

ARCHAEOLOGICAL IMPACT ASSESSMENT PROPOSED SAND MINE ON BLAAUWBERG FARM NEAR MELKBOSSTRAND

(Remainder of Cape Farm 91 & Remainder of Cape Farm 88)

Prepared for:

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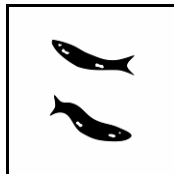
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**FEBRUARY
2012**

Executive summary

Amathemba Environmental Management Consulting requested that the Agency for Cultural Resource Management conduct an Archaeological Impact Assessment (AIA) for a proposed sand mining operation on Blaauwberg Farm east of Melkbosstrand in the Western Cape. Blaauwberg Farm (or Joyce's Dairy) is located alongside Melkbosstrand Road (M19), about 20 kms north of Cape Town and about 2.5 kms east of Melkbosstrand.

Remainder Cape Farm 88 and Remainder Cape Farm 91 has been identified for an open cast, haul and load sand-mining operation, providing sand for the building industry. Proposed mining activities entail the removal of sand to a depth of about 1.5 m, including the removal of top soil. Mining will be conducted on a 1.0 ha block mining basis with the removal of the top soil ahead of mining operations, and replacement of top soil directly onto a mined out strip. All mining areas will be rehabilitated.

The total area of the property to be mined is about 336 ha. Five Mining Areas have been identified. All the land applied for mining has been previously transformed and ploughed and used as pasture land for cattle.

Numerous surveys have been undertaken by the archaeologist and others in the Blaauwberg area. Even while the region has been heavily impacted by agriculture, archaeological heritage is still visible in these transformed landscapes. Scatters of Later Stone Age (LSA) implements have been recorded by J. Kaplan and by J. Orton of the Archaeology Contracts Office on Blaauwberg Farm, and two Khoisan burials were exposed in informal diggings (for building sand) on Oliphantskop Farm some 2.5 kms north east of the study area in the 1960s. Given the known archaeological sensitivity of the region, it was therefore assumed that pre-colonial archaeological sites (and human remains) might potentially be impacted by proposed sand mining operations on Blaauwberg Farm. While it is considered unlikely 'war graves' relating to the Battle of Blouberg (1806) may also occur in the mining application area.

A two-day foot survey of Mining Areas (MA1-MA5) was undertaken in which the following observations were made:

MA1: A relatively large scatter of LSA flakes and tools were documented in a large blowout between the Eskom servitude and a sand track in the south eastern corner of MA1. Numbering about 80 tools, the lithics occur on a slightly gritty, yellow sand floor, about 1.5 m below the overburden. The majority of the tools are in fine grained silcrete, but tools and debitage in quartz and shale were also noted. Many flakes, including a few bladelets were counted, as well as utilized and retouched pieces, round and cylindrical cores, one convex scraper and a single high backed/boat shaped scraper. Several hammerstones, grinding stones, manuports, an anvil, and a broken bored stone fragment were also found. A few small pieces of red ochre were recovered. No pottery was found, suggesting that the site is older than 2000 years. Tortoise bone, and several large weathered limpets and fragments of adiaagnostic limpet shell were noted providing a direct link with the ocean more than 3 kms to the west. While the site has been disturbed and the material displaced by natural processes, it is contained within the blowout, and is possibly a nearly complete sample of a range of tools and subsistence remains that are representative of the time.

The context in which the tools and remains were found means that the site (known as Site 475) has been rated as having medium-high (Grade 3B) local significance.

Site 475 will not be directly impacted by proposed mining activities, as it is located outside the mining application area, but secondary (or indirect) impacts relating to sand mining operations (such as the use of heavy vehicles for example), may damage the site and compromise its integrity over time.

A few more silcrete and quartz flakes were found alongside/in the Eskom servitude and in the sandy farm road, but these are isolated finds, occurring in a disturbed context and have been rated as having low (Grade 3C) local significance.

MA2: Several isolated quartz chunks and flakes, and some modern glass and porcelain were found over the large footprint area of MA2, but the remains are not significant (Grade 3C).

MA3: No archaeological remains were found in MA3.

MA4: A silcrete adze, a quartz core and several quartz chunks were found in a sand blow out in MA4. The very small numbers mean that the archaeological remains have been rated as having low (Grade 3C) local significance.

MA5: No archaeological remains were found in MA5.

The specialist archaeological study has shown that proposed sand mining operations on Remainder of Cape Farm 88 and Remainder of Cape Farm 91 will not have an impact of great significance on surface archaeological remains, but buried sites and unmarked (indigenous and war graves) human remains may be uncovered or exposed mining operations.

With regard to proposed sand mining on Remainder Cape Farm 88 and Remainder Cape Farm 91, the following recommendations are made:

1. A controlled collection of the scatter of tools (Site 475) in the sand blowout in MA1 should be made. Surface sands should also be sieved in order to recover any buried artefacts and subsistence remains. The aim is to 'rescue' the site and collect the material which could then be compared with remains from controlled excavations and other collections from elsewhere in the surrounding area. It is maintained that sand mining operations will, in all likelihood expose and destroy buried sites during the life cycle of the mine, and that the collection of the tools and possible dating of the site (from shell) presents an opportunity to mitigate the loss of important archaeological heritage to some degree.

2. The ECO (Environmental Control Officer) must be briefed by the archaeologist prior to sand mining operations commencing, and the procedure to follow in case any archaeological heritage or human remains are exposed.

3. If any unmarked human remains are uncovered or exposed during sand mining operations these must immediately be reported to the archaeologist (Jonathan Kaplan 082 321 0172), or Heritage Western Cape (Ms Jenna Lavin 021 483 9543). Human remains must not be disturbed until inspected by the archaeologist.

