APPENDIX E - ENVIRONMENTAL MANAGEMENT PROGRAMME

MINING APPLICATION FOR BORROW PITS AND QUARRIES BETWEEN ZANDKRAAL AND WINBURG SOUTH, FREE STATE, SOUTH AFRICA

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

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LIST OF ACRONYMS

CES	CES Environmental and Social Advisory Services
DEFF	Department of Environment, Forestry and Fisheries
DMR	Department of Mineral Resources
DEO	Designated Environmental Officer
EA	Environmental Authorisation (former Record of Decision)
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EM	Environmental Monitor (Engineer's Environmental Representative)
EMPr	Environmental Management Programme
ENG	Engineer
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
NEMA	National Environmental Management Act, 107 of 1998
PC	Project Coordinator (also knows Project Manager)
PSM	Project or Site Manager (also known as Project Coordinator)
SAHRA	South African Heritage Resource Agency
SANRAL	South African National Roads Agency SOC Ltd
SAPS	South African Policy Service
SM	Social Monitor (Engineer's Social Representative)
WULA	Water Use License Application

CHECKLIST

The content of the EMPr is consistent with the requirements as set out in Appendix 4 of the EIA Regulations (as amended in 2017) stated below, for the planning, construction and operation phases.

Requirements of an EMPR (Appendix 4 of GNR 982 of 2014, as amended)	Relevant section(s)
(1) An EMPr must comply with section 24N of the Act and include-	
(a) Details of – (i) The EAP who prepared the EMPr; and (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 3.5 and Appendix E1
(b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Chapter 3
(c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Appendix E2
(d) A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including – (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) Where relevant, operation activities;	Chapter 4
(f) A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to – (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practices; (iii) Comply with any applicable provisions of the Act regarding closure, where applicable; and comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Section 3.4 – 3.6, Chapter 4 and Chapter 5
(g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapter 8
(h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	
(i) An indication of the persons who will be responsible for the implementation of the impact management actions;	
(j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Table 8.1
(k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	

Requirements of an EMPR (Appendix 4 of GNR 982 of 2014, as amended)	Relevant section(s)
(l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	
(m) An environmental awareness plan describing the manner in which – (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Appendix E3 and E4
(n) Any specific information that may be required by the competent authority.	No specific information has been requested from the DMR to date.
(2) Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	N/A

1 INTRODUCTION

An Environmental Management Programme (EMPr) must consist of a set of mitigation, monitoring and institutional measures to be taken during planning, construction and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The programme also includes the actions needed to implement these measures.

1.1 ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

An EMPr is defined as, "*an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced*". EMPrs are therefore an important tool in the sound environmental management of projects, provided the specifications are implemented and the user understands the reasons and need for their implementation. This EMPr has the following objectives:

- To highlight the requirements of all applicable legislation, policies and guidelines;
- To set out the mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the significance of the anticipated environmental impacts;
- To provide guidance regarding the necessary method statements which are to be developed by the construction contractor to meet the environmental specifications presented in this report (refer to Appendix E3 for an example of the method statement);
- To define the corrective action approach to be adopted in the event of non-compliance with the environmental specifications contained in this report; and
- To prevent long-term or permanent environmental degradation of the project site and surrounds.

There are essentially four broad categories of EMPrs: Planning and Design Phase, Construction (Site Establishment) Phase, Operational (Mining) Phase and Decommissioning (Mine Closure) Phase. The objectives of these EMPrs are all the same in that they need to identify potential environmental risks and impacts of the proposed project, and develop measures to minimise, mitigate and manage the negative impacts while enhancing the beneficial ones. The difference between these EMPrs lies in the different mitigation measures required for the different stages of the project life cycle. These phases are discussed below.

1.2 PLANNING AND DESIGN PHASE EMPR

The Planning and Design Phase EMPr is an integral component of the project life cycle and requires interaction between the project manager and environmental consultants to ensure that the engineers are aware of the environmental constraints that must be considered and incorporated into the final design of the project. The format of this planning and design EMPr is checklist in nature to ensure that all specifications are included in the planning and design phase. The planning and design EMPr phase requires ongoing and in-depth discussions between the contractor and the Environmental Control Officer (ECO). The project manager

and the contractor will have to cost for, and be available for, ongoing discussions with the environmental officer at all stages of final design. The majority of the work is undertaken at a desktop level and thus impacts are negligible and will not be discussed in further detail.

1.3 CONSTRUCTION PHASE EMPR

The Construction Phase EMPr details the environmental management system/framework within which construction and site establishment activities will be governed for the Construction Phase. The Construction EMPr consists of various actions, initiatives and systems that the contractor will have to ensure are in place and are undertaken. The Construction EMPr consists of both a management system and environmental specifications which contain detailed specifications that will need to be undertaken or adhered to by the appointed contractor. The Construction EMPr will need to be developed in parallel with the Final Design Stages, and constructive input should be invited from the selected contractor. Sound environmental management is orientated around a pragmatic, unambiguous but enforceable set of guidelines and specifications, and for this reason it is imperative that the contractor, while being bound by the EMPr, fully understands it and has had input into its final development. For this reason, the final Construction EMPr will need to be signed off after input from the selected contractor prior to the initiation of construction / site establishment activities.

1.4 OPERATIONAL PHASE EMPR

The Operational Phase EMPr provides specific guidance related to operational activities associated with a particular development, in this case the mining of the borrow pits and quarries. Operational EMPrs are sometimes referred to as Environmental Management Systems (EMS). The Operational EMPr will need to be developed in parallel with the Site Establishment Stages, and constructive input should be invited from the selected contractor. Again, sound environmental management is orientated around a pragmatic, unambiguous but enforceable set of guidelines and specifications, and for this reason it is imperative that the contractor, while being bound by the EMPr, fully understands it and has had input into its final development. Monitoring of certain issues such as the success of vegetation re-establishment and erosion control will be required to start during operation. The final Operational Phase EMPr should be developed in conjunction with any other relevant stakeholders prior to the adoption thereof.

1.5 DECOMMISSIONING PHASE EMPR

The Decommissioning Phase EMPr provides specific guidance related to the decommissioning of operational activities and closure the mines. The final Decommissioning Phase EMPr should be developed in conjunction with any other relevant stakeholders prior to the adoption thereof. Impacts during the decommissioning phase of a development of this nature will be few in number and low in intensity. By taking pro-active measures during the planning, construction and operational phases, potential environmental impacts emanating during the decommissioning phase will be minimised. Monitoring of certain issues such as the success of vegetation re-establishment and erosion control will continue during this phase.

2 DEFINITIONS

For the purposes of this EMPr, the following definitions and abbreviations shall apply:

Alien Vegetation: Alien vegetation is defined as undesirable plant growth which shall include, but not be limited to all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA) regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable. This includes plant species identified as Alien and invasive species in the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), Alien and Invasive Species Regulations, 2014.

Environment: Environment means the surroundings within which humans exist and that could be made up of: -

- The land, water and atmosphere of the earth;
- Micro-organisms, plant and animal life;
- Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Aspect: An environmental aspect is any component of a contractor's construction activity that is likely to interact with the environment and pose a potential risk thereto.

