

**Phase 1 Heritage Impact Assessment for proposed
prospecting drilling in the Big Syncline area on the farm
Aggeneys 56 Portion 01, Khai-ma local Municipality, NC
Province.**

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Executive Summary

A Phase 1 Heritage Impact Assessment was carried out over a 25 ha area on portion 1 of the farm Aggeneys 56, situated between Pofadder and Springbok in the Northern Cape Province, where the exploration department of the Black Mountain mining company plans to conduct drilling activities in a previously pristine area of the Big Syncline (Aggeneys se Berg), which is located approximately 3 km to the northwest of the town of Aggeneys. The field assessment provided no above-ground evidence of prehistoric structures, buildings older than 60 years, or material of cultural significance or *in situ* archaeological sites within the study area. The proposed drilling footprint and existing access roads yielded no archaeological or cultural heritage resources and are not considered palaeontologically significant. It is also considered unlikely that any significant artefact occurrences would be found below the surface within the boundaries of the study area. No mitigation is required, as long as all planned activities are restricted to within the boundaries of the development footprint. The heritage significance of the proposed footprint is considered low and the study area is assigned a site rating of Generally Protected C (GP.C).

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Introduction

A Phase 1 Heritage Impact Assessment was carried out over a 25 ha area on portion 1 of the farm Aggeneys 56, situated between Pofadder and Springbok in the Northern Cape Province, where the exploration department of the Black Mountain mining company plans to conduct drilling activities in a previously pristine area of the Big Syncline (Aggeneys se Berg), which is located approximately 3 km to the northwest of the town of Aggeneys (**Fig. 1**). The region's unique and non-renewable archaeological and palaeontological heritage sites are 'Generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. As many such heritage sites are threatened daily by development, both the environmental and heritage legislation require impact assessment reports that identify all heritage resources including archaeological and palaeontological sites in the area to be developed, and that make recommendations for protection or mitigation of the impact of the sites.

Archaeological Impact Assessments (AIAs) and Palaeontological Impact Assessments (PIAs), or overarching Heritage Impact Assessments (HIAs) are most often specialist reports that form part of the wider heritage component of Environmental Impact Assessments (EIAs) required in terms of the National Environmental Management Act or of the Environment Conservation Act by the provincial Department of Environment Affairs; or Environmental Management Plans (EMPs) required by the Department of Minerals and Energy.

Legislative framework

The primary legal trigger for identifying when heritage specialist involvement is required in the Environmental Impact Assessment process is the National Heritage Resources (NHR) Act (Act No 25 of 1999). The NHR Act requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, battlefields, graves, and structures over 60 years of age, living heritage and the collection of oral histories, historical settlements, landscapes, geological sites, palaeontological sites and objects.

The Act identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. In this regard, categories of development listed in Section 38 (1) of the NHR Act are:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of the site;
- Exceeding 5000 m² in extent;
- Involving three or more existing erven or subdivisions thereof;
- Involving three or more subdivisions thereof which have been consolidated within the past five years;
- Costs of which will exceed a sum set in terms of regulations by the South African Heritage Resources Agency (SAHRA).
- The rezoning of a site exceeding 10 000 m².
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

If a heritage resource is likely to be impacted by a development listed in Section 38 (1) of the NHR Act, a heritage assessment will be required either as a separate HIA or as the heritage specialist component (AIA or PIA) of an EIA.

The significance or sensitivity of heritage resources within a particular area or region can inform the EIA process on potential impacts and whether or not the expertise of a heritage specialist is required. A range of contexts can be identified which typically have high or potential cultural significance and which would require some form of heritage specialist involvement (**Table 1**). This may include formally protected heritage sites or unprotected, but potentially significant sites or landscapes (**Table 2**). The involvement of the heritage specialist in such a process is usually necessary when a proposed development may affect a heritage resource, whether it is formally protected or unprotected, known or unknown. In many cases, the nature and degree of heritage significance is largely unknown pending further investigation (e.g. capped sites, assemblages or subsurface fossil remains). On the other hand, it is also possible that a site may contain heritage resources (e.g. structures older than 60 years), with

little or no conservation value. In most cases it will be necessary to engage the professional opinion of a heritage specialist in determining whether or not further heritage specialist input in an EIA process is required. This may involve site-significance classification standards as prescribed by SAHRA (**Table 3**). Alternatively, useful sources of information on heritage resources in South Africa can also be obtained through SAHRA's national database of heritage resources, including existing heritage survey information as well as other published or secondary source material on the overall history of a particular area or site.

Methodology

The significance of the affected area was evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature. This was followed by a field assessment by means of a pedestrian survey of the area. Particular attention was given to low-lying areas and associated alluvial deposits. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant archaeological and palaeontological information, maps, Google Earth images and site records were consulted and integrated with data acquired during the on-site inspection.

The task also involved identification and assessment of possible archaeological heritage within the proposed project area, in accordance with section 9(8) and appendix 6 ("Specialist reports") of the NEMA EIA Regulations, 2014, whereby the specialist report takes into account the following terms of reference:

- Identify and map possible heritage sites and occurrences using available resources.
- Determine and assess the potential impacts of the proposed development on potential heritage resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

The study area is rated according to field rating categories as prescribed by SAHRA (**Table 3**) and summarized according to three significance rating categories (**Table 4**).

Assumptions and Limitations

The field assessment focused on a small development footprint located on rocky terrain with sparse vegetation and shallow soil profiles, with the expectation that

archaeological visibility should be relatively high in terms of Stone Age archaeological remains, rock art sites and above ground historical structures. However, for the sake of prudence, it is emphasized that potential subsurface features of heritage significance may not be noticed during the initial field assessment.

Locality data

1 : 50 000 scale topographic map 2918 BB Aggeneys

1 : 250 000 scale geological map 2918 Pofadder

Transect coordinates of the study area (**Fig. 2**).