DECLARATION OF INDEPENDENCE

I, Jonathan Kaplan, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in the compilation of the above report;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed to the EAP any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management act;
- have provided the EAP with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543, 2010.

Signature of the specialist

A handwritten signature in blue ink, appearing to be 'JK', written over a light blue horizontal line.

Date: 29 February, 2012

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1. INTRODUCTION

Amathemba Environmental Management Consulting on behalf of Tip Trans Resources (Pty) Ltd requested the Agency for Cultural Resource Management to conduct an Archaeological Impact Assessment (AIA) for a proposed sand mining operation on Blaauwberg Farm east of Melkbosstrand in the Western Cape (Figure 1).

Remainder Cape Farm 88 and Remainder Cape Farm 91 has been identified for an open cast, haul and load sand-mining operation, providing sand for the building industry. Proposed mining activities entail the removal of sand to a depth of about 1.5 m, including the removal of top soil. Mining will be conducted on a 1 ha block mining basis with the removal of the top soil ahead of mining operations, and replacement of top soil directly onto a mined out strip. All mining areas will be rehabilitated.

The total area of the property to be mined is about 336 ha. Five Mining Areas (MA1-5) have been identified (Figure 2). All the land applied for mining has been previously transformed and ploughed and used as pasture land for cattle. However, not all of the proposed MAs will be mined and only certain areas will be targeted where the resource is viable (Figure 3).

A Notification of Intent to Develop (NID) was submitted to Heritage Western Cape (HWC) on 09 December 2011 by Amathemba Environmental Management Consulting. In a letter dated 14 November, 2011 (Case No. 111019JB16), HWC requested a Heritage Impact Assessment (HIA) comprising an archaeological, palaeontological, historical and visual impact study for the proposed activities. The archaeological study forms part of the HIA which is being coordinated by PHS Consulting.

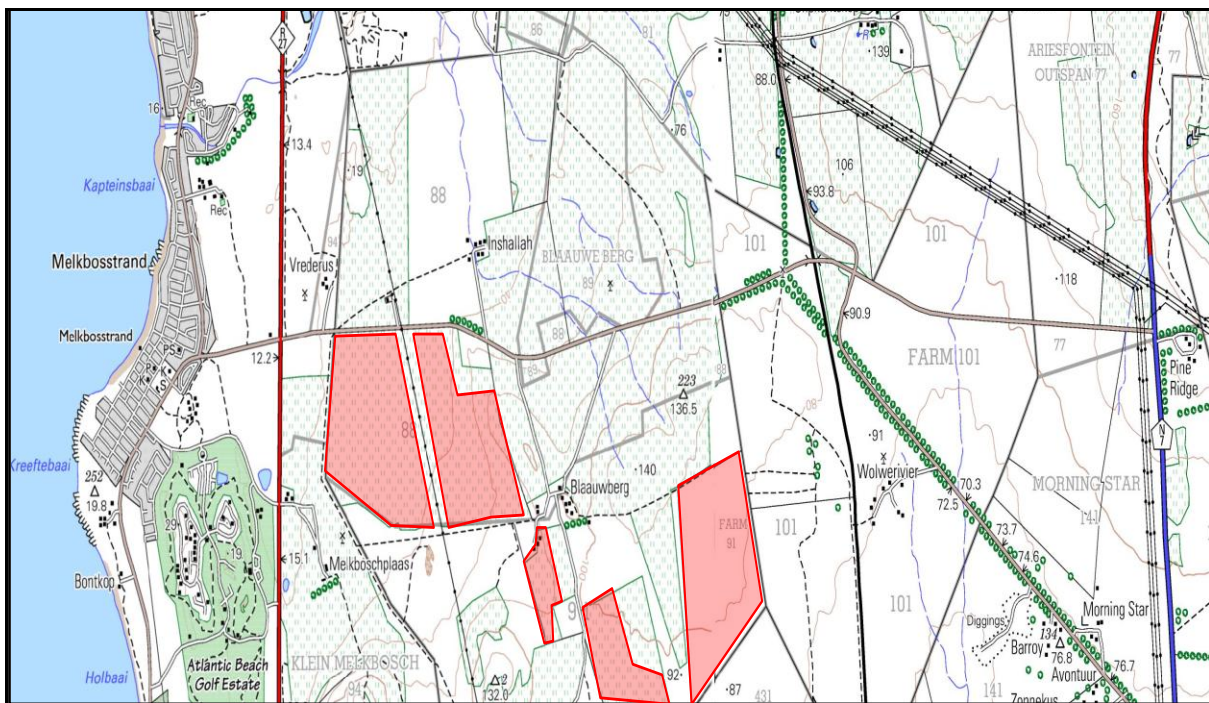


Figure 1. Locality Map (3381 CB Melkbosstrand) indicating proposed MAs (in pink)