Environmental Authorisation (EA): A written statement from the relevant environmental authority, with or without conditions, that records its approval of a planned undertaking to construct the proposed infrastructure and the mitigating measures required to prevent or reduce the effects of environmental impacts during the project's lifespan.

Environmental Control Officer (ECO): A suitably qualified and experienced person or entity appointed for the construction works, to perform the obligations specified in the EA.

Environmental Impact: An impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.

Environmental Impact Assessment: The process of examining the environmental effects of a development. The assessment requires detailed/specialist studies of significant issues that have been identified during the environmental scoping.

Environmental Management Programme (EMPr): An environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced.

Environmental Management System (EMS): A system enables companies, organizations and operations to systematically manage, prevent and reduce their environmental impacts (or footprint) and associated costs. In terms of ISO 14001 an EMS is defined as, "that part of the overall management system includes organizational structure, planning activities, responsibilities, procedures, processes and resources for developing, implementing, reviewing and maintaining the environmental policy."

Environmental Policy: A statement by the organisation of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets.

External Auditor: A suitably qualified and experienced independent environmental auditor.

Interested and Affected Party (I&AP): Refers to an I&AP party contemplated in section 24(4)(d) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and which, in terms of that section, includes –

a) Any person, groups of persons, organisation interested in or affected by an activity, and;
b) Any organ of state that may have jurisdiction over any aspect of the activity.

Method Statement: Is a written submission by the construction contractor to the ECO in response to the EMPr specifications, or to any request by the ECO, setting out the methods the contractor proposes using to carry out an activity. The Method Statement shall be in such detail that the ECO is able to assess whether the contractor's proposal is in accordance with the EMPr specifications.

Mitigate: The implementation of practical measures to reduce the adverse impacts, or to enhance beneficial impacts of a particular action.

No-Go Area: Areas where construction activities are prohibited.

Pollution: According to the NEMA, pollution can be defined as, "Any change in the environment caused by (i) substances; (ii) radioactive or other waves; or (iii) noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future".

Potentially hazardous substance: Is a substance that can have a deleterious effect on the environment. Hazardous chemical substances are defined in the Regulations for Hazardous Chemical Substances published in terms of the Occupational Health and Safety Act.

Reasonable: Means, unless the context indicates otherwise, reasonable in the opinion of the ECO, after they have consulted with relevant parties.

Rehabilitation: To re-establish or restore to a healthy, sustainable capacity or state.

Silt laden water: Means water containing sand and silt arising from the contractor's activities and/or as a result of natural run-off.

Site: The area in which construction is taking place.

Solid waste: Means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

Species of Special Concern (SSC): Species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild, Regionally Extinct, Near Threatened, Critically Rare, Rare and Declining.

Threatened species: Threatened species are defined as: a) species listed in the endangered or vulnerable categories in the revised South African Red Data Books or listed in the globally threatened category; b) species of special conservation concern (i.e. taxa described since the relevant South African Red Data Books, or whose conservation status has been highlighted subsequent to 1984); c) species which are included in other international lists; or d) species included in Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES).

Topsoil: The top 100mm of soil and may include top material e.g. vegetation and leaf litter.

3 BACKGROUND INFORMATION

The South African Nationals Roads Agency SOC Limited (SANRAL) is undertaking the upgrading of National Route 1, Section 16 (N1-16) from Zandkraal (km 33.8) and Winburg South (km 78.0) in Free State province, South Africa.

Fifteen (15) borrow pits and two (2) quarries are required to supply the necessary material for the construction the new carriageway and rehabilitation of existing carriageway, the expansion and maintenance of existing pipe culverts, the installation of stormwater drainage infrastructure and the construction of the various bridges. This Environmental Management Programme (EMPr) has been prepared as part of the Environmental Impact Assessment (EIA) process to provide specific environmental guidance for the planning, construction and operational phase of the proposed mining sites for the material needed for the road upgrade on the N1 Section 16, Free State.

In terms of Section 106 of the Mineral and Petroleum Resources Development Act (MPRDA No. 28 of 2002) SANRAL is exempted from the application for a Mining Permit for the mining sites but is not exempted from the application for environmental authorisation. In accordance with the requirements of the National Environmental Management Act (Act No 107 of 1998) (NEMA), and relevant EIA Regulations made in terms NEMA EIA Regulations (2014) and updated in the EIA Regulation amendment of April 2017 (Government Notice R 982), and listed activities under (Government Notice R 983, R 984 and R 985), the proposed mining works, were subject to the submission of an Environmental Impacts Report (EIR) as part of the Environmental Impact Assessment (EIA) process to the Department of Mineral Resources (DMR).

In terms of the EIA process, all reports generated from the environmental studies form part of a series of documents for the project. The EIR identified potentially significant environmental impacts and investigated potentially significant environmental issues and recommended appropriate mitigation measures. This Environmental Management Programme (EMPr) interprets the findings of the EIR, and prescribes project-specific specifications to be achieved. In addition to the requirements of Appendix 4 of GNR 982, this EMPr is based on the principles of Integrated Environmental Management (IEM).

3.1 PROJECT ACTIVITY AND LOCATION

SANRAL awarded contract NRA N.001-160-2018/1F, for the upgrade of National Route 1, Section 16 (N1-16), from Zandkraal (KM 33.8) to Winburg South (KM 78.0) to SMEC South Africa on 16 October 2015. Fifteen (15) borrow pits and two (2) quarries are required to supply the necessary material for the construction the new carriageway, the expansion and maintenance of existing pipe culverts, the installation of stormwater drainage infrastructure and the construction of the various bridges. The proposed borrow pits, quarries and associated infrastructure are located across 18 farm portions, along the N1-16 route between Zandkraal and Winburg South, in the Masilonyana Local Municipality of the Lejweleputswa District, Free

State. Figure 3.1 illustrates the proposed mining sites, located along the N1-16 route. Table 3.1 indicates the property portions and farm names associated with the mining sites.