A) 29°12'56.40"S 18°49'7.68"E

B) 29°13'2.79"S 18°48'56.92"E

C) 29°13'5.2 5"S 18°48'46.55"E

D) 29°13'5.55"S 18°48'36.96"E

The size of the study area is approximately 800m east to west and 300m north to south (**Fig. 2**). The footprint traverses the southern and southwestern gradient of the Big Syncline and is underlain by rocks of the Namaqua-Natal Metamorphic Complex, where rocks of the Bushmanland Group and Precambrian granites outcrop in places (**Fig. 3**). The prominent inselbergs and ranges of hills which characterise the arid landscape of the area are formed by the metavolcanic-metasedimentary units of the Bushmanland Group that usually occur as major, often overturned, synformal infolds in the associated granitic gneisses (Bailie *et al.* 2007) (**Fig. 4**). Geologically recent superficial deposits along the valley floors are largely made up of by gritty to gravelly, brown top soils composed of an admixture of weathered bedrock, calcretes and Quaternary wind-blown sands.

Background

Due to the complex history of intense deformation and metamorphism of many aspects concerning the province are still controversial and revision of stratigraphic correlations and genetic models is an ongoing process. Geologically recent superficial deposits along the valley floors are largely made up of Quaternary calcretes and sands.

Cenozoic river terrace deposits between Upington and Pella consists of thin remnants preserved as bedrock lags and small sediment accumulations concentrated at local bedrock knickpoints (De Wit 2006). There are currently no records of vertebrate fossil remains from alluvial contexts associated with the Orange River in the region. Paleogene fossil assemblages are known from a crater-lake deposit within a volcanic pipe at Stompoor, located about 160 km due south of Upington, and include a diversity of fish, frogs, reptiles, insects, and palynological remains (Smith 1988). Fluvial deposits from the ancient Koa Valley have yielded fossil vertebrate bone as well as fossil wood (Maglio 1978; De Wit 1996; De Wit and Bamford 1993) while a rich, Middle Miocene vertebrate site is located further downstream in proto-Orange River gravel deposits on the Namibian side of the Orange River at Arrisdrift, about 40 km northeast of Oranjemund.

Archaeological and historical evidence show that the Middle Orange River and Bushmanland regions have been populated more or less continuously during prehistoric times and that the region was extensively occupied by Khoi herders and San hunter-gatherers during the last 2000 years (Morris & Beaumont 1991; Beaumont *et al.* 1995; Smith 1995). According to Beaumont (1986) archaeological visibility in the region was high during the Last Glacial Maximum, a viewpoint that is in contrast to that indicated for southern Africa as a whole (Deacon and Thackeray 1984). Beaumont *et al.* 1995 also noted that MSA artifact occurrences are widespread in the Bushmanland area, but are mainly preserved as low density surface scatters on the landscape. Morris (2010, 2013a, 2013b) noted very sparse localized scatters of MSA stone tools at the top of Gamsberg, including a MSA knapping site, and ESA material, including a Victoria West core on quartzite within the Gamsberg basin. The importance of Gamsberg as an archaeological/historical focal point is further alluded to in early 19th century records (Penn 2005) as a place of refuge and conflict during the colonial frontier period and by the meaning of its name, which is derived from the Khoikhoi word Gaams, meaning 'grassy spring'. The principal Khoikhoi inhabitants of the Middle Orange River were the Einiqua who belonged to the same language group as the Namaqua and Korana, namely the Orange River Khoikhoi (Penn 2005). The Einiqua occupied the area around and east of the Augrabies Falls while the Korana occupied the Middle-Upper Orange River further to the east. A large number of burial cairns were excavated near the Orange River in the Kakamas area and appear to be related to Korana herders (Morris 1995). It is pointed out that while

Bushmanland sites in the surrounding area appear to be ephemeral occupations by small hunter-gatherer groups, substantial herder encampments found along the Orange River itself indicate that the banks and floodplains of the river were more intensely exploited (Morris & Beaumont 1991; Beaumont 1995). Hinterland sites are mainly restricted rock shelters near mountainous terrain sand dune deposits, or around seasonal pans and springs (Beaumont 1995). Herder sites with ample pottery have been recorded near Aggeneys and, east of Pofadder, at Schuitdrift South (Morris 1999) and historical records show that herder groups settled at the stronger springs such as Pella (Thompson 1827). Pella originated as Roman Catholic mission station, about 28 km northwest of Pofadder. It was established as a station of the London Missionary Society about 1806, was taken over by the Rhenish Missionary Society until 1869, and then by the Roman Catholics in 1874. The town of Pofadder developed from a station of the Inland Mission founded in 1875, and named after Klaas Pofadder, a Korana chief. The town was laid out in 1917 and a village management board was instituted in 1937. Originally named *Theronsville*, the name Pofadder was restored in 1936. Grinding grooves have been found on rock outcrops in the Gamsberg area (Morris 2011) and rock paintings, grinding surfaces and cupules sites are known from the Black Mountain Mining property at Aggeneys and at the foot of the Swartberg on Zuurwater 62 (Morris 2013a) (**Fig. 5**). No Iron Age sites are expected to be found in this area as it falls outside the southwestern periphery of distribution of Iron Age settlement in the region (Humphreys 1976).

Impact Assessment

Nature of Impacts

It is expected that the proposed drilling activities will be localized, and that potential palaeontological and archaeological impacts, if any, will be confined to the development footprint during the construction phase. Bedrock underlying the study area is not considered to be palaeontologically significant, because of the metavolcanic-metasedimentary nature of the strata. However there is a low probability that well-developed Quaternary alluvial surface deposits may contain large vertebrate fossil remains or capped Stone Age occurrences. It is also likely that outcrop may yield rock art rock shelters with evidence of prehistoric human occupation.