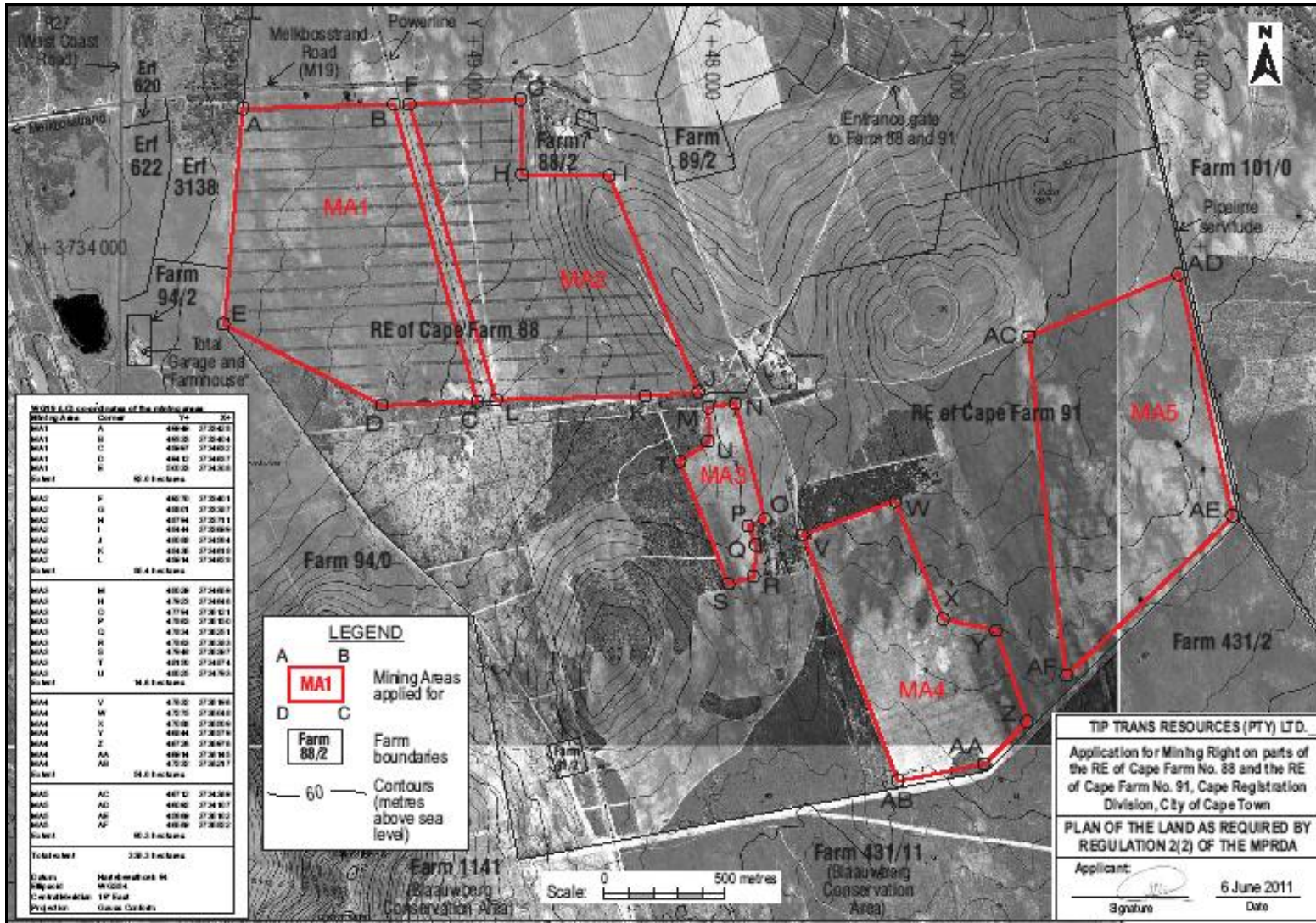


Figure 2 Proposed Mining Areas (MA1-MA5).

