

HERITAGE IMPACT ASSESSMENT FOR PROPOSED HYDRO-ELECTRIC FACILITIES NEAR RIEMVASMAAK, NORTHERN CAPE

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

Prepared for

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EXECUTIVE SUMMARY

ACO Associates was appointed by Aurecon South Africa (Pty) Ltd to assess the potential impacts to heritage resources that might occur through construction of two hydro-electric power station at one of four sites to the northeast of Augrabies Falls, in the Northern Cape Province. The proposed project entails two hydropower stations, power lines, pipelines, canals and structures associated with the turbines.

A literature survey and field inspection were carried out. Heritage resources were photographed and described and their positions recorded by GPS. ACO was requested to undertake this project at very late notice which did not allow sufficient time for planning. As a result, certain areas were not correctly examined or, due to time constraints, not thoroughly enough. Nevertheless, the survey was sufficient to arrive at robust conclusions.

The site is a topographically and geologically variable landscape. Rocky granite hills abound and are separated by wide, flat silty or gravelly plains. Vegetation in these areas is very sparse due to the extremely dry climate. Along the water courses the surface was more silty and vegetation was generally far denser.

A wide variety of heritage resources was recorded. These included scatters of Middle (MSA), and Later Stone Age (LSA) and historical artefacts, LSA occupation sites with deposits and historical occupation sites with ruined structures and artefacts of varying age. Significantly, a number of graves and many more stone features that may or may not be graves were located. A stone memorial was also found. All the historical features together comprise a relatively recent (20th century) cultural landscape but it should be noted that the community who created that landscape have given permission for the development to proceed. This serves to temper the significance of the cultural landscape and individual features of which it is comprised.

It is considered likely that, with proper planning and mitigation, impacts can be reduced to satisfactory levels. Of the four options available for consideration, Option 2a is considered most favourable, followed by Option 2b and Option 3. Due to its proximity to the Augrabies Falls, Option 1 is deemed least suitable.

It is concluded that the proposed hydro-electric scheme should be allowed to proceed as long as appropriate mitigation measures are adopted. The development and subsequent mitigation as required will need very careful planning to ensure that all aspects are suitably covered. The following recommendations are made:

- The project should be allowed to proceed;
- All known graves should be avoided unless the community authorises exhumation and reburial;
- An attempt should be made before further planning progresses to identify any other graves known to the community and which are not clearly identifiable today (these would include all the stone mounds recorded during the present survey);
- A final walk-down survey should be undertaken once final (and accurate) alignments are available. The spatial extent of the impacts (disturbance corridor) will also need to be indicated prior to this survey. Note that it may not be necessary for all areas to be rechecked – this can be determined through comparison with the present survey tracks;
- Prior to commencement of any mitigation or construction, a plan needs to be in place that stipulates exactly how any disturbed human remains should be treated, whether these are found during mitigation or during construction (this is very important since it

is considered highly likely that human remains will be disturbed, no matter what preventative measures are put in place prior to construction); and

- After the walk-down survey an accurate assessment of what archaeological mitigation will be required should take place. Mitigation will then need to be carried out under a permit issued to the responsible archaeologist by SAHRA.

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1. INTRODUCTION

ACO Associates was appointed by Aurecon South Africa (Pty) Ltd to assess the potential impacts to heritage resources that might occur through construction of a hydro-electric power station at one of four sites to the northeast of Augrabies Falls, in the Northern Cape Province (Figure 1). The four sites lie on large farm portions that used to be part of the Augrabies falls National Park but, through land restitution, have recently been returned to the Riemvasmaak Community who were once forcibly removed from the farms. The farms are, however, still under the management of South African National Parks (SANParks). The two affected farm portions are as follows:

- Remainder of Farm 497 Waterval (6948.3618 ha); and
- Portion 1 of farm 498 Riemvasmaak (74 562.8124 ha).

1.1. Project description

It is proposed to abstract water from a new weir of maximum 5 m height across the Orange River at a point 1.8 km east (upstream) of the Augrabies Falls. The water would then be transported by a combination of open or closed canals and pipelines to headponds which would feed into the turbines. A further option of diverting water along a shallow watercourse (which may then need to be formalised into a canal) for part of the length of Option 1 is also on the table. At the end of the water conveyance, power chambers would be built into shafts of up to 15 m diameter sunk into the ground. The turbines and generators would be placed within the shaft but additional structures on the surface would be required to house the transformers and switchgear. A tailrace tunnel would be required to divert the water from the turbines back into the Orange River downstream of the power stations. Finally, access roads would be required. These will follow existing roads as far as possible and, where they would run towards the power stations they would be constructed following the other infrastructure as far as is possible given the restrictions posed by the terrain.

The water conveyance options may be determined based on the suitability of topography, but undoubtedly there will be recommendations from specialists that might also have a bearing on the final design. Should open canals be constructed then they would be approximately 4 m deep, 5 m wide at the canal floor and would be fenced to prevent animals and people accessing them. Stormwater drains would be needed to divert stormwater away from the canals.

Options are also in place for the electrical infrastructure. It is conventional to use over head power lines but, given the potential visual sensitivity of the area, buried cables are also being considered. Either way, the lines would follow the water infrastructure back upstream but then, near the off-take weir, would continue along the internal road to the far eastern boundary of the study area. Immediately outside this boundary a new substation will be constructed but this substation does not form part of the present project.

Figure 1 shows the approximate alignments of the various alternatives with Figure 2 placing the same onto an aerial view of the study area.

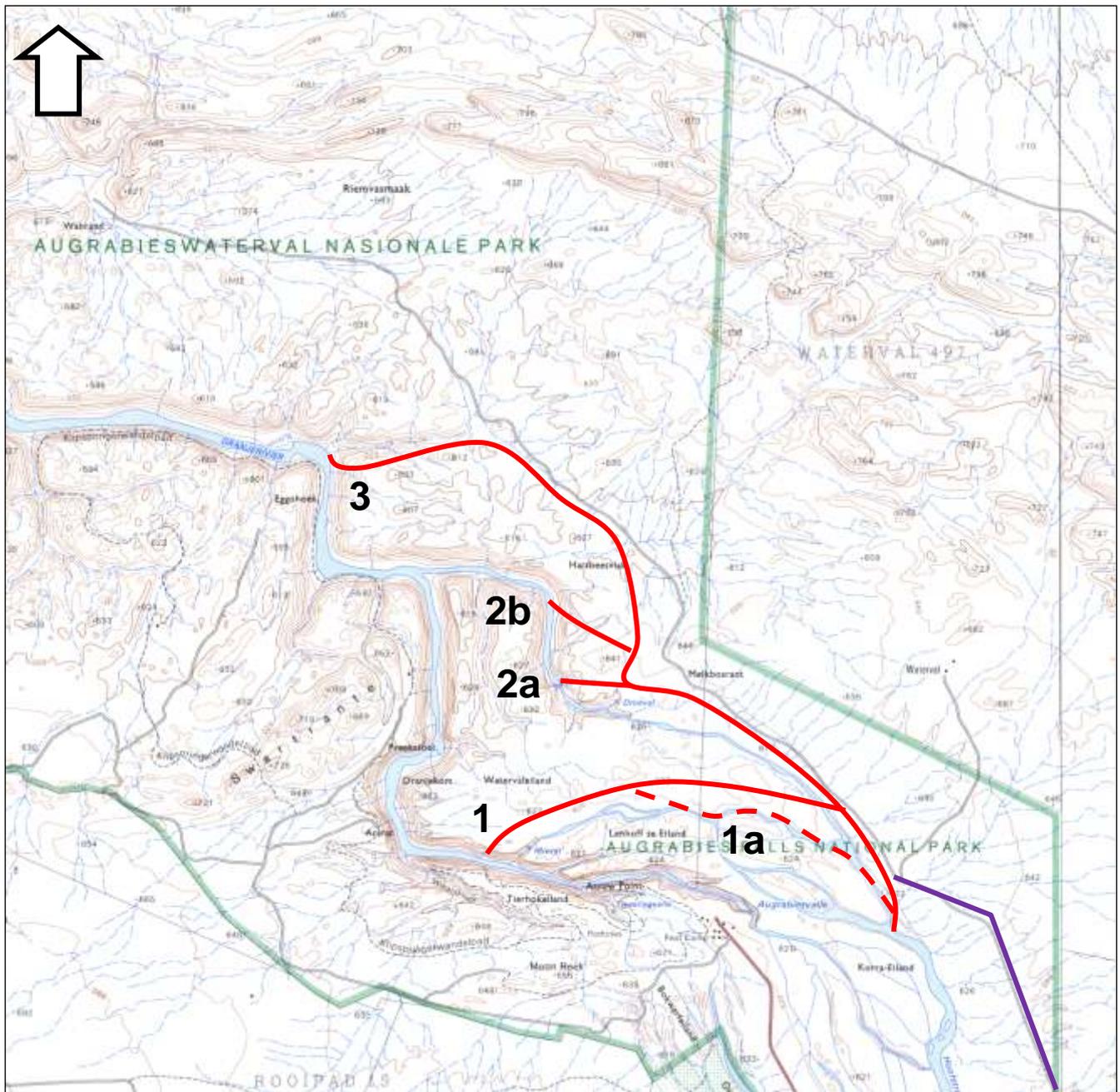


Figure 1: Map showing the location of the study area. The various options for the development are numbered. The red lines indicate electrical and water infrastructure and the purple line indicates electrical infrastructure only.

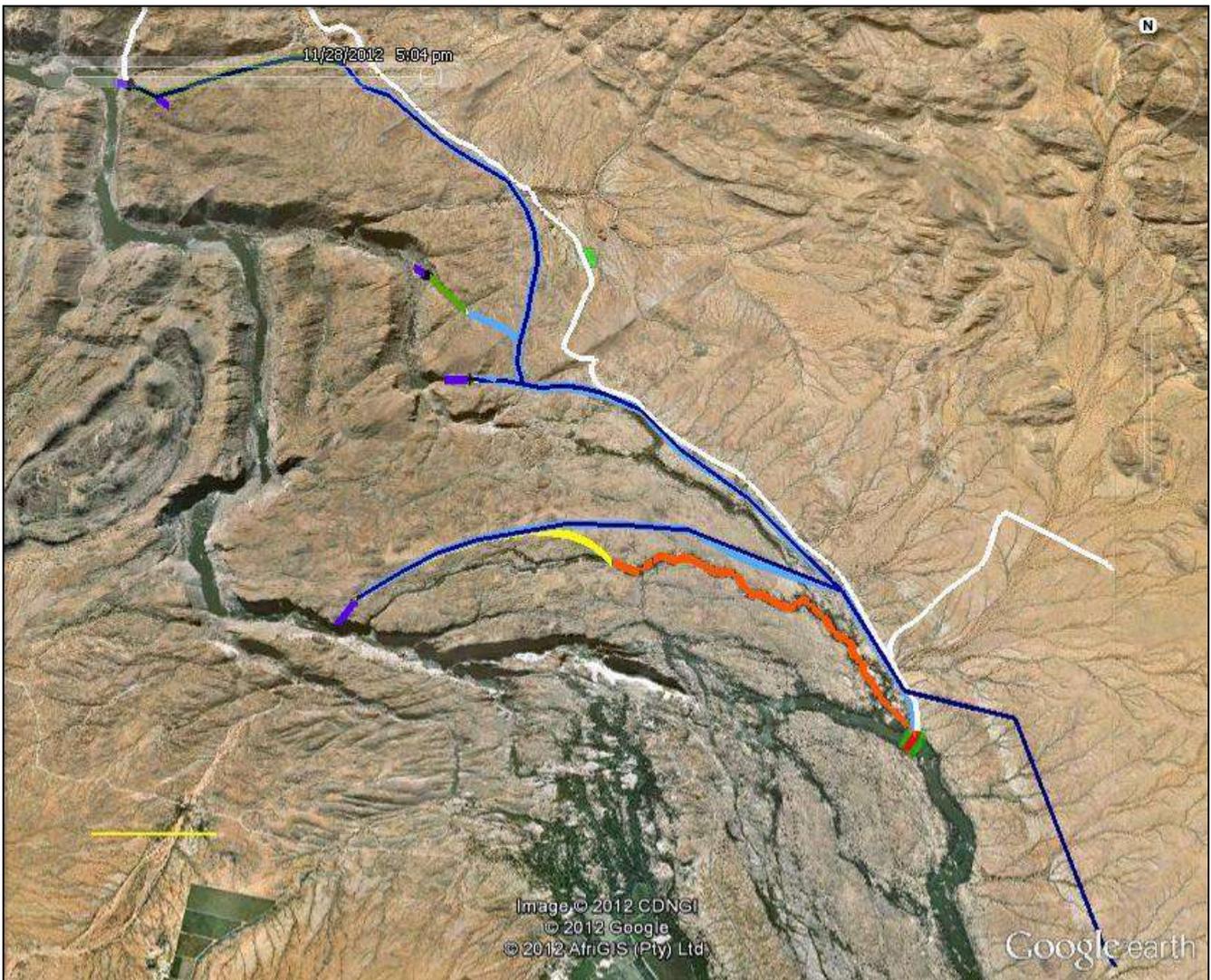


Figure 2: Aerial view of the study area showing the relationship between the proposed layouts and the Orange River channel. The waterfall is in mid-view near the bottom of the image. The yellow bar for scale in the lower left corner is 1 km long. Light blue = water infrastructure; dark blue = power lines, orange = river/canal, white = access roads

2. HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA) No. 25 of 1999 protects a variety of heritage resources including palaeontological, prehistoric and historical material (including ruins) more than 100 years old (Section 35), human remains older than 60 years and located outside of a formal cemetery administered by a local authority (Section 36) and non-ruined structures older than 60 years (Section 34). Landscapes with cultural significance are also protected under the definition of the National Estate (Section 3 (3.2d)). Section 38 (2a) states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted. This report fulfils that requirement.

Since the project is subject to an Environmental Impact Assessment (EIA), Heritage Northern Cape and the South African Heritage Resources Agency (SAHRA) are required to provide comments on the proposed project in order to facilitate final decision making by the Department of Environmental Affairs (DEA).

3. METHODS

3.1. Literature survey

A survey of available literature was carried out to assess the general heritage context into which the development is to be set. This literature included published material and unpublished commercial reports. The information so gained was used to inform and contribute to the results of the field survey.

3.2. Field survey

Two days (27th and 28th November 2012) were spent on site examining the proposed layouts and the general surroundings of the study area. The landscape and heritage resources were recorded photographically and GPS co-ordinates were taken to locate specific heritage resources as required.

3.3. Impact assessment

The impact assessment was done following a standardised scale provided to the specialists by Aurecon South Africa (Pty) Ltd.

3.4. Limitations

ACO was requested at very short notice to conduct this assessment and this unfortunately precluded proper preparation for the fieldwork. As such, minor components of the project were not surveyed and in some areas we were not exactly on the demarcated layout. Not knowing exactly how wide a corridor would be disturbed during construction meant that we could not comprehensively cover the area in the limited time available. However, using our knowledge of typical site locations we are fairly confident that significant sites would not have been missed during the survey in those areas visited by us.

An attempt was made to match up our findings with those of an earlier survey in the area but, due to the low resolution of the GPS co-ordinates provided in that survey, it was sometimes difficult to do this.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

With the exception of the Orange River itself, the study area is very dry and has a substrate either of rock (granite) or silt (Figures 3 to 7). Dense vegetation (riverine thicket) occurs along the margins of the rivers, particularly upstream (east) of the Augrabies Falls. Elsewhere, the vegetation is minimal but with occasional large trees such that ground visibility was very good.

Besides the granite, which is the only bedrock present, there are patches of dense pebbles that have been concentrated by the Orange River in times of heavy flooding. These pebbles would have served as a source of stone material to the prehistoric occupants of the area (Figure 8).



Figure 3: View showing the contrasting elements of the landscape, silt flats and granite koppies.



Figure 4: View into the Orange River canyon along Option 3 and showing the dry, desolate landscape around the river.



Figure 5: One of the current internal access roads winding between granite koppies.



Figure 6: A large granite outcrop.



Figure 7: An area of the silty plains that skirt the rivers in places.

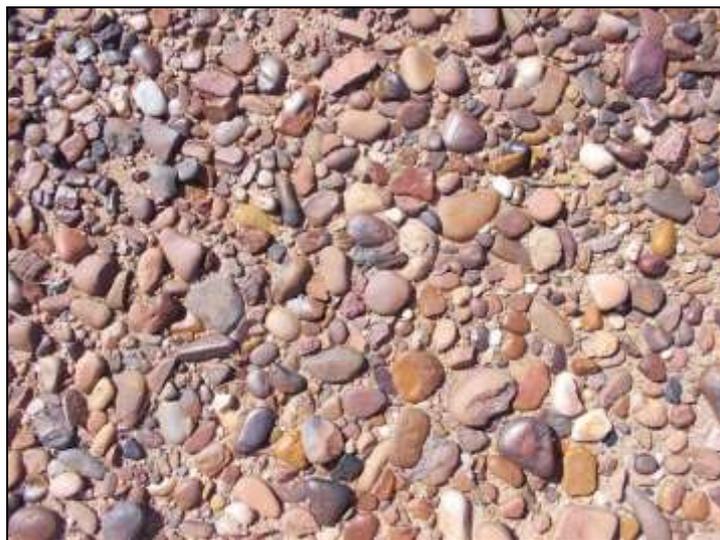


Figure 8: Pebble bed concentrated by river flooding.