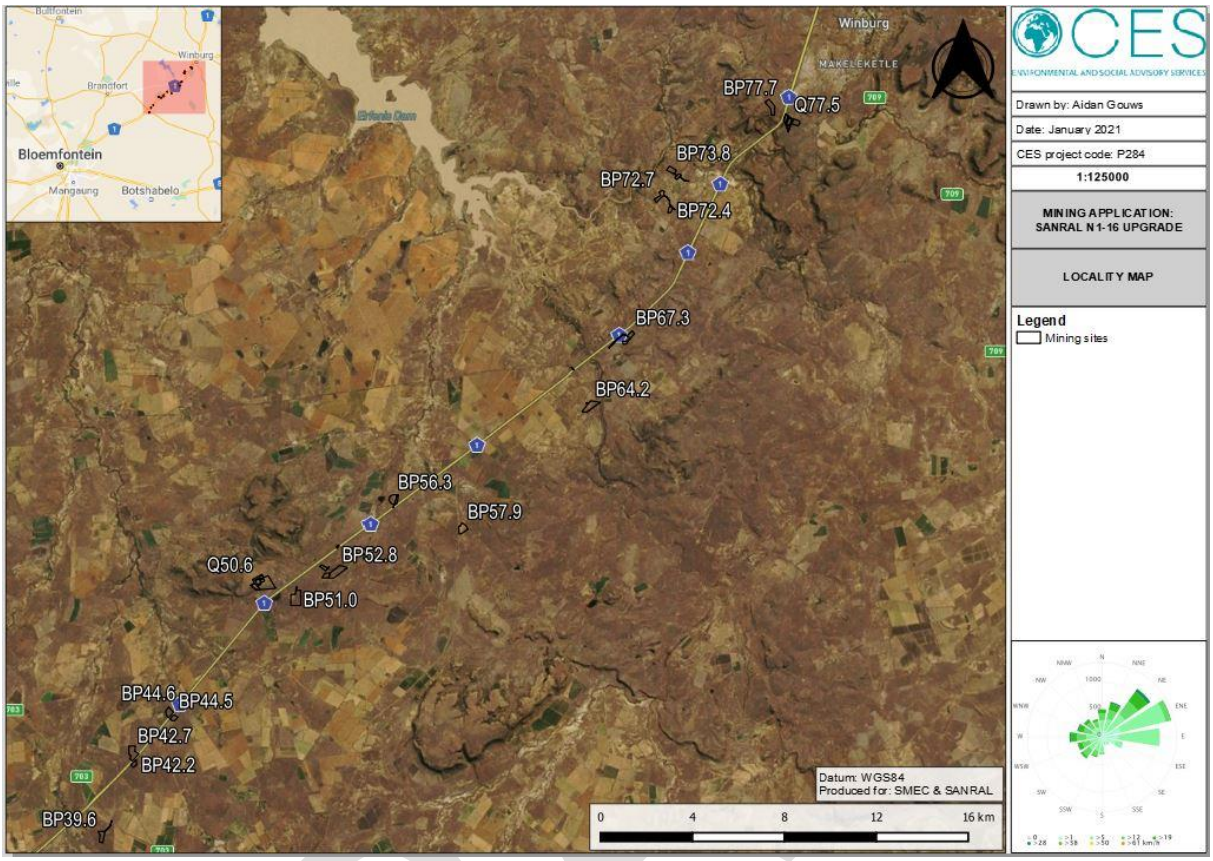


Figure 3.1: Project locality map of the proposed mining sites.

Table 3.1: Property portions and farm names associated with the proposed mining sites.

FARM NAME	FARM NO.	21 DIGIT SG CODE	SIZE (HA)
Kleinfontein	0/859	F00600000000085900000	342.6125
	1/859	F00600000000085900001	149.6893
Die Pan	0/1034	F00600000000103400000	285.1965
Graspan	0/553	F00600000000055300000	421.4625
Tweefontein	0/66	F04200000000006600000	929.8303
Helpman	3/1438	F04200000000143800003	274.4382
De Buys	0/2258	F04200000000225800000	172.1472
Welgewonden	0/64	F04200000000006400000	381.9448
Randfontein	0/1730	F04200000000173000000	191.332
Kraal	0/62	F04200000000006200000	605.1327
Welkom	1/55	F04200000000005500001	838.7092
Pleasant View	0/1356	F04200000000135600000	856.5320
Kruidbaden	1/1245	F04200000000124500001	312.8475
Harmonia	0/867	F04200000000086700000	376.6428
De Hartplaats	0/17	F04200000000001700000	318.3919
Grisella	0/1595	F04200000000159500000	171.2493
Brandkop	1/1594	F04200000000159400001	141.5509
Rietfontein	4/18	F04200000000001800004	12.2820
TOTAL			**6 781.9916 ha**

The extent of the mining activities and infrastructure at each site is listed in Table 3.2 below. The mining areas and associated infrastructure will cover an area of **204.16 ha** during the construction and operational phases.

Table 3.2: Proposed mining and associated infrastructure footprint calculations.

SITE	FOOTPRINTS (HA)		
	MINING	ACCESS ROADS	TOTAL
Borrow Pits (BP)			
BP39.6	7.2940	0.7123	8.0063
BP42.2	3.4687		3.4687
BP42.7	13.0195		13.0195
BP44.5	3.9097		3.9097
BP44.6	6.8286		6.8286
BP51.0	19.1977	0.2640	19.4617
BP52.8	Area A 15.5895 Area B + 4.1136 Area C + 3.1022 Total = 22.8053	Area E 0.3414 Area F + 0.4170 Total = 0.7584	23.5637
BP56.3	Area A 7.7835 Area B + 2.4912 Total = 10.2747	0.1557	10.4304
BP57.9	9.4353		9.4353
BP64.2	12.6517	0.1302	12.7819
BP67.3	Area A 3.8135 Area C + 1.9559 Total = 5.7694	Area B 0.2126 Area D + 2.2971 Total = 2.5097	8.2791
BP72.4	2.9760		2.9760
BP72.7	6.2741	1.0245	7.2986
BP73.8	Area D 5.5390 Area F + 2.5087 Total = 8.0477	Area E 0.1732 Area G + 0.3367 Area X + 0.2566 Total = 0.5099	8.5576
Ramp for BP72.4, BP72.7 & BP73.8		2.0512	2.0512
BP77.7	10.8081		10.8081
Quarries (Q)			
Q50.6 (Q2)	Area A 6.1243 Area B + 29.7555 Total = 35.8798		35.8798
Q77.5 (1B)	New Quarry 12.2830 Existing + 5.2510 Quarry = 17.5340 Total		17.5340
TOTAL FOOTPRINT (HA)	**196.1743**	**7.9857**	**204.16**

The proposed mining plans for the borrow pits and quarries, including mining areas, location of stockpiles, processing areas and access roads are all indicated on the site maps and layout plans in Appendix A of the EIR.

3.2 ENVIRONMENTAL OBJECTIVES AND TARGETS

In The EMPr has been compiled to provide recommendations and guidelines according to which compliance monitoring can be done during the proposed mining activities as well as to ensure that all relevant factors are considered to ensure for environmentally responsible development. The purpose of the EMPr is to provide specifications for "*good environmental practice*" for application during construction.

This EMPr informs all relevant parties [the Project Coordinator, the Contractor, the Environmental Control Officer (ECO) and all other staff employed by SANRAL at the site as to their duties in the fulfilment of the legal requirements for the construction, operation and decommissioning of the proposed mining activities with particular reference to the prevention and mitigation of anticipated potential environmental impacts.

All parties should note that obligations imposed by the EMPr are legally binding in terms of the environmental authorisation granted by the relevant environmental permitting authority.

The objectives of an EMPr are to:

- Ensure compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international;
- Ensure that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events;
- Provide feedback for continual improvement in environmental performance;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Identify measures that could optimize beneficial impacts;
- Create management structures that addresses the concerns and complaints of I&APs with regards to the development;
- Establish a method of monitoring and auditing environmental management practices during all phases of the activity;
- Ensure that safety recommendations are complied with; and
- Specify time periods within which the measures contemplated in the final environmental management programme must be implemented, where appropriate.