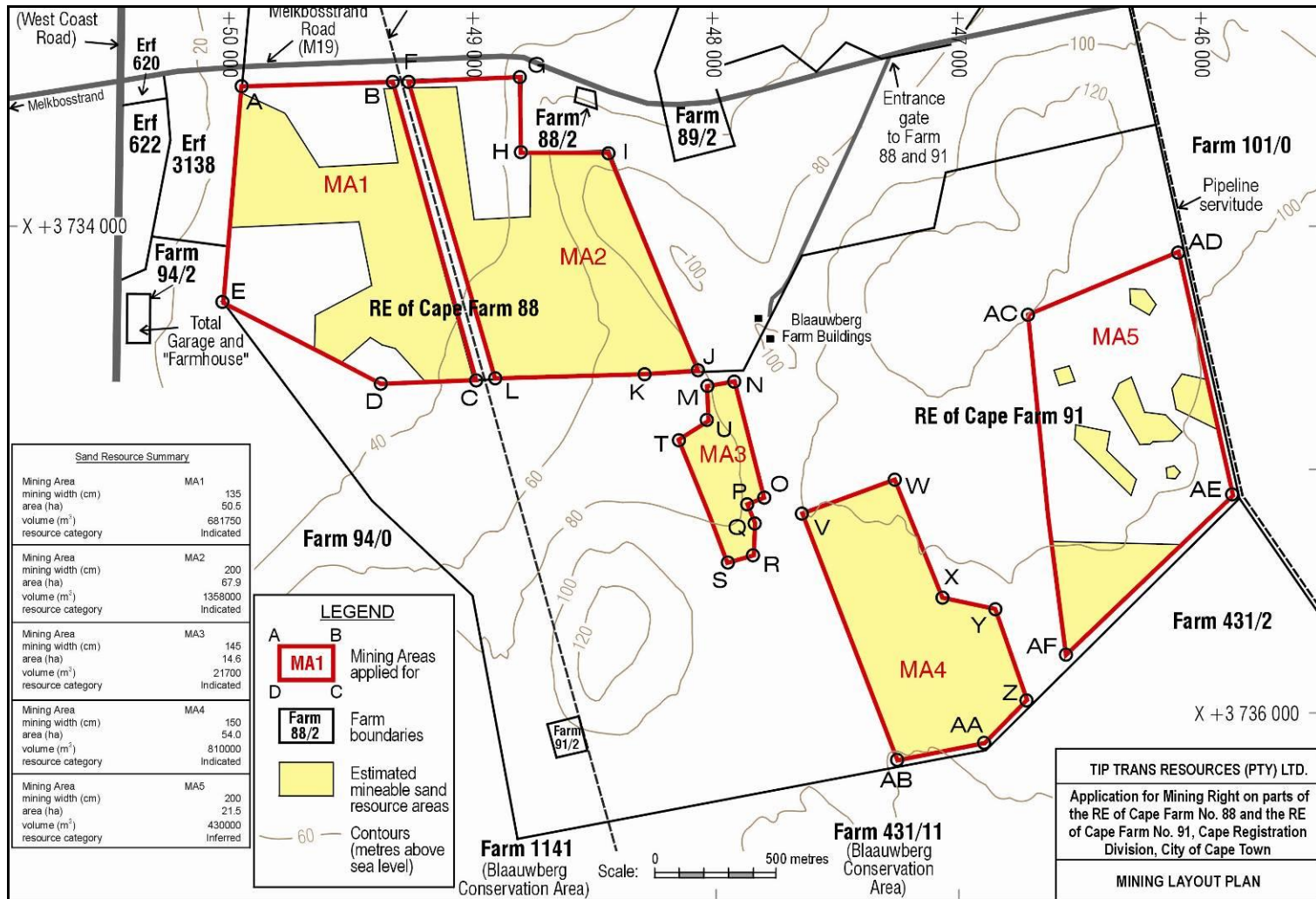


Figure 3. Estimated mineral sand resource areas to be mined

2. LEGAL FRAMEWORK

Section 38 (1) of the National Heritage Resources Act (Act No. 25 of 1999) makes provision for a compulsory Heritage Impact Assessment (HIA) when an area exceeding 5000 m² is being developed. This is to determine if the area contains heritage sites and to take the necessary steps to ensure that they are not damaged or destroyed during development.

3. TERMS OF REFERENCE

The terms of reference for the archaeological study were:

- To determine whether there are likely to be any important archaeological sites or remains in the proposed Mining Areas as indicated in Figure 2;
- To identify and map archaeological sites/remains in the proposed Mining Areas;
- To assess the status and significance of any impacts resulting from proposed operations, and
- To identify measures to protect any valuable archaeological sites/remains that may exist in the proposed Mining Areas

4. DESCRIPTION OF THE RECEIVING ENVIRONMENT

Blaauwberg Farm/Joyce's Diary is a large farm situated south of Melkbosstrand Road (M19), 20 kms north of Cape Town and about 2.5 kms east of Melkbosstrand. Entrance to the farm is off the M19.

Five parcels of land have been set aside as possible Mining Areas (MAs)

4.1 MA1 and MA2

Totalling nearly 175 ha, MA1 and MA2 are located in the north western portion of the Rem of Cape Farm 88, alongside M19 (Figures 4-9). The large landholdings were previously ploughed and ripped to a depth of about 50 cm (Mr Seymour Currie pers. comm.), with numerous windbreaks planted in between (refer to Figure 2). The windbreaks have since been removed and the landholdings are currently used for grazing, where several camps on the upper slopes have been established. The bulk of the lands are covered in thick kweek grass and are also becoming densely infested with alien Port Jackson, especially across the northern portion. The lands are fairly flat, but slope from east to west toward the West Coast Road (R27). A large area alongside M19 has very recently been cleared of Port Jackson. An Eskom servitude bisects MA1 and MA2 more or less in the middle, alongside a sandy farm track. There is a small pan near the southern boundary of MA1 and a large sand dune occurs in the north eastern portion of MA2. Surrounding land use is grazing and vacant land.

Archaeological study proposed sand mining near Melkbosstrand



Figure 4. View of MA2 facing west



Figure 5. View of MA2 view facing west



Figure 6. View of MA2 facing west



Figure 7. View of MA1 facing west



Figure 8. View of MA1 facing west



Figure 9. View of MA1 facing west

4.2 MA3

At 14.6 ha, MA3 is located about 200 m south west of the farm werf. The proposed site is covered in very thick Kweek grass. It is currently being grazed by cattle and is quite heavily trampled (Figures 10 & 11). There is hardly any surface stone on the subject property. Some remnant dunes and natural veld occurs in the south east. There are no significant landscape features on the property, and the surrounding land use is grazing and vacant land. Blaauwberg Hill is situated a few hundred metres to the west of the proposed site.



Figure 10. View of MA3 facing south. Table Mountain and Devils' Peak can be seen in the top right hand corner of the plate.



Figure 11. View of MA3 facing north west. The farmhouse is behind the Blue Gum trees in the top right hand corner of the plate.

4.3 MA4

MA4 is 54 ha in extent and slopes from north to south. The southern boundary of the proposed site is bordered by the Blaauwberg Conservation Area which is heavily infested with Port Jackson. Table Mountain and Durbanville Hills can be seen in the distance. The receiving environment is covered in a thick mat of Kweek grass (Figures 12 & 13). Dune mole rat activity is extensive over the property. There is hardly any surface stone on the proposed site. Some ostrich currently graze in the fields. There are some remnant dunes alongside the northern boundary of the proposed site, not far from where a small scatter of silcrete flake tools was found during a survey undertaken in 2002 (Kaplan 2002a). There is a large sand blowout more or less in the centre of the proposed site (refer to Figure 27). Surrounding land use is grazing and vacant land.