5. HERITAGE CONTEXT

5.1. Palaeontology

Given the igneous rocks of which the landscape is comprised, palaeontological material would not occur in the area's hard geology. Almond and Pether (2008) note the Namaqua-Natal Metamorphic rocks to have no palaeontological significance, since no fossils have yet been recorded in them. However, it is possible that isolated fossils might be present trapped within the silt deposits on the Orange River floodplains. These would most likely comprise of tiny plant and animal remains.

5.2. Pre-colonial archaeology

With few exceptions, the archaeology along the Orange River has only been well studied in two areas, the Richtersveld and the Middle Orange River area. The bulk of archaeological research conducted in the vicinity of Augrabies Falls was done during the 1970s and 1980s. It demonstrates that there are important heritage sites located in the region. Existing reports are summarised here.

The only decent Middle Stone Age (MSA) site is Zoovoorbij (Smith 1995), a cave some 64 km east of Augrabies. MSA flaked stone artefacts were collected from the lower levels of the excavation, while the upper levels contained typical Later Stone Age (LSA) materials. The latter included stone artefacts, bone beads, ostrich eggshell beads and a few potsherds. Among the stone artefacts were scrapers and miscellaneous retouched pieces. Dating revealed a strong pulse of occupation spanning 4140 ± 70 BP (Pta-2889) at the base of the LSA to 2800 ± 60 BP (Pta-2870) near the top. A small collection of MSA artefacts was also made by Morris and Beaumont (1991) at the base of a rock shelter near Augrabies (see below). Aside from these occurrences, "thousands of square kilometres of Bushmanland are covered by a low density lithic scatter" (Beaumont *et al.* 1995:240). Most of these artefacts are likely to relate to the MSA but Early Stone Age (ESA) and LSA artefacts will also be present.

Morris and Beaumont (1991) reported on the excavation of two Stone Age archaeological sites on Renosterkop, immediately east of the town of Augrabies. At Renosterkop 1 they found an open scatter of stone artefacts, pottery, ostrich eggshell beads and other materials. The stone was predominantly informal though a few retouched items (scrapers and backed tools) were present. Grindstones occurred and included one stone of the sort described by Webley (1990) for use in scraping skins. The pottery was thin walled and had incised horizontal lines and tear-drop-shaped impressions. Most sherds had mineral temper but a few were tempered with grass. The beads were mostly small, but did include a few far larger examples. Two square metres were excavated from Renosterkop 2, a small rock shelter. It contained modern material in the upper deposits with material similar in character to Renosterkop 1 occurring below. MSA artefacts occurred at the base but the interface between the LSA and MSA was unclear and the deposits were poorly stratified. Through comparison with other sites, Morris and Beaumont (1991) consider the LSA material to relate to a late phase of herder occupation.

Smith (1986) mentions a site near Augrabies Falls that contained pottery, sheep bones and an informal stone artefact assemblage with just one scraper among 1000 flaked artefacts. The site was dated to 760 ± 40 BP (Pta-3847) and is said to have been occupied by herders. He later names this site Waterval 1 and claims five miscellaneous retouched pieces and no scrapers among 827 artefacts (Smith 1995). Beads, a decorated flask mouth fragment and

thin-walled pottery were also found. The latter were grit-tempered and included impressed decoration and lugs.

Well south of the study area, far from the Orange River, Smith (1986) has also excavated a site called Droëgrond. It was occupied repeatedly during the last few hundred years with the proximate permanent water source no doubt the main attraction. He ascribed the site to a hunter-gatherer occupation. Other sites even further south into the Karoo and Bushmanland have also been studied but are less relevant here.

All these studies have resulted in the separation of two seemingly distinctive industries that are termed “Swartkop” and “Doornfontein”. The former are said to be related to occupation by hunter-gatherers and to occur away from large water courses, while the latter were said to be from herders and to cluster along the banks of the Orange River and its larger tributaries (Beaumont & Vogel 1984).

Parsons (2007) has recently worked on assemblages excavated from sites in the Augrabies Falls area by Peter Beaumont in past decades. These include Biesje Poort 2 and Bokvasmaak 3, both on the northern side of the falls. Beaumont *et al.* (1995) provide dates of 1390 ± 70 BP (Pta-4772) and 120 ± 50 (Pta-4872) for the two sites respectively. Biesje Poort 2 in particular contained numerous retouched items with many different types represented. Both sites had been ascribed to herders by Beaumont *et al.* (1995) but Parsons' (2007) analyses showed the relevant characteristics to be blurred and unreliable. Many archaeological sites are also on record in the Riemvasmaak area and surroundings to the north of the river (Hoffmann *et al.* 1995).

A type of feature not widely known from the interior of South Africa is bedrock grinding hollows. These are areas on exposed granite outcrops where people have smoothed the surface through grinding with an upper grindstone. In many parts of Bushmanland decent quartzite cobbles/slabs are not present and bedrock is the only possible option for making lower grindstones. The upper grindstones may well have been carried in from a long way off and removed when the sites were abandoned. These bedrock grinding grooves have recently been documented in other parts of Bushmanland to the southwest (Orton & Webley 2012) and a few were noted within the bounds of the Augrabies National Park (Anonymous 2001).

Also potentially relevant in the vicinity is the possibility of finding circular stone structures constructed by the pre-colonial occupants of the area. While such structures are found throughout much of the Karoo, they are less well documented in this region. However, on the farm Bloubos to the north of Augrabies Falls, Parsons (2004) has described a number of these features.

Very limited cultural resource management (CRM) work has been carried out in the region. A survey of the Augrabies Falls National Park for their cultural heritage management plan recorded a large number of sites but, sadly, the resolution of the GPS co-ordinates is poor. Nevertheless, the findings of the survey showed that ESA, MSA and LSA sites, graves, rock art (pre- and post-colonial), historical sites and the Manie Maritz Fort (see below) were all found in the region (Anonymous 2001). Hoffmann *et al.* (1995) summarise findings from surveys at Riemvasmaak showing that many archaeological resources of varying ages were present.

Hart (2003) subsequently conducted a desktop review of the heritage sensitivity of the southern side of the Lower Orange River valley to the west of the park noting that areas in close proximity to the river were likely to have very high sensitivity. Kinahan (2003) did an

archaeological sensitivity assessment of the northern side which included some fieldwork. His fieldwork in the Augrabies Falls area was limited to the gorge where archaeological remains were infrequent. He did, however, note that “Historical remains relating to events of the late nineteenth and early twentieth centuries, such as the Anglo-Boer War and the subsequent rebellion lead by Manie Maritz, are well preserved within the Augrabies Falls National Park” (Kinahan 2003: 14). The SA Military History website indicates that military graves are present on many farms in the Pofadder, Kakamas and Keimoes areas (The South African Military History Society n.d.). A large number of these graves probably pertain to the Anglo-Boer War testifying to its presence in the area.

The name “Augrabies” comes originally from the Khoe word “Aukoerebis” meaning the Place of the Great Noise. This was, of course, in reference to the thundering of the Augrabies Falls as they plummeted around 60 m to the base of the gorge (SA Venues 2012).

5.3. Graves and human remains

Many human skeletons have been exhumed from the area between Augrabies Falls and Upington, both by Dreyer and Meiring (1937) and by Alan Morris (1995). Eighteen came from close to Augrabies Falls. The burial cairns and other information suggested Khoekhoen people, specifically the Einiqua, and historical data shows the majority of graves to date to the 18th and early 19th centuries (A. Morris 1995). Figure 9 shows a map produced by Morris (1995:119) indicating the locations of stone cairn burials in the present study area. A recent survey to the west of the Augrabies Falls also found one large presumed burial cairn in that area (Orton 2012). Alan Morris (pers. comm. 2012) suggests that the graves were shallow and the cairns varied in size with those of women and children generally being smaller than those of men.

It is important to note that not all piles/mounds of stone necessarily represent burials. Some may be historical features, particularly where they are close to old structures.

5.4. Colonial period

In more recent times the water related infrastructure in the Kakamas area was important for agricultural development and several water wheels and excavated tunnels and leiwaters/furrows have been declared Provincial Heritage Sites (SAHRA, n.d.). The hand-dug tunnels represented impressive feats of engineering for the early 20th century (Open Africa 2012).

The author has not personally examined any farm complexes in the area. Given that agriculture has developed here only within the 20th century, early buildings are likely to be rare, although a few early 20th century water mills have been declared Provincial Heritage Sites. The nearby town of Kakamas was founded by the Dutch Reformed Church in 1898 at a place where the river was relatively easy to cross. It was earlier known as Bassonsdrif (Wikipedia 2012).

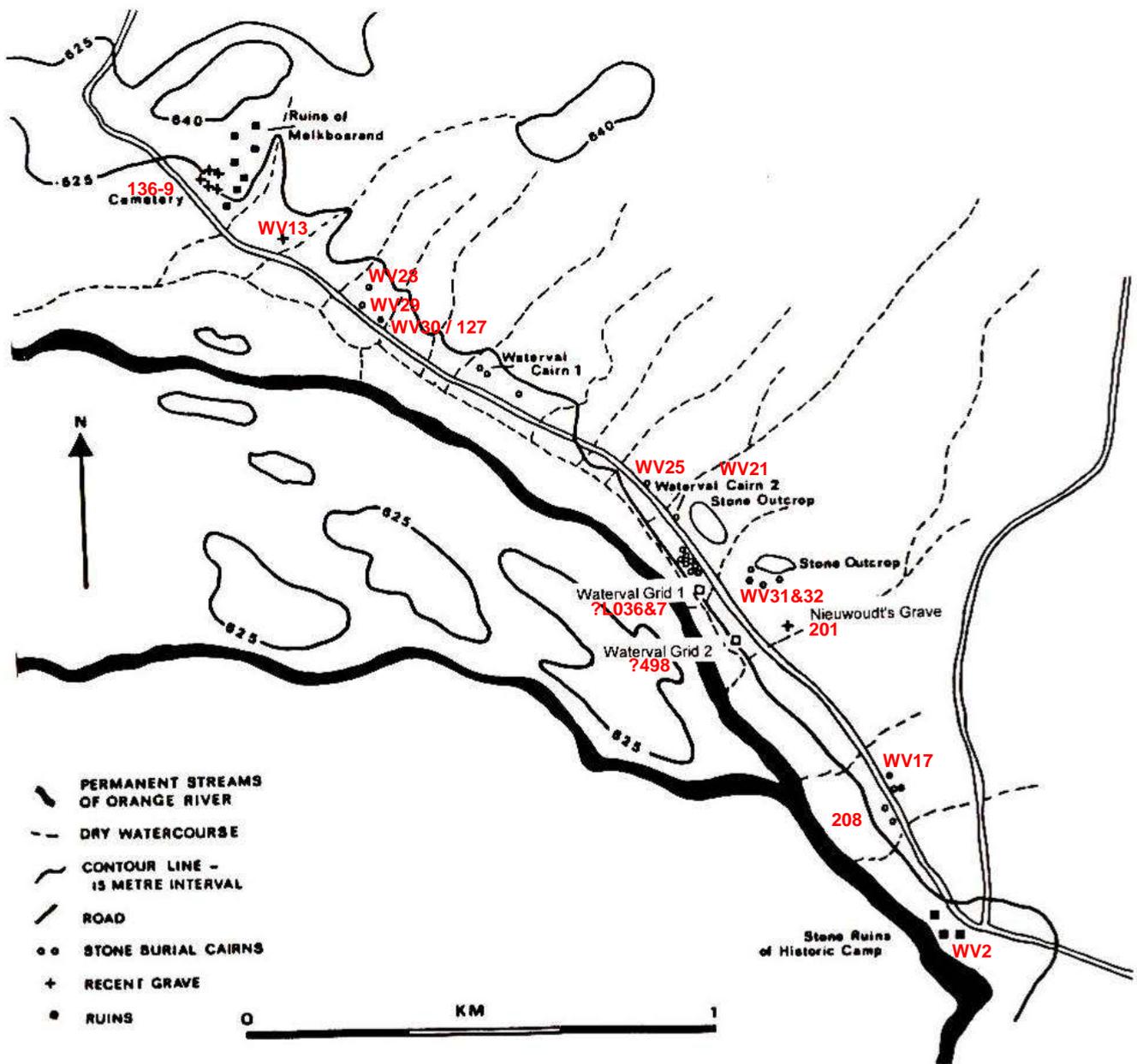


Figure 9: Map showing the locations of burial cairns on record on the Waterval farm (from Morris 1995, fig. 3.3).

6. FINDINGS

A large number of heritage sites and features were located in the study area. These vary in type and significance and are presented below. Please note that due to the large number of sites found only a selection are illustrated in order to provide the reader with an understanding of what the sites are like. The full set of recorded sites and features is detailed in Table 1. All sites are mapped in Appendix 1.

Table 1: Listing of all heritage resources located during both the present ACO survey and the earlier Anonymous (2001) SANParks survey. The earlier sites have had '2001' added into their site names to reduce confusion. All sites are mapped according to their field numbers. Mitigation (in approximate number of hours required on site) is indicated under significance with certain graves noted as "avoid". There are numerous stone features that may also be graves and would need testing as appropriate if they were to be disturbed.

Site no.	Field no.	Location	Type	Description	Heritage Significance
WV2001/002	109	S28 35 12.0 E20 21 21.4	Ruin	Building foundation of granite blocks.	Low
	110	S28 35 11.1 E20 21 21.3	Dump	Dump with glass, ceramics, iron, etc.	Low
	111	S28 35 11.5 E20 21 22.3	Stone feature	Semi-circular stone alignment, probably base of a fence.	Low
	112	S28 35 11.9 E20 21 22.6			
	113	S28 35 12.2 E20 21 22.5			
	114	S28 35 12.6 E20 21 22.1			
	115	S28 35 12.5 E20 21 21.6			
	116	S28 35 12.7 E20 21 23.0	Ruin	Building foundation of granite blocks.	Low
	117	S28 35 12.2 E20 21 23.7	Stone feature	Packed granite stone mound. Several other stone clusters around the 117-118 area.	Low
	118	S28 35 10.6 E20 21 24.1	Graves	Almost certainly three graves with packed granite stones on top. The stones have become somewhat dispersed with time.	High Avoid
	119	S28 35 14.1 E20 21 25.5	Stone feature	Packed granite stone feature, possibly grave but more likely structural.	Low (?High)
	120	S28 35 15.4 E20 21 20.7	Historic kraal	Remnants of a rectangular stone kraal, some 25m by 30m in size. Square granite blocks used as the base, but the walling made of rubble, little height remaining. Associated with iron rubbish (tin cans, enamel bowls, brown and blue glass). All 20 th century	Low
	121	S28 35 15.3 E20 21 21.6			
	122	S28 35 14.3 E20 21 21.5			
123	S28 35 14.4 E20 21 20.7				
L006	S28 35 15.2 E20 21 19.4	Historic	Large pile of rubble, including square blocks of granite and some cement blocks. Probably rubble from a building which has been heaped in one area.	Low	
L007	S28 35 16.8 E20 21 18.8	Historic	Three rectangular and adjoining stone basins built of granite slabs on top of a granite dome overlooking the river. The three basins are lined with cement, presumably to hold water, perhaps for animals.	Low	
WV2012/001	124	S28 35 02.9 E20 21 14.8	Stone feature	Two granite stone features with some iron lying around.	Low
WV2012/002	125	S28 35 00.5 E20 21 13.0	Stone feature	One granite stone feature. Possible grave?	Low (?High)
WV2001/017	WV17		Stone feature	May be the same site as above.	
WV2001/030	127	S28 34 18.4 E20 20 19.5	Stone feature	Granite stone mound, possibly a grave? 2.5x1.8m, aligned NE-SW.	Low (?High)
WV2012/003	128	S28 34 17.6 E20 20 16.8	Quarry	Source of granite blocks.	Low
MB2001/010	129	S28 34 07.5 E20 20 00.3	Ruin	Demolished mud-brick house. The historical features grouped here all belong to the settlement that was known as Melkbosrand.	Low