3.3 ENVIRONMENTAL LEGISLATION AND GUIDELINES

Construction must be according to the best industry practices, as identified in the project documents. This EMPr, which forms an integral part of the contract documents, informs the contractor as to their duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project.

The Contractor should note that obligations imposed by the approved EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter shall prevail.

The Contractor shall identify and comply with all South African national and provincial environmental legislation, including associated regulations and all local by-laws relevant to the project. Key legislation currently applicable to the design, construction and implementation phases of the project must be complied with. The list of applicable legislation provided below is intended to serve as a guideline only and is not exhaustive (Table 3.3).

Table 3.3: Relevant legislation applicable to the project

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
National Environmental Management Act, 1998 (Act 107 of 1998).	The proposed development triggers listed activities within this act	National and Provincial	27 November 1998
2014 Environmental Impact Assessment Regulations promulgated in terms of Section 24(5) of NEMA (as amended on 07 April 2017)	A number of listed activities have been identified that have triggered the need for a EIA in terms of these regulations	National and Provincial	04 December 2014
Constitution of the Republic of South Africa (Act No. 108 of 1996)	All activities must be undertaken according to the laws and regulations of RSA.	National and Provincial	18 December 1996
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	The NEMBA aims to conserve and provide management of biodiversity in the country. The proposed development site falls within an ecological support area and a portion of the site intersects a critical biodiversity area.	National and Provincial	07 June 2004
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Construction and clearing activities will have a direct effect on neighbouring housing areas.	National and Provincial	11 September 2004
National Water Act, 1998 (Act 36 of 1998)	The proposed activity will need to link to the existing water-based infrastructure to support further housing expansion.	Department of Water Affairs	26 August 1998
The National Heritage Resources Act, 1999 (Act No 25 of 1999) as amended, particularly Chapter II, Section 38	The proposed development requires the clearance of a large area of indigenous vegetation.	South African Heritage Resource Agency	28 April 1999
Occupational Health and Safety Act (Act No. 85 of 1993)	All tasks undertaken on the proposed housing site during construction must adhere to the Act and be included in the EMPr.	National and Provincial	23 June 1993

3.4 DETAILS OF THE EAP

In fulfilment of the legislative requirement (see Section 4.1 below) the details of the EAP that prepared this environmental impact assessment report as well as the expertise of the individual members of the study team are provided below.

CES was established in 1990 as a specialist environmental consulting company based in Grahamstown, with branches in East London, Cape Town, Port Elizabeth and Centurion. CES has considerable experience in terrestrial, marine and freshwater ecology, the Social Impact Assessment (SIA) process, and state of environment reporting (SOER), Integrated Waste Management Plans (IWMP), Spatial Development Frameworks (SDF), public participation, as well as the management and co-ordination of all aspects of the Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) processes. CES has been active in all of the above fields, and in so doing have made a positive contribution to towards environmental management and sustainable development in the Eastern Cape, South Africa and many other African countries.

Dr Alan Carter
(Role: Environmental Assessments Practitioner [EAP])
Alan is the executive of the CES East London Office. He holds a PhD in Marine Biology and is a Certified Public Accountant, with extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He has 30 years' experience in environmental management and has specialist skills in sanitation, coastal environments and industrial waste. Dr Carter is registered as a Professional Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP). He is also registered as an EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

Mr Aidan Gouws
(Role: Senior Environmental Consultant, Project Manager, Reporting)
Aidan obtained his MSc in Environmental Science (*Cum laude*) from Rhodes University, having conducted research on the spatio-temporal dynamics of *Acacia dealbata* invasions and broader land-use and cover changes in the northern Eastern Cape, funded through a study bursary awarded by the Agricultural Research Council (ARC). Prior to this, he obtained his BSc Honours in Geographical and Environmental Sciences (*Cum laude*) from the University of Pretoria, studying plant ecology and EIA methodology amongst others. He is also member of the Golden Key Honours Society. Aidan joined CES in 2018 and has been involved in several projects, including Basic Assessments, Full Scoping and Environmental Impact Assessments, Environmental Audits and Resettlement Action Plan (RAP) Audit. He works from the Gauteng office and his interests include the general Environmental Impact Assessment (EIA) process, GIS mapping, ecological studies and the Public Participation Process (PPP).

Full Curricula Vitae (CV) for individual members of the project team are attached as Appendix E1.

4 IMPACT ASSESSMENT AND MITIGATION SUMMARY

This section provides an assessment of the pre-mitigation significance as well as the post-mitigation significance of the social and environmental impacts that may result from the major activities associated with the project's development.

4.1 IMPACT MANAGEMENT OUTCOMES

In order to identify the appropriate methods required to manage and mitigate environmental disturbance during the proposed development, the impacts and risks that need to be avoided must first be identified. This has been conducted via an EIA process and the details of the impacts and risks associated with the proposed development are included in the EIR. The aim of the EMPr is to ensure that the impacts which have been identified are properly mitigated to ensure that their significance is reduced (in the case of negative impacts) in order to protect the environment. The tables below (Table 4.1 - Table 4.3) show the significance of the impacts before and after mitigation is taken into account during the design, construction and operational phases, respectively.

Table 4.1: Summary of the significance of impacts for the planning and design phase.

THEME	POTENTIAL ISSUES	SIGNIFICANCE	RESIDUAL RISK
Environmental policy	Legal and policy compliance	HIGH -	LOW -
Built environment	Mining layout & design	MODERATE -	LOW -
	Infrastructure	MODERATE -	LOW -
	Stormwater management	HIGH -	LOW -
	Waste management	MODERATE -	LOW -
Socio-economic	Health and safety	HIGH -	LOW -
Rehabilitation and maintenance	Inadequate rehabilitation and maintenance	HIGH -	LOW -
Ecological	Stormwater and erosion management	MODERATE -	LOW -
	Terrestrial and aquatic habitats	MODERATE -	LOW -
	Control of alien species	MODERATE -	LOW -
Heritage	Damage to Colonial Period structures (Historical Period sites)	VERY LOW -	VERY LOW +
	Damage to Colonial Period structures (Features)	VERY LOW -	VERY LOW +
	Damage to burial sites	LOW -	VERY LOW +

Table 4.2: Summary of the significance of impacts for the construction phase.

