ASSESSMENT OF THE POSSIBLE IMPACT OF THE CONSTRUCTION OF A CRUDE OIL PIPELINE ON ARCHAEOLOGICAL SITES BETWEEN DURBAN AND VAN REENEN, KWAZULU-NATAL

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EXECUTIVE SUMMARY

A desk-top assessment, coupled with an analysis of low-level aerial photographs and limited ground survey, identified 40 archaeological sites that may be affected by the construction of a proposed crude oil pipeline between Durban and Van Reenen. Of these, 25 archaeological sites are likely to be directly affected. The impact of the construction on these sites will be high and negative. The significance of the impact varies from low to high. Mitigation of the impact will be required on sites of medium to high significance prior to construction. This is likely to range from collections of surface artefacts and mapping to excavation of threatened deposits. The impact on the remaining 15 sites will depend upon the development and implementation of appropriate management strategies, and the location of servitudes and the construction train.

We strongly recommend that a full archaeological survey of the proposed route is carried out. It is probable that such a survey will identify additional archaeological sites, perhaps as many as three or four times the number reported here. It is conceivable that one or some of these may be of very high significance and require re-alignment of the pipeline route. However, the types of sites recorded in this report are typical of archaeological sites in KwaZulu-Natal and mitigation is possible on all of them.

Fossil sites identified near Merrivale, Estcourt and Ladysmith require expert evaluation if threatened.

1.0 INTRODUCTION

Mark Wood Consultants requested the Natal Museum Institute for Cultural Resource Management to conduct an evaluation of archaeological resources along the route of the proposed crude oil pipeline between Durban and Van Reenen. Time and financial constraints meant that a complete phase 1 assessment of the route was impossible. Following discussion between M. Wood and the responsible heritage agency, Amafa aKwaZulu-Natali, we agreed to conduct a preliminary assessment. Our terms of reference were:

- to provide a desktop assessment of the possible impact of the construction of the pipeline on archaeological sites, and
- to survey on foot selected sections of the proposed pipeline route.

2.0 THE EXISTING ENVIRONMENT

2.1 Background

The Natal Museum Department of Archaeology operates the regional recording centre for archaeological site data in KwaZulu-Natal and has on record details of nearly 6000 sites. Each archaeological site is allocated a National Site Number, comprising the relevant 1:50 000 topographic map sheet number and the number of the site on each sheet, such that a site in the Pietermaritzburg area, for example, will have a National Site Number of 2930 CB 1-*n*.

This resource makes possible an evaluation of the potential archaeological significance of an area based on its environmental attributes. Preliminary results from GIS mapping, based on the site records at Natal Museum, have also been used to demarcate areas of archaeological sensitivity in the province. Furthermore, stone-walled Iron Age sites which typically occur in the grasslands of KwaZulu-Natal are clearly visible on low-level aerial photographs.

For this assessment, we examined existing site records held by the museum's Department of Archaeology and the aerial photographs provided by the client. Foot surveys were used to complement these results.

2.2 The site records

Examination of records in the Natal Museum indicates that 36 archaeological sites already recorded may be affected by the proposed pipeline construction. These lie within 500 m of the proposed route. The sites range from Early Stone Age to Late Iron Age, and thus include representative material from the entire length of human history in the region. The sites are listed according to their National Site Numbers in Table 1 of the Appendix.

3.0 LEGAL REQUIREMENTS

The cultural heritage of KwaZulu-Natal is protected in terms of the KwaZulu-Natal Heritage Act (No. 10 of 1997). Amafa aKwaZulu-Natali, established in terms of the Act, is the body responsible for the management of cultural resources. Section 27 of the Act, dealing with heritage resources management, requires that the Council of Amafa, at the earliest stages of initiating certain categories of development projects, be furnished with details regarding the location, nature and extent of the proposed development. These categories of development are:

- construction of a road, wall, power line, pipeline canal or similar form of linear development or barriers exceeding 300 m in length.
- construction of a bridge or similar structure exceeding 50m in length; and
- any development, or other activity which will change the character of an area of land or water exceeding 10 000 m in extent;
  - involving three or more existing erven or subdivisions thereof; or
  - involving three or more existing erven, or subdivisions thereof, which have been consolidated within the past five years; or
  - the costs of which will exceed a sum set in terms of regulations; or
  - any other category of development provided for in regulations.

The Amafa Council may require that heritage impact assessments are carried out prior to any development being undertaken.