Extent of Impact

Possible extent of impact following the drilling activities will be locally restricted to potential damage or destruction as a result of excavations into granitic gneisses, Bushmanland Group strata and Quaternary overburden as well as potential damage or destruction as a result of the construction of access roads within the study area.

Duration of Impact

The proposed development is considered long term with the consequence that any damage or destruction to geological strata and archaeological heritage within the affected area will be permanent.

Cumulative Impact

There currently exists a well-established mining footprint within a 50 km radius of the proposed development. The proposed development will be carried out on a landscape where mining activities is a common feature.

Field Assessment

Located on a south-facing slope of the Big Syncline, the proposed drilling area covers mostly rocky terrain with very little soil development (**Fig. 6 - 9**). Lower down towards the valley, results from a foot survey suggest that impact on potential palaeontological heritage resources within the more developed superficial sediments (overlying Quaternary sediments) along gullies and drainage lines is unlikely. No above-ground evidence was found of intact Stone Age archaeological assemblages or sites. The pedestrian survey also revealed no evidence of prehistoric structures, marked graves or rock art sites within the confines of the study area.

Impact Statement and Recommendation

The field assessment provided no above-ground evidence of prehistoric structures, buildings older than 60 years, or material of cultural significance or *in situ* archaeological sites within the study area (**Table 5**). The proposed drilling footprint and existing access roads yielded no archaeological or cultural heritage resources and are not considered palaeontologically significant. It is also considered unlikely that any significant artefact occurrences would be found below the surface within the boundaries of the study area. No mitigation is required, as long as all planned activities are restricted to within

the boundaries of the development footprint. The heritage significance of the proposed footprint is considered low and the study area is assigned a site rating of Generally Protected C (GP.C) (Tables 3 and 4).

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Tables and Figures

Table 1: Relationship between different heritage contexts, heritage resources likely to occur within these contexts, and likely sources of heritage impacts in the region.

Heritage Context	Heritage Resources	Impact
Palaeontology	Precambrian shallow marine and lacustrine stromatolites, organic-walled microfossils, Ghaap Plateau (Transvaal Supergroup) Palaeozoic and Mesozoic fossil remains, e.g. Karoo Supergroup Neogene regolith	Road cuttings Quarry excavation Bridge and pipeline construction (Quaternary alluvial deposits)
Archaeology Early Stone Age Middle Stone Age LSA - Herder Historical	Types of sites that could occur in the Free State include: Localized Stone Age sites containing lithic artifacts, animal and human remains found near <i>inter alia</i> the following: River courses/springs Stone tool making sites Cave sites and rock shelters Freshwater shell middens Ancient, kraals and stonewalled complexes Abandoned areas of past human settlement Burials over 100 years old Historical middens Structural remains Objects including industrial machinery and aircraft	Subsurface excavations including ground levelling, landscaping, foundation preparation, road building, bridge building, pipeline construction, construction of electrical infrastructure and alternative energy facilities, township development.
History	Historical townscapes, e.g. Kimberley Historical structures, i.e. older than 60 years Historical burial sites Places associated with social identity/displacement, e.g. Witsieshoek Cave, Oppermansgronde Historical mission settlements, e.g. Bethulie, Beersheba, Moffat Mission	Demolition or alteration work. New development.
Natural Landscapes	Formally proclaimed nature reserves Evidence of pre-colonial occupation Scenic resources, e.g. view corridors, viewing sites, Historical structures/settlements older than 60 years Geological sites of cultural significance.	Demolition or alteration work. New development.
Relic Landscape Context	Battle and military sites, e.g. Magersfontein Precolonial settlement and burial sites Historical graves (marked or unmarked, known or unknown) Human remains (older than 100 years) Associated burial goods (older than 100 years) Burial architecture (older than 60 years)	Demolition or alteration work. New development.

Table 2. Examples of heritage resources located in the region.

Historically, archaeologically and palaeontologically significant heritage sites & landscapes	Examples
Landscapes with unique geological or palaeontological history	Karoo Basin Beaufort Group sedimentary strata Rock engravings and glacial striations on Ventersdorp andesites Taung World Heritage Site
Landscapes characterised by certain geomorphological attributes where a range of archaeological and palaeontological sites could be located.	Orange River valley Ancient Koa River drainage Ghaap Plateau Gamsberg
Relic landscapes with evidence of past, now discontinued human activities	Wonderwerk Cave Stone Age deposits
Historical towns, historically significant farmsteads, settlements & routes	Cambell
Battlefield sites, burial grounds and grave sites older than 60 years.	Prieska Kakemas

Table 3. Site rating categories as prescribed by SAHRA.

Field Rating	Grade	Significance	Mitigation
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

Table 4. Significance rating and recommendation

Rating	Recommendation
High	No-Go area. Off limits for development
Medium	Poses a potential risk to heritage resources, but can be accepted with mitigation
Low	Acceptable for development

Table 5. Summary of Impact in terms of Extent (the size of the area that will be affected by the impact), Intensity (the anticipated severity of the impact), Duration (the timeframe during which the impact will be experienced), Probability, Confidence, Mitigation and Site Rating.