Figure 14. View of MA4 facing south. Note the Durbanville Hills in the distance



Figure 15. View of MA4 facing south

4.4 MA5

Measuring 90.3 ha in extent MA5 is a fairly undulating landscape, characterised by a line of large heuweltjies located alongside the western portion of the site (Figures 16-19). Some Restio grasses inhabit the heuweltjies. Most of the proposed site is covered in a thick mat of Kweek grass and dry weeds. The Blaauwberg Conservation Area borders the property in the south. Dune mole rat activity is extensive and the site is also quite heavily trampled in places. There is a Telkom servitude running through the property in the north. There is very little surface stone on the proposed site. A pile of building rubble, concrete, bricks and large pieces of Koffieklip were noted, in the north east of the site, but it is unclear whether the rubble has been dumped on the site, or is the remains of a once-standing structure. Three small pans were also logged (refer to Figure 27). Surrounding land use is grazing and vacant land.



Figure 16. MA5 view facing south east. Note the Durbanville Hills in the distance



Figure 17. MA5 view facing south



Figure 18. MA5 view facing south west. Note Table Mountain in the distance



Figure 19. MA5 view facing north from one of the heuweltjies.

5. STUDY APPROACH

5.1 Method

A fairly detailed and controlled foot survey of each of the proposed Mining Areas was undertaken by the archaeologist. A track path of the survey was also created (refer to Figure 27). All archaeological occurrences were plotted in situ, using a hand held Garmin Oregon 300 GPS unit, set on the map datum wgs 84. The site visit and assessment took place on the 23rd and 24th February, 2012. A desk top study was also done. The desk top study was restricted to the pre-colonial archaeological heritage.

5.2 Constraints and limitations

There were no major constraints or limitation associated with study even though much of the receiving environment is covered in a matt of thick kweek grass. Large portions of MA1 & MA2, however, are covered in dense stands of Port Jackson (refer to Figure 8), resulting in low archaeological visibility. This has not, however, compromised the findings of the study.

5.3 Identification of potential risks

Archaeological sites such as scatters of stone tools may well be buried under a mantle of thick, wind blown sands, and these will only be exposed during sand mining operations. Such sites are likely to be negatively impacted with little opportunity for recovery and sampling.

Unmarked human burials (Khoisan and Battle of Blouberg war graves) may also be intersected or exposed during mining operations.

6 RESULTS OF THE DESK TOP STUDY

Numerous AIA's have been undertaken in the Melkbosstrand/Blaauwberg region in the last 15 years, arising out of proposals to develop land for residential and resort purposes such as the Atlantic Beach Golf Estate, as well as for infrastructure such as roads, powerlines, pipeline, substations, fibre optic cables, etc.

Archaeological sites are relatively well documented in the shoreline area between Duinefontein and Bloubergstrand. LSA (and MSA) shell middens have been recorded on and nearer to the coast (Rudner 1968; Kaplan 1993, 1997, 1998a, b, 2002b), some of which have been investigated in more detail (Deacon & Goosen 1997; Kaplan 1998c, d, Kaplan 2000b, Kaplan 2004; Sealy *et al* 2004). There are numerous historical accounts of the presence of 'Strandlopers' (Khoi entrepreneurs in the trade between the Dutch and the Khoi) peopling the Table Bay coastline before and shortly after the arrival of the Dutch settlers at the Cape in 1652 (Smith 1983). From his residence at the Fort in what is now central Cape Town, Van Riebeeck in 1652 recorded 'many fires burning in the mountains on the opposite side of the bay...' (Thom 1952:102). Sadly, many of these near coastal sites have been heavily impacted as a result of development activities, and few remain in tact.

The dune area between the coast and Blaauwberg Hill (incorporating most of the BCA) is also regarded as archaeologically sensitive. The area is heavily vegetated, but these driftsand dunes may contain ancient as well as more recent shell middens. Calcified (fossilised) dunes here may also hold very old cultural material, as well as ancient animal lairs with preserved bones (Clift 1997).

In recent years, LSA sites with scatters of tools, pottery (but not always) and ostrich eggshell have been documented inland of the coast, between the N7 and the R27, on Blaauwberg Farm, Groot Oliphantskop, and alongside the Sout River on the farms Vaatjie, Brakkuil and Keert de Khoe (Kaplan 2000a, 2007). LSA silcrete quarry sites have also been documented at Groot Oliphantskop and Keert de Koe (Kaplan 1996, 2007) and at Vissershok alongside the N7 (Kaplan 2002c). Silcrete outcrops, some associated with scatters of LSA stones have been recorded alongside the N7 between the M19 and the Philadelphia turnoff by J. Orton (2010).

Not surprisingly, Early Stone Age (ESA) tools have been collected from ploughed fields on the farms Vaatjie, Witdam, Brakkuil and Joyce's Dairy (Kaplan 1996, 2000b), while MSA artefacts were found in an ESKOM servitude close to Joyce's Dairy (Kaplan 2000c) as well as west of the N7 (Kaplan 2002b).

6.1 Burials

Up to 55 Khoisan burials have been uncovered from the coastal dunes between Milnerton and Melkbosstrand (Deacon & Goosen 1997; Kaplan 2000b, Kaplan 2002b; Orton 2010; Yates 2001; M Patrick pers. comm.; J Lavin pers. comm.). Six burials were documented on the site of the Pick and Pay shopping centre at Melkbosstrand and three burials were uncovered at the site of the Melkbosstrand Post Office. The remains of at least three burials have also been uncovered at Big Bay in Blouberg, during the course of earthworks and excavations relating to the large development there. Two burials associated with stone tools and ostrich eggshell beads were also excavated from a large sand dune on the farm Groot Oliphantskop, located some 2.5 kms north east of Blaauwberg Farm (Kaplan 1996).

Bloubergsvlei farm, south of Blaauwberg Farm, is the site of the historic Battle of Blouberg, which took place on 6 January 1806. In this battle, the VOC Company forces were defeated by a British expeditionary force, heralding the start of the second British occupation of the Cape, and the end of final Dutch rule (Kaplan 1998a). More than 200 war graves are also thought to occur in the soft sands in the surrounding area, although to date none have yet been recovered. Of importance is that troops marched from Saldanha Bay to Blouberg and camped in the area near the present day farm of Joyce's Dairy, surrounding the battlefield site.