4.0 STUDY APPROACH

4.1 The aerial photographs

The aerial photographs (scale 1:8000) supplied by Mark Wood Consultants were studied by G. Whitelaw, G. Anderson, W. Fish and F. Prins, since Late Iron Age stone-walled sites in areas with limited bush or forest cover are visible on low-level aerial photographs. The photographic study also assisted with the identification of areas of potential archaeological sensitivity: archaeological sites are subjected to a variety of post-depositional stresses that expose them, damage or destroy and affect their significance. Stresses visible on aerial photographs include:

- Agricultural activities
- Commercial plantations
- Erosion
- Development

4.1.1 Agricultural (cultivation) activities

Numerous studies have been conducted on archaeological sites that have been ploughed. The results of this research show that ploughing is usually limited to the top 30cm of topsoil. Thus archaeological sites that lie deeper than 30cm are not affected by ploughing. In fact, ploughing of such sites may assist the archaeologist in identifying sites. The movement of artefacts within the plough-zone is generally minimal. Point-to-point data are ruined but the site layout and settlement pattern can be identified.

4.1.2 Commercial plantations

Our understanding is the following: young trees are planted in pits about 50 cm across and 50 cm deep, dug every three metres along a chain. Once harvested, new trees are planted between the stumps, again at three metre intervals. All these processes are likely to have a negative impact on archaeological sites, particularly those located close to and on the earth surface. The effects on archaeological sites of changing pH balances and soil-moisture content due to tree growth are unknown, but probably negative.

4.1.3 Erosion

Soil erosion and deposition continually affect archaeological sites. Were it not for soil deposition, many archaeological sites would not be preserved. Soil erosion, on the other hand, whilst being largely destructive may lead to the discovery of sites.

4.1.4 Development

Development usually has the highest impact on archaeological sites. Destruction of sites is frequently wholesale.

Areas of potential archaeological sensitivity, based on the assessment of the aerial photographs, are listed in Table 2 in the Appendix. Also listed are the types of archaeological sites that may occur in these areas.

4.2 The ground survey

We divided the proposed pipeline route into three zones:

- Durban to Pietermaritzburg,
- Pietermaritzburg to Estcourt, and
- Estcourt to Van Reenen.

We chose to conduct the ground survey in areas within each zone that appeared to have the greatest archaeological potential, based on the study of the aerial photographs (Appendix: Table 2). We excluded from the ground survey examination of Late Iron Age stone-walled sites identified during the study of the photographs, and areas with good archaeological data (around Pietermaritzburg and Estcourt, for example). Instead, we chose to search areas of high potential about which we had little or no archaeological information in order to get maximum benefit from the limited time and finances available. The ground survey included terrain up to 500 m either side of the proposed route, because we were uncertain of the full extent of the impact of the construction work.

5.0 ARCHAEOLOGICAL IMPACTS

The construction of the pipeline is likely to impact on many archaeological sites. We identified 25 sites of varying type during the course of this preliminary assessment. It is not inconceivable that three or four times this number occur along the proposed route.

The proposed pipeline construction will have a high negative impact on all archaeological sites or parts of sites located within the 50 m wide pipeline corridor. The construction may have a negative impact on sites located outside this corridor. The level of impact in this latter zone may vary, and depend upon the development and implementation of appropriate management principles, the location of servitudes and of the construction train.

The significance of the negative impact will vary from low to high, depending upon the significance of each archaeological site.

The 36 sites already recorded are listed in Table 1 of the Appendix. Further sites were recorded during the course of the ground survey. The areas surveyed were as follows[1]:

1. The area south of Ladysmith along Flight Path 32 and the northern end of Flight Path 31. We received reliable reports of fossil bone associated with Middle Stone Age artefacts in this area. We found no bone, but identified pieces of petrified wood in erosion gullies along with Middle Stone Age stone tools **(site A)**. A Late Iron Age site was located along the route of the proposed pipeline at the base of the hill on which stands triganometrical beacon 305 **(site B)**.
2. The area north of Howick along Flight Path 16 in the vicinity of the Mngeni River and Flight Path 18. No archaeological sites were located.
3. The area known as Merrivale along Flight Path 15. No archaeological sites were located. However, in shale quarries we noted plant fossils and possible animal tracks. The significance of these fossils should be assessed by a competent expert.
4. The area along the north eastern portion of Flight Path 5 and Flight Path 6. Whilst no archaeological sites were found, the area seems particularly well suited to Early and Middle Stone Age and Early and Late Iron Age habitation and a more in-depth survey is needed **(site F)**.
5. Flight Path 7. No archaeological sites were found.
6. Flight Path 8 was surveyed and the following archaeological sites were located on or near the summit of what is known as Shale Kop **(site G)**: Early Stone Age stone tools; Middle Stone Age stone tools; an historic stone wall.
7. Flight Path 9 was surveyed northwards up to the Mlazi River. There are known sites from this area and the potential for Early Iron Age sites being located in the Mlazi River area is high. We located one site on the banks of the Mlazi area which appears to fall within the Early Iron Age **(site H)**.