THEME	POTENTIAL ISSUES	SIGNIFICANCE	RESIDUAL RISK
Environmental policy	Legal and policy compliance	HIGH -	LOW -
Built environment	Infrastructure	MODERATE -	LOW -
	Material Stockpiling	MODERATE -	LOW -
	Stormwater management	MODERATE -	LOW -
	Waste Management	MODERATE -	LOW -
		MODERATE -	LOW -
	Hazardous substances	HIGH -	LOW -
Socio-economic	Job creation	LOW +	LOW +
	Health and safety	MODERATE -	LOW -
	Air quality and dust control	MODERATE -	LOW -
		MODERATE -	LOW -
	Noise	MODERATE -	LOW -
	On-site fire risk	MODERATE -	LOW -
	Traffic	LOW -	LOW -
	Visual – construction activities	LOW -	LOW -
Aquatic and wetland	Loss of riparian and wetland systems, habitat fragmentation and disturbance to watercourses and or wetlands during construction, operations and decommissioning phases	LOW -	LOW -
	Increase in sedimentation and erosion within the development footprints	MODERATE -	LOW -
	Impact on localized surface water quality	LOW -	LOW -
Ecological	Terrestrial and aquatic habitats	MODERATE -	LOW -
	Stormwater and erosion management	MODERATE -	LOW -
		MODERATE -	LOW -
		MODERATE -	LOW -
	Rehabilitation of disturbed areas	MODERATE -	LOW -
	Species of Conservation Concern	MODERATE -	LOW -
	Control of Alien Species	MODERATE -	LOW -
		MODERATE -	LOW -
	Wildlife mortalities	MODERATE -	LOW -
Heritage	Damage to Colonial Period structures (Historical Period sites)	LOW -	VERY LOW +
	Damage to Colonial Period structures (Features)	VERY LOW -	VERY LOW +
	Damage to burial sites	HIGH -	VERY LOW +
Paleontological	Impact on possible paleontological findings	LOW -	VERY LOW +

Table 4.3: Summary of the significance of impacts for the operational phase.

THEME	POTENTIAL ISSUES	SIGNIFICANCE	RESIDUAL RISK
Environmental policy	Legal and policy compliance	HIGH -	LOW -
Built environment	Material Stockpiling	MODERATE -	LOW -
	Stormwater management	MODERATE -	LOW -
	Waste Management	MODERATE -	LOW -
		MODERATE -	LOW -
	Hazardous substances	HIGH -	LOW -
Socio-economic	Job creation	LOW +	LOW +
	Health and safety	MODERATE -	LOW -
	Air quality and dust control	MODERATE -	LOW -
		MODERATE -	LOW -
	Noise	MODERATE -	LOW -
	On-site fire risk	MODERATE -	LOW -
	Traffic	LOW -	LOW -
	Visual – construction activities	LOW -	LOW -
Rehabilitation and maintenance	Inadequate rehabilitation and maintenance	MODERATE -	LOW -
Aquatic and wetland	Loss of riparian and wetland systems, habitat fragmentation and disturbance to watercourses and or wetlands	LOW -	LOW -
	Impact on riparian / wetland systems through the possible increase in surface water runoff on downstream riparian form and function, due to impacts to the hydrological regime such as alteration of surface run-off pattern	LOW -	LOW -
	Increase in sedimentation and erosion within the development footprints	MODERATE -	LOW -
	Impact on localized water quality	LOW -	LOW -
Ecological	Watercourses	MODERATE -	LOW -
	Material stockpiling	MODERATE -	LOW -
	Stormwater management	MODERATE -	LOW -
	Rehabilitation of disturbed areas	MODERATE -	LOW -
	Natural vegetation	MODERATE -	LOW -
	Control of Alien Species	MODERATE -	LOW -
		MODERATE -	LOW -
	Wildlife mortalities	MODERATE -	LOW -
		LOW -	LOW -
		LOW -	LOW -
	Loss/ fragmentation of habitats	MODERATE -	LOW -
		MODERATE -	LOW -
Heritage	Damage to Colonial Period structures (Historical Period sites)	VERY LOW -	VERY LOW +
	Damage to Colonial Period structures (Features)	VERY LOW -	VERY LOW +
	Damage to burial sites	HIGH -	VERY LOW +
Paleontological	Impact on possible paleontological findings	LOW -	VERY LOW +

Table 4.4: Summary of the significance of impacts for the decommissioning phase.

THEME	POTENTIAL ISSUES	SIGNIFICANCE	RESIDUAL RISK
Environmental policy	Legal and policy compliance	HIGH -	LOW -
Built environment	Material stockpiling	MODERATE -	LOW -
	Stormwater management	HIGH -	LOW -
	Waste management	MODERATE -	LOW -
Rehabilitation and maintenance	Inadequate rehabilitation and maintenance	MODERATE -	LOW -
Aquatic and wetland	Loss of riparian and wetland systems, habitat fragmentation and disturbance to watercourses and or wetlands	LOW -	LOW -
	Impact on riparian / wetland systems through the possible increase in surface water runoff on downstream riparian form and function, due to impacts to the hydrological regime such as alteration of surface run-off pattern	LOW -	LOW -
	Increase in sedimentation and erosion within the development footprints	MODERATE -	LOW -
Ecological	Stormwater and erosion management	MODERATE -	LOW -
	Rehabilitation of disturbed areas	MODERATE -	LOW -
	Control of Alien Species	MODERATE -	LOW -
		MODERATE -	LOW -

Table 4.5: Summary of the significance of impacts for the no-go alternative.

THEME	POTENTIAL ISSUES	SIGNIFICANCE	RESIDUAL RISK
Built environment	Infrastructure	MODERATE -	MODERATE +
Socio-economic	Health and safety	HIGH -	MODERATE +
	No job opportunities	MODERATE -	MODERATE +
Aquatic and wetland	Status-quo – No mining activities	MODERATE -	MODERATE -
Vegetation	Status-quo – No mining activities	LOW +	LOW +

4.2 IMPACT MANAGEMENT ACTIONS

The tables below (Table 4.6 - Table 4.8) list the impact management actions which need to be implemented in order to correctly mitigate the significance of the abovementioned impacts during the planning and design, construction, and operational phases, respectively.

Table 4.6: Summary of the mitigation measures applicable to the planning and design phase.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
Environmental policy	Legal and policy compliance	• The mining of the borrow pits and quarries must not commence prior to receiving an EA. • Should the borrow pits and quarries receive an EA, the project team must adhere to the conditions stipulated in the EA. • A qualified and independent Environmental Control Officer (ECO) must be appointed prior to commencement of any activity on site to monitor all legal and policy compliance. • No activities must commence within watercourses or within the regulatory buffers of watercourses without authorisation from the DWS. • All legal matters pertaining to permitting must be completed prior to any construction activity. • In particular, all necessary Water Use Licences must be in order for abstraction or any construction activities within 32 metres of a watercourse and within 500 m of a wetland. • The proposed mining must be consistent with the local IDP's and SDF's. • The planning and design of the proposed development must adhere to the recommendations of the Free State Biodiversity Plan (2015).
Built environment	Mining layout & design	• The borrow pits and quarries must be designed by an appropriately qualified engineer.
	Infrastructure	• Planning for and placement of infrastructure must be done so as to avoid sensitive areas as far as possible. • Stormwater, Rehabilitation, Alien Vegetation and Erosion Management Plans must be compiled during the planning and design phase of the proposed mining activities and implemented during the site establishment, mining and decommissioning phases. • The contractor should clearly demarcate construction and operational areas so as to minimise site disturbance.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
	Stormwater management	• A Stormwater Management Plan must be compiled during the planning and design phase of the proposed mining activities and implemented during the site establishment, mining and decommissioning phases. • Appropriate stormwater structures must be designed to minimise erosion and sedimentation of watercourses. • All infrastructure situated on slopes must incorporate stormwater diversion. • Flood attenuation and stormwater management plans must be drawn up by a qualified engineer and approved by DMR, the ECO and DWS. • Stormwater design must be in line with SANRAL and DHSWS requirements.
	Waste management	• A Waste Management Plan must be compiled during the planning and design phase of the proposed project. • This management plan should include waste management considerations for handling onsite general and hazardous waste during the site establishment, mining and decommissioning phases. • An appropriate area must be identified where waste can be stored before disposal. • All hazardous substances such as paints, diesel and cement must be stored in a secure bunded area with an impermeable surface beneath them.
Socio-economic	Health and safety	• A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be drawn up by and HSE officer prior to construction to ensure workers safety. • Roadside safety protocols need to be implemented during construction and operational phases.
Rehabilitation and maintenance	Inadequate rehabilitation and maintenance	• A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during site establishment, mining and decommissioning phases. This method statement must be approved by the appointed ECO.
Ecological	Stormwater and erosion management	• A Stormwater and Erosion Management Plan must be developed and implemented to control runoff and prevent erosion and loss of soil and sedimentation of watercourses during all phases of the project. • A Rehabilitation Plan must be developed for implementation during the site establishment, mining and decommissioning phases.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
	Terrestrial and aquatic habitats	• Project infrastructure and mining activities must be designed in such a way as to minimise the impact on surrounding terrestrial and aquatic habitsts. • The boundary of the mining areas must be demarcated to ensure minimal loss of intact natural terrestrial and aquatic (i.e. wetlands and watercourses) habitats.
	Control of alien species	• An Alien Vegetation Management Plan and Rehabilitation Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project.
Heritage	Damage to Colonial Period structures (Historical Period sites)	• Site monitoring, avoidance, 20m conservation buffer. • Phase 2 Study and destruction permitting if impacted on.
	Damage to Colonial Period structures (Features)	• Frequent site monitoring by heritage specialist / ECO.
	Damage to burial sites	• Frequent site monitoring by heritage specialist / ECO, heritage site management plan.

