

**ENVIRONMENTAL IMPACT ASSESSMENT FOR PROPOSED
EXTENSION OF TORMIN MINE, WEST COAST, SOUTH
AFRICA:**

ARCHAEOLOGICAL IMPACT ASSESSMENT

(HWC CASE: 17050213AS0504E)

Report Prepared for

**SRK Consulting (South Africa) (Pty)
Ltd**

On behalf of

Mineral Sands Resources (Pty) Ltd

Report Prepared by



ACO Associates cc
Archaeology and Heritage Specialists

May 2018

Extension of Tormin Mine, West Coast, South Africa

Archaeological Impact Assessment

(HWC CASE: 17050213)

(compiled in terms of Section 38(8) of the NHRA of 1999)

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EXECUTIVE SUMMARY

Mineral Sand Resources (Pty) Ltd owns and operates the Tormin Mineral Sands Mine (Tormin Mine) on the West Coast of South Africa, ~25 km west of Lutzville (Figure 1-1). MSR proposes to extend mining operations into the following two areas:

- Ten beaches adjacent to Remainder of Graauw Duinen 152 and Portions of Farm Klipvley Karoo Kop 153, along a stretch of coastline north of Tormin Mine comprising ~6ha mining and haul road widening
- Inland “strandline” mining area on the Farm Geelwal Karoo 262, inland of the existing Processing Plant comprising 75 ha mining; and
- An infrastructure / plant expansion area of 64 ha adjacent to the existing Processing Plant to accommodate additional processing plants, stockpile areas, industrial yards, parking and laydown areas (**Error! Reference source not found.**).

MSR has appointed SRK Consulting (South Africa) (Pty) Ltd (SRK) to conduct the Environmental Impact Assessment (EIA) processes. ACO Associates cc, Archaeology and Heritage Specialists, have been appointed to undertake both the archaeological specialist study and the integrated Heritage Impact Assessment (HIA) of the project to inform the EIA process. Mr John Pether, M.Sc., Pr. Sci. Nat. (Earth Sci.), Geological and Palaeontological Consultant has prepared the Palaeontological Impact assessment.

This report is the Archaeological specialist study that will be integrated into the HIA.

ARCHAEOLOGICAL RESOURCES SUMMARY

The Baseline study of the site prepared earlier showed that Archaeological resources in the area are from a wide range of ages. These include traces of human activity from as far back as the Earlier Stone Age in excess of ~250 000 years. Distinctive stone artefacts known as handaxes are found in erosion contexts where more recent mantling sands have been removed. The presence of sometimes well preserve fossil bone in similar contexts indicates the possibility of finding stone artefacts and bone together to inform the economies of early humans.

Similarly, artefacts characteristic of the Middle Stone Age are also found in eroded areas. These artefacts were produced between ~25 and 250 000 years ago when early modern humans were appearing in southern Africa. While the artefacts dating to these distant time periods are more often than not found in situations where no associated material is preserved, the possibility exists in this area of Namaqualand, to find artefacts associated with other associated material.

The remains of Later Stone Age sites are numerous along the entire length of the west coast. Sites near the coast more often than not contain large amounts of shellfish which indicate the importance of marine resources for sustaining life here. While these may date to the period after 10 000 years ago, radiocarbon dating of sites up and down the coast indicate that the majority post-date 5000 years and straddle the period when domestic stock and ceramics were introduced to southern Africa.

The specific areas where expansion of the mine has been proposed was assessed by fieldwork. We found very little by way of surface archaeological resources in the proposed strandline mining areas, or in the areas of plant expansion. Neither did we find much along the 22kV powerline route. Although we cannot accurately predict what buried archaeological (and Palaeontological) resources may exist below the surface due to lack of immediate sections in those areas, it is likely that ESA and MSA resources will be found, particularly on old deflation surfaces. As the possibility of finding both lithic and non-lithic material together has been demonstrated in the broader area, it is essential

that the mining areas are monitored from the earliest stages of excavation to determine what resources are present and the context thereof.

In terms of the beach mining, it is unlikely that pre-colonial material will be found due to the location. The possibility exists however that maritime archaeological resources may be present although there are no specific records of any shipwrecks at any of the affected beaches. Inaccurate and incomplete records of shipwreck locations means however that the presence of maritime material buried in the beach sand cannot be excluded.

Selected beach access haul roads off the provincial main coastal road are proposed to be upgraded for the purposes of accessing the beach mining areas by ADT's. All of these are existing tracks that arose of many years of coastal diamond mining. Though mostly too narrow to accommodate larger trucks, they will undergo some widening. As the area is quite disturbed by old mining, relatively few archaeological sites were identified warranting some form of mitigation. Once routes are finalised, some mitigation should be undertaken of sites where some scientific information can be rescued.

Widening by grading of the existing public road (OP9764) from its current average width of 5-6 m to at least 8 m for use as a haul road may result in some impact to archaeological material. Grading work over the years has already resulted in some disturbance and creation of a low berm along both sides in places. As the OP9764 was not going to be changed in the original proposal, the widening of the road has not been specifically assessed for archaeological material although we have travelled this road many times. Experience suggests that heritage resources along the road are limited in number and significance. In addition, existing soil berms created by grading tend to obscure cuttings and archaeological visibility, and as a result, we suggest that widening of the road is monitored, and if any significant remains are encountered, that they be mitigated.

KEY FINDINGS AND RECOMMENDATIONS

Strandline mining and plant expansion

Despite the relatively high numbers of archaeological sites along the Namaqualand coast generally, assessments of the expansion of the strandline mining activities proposed by Tormin will not apparently have high impact on visible surface archaeological resources, or heritage resources in general. We do however have an expectation that buried archaeological and palaeontological resources will/may be found in both the strandline mining area as well as in the plant expansion and associated infrastructure zone. The absence of exposures of the subsurface in the relevant areas prevents any clear statements being made on the likelihood, though there is ample evidence for such material to be found elsewhere along the immediate coastal plain, and particularly to the south of the proposed mining area at Cliff Point.

The uncertainty with respect to the presence of resources is not optimal and will require some monitoring of the plant construction activities, and of the strandline mining area to establish the situation. An archaeologist should be appointed to supply these services. Ongoing monitoring will indicate if any buried resources are present or not, and based on the observations, an ongoing program can be established. If the plant is constructed before the mining commences, we will already be in a better position to evaluate likelihood. The need for, and frequency of monitoring will be established in due course.

Upgrade of beach access roads

Assessment of the identified roads where upgrading will be carried out has identified only a few potential sites that may be impacted. As there are some issues with precise route information for both access routes to beach 10, we have used the actual existing road alignments to be the correct ones. Mitigation of identified sites with significance is required as indicated below:

Site L019: Beach 10 Access road 1 (actual)

Extensive scatter of LSA material including marine shell (*C. granatina*, *S. granularis*, *S. argenvillei*), quartz flakes and cores and ostrich eggshell fragments on surface between the bushes around and on the access road. Very ephemeral but may represent a larger and more substantial sub-surface shell midden. Sample sections that will be impacted by widening if necessary.

Site D012: Beach 9 Access road 1

Residual LSA shell midden in road and in the roadside walls. Shell includes (*C. granatina*, *S. granularis*, *S. argenvillei*, *C. meridionalis*) and there are also stone artefacts. The material in the road is crushed and only thin lens visible in walls. Sample sections that will be impacted by widening if necessary.

Site D013: Beach 8 Access road 1

Extensive deflated MSA stone scatter in and next to the access road. No non-lithic material observed. Stone consists of quartz and quartzite, cores, flakes, chunks, blades. A sample of the artefactual material should be collected from the road and from a small deflated area to south. (Called LBM2 on a previous survey).

As we had no landowner permission to access beaches 1 and 2, and the associated roads, these must be evaluated prior to construction.

Hart (2003) previously recorded one LSA archaeological site in the access road to Beach 1 which was known as BV 1. This was a very large LSA shell midden though was considerably disturbed. Hart suggested it had low significance. The material included quartz debitage, ostrich eggshell, pottery, and shellfish remains include *S. Argenvillei*, *C. granatina*, *S. granularis*, *Burnupena* sp. At that time he suggested sampling the shellfish and collection of artefacts.

There are no previously recorded sites on or near the access road to Beach 2.

Beach mining

There is unlikely to be any impact to Pre-colonial remains due to the intertidal location. However, we are unable to ignore the possibility that unknown shipwreck material may occur. The incomplete nature and inaccuracies of the National shipwreck database prevent more certainty with respect to maritime heritage. We have suggested that machine operators and supervisors be made aware of what to look out for in the course of the beach mining through tool box talks and written handouts. A protocol must be in place in the event that any shipwreck material is seen. Any finds must be reported to supervisors and Environmental Control Officer who in turn should report the matter to the archaeologist. A maritime archaeologist should assess the material (initially via photographic material) to assess if the material is significant or not, and if a site visit is required.

If shipwreck material is located, its significance will depend on its age, and state of preservation and/or the association with related material (cargos etc). Material may be excavated and/or collected if deemed necessary. SAHRA would be kept informed of any shipwreck finds. A permit may be required to excavate/ collect shipwreck material.

22kv powerline

We have assessed the section of the line on Geelwal Karoo 262 and have found no significant surface archaeological material. The section extending to the on-site substation on the wind energy facility has previously been assessed by Hart (2007) as part of the EIA for the wef. No surface archaeological material was located along the powerline route in that area, although several sites were found elsewhere seemingly clustered about a seasonal pan. In our opinion, the infrastructure required for the powerline is very small and is unlikely to have any impact on archaeological resources.

SUMMARY OF IMPACTS

A summary of impacts and mitigation / optimisation measures is provided in Table 7-1.

In overall terms, **Construction Phase** impacts on terrestrial archaeological resources is considered to be **LOW (-ve)** without mitigation, and **LOW (+ve)** with mitigation.

Operational Phase impacts on terrestrial archaeological resources is considered to be **MED (-ve)** without mitigation, and **LOW (+ve)** with mitigation. The possibility of impact on maritime archaeological resources is unpredictable and we tentatively rate the impact as **LOW (-ve)** without mitigation and **VERY LOW (+ve)** with mitigation.

ENVIRONMENTAL ACCEPTABILITY

In our opinion, the expansion of mining as proposed (no alternatives provided) can be supported from an archaeological perspective provided that the proposed mitigation is carried out.

TABLE OF CONTENTS

1	Introduction	7
1.1	Background	7
1.2	Terms of Reference	7
1.3	Assumptions and Limitations	8
2	Project Description	13
3	Methodology	15
3.1	Literature Review	15
3.2	Data Gathering	16
3.3	Analysis	16
3.3.1	Strandline mining	16
3.3.2	Plant expansion	16
3.3.3	22 kV powerline	17
3.3.4	North Haul road	17
3.3.5	Beach access roads	17
3.3.6	Beach mining sites	18
3.4	Impact Assessment	19
4	Applicable Legislation	20
4.1	Grading of Heritage Resources	20
4.2	Responsible Heritage Authority	21
4.2.1	SAHRA	21
4.2.2	HWC	21
5	Baseline	22
5.1	Palaeontology	23
5.1.1	Hyena Lair	23
5.2	Pre-Colonial Archaeological Sites	24
5.3	Graves	25
5.4	Built Environment	26
5.5	Cultural Landscape	26
5.6	Site sensitivity	27
6	Impact Assessment	29
6.1	Potential Impacts: Construction Phase	29
6.1.1	Potential Impact: Loss of archaeological resources during upgrade of beach access roads and North haul road	29
6.1.2	Potential Impact: Loss of archaeological resources during construction of new plant and associated infrastructure	30
6.2	Potential Impacts: Operation Phase	30
6.2.1	Potential Impact: Loss of buried archaeological resources during mining of the strandline area	30
6.2.2	Potential Impact: Loss of buried maritime archaeological resources during mining of the beaches	31

6.3	Cumulative Impacts	32
6.3.1	Decommissioning	32
6.3.2	No Go option	32
7	Findings and Recommendations	33
7.1	Strandline mining and infrastructure expansion area	33
7.2	upgrade of beach access roads and North haul road.....	33
7.3	Beach mining	34
7.4	22kv powerline	34
7.5	Key Findings	34
7.6	Environmental Acceptability.....	36
8	References	37

TABLES

Table 4-1:	Grading of Heritage Resources (only categories I, II and III are defined in the NHRA), but HWC have introduced additional categories under III).....	20
Table 6-1:	Significance of loss of archaeological resources during upgrade of beach access roads	30
Table 6-2:	Significance of loss of archaeological/palaeontological resources during construction of new plant and associated infrastructure	30
Table 6-3:	Significance of loss of archaeological resources during mining of the strandline areas	31
Table 6-4:	Significance of loss of maritime archaeological resources during mining of the beaches.....	31
Table 7-1:	Summary of impacts and mitigation / optimisation measures	35

FIGURES

Figure 1-1:	Locality map	10
Figure 1-2:	Location of strandline mining and plant expansion area	11
Figure 1-3:	Plant expansion detail.....	12
Figure 3-1:	Assessment of the strandline mining expansion, strandline line mining blocks (dark blue outline), infrastructure expansion area (black outline), existing plant (green shading), powerline (red line), track paths (magenta lines), archaeological resources (black triangles) and farm boundary (yellow). Some turbines and service road of the adjacent Sere wind energy facility are seen at the top of the image.	11
Figure 3-2:	Assessment of beach mining expansion and access roads, track paths (magenta lines)	12
Figure 3-3:	Assessment of beach mining expansion and access roads, track paths (magenta lines)	13
Figure 3-4:	Assessment of beach mining expansion and access roads, track paths (magenta lines), archaeological sites (black triangles).....	14
Figure 3-5:	Assessment of beach mining expansion and access roads, track paths (magenta lines), archaeological sites (black triangles).....	15