Site	Impact	Extent	Intensity	Duration	Probability of impact	Confidence	Mitigation	Rating
Big Syncline Drilling footprint	Impact of proposed development on palaeontological heritage	Local	Low	Permanent	Improbable; Non-fossiliferous bedrock Sterile superficial deposits	High	None	Generally Protected C (GP.C)
	Impact of proposed development on archaeological heritage	Local	Low	Permanent	Improbable: No aboveground evidence of <i>in situ</i> features	High	None	Generally Protected C (GP.C)

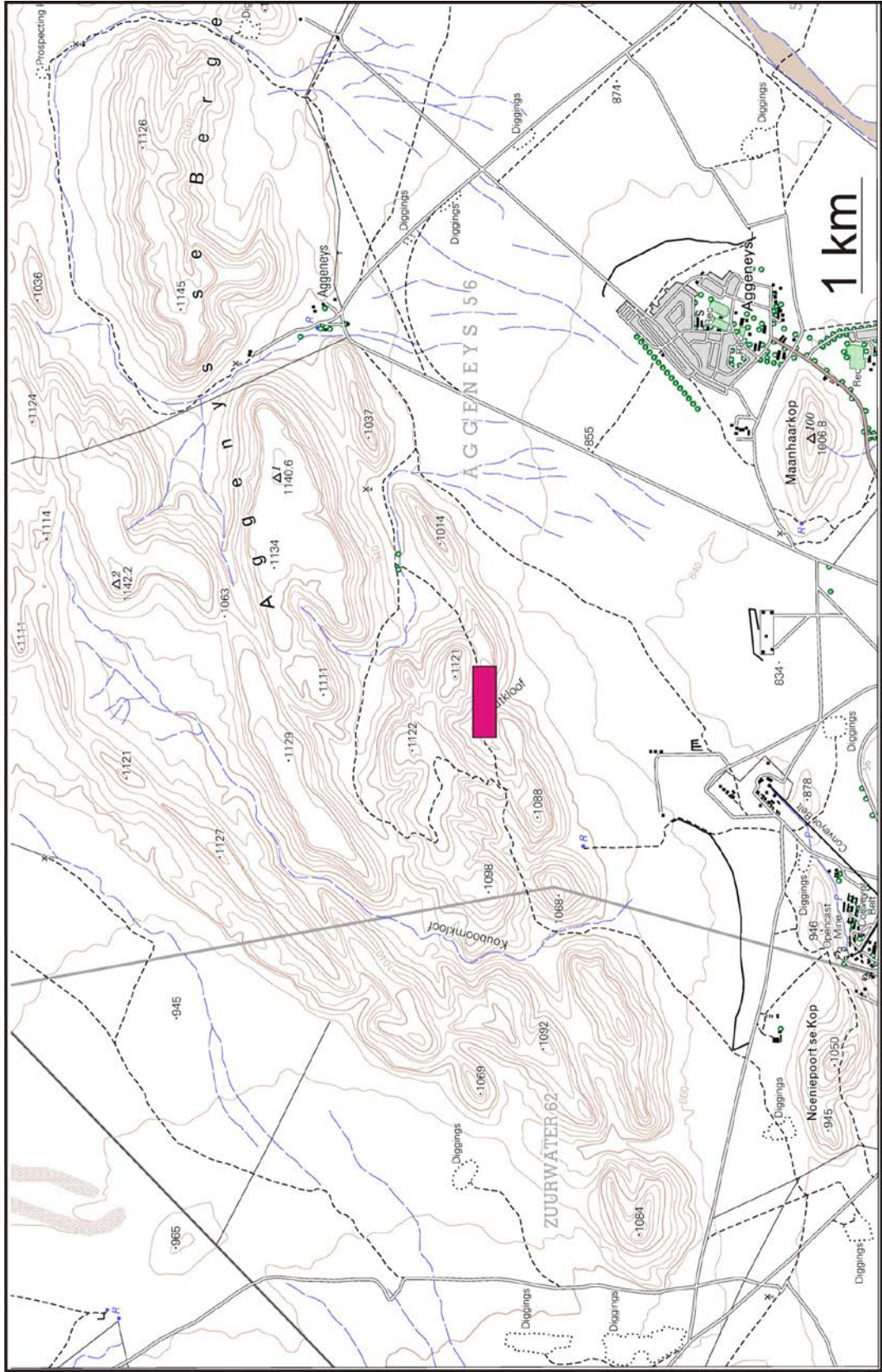


Figure 1. Locality map of the Big Syncline drilling site (portion of 1:50 000 scale topographic map 2918BB Aggeneys)

