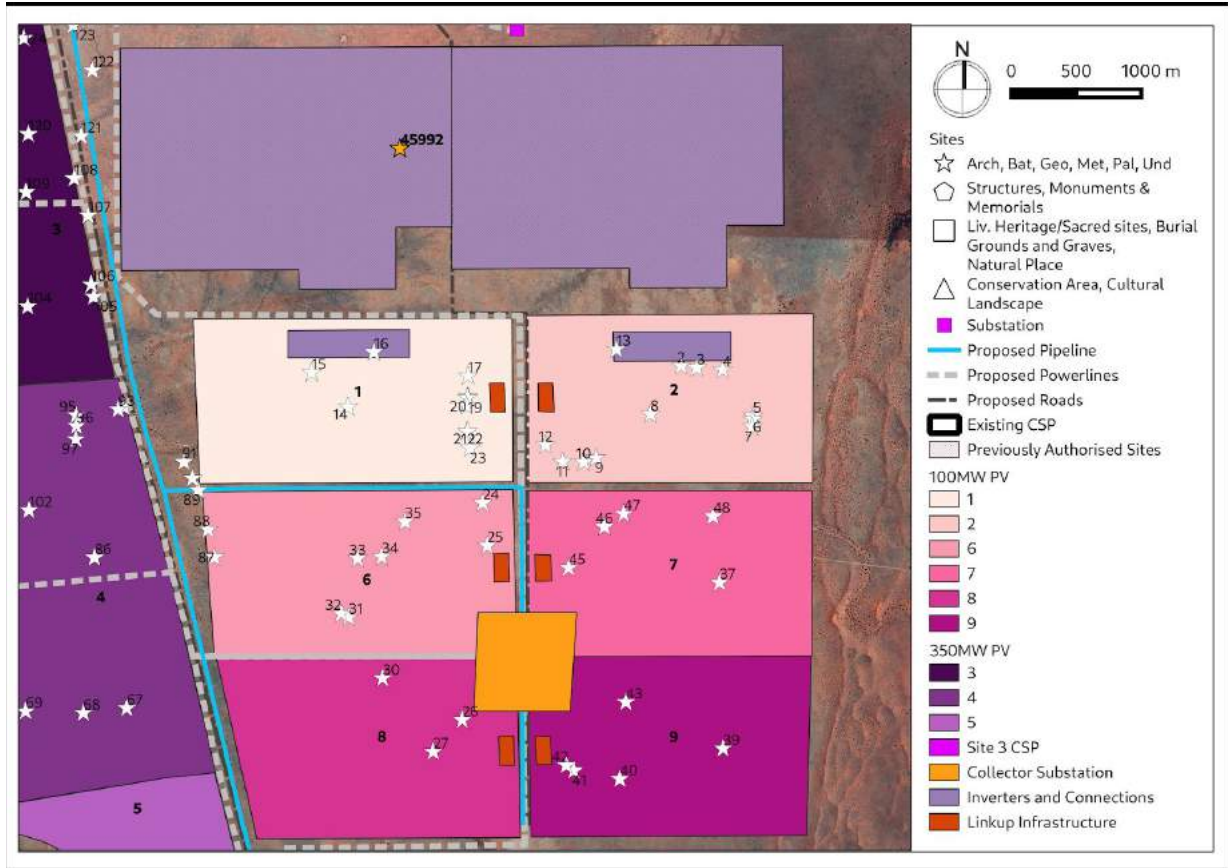


Figure 7.1: Map of heritage resources within the proposed 100MW PV facilities

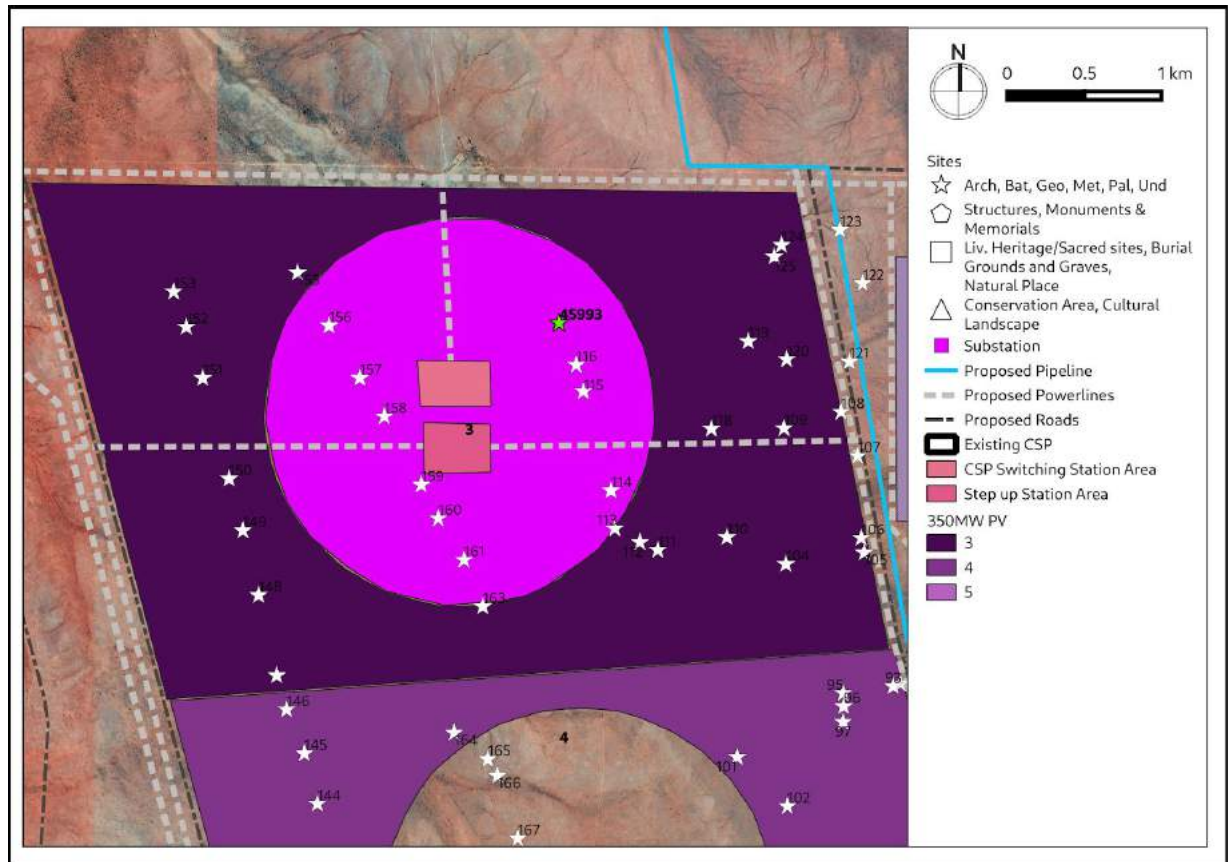


