SECTION 5: KEY FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

Section 5 lists the key findings of the study and recommendations. These findings are based on:

- A review of key planning and policy documents pertaining to the area;
- Semi-structured interviews with interested and affected parties;
- A review of the findings of other relevant studies undertaken as part of the EIA;
- A review of social and economic issues associated with similar developments;
- The experience of the authors with the area and other similar projects in Southern Africa.

5.2 SUMMARY OF KEY FINDINGS

The key findings of the study are summarised under the following sections:

- Fit with policy and planning;
- Operational phase impacts;
- No-development option.

As indicated in Section 1, in the case of the proposed Koingnaas–Samsons Bak mining project there is no clear distinction between the construction and operational phase of the project. The project involves mining new areas associated with an already established mining area. The key activities associated with establishment (construction phase) of the mining operation, such as infrastructure, access roads, housing, processing plant etc. were undertaken by De Beers. The focus of the SIA is therefore on the operational and decommissioning phase.

5.2.1 Policy and planning issues

For the purposes of the meeting the objectives of the SIA the following national, provincial and local level policy and planning documents were reviewed, namely:

National
- Mining Charter (2010);
- New Growth Path Framework (2010);

Provincial
- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Northern Cape Spatial Development Framework (2012).

District and local
- Namakwa District Municipality Integrated Development Plan (Review 2014/15);
- Hantam Local Municipality Integrated Development Plan (Review 2014/15).

Based on the findings of the review the development of mining is supported as key investment sector in the New Growth Plan, Northern Cape Provincial Growth and Development Strategy (NCPGDS) and the Northern Cape Spatial Development Framework (NCSDF). In terms of supporting development in the mining sector the PGDS identifies a number of strategic interventions, including:

- Promote the development of synergies between the mining and other economic activities;
- Promote the role mines play in terms of rural economic development;
- Promote further large-scale mining development;
- Support small-scale mining development;
- Enhancing logistics for minerals development;
- Develop opportunities for black business development in the minerals sector.

Support for investment and creation of opportunities for job creation and economic development are also highlighted as key objectives in the Integrated Development Plans prepared by the Nama Khoi and Kamiesberg Local Municipalities.

Based on the findings of the review the proposed Koingnaas-Samsons Bak mining project is supported at a national, provincial and local planning and policy level.

5.2.2 Operational phase

The key social issues associated with the operational phase include:

Potential positive impacts

- Creation of employment opportunities;
- Creation of skills development and training opportunities;
- Creation of business opportunities;
- Creation of opportunities to revitalise Koingnaas and Kleinzee;
- Support for local community initiatives and developments.

Employment

The current operations employ ~ 100 permanent staff, of which 93 (93%) are historically disadvantaged individuals (HDIs). In terms of employees from the local area, 93 (93%) of the total workforce comes from local towns in the area (Table 4.1). All of these workers are HDIs.

At full production the total workforce will number 250-300. As in the case of the current breakdown, more than 90% of this workforce will be HDIs. The proposed mining development will therefore create significant employment opportunities for HDIs. Although the employment opportunities will be limited to the life of mine, which is currently estimated to be between 10 and 15 years, this will represent a significant benefit and opportunity for the local economy in the KLM and NKLM.

The total annual wage bill associated with the current operations which employs ~ 100 staff is R 31 million (2016 rand values). The annual total wage bill associated with a workforce of between 250 and 300 will be in the region of R 90 million (2016 rand values). The total wage bill (excluding annual increases) over the 10 to 15 life of mine would therefore be in the region of R 900 million to R 1.35 billion (2016 rand values).

As indicated above, 93% of the current employees are HDIs and live in local towns in the study area. These figures are also likely to apply to the full production workforce of 250-300. A significant portion of the annual wage bill is and will be earned by HD members from the area and will be spent in local towns in the area. The injection of wage income over the 10 and 15 year life of mine (R 900 million to R 1.35 billion) will represent a significant socio-economic benefit and opportunity for the local economy and business in the KLM and NKLM.

Training and skills development

86 out of the current total of 100 current employees have undergone some form of training and skills development within the first 12 months of being employed. All of the recipients are HDIs. Similar on-going training and skills development opportunities will be provided for the additional workers employed when full production is achieved (250-300). As is currently the case, the majority of the beneficiaries will be HDIs from local communities in the NKLM and KLM. The proposed mining development will therefore create significant training and skills development opportunities for HDIs. Although these opportunities will be limited to the life of mine, which is currently estimated to be between 10 and 15 years, this will represent a significant benefit and opportunity for the workers and will increase their chances of finding alternative employment when the mining operations stop.

Creation of business opportunities

The creation of business opportunities will be linked to capital expenditure and procurement expenditure by WRC and wage spend by employees in the local economy.

WRCs capital expenditure associated with start-up activities amounts to ~ R 26 million (2016 rand values) for the first year of operations. The capital expenditure for the remaining 10 -15 years life of mine is estimated to be region of R 128 million (2016 rand values). This expenditure creates business opportunities for local companies involved in the mining sector.

In addition to capital expenditure WCR outsource a number of their operations to mining, service and security contractors etc. The total expenditure by WCR for period 2015/16 was therefore in the region of R 55 million (2016 rand values). This, like the annual wage bill, will increase when mining operations move into full production and will create opportunities for local businesses in the NKLM and KLM. WCRs are committed to the implementation of a preferential procurement plan as per the requirements set out in the Social Labour Plan (April 2015).

In addition to the business opportunities associated with the mining related expenditure a percentage of the annual wage bill (R90 million at full employment) will be spent in the towns where the workers live. As indicated above the total wage bill over the 10-15 life of mine will be in the region of R 900 million to R 1.34 billion. The local spend of a percentage of this wage income will represent a significant socio-economic benefit and opportunity for the local economy and business in the KLM and NKLM.

Creation of opportunities to revitalise Koingnaas and Kleinzee

Given the limited economic opportunities in the area the mining operations proposed by WRCs provide an opportunity to act as catalyst to revitalise the towns of Koingnaas and Kleinzee. In this regard the presence of WCRs employees in these towns will create demand for services, such as doctors, pharmacists, etc. and facilities, such as supermarkets, sports facilities and restaurants. Friends and family

members of WCR employees will also visit the towns, thereby increasing the demand for services and facilities and also increasing the exposure of these towns to the public.

In the absence of the potential opportunities created by the proposed mining there is a very real risk that the towns of Koingnaas and Kleinzee would deteriorate and become dysfunctional, run-down towns. If this happens it will pose a financial burden on the NKLM and KLM.

Support for community initiatives

In discussions with representatives from the NKLM and KLM WCRs have identified a number of community initiatives to support, including up-grading school facilities and covering salaries for school teachers and the establishment of play parks and internet cafes. A budget of ~ R 10 million has been allocated to supporting community initiatives over the next five years.

However, based on the feedback from the local community one of the key challenges facing the communities in Hondeklip Bay and Soebatsfontein was access to affordable public transport. There is no bus service that services the local small towns in the area and transport costs associated with travelling to towns such as Springbok, Garies and Kamieskroon are high. One the key costs that local parents are faced is the cost of transporting children to the high school in Garies. Due to the high transport costs a number of families cannot afford to send their children to high school. As a result they do not complete school and this places them at a disadvantage in later life. The other issue identified by representatives from Hondeklip Bay was the lack of sports facilities for the youth. The only sport facility is the rugby field, which has not ablution facilities or change rooms. The cost associated with hiring transport for away games was also raised as an issue.

Potential negative impacts

- Risks to local communities posed by workers;
- Risk to abalone and crayfish operations[9];
- Noise, dust and safety impacts associated with mining related activities and the movement of heavy vehicles.

The significance of the potential negative impacts with mitigation was assessed to be of **Low Negative** significance. All of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

Table 5.1 summarises the significance of the impacts associated with the operational phase.

[9] The potential risk to abalone and crayfish operations along the coast has been assessed as part of the specialist marine assessment

Table 5.1: Summary of social impacts during construction phase

Impact	Significance No Mitigation	Significance With Enhancement /Mitigation
Creation of employment opportunities	Medium (Positive impact)	High (Positive impact)
Creation of training and skills development opportunities	Medium (Positive impact)	High (Positive impact)
Creation of business opportunities	Medium (Positive impact)	High (Positive impact)
Revitalisation of Koingnaas and Kleinzee	High[10] (Negative impact)	High (Positive impact)
Support for community initiatives	High	High
Risk to local communities posed by workers	Low (Negative impact)	Low (Negative impact)
Dust, noise and safety impacts associated with mining related activities	Low (Negative impact)	Low (Negative impact)

5.2.3 Assessment of closure and decommissioning

In terms of South Africa the Mineral and Petroleum Resources Development Act, 2002, (Act No 28 of 2002) (MPRDA), the potential impacts associated with downscaling and retrenchments must be addressed in the SLP. In this regard one of the objectives of the SLP is to provide mine workers with additional skills, save jobs and manage downscaling and/or closure.

In the case of the proposed project, the WCRs employees are aware that the life of mine is 10-15 years. In addition, unlike the previous De Beers operations, employees will not be provided with free housing, services and schooling for children etc. This created a dependency mentality which exacerbated the impact on workers and families when the De Beers operations were closed down.

5.2.4 Risk to abalone farming operations

The potential risk to abalone and crayfish operations along the coast has been assessed as part of the specialist marine assessment undertaken by Capricorn Marine Environmental (July 2016). Based in the key findings the risk to the current abalone operations is an issue that will need to be addressed as part of the mining programme. It is also worth noting that mining operations are temporary in nature. The opportunity to resume abalone farming once marine mining operations have ceased is therefore likely. This feasibility of this should be confirmed by the marine specialists.

5.2.5 Assessment of no-development option

The no-development alternative would result in a lost opportunity to create employment and business opportunities associated with the proposed mining operations. The no-development option would also result lost opportunity to support local community initiatives in the area and act as a catalyst to revitalise the towns of Koingnaas and Kleinzee. The no-development option is therefore not supported.

[10] Assumes that mining does not proceed

5.3 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The findings of the SIA indicate that the Koingnaas-Samsons Bak mining project will create a number of positive social and economic opportunities for the local community and the area as a whole. These include the creation of employment, training and skills development and business opportunities. In addition the mining operations will create opportunities to support local community initiatives and revitalise the towns of Koingnaas and Kleinzee. The proposed project also supports a number of key objectives contained in the NKLM and KLM IDPs, specifically employment creation and economic development. The establishment of the proposed Koingnaas-Samsons Bak mining project is therefore supported by the findings of the SIA.

Recommendations

The following recommendations are made:

- WCRs should seek to increase the number of workers employed from Hondeklip Bay and Soenbatsfontein, specifically given their proximity to the mining area. Likewise, training and skills development opportunities should also be provided for members from these communities to enable them to apply for jobs on the mine;
- As part of it community support programme, WCRs should investigate the opportunity for providing free and or subsidized transport for school children in the area, specifically high school children that attend boarding school. Support for local sports clubs should also be investigated;
- WCRS, in consultation with the NKLM, KLM, Northern Cape Provincial Government and relevant institutions, such as the South African Development Bank, should develop a strategy and plan aimed at promoting the development of Koingnaas and Kleinzee as sustainable, coastal towns.