Table 4.7: Summary of the mitigation measures applicable to the construction phase.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
Environmental policy	Legal and policy compliance	• All construction related conditions in the Environmental Authorisation, EMPr and other permits must be adhered to. • SANRAL must employ an independent Environmental Control Officer (ECO) for the construction phase to ensure that construction is implemented according to specifications in the EA and EMPr. • Copies of all applicable licenses, permits and managements plans (EA, EMPr, etc.) must be available on-site at all times. • Environmental Awareness Training must be included in site meetings/talks with all workers.
Built environment	Infrastructure	• A Stormwater, Rehabilitation, Alien Vegetation and Erosion Management Plan must be compiled during the planning and design phase of the proposed mining activities and implemented during the site establishment, mining and decommissioning phases. • The construction contractor should clearly demarcate construction areas so as to minimise site disturbance.
	Material Stockpiling	• Material stockpiles must be located away from sensitive areas and they must be monitored for erosion and alien vegetation. • Material stockpiles locations must be approved by the ECO.
	Stormwater management	• The construction site must be managed in a manner that prevents pollution to downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. • Berms and swathes must be placed in areas that may be prone to erosion. • Temporary cut-off drains and berms may be required to capture storm water and promote infiltration.
	Waste Management	• All general waste must be disposed of in bins/waste skips labelled “general waste”. • Sufficient waste bins must be provided throughout the construction site for collecting waste. • All general waste collected on site must be disposed of at a licensed general waste disposal site. • All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
		• Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site. • Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground. • Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages. • Concrete and cement mixing must be conducted at a single location which should be centrally located, where practical. This mixing must take place on an impermeable surface, and dried waste concrete and cement must be disposed of with building rubble. • No concrete mixing must take place within 32 m of any watercourse.
	Hazardous substances	• Any storage tanks containing hazardous materials (ie fuel, diesel) must be placed in bunded containment areas with sealed surfaces and the capacity of the bunded containment areas must be 110% the volume of the storage tanks within it. • Barrels, bitumen must be stored in a secured area and all used barrels must be properly maintained and secured. • Cement and concrete must not be mixed directly on the ground, or during rainfall events when the potential for transport of pollutants to watercourses is the greatest. • Used cement bags should be collected and stored in containers to prevent wind-blown cement dust and water contamination. • Mixed cement/concrete must not be allowed to flow into any watercourses. • Drip trays must be placed under stationary construction machinery overnight to avoid soil contamination from oil and fuel leaks. • Absorbent materials in the form of a spill kit must be provided on site. • Contaminated soil must either be excavated or treated on-site, depending on the nature and extent of the spill. • The ECO must determine the precise method of treatment of polluted soil. This could involve the application of soil absorbent materials or oil-digestive powders to the contaminated soil. • Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in suitable containers until appropriate disposal. • All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
		• Proof of receipt of hazardous waste by a licensed service provider must be maintained on the site.
Socio-economic	Job creation	• N/A
	Health and safety	• A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be adhered to and enforced by a HSE officer to ensure workers safety. • Roadside safety protocols need to be implemented during construction and operational phases.
	Air quality and dust control	• During windy periods un-surfaced and un-vegetated areas must be dampened down. • Vegetation must be retained where possible as this will reduce dust travel. • Any complaints or claims emanating from dust issues must be attended to immediately and noted in the complaints register. • Vehicles and construction plant must be serviced regularly so as to reduce excessive vehicle emissions.
	Noise	• Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm). • There must be a complaints register on site for nearby residents to make complaints. These must be addressed and recorded.
	On-site fire risk	• In order to reduce the risk of fires: • All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. • Smoking must not be permitted near flammable substances. • All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. • No open fires must be allowed on site. • Fire extinguishers must be available onsite.
	Traffic	• Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm).