Figure 7.2: Map of heritage resources within Site 3 350MW facility and the Site 3 CSP





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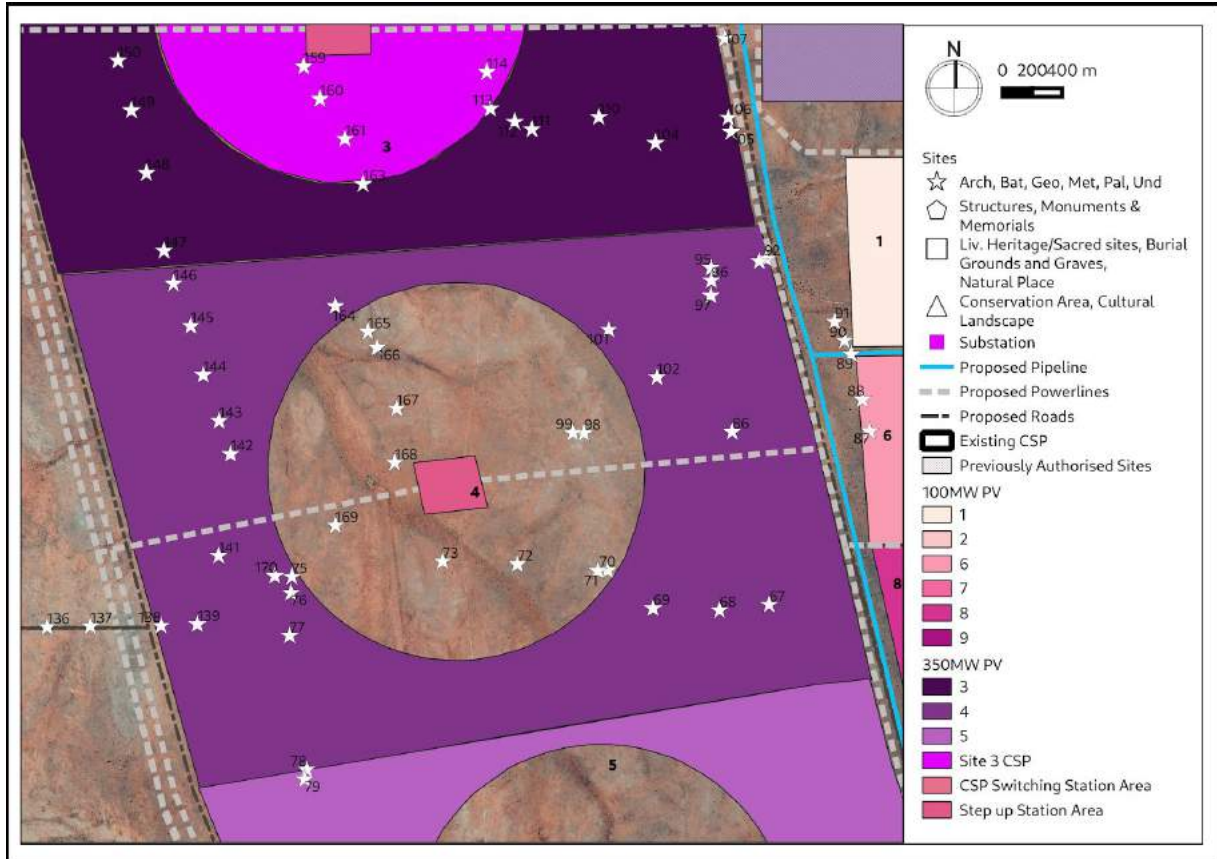