7. RESULTS OF THE SURVEY

Archaeological remains and occurrences documented during the study are illustrated in Figure 27.

7.1 MA1

GPS reading S 33 44.184 E 18 28.292

More than 80 LSA flakes and implements were counted in a large sand blowout between the Eskom servitude and a sand track in the south eastern corner of MA1 (Figure 20). The extent of the scatter, known as Site 475, measures about 25 x 10 m, but the blowout is much bigger (Figure 21). The tools occur on a gritty yellow-sand floor, about 1.5 m below the overburden. More than 80% of the tools are in fine grained silcrete, but flakes, chunks, and several irregular cores in quartz and shale were also counted. Apart from a relatively large number of unmodified silcrete flakes, chips, flaked chunks and nodules of silcrete, utilized and retouched flakes, bladelets and round, irregular and cylindrical shaped cores were also found. One high backed/boat shaped scraper and one convex scraper was also found, but no adzes or other backed pieces were seen. At least two hammerstones, several large and smaller grindstones and grindstone fragments, manuports, a large flat anvil, and a broken bored stone fragment were also found (Figures 22-24). One refit grindstone fragment was recovered. A few pieces of red ochre were also counted. No pottery was found, suggesting that the Site 475 is older than 2000 years and hunter-gatherer, not Herder. No ostrich eggshell fragments or any beads were found either, but these may be buried under the soft wind blown sands. Several fragments of weathered tortoise bone were found, as well as fragments of some adagnostic bone. Four large, weathered whole limpet shells (Scutellastra argenvillei)

and weathered limpet fragments and a diagnostic shell were recovered, providing a direct link with the ocean which is located about 3 kms to the west.

While the site has clearly been disturbed and continues to erode back due to natural processes, the artefactual remains contained within the blowout are a very good sample of, a range of tools and cultural remains that are representative of the time. The context in which the tools and subsistence remains occur means that Site 475 has been rated as having medium-high (Grade 3B) local significance.

Site 475 will not be directly impacted by proposed mining activities as it is located between the Eskom servitude and a farm road (and therefore outside the mining application area), but secondary/indirect impacts relating to mining operations may impact negatively on the site. The site will, however, continue to be exposed and erode back as a result of natural processes.

It is interesting to note that Site 475 appears to be very close, within just a few meters when plotted on Google Earth, to Site 9 documented by Orton (2010) during a survey for a proposed sewer pipeline, described as having flaked artefacts in quartz and silcrete in a ploughed field (refer to Figure 20).

Site 8 recorded by Orton (2010) consists of flaked artefacts in quartz and silcrete, a few pieces of ochre and shale and several marine shell fragments (refer to Figure 20). Orton (pers. comm.) has confirmed that his survey was restricted to the Eskom servitude; the proposed route for the sewer pipeline and that he did not venture outside the alignment.