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
		• There must be a complaints register on site for nearby residents to make complaints. These must be addressed and recorded. • Local residents should be made aware of the presence of construction vehicles by making use of high-visibility signage. • All traffic safety (flagmen) and traffic calming measures should be in place within the site and where traffic enters the main road. • It is recommended that any damage to the road as a result of construction activities and vehicles should be repaired immediately and maintained in the original or improved state prior to construction.
	Visual – construction activities	• Construction activities should only take place during normal working hours (7am to 5pm) • The construction contractor should clearly demarcate construction areas so as to minimise site disturbance. • The site should be kept neat and tidy. Littering should be fined, and the SHE officer should organise rubbish clean-ups on a regular basis. • Night lighting of the construction sites should be minimised within requirements of safety and efficiency. • Implement mitigation measures as recommended in the EMPr.
Aquatic and wetland	Loss of riparian and wetland systems, habitat fragmentation and disturbance to watercourses and or wetlands during construction, operations and decommissioning phases	• The engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) generated by ay runoff in particular any access roads. • The final access road layout and any processing areas / stockpiles must make provision for stormwater management with the provision of suitable erosion protection features and or culverts. During the construction and operational /decommissioning phase, monitor culverts to see if erosion issues arise and if any erosion control is required. • Where possible culvert bases for any road crossings if needed, must be placed as close as possible with natural levels in mind so that these don't from additional steps / barriers. • Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. • It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
		clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas within aquatic environment, using selected species detailed in this report. • All alien plant re-growth must be monitored, and should it occur these plants should be eradicated. The scale of the operation does however not warrant the need of a Landscape Architect and / or Landscape Contractor.
	Increase in sedimentation and erosion within the development footprints	• Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. • Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. • Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments
	Impact on localized surface water quality	• Strict use and management of all hazardous materials used on site in line with the specific material safety data sheets, e.g. fuels must be stored within a contained / bunded site with the necessary and spill kits available. • Strict management of potential sources of pollution (e.g. litter, hydrocarbons from vehicles & machinery, cement during construction, etc.). • Containment of all contaminated water by means of careful run-off management on the development site. • Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the sites. • Strict control over the behaviour of construction workers, with regard littering, use and storage of chemicals. • Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced. Additional details in this regard in contain in Section 9 of this report and have also been considered in the mitigation assessment process.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
Ecological	Terrestrial and aquatic habitats	• Construction activities must be restricted to the demarcated mining project footprints. • The appointed ECO must ensure that the project footprint has been properly demarked and that activities are restricted to the demarkaed areas. • Surrounding terrestrial and aquatic habitats (i.e. watercourses and wetlands, whether artificial or natural) must be avoided.
	Stormwater and erosion management	• A Stormwater and Erosion Management Plan must be implemented during the construction phase. • Appropriate stormwater structures must be used during the construction phase. • The Stormwater and Erosion Management Plan and Rehabilitation Plan must be approved by the appointed ECO prior to implementation.
		• Disturbed areas must be rehabilitated as soon as possible after construction. • Regular monitoring for erosion after construction must take place to ensure that no erosion problems have developed as result of the disturbance. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and vegetation techniques. • All cleared areas (not used for the development footprint) should be vegetated with indigenous perennial shrubs and grasses from the local area as soon as possible. • Natural vegetation that was removed onsite may be used as soil stabilisers by placing them on cleared areas if natural recovery is slow.
		• Only topsoil from the project site, which has been appropriately stored, must be used for rehabilitation. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. • Restoration must be conducted as per the approved Erosion Management Plans.
	Rehabilitation of disturbed areas	• All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete. Restoration must be conducted as per a Rehabilitation Management Plan. • Only topsoil from the development site, which has been appropriately stored, must be used for rehabilitation.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
	Species of Conservation Concern	• Should any SCC be noted on site by the ECO the necessary permits must be obtained in to remove them. • Once removed the, the SCC must be taken to a suitable habitat or nursery for the duration of the construction phase. • All rescued SCC must be replanted within the site where it was originally found or in close proximity during rehabilitation.
	Control of Alien Species	• The approved Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc. in accordance with the NEMBA: Alien Invasive Species Regulations.
		• Only topsoil from the project site, which has been appropriately stored, must be used for rehabilitation. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. • Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans.
	Wildlife mortalities	• All staff on site must be trained regarding the proper management and response should animals be encountered on site. • No hunting, baiting or trapping must be permitted on site on adjacent land.
Heritage	Damage to Colonial Period structures (Historical Period sites)	• Site monitoring, avoidance, 20m conservation buffer. • Phase 2 Study and destruction permitting if impacted on.
	Damage to Colonial Period structures (Features)	• Frequent site monitoring by heritage specialist / ECO.
	Damage to burial sites	• Site monitoring, avoidance, 100m conservation buffer, site management • Grave relocation subject to authorisations and permitting if impacted on.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
Paleontological	Impact on possible paleontological findings	• In the case of any significant fossil finds exposed by access road building, quarry or borrow pit excavations during development, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to SAHRA • This is so that appropriate mitigation (i.e. recording, sampling or collection) by a paleontological specialist can be considered and implemented before rehabilitation of the access road cuttings, quarries or borrow pits takes place • These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the proposed quarry and borrow pit developments.

Table 4.8: Summary of the mitigation measures applicable to the operational phase

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
Environmental policy	Legal and policy compliance	• The proponent must ensure that operations of the mines are compliant with the relevant legislation and policy. • These should include (but are not restricted to): NEMA, EA, EMPr and any other permits/authorisations.
Built environment	Material Stockpiling	• Material stockpiles must be located away from sensitive areas and they must be monitored for erosion and alien vegetation. • Material stockpiles locations must be approved by the ECO.
	Stormwater management	• The construction site must be managed in a manner that prevents pollution to downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. • Berms and swathes must be placed in areas that may be prone to erosion. • Temporary cut-off drains and berms may be required to capture storm water and promote infiltration.
	Waste Management	• All general waste must be disposed of in bins/waste skips labelled “general waste”. • Sufficient waste bins must be provided throughout the construction site for collecting waste. • All general waste collected on site must be disposed of at a licensed general waste disposal site. • All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. • Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site. • Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground. • Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages. • Concrete and cement mixing must be conducted at a single location which should be centrally located, where practical. This mixing must take place on an impermeable surface, and dried waste concrete and cement must be disposed of with building rubble. • No concrete mixing must take place within 32 m of any watercourse.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
	Hazardous substances	• Any storage tanks containing hazardous materials (ie fuel, diesel) must be placed in bunded containment areas with sealed surfaces and the capacity of the bunded containment areas must be 110% the volume of the storage tanks within it. • Barrels, bitumen must be stored in a secured area and all used barrels must be properly maintained and secured. • Cement and concrete must not be mixed directly on the ground, or during rainfall events when the potential for transport of pollutants to watercourses is the greatest. • Used cement bags should be collected and stored in containers to prevent wind-blown cement dust and water contamination. • Mixed cement/concrete must not be allowed to flow into any watercourses. • Drip trays must be placed under stationary construction machinery overnight to avoid soil contamination from oil and fuel leaks. • Absorbent materials in the form of a spill kit must be provided on site. • Contaminated soil must either be excavated or treated on-site, depending on the nature and extent of the spill. • The ECO must determine the precise method of treatment of polluted soil. This could involve the application of soil absorbent materials or oil-digestive powders to the contaminated soil. • Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in suitable containers until appropriate disposal. • All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. • Proof of receipt of hazardous waste by a licensed service provider must be maintained on site.
Socio-economic	Job creation	• N/A
	Health and safety	• A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be adhered to and enforced by a HSE officer to ensure workers safety. • Roadside safety protocols need to be implemented during construction and operational phases.
	Air quality and dust control	• During windy periods un-surfaced and un-vegetated areas must be dampened down.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
		• Vegetation must be retained where possible as this will reduce dust travel. • Any complaints or claims emanating from dust issues must be attended to immediately and noted in the complaints register. • Vehicles and construction plant must be serviced regularly so as to reduce excessive vehicle emissions.
		•
	Noise	• Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm). • There must be a complaints register on site for nearby residents to make complaints. These must be addressed and recorded.
	On-site fire risk	• In order to reduce the risk of fires: • All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. • Smoking must not be permitted near flammable substances. • All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. • No open fires must be allowed on site. • Fire extinguishers must be available onsite.
	Traffic	• Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm). • There must be a complaints register on site for nearby residents to make complaints. These must be addressed and recorded. • Local residents should be made aware of the presence of construction vehicles by making use of high-visibility signage. • All traffic safety (flagmen) and traffic calming measures should be in place within the site and where traffic enters the main road. • It is recommended that any damage to the road as a result of mining activities and vehicles should be repaired immediately and maintained in the original or improved state prior to construction.
	Visual – construction activities	• Mining activities should only take place during normal working hours (7am to 5pm)