Figure 7.3: Map of heritage resources within Site 4 350MW facility

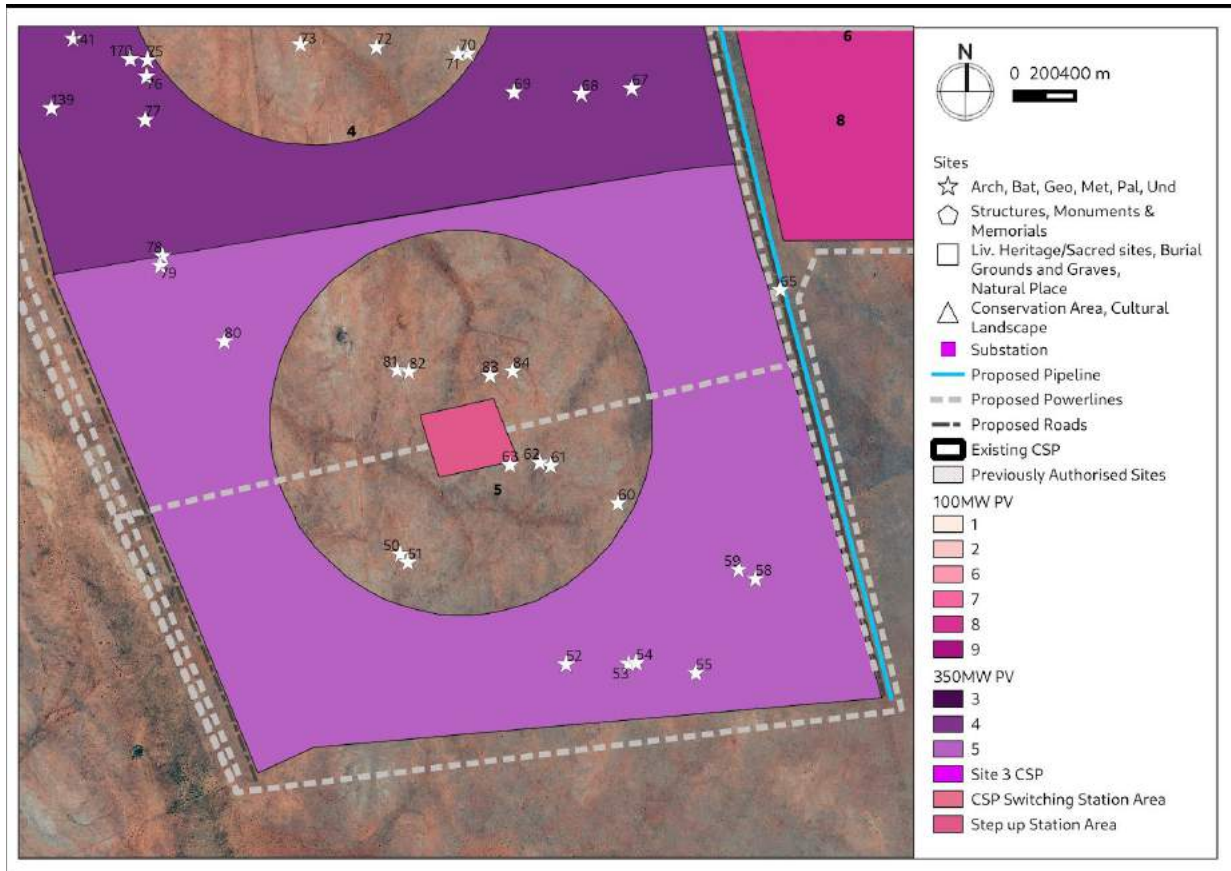


Figure 7.4: Map of heritage resources within Site 4 350MW facility





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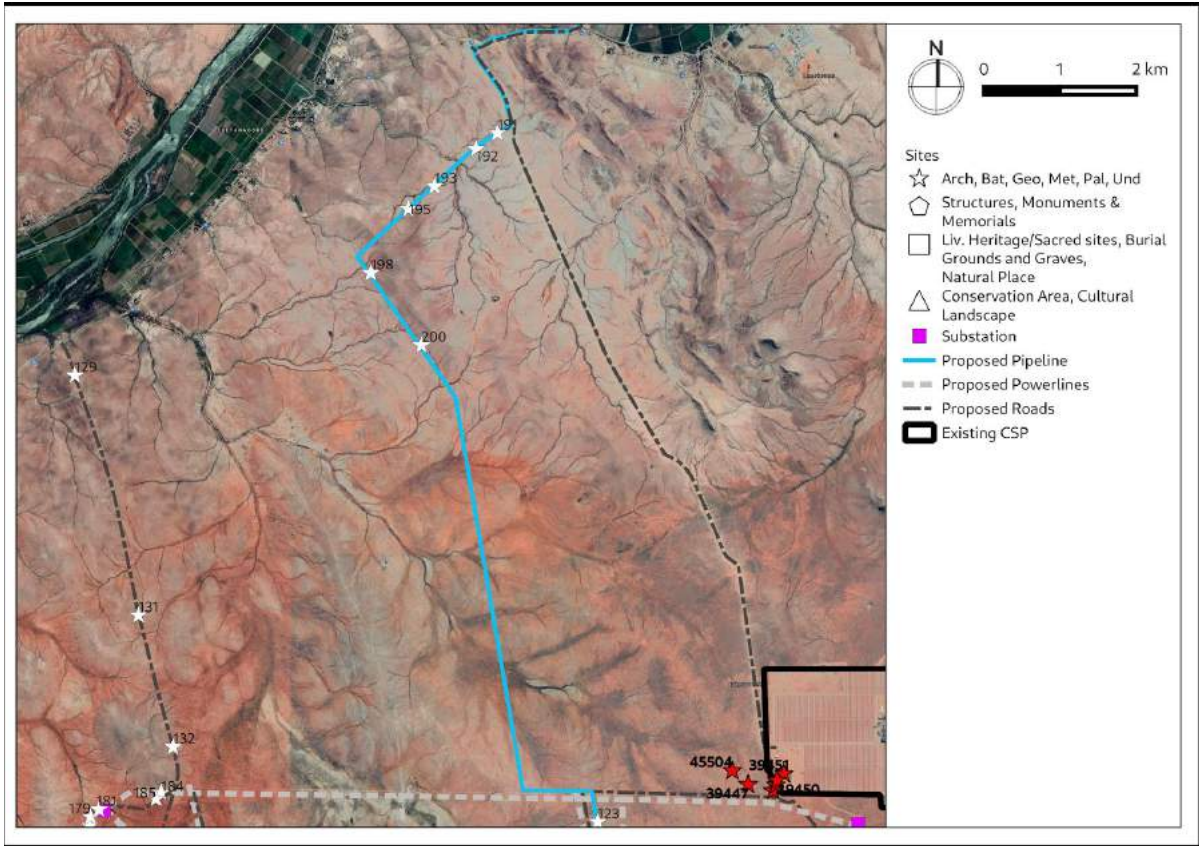