	130	S28 34 06.7 E20 20 01.2	Ruin	Demolished mud-brick house. Possibly the main house of the complex. Includes cement and banded iron stone pebble lintels and three garden features on south (presumably front) side. This is the largest of the ruins.	Low
	131	S28 34 06.0 E20 20 00.3	Ruin	Demolished mud-brick house. Small structure.	Low
	132	S28 34 03.4 E20 20 03.1	Ruin	Small granite stone structure, demolished.	Low
	133	S28 34 02.1 E20 20 04.0	Ruin	Small granite foundation.	Low
	134	S28 34 01.0 E20 20 04.5	Ruin	Small granite structure, demolished, with stone features around it.	Low
	135	S28 34 01.3 E20 20 03.0	Ruin, dump	Granite rubble pile with other stone alignments and features around it and nearby a large tin dump.	Low
	136 137 138 139	S28 34 05.5 E20 19 59.6 S28 34 05.2 E20 19 58.7 S28 34 06.1 E20 19 58.4 S28 34 06.5 E20 19 59.2	Graveyard	c. 74 graves. Those few dated (cement headstones) are between 1954 and 1965. Plastic Twizza 2l bottles, marine shells at/on two graves.	High Avoid
	L008	S28 34 07.3 E20 19 58.9	Historic dump	20 th century dump with glass, tin and ceramic	Low
	L009	S28 34 07.9 E20 19 56.5	Historic dump	20 th century dump, but overlying a scatter of stone artefacts. Some flaked quartzite, hornfels, banded ironstone	Low
	L010	S28 34 07.4 E20 19 56.3	Historic dump	Granite blocks, one upright stone. Associated with heap of rusted tin cans.	Low
	L012	S28 34 07.4 E20 19 54.9	Historic house	Demolished house. About 13m x 13m. Of unshaped granite blocks, but a few red bricks interspersed. A paved area to the front, and a small square structure, also demolished nearby. Associated with tin cans, wire, etc	Low
	L013	S28 34 10.7 E20 19 55.1	Historic structure	A square stone structure. 5m x 5m. Shaped granite blocks as well as concrete blocks. Lots of rusted iron, enamel, wire plus 2 mother of pearl buttons	Low
	L014	S28 34 12.0 E20 19 53.1	Historic structure	Another rectangular structure. 8m x 6m of shaped granite blocks. Lots of wire, enamel and rusted iron. All 20 th century.	Low
	L015	S28 34 12.2 E20 19 53.8	Historic structure	Little square structure (1.5 x 1.5m) with ash and charcoal. Hearth?	Low
	L016	S28 34 12.8 E20 19 53.5	Historic kraal	Two remaining walls of a very roughly packed stone kraal, with some dung deposit.	Low
	L017	S28 34 10.2 E20 19 56.0	Historic dump	Rubbish heap with ash, glass and ceramic. One large broken stone ware base. Late 19 th century?	Low
RVM2012/001	140	S28 33 35.6 E20 19 55.7	Dump	Some tins and other 20 th century debris.	Low
	L023	S28 33 35.6 E20 19 54.1	Historic structure	Scatter of granite rocks associated with clear glass fragments and rusted iron. 20 th century	Low
	L024	S28 33 37.0 E20 19 55.7	Historic structure	A roughly L shaped arrangement of stone. Associated with glass, iron, wire, horse shoes, etc.	Low
RVM2012/002	141	S28 33 24.2 E20 19 43.2	Stone features	Granite stone alignments and mound. Possible grave.	Low (?High)

RVM2012/003	142	S28 33 01.3 E20 19 14.7	Artefact scatter	Light quartz scatter. Probably MSA.	Low
RVM2012/004	143	S28 32 30.1 E20 18 35.3	Stone feature	Stone mound with ceramic and bottle top on it, also glass, iron and wire around it. MB9 cemetery nearby. Historic features in this area (points 143 to 160) belong to the settlement once known as Blousyfer (MB8 in Anonymous 2001). A cemetery is also located nearby but was not recorded during the present survey (MB9 in Anonymous 2001).	Low
RVM2012/005	144 145	S28 32 34.5 E20 18 33.8 S28 32 35.6 E20 18 33.8	Ruins	Ruined granite stone structures, features, etc at base of granite outcrop.	Low
RVM2012/006	146	S28 32 31.9 E20 18 28.8	Stone feature	Packed granite stone against granite outcrop, also one can.	Low
RVM2012/007	147	S28 32 39.4 E20 18 39.1	Ruin	Small circular structure of granite and rose quartz. c. 2x3 m in size.	Low
	148	S28 32 39.3 E20 18 38.3		Small circular structure of granite and two rose quartz blocks. c. 1.3x1.3 m in size.	Low
RVM2012/008	149 150 151	S28 32 42.8 E20 18 42.9 S28 32 42.6 E20 18 42.5 S28 32 42.4 E20 18 42.7	Stone features	Three small stone features with glass, metal, wire and cans around them.	Low
RVM2012/009	152	S28 32 42.5 E20 18 43.9	Stone feature	One more stone feature as above.	Low
RVM2012/010	153	S28 32 43.7 E20 18 44.7	Stone features	Several stone features, mounds, alignments, etc with glass, wire, etc around them.	Low
	154	S28 32 43.4 E20 18 46.0	Ruin	Stone structure, possibly a curved kraal up against rock outcrop.	Low
	155	S28 32 44.3 E20 18 45.9	Ruin	Stone structure and square kraal	Low
	156	S28 32 44.4 E20 18 45.0	Stone feature	Stone feature. Also a dump between this and '155'.	Low
RVM2012/011	157 158 159 160	S28 32 47.1 E20 18 50.0 S28 32 46.8 E20 18 49.0 S28 32 45.9 E20 18 49.7 S28 32 46.5 E20 18 50.3	Ruin	Large square kraal with various stone ruined structures inside it.	Low
RVM2012/012	161	S28 33 20.4 E20 19 36.6	Artefact scatter	Scatter of pottery between rocks / in a gully below a granite outcrop.	Low
RVM2012/013	162	S28 33 21.2 E20 19 37.4	Artefact scatter	Scatter of quartz and banded ironstone in small hollow between rocks.	Low
RVM2012/014	163	S28 33 27.8 E20 19 40.6	Ruin	Small stone structure against a boulder with tins, enamel cup and flask, and fragments of glass.	Low
RVM2012/015	164	S28 34 00.2 E20 19 44.8	Artefact scatter	Light scatter of banded ironstone and occasional quartz artefacts.	Low
RVM2012/016	165	S28 34 10.7 E20 20 08.5	Stone feature	Stone feature	Low
WV2001/013	166	S28 34 10.4 E20 20 07.4	Stone feature	Stone feature	Low
n/a	167	S28 34 35.2 E20 20 41.9	n/a	Isolated upper grindstone with five facets, four of them with dimples.	n/a

WV2012/004	168	S28 34 45.4 E20 20 40.1	Artefact scatter	Pebble exposure with a light scatter of banded ironstone artefacts, probably MSA.	Low
WV2012/005	169	S28 34 48.9 E20 20 36.5	Artefact scatter	Quartz, quartzite, hornfels, banded ironstone, hornfels scatter on floodplain.	Low
WV2012/006	170	S28 34 47.7 E20 20 29.8	Artefact scatter	Artefact scatter on granite outcrop. Quartzite, FGB, banded ironstone.	Low
WV2012/006	171	S28 34 47.1 E20 20 29.5	Artefact scatter	'Waterbakke' with three grinding hollows alongside one of them.	Low
WV2012/007	172	S28 34 46.8 E20 20 29.3	Artefact scatter	Artefact scatter of mixed age next to granite outcrop. Quartz, quartzite, hornfels, FGB, banded ironstone.	Low
WV2012/008	173	S28 34 45.8 E20 20 26.6	Artefact scatter	Light scatter of banded ironstone artefacts.	Low
WV2012/009	174	S28 34 45.9 E20 20 08.0	Artefact scatter	Light scatter of banded ironstone and FGB artefacts.	Low
RVM2012/017	175	S28 34 44.4 E20 20 00.9	Artefact scatter	Isolated quartzite upper grindstone / hammer stone and a light MSA scatter.	Low
RVM2012/018	176 177	S28 34 45.5 E20 19 57.3 S28 34 46.2 E20 19 57.5	Artefact scatter	Large, probably MSA scatter of artefacts. Banded ironstone, hornfels, Quartzite, FGB.	Medium Mitigate : 4 hrs
RVM2012/019	178	S28 34 44.2 E20 19 52.7	Artefact scatter	Widespread light scatter of quartz, banded ironstone, quartzite, FGB, hornfels all over this area.	Low
RVM2012/020	179	S28 34 44.1 E20 19 45.7	Artefact scatter	Artefact scatter in alcove against a granite outcrop. Quartz, banded ironstone, FGB.	Medium Mitigate : 2 hrs
RVM2012/021	180	S28 34 47.7 E20 19 31.7	Artefact scatter	Good scatter of quartz, quartzite and banded ironstone in a sandy area with some gravel and close to 'waterbakke'. Probably MSA. There is widespread low density scatter all around this area.	Medium Mitigate: 8 hrs
RVM2012/022	181	S28 34 47.7 E20 19 28.2	Artefact scatter	As above but in lower density. Quartz, quartzite, banded ironstone.	Low
RVM2012/023	182	S28 34 51.6 E20 19 13.8	Artefact scatter	Small, dense scatter of quartz and banded ironstone.	Medium Mitigate: 2 hrs
RVM2012/024	183	S28 34 51.7 E20 19 10.7	Artefact scatter	Extensive low density scatter of artefacts. Quartz, quartzite, banded ironstone.	Low
RVM2012/025	184	S28 34 50.7 E20 19 01.2	Artefact scatter	Tiny rock shelter with dense scatter of quartz, banded ironstone and FGB in front of it.	Medium Mitigate: 8 hrs
RVM2012/026	185 186	S28 34 51.7 E20 19 00.5 S28 34 52.0 E20 19 00.9	Artefact scatter	Large tee with a scatter of variably-sized granite blocks in a very rough circle beneath it. To the east and southeast of this there is a scatter of quartz (mostly), banded ironstone, FGB and OES. LSA.	Medium Mitigate: 8 hrs
RVM2012/027	187	S28 34 52.0 E20 19 09.1	Artefact scatter	Widespread light MSA scatter of banded ironstone, quartz, FGB, quartzite, hornfels on gravel pavement.	Low
RVM2012/028	188	S28 34 50.5 E20 19 10.0	Artefact scatter	Widespread light MSA scatter of banded ironstone, quartz, FGB, quartzite, hornfels on gravel pavement.	Low
RVM2012/029	189	S28 34 48.5 E20 19 14.7	Artefact scatter	Widespread light MSA scatter of banded ironstone, quartz, quartzite on gravel pavement.	Low

RVM2012/030	190	S28 34 43.5 E20 19 43.0	Artefact scatter	MSA scatter of quartz and banded ironstone. Also a quartzite hammer stone.	Low
RVM2012/031	191	S28 34 41.5 E20 19 46.4	Artefact scatter	Scatter of banded ironstone and FGB below a granite outcrop.	Low
RVM2012/032	192 193 194	S28 34 41.2 E20 19 47.5 S28 34 41.5 E20 19 48.4 S28 34 42.3 E20 19 48.6	Artefact scatter	Widespread LSA scatter of quartz, CCS, 2 OES along with some background scatter of banded ironstone and FGB.	Medium Mitigate: 16 hrs
RVM2012/033	195	S28 34 42.4 E20 19 46.4	Artefact scatter	Five grinding hollows in 2 m ² of rock.	Low
RVM2012/034	196	S28 34 42.8 E20 19 47.6	Artefact scatter	Small MSA scatter of quartz and banded ironstone.	Low
RVM2012/035	197	S28 34 42.4 E20 19 53.0	Artefact scatter	Ephemeral LSA scatter of quartz and OES.	Low
WV2012/010	198	S28 34 58.4 E20 21 06.8	Artefact scatter	LSA scatter of quartz, banded ironstone, FGB, OES, pottery, 1 bone fragment associated with an ashy patch.	Medium Mitigate: 4 hrs
WV2012/011	199	S28 34 55.9 E20 21 04.7	Artefact scatter	LSA scatter of quartz, banded ironstone, FGB, OES, pottery associated with an ashy patch.	Medium Mitigate: 2 hrs
WV2012/012	200	S28 34 55.5 E20 21 03.6	Artefact scatter	LSA scatter of quartz, FGB associated with an ashy patch.	Medium Mitigate: 2 hrs
WV2001/018	201	S28 34 55.6 E20 21 12.0	Grave	J.A. Nieuwoudt, died 1921. Original gravestone was local granite with details carved in roughly. New granite gravestone has been added with original one (now broken) cemented onto the surface of the grave.	High Avoid
WV2012/013	202 203	S28 35 00.4 E20 21 11.8 S28 35 00.4 E20 21 11.1	Artefact scatter	LSA scatter of quartz, banded ironstone, FGB, pottery associated with ashy patches. Big LG with two grooves on each side.	Medium Mitigate: 4 hrs
WV2012/014	204	S28 35 02.0 E20 21 11.1	Artefact scatter	Ephemeral LSA scatter of quartz, FGB, banded ironstone, pottery, charcoal and some iron fragments that may not belong.	Low Mitigate: 2 hrs
WV2012/015	205	S28 35 02.3 E20 21 11.5	Artefact scatter	LSA scatter with quartz, quartzite, FGB, banded ironstone, OES, pottery, 1 large bead.	Medium Mitigate: 4 hrs
WV2012/016	206	S28 35 01.2 E20 21 12.3	Artefact scatter	Light LSA scatter of quartz, quartzite, FGB, OES, pottery, historical ceramic (probably not associated)	Low Mitigate: 2 hrs
WV2012/017	207	S28 35 03.2 E20 21 13.8	Dump	Historical dump with glass, ceramics, copper, iron, tin. Includes some typical late 19 th century ceramics.	Low
WV2012/018	208	S28 35 04.5 E20 21 12.7	Stone feature	Possible grave. Length is visible at 1.2 m but width is obscured.	Low (?High)
WV2012/019	209	S28 35 08.1 E20 21 15.6	Stone feature	Dispersed scatter of rocks with occasional fragments of glass, ceramics and wire.	Low
WV2012/020	210	S28 35 09.9 E20 21 15.5	Stone features	Two clusters of granite stones.	Low
WV2012/021	211	S28 35 09.4 E20 21 15.5	Ruin	Small stone foundation with some glass and ceramic fragments and wire scatter about.	Low
WV2012/022	212	S28 35 08.5 E20 21 16.2	Ruin	Small ?foundation / ?grave.	Low (?High)
WV2012/023	213	S28 35 10.6 E20 21 18.8	Stone	Trapvloer of 12 m diameter with tin, glass and ceramic fragments lying	Low

			feature	about.	
WV2012/024	214	S28 35 17.9 E20 21 23.0	Stone feature	Large packed stone feature. No obvious structure to it but it is possibly a floor. c. 6m in diameter.	Low
WV2001/014	215	S28 35 18.6 E20 21 25.2	Memorial	Inscription: "Eerste Landsdienskom Dept v Landbou 21.6.52 – 5.?.52".	High
WV2012/025	216	S28 35 46.7 E20 22 08.2	Stone feature	Tiny circular stone feature.	Low
n/a	217	S28 37 03.2 E20 22 06.9	Artefact scatter	Background scatter of artefacts increases close to the river after nothing on the granites further away.	Low
WV2012/026	218	S28 35 20.3 E20 21 25.1	Ruin	Cement floor and ?machine base. Also a bottle and tin dump here.	Low
WV2012/027	219	S28 35 22.0 E20 21 25.6	Stone feature	Small mound of calcrete nodules, possibly a grave. Has a small piece of cement alongside it that has pebble impressions in it.	Low (?High)
WV2012/028	220	S28 35 31.3 E20 21 32.0	Ruin	Foundation of a structure. There are occasional glass fragments scattered about.	Low
MB2001/003 (RVM)	L018	S28 33 27.6 E20 19 46.1	Grave?	Irregular heap of granite stones. The historical features in this area may belong to a settlement known as Hartbeesvlak. Anonymous (2001) recorded the settlement as MB3.	Low (?High)
	L019	S28 33 28.0 E20 19 47.0	Ruin	Two semicircles of granite stone. Function unknown. Some 20 th century material nearby	Low
	L020	S28 33 29.2 E20 19 46.1	Ruins?	Two scatters of granite rock near a grove of thorn trees. There is no apparent pattern, they may represent an informal dwelling. Great deal of wire around	Low
	L021	S28 33 29.0 E20 19 46.5	Stone feature	Scatter of rocks in the grove of thorn trees. Maybe relating to a "matjies" house settlement	Low
	L022	S28 33 28.8 E20 19 47.8	Stone feature	Scatter of rocks near a bush. Associated with 20 th century metal remains	Low
	MB3				It is unclear whether MB3 is one of the above features or not.
RVM2012/036	L025	S28 34 06.6 E20 19 28.2	MSA	Ephemeral scatter of MSA flakes and flaked cobbles on banded ironstone	Low
MB2001/004	L026 L027	S28 34 06.8 E20 19 26.7 S28 34 05.6 E20 19 25.0	MSA	Very large open site, sandy terrace overlooking river, comprising dense scatter of MSA artefacts on banded ironstone. Flakes and cores. Some retouch. Some typical MSA flakes. Also quartzite and hornfels. Covers area around 40m x 80m.	Medium Mitigate: 4 hrs
RVM2012/037	L028	S28 34 05.2 E20 19 22.5	MSA	Small, ephemeral scatter of MSA material	Low
RVM2012/038	L029 L030 L031 L032	S28 34 10.1 E20 20 01.5 S28 34 10.4 E20 20 01.8 S28 34 11.1 E20 20 02.0 S28 34 10.5 E20 20 02.4	LSA	Near historic settlement, on the sandy banks of the river. Collection of pottery, ostrich eggshell (2 OES beads of 7-8mm in size), and few stone artefacts. Pottery includes a burnished sherd, one rim sherd (6mm in thickness). L030 is a single thick potsherd, burnished red with partial boss. L031 single potsherd. L032 another potsherd. Possible deposit.	High Mitigate: 8-16 hrs
WV2012/029	L033	S28 34 33.9 E20 20 37.8	LSA	On the sandy banks of the river, against a small rocky outcrop, both historic and prehistoric material superimposed. Iron, beer glass, white glass. A single potsherd with mica temper (5mm thickness); 3 freshly	Medium Mitigate: 4 hrs