5.4 IMPACT STATEMENT

The findings of the SIA indicate that the Koingnaas-Samsons Bak mining project will create a number of positive social and economic opportunities for the local community and the area as a whole. The majority of the employment opportunities are likely to benefit HD members from the community. The findings of the SIA also indicate that all of the potential negative impacts can be effectively mitigated. It is therefore recommended that the proposed Koingnaas-Samsons Bak be supported, subject to the implementation of the recommended enhancement and mitigation measures contained in the SIA report.

ANNEXURE A: LIST OF SOURCES

INTERVIEWS

- Willie van Rooyen, owner of Anker Guesthouse, 21/06/2016;
- Mr Rudy Raath, General Manager WCRs, 22/06/2016;
- Mr Pieter Smith, Accountant, WCRs, 22/06/2016;
- Mr Ralph Losper, Human Resource Manager, WCRs, 22/06/2106;
- Mr Leonard Pietersen, Chairperson Hondeklip Bay Police Forum, 22/06/2016;
- Thelana Titus, Community Worker, Hondeklip Bay, 22/06/2016;
- Detective Hennie van Niekerk, Kleinzee Police Station, 22/06/2016;
- Dawid Markus, Chairperson Hondeklip Bay Rugby Club, 23/06/2016;
- Helen Philander, Hondeklip Bay Bakery, 23/06/2016;
- Ms Elsabie Stevens, Local Councillor Hondeklip Bay / Soebatsfontein, 5/07/2016;
- Mr Piet Claasen, local resident Soebatsfontein, 5/07/2016;

REFERENCES

- Mining Charter (2010);
- New Growth Path Framework (2010);
- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Northern Cape Spatial Development Framework (2014).
- Namakwa District Municipality Integrated Development Plan (Review 2014/15);
- Hantam Local Municipality Integrated Development Plan (Review 2014/15).

ANNEXURE B: ASSESSMENT METHODOLOGY

Assessment of predicted significance of impacts for a proposed development is by its nature, inherently uncertain – environmental assessment is thus an imprecise science. To deal with such uncertainty in a comparable manner, standardized and internationally recognized methodology has been developed, and is applied in this study to assess the significance of the potential environmental impacts of the proposed exploration activities.

The significance of the impacts was determined through the following:
For each impact, the SEVERITY (size or degree scale), DURATION (time scale) and EXTENT (spatial scale) are described (Table 1-1). These criteria are used to determine the CONSEQUENCE of the impact (Table 1-2), which is a function of severity, spatial extent and duration.

Table 1.1: Ranking criteria for environmental impacts

SEVERITY/ INTENSITY	H	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Irreplaceable loss of resources.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Noticeable loss of resources.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Limited loss of resources.
DURATION	L	Quickly reversible. Less than the project life. Short term (0-5 years)
	M	Reversible over time. Life of the project. Medium term (6-11 years)
	H	Permanent. Beyond closure. Long term (>11 years)
SPATIAL SCALE	L	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national

Table 1.2: Determining the consequence

SEVERITY	DURATION		SPATIAL SCALE		
			Site Specific (L)	Local (M)	Regional/ National (H)
Low	Long term	H	Medium	Medium	Medium
	Medium term	M	Low	Low	Medium
	Short term	L	Low	Low	Medium
Medium	Long term	H	Medium	High	High
	Medium term	M	Medium	Medium	High
	Short term	L	Low	Medium	Medium
High	Long term	H	High	High	High
	Medium term	M	Medium	Medium	High
	Short term	L	Medium	Medium	High

The SIGNIFICANCE of an impact is then determined by multiplying the consequence of the impact by the probability of the impact occurring, as shown in Table 1.3 with interpretation of the impact significance outlined in Table 1.4.

Table 1.3: Determining the Significance Rating

PROBABILITY (of exposure to impacts)		CONSEQUENCE		
		L	M	H
Definite/ Continuous	H	Medium	Medium	High
Possible/ frequent	M	Medium	Medium	High
Unlikely/ seldom	L	Low	Low	Medium

Table 1.4: The interpretation of the impact significance

SIGNIFICANCE	CRITERIA
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

Table 1.5: The interpretation of the status of the impact

IMPACT STATUS	CRITERIA
Positive	The impact benefits the environment

Negative	The impact results in a cost to the environment
Neutral	The impact has no effect on the environment

Once the significance of an impact has been determined, the CONFIDENCE in the assessment of the significance rating is ascertained using the rating systems outlined in Table 1.6.

Table 1.6: Definition of confidence ratings

CONFIDENCE RATINGS*	CRITERIA
High	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact. Greater than 70% sure of impact prediction
Medium	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact. Between 35% and 70% sure of impact prediction.
Low	Limited useful information on and understanding of the environmental factors potentially influencing this impact. Less than 35% sure of impact prediction.

* The level of confidence in the prediction is based on specialist knowledge of that particular field and the reliability of data used to make the prediction.
The degree to which the impact can be reversed is estimated using the rating system shown in Table 1.7.

Table 1.7: Definition of Reversibility Ratings

REVERSIBILITY RATINGS	CRITERIA
Irreversible	Where the impact is permanent.
Partially Reversible	Where the impact can be partially reversed.
Fully Reversible	Where the impact can be completely reversed.

The degree to which there will be a loss of resources, as shown in Table 1.8 refers to the degree to which a resource is permanently affected by the activity, i.e. the degree to which a resource is irreplaceable.

Table 1.8: Definition of loss of resources

LOSS OF RESOURCES	CRITERIA
Low	Where the activity results in a loss of a particular resource but where the natural, cultural and social functions and processes are not affected.
Medium	Where the loss of a resource occurs, but natural, cultural and social functions and processes continue, albeit in a modified way.
High	Where the activity results in an irreplaceable loss of a resource.

Lastly, the degree to which the impact can be mitigated or enhanced is shown in Table 1.9:

Table 1.9:Degree to which impact can be mitigated

DEGREE TO WHICH IMPACT CAN BE MITIGATED	CRITERIA
None	No change in impact after mitigation.
Very Low	Where the significance rating stays the same, but where mitigation will reduce the intensity of the impact.
Low	Where the significance rating drops by one level, after mitigation.
Medium	Where the significance rating drops by two to three levels, after mitigation.
High	Where the significance rating drops by more than three levels, after mitigation.

Environmental Assessment Policy requires that, "as far as is practicable", cumulative environmental impacts should be taken into account in all environmental assessment processes. EIAs have traditionally, however, failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements; and
- Environmental assessments are typically carried out on specific developments, whereas cumulative impacts result from broader biophysical, social and economic considerations, which typically cannot be addressed at the project level.

However, when assessing the significance of the project level impacts, cumulative effects have been considered as far as it is possible (as High, Medium or Low) in striving for best practice. The sustainability of the project is closely linked to assessment of cumulative impacts.

Appendix 2.19.2: Heritage/Archaeological study – Included as part of Volume 4 of the EIAR (Section 1)

WEST COAST RESOURCES-NAMAQUALAND MINES – ENVIRONMENTAL IMPACT ASSESSMENT

HERITAGE IMPACT ASSESSMENT: WEST COAST RESOURCES NAMAQUALAND MINES

IMPACT ASSESSMENT FOR THE AMENDMENT OF AN ENVIRONMENTAL MANAGEMENT PROGRAMME AND ENVIRONMENTAL IMPACT ASSESSMENT IN SUPPORT OF A MINING RIGHT HELD BY WEST COAST RESOURCES ((PTY)) LTD OVER THE NAMAQUALAND MINES, NORTHERN CAPE PROVINCE

Prepared for

Myezo Environmental Management Services (Pty) Ltd

DRAFT 1 19 July 2016

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Summary

ACO Associates CC was appointed by Myezo (Pty) Ltd to provide a specialist contribution in terms of heritage to an Environmental Impact Assessment for renewed mining activities by West Coast Resources (PTY) Ltd (WCR). WCR is undertaking mining in terms of an existing EMP; however the addition of beach mining activities has triggered a renewed EIA process to consider the impact of the new activities. The land portions under consideration are the farms Zwartlintjies River 484, Kliphuis 496, Mitchell's Bay 495 and Samson's Bak 330.The project area commences north of the old De Beers town of Koingnaas (now an independent municipality) and extends southwards as far as Mitchell's Bay which lies just north of the Spoeg River Mouth. Previous studies have revealed that the project area contains a wide variety of heritage resources ranging from Palaeontology, Stone Age shell middens to maritime archaeology.

Findings

A feature of the project area is the excellent surface preservation of many archaeological sites; in particular those in un-mined areas under secure control. This preservation is as a result of these areas having been restricted to the public for many years. To minimise the destructive effects of human action in the future it is suggested that the following measures be applied:

- The palaeontology management plan (Pether 2008 Appendix B) remains valid, however to reiterate, mining has made a contribution to the understanding of the regional sequence in that work done by the mine itself and also by outside specialists has added to the academic understanding of the west coast geological sequence. Positive outcomes for knowledge and science can be gained by ensuring that a palaeontologist inspects pits and profiles before they are rehabilitated.

- Archaeological sites are an irreplaceable aspect of the environment and should be protected as vigilantly as any endangered animal or plant species. It should become part of the company environmental policy that people are actively discouraged from collecting artefactual material or conducting excavations without a SAHRA permit, or removing material from shipwrecks.

- Provided that a range of archaeological sites are preserved in areas which are not going to be mined, this will to some extent mitigate the damage that mining does to heritage sites elsewhere. In order to execute effective conservation and mitigation procedures the following measures are proposed.

- Mining should be treated like any other development activity. New mining areas should be subjected to a heritage impact assessment (HIA) well in advance of the start of any earthmoving. During the course of the HIA all archaeological and other heritage sites will have to be identified and their surface characteristics recorded and certain kinds of archaeological material collected. Sites which are important will have to be sampled/excavated as part of a mitigation programme.

- Off-road vehicles should be restricted to existing roads and tracks which will minimise damage to archaeological material. This is particularly so in areas within 1km of the shoreline which contain large concentrations of sites.

Potential for impacts to maritime heritage can occur in beach mining operation.

- If any shipwreck material or unexplained seabed anomalies are discovered during the seabed survey or mining activities, the findings should then be assessed by a maritime archaeologist at SAHRA to identify the need for further action / mitigation.

- It is recommended that should any shipwrecks be discovered, any relevant observations and position of the find be reported to SAHRA for inclusion on the National Shipwreck Database.
- SAHRA's permission in the form of a permit would be required to disturb a maritime archaeological site or material (this includes any sites within the inter-tidal zone below the high water mark), should it not be possible for the project to avoid such sites. It is important to bear in mind that such permission is likely to be premised on suitable archaeological mitigation of any such site having been conducted, to ensure preservation of the site by record.

Rehabilitation of mined areas, although positive for the environment, can pose a threat to otherwise undisturbed sites through earthmoving and related activity, particularly where the edges of deep excavations are collapsed and contoured. Archaeological sites that have survived on the edges of pits have been destroyed during rehabilitation. Similarly sites on prospective roads, mine dumps and infrastructure should be included in the HIA programmes. Work that has taken place to date under old De Beers management has resulted in survey and mitigation of many of the proposed mining blocks that WCS intends to mine, thus reducing impacts and the amount of archaeological work necessary before mining. A number of areas still need to be surveyed and mitigated. This can be done on an annual/bi or tri-annual basis depending on the mining block planning.

Conclusion

Provided that mitigation is applied where necessary, all mining work can proceed in accordance with the law. This report finds that the proposed activities are acceptable and that most impacts can be successfully mitigated.

Details of the specialist

This study has been led by Tim Hart BA Hons, MA (ASAPA, APHP) of ACO Associates CC, archaeologists and heritage consultants.