APPENDICES

Appendix A:	Curriculum Vitae
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Appendix B: Archaeological Resources table

Appendix C: HWC comment on the NID submission

Appendix D: SAHRA comment on the Scoping report

Appendix D1: SAHRA clarification with respect to interim comment on scoping report

Appendix E: Specialist declaration

ACRONYMS AND ABBREVIATIONS

ACHA	African Centre for Heritage Activities
BA	Basic Assessment Process
CRM	Cultural Resource Management
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ESA	Early Stone Age >~3000 0000 years –~ 1.1 Million years
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape – Provincial Heritage Authority
LSA	Late Stone Age <~20 000 years
MSA	Middle Stone Age – between ~300 000 and ~20 000 years
MSP	Mineral Separation Plant
MSR	Mineral Sands Resources (Pty) Ltd
NEMA	National Environmental Management Act 107 of 1998, as amended
NHRA	National Heritage Resources Act of 1999
NID	Notice of intent to Develop – application to HWC at inception of the project
SAHRA	South African Heritage Resources Agency – the National Heritage Authority
SAHRIS	South African Heritage Resources Information System
S&EIR	Scoping and Environmental Impact Reporting
SRK	SRK Consulting (South Africa) (Pty) Ltd
ToR	Terms of Reference
VHM	Very Heavy Minerals

GLOSSARY

Baseline	Information gathered at the beginning of a study which describes the environment prior to development of a project and against which predicted changes (impacts) are measured.
Construction Phase	The stage of project development comprising site preparation as well as all construction activities associated with the development.
Cumulative Impacts	Direct and indirect impacts that act together with current or future potential impacts of other activities or proposed activities in the area/region that affect the same resources and/or receptors.
Environment	The external circumstances, conditions and objects that affect the existence of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Environmental Authorisation	Permission granted by the competent authority for the applicant to undertake listed activities in terms of the NEMA EIA Regulations, 2014.
Environmental Impact Assessment	A process of evaluating the environmental and socio-economic consequences of a proposed course of action or project.
Environmental Impact Assessment Report	The report produced to relay the information gathered and assessments undertaken during the Environmental Impact Assessment.
Environmental Management Programme	A description of the means (the environmental specification) to achieve environmental objectives and targets during all stages of a specific proposed activity.
Impact	A change to the existing environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.
Mitigation measures	Design or management measures that are intended to minimise or enhance an impact, depending on the desired effect. These measures are ideally incorporated into a design at an early stage.
Operational Phase	The stage of the works following the Construction Phase, during which the development will function or be used as anticipated in the Environmental Authorisation.
Scoping	A procedure to consult with stakeholders to determine issues and concerns and for determining the extent of and approach to an EIA and EMP (one of the phases in an EIA and EMP). This process results in the development of a scope of work for the EIA, EMP and specialist studies.
Specialist study	A study into a particular aspect of the environment, undertaken by an expert in that discipline.
Stakeholders	All parties affected by and/or able to influence a project, often those in a position of authority and/or representing others.

1 INTRODUCTION

1.1 BACKGROUND

ACO Associates cc has been appointed to undertake a Heritage Impact Assessment (HIA) of the proposed extensions to the Tormin Mine. A notice of intent to develop application has been submitted to Heritage Western Cape (HWC) in order to ascertain the required content of the study. The response from HWC dated 30 May 2017 requested that an HIA be submitted and must include assessments of the impacts on archaeological and palaeontological resources (Appendix C). In terms of the National Heritage Resources Act, No 25 of 1999 (NHRA), Sections 2 and 35 stipulates that any wreck, being any vessel or aircraft or any part thereof older than 60 years old lying in South Africa's territorial waters or maritime cultural zone is protected and falls under the jurisdiction of South African Heritage Authority's (SAHRA's) Maritime and Underwater Cultural Heritage Unit. As Beach Mining could possibly affect such resources, the details of the project and Scoping study were uploaded to the SAHRIS database for comment, which was received back on 11 July 2017 (Appendix D).

In terms of the heritage authorities' comments, the heritage impact assessment study accordingly includes both Archaeological and Palaeontological assessments, and discussion of the potential for shipwrecks being encountered in the beach mining areas. This report is the standalone Archaeological Impact Assessment.

Mineral Sand Resources (Pty) Ltd (MSR) owns and operates the Tormin Mineral Sands Mine (Tormin Mine) on the West Coast of South Africa, near Lutzville. The mine holds two Mining Rights (MR162 and MR163), covering an area of 119.9 ha, and an approved Environmental Management Programme (EMPr) to mine Valuable Heavy Minerals (VHM) below the high-water mark adjacent to Farm Geelwal Karoo 262 (Figure 1-1). The mine has been in operation since 2013.

MSR intends to extend mining operations into the following areas (the "project") (see Figure 1-1 and Figure 1-2):

- Ten beaches adjacent to Remainder of Graauw Duinen 152 and Portions of Farm Klipvley Karoo Kop 153, along a stretch of coastline north of Tormin Mine comprising 43.7 ha mining and ~ 6 ha haul road widening;
- Inland "strandline" mining area on the Farm Geelwal Karoo 262, inland of the existing Processing Plant comprising 75 ha mining; and
- An infrastructure / plant expansion area of 64 ha adjacent to the existing Processing Plant to accommodate additional processing plants, stockpile areas, industrial yards, parking and laydown areas (**Error! Reference source not found.**).

MSR has appointed SRK Consulting (South Africa) (Pty) Ltd (SRK) to conduct an Environmental Impact Assessment (EIA) process compliant with the EIA Regulations, 2014, for the project.

ACO Associates cc was appointed by SRK to undertake a Heritage impact assessment and Archaeological impact assessment of the project to inform the EIA process.

1.2 TERMS OF REFERENCE

General Terms of Reference

The generic Terms of Reference (ToR) and principal objectives for each specialist study are to:

- Undertake an initial sensitivity screening – a specialist desktop study to describe, assess and delineate sensitive and not-sensitive areas in the project footprint (i.e. terrestrial environment up

to 1 km inland of the proposed beach mining area, and all areas proposed for conventional surface mining);

- Describe the existing baseline characteristics of the study area and place this in a regional context;
- Identify and assess potential impacts of the project and the alternatives, including impacts associated with the construction and operation phases, using SRK's prescribed impact rating methodology;
- Indicate the acceptability of alternatives and recommend a preferred alternative;
- Identify and describe potential cumulative impacts of the proposed development in relation to proposed and existing developments in the surrounding area;
- Recommend mitigation measures to avoid and/or minimise impacts and/or optimise benefits associated with the proposed project; and
- Recommend and draft a monitoring campaign, if applicable.

Specific Terms of Reference: Heritage

The proposed ToR for the Heritage Impact Assessment is as follows:

- Undertake a sensitivity screening study for all project areas and map sensitivity;
- Undertake site surveys to identify and analyse the heritage resources in the refined area of study and place these in a regional context, including a more detailed assessment of any specific points of interest or/and relevance;
- Formulate statements of heritage significance in terms of the heritage criteria;
- Identify and assess the suite of potential direct and indirect heritage impacts of the extension of VHM beach mining operation;
- Identify and assess the suite of potential direct and indirect heritage impacts of the expansion of operations to include conventional opencast surface VHM mining inland;
- Identify and assess the potential cumulative impacts of the project and existing mining activities at Tormin and regionally;
- Recommend mitigation measures to avoid and/or minimise impacts and enhance benefits associated with the proposed project; and
- Specify management and monitoring requirements/guidelines for use as conditions.

1.3 ASSUMPTIONS AND LIMITATIONS

The Archaeological Impact Assessment is based on a number of assumptions and is subject to certain limitations, which should be borne in mind when considering information presented in this report. The validity of the findings of the study is affected to some degree by these assumptions and limitations but have been taken account of in the recommendations:

- Archaeological assessment is limited for the most part to the surface, and occasionally to the sub-surface where there is erosion or disturbance;
- Where there are no surface indications, assumptions about the archaeological resources are based on the information provided by surveys in the vicinity and considering visible heritage resource indicators;
- It is generally not possible to predict the location of pre-colonial burials from surface assessment. Experience does however suggest that burials are usually closely associated with occupation or other pre-colonial sites. On the coast, shell middens or scatters are evidence of occupation. Burials dating to the more recent occupation of the coast during colonial times are

usually associated with settlements/farms and may be marked by simple grave furniture such as slabs of local rock;

- We were able to freely access beaches 3 - 10, but access to beaches 1 and 2 was not possible as the access roads were locked and we did not have the necessary landowner contact details;
- Our assessment is of the areas provided by the client at the time of undertaking the fieldwork;
- Widening by grading of the existing public road (OP9764) from its current average width of 5-6 m to at least 8 m for use as a haul road may result in some impact to archaeological material. Grading work over the years has already resulted in some disturbance and creation of a low berm along both sides in places. As the OP9764 was not going to be changed in the original proposal, the widening of the road has not been specifically assessed for archaeological material although we have travelled this road many times. Experience suggests that heritage resources along the road are limited in number and significance. In addition, existing soil berms created by grading tend to obscure cuttings and archaeological visibility, and as a result, we suggest that widening of the road is monitored, and if any significant remains are encountered, that they be mitigated.

Other assumptions made in the report are explicitly stated in the relevant sections.