				flaked black rock, 1 banded ironstone flake, some quartz flakes, ostrich eggshell. Also evidence of a hearth, charcoal being exposed.	
WV2012/030	L034	S28 34 47.8 E20 20 57.9	Stone feature	Rough cluster of granite rocks, 2m x 3m. With tin cans, brown beer bottle glass fragments.	Low
WV2012/031	L035	S28 34 48.5 E20 20 57.7	Stone feature	Large spread of roughly shaped granite rocks, forming a very rough square 5m x 4m.	Low
WV2012/032	L036 L037	S28 34 49.3 E20 20 57.7 S28 34 49.5 E20 20 58.1	LSA	L036: On sandy banks of the river, a small concentration of freshly flaked black stone cobbles and flakes, some quartz. No sign of pottery. L037: Extension of L036. On sandy banks of river, a very dense concentration of freshly flaked black cobbles and flakes. Quartz also present. Banded ironstone artefacts not common. They appear to be eroding from deposit by a little gully running between L036 and L037.	Medium Mitigate: 4 hrs
WV2012/033	L038	S28 34 54.6 E20 21 03.4	LSA	Next to a SAN Parks brick building, on the banks of the river, at least 4 potsherds, flaked black cobbles and flakes, ostrich eggshell fragments. Site about 20m x 20m.	Medium Mitigate: 8 hrs
WV2012/034	L039 L040 L042	S28 34 53.9 E20 21 02.8 S28 34 54.1 E20 21 02.1 S28 34 52.6 E20 21 00.9 S28 34 53.4 E20 21 02.3	LSA	L042 is spread of flaked cobbles. L039 is a large potsherd, burnished red on the outside, about 5-6mm in thickness. L040 is a potsherd with gritty temper, about 6-7mm in thickness.	Medium Mitigate: 4 hrs
WV2012/035	L041	S28 34 52.6 E20 21 00.9	LSA	L041 is an ephemeral spread of flaked black cobbles. Possibly related to L042.	Low Mitigate: 1 hr
WV2012/036	L043	S28 35 26.4 E20 21 29.1	Historic dump		Low
WV2012/037	L044	S28 35 27.7 E20 21 31.5	LSA/MSA	Ephemeral spread of black cobbles and banded ironstone	Low
WV2012/038	L045	S28 35 30.2 E20 21 38.2	Historic	Sponge decorated refined earthenware, one embossed with ceramic, cartridge case, metal razor. Near a cluster of stones which could represent an informal settlement	Low
WV2012/039	L046	S28 35 29.0 E20 21 39.9	Historic kraal	Small stone kraal, of roughly packed granite blocks, forming a semi-circle next to a rock face. About 3m x 3m	Low
WV2001/023 WV2001/024	WV23&24	Unknown	LSA	Excavated by A. Smith as Grid1 and Grid 2 respectively. Not recorded during 2012 survey (possibly all removed).	Low

6.1. Stone Age archaeology

Although no ESA sites were found during the present survey, the earlier survey of the National Park revealed several isolated ESA artefacts and at least one scatter of such artefacts. None occur within our present study area. MSA artefacts and scatters are far more common. We recorded a large number of such sites during our survey. The vast majority are relatively light scatters, often associated with naturally occurring pebbles of banded ironstone. However, some are denser and a few of these may require some mitigation if they are to be impacted by the final layout of the proposed development.



Figure 10: The location of the MSA scatter at RVM2012/021 (point 180).



Figure 11: The ground surface with artefacts visible at RVM2012/021 (point 180).



Figure 12: Artefacts from the MSA scatter at RVM2012/022 (point 181).



Figure 13: Artefacts from the MSA scatter at RVM2012/018 (points 176-177).



Figure 14: Artefacts from the MSA scatter at WV2012/004 (point 168).

A number of LSA sites were encountered, mostly close to or beneath trees on the silty plains along the river margins. Many of these sites are very likely to be those of pastoralist people (the Khoekhoen) who were known to camp along the river margins. The best documented examples are those at Jakkalsberg A and B in the Richtersveld (Webley 1997), but some of the material excavated by Smith (1986, 1995) may also relate to such sites. Figures 15 to 18 show the situations and finds from some of these sites. It was frequently the case that ashy patches – presumed to be the remnants of hearths – were found associated with the artefacts. This raises the significance of the site since it greatly elevates the chances of obtaining reliable radiocarbon dates.



Figure 15: View of the area close to the riverine bush where site RVM2012/038 (point L029) was found. The river is out of picture to the right.



Figure 16: Artefacts from RVM2012/038 (point L029). OES (upper left), flaked stone (lower left), OES beads (upper right) and pottery (lower right).



Figure 17: View of the area close to the riverine bush where site WV2012/033 (point L038) was found. The river is to the right and the building in the background is part of a disused SANParks bushcamp.



Figure 18: Artefacts from WV2012/033 (point L038). They include flaked fine-grained black rock, quartz, OES fragments and pottery fragments.

Few rock shelters are present in the study area but when a reasonable one is found it invariably has artefacts around it. One example was located near the end of Option 1 (Figure 19). The site was previously recorded by Anonymous (2001) as “IS1”. They also mention a second rock shelter round the eastern side of the same outcrop as well as two bedrock grinding grooves. The artefact scatter outside the rock shelters is probably a mix of MSA and LSA artefacts (Figure 20). Very close by there is a large isolated tree. Beneath this tree is a light scatter of rocks in a loose circular arrangement. It is likely that these rocks relate to weights from a ‘matjieshuis’ having been sited there (Figure 21). To the east and southeast of the tree is an extensive scatter of small flaked stone artefacts. These are LSA in age and quite likely relate to the stones under the tree. The vast majority of these artefacts – unlike on the MSA scatters – is quartz, but banded ironstone and fine-grained black rock is also present along with some OES fragments.



Figure 19: View into the rock shelter at RVM2012/025 (point 184). The shelter is too low for general human occupation but could be slept in if required.



Figure 20: View of the ground surface and artefacts at RVM2012/025 (point 184).



Figure 21: View of the area in front of the tree at RVM2012/026 (point 185) with some stones visible.

LSA sites often contain grindstones which may have been used for processing plant foods or perhaps for grinding ochre. It is very rare to find large portable lower grindstones with multiple grooves – a small number are known from the Namaqualand coastline. Site WV2012/013 was located near a river in the typical floodplain environment favoured by the Khoekhoen (Figure 22). It contained a large lower grindstone with two very well-developed grooves on either side (Figure 23). The artefact scatter included quartz, banded ironstone, fine-grained black rock and pottery and the finds were associated with what appears to be an ashy deposit.

A second type of grinding stone, bedrock grooves, is significant in the wider Bushmanland region. Anonymous (2001) recorded two near their IS1 site (discussed above) and we found two further localities, with three and six grooves respectively. The grooves are typically poorly developed and often manifest as shallow hollows.

Upper grindstones would have been used in conjunction with both of the above lower grindstone types. Several upper grindstones were seen during the survey but these were often not associated with LSA sites. Figures 26 and 27 show two examples, both with dimples pecked into their grinding surfaces. The RVM2012/010 example was associated with historical material and may even have been used historically. The latter was entirely isolated,

presumably dropped there during prehistory, and had four different grinding facets, all of them dimpled.



Figure 22: View of the area in which site WV2012/013 (point 202-203) was found. The grindstone is visible.

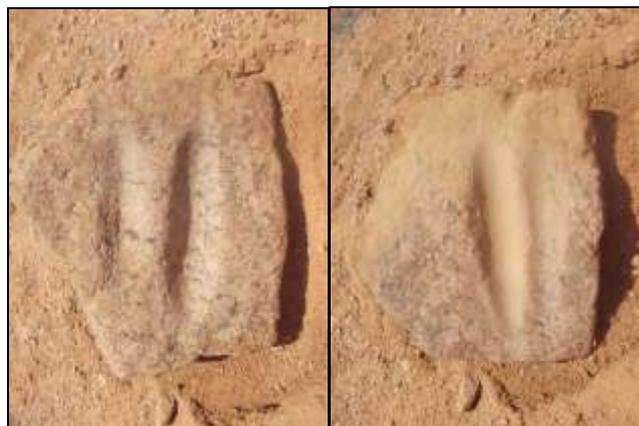


Figure 23: The two surfaces of the large lower grindstone with multiple grooves.



Figure 24: View of the five grinding hollows (arrowed) at RVM2012/033 (point 195).



Figure 25: Close-up of one of the grinding hollows at WV2012/006 (point 171).



Figure 26: Upper grindstone from RVM2012/010 (point 153).



Figure 27: Isolated upper grindstone from point 167. Four different views of the same artefact are shown.

6.2. Historical archaeology and local history

The study area had abundant historical archaeological remains. The vast majority are likely to be less than 100 years of age and thus not legally protected by the NHRA. Importantly, however, the sites relate to the ancestors of the Riemvasmaak community who were forcibly removed from the land in 1973 and 1974 during the Apartheid regime. The sites thus represent the community's history. It should be noted that the community, through a letter from the Riemvasmaak Trust's lawyer, has indicated their support for the development even though it passes through the area once occupied by them and their predecessors. They did, however, stipulate that all graves should be protected. The letter is included in Appendix 2 of this report.

Hoffmann *et al.* (1995) provide a basic history of the Riemvasmaak community which is paraphrased here. People of Xhosa, Damara, Nama and other local heritage colonised the land in the late 19th and early 20th centuries. In 1973 the government of the day removed those of Xhosa heritage to the Ciskei, while the following year the Nama and Damara were moved to northern Namibia. The remaining people were classified 'coloured' and allowed to live on in surrounding areas. The land was then taken over as a military training and testing ground. The site is significant in local South African history in that it was the very first land restitution case in South Africa with the decision to restore the land to its rightful owners being taken in December 1993. The community returned during early 1995.

Anonymous (2001) lists four historic settlements in the area, one of which (Wabrand) occurs to the northwest, out of the study area. Three are relevant to the present report. Blousyfer occurs in the northernmost part of the study area and Hartbeesvlak and Melkbosrand in the centre. A fourth settlement occurs in the south but this one's name is unknown (Figure 28). Anonymous (2001) was apparently also unable to trace the name and it is not included in their list of four. Ironically, this unnamed one is the only one clearly visible on 1941 aerial imagery (Figure 29), although not all its features had yet been constructed. Melkbosrand (Figure 30) may have been started but no buildings seem present and neither is the graveyard evident. Its earliest dated grave is 1954. Hartbeesvlak appears to have been a far less formal settlement as there are only very small stone features there today. This too is not visible in 1941 but, given the scale of the features visible today, this may not be a reliable

observation. It seems likely that the main community settlement was at the town of Riemvasmaak to the north, with the other mentioned settlements being small outposts/villages (Melkbosrand is, however, described by Hoffmann *et al.* (1995) as permanent and they note that a school and chapel were present there from 1947).

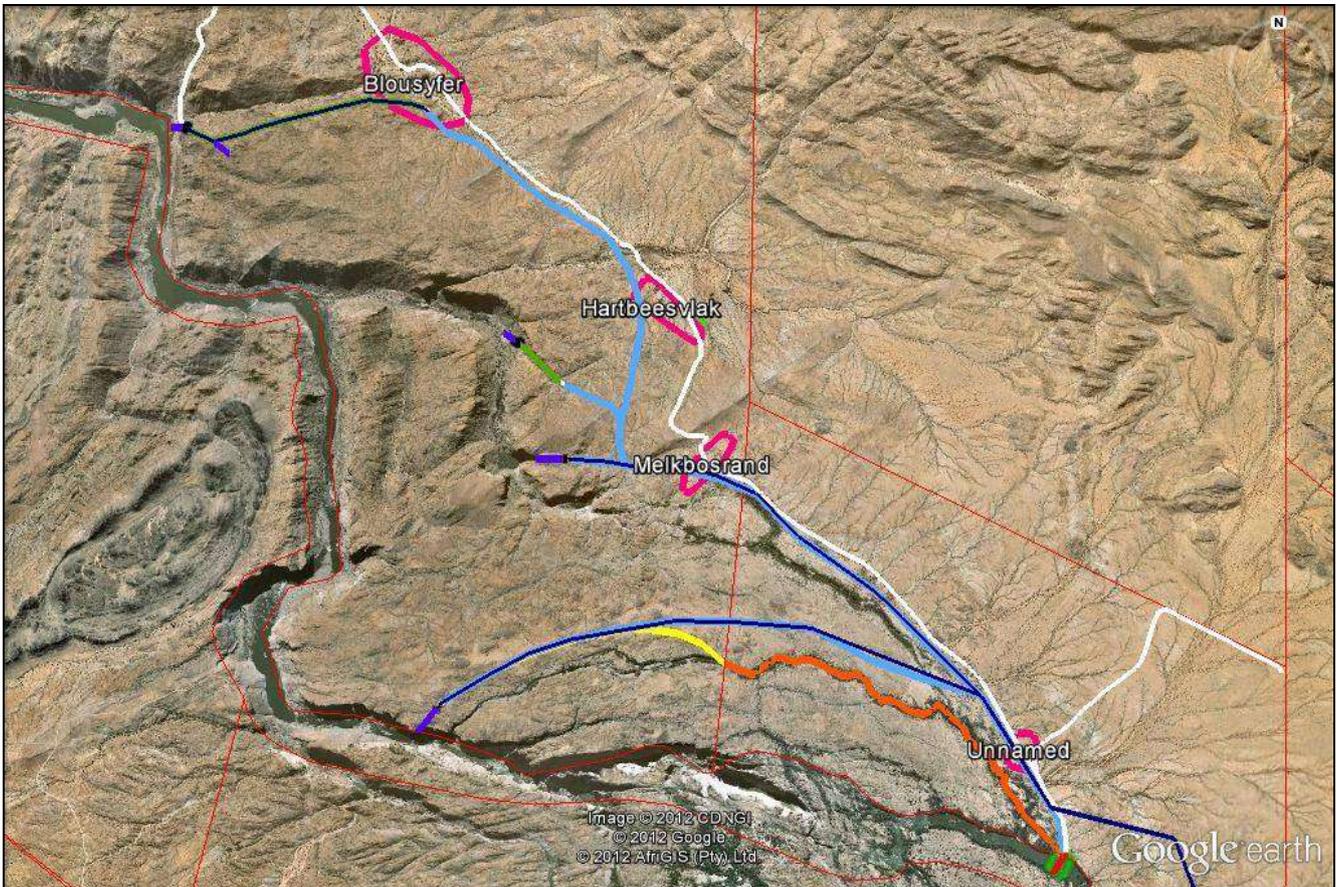


Figure 28: Aerial view of the study area showing the locations of the four historical settlements located during the study.

Stepping forwards in time, Blouster and Hartbeesvlak are not visible on the 1963 aerial photograph. It should be noted that quality of the imagery may, in fact, be obscuring the details. At Melkbosrand, the main house and one of the outbuildings are visible at this time but the graveyard is not visible despite the dated graves indicating it to be present. It may, of course, have been very small at the time. At the unnamed settlement things have changed. The square kraal is clearly visible and the main cluster of stone features is visible as a dark stain. The other features so plainly visible in 1941 are absent. Interestingly, the road is fairly well visible leading north-westwards as far as Melkbosrand but once it crests the hill there it is very difficult to trace and was probably very seldom used beyond that point if it even existed at all. More recent imagery is at such a scale as to make this exercise futile. Nevertheless, the 1976 image appears to show something of the main house and graveyard at Melkbosrand. Sadly, the aerial photographs have not helped determine when demolition of the structures took place.