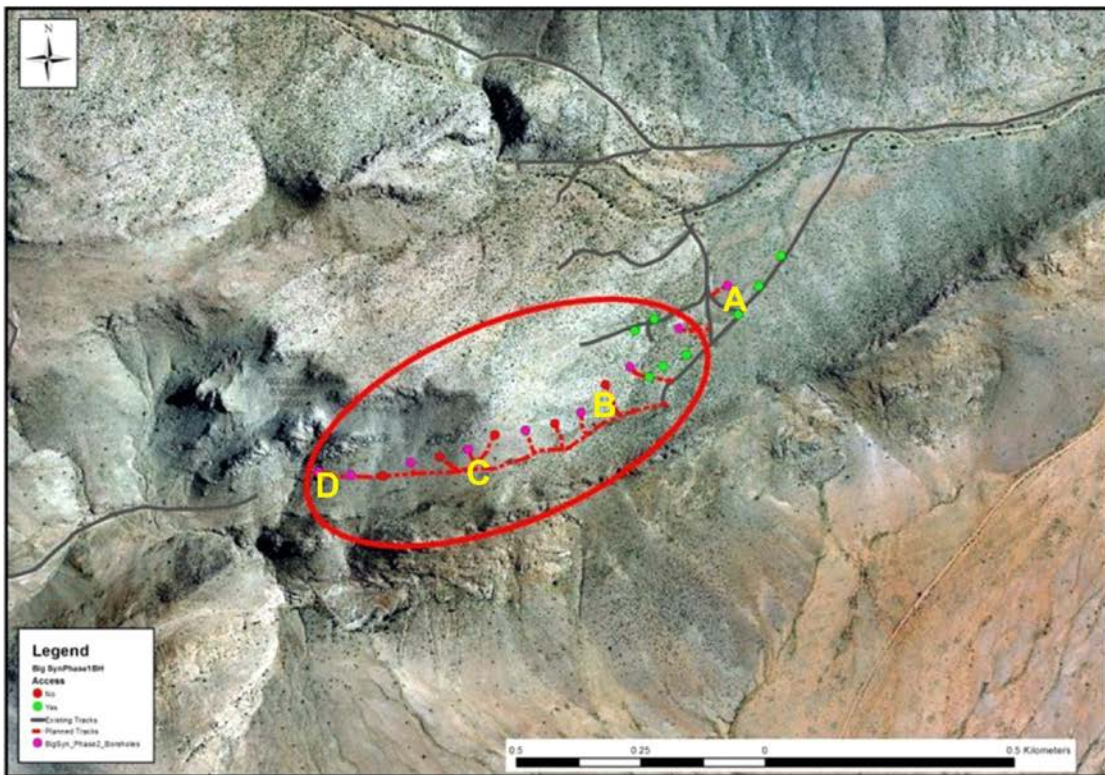
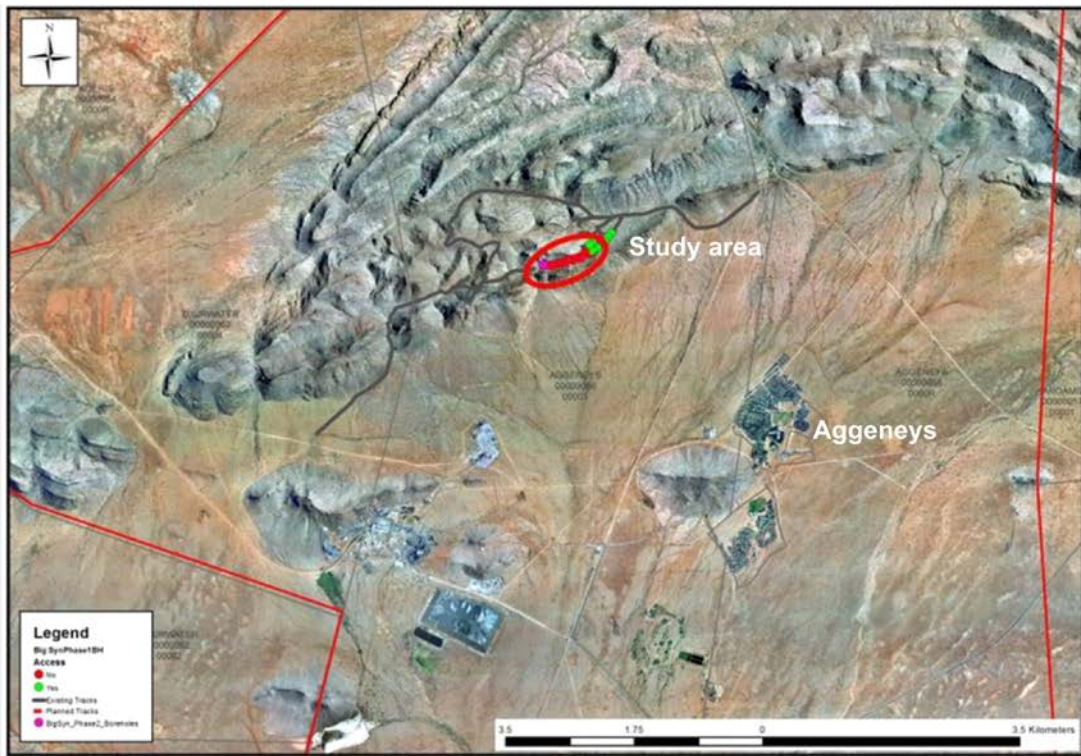


Figure 2. Aerial view of the study area.