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Curriculum vitae

Name: Timothy James Graham Hart

Profession: Archaeologist

Date of Birth: 29/07/60

Parent Firm: ACO Associates

Position in Firm: Director

Years with Firm: 9

Years experience: 30 years

Nationality: South African

Education: Matriculated Rondebosch Boys High, awarded degrees BA (UCT) BA Hons (UCT) MA (UCT).

Professional Qualifications: Principal Investigator ASAPA, member of Association of Heritage Professionals (APHP)

Languages: Fully literate in English, good writing skills. Conversation in Afrikaans, mediocre writing skills, good reading skills. Some knowledge of Latin.

KEY QUALIFICATIONS

- Bachelor of Arts in Archaeology and Psychology
- BA Honours in archaeology
- MA in Archaeology
- Recipient of Frank Schweitzer Memorial Prize (UCT) for student excellence
- Professional member (no 50) Association of Southern African Professional Archaeologists (ASAPA)
- Principal Investigator, cultural resources management section (ASAPA)
- Professional member in specialist and generalist categories Association of Heritage Professionals (APHP)
- Committee Member Heritage Western Cape, Committee Member SAHRA
- Awarded Department of Arts and Culture and Sport award for best heritage impact study in 2014,

Relevant recent Project Experience with respect to large projects:

- Specialist consultant – Eskom's Kudu Integration project (identifying transmission line routes across Namaqualand)
- Specialist consultant – Eskom's Atlantis Open Cycle Gas Turbine project, upgrade and power lines
- Specialist consultant – Eskom's Mossel Bay Open Cycle Gas Turbine project, substations and power lines
- Specialist consultant – Eskom's proposed Omega sub-station

- Specialist consultant – Eskom's Nuclear 1 programme
- Specialist consultant – Eskom's PBMR programme
- Specialist consultant – Department of Water Affairs raising of Clanwilliam Dam project
- Specialist consultant to De Beers Namaqualand Mines (multiple projects since 1995)
- Specialist consultant – Saldanha Ore Handling Facility phase 2 upgrade
- Three years of involvement in Late Stone Age projects in the Central Great Karoo
- Wind Energy systems: Koekenaap, Hopefield, Darling, Vredendal, Bedford, Sutherland, Caledon, Pofadder, and central Karoo (86 completed to date).
- Specialist consultant – Eskom nuclear 1
- Consultant on various projects 1991-2008 Namaqualand diamond mines.
- Bantamsklip Nuclear 1 TX lines
- Koeberg Nuclear 1 TX lines
- Karoo uranium prospecting various sites
- HIA Houses of Parliament
- Proposed Ibhubesi gas project, West Coast of South Africa.

Experience

After graduating from UCT with my honours degree I joined the Southern Methodist University (SMU Dallas Texas) team undertaking Stone Age research in the Great Karoo. After working in the field for a year I registered for a Master's degree in pre-colonial archaeology at UCT with support from the SMU Zeekoei Valley Archaeological Project. On completion of this degree in 1987 I commenced working for the ACO when it was based at UCT. This was the first unit of its kind in RSA.

In 1991 I took over management of the unit with David Halkett. We nursed the unit through new legislation and were involved in setting up the professional association and assisting SAHRA with compiling regulations. The office developed a reputation for excellence in field skills with the result that ACO was contracted to provide field services for a number of research organisations, both local and international. Since 1987 in professional practise I have has been involved in a wide range of heritage related projects ranging from excavation of fossil and Stone Age sites to the conservation of historic buildings, places and industrial structures. To date the ACO Associates CC (of which I am co-director) has completed more than 2000 projects throughout the country ranging from minor assessments to participating as a specialist in a number of substantial EIA's as well as international research projects. Some of these projects are of more than 4 years duration

Together with my colleague Dave Halkett I have been involved in heritage policy development, development of the CRM profession, the establishment of 2 professional bodies and development of professional practice standards. Notable projects I have been involved with are the development of a heritage management plan and ongoing annual mitigation for the De Beers Namaqualand Mines Division, heritage management for Namakwa Sands and other west coast and Northern Cape mining firms. Locally, I was responsible for the discovery of the "Battery Chavonnes" at the V&A Waterfront (now a conserved as a museum – venue for Da Vinci exhibition), the discovery of a massive paupers burial ground in Green Point (now with museum and memorial), the fossil deposit which is now the subject of a public display at the West Coast Fossil Park National Heritage Site as well as participating in the development of the Robben Island Museum World Heritage Site. I have teaching experience within a university setting and have given many public lectures on archaeology and general heritage related matters. I am presently running a NLF funded project to research the historic burial grounds of Green Point.

Academic Publications

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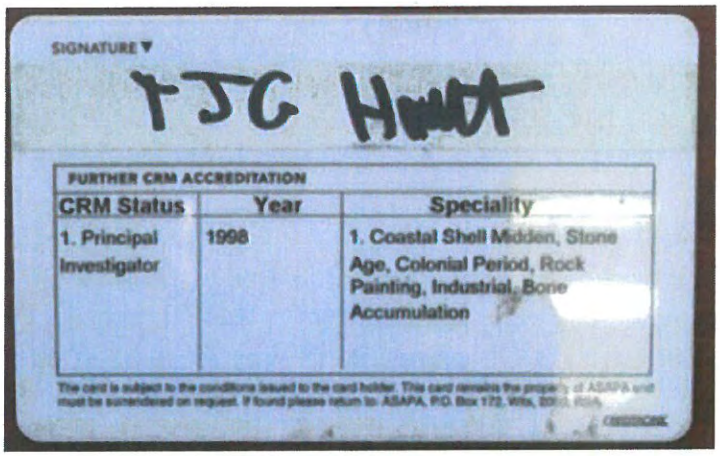

SIGNATURE ▼

TJG Hart

FURTHER CRM ACCREDITATION

CRM Status	Year	Speciality
1. Principal Investigator	1998	1. Coastal Shell Midden, Stone Age, Colonial Period, Rock Painting, Industrial, Bone Accumulation

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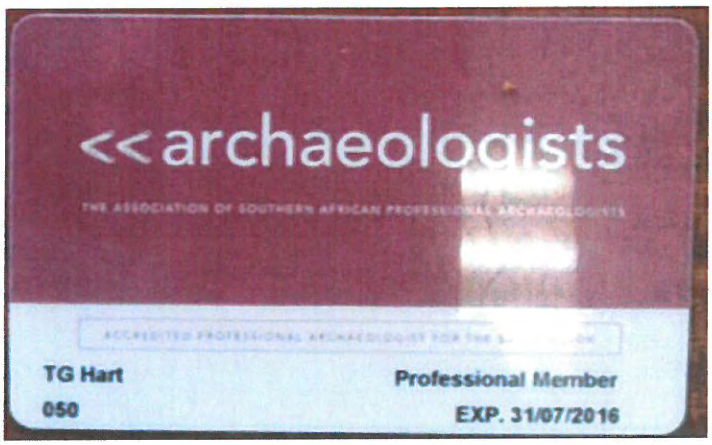

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THE ASSOCIATION OF SOUTHERN AFRICAN PROFESSIONAL ARCHAEOLOGISTS

ACCREDITED PROFESSIONAL ARCHAEOLOGIST FOR THE S... ...ON

TG Hart

050

Professional Member

EXP. 31/07/2016

Declaration of independence

PROJECT: WEST COAST RESOURCES EIA

I, **Tim Hart,** as the appointed independent specialist hereby declare that I acted as the independent specialist in this application; and that I

- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have 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, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) 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 71 of GN No. R. 543.

Note: The terms of reference must be attached.

Signature of the specialist:

TJG Hart

Name of company:
ACO Associates cc

Date: 18 July 2016

GLOSSARY

Archaeology: *Remains resulting from human activity which is in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.*

Anthropogenic: *Something made by humans.*

Calcrete: *A soft sandy calcium carbonate rock related to limestone which often forms in arid areas.*

Cultural landscape: *The combined works of people and natural processes as manifested in the form of a landscape*

Early Stone Age: *The archaeology of the Stone Age between 700 000 and 2500 000 years ago.*

Fossil: *Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.*

Heritage: *That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).*

Holocene: *The most recent geological time period which commenced 10 000 years ago.*

Late Stone Age: *The archaeology of the last 20 000 years associated with fully modern people.*

Middle Stone Age: *The archaeology of the Stone Age between 20-300 000 years ago associated with early modern humans.*

Midden: *A pile of debris, normally shellfish and bone that have accumulated as a result of human activity.*

National Estate: *The collective heritage assets of the Nation*

Palaeontology: *Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.*

Pan: *A shallow depression in the landscape that accumulates water from time to time.*

Palaeosole: *An ancient land surface.*

Pleistocene: *A geological time period (of 3 million – 20 000 years ago).*

Pliocene: *A geological time period (of 5 million – 3 million years ago).*

Miocene: *A geological time period (of 23 million - 5 million years ago).*

SAHRA: *South African Heritage Resources Agency – the compliance authority which protects national heritage.*

Structure (historic :) *Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.*

Acronyms

CRM	Cultural Resource Management
DEAT	Department of Environmental Affairs and Tourism
ESA	Early Stone Age
EMP	Environmental Management Plan.
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
LSA	Late Stone Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Agency

Table of Contents

Appendix A Heritage Impact Surveys and mitigation completed to date

Appendix B De Beers Palaeontological management plan (by John Pether 2008)

1 Introduction

West Coast Resources (Pty) Ltd has taken over prospecting and diamond mining areas in the Koingnaas region of the west coast, Northern Cape Province (Figure 1). West Coast Resources ((Pty)) Ltd is owned by a consortium of mining companies and the state including significant ownership by previously disadvantaged communities in the region. Transhex (Pty) Ltd, a company that has mined in the area for many years is also a shareholder and will guide the mining operations. The land portions under consideration are the farms Zwartlintjies River 484, Kliphuis 496, Mitchells Bay 495 and Samson's Bak 330.

The project area commences north of the old De Beers town of Koingnaas (now an independent municipality) and extends southwards as far as Mitchells Bay which lies just north of the Spoeg River Mouth. The area has been mined in various ways for almost 70 years with the bulk of operations located in the high security area south of Koingnaas, however WCR will be not only continuing under the existing Environmental Management Plan (EMP) but will also engaging in beach mining activities that triggers a new Environmental Impact Assessment. This specialist report covers heritage issues and also makes reference to the fact that there has been heritage legislative change since the previous EMP was completed.

1.1 The proposed activity

West Coast Resources (Pty) Ltd has taken over a number of prospecting and diamond mining areas in the Koingnaas region of the west coast, Northern Cape Province (Figure 1). West Coast Resources (Pty) Ltd is owned by a consortium of mining companies and the state including significant ownership by previously disadvantaged communities in the region. Transhex (Pty) Ltd, a company that has mined in the area for many years who is also a share holder will guide the mining operations. The land portions under consideration are the farms Zwartlintjies River 484, Kliphuis 496, Mitchells Bay495 and Samson's Bak 330.

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The mining will take place in a number of forms:

Land based mining, that is open cast excavation with bedrock cleaning and ore extraction will continue at land-based mining sites as per the existing EMP.

Shore and beach based mining has been practiced up to now on a limited scale, mostly by means of divers who pump diamondiferous gravels from rocky gullies below the high water mark. WCS intends to increase this operation to include larger scale mining which will involve the construction of retaining berms/walls to exclude the ocean. The areas will then be mined by means of mechanical excavation to extract ore which will be transported by truck to a nearby processing plant. This new form of activity is not included in the existing EMP and therefore triggers a renewed EIA.