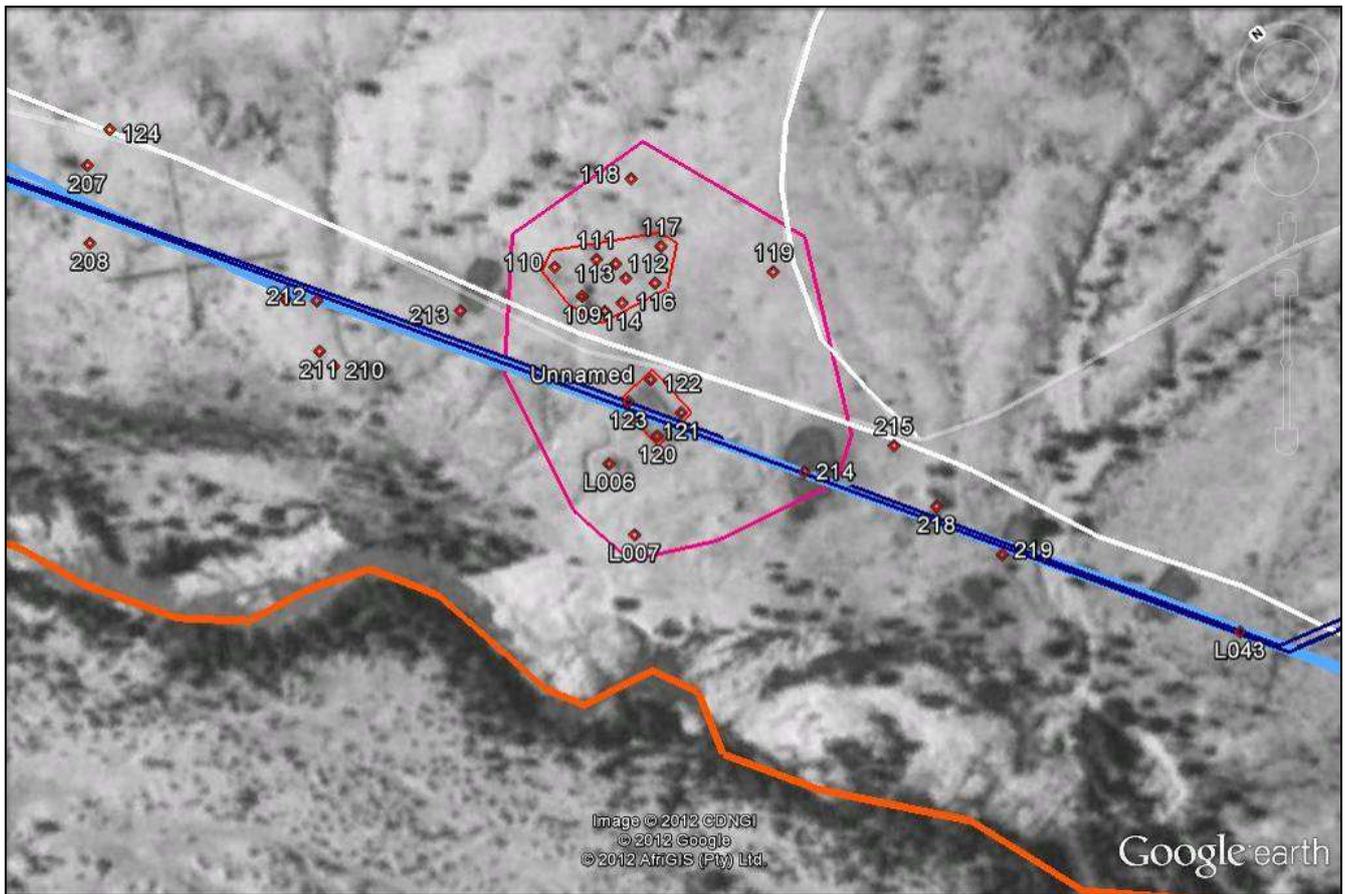


Figure 29: Aerial view of the area with the unnamed historical settlement. In this image the 1941 aerial photograph has been overlaid on Google Earth. Interestingly, some of the historical features are not at all visible today (like the large cross on the left) while others, those with stonework, remain visible.

Figures 31 to 42 show examples of the types of material referred to above. They include all of the following aspects:

- Ruins of structures;
- Stone features of indeterminate function;
- Artefact dumps;
- and isolated artefacts.

It should be noted that the vast majority of historical artefacts are quite recent (mid-20th century) but that occasional ceramic fragments were undoubtedly originally of late 19th century origin. Of course it is quite likely that they were only deposited during the early to mid-20th century.

6.3. Built environment

No structures remain intact in the study area, all having been demolished either during the military occupation post-dating 1974 or else after the land was incorporated into the Augrabies Falls National Park in 1982. Sadly this has resulted in a tremendous loss of local heritage.

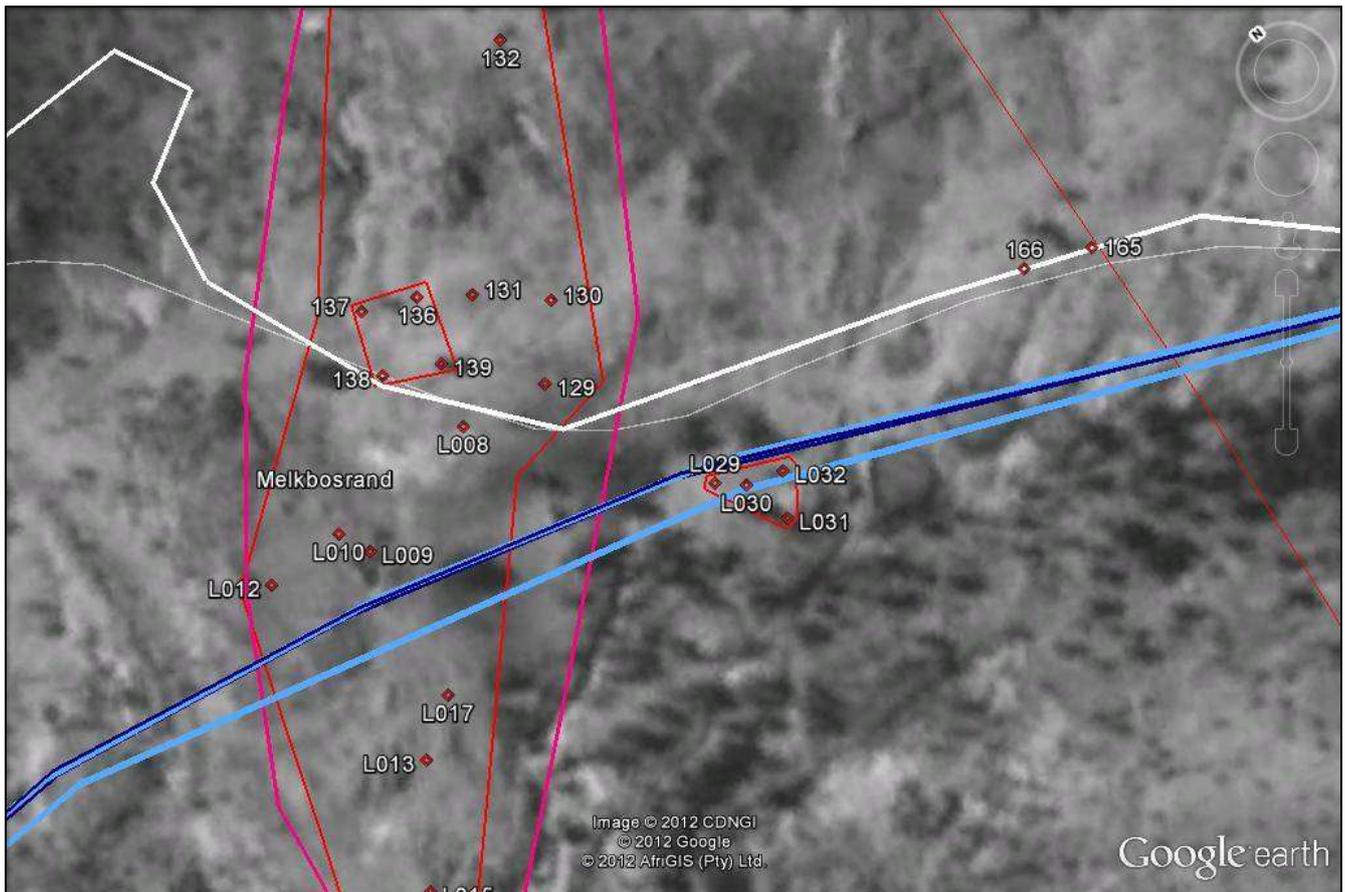


Figure 30: Aerial view of the area with the Melkbosrand historical settlement. In this image the 1941 aerial photograph has been overlaid on Google Earth. The cemetery is the most obvious feature today (marked by red square) but is not at all visible in this view. Note what appear to be historical features to the right of the L029-L032 points – nothing is visible there today at all but these may well represent kraals. Points 129, 130 and 131 are the three demolished buildings. None is visible in 1941.

6.4. Graves

Morris (1995) has reviewed the occurrence of pre-colonial graves in the local landscape and found that they are likely to be very common. The majority are quite recent in date (18th to 19th centuries). Most graves are covered with a stone cairn of varying size. Many of the stone features noted by us might be burials but it is impossible to say this for sure without subsurface testing, since there are also likely to be many historical features constructed for various reasons by the Riemvasmaak community when they lived there during the 20th century. Some examples are very strongly likely to be graves and a few are illustrated in Figures 43 to 45. Several isolated formal graves (e.g. Figures 46 to 48) and one formal graveyard also occur, the latter at Melkbosrand (Figures 49 to 51).

6.5. Memorial

A memorial stone was found at WV2001/014 (point 215; Figures 52 and 53). It has an inscription reading: “Eerste Landsdienskom Dept v Landbou 21.6.52 – 5.?.52”.

6.6. Cultural landscapes

Given the numerous historical features, ruins and graves found across the study area, the entire site can be regarded as a historic cultural landscape. There is little evidence, however, of human modification to the landscape, only of adding layers to it.

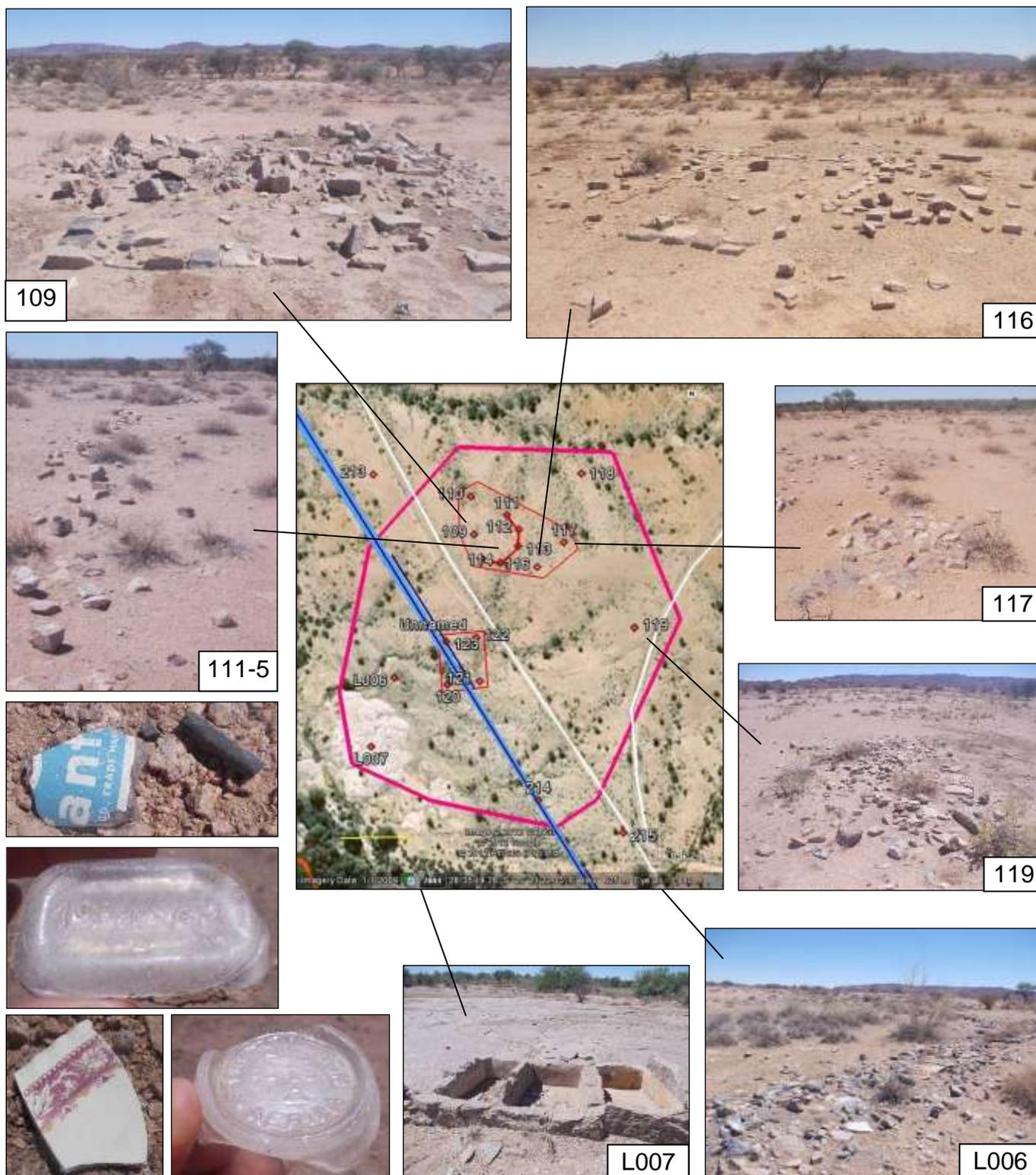


Figure 31: Photographs of finds at the unnamed settlement (WV2001/002) in the south-eastern part of the study area. 109, 116 and 119 are building foundations, 111-5 is a semi-circular feature, presumably the base of a fence, 117 is a stone feature of unknown function, L006 is a large collapsed kraal and L007 is set of what may be animal feeding/watering troughs close to the river. A few isolated artefacts found close to the kraal are also found. The Fanta bottle fragment is clearly not very recent but it is essentially modern rubbish. The yellow bar for scale at lower left in the aerial photograph is 50 m long.

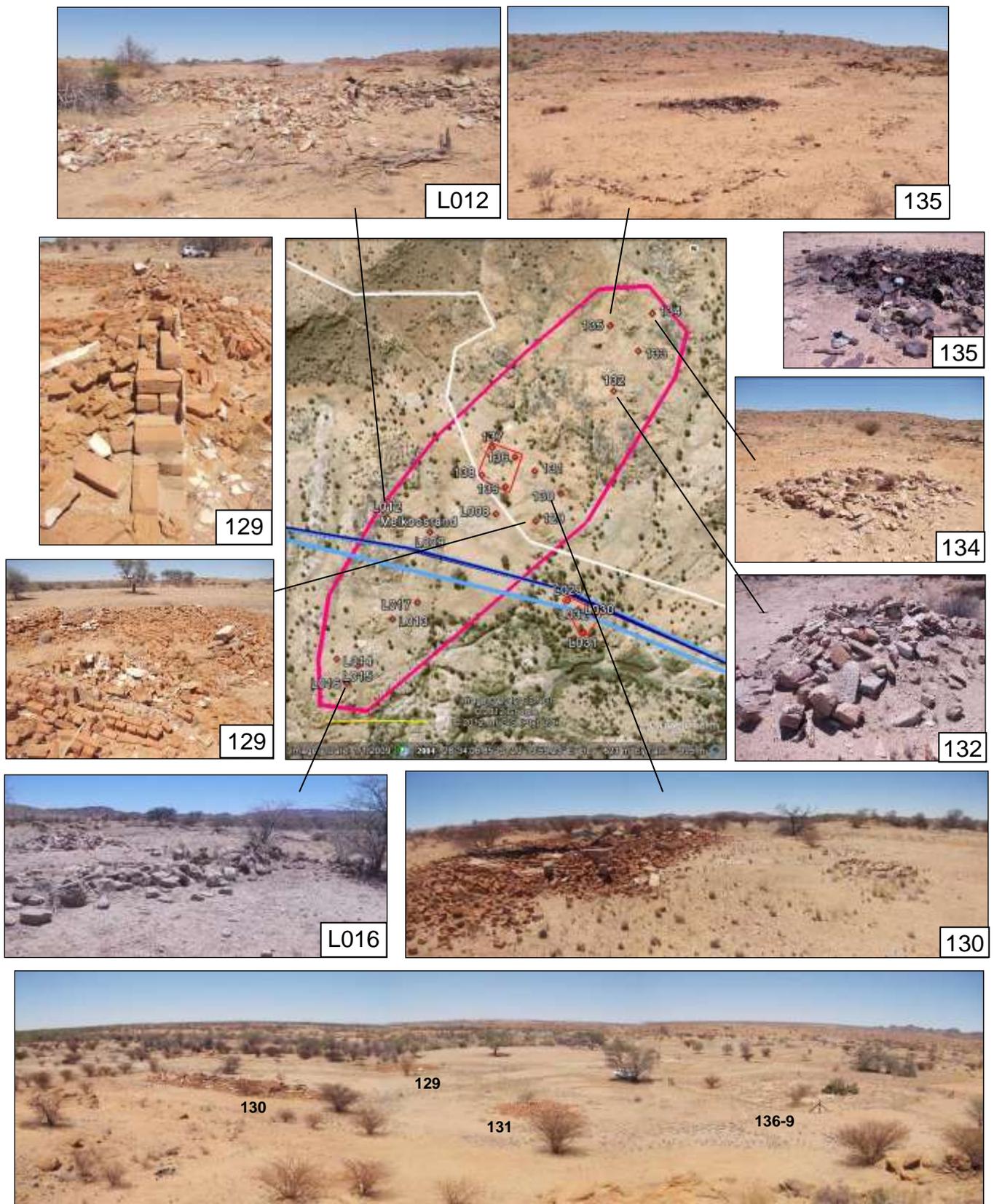


Figure 32: Photographs of finds at the Melkbosrand settlement (MB2001/010) in the central part of the study area. 129 and 130 are demolished houses, 132 and 134 are stone features, the latter may have been a small structure, 135 is probably the base of a fenced stock enclosure with a dump of tins inside it and L016 is two sides of a collapsed stone kraal.