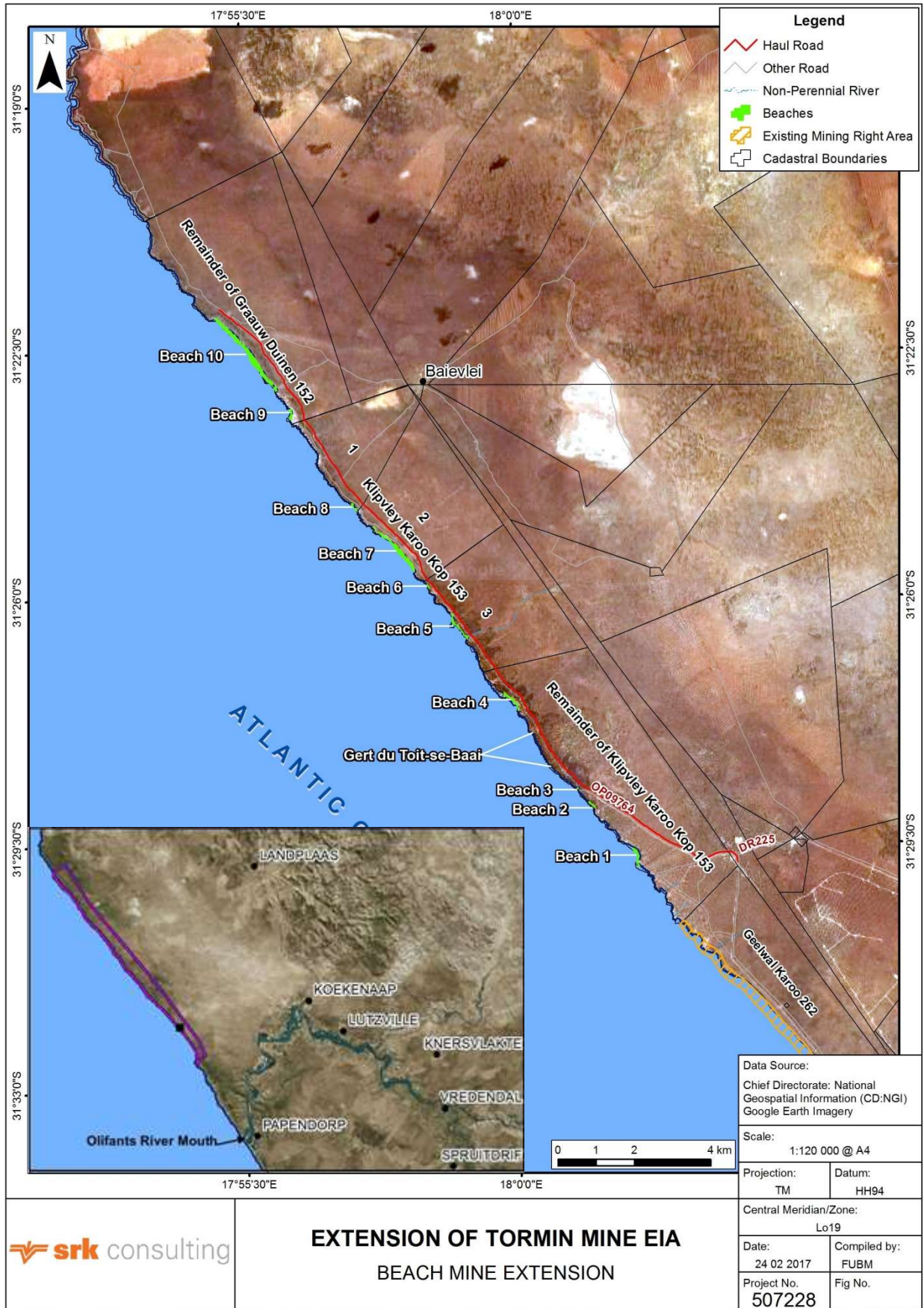


Figure 1-1: Locality map

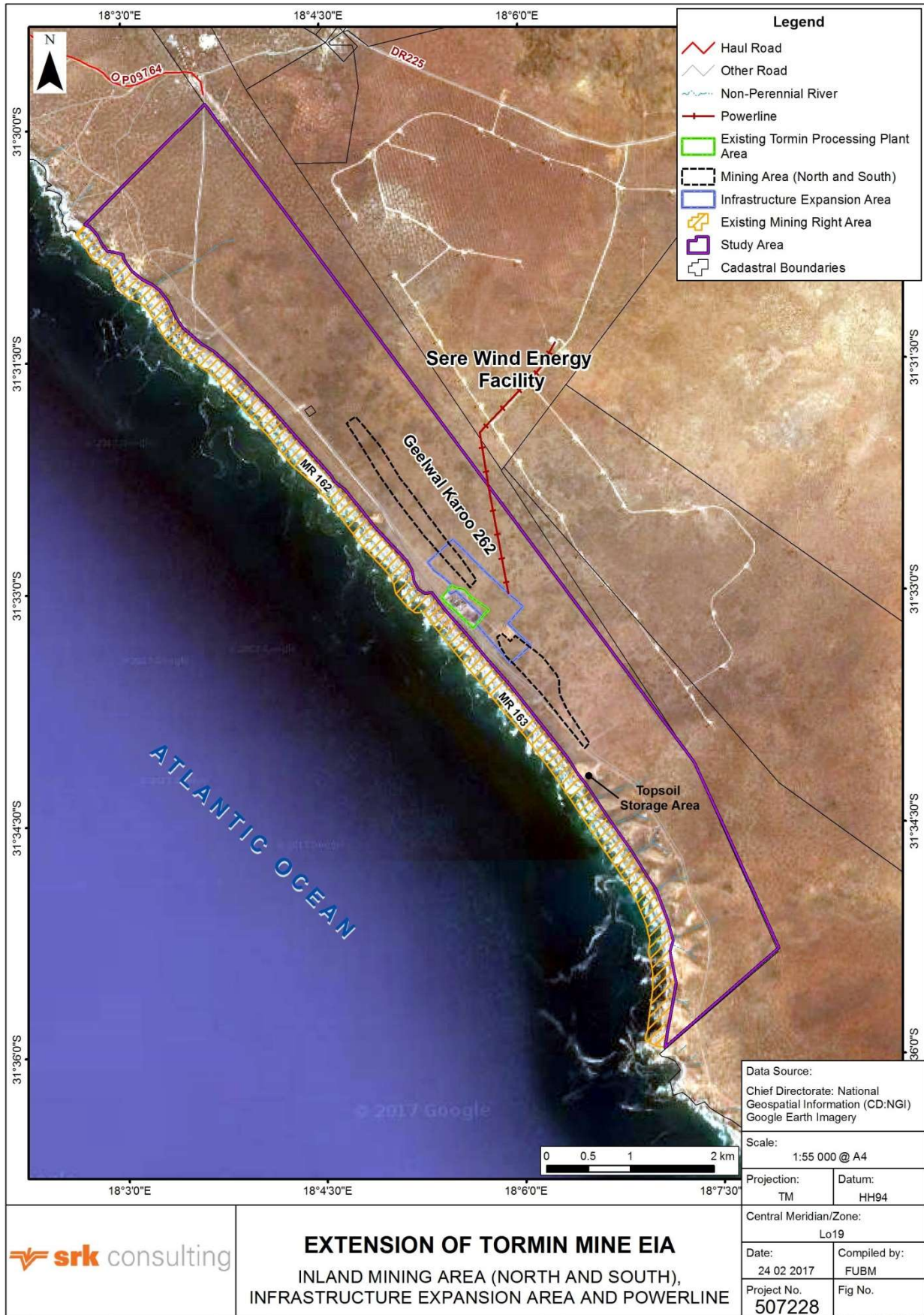
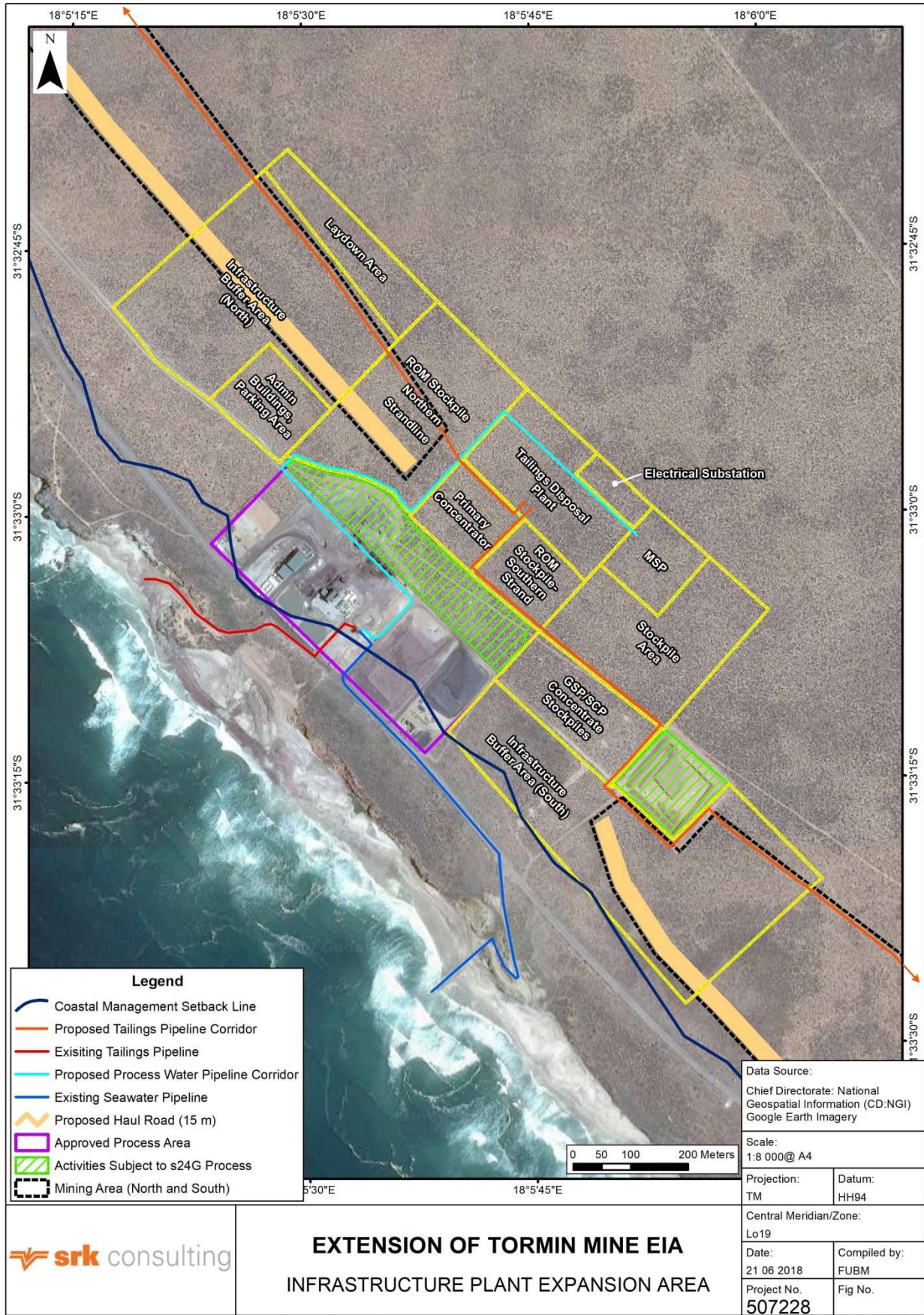


Figure 1-2: Location of strandline mining and plant expansion area



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 Revision: A Date: 25 07 2018

Figure 1-3: Plant expansion detail

2 PROJECT DESCRIPTION

MSR currently uses hydraulic excavators to mine VHM beach deposits to an average depth of 6 m, along a ~75 m wide and ~12 km long stretch of beach adjacent to Farm Geelwal Karoo 262. Sand (ore) is excavated and loaded into dump trucks. The dump trucks haul the ore to a processing plant on the elevated coastal plain. The VHM are extracted at the processing plant and the silica (beach sand) is returned to the beach as slurry by pipeline.

MSR proposes to extend mining operations to ensure the ongoing operation of Tormin Mine. The proposed project consists of the following key components:

- **Mine VHM deposits on ten discrete beaches** along a stretch of coastline north of Tormin Mine:
 - Mining will be undertaken using hydraulic excavators, slurry pumps and other ancillary equipment to position and load the ore into a mobile Primary Beach Concentrator for processing. Dump trucks will haul the processed ore up the beach access roads to the haul road and then onward to the secondary (current) processing plant;
 - Beach mining will be conducted along the beaches between the low-water mark of the sea and the toe of the dunes / cliffs with a 10 buffer. Mining will progress along each beach depending on tidal movements and mine schedule grade requirements;
 - Mining will be to an average depth of 6m. Where the VHM deposit is shallow or poorly developed, mining will take place during where tides allow. Where thick VHM deposits are found near the low water mark, a sand berm, wave breaker (ditch in the sand), or similar will be constructed on the seaward side of the deposit, providing temporary safety protection from the incoming tide whilst ensuring the mining process is efficient and minimising the need to return to the same area following tide retreat. Once the deposit has been mined, wave action will quickly return the beach to its former condition in a short period of time (and partly replenish VHM deposits). In some instances, a bulldozer will reshape the beach to the original profile where mining occurs above the high-water mark;
- MSR proposes to utilise existing gravel roads from the Tormin Mine entrance (off the DR2225) to the beaches to serve as haul roads for dump trucks. This includes public road OP09764 adjacent to the coast and informal beach access roads currently used by the Trans Hex Group and, previously, by Namakwa Diamond Company. **MSR will widen and grade the OP9764 and the beach access roads** as required:
- **Mine an inland strandline** within a 100 - 300 m wide and ~4.8 km long area inland of the existing mine and processing plant but seaward of the Sere wind energy facility:
 - Strip mining will be undertaken progressively with topsoil (to a depth of 50cm) removed and stockpiled in designated areas or – where mine sequencing allows – placed directly over tailings backfilled to the preceding mine void. Topsoil from the initial box cut will be stored in the existing topsoil storage area;
 - Overburden will be removed to a depth of 2-25 m (depending on resource depth) and will immediately be backfilled into an adjacent previously mined-out area or temporarily stored in the designated infrastructure buffer areas;
 - Excavators will mine the mineralised sand layer (ore) up to a maximum depth of 30 m. The ore will be loaded into dump trucks and transported to the new ROM stockpile area in the infrastructure / plant expansion area;

- Tailings will be returned (pumped) to the mine void as backfill and then covered with stockpiled overburden and topsoil material; and
- Rehabilitation will be undertaken as soon as the mining path allows. Once an area has been mined and backfilled, the backfilled material will be re-profiled to create the desired landform. The backfill material will be reseeded (if required) and the final rehabilitated area demarcated as a No-Go area;
- **Construct additional processing plants** in the infrastructure / plant expansion area:
 - A **Mineral Separation Plant (MSP)** to further beneficiate the concentrates produced and increase overall mineral recovery;
 - A **Tailings Disposal Plant (TSP)**; and
- **Install a 22 kV powerline** from the Sere wind energy facility to an electrical substation in the infrastructure / plant expansion area.

3 METHODOLOGY

The Archaeological Impact Assessment was preceded by a broader baseline assessment of the general area and extended from Beach 10 in the north to as far as the Olifants River in the south. Information in the literature survey, however, extends to the broader west coast region.

3.1 LITERATURE REVIEW

A survey of available literature was carried out to assess the general heritage context of the area. A background search of other Cultural Resource Management (CRM) projects in the area was made via the South African Heritage Resources Information Systems (SAHRIS) database. Further information was provided by SRK and also found in ACO Associates' own database.

Of importance are the early surveys by Parkington & Poggengoel (1991) and numerous reports by ACO Associates (see References). The Archaeology Contracts Office at the University of Cape Town, and subsequently ACO Associates cc, has been involved in a number of heritage surveys along this section of the coastline since 1993. They have also excavated at least 11 archaeological sites along the west coast and in the area currently mined by Tronox Namakwa Sands. This background information has informed our survey and desktop review.

The following Heritage, Palaeontological and Archaeological reports are relevant and were consulted:

- Hart (1999) undertook an archaeological survey of the proposed Liebenberg Bay Mine to the north of Tormin (on the farm Klipvley Karoo Kop 153);
- Halkett (2000) undertook an initial assessment of the heritage resources in the Transhex West Coast mining concessions stretching from the mouth of the Olifants River to Brand se Baai, which included sections of the study area;
- Kaplan (2001) surveyed an area to the north of Liebenberg Bay, on the farm Klip Vley Karoo Kop 153, for the Namaqua Diamond Company (Pty) Ltd;
- Hart (2003) undertook an archaeological assessment of proposed diamond mining areas situated on the farms Geelwal Karoo, Klip Vley Karoo Kop and Graau Duinen;
- eThembeni Cultural Heritage (2007) prepared an HIA of the mining rights application for GCS (Pty) Ltd on behalf of Tormin Mineral Sands area (a map of the survey area is not provided in the report);
- Hart (2007) undertook an HIA for the Koekenaap Wind Energy Facility, immediately to the east of the study area (predominantly on Grave Water Kop 185/5);
- PGS (2009) undertook an archaeological assessment of the wet concentrator plant site and access roads to the beach for GCS (Pty) Ltd, on behalf of Tormin Mineral Sands. This represented a very small portion of the study area of Geelwal Karoo 262;
- Chris House (2011) based an Honours thesis (University of Cape Town) on an excavation of a carnivore lair at Cliff Point, Geelwal Karoo;
- Cape Archaeological Survey cc (2012 & 2014) undertook a brief survey of the coastal strip of Graauw Duinen and the inland area of Rietfontein/Houtkraal;
- Stynder & Reed (2015) were issued a permit by HWC to excavate Site CP-537, which is located on the farm Geelwal Karoo 262. They have also surveyed the broader coastline in the vicinity of CP-537 and have located approximately 140 fossil and archaeological sites; and

- Kaye Reed from the Institute of Human Origins at Arizona State University (USA) produced a report on the survey of the coastline by between Doringbaai and Namakwa Sands/Exxarro in 2009 and an excavation survey in 2015.
- Hart and Kendrick (2016) undertook a heritage impact assessment for the proposed Ibhubesi gas project on the West Coast with palaeontological assessments by Dr Graham Avery and Maritime archaeology input by African Centre for Heritage Activities.