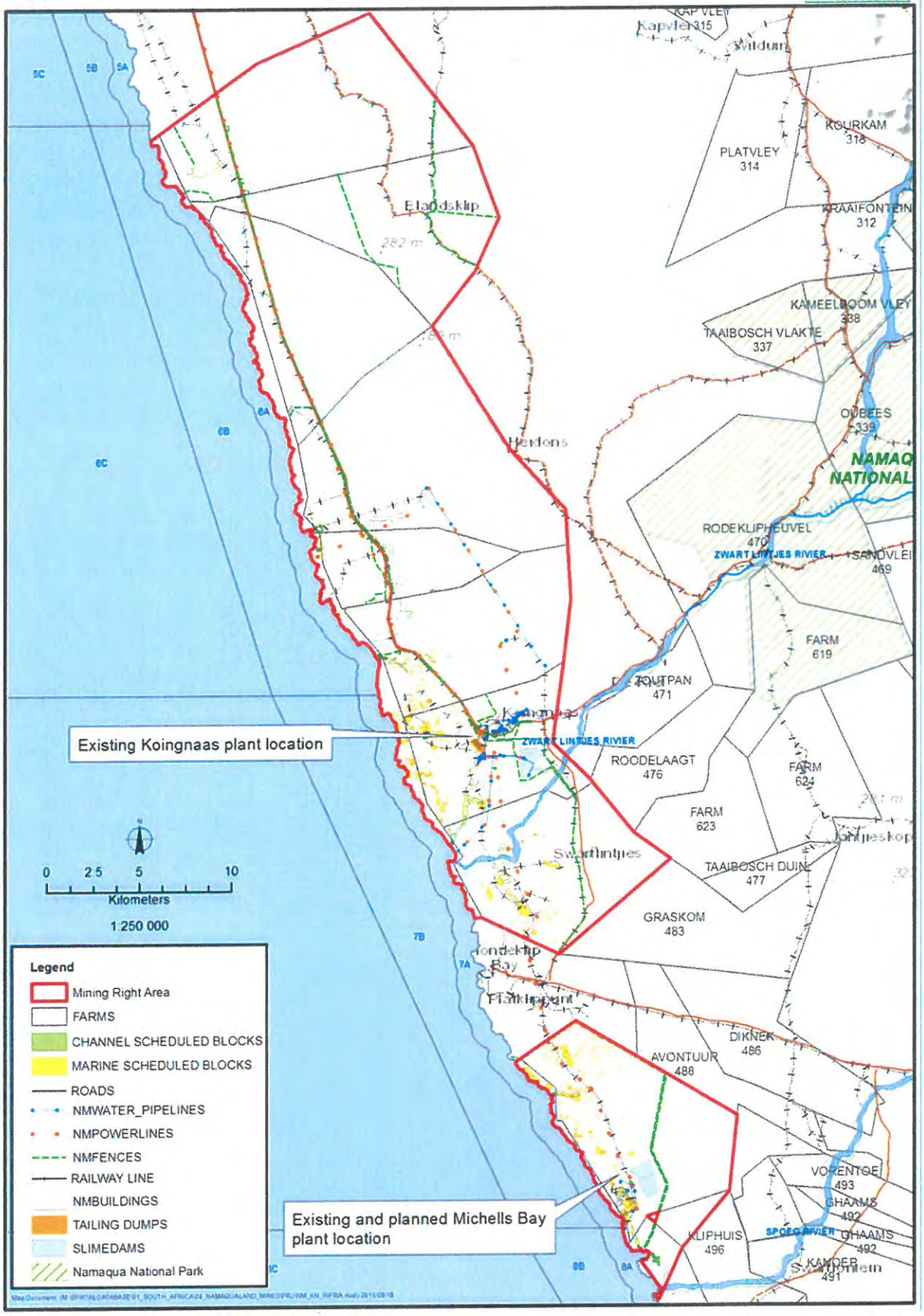

Figure 1 The WSP mining rights area

2 Legislation

Certain Archaeological sites in South Africa have been afforded legal protection since 1911 when the Bushmen Relics Protection Act became the first body of legislation that specifically protected artefacts and sites of 'South African Bushmen or other aboriginals' The first South African conservation authority - the Commission for the Preservation of Natural and Historical Monuments of the Union - was established in terms of the Natural and Historical Monuments Act of 1923. This body was more commonly known as the Historical Monuments Commission. In 1934, previous Acts were replaced by the Natural and Historical Monuments, Relics and Antiquities Act (see also Deacon and Pistorius 1996). This was superseded in 1969 with the creation of the National Monuments Council by an Act of Parliament. Various amendments have since been made to the Act, with the most recent amendment being in 1986. In 1999 new legislation was passed which is far more comprehensive than anything before, that is the National heritage Resources Act 25 of 1999 (as amended) which was implemented in 2003. A summary of critical elements of the legislation is included below.

The basis for all Heritage Impact Assessments (HIA) is the National Heritage Resources Act, No 25 of 1999 (NHRA), which in turn prescribes the manner in which heritage is assessed and managed. The legislation makes it mandatory that EIA process under taken under NEMA or under Minerals and Energy legislation applies the principals that are in place in sections 34 and 38 of the National Heritage Resources Act. The NHRA has defined certain kinds of heritage as being worthy of protection, by either specific or general protection mechanisms. In South Africa the law is directed towards the protection of human made heritage, although natural places and objects of scientific importance are covered. The National Heritage Resources Act also protects intangible heritage such as traditional activities, oral histories and places where significant events happened. Generally protected heritage, which must be considered in any heritage assessment, includes:

- Any place of cultural significance (described below)
- Buildings and structures (greater than 60 years of age)
- Archaeological sites (greater than 100 years of age)
- Palaeontological sites and specimens
- Shipwrecks and aircraft wrecks
- Graves and grave yards.

Section 38 of the NHRA stipulates that HIAs are required for certain kinds of development such as changing the character of land greater than 5000 sqm in extent or exceeding 3 or more sub-divisions, linear developments in excess of 300 m or for any activity that will alter the character or landscape of a site greater than 5000 sqm. Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as:

a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;

b) The construction of a bridge or similar structure exceeding 50 m in length;

c) Any development or other activity which will change the character of a site--

i) Exceeding 5 000 sqm in extent; or

ii) Involving three or more existing erven or subdivisions thereof; or

iii) Involving three or more erven or divisions thereof which have been consolidated within the past five years; or

iv) The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

d) The re-zoning of a site exceeding 10 000 sqm in extent; or

e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Section 3(3) of the National Heritage Resources Act (NHRA), No 25 of 1999 defines the cultural significance of a place or objects with regard to the following criteria:

(a) Its importance in the community or pattern of South Africa's history;
(b) Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
(c) Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
(d) Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
(e) Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
(f) Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
(g) Its strong or special association with a particular community or cultural group for social cultural or spiritual reasons;
(h) Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
(i) Sites of significance relating to the history of slavery in South Africa.

The archaeological record and the Cenozoic palaeontology of the project area are the main heritage resources

Under **Section 2 - Definitions,** the term archaeological is defined as:

(a) material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
(b) rock art, being in any form of painting, engraving or any other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years, including any area within 10m of such representation; and
(c) wrecks, being any vessel or aircraft, or any part thereof which is wrecked in South Africa, whether on land or in the maritime cultural zone referred to in section 5 of the Marine Zones Act, 1994 (Act 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which the SAHRA considers to be worthy of conservation:
(d) Features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

Relating to what is protected:

Section 30 (1) *No person may alter or demolish any structure or part of a structure which is older than 60 years except under the authority of a permit issued by the provincial heritage authority.*

Section 31(4) *No person may, except under the authority of a permit issued by a responsible heritage authority-*

a) Destroy, damage, excavate, alter, deface or disturb any archaeological or palaeontological site or meteorite;
b) Destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or meteorite;
c) Trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological material or palaeontological material or object, or any meteorite; or
d) Bring onto use at an archaeological or palaeontological site any excavation equipment or any equipment which assists in the detection or recovery of metals or archaeological or palaeontological material or objects, or use such equipment for the recovery of meteorites.

Section 32(3) *No person shall, except under the authority of a permit issued by a provincial heritage authority-*

(a) destroy, damage, alter, exhume, remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground which is situated outside of a formal cemetery administered by a local authority and which is older than 60 years; or
(c) Bring onto or use at a burial ground or grave referred to in clause (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

2.1 Scenic Routes

While not specifically mentioned in the NHRA, No 25 of 1999, Scenic Routes are recognised as a category of heritage resources which requires grading as the Act protects area of aesthetic significance (see clause "e" above). Baumann & Winter (2005) comment that the visual intrusion of development on a scenic route should be considered a heritage issue. HWC has taken this opinion further by acknowledging that the aesthetics of a landscape/place/area are protected by the National Heritage Resources Act and like any other form of heritage, should be considered a grade-able entity. (The definition of cultural significance in terms of the NHRA includes the aesthetic value of a place or area).

2.2 Heritage Grading

A key tool in the assessment of heritage resources is the heritage grading system which uses standard criteria. In the context of an EIA process, heritage resources are graded following the system established by Winter & Baumann (2005) in the guidelines for involving heritage practitioners in EIA's (Table 1). The system is also used internally within Heritage Authorities around the country for making decisions about the future of heritage places, buildings and artefacts.[1] Presently Heritage Western Cape has a good guide to grading which is nationally applicable (http://www.westerncape.gov.za/public-entity/heritage-western-cape).
The grading system was designed with structures in mind but has been applied to archaeological sites, streetscapes, objects. The call has been made by the heritage authority to apply the system to landscapes. The decision making process that we have used in this report is based on a simple 3-phase process.

1) Decide what kind of landscape is involved (rural, natural wilderness, historical townscape or historical agricultural area) – establish its dominant characteristics taking cognisance of UNESCO guidelines and previous work.
2) Establish the value of the landscape in terms of its history, its aesthetic value and its heritage value to a given community.
3) Consider the intactness of the landscape – has it been recently intruded on by new development (we have taken 60 years as a marker as this is generally used as a historic cut-off), and using the grading system as a guide suggest a field grading.

The system is in its early days of development and still needs to be refined further.

[1] http://www.westerncape.gov.za/other/2012/9/grading_guide_&_policy_version_5_app_30_may_2012.pdf

Table 1: Grading of heritage resources (Source: Winter & Baumann 2005).

Grade	Level of significance	Description
1	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
2	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
3A	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3A heritage resources.
3B	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.
3C	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.

Heritage specialists use this grading system to express the relative significance of a heritage resource. This is known as a field grading or a recommended grading. Official grading is done by a special committee of the relevant heritage authority; however heritage authorities rely extensively on field grading in terms of decision making.

Mining operations are not exempt from any heritage legislation; however it is lamentably common that mining operations continue to ignore heritage legislation. It is equally lamentable that Provincial and National heritage bodies whose duty it is to enforce legislation do not have the capacity to implement the law throughout their areas of jurisdiction. With due credit to De Beers Namakwaland Mines Division a good heritage management program was implemented with the result that West Coast Resources will benefit from large areas of land that have been subject archaeological assessment and in some areas, the necessary mitigation.

3 Methodology

This study is based on a considerable body of desktop information and directly relevant experience which ACO has accumulated over the last 26 years in the project area. New aerial photographs have been provided which has assisted the compilation of this report.