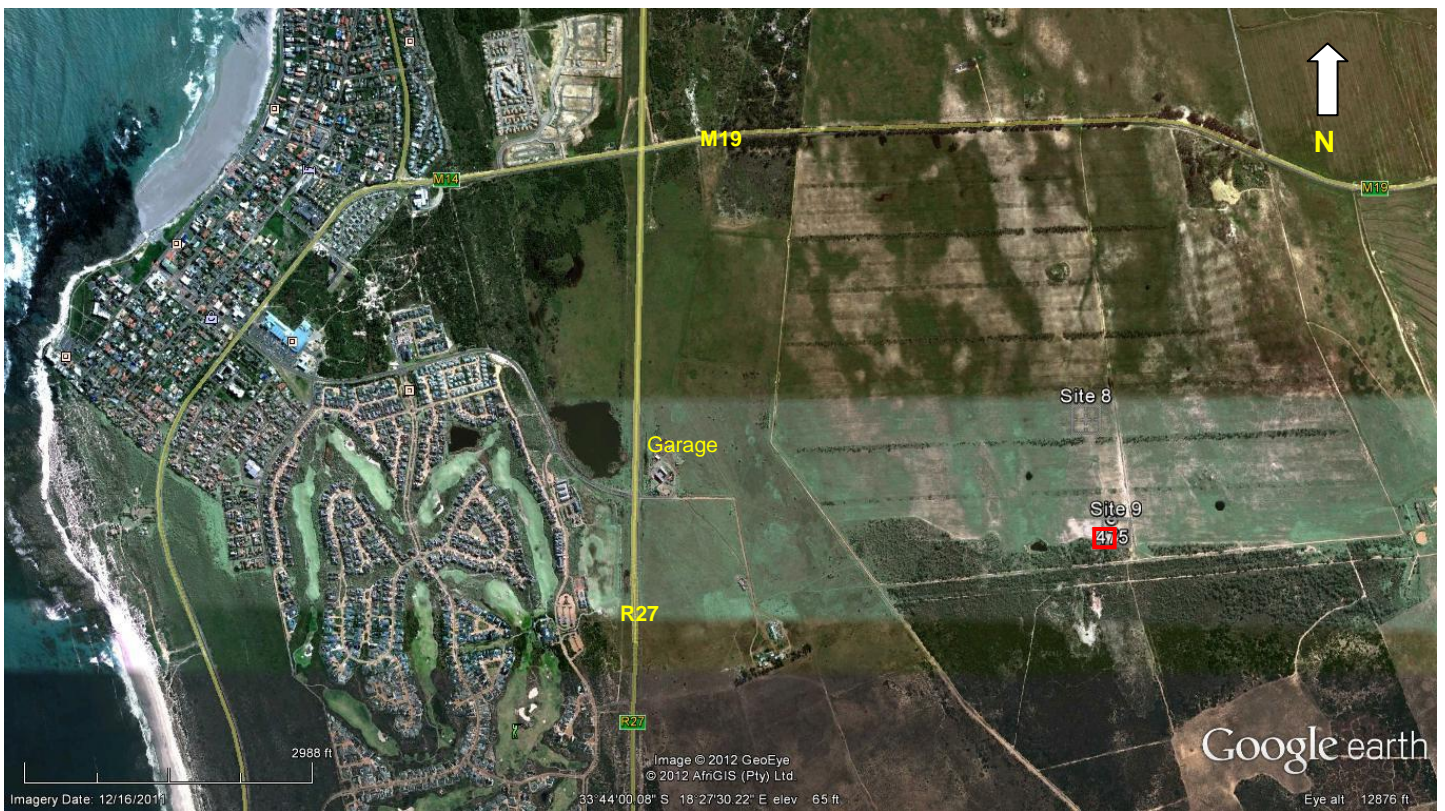


Figure 20. Aerial photograph showing the location site of 475 (red square), Site 9 and Site 8 (after Orton 2010).



Figure 21. Sand blowout view facing south.



Figure 23. Collection of remains from 475. Scale is in cm



Figure 22. Collection of tools from 475. Scale is in cm



Figure 24. Grindstone and anvil. Scale is in cm

S33 44.125 E18 28.322

Several silcrete and quartz flakes and chunks (474) were found in the sandy farm road and in a deep eroded trench alongside the Eskom servitude, but these are isolated finds and occur in a very disturbed context. The remains have been rated as having low (Grade 3C) local significance.

GPS reading S 33 44.123 E 18 28.311

Two silcrete flakes and one quartz flake (476) were found on a sandy patch of ground west of the Eskom servitude about 50 m from Site 475. The small numbers mean that the remains have been rated as having low (Grade 3C) local significance.

GPS reading S 33 44.070 E 18 28.056

A quartz chunk was found in grazing lands in MA1. The remains are not significant (Grade 3C).

7.2 MA2

GPS reading S 33 43.944 E 18 27.794

A single quartz chunk was found alongside a sandy track near the boundary fence between MA1 and MA2. The surrounding lands are infested with Port Jackson. The remains are not significant (Grade 3C).

GPS reading S 33 43.951 E 18 27.810

A quartz flake was found in the sandy track alongside the boundary fence. The surrounding lands are infested with Port Jackson. The remains are not significant (Grade 3C).

GPS reading S 33 43.788 E 18 28.039

Several pieces of modern glass, a few pieces of undecorated porcelain and bits of building rubble were found on soft sands surrounded by dense Port Jackson. The remains are not significant (Grade 3C).

GPS reading S 33 43.859 E 18 28.220

A single quartz flake was found on trampled sands in a cattle camp about 100 m south of the large sand dune in MA2 (refer to Figure 27). The remains are not significant (Grade 3C).

7.3 MA3

GPS reading S 33 44.629 E 18 29.006

A single quartz chunk (473) was found in MA3. The remains are not significant (Grade 3C).

7.4 MA4

GPS reading S 33 44.816 E 18 29.510

A silcrete adze, one quartz chunk/core and several quartz chunks were found in a sand blowout more or less in the centre of MA4 (Figures 25 & 26 and refer to Figure 27). The small numbers mean that the archaeological remains have been rated as having low (Grade 3C) local significance.

GPS reading S 33 44.939 E 18 29.724

A weathered silcrete MSA flake was found on a dune mole rat dump in the south eastern corner of the proposed site (refer to Figure 27). The remains are not significant (Grade 3C).



Figure 25. Dune blowout. Note Table Mountain in the background



Figure 26. Quartz core and silcrete flake. Scale is in cm

7. 5 MA5

No archaeological remains were found in MA5. A pile of building rubble, concrete, bricks and Koffieklip was noted in the north eastern portion of the site (refer to Figure 27).

8. IMPACT STATEMENT

Indications are that proposed sand proposed mining operations on Remainder of Cape Farm 88 and Remainder of Cape Farm 91 will not have an impact of great significance on surface archaeological remains (Table 1). Buried sites and unmarked (indigenous and war graves) human remains may however, be uncovered during sand mining operations. The scatter of tools (Site 475) in the blowout alongside the Eskom servitude will not be directly impacted by proposed mining activities, but will continue to erode and be exposed as a result of natural processes. Secondary (or indirect) impacts resulting from proposed mining operations may, however, impact negatively on this important site.

Potential impacts on archaeological heritage	MA1	MA2	MA3	MA4	MA5
Nature of impact:	Negative	Negative	Negative	Negative	Negative
Extent of impact:	Site specific	Site specific	Site specific	Site specific	Site specific
Magnitude of impact;	Medium-low	Very low	Zero	Very low	Zero
Duration of impact;	Medium term	Temporary	Temporary	Temporary	Temporary
Probability of occurrence:	Possible	Unlikely	Unlikely	Unlikely	Unlikely
Confidence:	Sure	Certain	Certain	Certain	Certain
Degree to which the impact can be reversed:	Reversible	Reversible	Reversible	Reversible	Reversible
Degree to which the impact may cause irreplaceable loss of resources:	Replaceable	Replaceable	Replaceable	Replaceable	Replaceable
Significance rating of impact prior to mitigation (Neutral, Very Low, Low, Medium, or High)	Medium	Low	Neutral	Low	Neutral
Significance rating of impact after mitigation (Neutral, Very Low, Low, Medium, or High)	Low	Low	Neutral	Low	Neutral

Table 1: Summary of impact assessment

9. CONCLUSION

Surface archaeological remains will not be impacted by proposed sand mining operations, but mining may impact negatively on buried archaeological sites, and possibly unmarked human remains during the life cycle of the mine.