3.2 DATA GATHERING

A preliminary 3 day field assessment was undertaken from 14-16th November 2016 by Halkett and Webley to inform the baseline study. We were accompanied by Mr Sibonelo Mkhize from the Environmental Section of MSR during most of our survey work. The survey was extremely cursory, in view of the size of the study area, but provided an opportunity to determine the range and broad distribution of heritage resources. Our tracks were recorded by means of a Garmin GPS receiver and palaeontological and archaeological sites that were identified were described and photographed (Appendix B). The field assessment enabled us to determine the extent of disturbance (both natural and man-made) of the landscape. We were able to re-visit some of the sites which had been identified by previous consultants in order to re-assess their significance, particularly those which had been identified by staff and students of the Archaeology Department at the University of Cape Town. While we did look at the 10 beach mining sites, this was quite broad brush as we had not yet been provided with information pertaining to specific access routes to the beach, or details with respect to the main northern haul road. We also did not look specifically at the strandline mining extension area to the east of the existing Tormin processing plant, as the proposed mining area had not been finalised at that time.

Subsequently, on the 4 – 6th May 2017 Halkett and Webley undertook a second short field assessment of the beach mining infrastructure (roads), the strandline line mining area and the short section of 22 kV powerline linking the mine to the adjacent wind energy facility. We were provided with information pertaining to the specific strandline mining and infrastructure expansion area and powerline route, while the beach access road information was provided when we were in the field. As before, we recorded our tracks with GPS receivers, onto which we had also loaded the route of the powerline, the strandline line mining block areas and areas identified for infrastructure expansion. Later we added the beach access road information to aid identification of the routes amongst the myriad tracks that occur along the coast there. Archaeological sites that had previously been located in the beach mining area over the years were also loaded on the GPS to facilitate re-identification and to avoid duplication. New observations were recorded and photographed, and some immediate assessment made of the heritage significance. Our observations are recorded in Appendix B while track information and site locations for the May 2017 field work is shown in **Error! Reference source not found.** 2-1 to Figure 3-5.

With respect to the powerline, we have assessed the route inside Farm Geelwal Karoo 262 on foot, but not the section inside the adjacent wind energy facility. This area was assessed in 2007 by Orton and Hart (Hart 2007) as part of the windfarm assessment and the archaeological resources there are well documented.

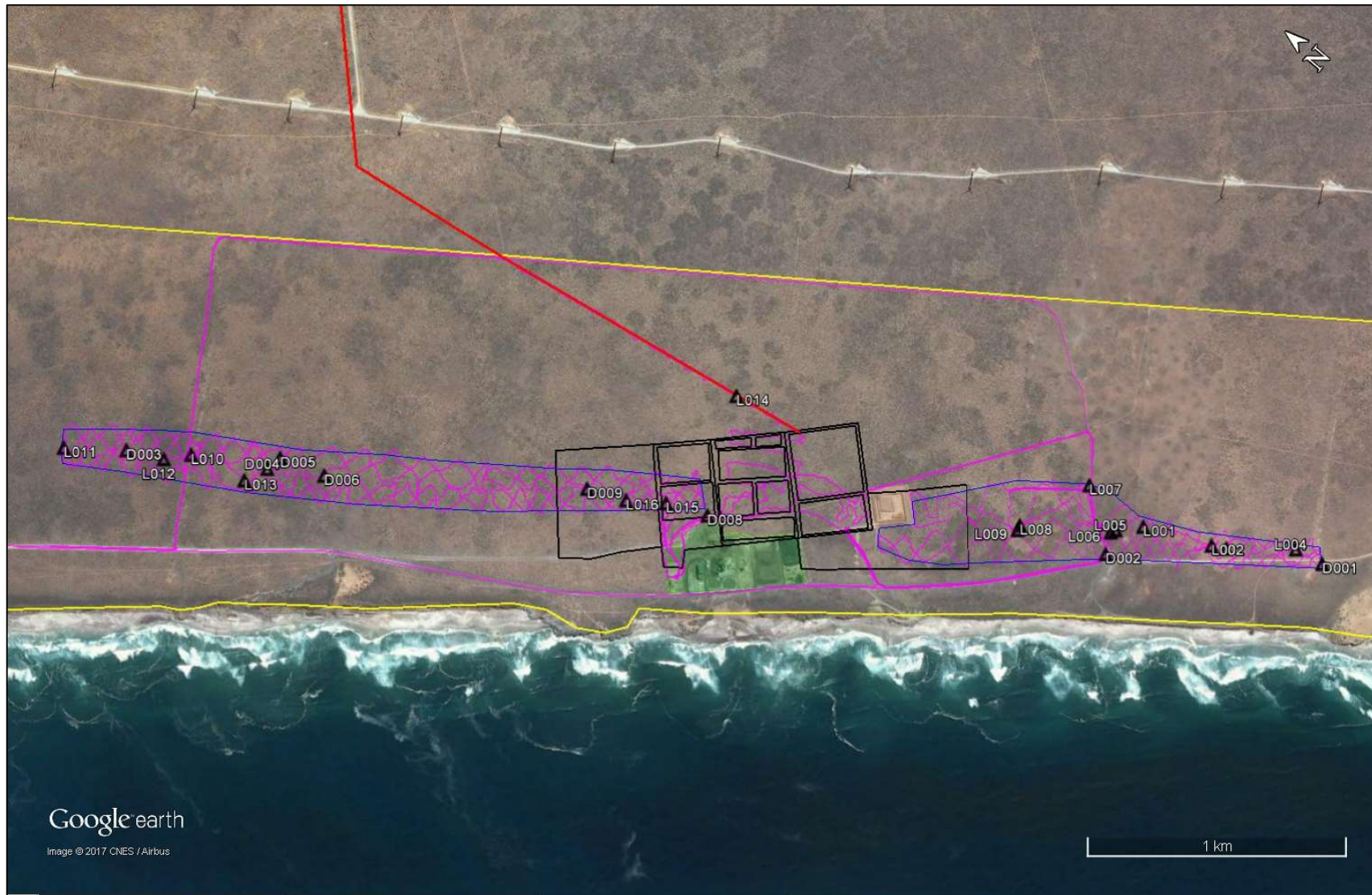


Figure 3-1: Assessment of the strandline mining expansion, strandline line mining blocks (dark blue outline), infrastructure expansion area (black outline), existing plant (green shading), powerline (red line), track paths (magenta lines), archaeological resources (black triangles) and farm boundary (yellow). Some turbines and service road of the adjacent Sere wind energy facility are seen at the top of the image.



Figure 3-2: Assessment of beach mining expansion and access roads, track paths (magenta lines)



Figure 3-3: Assessment of beach mining expansion and access roads, track paths (magenta lines)



Figure 3-4: Assessment of beach mining expansion and access roads, track paths (magenta lines), archaeological sites (black triangles)



Figure 3-5: Assessment of beach mining expansion and access roads, track paths (magenta lines), archaeological sites (black triangles)

3.3 ANALYSIS

A list of all archaeological resources located during the survey is show in the Appendix B.

3.3.1 STRANDLINE MINING

The surfaces of the areas identified for mining were intensively searched on foot for traces of archaeological resources (**Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.**). Although we had expected to find at least some Late Stone Age (LSA) scatters with marine shell and artefacts (such as were present on the adjacent windfarm site), most of what we found consisted of isolated stone artefacts of either LSA or Middle Stone Age (MSA) affiliation in either quartz or quartzite, with occasional silcrete being observed (Appendix B).

Some disturbances were observed across the strandline mining areas but even here, few archaeological resources were noted in overturned soil. Similarly, no archaeological material was noted in animal burrows. A recently excavated fibre optic trench alongside the western edge of the southernmost mining block, indicated variable depth of the calcareous “dorbank” unit below the surface. In some places it was very shallow and was exposed in erosion gulleys at ~150 mm below surface, while in the trench itself we observed it at ~400 mm in places, while in other areas it was below the base of the trench. The dorbank layer is significant since archaeological material that has been subject to deflation will collect on its surface and may be exposed during mining. We would expect older material such as MSA or Early Stone Age (ESA) material in these contexts though we are unable to predict the density at this time, or if any fossilised organic remains may be found in association. None of the surface archaeological material observed in the mining area has significant heritage value.



Plate 1: Looking south from the strandline mining area towards the existing plant with Cliff Point in the distance. Surface visibility is good amongst the sparse strandveld vegetation.

3.3.2 PLANT EXPANSION

No surface archaeological resources were identified in the plant expansion areas that we examined. Changes to the layout of the Plant Expansion area was presented to specialist for comment in July 2017. Based on our previous observations in the plant area and vicinity, we did not consider it necessary to undertake further field assessments and our impact assessment of the Plant expansion

remains relevant. There is likely to be some deflated archaeological material on the buried dorbank unit.

3.3.3 22 kV POWERLINE

A single isolated quartzite flake was identified on the powerline route inside the Geelwal Karoo 262 property (Appendix B and **Error! Reference source not found.**). No sites were recorded by Orton and Hart (Hart 2007) along the section of powerline route inside the adjacent windfarm. As this is a 22 kV powerline, the infrastructure is of small scale and the potential for disturbance of archaeological resources is considered very low to unlikely.

3.3.4 NORTH HAUL ROAD

While some archaeological resources are known along the edge of the OP9764, which will be used to haul material from the beaches to the existing plant, they are not expected to be of high significance and some disturbance has occurred over the years to road edges due to grading and use over time. In addition, existing soil berms created by grading tend to obscure cuttings and archaeological visibility, and as a result, we suggest that widening of the road is monitored, and if any significant remains are encountered, that they be mitigated. The road is shown running more or less parallel to the coast in Figure 3-2 to Figure 3-5.

3.3.5 BEACH ACCESS ROADS

A small number of LSA and MSA archaeological sites were observed (Appendix B) in or alongside the existing beach access roads proposed by MSR to be used as access road routes to the beach mining sites. Some impact will occur to archaeological resources due to upgrading the roads but is confined to a relatively small number of sites and mitigation can be easily undertaken. As the road alignments may change once other specialist have made their assessments, it may be necessary to re-examine new alternative alignments if any are presented.



Plate 2: Access road to Beach 4



Plate 3: Access road to Beach 9 with traces of archaeological remains in the centre median

3.3.6 BEACH MINING SITES

No pre-colonial archaeological resources are anticipated here as the sands are constantly overturned and replenished during storms, although there is a low possibility of finding maritime resources (shipwreck material).

No known coastal wrecks are marked on the relevant 1:50 000 maps of the coastline at any of the beaches in the study site (3117BD Baievillei, 3118 CA Papendorp, 3118 AC Landplaas).

The literature search indicated that a heritage impact assessment of the Ibhubesi Gas pipeline (Hart and Kendrick 2016) involving the construction of a gas pipeline from an offshore gas field off northern Namaqualand to supply natural gas to potential receivers at Saldanha Bay and Cape Town had inputs on the maritime component by the African Centre for Heritage Activities. While the pipeline itself does not come close to the coast, the assessment of shipwrecks was quite broad and therefore has application here.

Information on wreck locations is generally poor and consultation with Jaco Boshoff (Iziko) as well as input from maritime archaeologists at African Centre for Heritage Activities (ACHA) has revealed that while wrecks are known to exist along the west coast, particularly in the area of the Vredenberg Peninsula to St Helena Bay, the historic records are very inaccurate in terms of precise positional information.

The database used for the Ibhubesi study reflects the estimated positions of wrecks where the provenance is known or can be roughly estimated. Information is drawn mainly from ACHA's own records and the National Shipwreck database. In very few instances do old accounts/records provide co-ordinates, and so often shipwrecks are located based on descriptions such as estimated bearing and/or distance from a known shore based landmark or island.

Despite the inaccuracies of the data, we note that only one wreck is located offshore adjacent to the relevant section of coast proposed for beach mining expansion. In December 1840, the brigantine named Australia, caught fire, exploded and sank ~24 km north of the Olifants River and ~10km offshore (S31.562561° E17.947147°). Some debris from the Australia might have been driven onshore but the distance from shore where she went down means lighter debris would in all likelihood be very widespread.

After resubmission of the scoping report to SAHRA in 2018, a new case number and comment was issued (see Appendix D) In their comment on the scoping report (Appendix D), the case officer (Ms B Williams) and Unit head Ms Lesa Le Grange, noted that the nearest recorded wreck is that of the Catherine Isabella which lies approximately 18 kms south of Beach 1 off Robeiland but further indicated that there are no known shipwrecks within the development area. They required that an Underwater Heritage Impact Assessment (UHIA) be carried out by a suitably qualified maritime and underwater cultural heritage specialist as part of the Environmental Impact Assessment. The UHIA must include an in-depth survey of the affected area, paying particular attention to the coastal areas between the high and low water marks (i.e. the intertidal zone), indicating the significance of each heritage resource in the affected area, and making recommendations that seek to minimise negative impacts. As this latter requirement was not part of the original interim comment on which we had based our AIA, we sent extracts with respect to Maritime Heritage to Ms Le Grange in order to seek clarity on the requested UHIA study. Her response (see Appendix D1) indicated that the desktop assessment already completed, was likely to satisfy SAHRA's requirements.