Much relevant information has been obtained from 30 reports and a number of scientific publications, the authors of which have been in the employ of this company. Raw data held by ourselves includes track-logs of areas that have been surveyed, co-ordinates of heritage sites and objects which has been used to compile information about areas that have been surveyed or otherwise, all of which has been stored in digital form.

The body of information was gathered by ACO while in the employ of De Beers Namakwaland Mines Division. Between 1991 and 2008 the team completed surveys of proposed mining blocks, recording all the heritage material and archaeological finds they could. Numerous archaeological sites were formally excavated and moved from the path of mining, hence this experience and the resulting body of information has allowed for a solid assessment of the impacts of the current mining proposals.

The assessment of impacts has taken place as per the guideline documentation provided by Myezo (Pty) Ltd.

Appendix A contains tables and maps indicating parts of the project area that have already been subject to HIA and mitigation, and what further areas need to be done, while appendix B

contains a copy of the palaeontological management plan (prepared for De Beers Namakwaland Mines Division) that is still relevant by John Pether 2008.

3.1 Season of work

This specialist assessment (undertaken in June –July of 2016) is not affected by season. Being an arid zone ground surface visibility is extremely good all year round.

4 BACKGROUND TO HERITAGE IN NAMAQUALAND

4.1 Palaeontology

An Assessment of the palaeontology of De Beers Namakwaland Mines Division was completed by Pether (2008). This study was completed under the NHRA and remains valid to this day. Relevant portions of his report are included below.

In terms of the National Heritage Resources Act No. 25 of 1999, Sections 35 & 38, palaeontological materials (fossils) are regarded as a heritage resource and appropriate actions are required to mitigate impacts from mining, construction and development on palaeontological heritage. If fossils are turned up in excavations, they must be rescued from destruction and loss.

The significance of fossils as natural heritage is primarily their scientific value. They contribute to the understanding of South Africa's geo-history, the progression through "deep time" of changing climates, oceanography and of the biota, both plant and animal, that lived on the land and in the sea. This history ultimately resulted in the landscapes and coasts and the resources that sustain us today. Generally-speaking they are scarce, non-renewable and irreplaceable when destroyed. Their value is also severely compromised when they are collected without proper recording of their geological context. Geological (sedimentological/palaeoecological) observations are indispensable for the interpretation of fossil finds.

The value of fossils extends far beyond the curiosity of palaeontological study in museums, for they provide the basis for biostratigraphy, the division of the sedimentary record into units of distinct ages that can be correlated both regionally and globally. The fossil content of strata is thus very important for understanding the genesis of exploitable mineral resources and for the geological models that furnish the basis for ongoing mineral exploration. Moreover, there are the intersecting broader concerns of **GeoHeritage**, scientifically with regard to the preservation of Type Sections of the deposits and **GeoTourism** as a sustainable endeavour for the future (Pether 2008).

4.1.1 Koingnaas to Hondeklip Bay

Little information was forthcoming from the Hondeklip area of central coastal Namaqualand until Tankard (1966) described aspects of the succession revealed by prospecting. At that stage, the sequence was seen in terms of the preliminary biostratigraphy erected by Haughton (1932) (Zones E to A). Significantly, Tankard (1966) reported the presence of channel-infilling, kaolinitic, non-marine sediments overlying kaolinized gneiss (the "Channel Clays"). The occurrence of abundant phosphatic nodules was observed. Tankard encountered difficulties in the application of Haughton's (1932) biostratigraphic zones to the more extensive prospecting exposures he saw (*i.e.* the "megatrenches"). An important advance for the stratigraphy of Namaqualand coastal deposits was Carrington & Kensley's (1969) article describing new molluscan fossils from the central Namaqualand area in which a summary stratigraphic column was presented. Channel-infilling, unfossiliferous, fluviatile clays and clayey sands, considered

Mio-Pliocene in age, were recognized as the oldest unit, which was succeeded by remnants of phosphatic beds with abundant shell moulds, considered Pliocene in age.
In contrast to the earlier suggestions of a Mio-Pliocene age for the higher elevation coastal-plain deposits (Wagner & Merensky, 1928; Haughton, 1932), Carrington & Kensley (1969) considered the bulk of the succession to be of Pleistocene age. They identified "transgression complexes" at 75-90, 45-50, 17-21, 7-8, ~5 and ~2 m ASL. and a 29-34 m Beach. Importantly, they found that the bivalve *Donax rogersi* Haughton, 1926, actually subsumed two species; the thick-shelled, robust *D. rogersi* "proper" and a thin-shelled, generally smaller species (thought by Haughton to be juveniles), which they named *Donax haughtoni*. The latter species occurred only in the fine-grained, usually laminated, sands of the "45-50 m complex," whilst *D. rogersi* occurred only in the coarse, usually cross-bedded, sediments of the younger "17-21 m complex". This finding constituted a major advance in the biostratigraphic subdivision of the older coastal-plain marine deposits. Additionally, species obtained from the "45-50 m complex" suggested a fauna of warm-water affinity.

Further notes on the deposits of central Namaqualand were provided by Davies (1973) and by Tankard (1975a, 1975b). Tankard (1975a) differed from Carrington & Kensley (1969) in regarding the phosphatic beds in the Hondeklip area as older than the "channel clays". However, Carrington & Kensley (1969) were correct and the "channel clays" are older than the phosphatic beds. Tankard provided some information on the phosphatic beds that infill hollows in the bedrock and which had come to be known as "E stage," from Haughton's oldest biostratigraphic unit,"E Zone". Tankard (1975a, 1975b) proposed correlations of lower, middle and upper "E stage" sub-units with the succession in the Varswater Quarry near Langebaanweg. Kent & Davies (1980) informally named the coastal-plain deposits between the Olifants River and Kleinzee the "Hondeklipbaai sandy gravels".

Pether (1986) provided a summary of the main findings of his research on the succession at Hondeklipbaai, including suggested correlations farther afield. More intensive faunal sampling carried out during this study led to considerable additions to the marine molluscan fauna of Namaqualand coastal deposits (Kensley & Pether, 1986). The first extinct Tertiary barnacle recorded from South Africa was described from Hondeklip by Pether (1990). Brunton & Hiller (1990) have described the fossil brachiopods collected by the writer in the Hondeklip study area. Pether (1994b) provided detail on the exposures and palaeontology at Hondeklipbaai (Pether 2008)

4.2 Archaeology

During the 1960's several researchers reported sites from the diamond areas and pottery was collected (Rudner 1968). Since that time few researchers have worked in the area, probably as a result of a combination of factors such as increasing costs of fieldwork and difficulty of access. Since the completion of this survey small portions of the Namaqualand coast have been studied in more detail. Excavations have also been undertaken at a cave at the Spoeg River mouth where a sequence of occupation has been found (Webley 1992). In addition, six archaeological sites on De Beers owned land at Brand se Baai have been subjected to controlled archaeological excavation as part of a programme to mitigate the effects of diamond mining (Halkett and Hart 1993). More sites were excavated to the north of Brand se Baai as part of the mitigation of Anglo Americans' Namakwa Sands project (Halkett and Hart 1994). Dates obtained from these excavations, have provided the beginning of a chronological framework for the occupation of Namaqualand. Three areas, namely Brazil, Tweepad and Schulpfontein were partially surveyed during an IEM study for ESKOM (Parkington and Hart 1991).

Early in 1991, Professor John Parkington of the Department of Archaeology at the University of Cape Town visited Kleinsee and was shown a number of archaeological sites along the coast in the mining areas. Following discussions with Mr. Richard Molyneux, the chief geologist at the time, the Archaeology Contracts Office (ACO) was commissioned to make an inventory of the archaeology of De Beers owned coastal properties in Namaqualand. This took place over some

three months in the latter half of 1991. It was hoped that ultimately important archaeological sites could be identified and saved from destruction by mining.

The archaeology of the Namaqualand coast has remained for many years, relatively unexplored apart from odd forays to study specific aspects (Rudner 1968). In addition to making a partial inventory of sites, this early attempt was a pioneering exercise aimed at determining the range, age, quantity and context of archaeological material.

It became clear within the first few days of fieldwork that a complete inventory would be out of the question as the range and number of archaeological sites was greater than anything that had been expected. A sampling strategy was employed that concentrated on a coastal strip of approximately 1km in width, in which most sites usually occur. Hence the information that was obtained from the 1991 survey was patchy, and being pre-GPS days, the accuracy of mapping was indifferent.

In 1997 De Beers Namakwaland mines appointed ACO to develop a management plan for the protection and mitigation of archaeological sites that were to be affected by mining. The plan was implemented by De Beers for many years under the watchful eye of Andrew Mackensie and Mr Paul Kruger. The management plan enjoyed considerable success in that no less than 30 reports, two PhD dissertations and numerous academic publications were produced. **All of this amounts to a considerable archive of knowledge which would have been completely lost if the management plan was not implemented**. The 1997 management plan remained in place until De Beers reduced its coastal mining operation in recent years with the result that no further work has taken place on any new mining operations in the area. In 1999 the new National Heritage Resources Act was passed and eventually enabled in 2003. This effectively invalidated the 1997 heritage management plan that was drafted in terms of the old National Monuments Act; however the principals expressed in the plan remain valid. The National Heritage Resources Act 25 of 1999 is more comprehensive and very much more complex protecting a very wide range of resources including archaeology, palaeontology, the built environment as well as setting and cultural landscape.

4.3 Archaeology of the Koingnaas area

A simplified summary of the main characteristics of the various historical periods of the region is presented below. These summaries will help to place the findings of the archaeological investigation in context.

4.3.1 The Early Stone Age (ESA)

In 1911, an amateur archaeologist discovered some ancient stone artefacts on the banks of the Eerste River in Stellenbosch. Among these was an artefact type which he recognised as the hand axe and suggested that they were of extreme age. Modern research has shown that these artefacts were made by people who lived between 200 000 and 1 000 000 years ago. Sites containing these characteristic Early Stone Age artefacts have been found throughout Africa, parts of Europe and the Far East (Sampson 1974) and locally, sites of this period have been found throughout South Africa. The makers of Early Stone Age artefacts are believed to be the hominid type known as *Homo erectus*. Although the population of these hominids was probably relatively small, the sheer depth of time over which they roamed the landscape has resulted in large numbers of sites found in widely differing ecological zones from the coast to the mountainous regions. The raw material favoured for the production of Early Stone Age tools was quartzite. It is no coincidence therefore that ESA sites are often found next to river beds where large quantities of water worn quartzite cobbles can be found. Within De Beers owned land extensive deposits of Early Stone Age material have been recorded in the Buffels-Marine complex and on the high surface quartzite ridges behind Kleinzee. This situation at Koingnaas is less well explored.