An opportunity exists to 'rescue' an important archaeological site (Site 475) which has been identified outside the proposed mining application area, but which may be indirectly impacted by mining related activities. The collection of the tools and possible dating of the site (from marine shell) therefore presents an opportunity to mitigate the potential loss of archaeological heritage to some degree.

10. RECOMMENDATIONS

With regard to proposed sand mining operations on Remainder of Cape Farm 88 and Remainder of Cape Farm 91 near Melkbosstrand, the following recommendations are made:

1. A controlled collection of the scatter of tools (Site 475) in the sand blowout in MA1 should be made. Surface sands should also be sieved in order to recover any buried artefacts and subsistence remains. The aim is to 'rescue' the site and collect the material which could then be compared with remains from controlled excavations and other collections from elsewhere in the surrounding area. It is maintained that sand mining operations will, in all likelihood expose and destroy buried sites during the life cycle of the mine, and that the collection of the tools and possible dating of the site presents an opportunity to mitigate the loss of important archaeological heritage to some degree.
2. The ECO (Environmental Control Officer) must be briefed by the archaeologist prior to sand mining operations commencing, and the procedure to follow in case any archaeological heritage or human remains are exposed.
3. If any unmarked human remains are uncovered or exposed during sand mining operations these must immediately be reported to the archaeologist (Jonathan Kaplan 082 321 0172), or Heritage Western Cape (Ms Jenna Lavin 021 483 9543). Human remains must not be disturbed until inspected by the archaeologist.

11. REFERENCES

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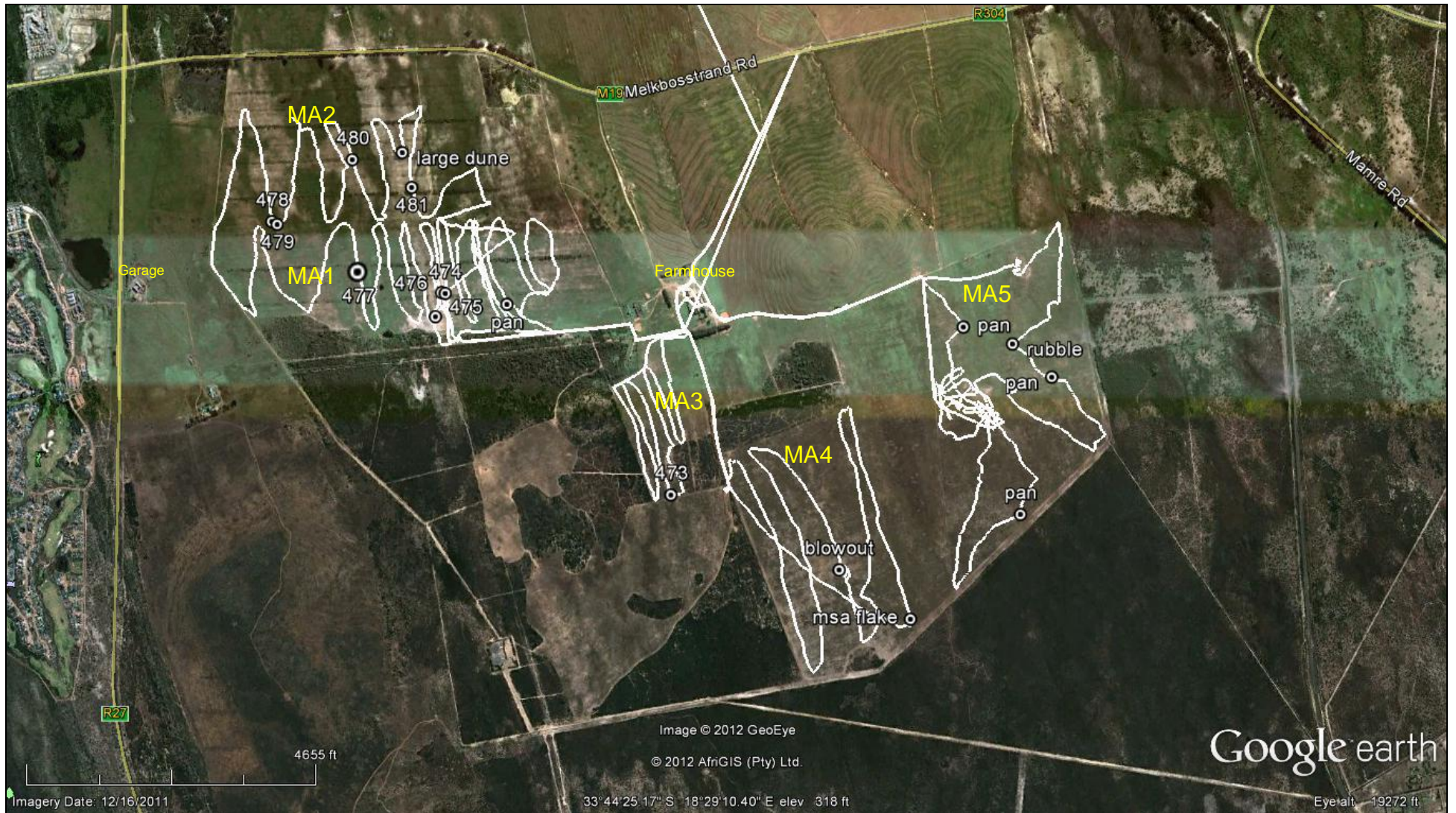


Figure. 27. MA1-5. Track paths and illustration of waypoints.