We have suggested that since it is mostly impossible to predict the possibility of finding shipwrecks at any of the beach mining locations, if any such remains should any be found, they should be reported to SAHRA as a matter of course.

The significance of any remains, if found, would be dependent on the type and age of the wreck. Older wrecks (14th – early 19th century) are of high significance and later 19th – 20th century wrecks are generally of lower significance.



Plate 4: Beach 5



Plate 5: Beach 6

3.4 IMPACT ASSESSMENT

Potential impacts of the proposed project were identified based on the baseline data, project description, review of other studies for similar projects and professional experience.

The significance of the impacts was assessed using the prescribed SRK impact rating methodology which is provided in SRK's report. The significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur.

Practical mitigation and optimisation measures that can be implemented effectively to reduce or enhance the significance of impacts were identified. The impact significance was re-rated assuming the effective implementation of mitigation measures.

4 APPLICABLE LEGISLATION

The National Heritage Resources Act, No 25 of 1999 (NHRA) (Section 38 (1)) makes provision for a compulsory notification of the intent to develop when any development exceeding 5000 m² in extent, or any road or linear development exceeding 300 m in length is proposed.

The NHRA provides protection for the following categories of heritage resources:

- Cultural landscapes (Section 3(3));
- Buildings and structures greater than 60 years of age (Section 34);
- Archaeological sites greater than 100 years of age (Section 35);
- Palaeontological sites and specimens (Section 35);
- Shipwrecks and aircraft wrecks; and
- Graves and grave yards (Section 36).

Prior to development (the extent of which is described in Section 38 of the NHRA) the person who intends to undertake the development must notify SAHRA/HWC at the very earliest stages of initiating such a project of the location, nature and extent of the development. 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. SAHRA is responsible for sites of National Heritage significance (Grade 1) and aspects of Maritime Heritage offshore.

4.1 GRADING OF HERITAGE RESOURCES

The significance of heritage resources is assessed according to the grading criteria established by the NHRA.

Table 4-1: Grading of Heritage Resources (only categories I, II and III are defined in the NHRA), but HWC have introduced additional categories under III).

Grade	Level of significance	Description
I	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
II	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
IIIA	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3a heritage resources.
IIIB	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3b heritage resources.
IIIC	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3c heritage resources.
NCW		Not conservation-worthy - The Heritage Authority has applied its mind and the resource does not have enough heritage significance to be included in the National Estate.

		le. Insufficient Heritage Significance or “Ungradeable”. This category is important as not all old places or structures are significant in terms of the NHRA.
Not yet graded		The Heritage Authority has not yet applied its mind in order to determine a grading for the resource or there is not, yet, sufficient information to determine the grading.

4.2 RESPONSIBLE HERITAGE AUTHORITY

4.2.1 SAHRA

Section 35(1) of the NHRA describes the protection of archaeological resources (which is the responsibility of the provincial resources authority), but then adds: “Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA”.

In terms of Section 6(i) of the Maritime Zone Act (Act 15 of 1994) the jurisdiction of the NHRA extends to the Maritime Cultural Zone, located 24 nautical miles (approximately 48 kilometres) from the baseline. Thus the area of interest falls within SAHRA’s jurisdiction.

Furthermore, in terms of the NHRA, Section 35 (4) (a), “No person may, without a permit issued by the responsible heritage resource authority- destroy, damage , excavate, alter, deface or otherwise disturb any archaeological... site”.

Any developments below the high water mark must be submitted to the national heritage resources authority, namely SAHRA, for their comment.

4.2.2 HWC

The relevant heritage authority with respect to any mining above the high water mark is HWC. HWC must be notified at the earliest stage of the proposed development via submission of a Notice of Intent to Develop application and they will indicate the range of heritage resources which must be assessed as part of the heritage component of the EIA.

A NID was submitted to HWC on the 4th May and a case number was assigned (17050213AS0504E). HWC requested both Archaeological and Palaeontological specialist studies in their comment of 30 May 2017. HWC also requested the comments of the local municipality and any registered conservation body for the area. Any requested specialist studies requested by HWC must be integrated into a Heritage Impact Assessment which considers the impact on heritage as a whole. Specialist reports, requested comments as well as those of I&AP’s must be included.

5 BASELINE

The broader baseline study area stretched from Klip Vley Karoo Kop 153 in the north, down to the farm known as “The Point 267” in the south (Figure 1-1), while the proposed expansion of the mine is restricted to an ~5km strip inland of the existing processing plant lying parallel to the coast, and to the ~23 km stretch of coastline north of the mine along which the ten potential beach sites lie. We discuss the broader area here in order to place the current mine expansion activities in context.



Plate 6: View of the sandy proposed mining area at beach 10 along the northern edge of Klip Vley Karoo Kop.



Plate 7: View of the rocky promontory of Cliff Point, on the southern edge of Farm Geelwal Karoo 262.



Plate 8: View of the Olifants River which forms the southern boundary of the broader study area at The Point 267.

The Namaqualand coast is known to be archaeologically sensitive (Parkington & Poggenpoel 1991; Hart & Halkett 2003). The area along the coastal strip, within 500 m to 1 km of the high water mark, is generally regarded as the most sensitive from an archaeological perspective but often where sites have already been destroyed over the years by a succession of mining operations and the associated infrastructure (Plate 4). Many of these early mining ventures were unregulated when it came to Environmental and Heritage concerns. There was no requirement for rehabilitation of the mining areas then and the traces of the activities are all too obvious along the broader coastline up as far as the Orange River and into Namibia.



Plate 9: View of a mining road which has bisected a Later Stone Age shell midden, with more recent vehicle tracks running across the surface of the site. This is a common sight along the Namaqualand coast.

Mining of diamonds continues along the coast but is nowadays restricted to the beaches and tidal zone. Extraction of heavy minerals is currently underway at the Tormin mine and at the Tronox mine at Brand se Baai which has been in operation for many years.

5.1 PALAEOLOGY

John Pether was appointed to provide a baseline palaeontological sensitivity assessment and has now compiled an Palaeontological Impact Assessment which will be integrated into the HIA. He discusses the palaeontology in greater detail.

The following palaeontological comments are from the heritage specialist reports submitted by eThembeni Cultural Heritage and Stynder & Reed (2015).

- eThembeni Cultural Heritage considered the palaeontological sites in the study area to have medium to high significance at all levels due to their scientific value. No specific information is however provided and any conclusions should be viewed as only general and superficial; and
- Stynder & Reed (2015) applied for a permit to excavate Site CP-537, which is located close to the coast on the extreme north western edge of Farm Geelwal Karoo 262, and ~3.5 km from the closest part of the strandline mining area, and ~2.5 km from the proposed Beach1 mining site. Significantly, they have identified a species of bovid from the site, which has previously only been recorded in North Africa and Ethiopia, and which dates between 2.5 and 1.7 million years ago. The multi-national composition of the research team working at CP-537 suggests that the site can be considered to have national or even international significance. It is not impacted by the current proposal.

5.1.1 HYENA LAIR

Stynder and Reed's research also identified a carnivore assemblage eroding out of a fossilised dune plume beneath a thick surface calcrete capping on Farm Geelwal Karoo 262 at a site known as Cliff Point 1 (CP1), which is found on the extreme south eastern edge of Geelwal Karoo 262, ~3 km from the closest part of the strandline mining area. It is not impacted by the current proposal.

The examination of CP1 (House 2011) indicated that while lithic material was present amongst the fossil material, it was unclear if the site was of anthropogenic (human) origin. Large amounts of fossilized faunal material were previously collected at CP1 by Stynder in 2010 and surveys of the immediate area identified a mix of Early, Middle and Later Stone Age lithic material in significant numbers. House (2011) undertook his research at CP1 as part of an Archaeology Masters project and it represents the first fossil-rich sites along this part of the coast to be systematically collected and excavated (12 m²) and described. Based on the palaeo-magnetic reversal date of the main calcrete outcropping, House (2011) suggests that the CP1 faunal accumulation must be younger than 3.5 Million years.

Other fossil hyena lair sites excavated on the west coast include Boegoeberg 1 south of Alexander Bay (Klein et al 1999) and Hoedjiespunt 1 at Saldanha (Churchill et al 2000, Stynder et al 2001).

5.2 PRE-COLONIAL ARCHAEOLOGICAL SITES

Reed (2017) reported the identification of at least 64 sites of either palaeontological and/or archaeological material along the broader coastline. They divided the sites into four general time periods: (1) possible early Pliocene strata, (2) assumed *Homo erectus* localities with ESA bifaces and bones (some with cut marks), (3) possible open air MSA deposits, and (4) caves with LSA and possible MSA, but likely dating back to only 125 000 years.



Plate 10: Some of the ESA stone artefacts recovered from the dorbank.

ESA occurrences consisting primarily of lithic artefacts (handaxes) have also been reported from Brand se Baai, Hondeklipbaai, Kleinsee, Koingnaas and Doringbaai. These are often isolated finds with no associated fossil material in open deflated contexts lacking stratification.

Dewar & Orton (2013) have reported that at least 90 MSA open sites have been recorded from northern Namaqualand. MSA artefacts deflate down through the red Aeolian sands and collect on a hard compact surface known as the Dorbank, typical of the Namaqualand coastal plain. In southern Namaqualand, MSA artefacts are frequently encountered in borrow pits or mining trenches where

removal of the surface sands has exposed the harder deposits below. In general, like with ESA sites, the stone artefacts are found in open contexts and are not associated with bone, shell or ostrich eggshell. Their information is therefore of limited value except in indicating the distribution of MSA settlement.

However, of particular interest are those MSA sites which are associated with large numbers of fossilised ostrich eggshell fragments, fossilised or mineralised bone fragments and amounts of shell, predominantly of *S argenvillei*. Such sites have been reported from Kleinsee (Orton & Webley 2012), near the Groen River mouth (Halkett 2001) and at Brand se Baai (Parkington & Poggenpoel 1991, Halkett and Hart 1993, Parkington et al 2004). These sites are extremely rare and carry very high heritage significance because of their information content.

Reed (2017) reported finding Howieson's Poort lithic material (a component of the MSA) consisting of blades and very small, fragmented fossils – on the top of one of the cliffs in the study area (although a precise location was not provided). This is highly significant as the Howieson's Poort industry is linked to the development of modern human behaviour and is of significant interest to scientists for that reason.

Many thousands of LSA sites have been recorded on the broader Namaqualand coast during the last 30 years (Dewar & Orton 2013). The majority consist of shell middens or shell scatters with associated artefacts. Previous studies by ACO Associates have suggested that the bulk of the visible archaeological sites lie within 500 m – 1 km of the coast. This spatial patterning reflects that people in arid environments tend to focus their settlements (mostly of short duration) close to resource rich areas such as the coast with its abundant marine resources. Further inland of the coast, archaeological sites are more scarce (Orton 2010), often limited to ephemeral lithic scatters in occasional deflation hollows. Where there are rocky outcrops with shelters or overhangs, or any place with potential for providing water, evidence of occupation can be prolific. Orton's (2010) assessment of a water pipeline along the DR2225 in the vicinity of Koekenaap, noted that while scatters of shell are found at the site of the Sere windfarm on the coast to the west, they diminish in frequency inland to the east.

Hart's (2007) survey of the Sere windfarm, immediately east of the Tormin central mining area some 3 km from the coast, identified at least 65 occurrences of an archaeological nature and a number of LSA shell middens. While these were individually of low conservation status (Grade IIIB-C), Hart noted that they had high group value and were academically significant. He concluded that the shell middens were concentrated around a seasonal pan, and contrasts strongly with the lack of archaeological sites in the proposed strandline mining area at Tormin.

eThembeni Cultural Heritage's survey (2007) suggested that "the entire landward extent of the project area, between the beach and the gravel road running parallel to the shore, should be considered as an extended archaeological and palaeontological landscape, consisting of a palimpsest of discrete sites". They considered the archaeological sites in the study area to have medium to high significance at all levels due to their scientific values.

5.3 GRAVES

As they generally lack surface markers, the locations of pre-colonial graves cannot easily be precisely identified. Although occasionally such graves were marked by stone cairns, these may be confused by later prospecting and surveying activities which have also resulted in similar features being dotted about the landscape. Usually LSA burials are more likely to be found in coastal dune

areas in association with LSA shell middens than at random locations. Earlier human remains from the MSA and ESA are very rare and will most likely be found associated with MSA/ESA sites where bone is preserved, but also in palaeontological contexts, particularly those associated with brown Hyena accumulations. Early human remains are of exceptionally high international significance.

Due to the difficulty in pre-identifying locations of pre-colonial burials, they are almost always uncovered by natural erosion processes or during the course of development/mining, where they are often inadvertently, partly or wholly disturbed in the process, thereby compromising the details of burial style and other forensic information.

More recent burials from the colonial era may be marked more conventionally with crosses or other grave furniture, but are also often covered with rocks and perhaps marine shells and/or quartz stones. Simple head and/or footstones of local rocks may be present. These tend to be found close to old settlements/farms or old mining camps.

The Master Catalogue of Holocene Human Skeletons from South Africa (Morris 1992) was consulted to see if any burials had been reported or collected along this section of the coast, but this proved negative (though would certainly have been encountered in the diamond mining pits along the coast). eThembeni Cultural Heritage did not identify any graves or human remains in their survey (2007).