6.0 IMPACT MITIGATION

Of the 36 archaeological sites listed in Table 1 of the Appendix, the following are most likely to suffer a high negative impact during the construction of the proposed pipeline. We provide details of each, including recommendations for further action.

2930 DD 23: Late Iron Age shell midden and burial. Appears to be of some significance. Requires re-examination in the course of a full phase 1 assessment.
3030 BB 81: Late Iron Age site. Significance uncertain. Requires re-examination in the course of a full phase 1 assessment.
3030 BB 93: Site with Early and Middle Stone Age, Late Iron Age and historical material. The site is significant and merits salvage if threatened with destruction or damage. Pre-development salvage excavation has already been carried out on some portions of the site in connection with expansion at AECI. The exact proximity of the pipeline to AECI is unclear from the map. It is therefore unclear whether or not the salvage work already done is adequate for the purpose of the pipeline construction. Requires re-examination in the course of a full phase 1 assessment.
2930 DC 9: Late Stone Age site. Significance uncertain. Requires re-examination in the course of a full phase 1 assessment.
2930 DC 26: Middle Stone Age site. Probably of low significance.
2930 CB 2: Scatter of Early, Middle and Late Stone Age artefacts. Possibly of low significance. Requires re-examination in the course of a full phase 1 assessment.
2930 CB 23: Middle Stone Age site. Probably of low significance. Requires re-examination in the course of a full phase 1 assessment.
2930 CB 32: Early and Late Stone Age site. Disturbed when originally recorded. Probably of low significance. Requires re-examination in the course of a full phase 1 assessment.
2930 CB 62: Early Stone Age site. Significance uncertain. Requires re-examination in the course of a full phase 1 assessment.
2930 CB 66: Scatter of Middle Stone Age flakes. Not significant. No further action required.
2930 CB 67: Early Iron Age site. This site is of high significance and merits conservation or salvage if threatened with destruction or damage.
2930 AC 21: Early Stone Age and (probably) Late Iron Age site. Significance uncertain. Requires re-examination in the course of a full phase 1 assessment.
2930 AC 23: Middle Stone Age site. Not significant. No further action required.
2929 BB 34: Site with Early and Middle Stone Age, and Late Iron Age material. Significance uncertain. Requires re-examination in the course of a full phase 1 assessment.
2929 BB 37: Stone-walled site of the Late Iron Age and, possibly, historic periods. This site is of high significance. It has already been affected by the construction of the Venus-Ariadne transmission line, for which pre-development mitigation was conducted. Further mitigation may be required, depending upon the extent of the impact of the pipeline construction.
2929 BB 38: Stone-walled site of the historic period. Not significant. No further action required.
2829 DD 1: Late Iron Age site with ruined stone walls. Significance uncertain. Requires re-examination in the course of a full phase 1 assessment.
2829 DD 2: Early Stone Age site. Significance uncertain. Requires re-examination in the course of a full phase 1 assessment.
2829 DD 35: Middle Stone Age site in donga. Probably of low significance.
2829 DD 45: Middle Stone Age site in donga. Probably of low significance.
2829 BC 6: Late Iron Age (or early historic period) stone-walled site, plus more recent structures with possible graves. This site is of medium to high significance and merits attention if threatened with destruction or damage. The possible graves require special consideration.

We provide the following comments and recommended mitigation for the sites located in the ground survey.

Site A: This site has medium to high significance. An in-depth survey needs to be made to ascertain whether the Middle Stone Age tools are *in situ* and whether or not preserved bone is present. Specialist opinion should be sought on the relative importance of petrified wood.

Site B: This Late Iron Age site seems to be well preserved and of medium to high significance. Mapping and test excavation will be necessary should the proposed pipeline impact on the site.