Figure 7.5: Map of heritage resources within the proposed pipeline and roads

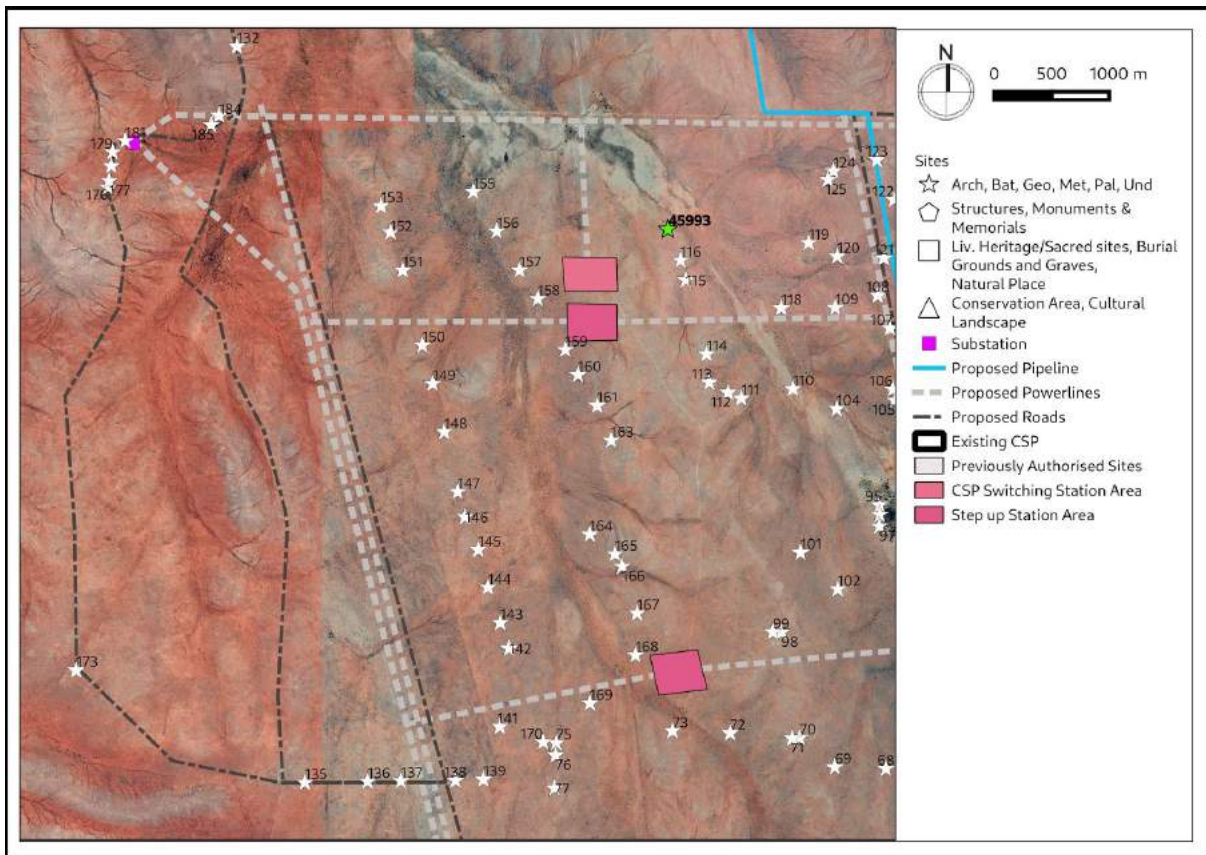


Figure 7.6: Map of heritage resources within the proposed road and powerlines