5.4 BUILT ENVIRONMENT

Colonial period heritage is extremely scarce in the study area and immediate vicinity. An examination of the Surveyor General's maps for the farms in the area, indicate that:

- Geelwal Karoo 262 was surveyed in 1871 (S.G. 816/1871), prior to this date it was Crown Land;
- To the north, Klip Vley Karoo Kop 153 was surveyed in 1871 (S.G. 818/1871). The northern portion of this narrow strip of land, bordering on Graauw Duinen, was called "Water Bak" indicating a source of fresh water which would have attracted pre-colonial and colonial settlement alike;
- To the east, Else Erasmus Kloof 158 was surveyed in 1878 (S.G. 1364/1878);
- To the south Elephant Rock Heights 171 was surveyed in 1871 (S.G. 817/1871);
- To the south, at the mouth of the Olifants River, The Point 267, was also surveyed in 1871 (S.G. 815/1871) and was Crown Land prior to this. The "lease areas" of the diamond companies date to 1962.

The built environment is limited, as far as we can determine at this time, to the small farm werf on Geelwal Karoo 262 which appears to date to the late 19th/early 20th century. It is reported by eThembeni (2007) to have been used as a Police Station at some point but so far we have been unable to confirm this fact. This is not impacted by the proposed activities.

5.5 CULTURAL LANDSCAPE

There has been very little discussion in the literature about the cultural landscape of the Namaqualand coast.

Hart (2007:8) described the landscape on the adjoining property to the east (Sere wind farm) thus: "The cultural landscape qualities of the place are that of a relatively undisturbed landscape imprinted over by the archaeological sites of the Late Stone Age hunter gatherers, then within the last 2000 years, the transhumant Khoekhoen pastoralists". The landscape has an "unspoiled" character and is

somewhat bleak with wide open spaces and uninterrupted views". A windfarm is now located to the east of the mine ~1.8 km from the coast and dominates the skyline of the area and so the "unspoiled" character of the landscape has changed somewhat. Although mining activities are ongoing at Geelwal Karoo 262, the impacts to the landscape are limited to the plant and roads at this time. Mining takes place on a number of the beaches. Opening the strandline pits will result in some changes during the operational phase, but rehabilitation will occur on a rolling basis as the pit progresses.

The scarring left by decades of diamond mining along the old raised beaches, along with the numerous associated coastal tracks is inescapable and will remain this way as there are no funds available from the state to rectify the situation, and many of the original companies have long since ceased to function.. The main coastal road and the numerous rough tracks continue to be used by members of the public who camp along this section of the coast (state land) and a number of informal beach huts are found at sheltered locations.

While the coastline to the north of Geelwal Karoo 262 is of a more conventional west coast nature, pronounced cliff lines are found along the coastline adjacent to Geelwal Karoo 262 extending down as far as the Olifants River. These cliffs are composed of successions of overlapping coastal sediments and rocky areas and the erosion of these deposits exposes older palaeontological and archaeological traces.

eThembeni Cultural Heritage (2007) described the landscape in the vicinity of the Tormin mine as "typical of the West Coast rural coastline, characterised by large tracts of open farmland with the Atlantic Ocean as a backdrop where infrastructure and buildings occur far apart. The terrain is typically characterised as plains with open low hills or ridges to the north of the property with open high hills and ridges to the south". They considered the landscape in and around the project area to have medium heritage significance with respect to its historical, scientific and aesthetic value.

Conspicuous changes to the landscape, such as additional buildings and landscape scarring will change the "feel" of the place.

Heritage indicators are the few farming and mining structures (some derelict) that are found on the coastal strip. Occasional exotic trees are found around structures while for the rest the vegetation is low Strandveld. Occasional old cultivated fields are noted inland, seeming not to come within ~2km of the coast. Other features are typical farming related features such as fences, windmills and reservoirs.

We would grade the landscape as Generally IIIC with perhaps some coastal areas being IIIB despite disturbance.

5.6 SITE SENSITIVITY

The baseline study indicates that the site contains both archaeological and palaeontological resources. Archaeological resources include those from the ESA, MSA and LSA. The proposed strandline mining area contains almost no visible surface archaeological material. LSA sites would usually be visible on the surface if they were present, and even if marginally buried, traces would be found in the soil coming out of burrows and bio-turbated by vegetation. Some isolated MSA artefacts have been found but these are not unique. Based on the findings of other coastal surveys that focus on older resources, we may expect to find buried MSA and ESA lithic artefacts and possibly fossilised bone deflated down onto older resistant strata. It is impossible to predict if this will in fact

be the case. Depending on the context of the finds, these could be either highly significant (in stratified context with spatial integrity) or less so (isolated finds in deflated context).

Beach mining of the ten beaches themselves on the coastal strip is unlikely to be sensitive from an archaeological perspective as the sands here are constantly reworked by the tides. We do however note the possibility of maritime archaeological resources occurring beneath the sands though it is impossible to predict if anything will be found. The associated access roads will require some upgrading and some MSA and LSA archaeological resources would be impacted in the process. These are few and already partially disturbed by earlier mining and erosion and are of such a nature that we would suggest some basic mitigation should occur prior to any upgrades occurring.

6 IMPACT ASSESSMENT

Note: As the mining is dependent on the location of the mineral resource, no alternative sites can be presented for the mining activity.

6.1 POTENTIAL IMPACTS: CONSTRUCTION PHASE

The following potential construction phase impacts were identified and assessed:

- Impact on archaeological resources when upgrading beach access roads;
- Impact on archaeological resources when upgrading the north haul road; and
- Impact on archaeological resources when constructing new plant, dams or other infrastructure on Geelwal Karoo 262.

We do not believe that any significant impact will result from construction of the 22kV powerline.

6.1.1 POTENTIAL IMPACT: LOSS OF ARCHAEOLOGICAL RESOURCES DURING UPGRADE OF BEACH ACCESS ROADS AND NORTH HAUL ROAD

Upgrading and widening of the identified beach access roads will impact a few archaeological sites that have been identified. Sites along the coast have already been subjected to considerable disturbance over the years due to diamond mining, associated infrastructure and informal coastal access.

As far as we can determine from surface observation and road cuttings, the activity will be in largely disturbed areas although some in situ material may be found where disturbance is limited, but the resources are limited. One MSA lithic scatter (D013 at S31.41256800 E17.95945801) lies in the proposed road and should be collected. The resources are not particularly unique.

While some archaeological resources are known along the edge of the OP9764, they are not expected to be of high significance and some disturbance has occurred over the years to road edges due to grading and use over time. In addition, existing soil berms created by grading tend to obscure cuttings and archaeological visibility, and as a result, we suggest that widening of the road is monitored, and if any significant remains are encountered, that they be mitigated.

The impact is assessed to be of **low** significance and with the implementation of mitigation remains **low** though the outcome moves to positive (Table 6-1). Even though of low significance due to context, there is still some spatial focus and retaining a sample of the material is seen as a positive outcome as the material can be useful for examining MSA lithic technology of this area.

Table 6-1: Significance of loss of archaeological resources during upgrade of beach access roads

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Long-term 3	Low 5	Probable	LOW	- ve	High
Essential mitigation measures:								
<ul style="list-style-type: none"> • Appoint an archaeologist to assist with mitigation of the archaeological sites prior to upgrading roads; • Limit clearance and the footprint of construction activities to what is absolutely essential; and • Sample the affected archaeological resources as required. 								
With mitigation	Local 1	Low 1	Long-term 3	Low 5	Definite	LOW	+ ve	High

6.1.2 POTENTIAL IMPACT: LOSS OF ARCHAEOLOGICAL RESOURCES DURING CONSTRUCTION OF NEW PLANT AND ASSOCIATED INFRASTRUCTURE

Building new plant may impact buried archaeological and/or palaeontological resources where foundations or slabs are dug down to or through the dorbank layer. It is not possible to predict the condition or quantity of material that may be found (if any) and some monitoring of activities will be required in the initial construction phase to determine the actual situation. No surface archaeological resources were however identified. If material is found, it can be mitigated by sampling. The context and type of material will determine its scientific significance.

The impact is assessed at this time given the limitations of the observations to be of **low** significance and with the implementation of mitigation remains **low** though the outcome moves to positive (Table 6-2).

Table 6-2: Significance of loss of archaeological/palaeontological resources during construction of new plant and associated infrastructure

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Low 1	Long-term 3	Low 5	Possible	LOW	- ve	Low
Essential mitigation measures:								
<ul style="list-style-type: none"> • Appoint an archaeologist to assist with monitoring of the construction activities; • Limit clearance and the footprint of construction activities to what is absolutely essential; • Monitor selected earthworks to determine if buried archaeological/palaeontological resources are present or not; and • If present, sample the affected archaeological/palaeontological resources as required. 								
With mitigation	Local 1	Low 1	Long-term 3	Low 5	Possible	LOW	+ ve	High

6.2 POTENTIAL IMPACTS: OPERATION PHASE

The following potential operation phase impacts were identified and assessed:

- Impact on buried archaeological resources during mining activities in the strandline area; and
- Impact on buried maritime archaeological resources during mining activities on the beach sites.

6.2.1 POTENTIAL IMPACT: LOSS OF BURIED ARCHAEOLOGICAL RESOURCES DURING MINING OF THE STRANDLINE AREA

Although we have not found any significant surface archaeological resources or indicators of shallowly buried archaeological material, the findings of the baseline study suggest that there is a possibility that buried archaeological resources may be found during the course of mining activities in the strandline area, but this is difficult to accurately predict due to a lack of observable sections exposed in the proposed mining area. These resources, if found, are likely to lie on the hard dorbank

layer where they rest after extensive periods of deflation and bioturbation. If there is buried material on the dorbank, it is likely to date to either the MSA or ESA, or combinations thereof. Context is likely to have been somewhat disrupted by deflation but nevertheless can provide valuable insights into early human behaviour in the area. The recovery of early human remains would be highly significant though chances are extremely low.

Despite there being a number of LSA sites on the farm to the east where the windfarm is located, none were found in the proposed mining area. Although no surface indications of LSA sites were identified, the possibility of random LSA burials cannot be ignored.

The impact is assessed to be of **medium** significance and with the implementation of mitigation is reduced to **low** positive (Table 6-3).

Table 6-3: Significance of loss of archaeological resources during mining of the strandline areas

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Medium 2	Long-term 3	Medium 6	Probable	MEDIUM	- ve	Medium
Essential mitigation measures:								
<ul style="list-style-type: none"> • Appoint an archaeologist to assist with monitoring of the mining activities; • Monitor the mining for archaeological resources. Initially this will need to be semi-permanent until such time as it can be established if any resources are present or not. Based on the initial observations, work out a program for ongoing or regular monitoring; and • Collect any archaeological resources that are exposed using appropriate methods to record provenance. 								
With mitigation	Local 1	Low 1	Long-term 3	Low 5	Probable	LOW	+ ve	Medium

6.2.2 POTENTIAL IMPACT: LOSS OF BURIED MARITIME ARCHAEOLOGICAL RESOURCES DURING MINING OF THE BEACHES

Although there is no information suggesting that maritime remains will definitely be located on any of the beaches, it is impossible to predict likelihood due to inaccuracies of the data pertaining to shipwrecks. We cannot however ignore the possibility of something occurring.

As it is impossible to predict the possibility of finding shipwrecks at any of the beach mining locations, should any be found, they should be reported to SAHRA as a matter of course.

The significance of any remains, if found, would be dependent on the type and age of the wreck. Older wrecks (14th – early 19th century) are of high significance and later 19th – 20th century wrecks are generally of lower significance.

The impact without mitigation is assessed to be of **low** significance and with the implementation of mitigation remains **low** but with a positive outcome (Table 6-34).

Table 6-4: Significance of loss of maritime archaeological resources during mining of the beaches

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Medium 2	Long-term 3	Medium 6	Improbable	LOW	- ve	Low
Essential mitigation measures:								
<ul style="list-style-type: none"> • Machine operators to be alerted to possibility of finding wreck material; • Establish protocol for what to do if any material found; includes reporting the find/s to SAHRA; • Maritime archaeologist must assess the material and propose the way forward; and • If required, collect/excavate any maritime archaeological resources that are exposed using appropriate methods to record provenance. 								
With	Local	Low	Long-term	Low	Improbable	VERY LOW	+ ve	Low

mitigation	1	1	3	5				
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6.3 CUMULATIVE IMPACTS

Mining activities over several decades on the coastline in the vicinity of the Tormin site has resulted in the loss of archaeological and palaeontological resources though the extent of the loss is difficult to quantify in any precise way. At present, diamond mining continues in the area though now targets the tidal zone on the beaches.

The heavy mineral sand mine at Brand se Baai now operated by Tronox, has been operational for at least 15 years and despite mitigation of some surface archaeological resources, the extent and scale of the mining (and associated mine health and safety restrictions) makes it difficult to monitor and/or mitigate buried archaeological and palaeontological resources, though not impossible.

The proposed Tormin strandline mining might add to the ongoing pressure on buried archaeological and palaeontological resources but we will not be able to ascertain the extent until mining commences, as there are few exposures of deep sections in the local mining area itself where one can observe the geological succession and any presence of heritage resources. We know there are such resources to the south of the proposed area where natural erosional processes have exposed ancient sediments in the cliffs, but we cannot say unequivocally that similar heritage resources will be present in the mining area.

We have established that there are no surface indications of LSA sites in the proposed strandline mining area and so at least these resources will not be additionally impacted.

Beach mining itself is not expected to impact archaeological resources as the sand here is constantly mobilised and replenished during tidal activity. There are no reports of shipwrecks ever having been found during mining as far as can be determined, and pre-colonial archaeological material is not found in the intertidal zone, and so cumulative impact is considered extremely low.

If existing roads are used to access the beaches, then additional impacts on heritage resources can be kept to a minimum. Monitoring and mitigation of the upgrading of beach access roads and the North haul road is required.