4.3.2 The Middle Stone Age (MSA)

Large cave sites discovered in the Kalk Bay Mountains on the Cape Peninsula in the 1920s, contained deep deposits with large numbers of more refined stone artefacts in the lower parts of the sequences. These were recognisably different from ESA artefacts and had many similarities to artefacts found in the Palaeolithic sites of Europe. Similar kinds of artefacts have since been found on many open sites and on rare occasions, in the deposits of caves throughout South Africa. A larger selection of fine grained raw material was used for the manufacture of artefacts as new techniques of production, and secondary working into intricate tools, required more predictable flaking properties. Research has shown that these artefacts belong to a period known in South Africa as the Middle Stone Age and date to the period between 40 000 and 200 000 years. Stone artefact sits of this time period are not uncommon. In some very rare instances where circumstances permit, fossil animal bone and marine shells have been found in association with the artefacts giving some indication of the diet and lifestyle. On the west coast of South Africa only 3 open sites of this kind have been encountered. One of these is at Boegoeberg north of Port Nolloth (exposed and damaged by mining), at Brandsebaai (destroyed by mining) and at Yzerfontein which was partially damaged by a road cutting but since been successfully studied. Other in-tact cave deposits have been identified at Elands Bay. In-tact MSA open sites are very rare and internationally prized. MSA people are thought to have been an early form of modern humans (*Homo sapiens*) who were capable of hunting large animals and capable of abstract thought. Current theory is that early *Homo sapiens* evolved in Africa and migrated to Europe and the Middle East circa 40 000 years ago (Klein 1989). It is believed that these new migrants may have been responsible for the demise of the Neanderthal populations in Europe.

MSA sites are likely to be buried below the surface but invisible to archaeological survey. The MSA, which is of late Pleistocene age, is identifiable by the artefactual content. It has particular stone tool forms associated with the characteristic technology of that period. MSA material does exist in some active dune seas where artefacts are periodically exposed as the sand shifts. A few sites were located at prospecting trenches where the material is present in sections and on spoil heaps. It is known that some ESA and MSA material will have been inundated by rising sea level as sites dating to the glacial phases would have been located on ancient coastal plains.

Most MSA and ESA sites are often of limited archaeological value because little more than stone artefacts survive. Organic materials are seldom preserved on open sites of this age except in exceptional circumstances where fossilisation takes place. These kinds of sites are highly valued. A number of such localities have been found in the Western Cape, for example Elandsfontein, Duinefontein and Saldahna. MSA sites with preserved organic material are prized internationally in terms of the information they contain about early modern human behaviour.

Although bone may be preserved on open sites where alkaline conditions prevail, caves and shelters are the best places for preservation. Where bone is found, extinct faunas are often present. Under these circumstances there is the possibility that included amongst them will be the remains of early human beings. While other parts of southern Africa have produced remains of Australopithecine's under specific preservation circumstances, very few remains of humans have been found which date to the late Pleistocene. The few remains which have been found in southern Africa are of major importance as they represent the earliest known existence of early modern humans, whom some researchers believe, evolved in Africa about 200 000 years ago (Klein 1989). We know that along the west coast we have artefactual material which attests to human activity from this time period but sites which produce hominid remains are extremely rare.

It is very difficult to date MSA sites in general because they require specialised direct dating techniques together with a range of supplementary Palaeoenvironmental information. As MSA

sites are over 40 000 years old, they are beyond the range of normal radio carbon dating. Because the MSA period is so extensive, the optimum situation is to find material in stratified context where relative ages can be deduced by comparing the contents of stratified layers.

4.3.3 The Late Stone Age (LSA)

This period has been subjected to detailed study by archaeologists, and is an area of focus in this report as it is the most common form of heritage site within the project area. Late Stone Age people lived in southern Africa from 40 000 years ago up to the arrival of European colonists at the Cape, and co-existing with them for some time. Late Stone Age people were the ancestors of the San (Bushmen) and Khoi Khoi people who were present throughout the south-western and Northern Cape during the colonial period. Throughout most of the Holocene (last 10 000 years) southern Africa was inhabited by small groups of San hunter-foragers who were highly mobile. They hunted with bows and arrows, snared small animals and, where groups lived close to the shore, gathered shellfish and other marine resources, a habit which resulted in the use of the term "Strandlopers". They used digging sticks, often weighted with bored stones, to find a variety of vegetable foods, particularly bulbs below the soil.

Not only did the San have a prodigious knowledge of the animals and plants around them, but they also had a complex belief system, aspects of which are represented in many of the rock painting and engraving sites of the northern and western Cape. It is now broadly accepted by archaeologists that shortly after 2000 years ago, a new economic system was introduced to southern Africa. Certain groups of people (the Khoi Khoi) who had adopted transhumant pastoralism (in this case with herds of fat-tailed sheep and later cattle) appeared in southern Africa (Smith 1987, Sealy and Yates 1994). While the San groups seem to have co-existed with the pastoralists, it has been suggested that hunter-foragers were marginalised moving into areas where the grazing opportunities were less attractive to pastoralists (Parkington et al 1986). The advent of pastoralism seems to have been accompanied by the technology of making clay pottery. The precise origin of early stock keeping and ceramic technology in southern Africa is still unclear but it is suggested that stock keeping was introduced from the north and gradually dispersed to the Cape.

The majority of archaeological sites in the study area date to the Late Stone Age, which is the heritage of the Khoi Khoi and San people. In the 1991 survey, which was by no means comprehensive hundreds of these sites were recorded.

4.4 Late Stone Age shell middens and open sites

The majority of visible archaeological sites in the project area date largely to the Later Stone Age (LSA). For reasons that are not entirely clear, but possibly related to climatic factors, LSA sites dating to the Holocene seem to fall within the last 5000 years. Of these, a large number date after the last 2000 years, when it is known that there was a major change in the prevailing social situation in the Cape. This is believed to have coincided with the arrival of pastoralist groups (Khoi Khoi) from the north, who in addition to introducing ceramic technology, also introduced domesticated stock, initially sheep and sometime later cattle. While the route of this migration remains unresolved, it is believed that one possible route for the introduction to southern Africa was from Botswana along the Orange River and down the west coast (Elphick 1977). Spoeg River cave has produced some of the oldest dates so far (2000 years ago) for domestic sheep in southern Africa (Webley 1992, Sealy and Yates 1994)

Late Stone Age sites along the coast of the project area are represented by scatters of marine shell (Figure 2). Areas immediately adjacent to the coast, especially where there are rocky shorelines, are often covered by extensive shell middens resulting from hundreds of visits by groups of pre-colonial people. These sites which overlie and overlap each other are very difficult to resolve archaeologically. Fortunately this is a near shore phenomenon and further inland, sites have more defined boundaries. Unlike those sites along the immediate shoreline which

contain few artefacts, occupation sites are generally believed to show a much wider range of artefactual material, with spatial arrangements indicating specific activity areas. Items that may be expected on such sites include stone artefacts, ostrich eggshell - particularly beads and water containers, grindstones, discrete shell piles, hearths, bone and whale bone structures. There seems to be no specific location which only attracts occupation sites however it has been observed that deflation bays along the coast or further inland were frequently selected for camping sites, and often contain suites of microlithic artefacts.

Within a kilometre of the shore, pre-colonial camp sites are found in a variety of environments and locations, some of which appear to have been favoured over others. Dune tops, dune lees, deflation bays and areas around sheltered bays appear to have strongly attracted pre-colonial people. We have noted clusters of middens and artefact scatters associated with coastal dune seas. These areas seem to have been popular 3000-5000 years ago. There are, however a significant number of sites that are not located at obvious natural foci and can be found on featureless coastal flatlands. This variability makes accurate prediction of location very difficult. What is clear is that people in this marginal landscape were attracted to the coast where food resources were the most reliable.

Later Stone Age sites along the coast are largely identified by scatters of marine shell. In some cases these dumps (called middens by archaeologists) are associated with domestic artefactual debris and are believed to represent occupation sites of long duration. Other sites, lacking a formal stone artefact component may represent visits of short duration.

Shell Middens typically occur within 1 km of the coast and tend to be prolific near estuaries and in dune fields, and adjacent to rocky shores. The immediate coastal dunes, especially close to rocky shorelines were greatly favoured by prehistoric people as marine food was close by. Areas close to sheltered bays contain so many middens that at times it is difficult to distinguish one from the next. Inland of the coast the frequency of shell middens drop away, however the pattern is not always predictable as an area with good game and a source of fresh water can result in middens existing kilometres inland.

4.4.1 The content of Late Stone Age middens

Three species of shellfish were heavily exploited by prehistoric people namely, the limpets *granatina, argenvillei* and *granularis*. Other species noted are the black mussel *Choromytilus meridionalis*, whelks *Burnupena sp.* and the limpet *barbara*. Information from the recorded sites indicates a tendency for higher quantities of *Choromytilus meridionalis* and *argenvillei* to be found on sites suspected to predate the ceramic period. The presence of the razor clam, *Solen capensis* on MSA sites, particularly around the present Swartlintjies River, suggest that estuarine conditions existed at some stage in the past and would be consistent with a higher sea level. Other species which occur in low numbers are *Patella compressa and Argobuccinum pustulosum pustulosum.* Some species have been collected for decorative purposes e.g. *Conus mosambicus,* a species of cowrie appears to have been perforated and used as decorative beads.

Figure 2 A late Stone Age shell midden situated close to Zwartlintjies Rivier.

The contribution of rock lobsters to the diet can be assessed on the basis of the number of mandibles found on the sites as these hard. Although lobster remains have been seen on most sites, observations so far indicate that sites suspected to be older than 1800 years show markedly higher mandible counts.

Archaeological sites in the Koingnaas area tend to be quite rich in both bone artefacts as well as local fauna. Numerous bone points have been recorded on middens and in some instances, even signs of ritual activity such as the burying of tortoise carapaces and carapace bowls under archaeological deposits, particularly at Rooiwal Bay (Orton, J. Hart, T. and Halkett, D.2005). Whale bones (particularly ribs) are found on a number of sites and were used as support struts in small huts and shelters. Whale vertebrae are also found on occasions and the use of these as seats has been ethnographically documented. A painting of a group of "Strandlopers" made during Robert Jacob Gordons' expedition of 1779, shows not only whale bone in the form of vertebral discs and ribs adjacent to a fire place, but also shows discarded shellfish remains, and attests to the use of small shelters and ostrich eggshell water containers (in Raper & Boucher 1988: 271). Two entries in Gordons' journal specifically describe the use of whale ribs: *We found seven huts standing together which the wild Bushmen had made of whale bones all protected to the NW. At these huts were large amounts of shells....*(ibid:258) and later: *There was a large hut made differently from those of the Hottentots with two high doors - or rather openings - open to the east, of wood from cast up trees, and Noordcaper or whale bones covered with grass and vegetation, and very hot.* (ibid: 269). The whale bones which he saw are most likely those of the Southern Right whale, *Balaena australis*.

For the early inhabitants of the area these were ostrich egg shells were versatile objects with a number of uses. They could be used as food and if the shells were carefully perforated could be used as water containers that could be filled and carried or stored in caches below ground for future use. Decorated ostrich eggshell fragments have been found on a number of sites indicating that decorated containers were once abundant. We have noted that certain parts of the coast thus far surveyed, contain more sites with decorated ostrich eggshell than others. Active dune fields close to the shoreline frequently contain sites with this material present. The

regional patterning of such occurrences as well as the geographical distribution of decorative patterns may hint at the arrangement of population and usage of the land by different groups of people. Ostrich eggshell has also been used in the manufacture of pendants and beads. Diameters of beads vary from site to site. Exterior diameters of beads thus far measured range from 4 to 16 mm. Current research at U.C.T. suggests that there may be chronological as well as cultural aspects related to size differences.