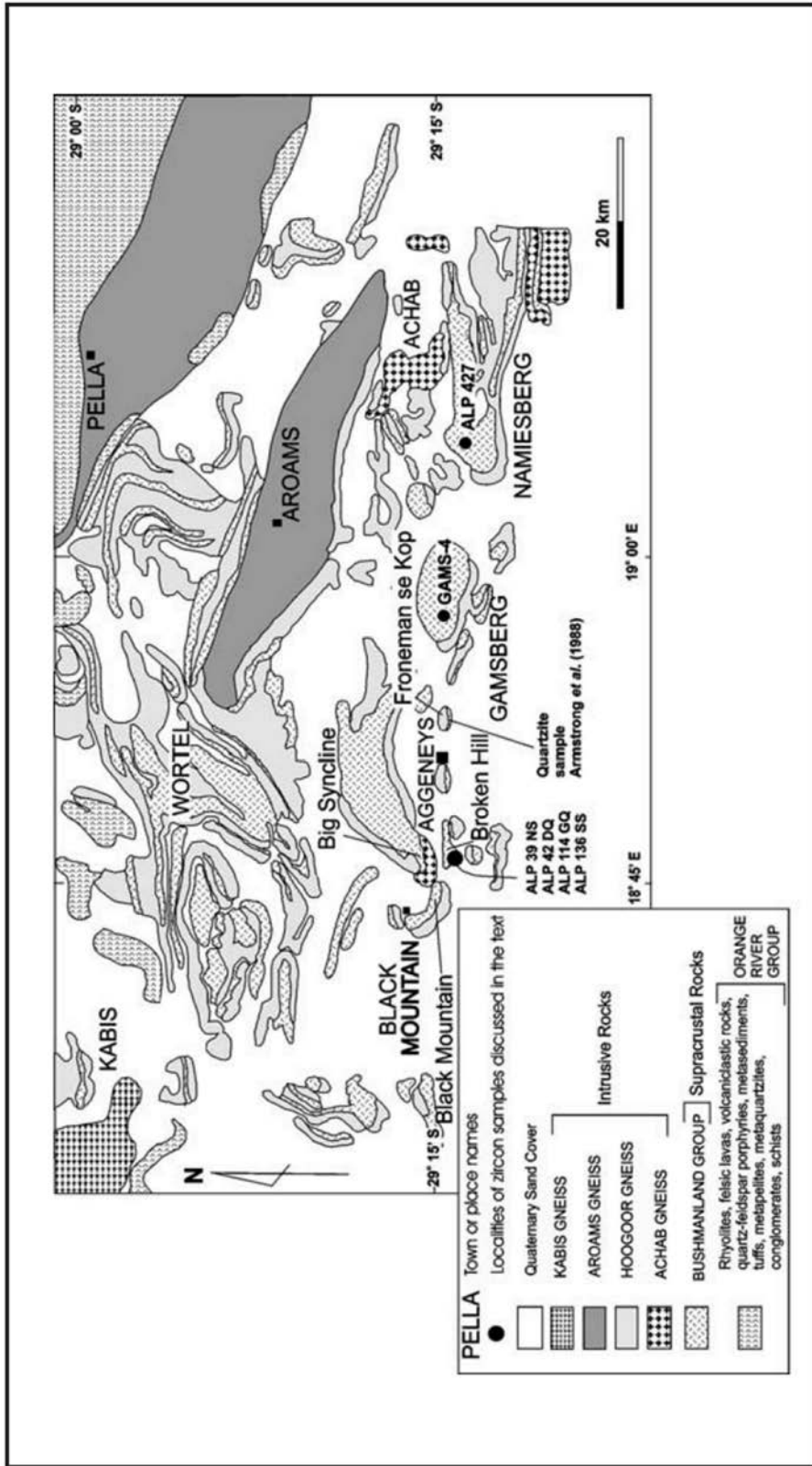
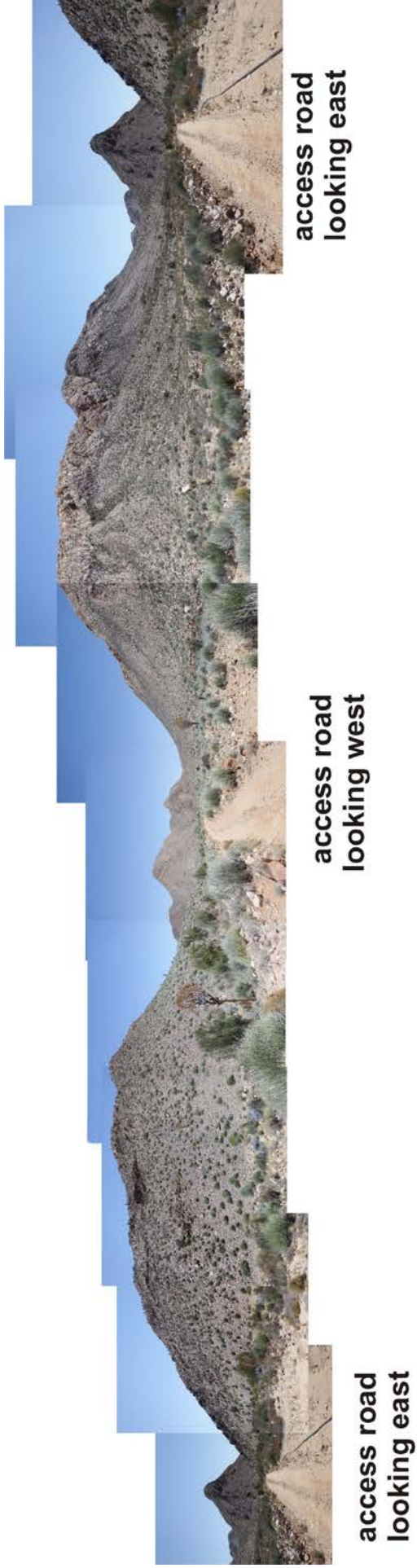


Figure 3. Simplified geological map of the area around Aggenneys and Gamsberg showing the various inselbergs and the distribution of the various granitic gneisses and the Bushmanland Group supracrustal succession (from Baillie *et al.* 2007).



A 360degree panoramic view of the valley at Big Syncline leading to and from the study area.