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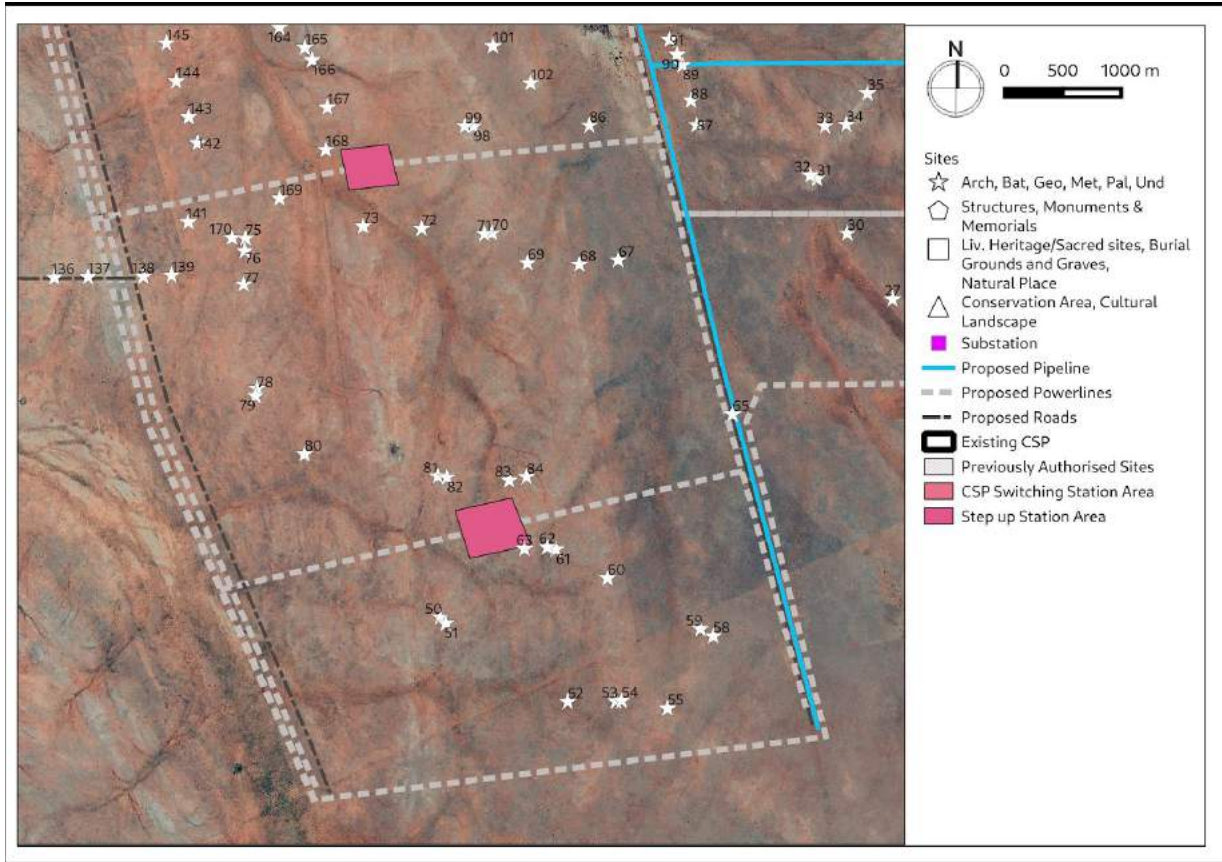


Figure 7.6: Map of heritage resources within the proposed roads, powerlines and pipelines