Figure 33: Stone feature at RVM2012/001 (point 147).



Figure 34: Stone feature at RVM2012/001 (point 147).



Figure 35: Tins and a bottle at RVM2012/001 (point 147).



Figure 36: Bottle from RVM2012/009 (point 152).



Figure 37: Bottle from RVM2012/009 (point 152).



Figure 38: Metal object from RVM2012/010 (point 153).



Figure 39: Plastic button from RVM2012/010 (point 153).

6.7. Augrabies Falls National Park

The Park is regarded as a natural heritage resource and construction of the proposed hydro-electric scheme might result in impacts to the visual context of the Park.



Figure 40: Enamel bowl from RVM2012/010 (point 155).



Figure 41: Small enamel bottle from RVM2012/014 (point 163).



Figure 42: Glass bottles from RVM2012/014 (point 163).



Figure 43: Graves at WV2001/002 (point 118). These three stone mounds occur side by side to the north of the unnamed settlement in the south-eastern part of the study area.



Figure 44: Possible grave at WV2012/002 (point 125).



Figure 45: Possible grave at WV2001/030 (point 127).

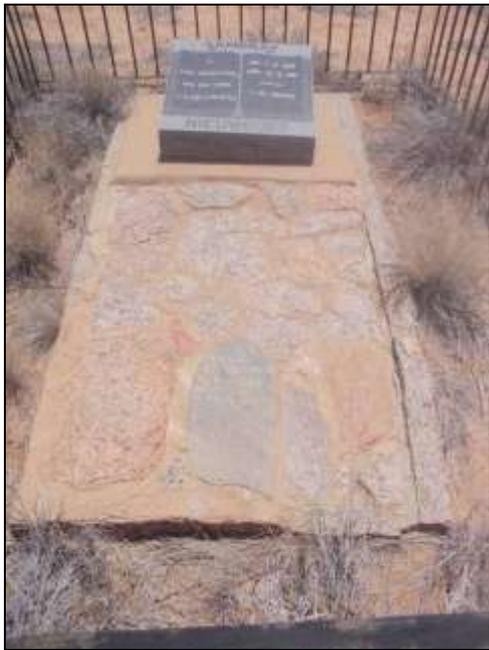


Figure 46: Grave at WV2001/018 (point 201). The person died in 1921.



Figure 47 & 48: New and original headstones on the t grave at WV2001/018 (point 201).



Figure 49: View of the graveyard at MB2001/010 (points 136-139).



Figure 50: View of the graveyard at MB2001/010 (points 136-139).



Figure 51: View of the graveyard at MB2001/010 (points 136-139).



Figure 52: View of the memorial at WV2001/014 (point 215).



Figure 53: The inscribed memorial stone at WV2001/014 (point 215).

7. ASSESSMENT OF IMPACTS

Due to the fact that we do not know the lateral extent of impacts within each possible construction corridor, the assessments provided below are best estimates. It may well be possible to alter the proposed alignments to some degree in order to avoid archaeological sites, but it is assumed that this is likely to be difficult in some areas due to the difficult topography and bedrock geology. Note that a single set of ratings has been provided rather than assessing each alternative. This is because the majority of the impacts actually would occur near the point where Option 1 branches away from the other Options and overall rating are likely to be similar. However, some discussion on the various options is included below.

7.1. Archaeology

By far the most significant impacts to archaeological resources will occur along the river close to where Option 1 leaves the main SE/NW alignment of infrastructure. Here there are many small campsites that likely relate to pastoralist people. The sites are fragile and very easily disturbed. Mitigation would be required where the sites cannot be avoided and would take the form of formal excavation and collection of archaeological material, analysis of the finds and radiocarbon dating of the sites. Many other sites that lack organic remains may also be impacted. These latter are both LSA and MSA and some will need formal excavation. Table 1 above indicates an approximate time for mitigation of each site should it need mitigation.

Table 2: Assessment of potential impacts to archaeological heritage resources.

Nature of impact: Destruction of archaeological resources during construction phase. This includes both pre-colonial and historical with the former being more important and guiding the assessment below.		
	Before mitigation	After mitigation
Extent	Site specific	Site specific
Magnitude	High	Low
Duration	Long term	Long term
Significance	Medium	Low
Probability	Definite	Definite

Confidence	Certain	Certain
Reversibility	Irreversible	
Cumulative impacts	Many similar pre-colonial sites will have been lost through commercial farming along the banks of the Orange River. Few areas close to Augrabies Falls are protected as the sites in the study area currently are.	

7.2. Graves

Besides the few known graves and single graveyard, there are a large number of features on the landscape that may be graves. This will need to be carefully assessed when final alignments and disturbance corridors are available and it is suggested that every stone feature of unknown function that will be disturbed should be tested by an archaeologist to see if it is a grave. The Riemvasmaak community members need to be made aware of this issue and should be requested to issue a statement indicating their wishes for the deceased should any such features turn out to be graves. By the time the remaining features are being tested (during the mitigation phase) it will be too late to reroute the development and the remains will have to be exhumed. In such instances a plan needs to be in place as to where/how the remains would be reinterred. It would also be helpful if, during subsequent planning of the development, the client was accompanied on site by community members such that any stone mounds that are known to be graves can be flagged and protected without further disturbance.

Table 3: Assessment of potential impacts to graves.

Nature of impact: Destruction of graves during the construction phase.		
	Before mitigation	After mitigation
Extent	Site specific	Site specific
Magnitude	High	High
Duration	Long term	Long term
Significance	High	Medium-High
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Irreversible	
Cumulative impacts	Many graves have no doubt already been impacted by commercial farming activities and new lands continue to be ripped in the area. Early researchers also did much damage to graves through excavation of a very large number of them.	

7.3. Cultural landscapes

The cultural landscape here is not deemed highly significant for two reasons. One is that it is not very old and the other is that the community that created it has given its permission for the proposed development to go ahead through the areas once inhabited by them and their predecessors. In terms of mitigation, it is desirable that the proposed development attempt to avoid all the main historical features (like house ruins and large collections of stone features) in order to try to retain the cultural landscape in as intact a form as possible, but it is acknowledged that many of the smaller – and often isolated – features make very little contribution to the cultural landscape and could be removed (subject to testing for graves if appropriate). Besides avoidance where possible, no other mitigation is suggested for the cultural landscape.

Table 4: Assessment of potential impacts to the cultural landscape.

Nature of impact: Destruction of cultural features associated with the Riemvasmaak community during the construction phase.		
	Before mitigation	After mitigation
Extent	Site specific	Site specific
Magnitude	Medium	Low
Duration	Long term	Long term
Significance	Medium	Low
Probability	Definite	Probable
Confidence	Certain	Certain
Reversibility	Irreversible	
Cumulative impacts	This cultural landscape is restricted to the greater Riemvasmaak area and it is likely that no/very few other similar features have been disturbed in recent decades.	

7.4. Augrabies Falls National Park

This impact is largely visual, but Table 5 gives a sense of the significance of the impacts in heritage terms. The only mitigation possible would be to use underground cables and to reduce the visual impacts as far as possible during all phases of the proposed development.

Table 5: Assessment of potential impacts to the Augrabies Falls National Park.

Nature of impact: Destruction of archaeological resources during construction phase. This includes both pre-colonial and historical with the former being more important and guiding the assessment below.		
	Before mitigation	After mitigation
Extent	Regional	Regional
Magnitude	Low	Very Low
Duration	Long term	Long term
Significance	Medium	Low
Probability	Definite	Probable
Confidence	Certain	Certain
Reversibility	Reversible (with full decommissioning and rehabilitation).	
Cumulative impacts	n/a	

8. OPTIONS

Several options have been proposed as illustrated in Figures 1 and 2 above. This section provides basic comments on each of these and ranks them in order of preference.

8.1. Option 1

This option is the closest to the main Augrabies falls National Park waterfall viewing areas and will likely have the greatest potential to cause visual impacts to the park and its natural heritage. Construction of the turbine halls and tailrace may impact on the main Orange River gorge in this area. For these reasons this option is not preferred. Option 1a (redirecting water along a river course) will likely scar the landscape if the river is canalised and would be more difficult to rehabilitate.

Only one historical settlement along the access road would be traversed by this option. Along the independent Option 1 alignment (i.e. southwest of the access road away from the main

infrastructural alignment) there are several archaeological sites that might require mitigation should they be impacted. These would be easy to mitigate and do not affect the decision on this Option.

8.2. Option 2a & 2b

Being further away from the waterfall, these options are more favourable and would not result in scarring to the main gorge – the turbines and tailrace would be in a side gorge.

The alignment would cross two historical settlements along the access road and would also require mitigation of archaeological sites that cannot be avoided. Again, these do not drive the assessment but it is noted that more LSA sites would potentially be damaged and require mitigation if either of these Options (2a or 2b) were selected. Overall, however, either of these Options are seen as preferred from a heritage point of view. Option 2a, in particular, will result in the smallest construction footprint and is the most favourable Option. Please note that Option 2b was not correctly assessed in the field but, even with some finds being made pre-mitigation, its impacts are not considered likely to be any more significant than those for Option 2a.

8.3. Option 3

This Option is far from the waterfall and thus this is not an issue. However, it is by far the longest option and would result in the greatest amount of damage to the landscape.

Option 3 would cross through three historical settlements along the access road and thus would potentially have the greatest impact to the cultural landscape by virtue of disturbing the greatest number of historical features. Also, being the longest, it would result in the greatest amount of landscape scarring.

In order of preference then, the options can be ranked as follows:

- Option 2a (most favoured);
- Option 2b;
- Option 3; and
- Option 1 (least favoured).

9. CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the proposed hydro-electric scheme should schemes could be allowed to proceed as long as appropriate mitigation measures are adopted.. The development and subsequent mitigation as required will need very careful planning to ensure that all aspects are suitably covered. The following recommendations are made:

- The project should be allowed to proceed;
- All known graves should be avoided unless the community authorises exhumation and reburial;
- An attempt should be made before further planning progresses to identify any other graves known to the community and which are not clearly identifiable today (these would include all the stone mounds recorded during the present survey);
- A final walk-down survey should be undertaken once final (and accurate) alignments are available. The spatial extent of the impacts (disturbance corridor) will also need to be indicated prior to this survey. Note that it may not be necessary for all areas to be

rechecked – this can be determined through comparison with the present survey tracks;

- Prior to commencement of any mitigation or construction, a plan needs to be in place that stipulates exactly how any disturbed human remains should be treated, whether these are found during mitigation or during construction (this is very important since it is considered highly likely that human remains will be disturbed, no matter what preventative measures are put in place prior to construction); and
- After the walk-down survey an accurate assessment of what archaeological mitigation will be required should take place. Mitigation will then need to be carried out under a permit issued to the responsible archaeologist by SAHRA.

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APPENDIX 1: mapping

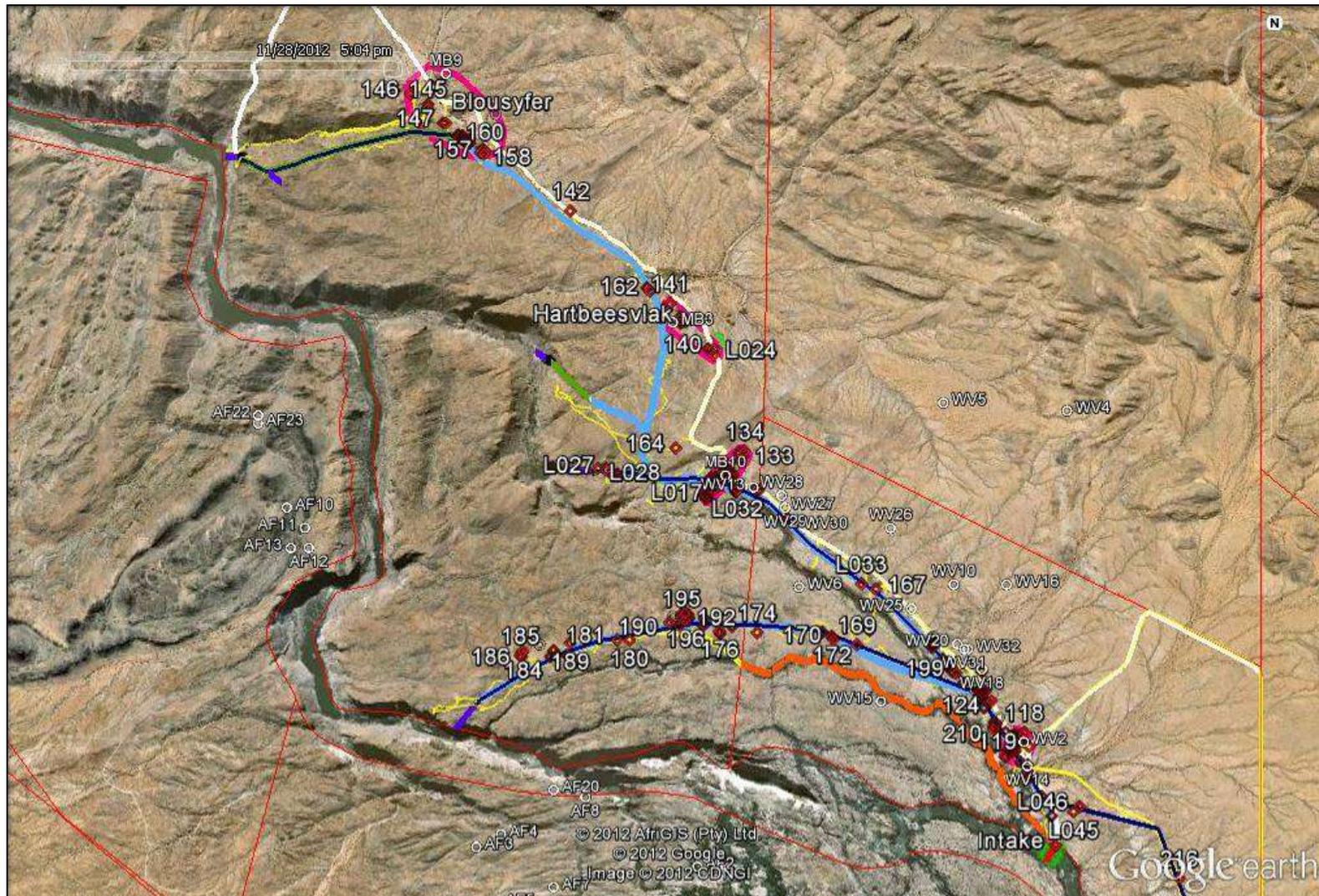


Figure A1: Aerial photograph of the entire study area showing the locations of heritage resources on record. In this and all subsequent images, the yellow lines indicate walk- and drive-paths, the red numbered icons are our finds (red outlines denote large sites) and the white numbered symbols are finds recorded by Anonymous (2001). Blue and green lines and shapes represent the development proposal and the thin red lines are property boundaries.