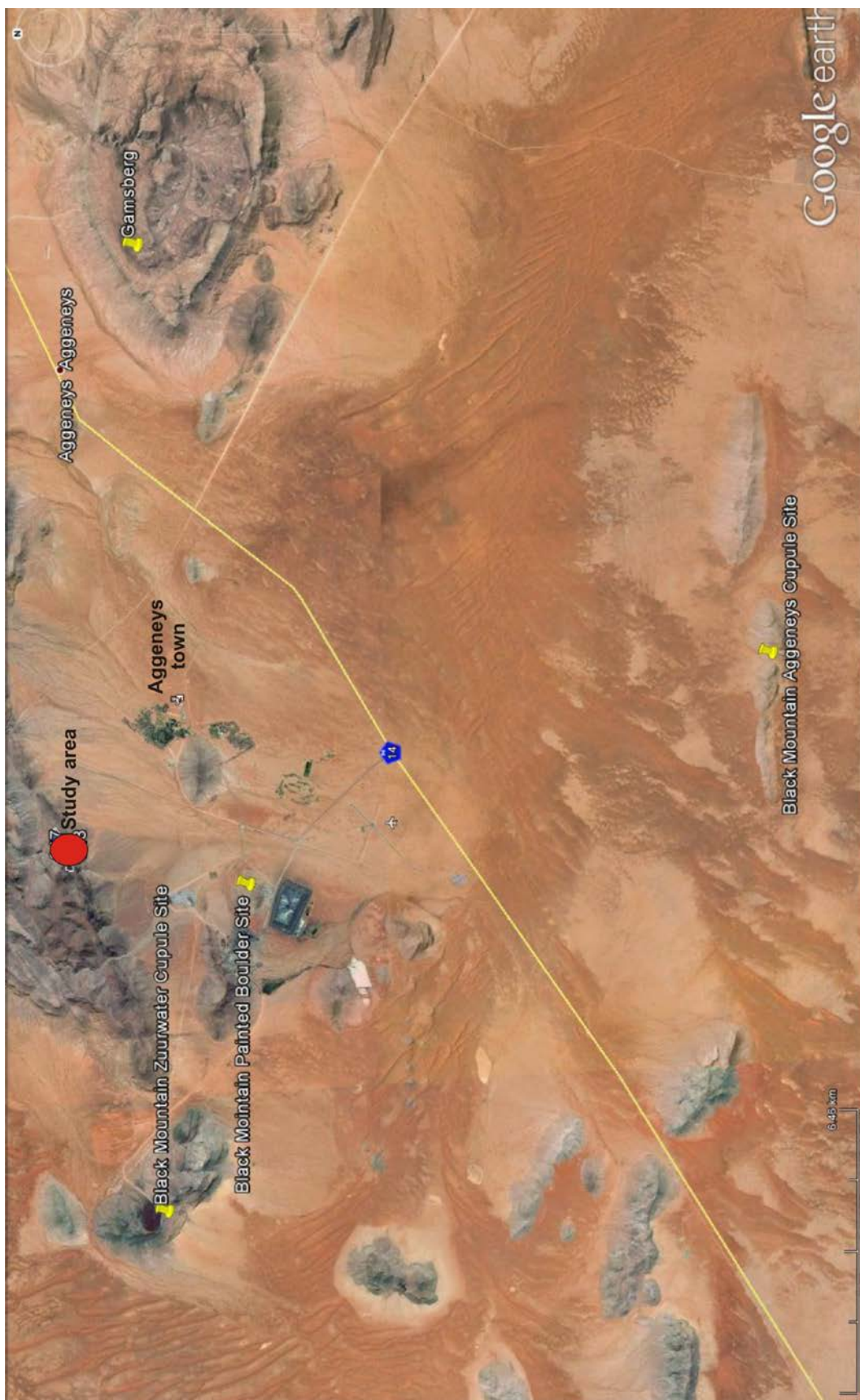


Figure 5. Aerial map of archaeological localities previously recorded in the vicinity of Aggeneys (Morris 2013a, 2013b).

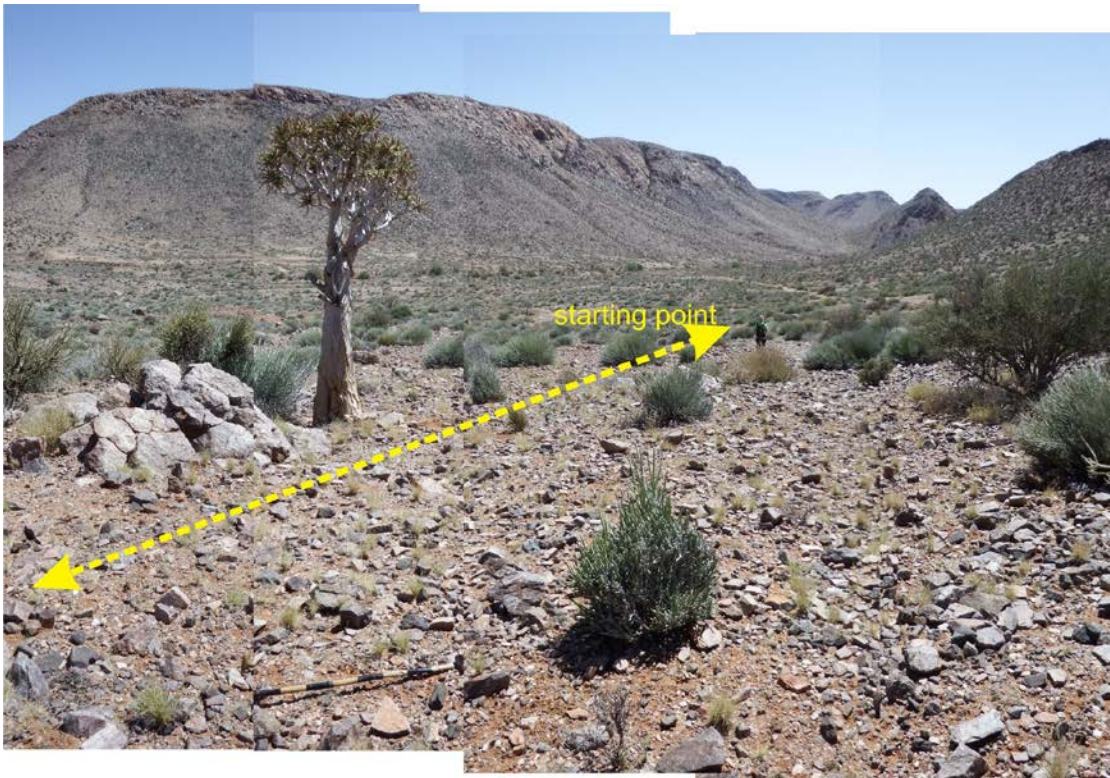


Figure 6. The transect marking the line on which the drilling localities will be placed, looking east-northeast toward the valley floor (top) and north towards the eastern slope of the Big Syncline (bottom).