Site F: The area should be surveyed in detail.

Site G: It appears as if no Early- or Middle Stone Age *in situ* deposit is present. The site is of low to medium significance. We recommend a surface collection of stone tools. The historic stone wall will probably be unaffected by construction.

Site H: This area needs to be more intensively surveyed. Site H is of medium to high significance. We recommend limited test excavations on site H to determine its significance more accurately, and determine whether or not further mitigation is necessary.

We further recommend the following:

- a detailed ground survey of the route and all associated servitudes should be conducted once the line is flagged and its exact location can be determined in the field,
- all archaeological sites within 200 m of centre line of the pipeline route, plus those within areas allocated to servitudes, to be recorded,
- sites to be categorised as follows:
  - i. low – can be destroyed without mitigation
  - ii. medium – require limited mitigation
  - iii. high – require extensive mitigation or re-alignment of the pipeline route,
- the development of an appropriate archaeological management plan,
- all costs of mitigation to be to the account of the developer,
- provision to be made for sufficient time to conduct the detailed ground survey and the necessary mitigation before construction starts.

7.0 CONCLUSION[2]

In discussion between Mark Wood Consultants and Amafa, it was accepted that only a preliminary assessment of the impact of the pipeline construction was possible, given time and budget constraints. It was similarly accepted that a full phase 1 survey of the route would be undertaken prior to construction, and that sufficient time and funds would be allocated to any archaeological mitigation required.

It must be borne in mind that the archaeological database at the Natal Museum is incomplete. Similarly, most archaeological sites are not visible on low-level aerial photographs. A report such as this, therefore, presents only a preliminary assessment of the impact of the proposed pipeline. Nevertheless, it is clear that the pipeline passes through areas of high archaeological sensitivity, and will impact on a variety of sites. Not one of the sites identified in this assessment is sufficiently significant to preserve at all costs, though mitigation will be required on several. This is likely to range from simple surface collections through to more intensive excavation of threatened deposits. Alternatively, minor adjustments in the pipeline route may need to be considered once a detailed archaeological inventory is compiled.

We emphasise that a complete inventory of archaeological sites along the proposed pipeline route may include three or four times the number of sites reported here. Furthermore, it is possible that a full phase 1 survey of the route will result in the identification of archaeological sites of very high significance for which destructive mitigation (excavation, removal of items) may not be the preferred option. Discovery of such sites may necessarily result in route changes. However, the types of sites recorded in this report are typical of archaeological sites in KwaZulu-Natal and mitigation is possible on all of them.

We strongly recommend that a complete archaeological survey of the route and associated servitudes be undertaken prior to the construction of the pipeline, and that sufficient time and funds are made available for whatever mitigation is necessary.

We noted fossils in the Merrivale (Howick) area. Fossil sites also occur around Estcourt and Ladysmith. Expert consideration should be given to these and other sites during a full assessment of the impact of the pipeline construction.

8.0 GLOSSARY OF TERMS AND ABBREVIATIONS

The **Stone Age (SA)** refers to the period when human and human ancestors survived principally through scavenging, gathering, fishing and hunting food. Technology was simple, people typically lived in smallish groups.

Early Stone Age (ESA): from older than 1 million years to about 200 000 years ago
Middle Stone Age (MSA): from about 200 000 years to about 25 000 years ago
Late Stone Age (LSA): from about 25 000 years ago to colonial times

The **Iron Age (IA)** refers to the period when black, Bantu-speaking people settled in southern Africa. They farmed domestic animals and crops and produced various metals from ore.

Early Iron Age (EIA): from about AD 400 to AD 1000
Late Iron Age (LIA): from AD 1000 to colonial times

The **Historic Period (H)** generally refers to the colonial period, which we generally define as the period from about AD 1830 to 60 years ago. Historic sites includes those of black people and of colonial settlers.

9.0 APPENDIX

TABLE 1

National Site Numbers of archaeological sites on or close to the proposed crude oil pipeline, together with the type of archaeological material occurring on each sites. See glossary for abbreviations.