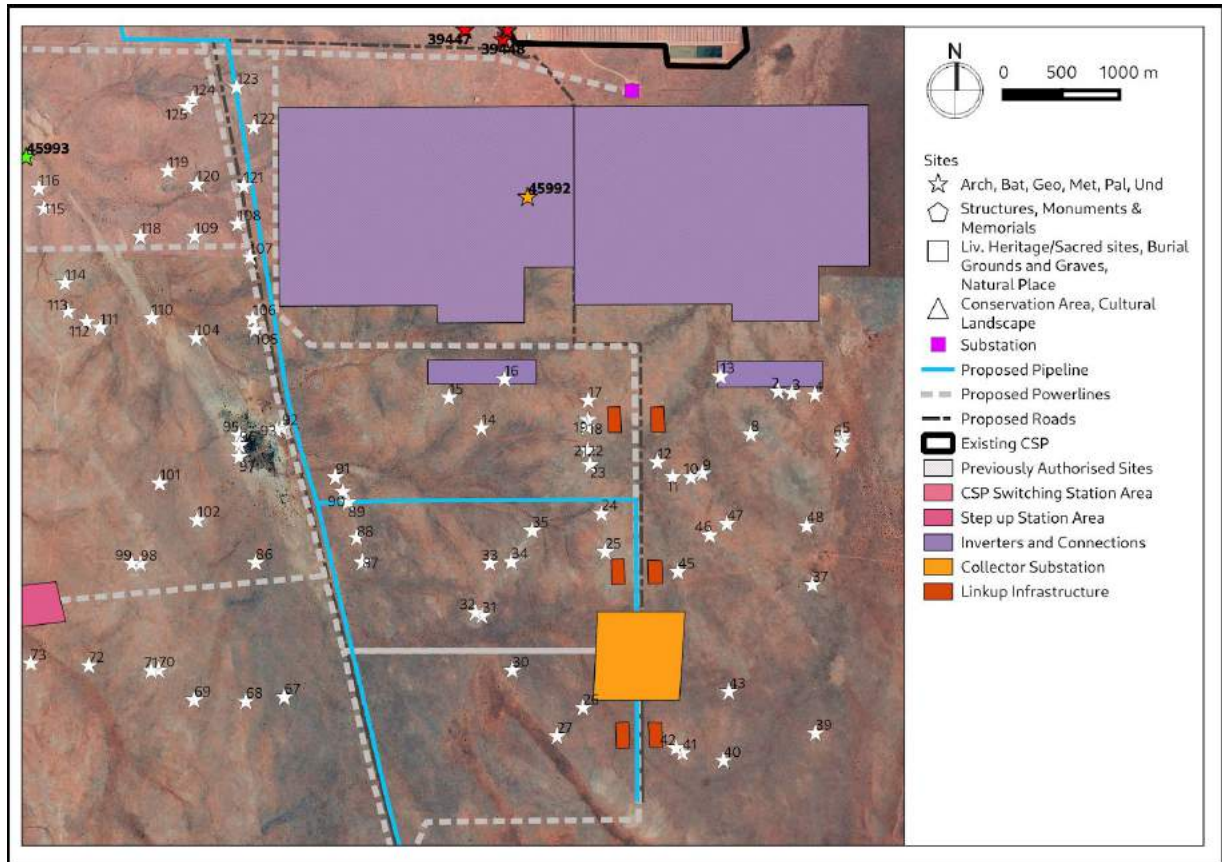


Figure 7.7: Map of heritage resources within the proposed roads, powerlines and pipelines



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## 6. CONCLUSION AND RECOMMENDATIONS

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits.

- No mitigation is required for archaeological material recorded in the footprint areas of the proposed 350MW and 100MW solar PV facilities, or the 350MW CSP, or the proposed powerline, access roads and pipeline. Despite the high number of observations of artefacts, the grading was not conservation worthy as they are common and representative of similar scatters across widespread areas of the Northern Cape.
- The westernmost access route option is not the preferred option as it does not follow an existing jeep track. If possible, the access route about 1.5km east of the westernmost route should be used as it follows an already impacted road.
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted.
- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist must be contracted as soon as possible to inspect the findings. A Phase 2 rescue excavation operation may be required subject to permits issued by SAHRA