The range of tools includes flakes, cores, hammer stones, upper and lower grindstones, small convex scrapers, backed scrapers, segments, drills and a variety of miscellaneously retouched pieces. The formal tool element includes scrapers, drills and segments. Drills and segments normally occur on sites that are older than those without, that are more than 3000 years ago. Scrapers seem to have had a longer history of use and occur on both early and later sites. Formal tools are more common on sites not on the immediate shoreline and are frequently found in deflation bays (see also Manhire 1987). Near shore sites more commonly contain informal stone assemblages of flakes made from quartzite and quartz. The range of stone used is limited to a number of types. Fine grained siliceous materials such as chalcedony and chert were used for scrapers, drills and segments. Quartz is found in large quantities on most sites but does not seem to have been regularly used for formal tools. Silcrete flakes and cores are present. Sources of silcrete and chalcedony have been identified in the vicinity of Kleinzee. A small outcrop of fine grained quartzite at Goraap was quarried for use in stone tool manufacture.

Many potsherds have been noted on this part of the coast. Sizes and quantities of the sherds varied considerably from site to site. In some instances it was clear that the remains represented reconstructable pots while in others only fragments of pots were present. While most sherds are plain, some do show traces of decoration. We have observed three kinds of decoration namely i) Impressed - usually linear arrangements of small depressions, ii) Lined - rows of horizontal lines around the neck, and iii) "Thumbnail" impression - series of crescent shaped depressions in various positions on the pot. Most vessels had perforated lugs and the presence of base nipples has been noted suggesting that some of the pots had pointed bases. The presence of fragments bearing traces of more conventional basal studs (feet) shows that some pots had round bases. While the established chronology for this material suggests that sites containing it post-date 2000 years, in some cases it is found on sites with an earlier signature. This has probably resulted from the multiple uses of those sites at different times. Pottery may provide regional and chronological information, particularly through the analysis vessel shapes and decorative motifs (Smith et al 1991). Collections of pottery from different parts of the South African coast have showed that there is variation in both vessel shape and decoration (Rudner 1968).

4.4.2 Age of sites

These observations show strong evidence of chronological variation. Sites with decorated ostrich eggshell and formal tools are virtually certain to be older than sites containing both decorated and undecorated pottery. Our observations also show that certain classes of artefacts are more common in some locations than others and suggest that there have been shifts in habitation patterns through time. It is possible at this stage to suggest a hypothetical chronology of occupation on the Namaqualand coast. Numerous MSA artefacts attest to the use of the coast during the late Pleistocene. Since the MSA sites that we have observed often contain shellfish, it would seem likely that some occupation occurred during interglacial periods when the shoreline closely resembled that of today. Some early material relating to the glacial stages was probably lost following inundation of the ancient coastal plain.

Between the end of the MSA (approximately 40 000 years BP) and about 5000 years ago, few sites dating to this period have been found anywhere along the west coast. Between about 5000 years ago and 2000 years ago (the ceramic period), the region was occupied by hunter/gatherers who were exploiting large amounts of marine foods which included quantities of mussels and lobsters, rather higher than what we have seen on ceramic period sites. This may reflect environmental changes associated with Holocene sea level fluctuations, depletion of

marine resources in later times, or even a change in cultural values associated with the ceramic period. It is known that the advent of a stock keeping economy in southern Africa was associated with changes in material culture. It is hypothesised that in Namaqualand this is reflected by the disappearance of types of formal artefacts from open sites and shifts in marine food collecting habits.

Before the 1991 study very little was known about the length of time that Late Stone Age people occupied Namaqualand. It is now known that the chronology of occupation is long and complex. Fragments of pottery are common on sites indicating that much of the pre-colonial occupation post-dates the arrival of the Khoi Khoi. We have also found a number of instances where fragments of pottery have been found on sites with older types of stone artefacts indicating that some sites were re-used over a long period of time.

In the same way as ceramics are indications of sites dating to after 2000 years ago, so certain types of stone artefacts are an indication of even earlier occupation. In South Africa, within the Holocene, the prevalence of refined microlithic artefacts such as segments, backed scrapers and backed bladelets indicate occupation approximately 3000-5000 years ago. In Namaqualand, a number of sites contain these types of formal artefacts indicating occupation since the mid-Holocene. In addition, formal artefacts are often accompanied by decorated ostrich eggshell and this material is also believed to have a mid-late Holocene signature. Layers in sites at Brand se Baai and Lamberts Bay containing formal artefacts, have been radio-carbon dated to between 4000-5000 years ago (Hart & Halkett 1994, Orton 2012).

3.4 The Colonial Period

When the Dutch colonists arrived to set up a replenishment station at the Cape in 1652, they encountered several Khoi Khoi groups. Some of these lived on the Cape Peninsula while the larger groups grazed herds of sheep and cattle in the Tygerberg Hills and Cape Flats. First contact between Europeans and indigenous southern African pastoralist groups had occurred much earlier when Portuguese mariners sailing down the coast in the 15th and 16th centuries had bartered supplies of meat from the Khoi that they encountered at places such as Saldahna Bay (Smith 1985). With the increase of shipping rounding the Cape, it was inevitable that some would be wrecked. Encampments were set up by the survivors of such wrecks, and they often recount meeting and trading with the indigenous groups (Smith 1985, Raven-Hart 1967) so that by the time that Van Riebeeck arrived, a history of contact had already been established. Although it is not entirely clear from the writings of the early settlers, it appears that some San groups still existed in the Cape. They still seemed to be pursuing a largely hunting and foraging lifestyle and were often encountered in the more mountainous regions where there was less possibility of conflict with either the Khoi or Dutch settlers (Parkington et al 1986).

At first the relationship between the Dutch and the Khoi Khoi was one of co-operation, with a great deal of bartering taking place primarily to get regular supplies of fresh meat. However, as the colony grew and free burghers were granted lands further away from Cape Town, grazing lands previously available to the Khoi Khoi were encroached upon. The conflict for land began a process of attrition which when accompanied by several deadly smallpox epidemics broke down the indigenous population and its political structures. Those who survived were pressed into service as farm labour or settled around several large mission stations that had been established in the Cape. Namaqualand was one of the least desirable parts of South Africa for the colonists and meant that San and Khoi Khoi people were able to continue many aspects of their traditional ways of life in this area until they were displaced during the early 20th century. The accounts of several early travellers who passed through Namaqualand, most notably that of Robert Jacob Gordon in 1779, clearly attest to the presence of indigenous hunter-forager and pastoralist groups in the area (Raper & Boucher, 1988). The Nama, originally one of the Khoi Khoi groups, still practice transhumant pastoralism in reservations in Namaqualand today, while many other people of Khoisan discordancy worked on the mines and on farms. Loss of traditional land now followed by the closure of many mining operations has had a serious impact

on these communities.

Historical research in Namaqualand is minimal, since there is rather less recent archaeology here than is the case further south. Historical sites, primarily in the form of ruins from the 19th and 20th centuries, are sparsely spread over the landscape, while a few contact period sites have been documented (Orton 2009; Webley 1984, 1986). These latter are sites inhabited by indigenous hunter-gatherers or herders that include evidence of contact with European colonists. Historical material almost certainly all relates to early mission stations and farmers of the region; the first mission station was established at Leliefontein in 1816 (Shaw 1840), although Johann Schmelen and others were preaching in the area from about 1812 (Trüper 2006). In this area formal land grants were all relatively late in the context of the history of the Northern Cape, most dating to the late 19th or 20th centuries. Prior to acquisition by De Beers, the land was used for farming livestock. Original farm boundaries are still retained although De Beers owns most of the land.

Mining has perhaps been the greatest force that brought colonial settlement to the west coast. The towns of Hondeklipbaai and Port Nolloth owe their presence to the establishment of copper mining in the 19th century, while later on in the early –mid 20th century the discovery of diamonds saw the development of the towns of Alexander Bay, Kleinzee and Koingnaas (Carstens *et al.*1987, Davenport 2010 Fleminger 2008 and Williamson 2000). Mission Stations also played a very important role in consolidating the remaining Khoikhoi communities who found themselves bereft of traditional land.

In 1925 the first Namaqualand diamond was discovered. It came from a site 10.5 km south of Port Nolloth and was found by Jack Carstens on 15th August using very rudimentary techniques (J. Carstens 1962; P. Carstens 2001). For the remainder of the 20th century the mining industry has been the dominant force of development on the west coast.

4.5 Maritime archaeology

There are shipwrecks in the surf zones on the west coast. These are considered part of the heritage of the area and giving the kinds of beach mining operations envisaged by West Coast Resources, are potentially under threat.

Shipwrecks greater than 60 years of age and within the territorial waters of South Africa are protected under the National Heritage Resources Act and considered to be part of the National Estate. There are an estimated 3000 known shipwrecks off the coast of South Africa, the earliest of which date to those of Portuguese mariners who rounded the Cape after 1500 AD. The amount of unknown or undocumented shipwrecks is unclear. Numerous vessels have been documented as leaving port bound past the Cape but have failed to arrive at their destinations, their whereabouts is unknown.

Inevitably records of the location of documented wrecks are poor as in a disaster situation ships' masters and navigators had other priorities than documenting the ships position at time of sinking. Positions tend to be estimates obtained from survivors and can be scores of kilometres off, even in sight of land. Ships that were wrecked off-shore can be incorrectly positioned in the order of hundreds of kilometres. Ships that were abandoned at sea can drift for many kilometres before they sink, and even then may drift below the ocean surface before the timbers get water-logged. Given these uncertainties assessing the impacts of a given development project is fraught with difficulties. Pro-active searches for wrecks over vast tracts of oceans is a technically demanding and laborious task, hence one is compelled to use what historical evidence there is available.

The data bases that are available (namely the national shipwreck database) reflects the estimated positions of wrecks where the provenance is known or can be roughly estimated. There are numerous shipwrecks off the west coast that potentially range in age from the days of the Portuguese navigators and Dutch East India Company to the late 20th century, the hotspots

for these wrecks are rocky shorelines and inlets and peninsulas, off-shore reefs. Further out at sea the coastal shipping route was subject to wartime casualties and ships that were abandoned at sea due to foundering, collision or fire on board. The majority of wrecks however are caused when ships hit a reef, an obstacle or are driven on shore. While a number of late 20th century casualties are reflected on the databases and maps, it is only wrecks that are greater than 60 years of age that are formally protected. The recent discovery of the oldest shipwreck south of the equator is that of the Portuguese galleon, the *Born Jesus (ran aground 1533)* found in a beach mining operation north of Oranjemund attests to the fact that this possibility exists in any place where beach mining takes place.

5 Impacts of Mining on heritage

The impacts of mining of heritage are discussed in this section of the report and illustrated with a few case studies that are relevant. Open cast mining, by nature is invasive and disruptive to the natural layering of soil and geology. This affects anything buried in the soil such as archaeology and geology and palaeontology. Impacts can occur during prospecting, operation of mine and during rehabilitation.

The proposed sea shore mining operation will affect the seabed to up to several hundred meters offshore but also affect areas adjacent to the beach/shore through peripheral earthmoving and disturbance by equipment installation, creation of new roads and areas for processing plants.

The near shore areas have not been surveyed in details up to now although certain areas near Mitchells Bay have been studied in detail (see appendix A) and are already mitigated and prepared for mining.

5.1 Importance of physical heritage

While written historical texts provide invaluable information, history is preserved in many other forms as well. Buildings, art, antiques and many other artefacts are also aspects of history which in themselves tell a tale. It is common knowledge that written texts document only a small fraction of the trajectory of human history and the balance must be inferred from the remains of activity which have been left behind. This is particularly true in Africa where the human species evolved some 4 million years ago, but written records have only existed in some areas for last few hundred years. The bulk of this history must therefore be gained from examining the remains of human activity in all its forms which is preserved on archaeological sites.