2930 DD	23	LIA
3030 BB	45B	SA
	81	SA, LIA
	92	MSA
	93	ESA, MSA
2930 DC	9	ESA
	10	ESA
	26	MSA
	27	SA
2930 CB	2	ESA, MSA, LSA
	7	LSA, SA
	23	MSA
	32	ESA, LSA
	62	ESA
	66	MSA
	67	EIA
2930 AC	7	LIA
	19	LIA
	21	ESA
	22	LSA
	23	MSA
2929 BB	34	ESA, MSA, LIA
	37	LIA
	38	IA
2829 DD	1	LIA
	2	ESA
	35	MSA
	45	MSA
2829 DB	5	MSA, SA
	6	ESA

	7	MSA
2829 BC	3	MSA
	6	IA, H?
	7	IA, H?
2829 AD	5	SA, LSA
	6	Rockart

TABLE 2

Potentially sensitive areas listed according to flight path/photograph number and type of possible archaeological occurrence. Iron Age stone-walled sites visible on the aerial photographs are indicated by the term 'stone enclosures'. These occur within 200 m of the pipeline route.

2/024	Early Iron Age
3/035	Early Iron Age
4/054	Early Iron Age
5/009	Historic/Late Iron Age; Early Iron Age
8/056	Middle Stone Age (wetland)
9/070	Middle Stone Age; Historic/Late Iron Age
11/011	Early Iron Age
11/015	Early Iron Age
12/020	Early Iron Age
12/022	Early Iron Age
13/047	Early Iron Age
14/055	Middle Stone Age, Early Iron age
14/057	Early Iron age; Middle Stone Age
14/059	Early Iron age; Middle Stone Age
14/063	Middle Stone Age
14/065	Middle Stone Age
14/069	Early Iron Age; Late Iron Age
15/075	Early Iron Age; Late Iron Age; Middle Stone Age
19/090	Late Iron Age; Middle Stone Age
21/006	Late Iron Age
21/008	Late Iron Age - stone enclosures
22/043	Late Iron Age - stone enclosures
22/043	Late Iron Age - stone enclosures
21/016	Late Iron Age - stone enclosures
22/039	Late Iron Age - stone enclosures
22/045	Late Iron Age - stone enclosures
23/028	Late Iron Age; Middle Stone Age
23/030	Late Iron Age - stone enclosures
23/032	Middle Stone Age
24/038	Middle Stone Age
24/040	Middle Stone Age
25-005	Middle Stone Age
25/007	Late Iron Age
26/055	Middle Stone Age; Late Iron Age - stone enclosures
28/057	stone walling - historic?
26/057	Middle Stone Age
28/089	Late Iron Age - stone enclosures
28/093	Late Iron Age - stone enclosures
27/069	Middle Stone Age
27/071	Middle Stone Age
27/073	Middle Stone Age

27/075	Middle Stone Age; Early Iron Age
29/107	Late Iron Age - stone enclosures
30/111	Late Iron Age - stone enclosures
28/085	Middle Stone Age
26/057	Middle Stone Age
28/089	Late Stone Age - stone enclosures
28/093	Late Stone Age - stone enclosures
29/107	Middle Stone Age
30/109	Middle Stone Age; Late Iron Age - stone enclosures
30/113	Late Iron Age - stone enclosures
31/134	Late Iron Age - stone enclosures
31/136	Late Iron Age - stone enclosures
35/030	Late Iron Age - stone enclosures
35/032	Late Iron Age - stone enclosures
35/034	Late Iron Age - stone enclosures; Middle Stone Age
35/036	Late Iron Age - stone enclosures
35/038	Late Iron Age - stone enclosures
35/040	Late Iron Age - stone enclosures
34/022	Late Iron Age - stone enclosures; Middle Stone Age
35/042	Late Iron Age - stone enclosures; Middle Stone Age
36/011	Late Iron Age - stone enclosures
36/013	Late Iron Age - stone enclosures
36/015	Late Iron Age - stone enclosures
36/017	Late Iron Age - stone enclosures
36/019	Late Iron Age - stone enclosures
37/027	Late Iron Age - stone enclosures; Middle Stone Age
37/033	Rock shelter? Late Stone Age/rock art?
37/035	Rock shelter? Late Stone Age/rock art?
38/007	Rock shelter? Late Stone Age/rock art?

[1] Please note that we excised notes on sites C, D and E from this report and forwarded details of them to Amafa aKwaZulu-Natali. Amafa is responsible for compiling the report on historical sites.

[2] Note that we have excised comments on the Wynn Hills Anglo-Boer battlesite north of Colenso from this report, as well as several recommendations concerning sites of Anglo-Boer and Voortrekker-Zulu military action. We forwarded these to Amafa aKwaZulu-Natali.