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## 7. REFERENCES

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
4119	AIA Phase 1	Jonathan Kaplan	01/08/2008	An Archaeological Assessment of Two Borrow Pits Alongside DR 3321 Uap, Northern Cape Province
4127	AIA Phase 1	Peter Beaumont	15/08/2006	On a Planned Extension of the Lambrechtsdrift Township, Siyanda District Municipality, Northern Cape
4128	AIA Phase 1	Peter Beaumont	16/08/2006	On a Planned Extension of the Leerkrantz Township, Siyanda District Municipality, Northern Cape
4129	AIA Phase 1	Peter Beaumont	16/08/2006	On a Planned Extension of the Karos Township, Siyanda District Municipality, Northern Cape
4130	AIA Phase 1	Peter Beaumont	16/08/2006	Phase 1 Heritage Impact Assessment Report on a Planned Extension of the Louisvaleweg Township, //Khara Hais Municipality, Northern Cape Province
4132	AIA Phase 1	Peter Beaumont	18/08/2006	Phase 1 Heritage Impact Assessment Report on a Planned Extension Flanking Rondonstraat, //Khara Hais Municipality, Northern Cape Province
15988	Heritage Statement	Johnny Van Schalkwyk	01/04/2012	DOCUMENTATION OF FOUR BRIDGES ON THE N10 NATIONAL ROAD BETWEEN UPINGTON AND GROBLERSHOOP, NORTHERN CAPE PROVINCE
15989	Palaeontological Specialist Reports	John E Almond	01/03/2012	RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES & MITIGATION: PROPOSED UPGRADING OF FOUR ROAD BRIDGES ALONG THE N10 BETWEEN GROBLERSHOOP & LAMBRECHTSDRIFT, NORTHERN CAPE
34135	HIA Phase 1	Stephan Gaigher	30/04/2012	Heritage Impact Assessment Report EIA Phase: Proposed Establishment of the Karoshoek Valley Solar Park Components on Sites 1.1, 1.3, 1.4, 2, 3, 4 & 5 on Sites Located South and East of Upington, Northern Cape Province
45016	HIA Phase 1	Johnny Van Schalkwyk	01/05/2011	Heritage Impact Assessment for the Proposed Establishment of the Ilanga Solar Thermal Power Plant near Upington, Northern Cape
49492	HIA Phase 1	Cobus Dreyer	09/09/2011	FIRST PHASE ARCHAEOLOGICAL & HERITAGE ASSESSMENT OF THE HOUSING DEVELOPMENTS AT MELKSTROOM 563, UPINGTON, NORTHERN CAPE
108359	HIA Phase 1	Cobus Dreyer	01/09/2011	FIRST PHASE ARCHAEOLOGICAL & HERITAGE ASSESSMENT OF THE HOUSING DEVELOPMENTS AT MELKSTROOM 563, UPINGTON, NORTHERN CAPE
111142	HIA Phase 1	Johnny Van Schalkwyk	01/03/2012	Heritage Impact Assessment for the Proposed Development of an Agri-estate on the Farm Melkstroom East of Upington, Gordonia Magisterial District, Northern Cape Province
117805	AIA Phase 1	Cobus Dreyer	18/04/2013	FIRST PHASE ARCHAEOLOGICAL & HERITAGE ASSESSMENT OF THE HOUSING DEVELOPMENTS AT MELKSTROOM 563, UPINGTON, NORTHERN CAPE
121280	HIA Phase 1	Robert de Jong	05/11/2010	FINAL HERITAGE IMPACT ASSESSMENT REPORT: PROPOSED LAND USE CHANGE TO PROVIDE FOR THE DEO GLORIA OLIVE ESTATE ON PORTION 67 AND THE REMAINDER OF THE FARM VAALKOPPIES 40 NEAR UPINGTON, KAI! GARIB MUNICIPALITY, NORTHERN CAPE PROVINCE
121413	AIA Phase 1	Johnny Van Schalkwyk	01/08/2010	Archaeological impact survey report for THE LAND USE CHANGE ON SECTIONS OF THE FARM VAALKOPPIES 40, GORDONIA DISTRICT, NORTHERN CAPE PROVINCE
121413	AIA Phase 1	Johnny Van Schalkwyk	01/08/2010	Archaeological impact survey report for THE LAND USE CHANGE ON SECTIONS OF THE FARM VAALKOPPIES 40, GORDONIA DISTRICT, NORTHERN CAPE PROVINCE
130139	Archaeological Specialist Reports	Jonathan Kaplan	01/02/2013	ARCHAEOLOGICAL IMPACT ASSESSMENT THE PROPOSED UPGRADING OF THE LOUISEVALE ROAD WASTE WATER TREATMENT WORKS IN LOUISEVALE
131589	Heritage Impact Assessment Specialist	Stephan Gaigher	22/02/2013	Proposed Establishment of Several Electricity Distribution Lines within the Northern Cape Province