6.3.1 DECOMMISSIONING

Impacts on archaeological/heritage resources are expected to occur primarily during the construction and operational phases. No additional significant impacts are anticipated during the decommissioning phase.

6.3.2 No Go OPTION

If the “no go” option is invoked, the status quo will be maintained and natural and human processes present in the area will continue to erode the archaeological/heritage resources.

7 FINDINGS AND RECOMMENDATIONS

7.1 STRANDLINE MINING AND INFRASTRUCTURE EXPANSION AREA

Despite the relatively high numbers of archaeological sites along the Namaqualand coast generally, assessments of the expansion of the strandline mining activities proposed by Tormin will not apparently have high impact on visible surface archaeological resources, or heritage resources in general. We do however have an expectation that buried archaeological and palaeontological resources will/may be found in both the strandline mining area as well as in the infrastructure expansion area and associated infrastructure zone. The absence of exposures of the subsurface in the relevant areas prevents any clear statements being made on the likelihood, though there is ample evidence for such material to be found elsewhere along the immediate coastal plain, and particularly to the south of the proposed mining area at Cliff Point.

The uncertainty with respect to the presence of resources is not optimal and will require some monitoring of the infrastructure construction activities, and of the strandline mining area to establish the situation. An archaeologist should be appointed to supply these services. Ongoing monitoring will indicate if any buried resources are present or not, and based on the observations, an ongoing program can be established. If the MSP, for example, is constructed before the mining commences, an archaeologist will already be in a better position to evaluate likelihood. The need for, and frequency of monitoring can then be established.

7.2 UPGRADE OF BEACH ACCESS ROADS AND NORTH HAUL ROAD

Assessment of the identified roads where upgrading will be carried out has identified only a few potential sites that may be impacted. Mitigation of identified sites with significance is required as indicated below:

Site L019: Beach 10 Access road 1 (actual)

Extensive scatter of LSA material including marine shell (*C. granatina*, *S. granularis*, *S. argenvillei*), quartz flakes and cores and ostrich eggshell fragments on surface between the bushes around and on the access road. Very ephemeral but may represent a larger and more substantial sub-surface shell midden. Sample sections that will be impacted by widening if necessary.

Site D012: Beach 9 Access road 1

Residual LSA shell midden in road and in the roadside walls. Shell includes (*C. granatina*, *S. granularis*, *S. argenvillei*, *C. meridionalis*) and there are also stone artefacts. The material in the road is crushed and only thin lens visible in walls. Sample sections that will be impacted by widening if necessary.

Site D013: Beach 8 Access road 1

Extensive deflated MSA stone scatter in and next to the access road. No non-lithic material observed. Stone consists of quartz and quartzite, cores, flakes, chunks, blades. A sample of the artefactual material should be collected from the road and from a small deflated area to south. (Called LBM2 on a previous survey).

As we had no landowner permission to access beaches 1 and 2, and the associated roads, these must be evaluated prior to construction.

Hart (2003) previously recorded one LSA archaeological site in the access road to Beach 1 which was known as BV 1. This was a very large LSA shell midden though was considerably disturbed. Hart suggested it had low significance. The material included quartz debitage, ostrich eggshell,

pottery, and shellfish remains include *S. Argenvillei*, *C. granatina*, *S. granularis*, *Burnupena* sp. At that time he suggested sampling the shellfish and collection of artefacts.

There are no previously recorded sites on or near the access road to Beach 2.

Haul road

Widening by grading of the existing public road (OP9764) from its current average width of 5-6 m to at least 8 m for use as a haul road may result in some impact to archaeological material. Grading work over the years has already resulted in some disturbance and creation of a low berm along both sides in places. As the OP9764 was not going to be changed in the original proposal, the widening of the road has not been specifically assessed for archaeological material although we have travelled this road many times. Experience suggests that heritage resources along the road are limited in number and significance. In addition, existing soil berms created by grading tend to obscure cuttings and archaeological visibility, and as a result, we suggest that widening of the road is monitored, and if any significant remains are encountered, that they be mitigated.

7.3 BEACH MINING

There is unlikely to be any impact to Pre-colonial remains due to the intertidal location. However, we are unable to ignore the possibility that unknown shipwreck material may occur. The incomplete nature and inaccuracies of the National shipwreck database prevent more certainty with respect to maritime heritage. We have suggested that machine operators and supervisors be made aware of what to look out for in the course of the beach mining through tool box talks and written handouts. A protocol must be in place in the event that any shipwreck material is seen. Any finds must be reported to supervisors and Environmental Control Officer who in turn should report the matter to the archaeologist. A maritime archaeologist should assess the material (initially via photographic material) to assess if the material is significant or not, and if a site visit is required.

If shipwreck material is located, its significance will depend on its age, and state of preservation and/or the association with related material (cargos etc). Material may be excavated and/or collected if deemed necessary. SAHRA would be kept informed of any shipwreck finds. A permit may be required to excavate/ collect shipwreck material.

7.4 22KV POWERLINE

We have assessed the section of the line on Geelwal Karoo 262 and have found no significant surface archaeological material. The section extending to the on-site substation on the Sere windfarm has previously been assessed by Hart (2007) as part of the EIA for the windfarm. No surface archaeological material was located along the powerline route in that area, although several sites were found elsewhere seemingly clustered about a seasonal pan. In our opinion, the infrastructure required for the powerline is very small and is unlikely to have any impact on archaeological resources.

7.5 KEY FINDINGS

A summary of impacts and mitigation / optimisation measures is provided in Table 7-1.

In overall terms, **Construction Phase** impacts on terrestrial archaeological resources is considered to be **LOW (-ve)** without mitigation, and **LOW (+ve)** with mitigation.

Operational Phase impacts on terrestrial archaeological resources is considered to be **MED (-ve)** without mitigation, and **LOW (+ve)** with mitigation. The possibility of impact on maritime archaeological resources is unpredictable and we tentatively rate the impact as **LOW (-ve)** without mitigation and **VERY LOW (+ve)** with mitigation.

Table 7-1: Summary of impacts and mitigation / optimisation measures

Impact	Significance rating		Preferred Alternative	Key mitigation / optimisation measures
	Before mitigation/ optimisation	After mitigation/ optimisation		
CONSTRUCTION PHASE IMPACTS				
Loss of archaeological resources during upgrade of beach access roads and North haul road	Low (-ve)	Low (+ve)	n/a	<ul style="list-style-type: none"> • Appoint an archaeologist to assist with mitigation of the archaeological sites prior to upgrading of beach access roads; • Appoint an archaeologist to monitor the construction phase upgrading of OP9764 and to mitigate any significant heritage resources as required; • Limit clearance and the footprint of construction activities to what is absolutely essential;
Loss of archaeological/palaeontological resources during construction of new plant and associated infrastructure	Low (-ve)	Low (+ve)	n/a	<ul style="list-style-type: none"> • Appoint an archaeologist to assist with monitoring of the construction activities; • Limit clearance and the footprint of construction activities to what is absolutely essential; • Monitor selected earthworks to determine if buried archaeological/palaeontological resources are present or not; • If present, sample the affected archaeological/palaeontological resources as required.
OPERATIONAL PHASE IMPACTS				
Loss of archaeological/palaeontological resources during mining of the strandline area	Medium (-ve)	Low (+ve)	n/a	<ul style="list-style-type: none"> • Appoint an archaeologist to assist with monitoring of the mining activities; • Monitor the mining for archaeological/palaeontological resources. Initially this will need to be semi-permanent until such time as it can be established if any resources are present or not. Based on the initial observations, work out a program for ongoing or regular monitoring; • Collect any archaeological/palaeontological resources that are exposed using appropriate methods to record provenance;
Loss of maritime archaeological resources during mining of the beaches	Low (-ve)	Very low (+ve)	n/a	<ul style="list-style-type: none"> • Machine operators to be alerted to possibility of finding shipwreck material via tool box talks and an explanatory handout that includes procedure to follow if material is found; • Establish a protocol for what to do if any shipwreck material is found; • If any material is found during beach mining, the area should be cordoned and photographs of the material should be sent to the archaeologist to assess if the find/s are significant or not, or if an on-site inspection should be made; • If clearly not significant, mining may continue; • If significant, material may require controlled excavation / collection by archaeologist using appropriate methods to record provenance, and mining at the location on hold until that process is completed; • Archaeologist reports the finds to SAHRA;

7.6 ENVIRONMENTAL ACCEPTABILITY

In our opinion, the expansion of mining as proposed (no alternatives relevant to the HIA) and installation of the necessary infrastructure can be supported from an archaeological perspective provided that the proposed mitigation is carried out.

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APPENDICES

APPENDIX A: SPECIALISTS CV

CURRICULUM VITAE

Name: David John Halkett

Profession: Archaeologist, Heritage Impact Assessor

Date of Birth: 23.07.1958

Parent Firm: ACO Associates cc

Position in Firm: Director

Years with Firm: 9

Years' experience: 29

Previous employment: Archaeology Contracts Office, UCT, 24 years

Nationality: South African

HDI Status: White Male

Education:

- 1991 M.A. (Archaeology) University of Cape Town
- 1982 B.A. (Hons) (Archaeology) University of Cape Town
- 1980 B.A. University of Cape Town
- 1976 Pinelands High School (matric exemption)

Professional Qualifications:

MA (Archaeology) UCT
Registered member of ASAPA (member 044)

Languages:

First language – English
Second language - Afrikaans (speaking, reading and writing).

KEY QUALIFICATIONS:

David began studying archaeology in 1977 and participated actively in the fieldwork program of the Department of archaeology at UCT, participating in numerous excavations and Cederberg rock art surveys under Prof John Parkington and Prof Andrew Smith. After graduating, David co-directed the Archaeology Contracts Office at the University of Cape Town (one of the first heritage resource management companies in South Africa) for 24 years before establishing and becoming a director of the recently established ACO Associates cc. The company provides specialist Heritage and Archaeological Impact Assessment services to a wide range of clients in order for them to comply with National Environmental and Heritage Legislation. The company currently employs 5 permanent staff. David is a long standing member of the Association of Professional Archaeologists (ASAPA) and is an accredited member of the Cultural Resource Management (CRM) section of the association, accredited as a Principal Investigator to work on Stone Age sites, especially coastal shell middens, rock painting sites and colonial period sites, including Industrial structures and sites. He also has experience in dealing with scavenger bone accumulations. With 29 years of working experience in heritage impact assessments, conservation and archaeological research, he has worked in a wide variety of contexts and participated in over a thousand heritage projects ranging from heritage and archaeological impact assessments, to mitigation of archaeological sites in suburban, rural and industrial (mining) situations. David's broad experience in heritage management has led to his serving as an advisor to the National Monuments Council up until 2000, and more recently as a member of two regulatory committees of the Provincial Heritage Resources Authority, Heritage Western Cape, Department of Cultural Affairs and Sport, namely the Impact Assessment Review Committee (IACOM) and the Archaeology, Palaeontology and Meteorites Committee (APM) until the end of his term in 2013. He served on occasion as a forensic

consultant to the Missing Persons Unit of the NPA in 2007. He has led field research projects on behalf of both local and overseas research organisations, and continues to participate in archaeological research on an ad hoc basis. Research interests include aspects of the Middle Stone Age, Later Stone Age and Colonial era of southern Africa. He has co-authored a number of peer reviewed journal articles on these topics. David recently won the award for the best Heritage Impact assessment in the Western Cape for 2013/2014 presented by the Provincial Department of Cultural Affairs and Sport of the Western Cape.

SUMMARY OF OTHER EXPERIENCE:

2008-present: Director and Principal Investigator: ACO Associates cc. Projects undertaken in the Eastern, Northern and Western Cape Provinces.

1988-2012: Principal Investigator and director: Archaeology Contracts Office, University of Cape Town. Projects undertaken in the Eastern, Northern and Western Cape Provinces.

1997: Junior Research Officer: Palaeoanthropology Research Unit, University of the Witwatersrand, (part time apt for one year) Cape Town based.

1984: Part time research assistant: Spatial Archaeology Research Unit, University of Cape Town

RELEVANT EXPERIENCE:

Employment since 1988 has required management of all aspects of heritage projects, and management of the day to day functions of the business (including Financial, HR).

Relevant commercial projects:

Relevant mining projects on the west coast done by Halkett or more generally by the ACO:

Halkett, D. & Hart, T. 1993. Excavations at six archaeological sites in the near shore diamond mining area, Brandsebaai, Namaqualand. Unpublished report prepared for De Beers Namaqualand Mines Division. Archaeology Contracts Office, UCT.