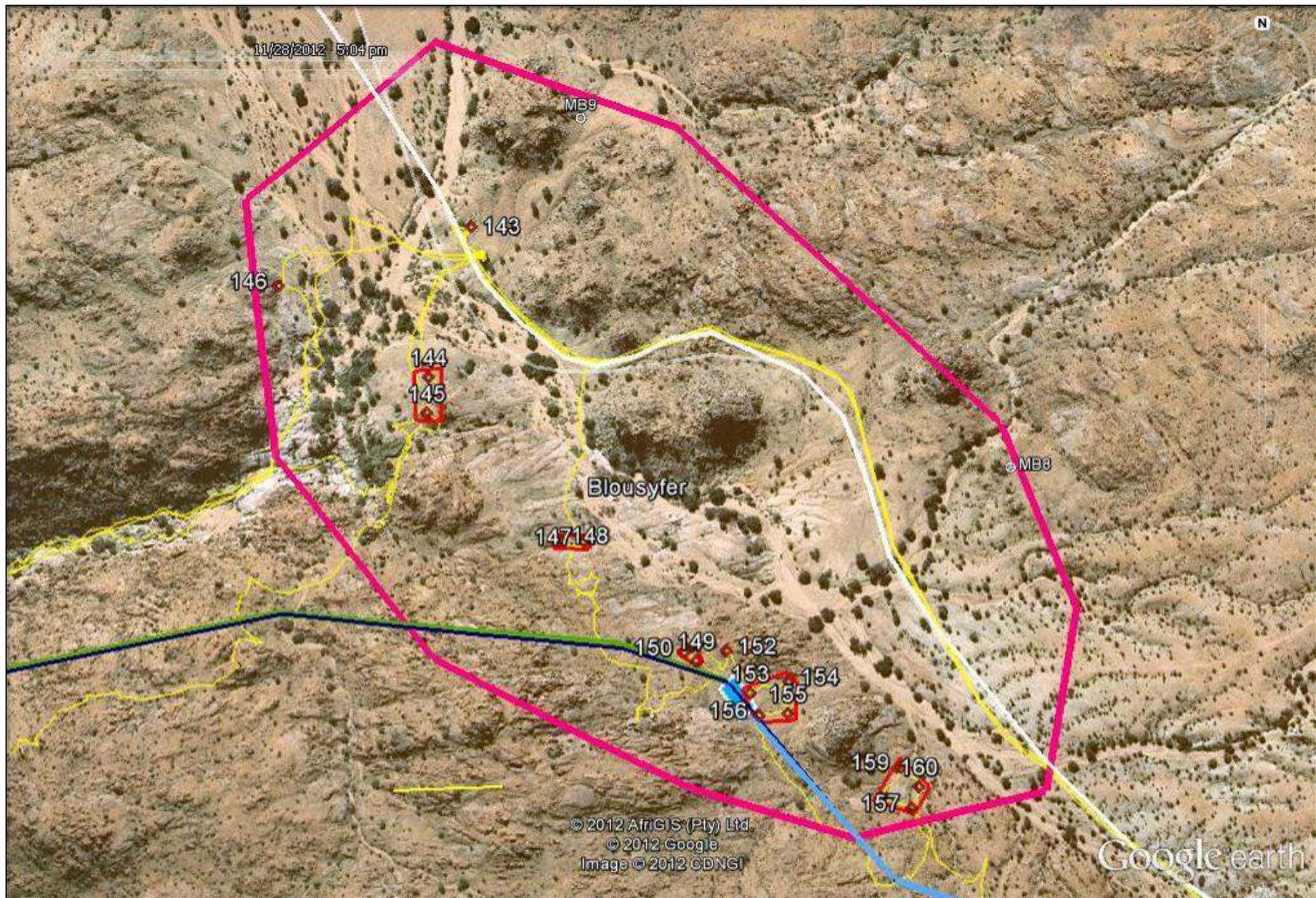


Figure A2: Aerial photograph showing the Blousyfer settlement in the far north of the study area. The yellow bar for scale at lower left is 100 m long.



Figure A3: Aerial photograph showing the Hartbeesvlak settlement in the north of the study area. The yellow bar for scale at lower left is 100 m long.

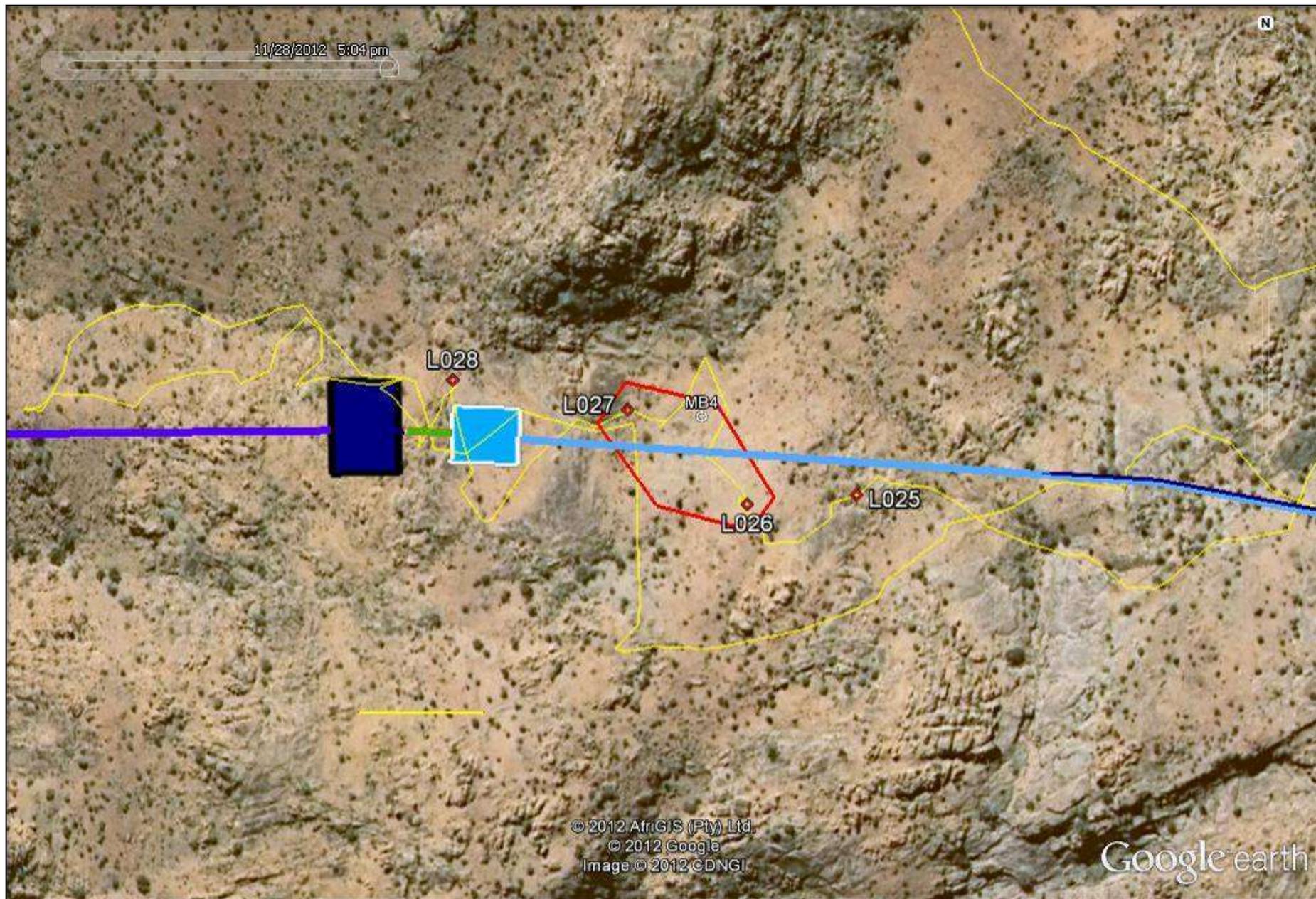


Figure A4: Aerial photograph showing the area around Option 2a. The yellow bar for scale at lower left is 50 m long.

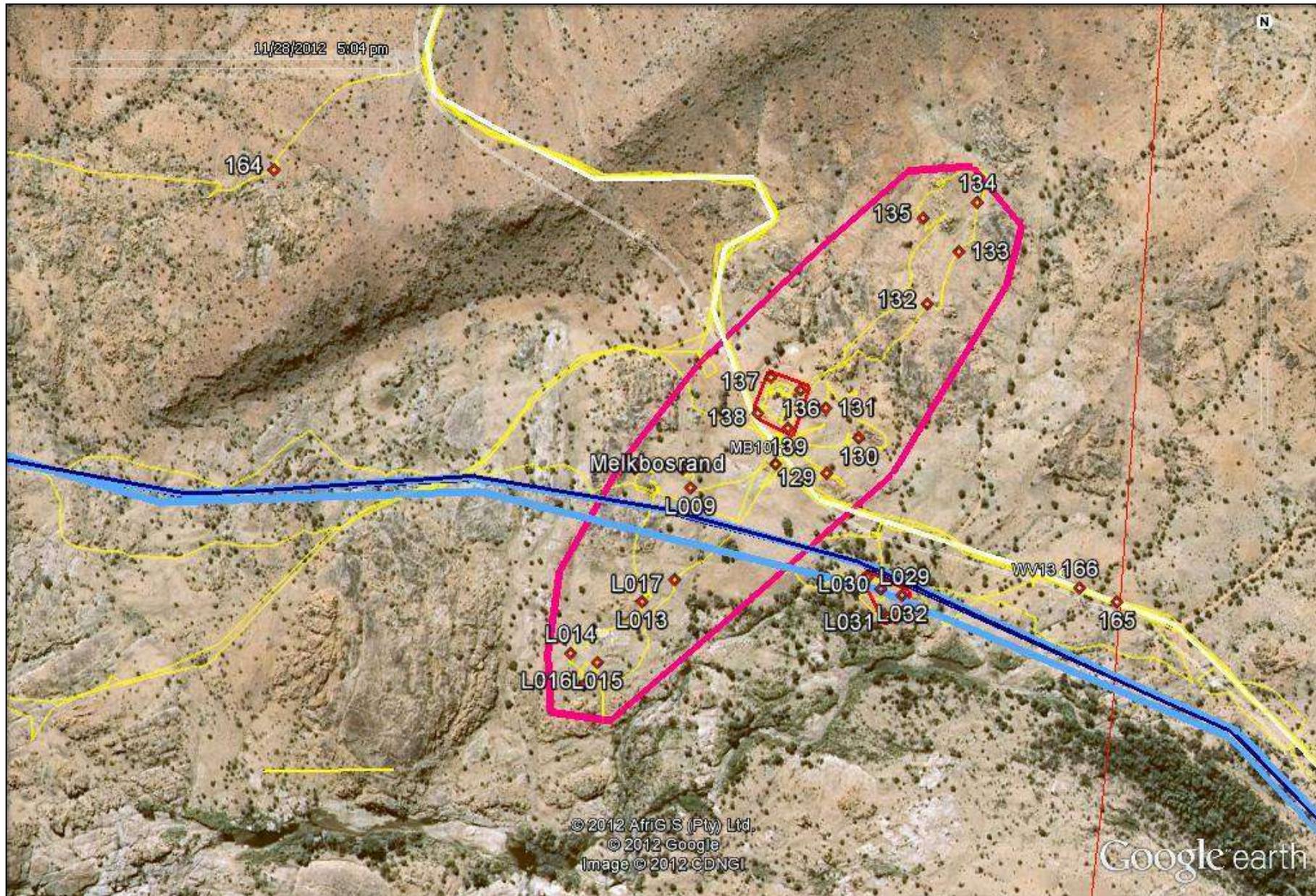


Figure A5: Aerial photograph showing the area around Melkbosrand. The yellow bar for scale at lower left is 100 m long. The cemetery is indicated by the red square in the centre.

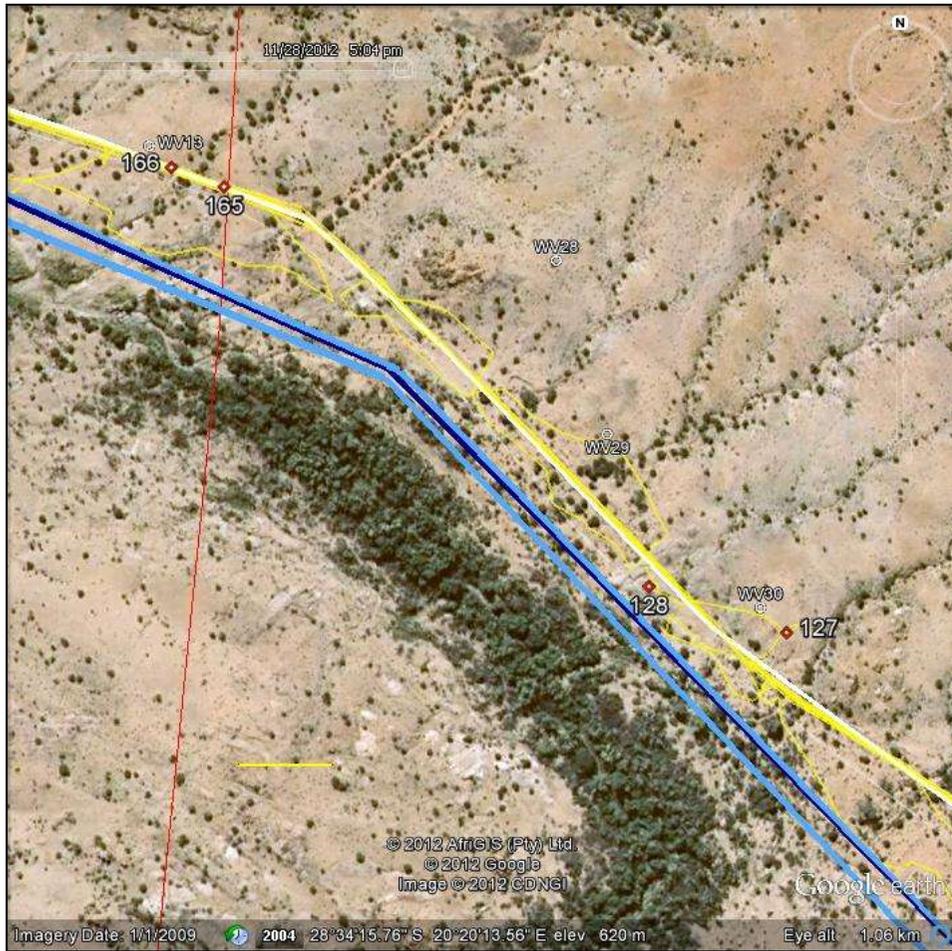


Figure A6: Aerial photograph showing the area just southeast of Melkbosrand. The yellow bar for scale at lower left is 50 m long.

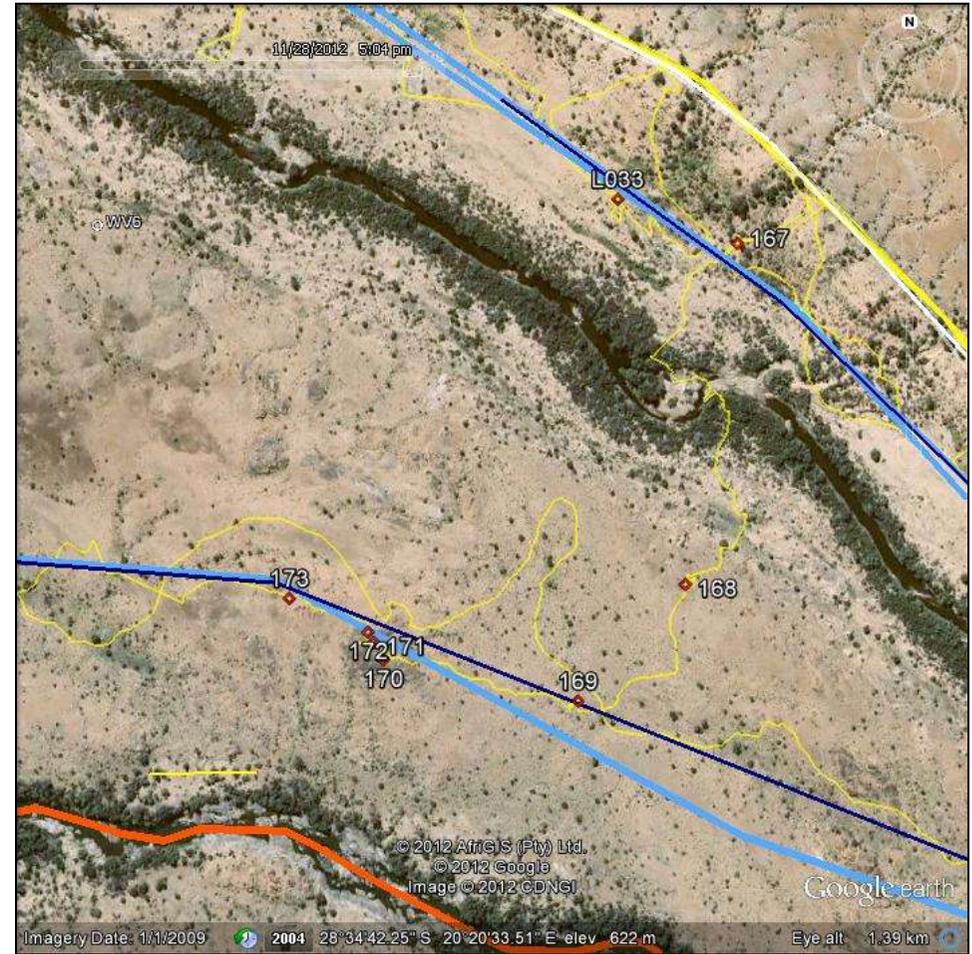


Figure A7: Aerial photograph showing the area just northwest of the point from which Option 1 branches off from the main access road. The yellow bar for scale at lower left is 50 m long.