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	Reports			
154837	AIA Phase 1	Peter Nilssen	06/12/2012	AIA - Proposed Deo Gloria Bulk Water Supply Line & Reservoir
154839		John E Almond	31/03/2013	Letter of Exemption
159293	HIA Phase 1	Johnny Van Schalkwyk	12/03/2014	Cultural Heritage Impact Assessment for proposed township development, Louisvaledweg, UPINGTON
161427	HIA Phase 1	Stephan Gaigher	15/04/2014	Proposed Establishment of Several Electricity Distribution Lines within the Northern Cape Province
162266	Heritage Impact Assessment Specialist Reports	Johnny Van Schalkwyk	31/05/2011	Heritage Impact Assessment for the Proposed Establishment of the Ilanga Solar Thermal Power Plant near Upington, Northern Cape Province
165290	AIA Phase 1	Neels Kruger	01/04/2015	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF A DEMARCATED SURFACE PORTION ON THE FARM AVONDALE 410 FOR THE PROPOSED AVONDALE 1 PHOTOVOLTAIC POWER PLANT & 132KV POWER LINES DEVELOPMENT, //KHARA HAIS LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHE
254926	PIA Desktop	Barry Millstead	10/02/2015	Full Palaeontological Heritage Impact Assessment Report on the Site of Proposed Solra Energy Generation Facilities (Grootdrink Solar Projects 1 and 2 ) to be located on the farm Albany 405 near Karos, Northern Cape Province
254927	Heritage Scoping	Jaco van der Walt	10/02/2015	Heritage Scoping Report for the Proposed Grootdrink Solar (PV) Energy Facility East of Upington
266098	Archaeological Specialist Reports	Jaco van der Walt	13/03/2015	Archaeological Impact Assessment for the Proposed Realignment of the N10 to Facilitate Access to the Ilanga CSP Facility Site, East of Upington, NC Province
341377	HIA Phase 1	Jayson Orton	22/06/2015	
344305	PIA Desktop	John E Almond	13/11/2015	Palaeontological Heritage Assessment Desktop Study for the Additional CSP Facilities Associated with the Authorized CSP Sites (1,3, 1,4, 3, 4 & 5) within the Karoshoek Solar Valley Development near Upington, ZK Mgcawu Distrcitu, NC Province
344306	Heritage Scoping	Jaco van der Walt	13/11/2015	Archeological Scoping Report for the Additional CSP Facilities Associated with the Authorized CSP Sites (1,3, 1,4, 3, 4 & 5) within the Karoshoek Solar Valley Development near Upington, ZK Mgcawu Distrcitu, NC Province
351273	Palaeontological Specialist Reports	Barry Millstead		FULL PALAEOLOGICAL HERITAGE IMPACT ASSESSEMENT REPORT ON THE SITE OF PROPOSED SOLAR ENERGY GENERATION FACILITIES (TEWA ISITHA SOLAR 1 AND 2) TO BE LOCATED ON THE REMAINING EXTENT OF THE FARM ALBANY 405 NEAR KAROS, NORTHERN CAPE PROVINCE
351279	Archaeological Specialist Reports	Jaco van der Walt	02/12/2015	Archaeological Impact Assessment for the proposed Tewa Isitha Solar 1 PV Facility East Of Upington, Northern Cape Province.
351311	Archaeological Specialist Reports	Jaco van der Walt	02/12/2015	Archaeological Impact Assessment for the proposed Tewa Isitha Solar 2 PV Facility East Of Upington, Northern Cape Province.
354735	PIA Desktop	John Almond	16/11/2015	Palaeontological Heritage Assessment: Desktop Study for the Proposed Ilanga CSP 7, 8 & 9 facilities and associated infrastructure within the Karoshoek Solar Valley Development near Upington, NC Province
354736	Archaeological Specialist Reports	Jaco van der Walt	16/11/2015	Archaeological Scoping Report for the Ilanga CSP 9 facility and associated infrastructure within the Karoshoek Solar Development near Upington, NC Province
354743	Archaeological Specialist Reports	Jaco van der Walt	16/11/2015	Archaeological Scoping Report for the Ilanga CSP 7 & 8 facilities and associated infrastructure within the Karoshoek Solar Development near Upington, NC Province
361653	Heritage Impact Assessment Specialist	Jaco van der Walt	18/04/2016	Archaeological Impact Assessment Report for the Proposed Establishment of the Ilanga CSP 2 Project, near Upington, Northern Cape Province



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	Reports			
361654	Heritage Impact Assessment Specialist Reports	Jaco van der Walt	13/04/2016	Archaeological Impact Assessment Report for the Proposed Establishment of the Ilanga Tower 1 Project, near Upington, NC Province
363353	Archaeological Specialist Reports	Jaco van der Walt	12/04/2016	Archaeological Impact Assessment Report for the Ilanga CSP 3 Project, near Upington, Northern Cape Province
363356	Archaeological Specialist Reports	Jaco van der Walt	11/04/2016	Archaeological Impact Assessment Report for the Proposed Establishment of the Ilanga CSP 5 Project, near Upington, Northern Cape Province
363357		Jaco van der Walt		Archaeological Impact Assessment Report for the Proposed Establishment of the Ilanga CSP 4 Project, near Upington, Northern Cape Province
365243	Archaeological Specialist Reports	Jaco van der Walt	20/06/2016	AIA for the proposed Ilanga Tower 1 project, near Upington, NC Province
365251	Archaeological Specialist Reports	Jaco van der Walt	20/06/2016	AIA for the proposed establishment of the Ilanga CSP 3 project, near Upington, NC Province
365252	Archaeological Specialist Reports	Jaco van der Walt	20/06/2016	AIA for the proposed Ilanga CSP 5
365253	Archaeological Specialist Reports	Jaco van der Walt	20/06/2016	AIA for the Ilanga CSP 4
365875	Archaeological Specialist Reports	Jaco van der Walt	14/06/2016	Ilanga CSP9 and Associated Infrastructure Within Karoshoek Solar Valley Development Near Upington, Northern Cape Province
365889		Jaco van der Walt		Archaeological Impact Assessment Report