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APPENDIX B: ARCHAEOLOGICAL RESOURCES TABLE

Table of archaeological resources

Site Number	Lat S (dec deg)	Lon E (dec deg)	Description	Significance
Strandline				
D001	31.56677297	18.10794803	MSA flakes (~15), qzit, and qtz, exposed in erosion gully – lying on dorbank	NCW
D002	31.56097898	18.10264204	?	NCW
D003	31.53306196	18.08023402	Isolated small silcrete flake (lsa?) on surface	NCW
D004	31.53715703	18.08334304	Isolated qtz flake/blade on surface	NCW
D005	31.53725401	18.08401502	Isolated small qtz flake on surface	NCW
D006	31.53879301	18.08461902	Isolated qtz chunk on surface	NCW
D008	31.54968001	18.09339001	Isolated opaque crystal qtz core on surface	NCW
D009	31.54594302	18.09107400	Isolated broken donax bivalve shell	NCW
L001	31.56132599	18.10444599	Qtz flake in loose sand near a large antbear hole.	NCW
L002	31.56351903	18.10564402	Qtz core in a large bulldozed patch – geotechnical explorations?	NCW
L003	31.56397199	18.10593998	Qtz flake – on the surface no disturbance of the topsoil	NCW
L004	31.56576999	18.10770504	Silcrete flake (light brown) with prepared platform– probably MSA found on surface.	NCW
L005	31.56069400	18.10362699	Scatter of ostrich eggshell fragments – probably natural	NCW
L006	31.56061504	18.10343103	Isolated qzite flake – on surface	NCW
L007	31.55899096	18.10430903	Isolated qtz chunk on surface	NCW
L008	31.55807700	18.10126799	Cairn of 6 boulders (with another 3 boulders nearby) – located near a cleared Geotech area. Probably related to prospecting activities in the past	NCW
L009	31.55812302	18.10106800	Ephemeral scatter of qtz flakes and cores, and large flaked qzite cobbles in a disturbed area, immediately below topsoil. Possibly a LSA site	IIIC
L010	31.53485402	18.08178602	Qzite flake in a large disturbed area (Geotech?).	NCW
L011	31.53139103	18.07869301	Qtz flake, chunk and chip in close proximity to each other on surface	NCW
L012	31.53423300	18.08093299	Isolated snapped qzite blade on surface, probably MSA – no prepared platform. (photos)	NCW
L013	31.53681303	18.08238499	Qtz flake and red silcrete flake on surface	NCW
L015	31.54832197	18.09268903	Isolated qtz core on surface	NCW
L016	31.54721397	18.09173098	Isolated qtz chunk on surface	NCW
Powerline				
L014	31.54777204	18.09781398	Isolated qzite flake on powerline route	NCW
Beach mining and haul roads				
D010	31.37932101	17.93442101	Beach 10 Access road 2 Few qtz artefactual pieces in a borrow pit next to (originally called LS10 in an earlier survey)	NCW
D011	31.39052804	17.94193304	North haul road at turnoff to Beach 9 Access road 1 Remains of significant shell midden on spoil heaps next to a small old prospecting hole immediately east of north haul road. Intact in situ midden lens on the south side of the pit. GGA, informal stone artefacts, pottery, oes. If not widened then status quo will be maintained.	IIIB
D012	31.39008698	17.94154798	Beach 9 Access road 1 Residual shell midden in road and in the side walls GGA Ch, stone artefacts. The material in the road is crushed and only	IIIC

			thin lens visible in walls.	
D013	31.41256800	17.95945801	<p>Beach 8 Access road 1</p> <p>Extensive deflated MSA stone scatter in and next to access road. No non-lithic material observed. Stone consists of qtz and qzit, cores, flakes, chunks, blades. A sample of the artefactual material should be collected from the road and from a small deflated area to south. (Called LBM2 on a previous survey)</p>	IIIB
L017 L018 L019	31.36566999 31.36591198 31.36589999	17.91855499 17.91861299 17.91899303	<p>Beach 10 Access road 1</p> <p>Extensive scatter of shell (GGA), qtz flakes and cores, oes fragments on surface between the bushes around and on the access road. Very ephemeral but may represent a larger and more substantial sub-surface shell midden</p>	IIIC

APPENDIX C: HWC COMMENT ON THE NID SUBMISSION

Our Ref: HM/MATZIKAMA/TORMIN MINE
Case No.: 17050213AS0504E
Enquiries: Andrew September
E-mail: andrew.september@westerncape.gov.za
Tel: 021 483 9543
Date: 30 May 2017



Sue Rether
Albion Spring
183 Main Road
Rondebosch
7700
capetown@srk.co.za

RESPONSE TO NOTIFICATION OF INTENT TO DEVELOP: HIA REQUIRED
In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999) and the Western Cape
Provincial Gazette 6061, Notice 298 of 2003

NOTIFICATION OF INTENT TO DEVELOP: PROPOSED SAND MINE ON THE REMAINDER OF FARM GEELWAL KAROO 262, REMAINDER AND PORTION 4, 5, 6 & 7 OF FARM KLIPVLEY KAROO 153, OP09764, FARM PERSEEL KAROO 191-206, PORTION 3 OF FARM GRAAUWUINEN 152, TORMIN MINE, LUTZVILLE, MATZIKAMA SUBMITTED IN TERMS OF SECTION 38(8) OF THE NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)

CASE NUMBER: 17050213AS0504E

The matter above has reference.

Heritage Western Cape is in receipt of your application for the above matter received on 04 May 2017. This matter was discussed at the Heritage Officers meeting held on 29 May 2017.

You are hereby notified that, since there is reason to believe that the proposed development will impact on heritage resources, HWC requires that a Heritage Impact Assessment (HIA) that satisfies the provisions of section 38(3) of the NHRA be submitted. This HIA must have specific reference to the following:

- Impacts to archaeological heritage resources
- Impacts to palaeontological heritage resources

The required HIA must have an integrated set of recommendations.

The comments of relevant registered conservation bodies and the relevant Municipality must be requested and included in the HIA where provided. Proof of these requests must be supplied.

HWC reserves the right to request additional information as required.

Please note, should you require the HIA to be submitted as a Phased HIA, a written request must be submitted to HWC prior to submission. HWC reserves the right to determine whether a phased HIA is acceptable on a case by case basis.

Should you have any further queries, please contact the official above and quote the case number.

Yours faithfully


.....
M Mxolisi Dlamuka
Chief Executive Officer, Heritage Western Cape

www.westerncape.gov.za/cas

Street Address: Protea Assurance Building, Green Market Square, Cape Town, 8000 • **Postal Address:** Private Bag X9067, Cape Town
• **Tel:** +27 (0)21 483 5959 • **E-mail:** eeheritage@westerncape.gov.za

Straatadres: Protea Assuransie gebou, Groentemarkplein, Kaapstad, 8000 • **Posadres:** Privaatsak X9067, Kaapstad, 8001

APPENDIX D: SAHRA COMMENT ON SCOPING REPORT

Our Ref:



an agency of the
Department of Arts and Culture

T: +27 21 462 4502 | F: +27 21 462 4509 | E: info@sahra.org.za
South African Heritage Resources Agency | 111 Harrington Street | Cape Town
P.O. Box 4637 | Cape Town | 8001
www.sahra.org.za

Enquiries: Brieg Williams
Tel: 021 462 4502
Email: bwilliams@sahra.org.za
CaseID: 12519

Date: Monday May 28, 2018
Page No: 1

Interim Comment

In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999)

Attention: SRK Consulting (Pty) Ltd - Western Cape

The Administrative Building, 183 Main Road, Albion Springs
7700 Rondebosch, South Africa
PostNet Suite #206, Private Bag X18
7701 Rondebosch

Proposal to extend existing mining of heavy minerals to an inland "strandline" area and to additional 10 beach sites. Western Province.

The South African Heritage Resources Agency would like to thank you for submitting the scoping report for the Extension of Tormin Mine, West Coast, South Africa. The proposal is to extend existing mining of heavy minerals to an inland "strandline" area and to additional 10 beach sites.

The Environmental Authorisation (EA) was applied for in January 2017 and as part of this application a draft Scoping Report was released for stakeholder comment in April 2017 and updated at the end of the comment period to produce a Final Scoping Report, which was submitted to the Department of Mineral Resources (DMR) in June 2017. On 22 November 2017, DMR refused the EA at the Scoping Phase, citing the undertaking of a section 24G (s24G) process in terms of NEMA for the rectification of unlawful activities. MSR appointed SRK to undertake a s24G application process (to rectify unlawful activities), in terms of NEMA and Regulations 698 of 2017.

A new application for EA for the proposed extension of Tormin Mine has now been submitted. This Scoping Report, which forms part of the new EIA process, is largely the same as the Scoping Report dated April 2017 and previously released for stakeholder comment.

The scoping report for the 2017 Environmental Authorisation was submitted to SAHRA for comment in July 2017 under the case Number 11244. As the 2018 Scoping Report is part of a new application SAHRA required that a new case be created and submitted on SAHRIS for comment.

The proposed extension will affect ten beaches adjacent to Remainder of Graauw Duinen 152, and Portions of Farm Klipvley Karoo Kop 153, along a stretch of coastline north of Tormin Mine processing plant comprising 43.7 ha mining and 2.1 ha beach access road widening. Heavy machinery will be used to excavate the sand

Extension of Tormin Mine, West Coast South Africa (May 2018)

Our Ref:



an agency of the
Department of Arts and Culture

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Enquiries: Briega Williams
Tel: 021 462 4502
Email: bwilliams@sahra.org.za
CaseID: 12519

Date: Monday May 28, 2018
Page No: 2

down to an average depth of 6m and will take place between the tidal level and the high water mark. Sand berms, ditches, or a similar structure may be constructed on the seaward side of the deposit if required to provide temporary protection from the incoming tide.

In terms of the National Heritage Resources Act, No 25 of 1999 (NHRA), Sections 2 and 35 stipulate that any wreck, being any vessel or aircraft or any part thereof older than 60 years lying in South Africa's territorial waters or maritime cultural zone, is protected and falls under the jurisdiction of SAHRA's Maritime and Underwater Cultural Heritage Unit. These heritage sites or objects may not be disturbed without a permit from SAHRA.

With regard to maritime and underwater cultural heritage, it is important to note that the number of known shipwrecks along the South African coast is approximately 2500, the positions of the large majority of these are not known, only that they occurred and an approximate location. The nearest recorded wreck is that of the Catherine Isabella which lies approximately 18kms south of Beach 1 off Robeiland. While there are no known shipwrecks within the development area there is always the potential for unknown wrecks or shipwreck material to have been washed up and buried along the shoreline. The act of excavating the beach and building sand berms is highly destructive and while the area many have been previously disturbed, heritage material can exist metres under the current surface due to the dynamism of the coastal zone. The likelihood of any shipwreck material being present within the development area must be explored. Therefore it is required that an Underwater Heritage Impact Assessment (UHIA) is carried out by a suitably qualified maritime and underwater cultural heritage specialist as part of the Environmental Impact Assessment. The UHIA must include an in-depth survey of the affected area, paying particular attention to the coastal areas between the high and low water marks (i.e. the intertidal zone), indicating the significance of each heritage resource in the affected area, and making recommendations that seek to minimise negative impacts.

No archaeological or palaeontological material may be damaged, altered, removed, or disturbed in any way during works. Should anything of archaeological or paleontological significance be exposed at any time, work must cease immediately and the relevant heritage resources authority must be informed of its discovery. In this event, work may not continue until feedback and/or a permit has been received from the relevant heritage resources authority.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully

Extension of Tormin Mine, West Coast South Africa (May 2018)

Our Ref:



an agency of the
Department of Arts and Culture

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Enquiries: Briega Williams
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CaseID: 12519

Date: Monday May 28, 2018
Page No: 3

Briega Williams
Heritage Officer
South African Heritage Resources Agency

Lesa la Grange
Acting Manager: Maritime and Underwater Cultural Heritage
South African Heritage Resources Agency

ADMIN:

Direct URL to case: <http://www.sahra.org.za/node/504556>

Terms & Conditions:

1. This approval does not exonerate the applicant from obtaining local authority approval or any other necessary approval for proposed work.
2. If any heritage resources, including graves or human remains, are encountered they must be reported to SAHRA immediately.
3. SAHRA reserves the right to request additional information as required.

**APPENDIX D1: SAHRA CLARIFICATION WITH RESPECT TO INTERIM COMMENT
ON SCOPING REPORT**



an agency of the
Department of Arts and Culture

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South African Heritage Resources Agency - Head Office | 111 Harrington Street | Cape Town
P.O. Box 4637 | Cape Town | 8001

Monday, 9 July 2018

ACO Associates
Unit D17
Prime Park
Mocke Road
Diep River
7800

Dear Mr Halkett,

RE: EXTENSION OF TORMIN MINE, WEST COAST SOUTH AFRICA (MAY 2018): CASE 12519

Thank you for your letter regarding the above dated 9 July 2018, wherein you requested that SAHRA review its interim comment made on SAHRIS case ID 12519 on 28 May 2018.

From the contents of your letter, SAHRA notes that an Archaeological Impact Assessment (AIA) has already been carried out, and that underwater heritage impacts were assessed as part of the AIA. It must also be clarified that the Underwater Heritage Impact Assessment referred to in the interim comment issued on 28 May 2018 does not require additional physical surveys to be carried out. As per the comment, "*an in-depth survey of the affected area, paying particular attention to the coastal areas between the high and low water marks (i.e. the intertidal zone), indicating the significance of each heritage resource in the affected area, and making recommendations that seek to minimise negative impacts*" is required. The survey referred to is a desktop research survey.

SAHRA also notes that, as per your letter, the AIA appears at this stage to address impacts to underwater heritage and will be provided in the full Environmental Impact Assessment (EIA) which will be submitted to SAHRA for comment following the conclusion of consultation on the Scoping Report. The interim comment issued on 28 May 2018 therefore does not refer to an existing AIA as SAHRA was not aware that one had been carried out, and the requirement for a "Underwater Heritage Impact Assessment (UHIA)" in that comment may be satisfied by the existing AIA once it is submitted to SAHRA for comment with the full EIA.

We trust this clarifies the matter. Should you have any further questions, please do not hesitate to contact us.

Sincerely,

Lesla la Grange
Acting Manager: Maritime and Underwater Cultural Heritage

www.sahra.org.za

APPENDIX E: SPECIALIST DECLARATION

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

D.J. HALKETT as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at 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 48 of GN No. R. 326.

Note: The terms of reference must be attached.

Signature of the specialist:



Name of company:

ACO ASSOCIATES CC

Date:

26 JULY 2018