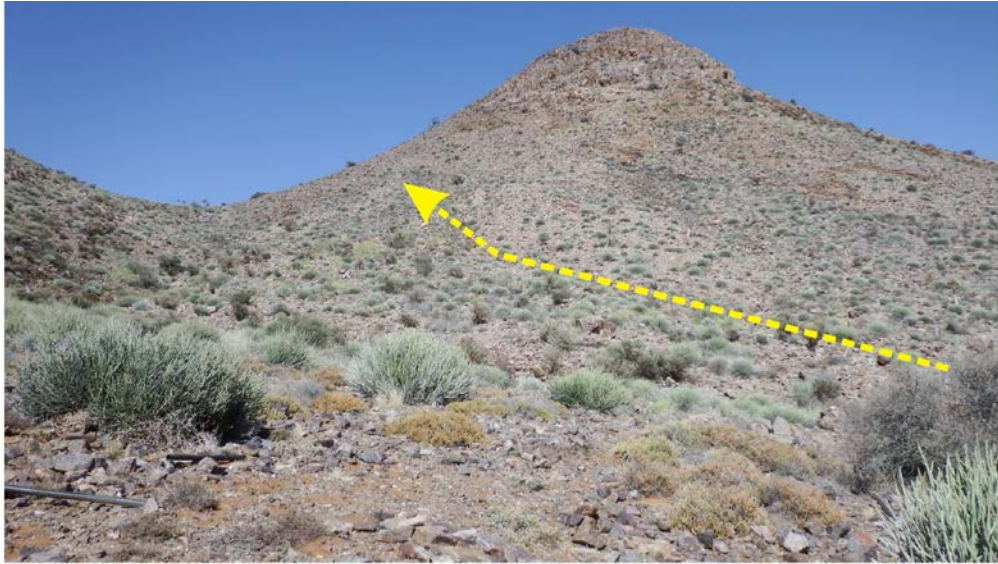


Figure 7. The study area, looking towards the southern incline from the east (top) and southeast towards the access road to the site (bottom).

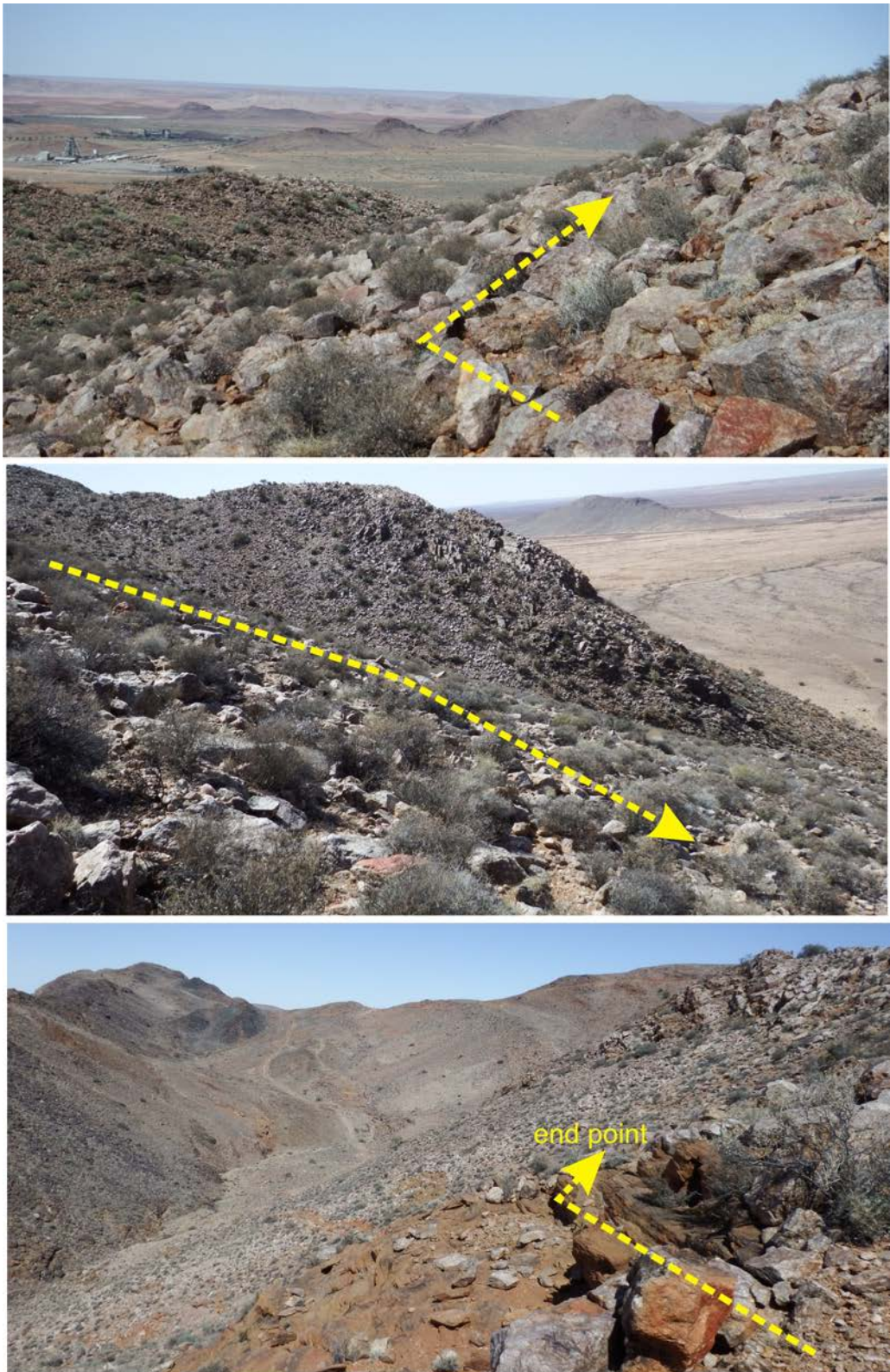


Figure 8. The study area, looking southwest (top) south (center) and northwest along the incline (bottom).



Figure 9. Looking north towards granite outcrop along the apex of the mountain. There is no evidence of rock art sites within the boundaries of the proposed footprint.