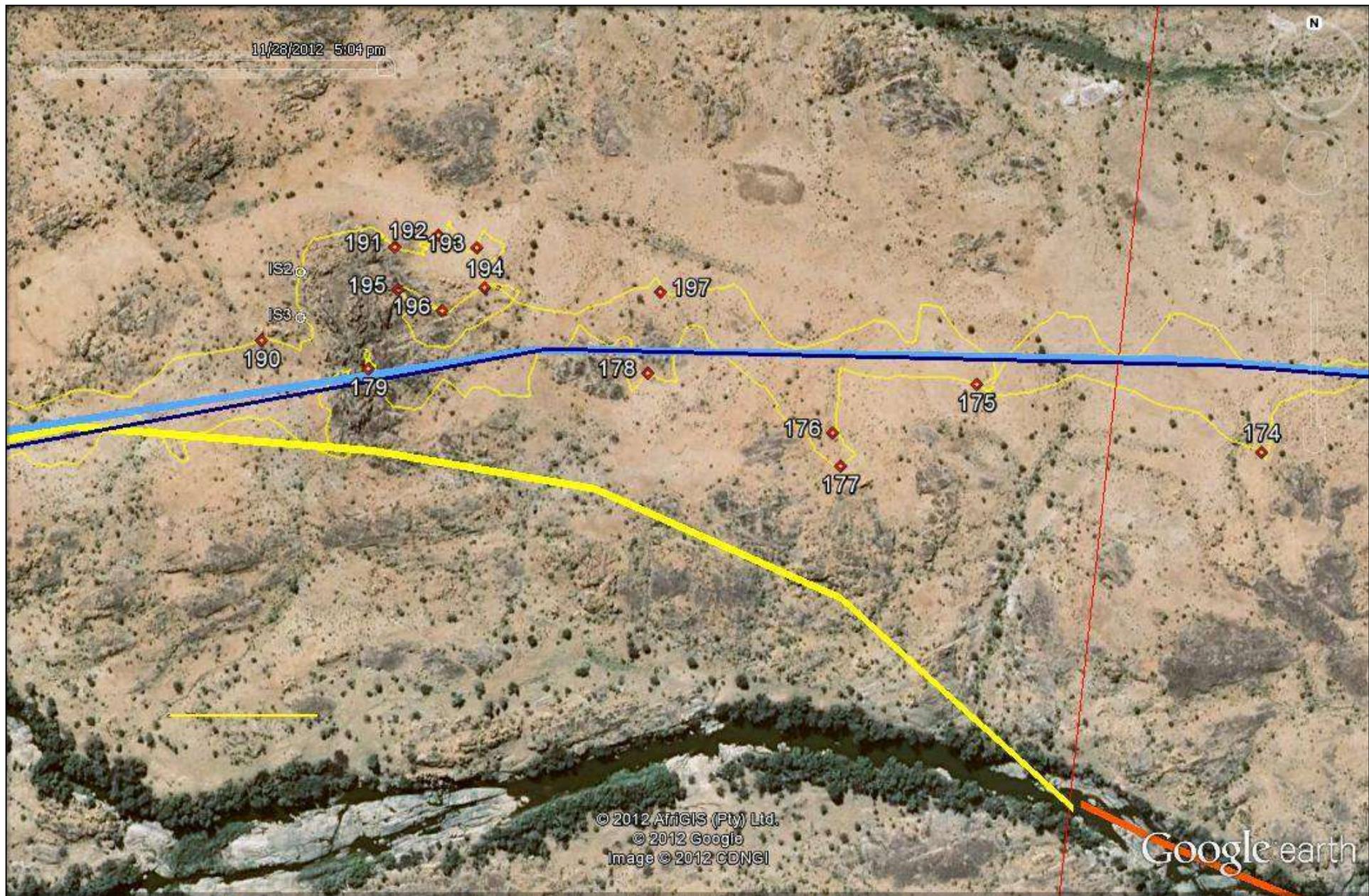


Figure A8: Aerial photograph showing the central part of Option 1. The yellow bar for scale at lower left is 100 m long.

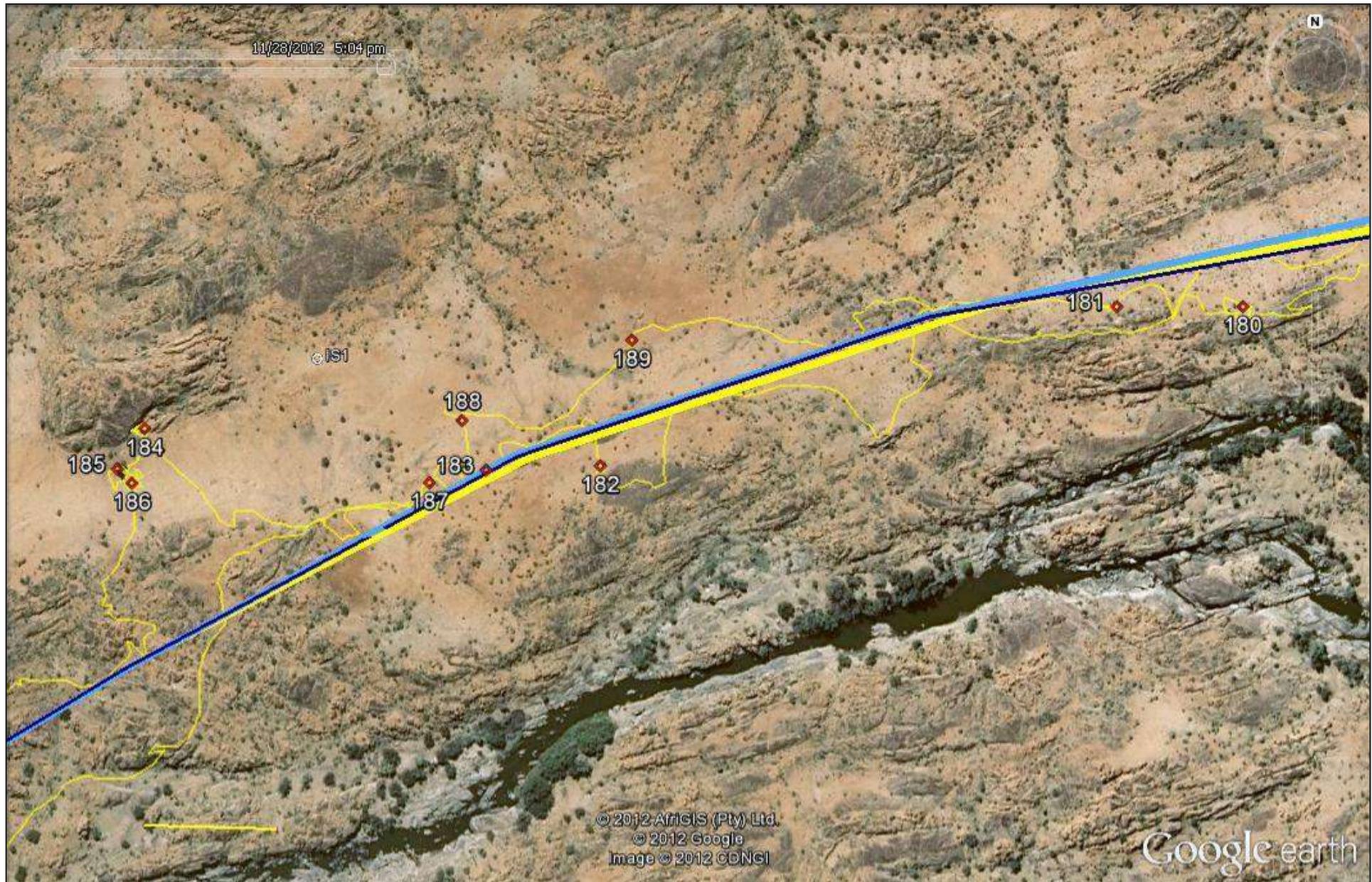


Figure A9: Aerial photograph showing the western part of Option 1. The yellow bar for scale at lower left is 100 m long.

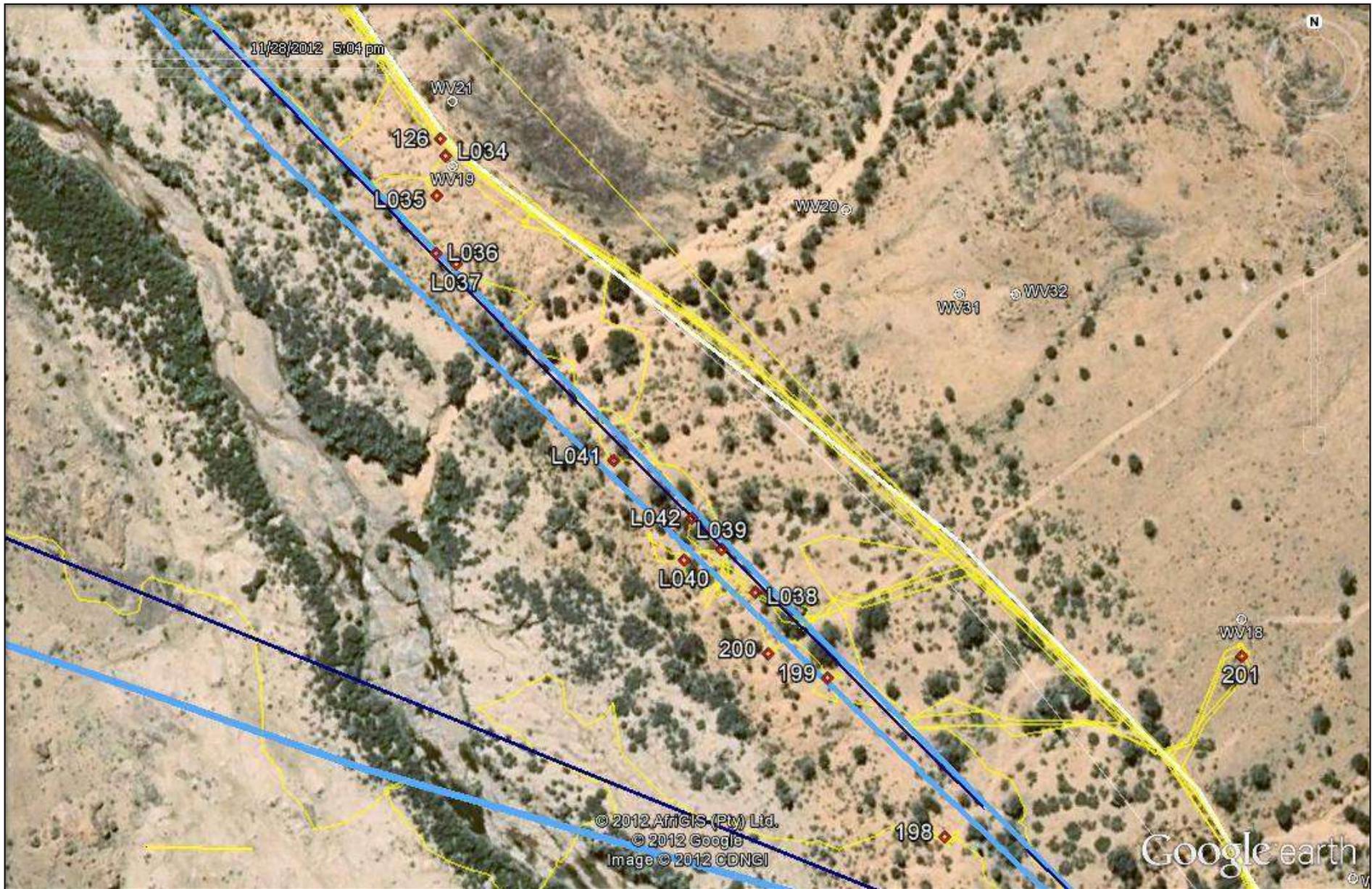


Figure A10: Aerial photograph showing the area just northwest of the point from which Option 1 branches off from the main access road. The yellow bar for scale at lower left is 50 m long.



Figure A11: Aerial photograph showing the area where Option 1 branches off from the main access road. The yellow bar for scale at lower left is 50 m long.

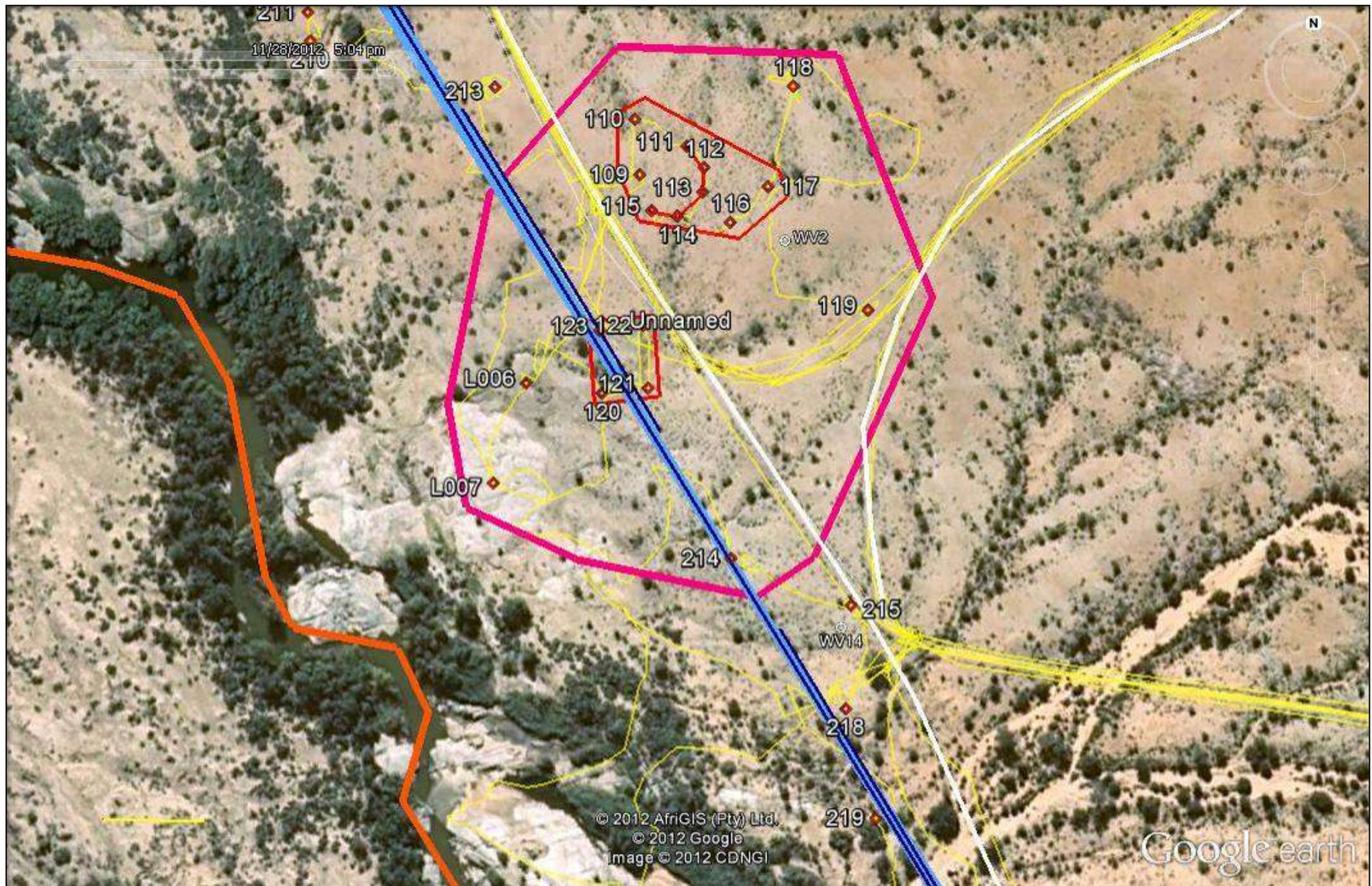


Figure A12: Aerial photograph showing the area south of where Option 1 branches off from the main access road. The yellow bar for scale at lower left is 50 m long.



Figure A13: Aerial photograph showing the area north of the proposed weir and where the power line (dark blue line) branches away from the water infrastructure. The yellow bar for scale at lower left is 50 m long.

APPENDIX 2 : Letter from Riemvasmaak Community Development Trust.

Riemvasmaak Community Development Trust

T 56/95

Tel.: (053) 832 8222
Fax: 086 616 8021
Cell: 072 215 2028

33 Park Road/Weg
Belgravia
Kimberley, 8301

e-mail: matthewslaw@telkomsa.net

P.O. Box/Posbus 10118
Beaconsfield, 8315

08 NOVEMBER 2012

THE DIRECTOR
HYDRO SA KAKAMAS HYDRO ELECTRIC POWER (PTY) LTD
P.O. BOX 50
CAPE TOWN INTERNATIONAL AIRPORT
CAPE TOWN
7525

Attention: Mr. Niel Theron

Dear Sir

PROPOSED HYDRO ELECTRIC DEVELOPMENT: MELKBOSRAND, RIEMVASMAAK

1. Your letter per e-mail of 5 November 2012 refers.
2. Please be advised as follows:
 - 2.1 The Riemvasmaak Community Development Trust ("the trust") supports your proposal for the above development.
 - 2.2 The final approval for the project by the trust will depend on the concurrence and agreement of the Provincial Government, IDC and the trust beneficiaries.
 - 2.3 As you are aware, representatives of Government and IDC have already been met and the meeting with the Riemvasmaak community / trust beneficiaries is pending.
 - 2.4 Upon agreement of the above stakeholders, a land lease agreement inter alia will be negotiated and entered into with your company.
3. We trust the above finds you well.

Yours faithfully


R.E. MATTHEWS

TRUSTEES: R.E. MATTHEWS L.W. THEUNISSEN