Historical buildings, archaeological sites and other artefacts are non-renewable and once destroyed can never be replaced. This realisation has resulted in the formulation of statutory controls for the preservation of such resources in most countries in the world today. The International Council on Monuments and sites (ICOMOS), of which South Africa is now a member along with 84 other countries, seeks to apply the highest principles of conservation to the Monuments and Sites of the world (Deacon ed. 1996).

8.1 Sources of Impact

We generally identify two major sources of impact on heritage material. These are defined as primary sources which are often large scale organised activities which modify the landscape and secondary impacts which are of an *ad hoc* and usually more limited nature. While the action of mining itself has the most serious impact, there are other activities that can be detrimental and these are indicated below.

8.1.1 Primary Sources of Impact on Heritage Material

The activities identified below are generally responsible for the most damage to heritage

resources.

1) Development of land as a result of a structure plan
2) Development of land as a result of a rezoning application
3) Development of land as a result of a subdivision
4) Establishment of housing developments not subject to conditions of 1, 2, 3 above.
5) Establishment of townships
6) Establishment of resorts
7) Any development on undeveloped land
8) Mining and quarrying activities
10) Construction of airports
11) Construction of dams
12) Construction of ports harbours and marinas and seabed work.
13) Laying of pipelines
14) Construction of major sporting facilities
15) Flood control schemes, canals, aqueducts, river diversions
16) Any major landscaping, excavation or land remodelling projects
17) Construction of roads
18) Construction of railway lines
19) Illegal demolition of structures over 50 years old
20) Agricultural activity

8.1.2 Secondary Sources of Impact on Heritage Material

These impacts can be as serious as those caused by large developments but are usually of more limited nature and occur on an *ad hoc* basis. They are generally associated with increase in human activity resulting from proximity of residential areas and recreational facilities. Primary impacts which lead to the increase in human use of an area will usually be accompanied by secondary impacts. In a mining situation these impacts can occur on short term prospecting sites which can cause disturbance of surface archaeology, as well as driving off-road and creation of dirt tracks. Impact assessments must also consider these additional factors resulting from development activity. *The ad hoc* nature of the impact makes it difficult to control beyond educating the public as to the sensitivity of archaeological resources. We have identified some of the secondary impacts on archaeological sites below, many of which have the potential to occur in the project area.

1) Illegal collection of artefactual material
2) Indiscriminate use of off-road vehicles
3) *Ad-hoc* creation of dirt tracks or tracks for off-road vehicles
4) Establishment of informal parking areas
5) Establishment of Informal camp sites and picnic areas
6) Dumping
7) Unplanned footpaths
8) Erosion resulting from any of the above or any other source.

5.1.1 Impacts of mining on palaeontology

Palaeontology sensitivity is a risk at the land-based mining areas unless the management plan supplied by Pether (2008) is implemented. In the past mining operations have open a number of deep excavations which have contributed significantly to understanding the palaeontology of Namaqualand and developing the regional sequence. Much of this work was done by De Beers geologists themselves, however they also allowed opportunities for research to take place through allowing access to pit profiles before remediation takes place. Hence, there is considerable benefit to be had by using mining operations as an opportunity to examine deep sequences that would not normally be available to researchers. The gaining of this knowledge

is a positive impact provided that pit profiles are examined before backfilling or remediation takes place.

The mining of beach sequences has the potential to provide new knowledge with respect to marine regressions and transgressions in the project area. The presence of fossil shell beds exposed in beach mining must described/sampled and provenance by a suitably qualified person.

5.1.2 Mining Impacts on shallow archaeological sites

The spatial distribution of the components of archaeological sites are very important as it is the relationships between objects in time and space that that archaeologists use to deduct the events of the past. Artefacts for which there is no contextual knowledge have little more than curiosity value. Hence the breaking of the physical relationships between the components of archaeological sites destroys 90 percent of its scientific and heritage value. Such destruction will occur if a site is raided by illegal collectors or even driven over with a 4x4. Mining operations are the extreme of this spectrum of disturbance due to the scale of earthmoving and the size of the equipment used. Typically the destruction tends to be complete, permanent and non-reversible. While exact figures are not available diamond mining has destroyed at least half of the west coast heritage resources, while outside of mining areas uncontrolled 4x4 use, property development and farming has caused extensive damage. The impacts are of very high significance, irreversible and permanent.

5.1.3 Impacts on deeply buried archaeological sites

Considering that humans have inhabited Namaqualand for more than a million years, and through multiple sea level regressions and transgressions, erosion and depositional phases in the earth's history, archaeological sites can be deeply buried. Diamond mining operations clear all sediment down to bed rock which means that any archaeological site buried by sediment has the potential to be negatively impacted by mining. No archaeologists have ever had the opportunity to audit the extent of buried sites in Namaqualand, so it is very difficult to understand the extent to which impacts have taken place in the past. There are at least two recorded incidents of ancient archaeological sites destroyed by mining.

Case study – Brandsebaai. The first of these was recorded by ACO at Brandsebaai. Ancient archaeological materials with fossilized organic remains were found lying on the edge of an old prospecting trench immediately on the coastal dunes. Indications were that a Middle Stone Age site with very rare organic remains had been cut through by excavators. Trial excavations to a depth of about 3 m deep along the edge of the trench showed that none of the material had survived *in-situ*.

Case study – Boegoeberg. Mining by Alexcor along the coastline close to the Boegoeberge targeted old wave cut shorelines and inlets. Two shallow caves were exposed in a sea-cliff some 7 m below today's surface. Diamond diamondiferous gravels were mined out of a cave (Boegoeberg II) and in the process destroyed a 120000 year old archaeological site to the extent that only 10 percent of the site survived. The remaining 10 percent was sampled and studied and resulted in several scientific papers being written. It was one of a few archaeological sites of its kind in the world dating to early modern humans who lived on the coast of Namaqualand during the interglacial when sea levels were little higher than they are today. Fortunately at the adjacent cave (Boegoeberg I) mining was halted by the mine geologist before complete damage was done. The site was not anthropomorphic but an ancient hyena lair the provided a wealth of information about ancient environments.

The above cases show that archaeological sites can occur deep underground, especially in caves in ancient sea washed gullies. Finding one intact would make a huge contribution to

science. This is of particular importance where mining of gullies and ancient sea cliffs are envisaged. The total loss of such archaeological sites due to impacts of mining is scientifically disastrous so measure must be put in place to stop this from happening.

5.1.4 Impacts of mining on historical and proto-historical sites.

Historical sites that are over 100 years of age are very rare in the study area. Only one historical site is known from the study area at Samsonsbak which included numerous glass bottles of the 19th century, fragments of metal and foundations of a simple dwelling. Also evident were several simple graves. Like other forms of surface archaeological material, they will be destroyed by earthmoving.

5.1.5 Impacts of mining on shipwrecks

There are a number of known wrecks on the Namaqualand coast and those that are greater than 60 years of age are protected. Off-shore and coastal operations can impact wrecks. Boshoff (pers com) has conducted a number of beach surveys on the south coast using proton-magnetometry and has encountered a number of early wrecks completely covered by sand with no surface evidence whatsoever. The discovery of the oldest known wreck in the southern hemisphere took place when a geologist found copper ingots in a beach mining operation. In the sediments behind the see dam were the remains and cargo of a Portuguese East Indiaman that had foundered north of Oranjemund. It was laden with ivory, copper, bronze cannons and gold bullion. The Namdeb resident archaeologist, Dieter Noli was put under some pressure to shift the material as quickly as possible which was a near disaster, as Namibia (like RSA) did not have a dedicated conservation laboratory which resulted in very valuable artefacts being exposed to oxygen and resulting rapid deterioration. It has taken an international effort to salvage what could be done, however irreparable damage has been done to some material (Noli pers com). The bullion (worth a considerable fortune) is housed in the Bank of Namibia as the country's heritage legislation deems all material to be the property of the state (as in RSA). Ideally the wreck should have been left undisturbed behind the sea wall and mining deferred until international effort could be mustered to have the necessary conservation facilities put in place before any aspect of the ship was removed.

There is a real but generally low possibility that shipwreck material may be impacted by mining in the near shore areas. Should a wreck of significance be destroyed, this would be a severe impact without mitigation being in place, but a positive contribution to knowledge and history with mitigation.

5.1.6 Impacts of mining on human remains

Human remains are strongly protected by several bodies of legislation including the National Heritage Resources Act. Do date a number of human skeletons have been found in west coast mining areas, a number of which have been either excavated or collected by ACO. Graves are hard to recognise more often than not being unmarked, or marked with a pile of stone. Even historic graves marked with earth mounds and wooden crosses disappear over time. In the face of mining, a grave or human skeleton is unlikely to be noticed and will end up in the processing plant or mine dump. The impacts of mining are therefore high, and the presence of human remains very difficult to mitigate unless they are identified in pre-disturbance surveys and exhumed.

5.1.7 Impacts of mining of landscape and setting

Landscapes and places of scenic value to a given community are protected under the NHRA. Mining on the West Coast has been taking place for 70 years or more, and as such has become a heritage layer and a characteristic of this part of the world. From this perspective it is hard to argue that continued mining has a major negative impact under circumstances that are so well established, and which under the NHRA are in some instances functionally generally protected. There are scenic areas and enclaves that will be impacted and the character of such places will change as infrastructure is established. Mine rehabilitation can be very successful to the extent that intimately some scenic impacts can be fully reversed.

Table 2 Assessment of Impacts

Activities	Impacts	Aspects affected	ase	Significance rating			Typical mitigation measures
Impact of each mining on palaeontology	The process of creating a berm, followed by pumping out of the sea followed by excavation to bedrock has the potential to expose prehistoric marine regression events, shell beds and extinct invertebrate species. There is also a low possibility of fossil bone and shark teeth.				Without mitigation	With mitigation	Mine geologist to be mindful of palaeontological potential. Mine to foster a relationship with a palaeontologist and facilitate opportunities to make research observations and collect samples (see management plan by Pether 2008).
				Severity	Low	Low	
				Duration	High	Low	
				Extent	Local	Local	
				Consequence	Medium	Low	
				Probability	Medium	Low	
				Significance	Low	Low	
				Status	Negative	Positive	
				Confidence	High	High	
				Reversibility	Low	High	
				Loss of resource	High	Low	
				Degree to which the impact can be mitigated		High	
Impact of beach mining on maritime heritage	The process of creating a berm, followed by pumping out of the sea followed by excavation to bedrock has the potential to expose maritime archaeological debris including shipwrecks. Shipwrecks have varying importance which has a bearing on the severity of the impact; however destruction of a previously undescribed wreck with significant cargo and great age is a possibility. Destruction of such a wreck through uncontrolled excavation, looting of cargo and non-implementation of artefact conservation measures would be a significant loss of historical				Without mitigation	With mitigation	Pro-active measures involve conducting remote sensing scans for evidence of shipwrecks with are best avoided, or if need be removed under a SAHRA issued permit. Staff on site to be mindful of artefacts that may appear in excavated material from seabed. Such material can include lumps of iron, ballast stones or ingots, pieces of rope, wood, leather as well as ceramics and porcelain. Iron and bronze cannons are also
				Severity	High	Low	
				Duration	High	Low	
				Extent	Regional	Local	
				Consequence	Medium	Low	
				Probability	Medium	Low	
				Significance	High	High-Low	
				Status	Negative	Positive	
				Confidence	High	High	
				Reversibility	Low	Medium	