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
		• The mining contractor should clearly demarcate mining areas so as to minimise site disturbance. • The site should be kept neat and tidy. Littering should be fined, and the SHE officer should organise rubbish clean-ups on a regular basis. • Night lighting of the construction sites should be minimised within requirements of safety and efficiency. • Implement mitigation measures as recommended in the EMPr.
Rehabilitation and maintenance	Inadequate rehabilitation and maintenance	• A Rehabilitation Management Plan must be compiled during the planning and design phase of the proposed mining activities and implemented during the site establishment, mining and decommissioning phases. • Disturbed areas will be rehabilitated/prepared to allow natural re-vegetation.
Aquatic and wetland	Loss of riparian and wetland systems, habitat fragmentation and disturbance to watercourses and or wetlands	• The engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) generated by ay runoff in particular any access roads. • The final access road layout and any processing areas / stockpiles must make provision for stormwater management with the provision of suitable erosion protection features and or culverts. During the construction and operational /decommissioning phase, monitor culverts to see if erosion issues arise and if any erosion control is required. • Where possible culvert bases for any road crossings if needed, must be placed as close as possible with natural levels in mind so that these don't from additional steps / barriers. • Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. • It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas within aquatic environment, using selected species detailed in this report. • All alien plant re-growth must be monitored, and should it occur these plants should be eradicated. The scale of the operation does however not warrant the need of a Landscape Architect and / or Landscape Contractor.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
	Impact on riparian / wetland systems through the possible increase in surface water runoff on downstream riparian form and function, due to impacts to the hydrological regime such as alteration of surface run-off pattern	• Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. • Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. • Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments
	Increase in sedimentation and erosion within the development footprints	• Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. • Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. • Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments
	Impact on localized water quality	• Strict use and management of all hazardous materials used on site in line with the specific material safety data sheets, e.g. fuels must be stored within a contained / bunded site with the necessary and spill kits available. • Strict management of potential sources of pollution (e.g. litter, hydrocarbons from vehicles & machinery, cement during construction, etc.). • Containment of all contaminated water by means of careful run-off management on the development site. • Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the sites. • Strict control over the behaviour of construction workers, with regard littering, use and storage of chemicals.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
		• Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced. Additional details in this regard in contain in Section 9 of this report and have also been considered in the mitigation assessment process.
Ecological	Watercourses	• Mining activities must be kept to the approved and demarcated footprint of each borrow pit and quarry. • Surrounding watercourses and wetlands (artificial or natural) must be avoided.
	Material stockpiling	• No mining material must be stored within 32 m of any watercourse. • Stockpiles within 50 m of watercourses must be monitored for erosion and mobilisation of materials towards watercourses. If this is noted by the EO, suitable cut-off drains or berms must be placed between the stockpile area and the watercourse.
	Stormwater management	• Stormwater management structures must be monitored and maintained throughout the operation phase.
	Rehabilitation of disturbed areas	• All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the EO is satisfied that all affected areas have been rehabilitated.
	Natural vegetation	• The mining footprint must be surveyed and demarcated prior to mining commencing. • No mining activities must be allowed outside the demarcated footprint. • No mining activities must be allowed where untransformed areas of natural vegetation occur. • Mining activities must be limited to the absolute necessary area only. • Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken. • Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation may be mulched and used as ground cover during rehabilitation. • The contractor's staff must not harvest any natural vegetation.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
	Control of Alien Species	• The approved Alien Vegetation Management Plan must be implemented to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations. • Only topsoil from the mining site, which has been appropriately stored, must be used for rehabilitation. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as mining in the particular area is complete. • Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans.
	Wildlife mortalities	• All staff on site must be trained regarding the proper management and response should animals be encountered. • No hunting, baiting or trapping must be permitted on site or on adjacent land.
	Loss/ fragmentation of habitats	• The clearance of vegetation within aquatic habitats must be avoided as far as possible. • Should avoidance be impractical, vegetation clearance must be minimised as much as possible. • Indigenous tree species should be pruned using loppers or saws where they pose safety threats. If their presence compromises safety mandates entirely, fell and stump treat with appropriate herbicide.
Heritage	Damage to Colonial Period structures (Historical Period sites)	• Site monitoring, avoidance, 20m conservation buffer. • Phase 2 Study and destruction permitting if impacted on.
	Damage to Colonial Period structures (Features)	• Frequent site monitoring by heritage specialist / ECO.
	Damage to burial sites	• Site monitoring, avoidance, 100m conservation buffer, site management • Grave relocation subject to authorisations and permitting if impacted on.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTIONS / MITIGATION MEASURES
Paleontological	Impact on possible paleontological findings	• In the case of any significant fossil finds exposed by access road building, quarry or borrow pit excavations during development, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to SAHRA • This is so that appropriate mitigation (i.e. recording, sampling or collection) by a paleontological specialist can be considered and implemented before rehabilitation of the access road cuttings, quarries or borrow pits takes place • These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the proposed quarry and borrow pit developments.

Table 4.9: Summary of the mitigation measures applicable to the decommissioning phase

THEME	POTENTIAL ISSUES	MANAGEMENT ACTION / MITIGATION MEASURE
Environmental policy	Legal and policy compliance	• The application for closure of the mines must be submitted together with all relevant documents as indicated in Section 43 of Mineral and Petroleum Resources Development Act (Act 28 of 2002), as amended.
Built environment	Material stockpiling	• All structures comprising the site camp are to be removed from site. • All rubble must be removed from the site to an approved disposal site as approved by the ECO. • Fences, barriers and demarcations associated with the construction phase must be removed from the site. • All residual stockpiles must be removed or spread on site as directed by the ECO. • All leftover building materials must be removed from the site.
	Stormwater management	• All surfaces hardened due to construction activities must be ripped and imported material thereon removed. • The Contractor must check that all watercourses are free from building rubble, spoil materials and waste materials. • A programme for controlling invasive species must be implemented within disturbed zones to ensure that it does not become a conduit for the propagation and spread of invasive exotic plants.
	Waste management	• The area that previously housed the site camp is to be checked for spills of substances such as oil, paint, etc., and these must be cleaned up and contaminants disposed of appropriately. • All rubble must be removed from the site to an approved disposal site as approved by the ECO. Burying of rubble on site is prohibited. • The site must be cleared of all litter.
Rehabilitation and maintenance	Inadequate rehabilitation and maintenance	• All areas affected during the site establishment and mining phases must be rehabilitated. • All disturbed areas must be re-vegetated with an indigenous seed mix in consultation with an indigenous plant expert, ensuring that during rehabilitation only indigenous shrubs, trees and grasses are used in restoring the biodiversity. • A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTION / MITIGATION MEASURE
		• The programme for controlling invasive species must be implemented within disturbed zones to ensure that it does not become a conduit for the propagation and spread of invasive exotic plants. • Final inspection in order to ensure adherence to EMPr guidelines, completion of localised/ remaining areas of impact, monitoring of rehabilitation success, etc.
Aquatic and wetland	Loss of riparian and wetland systems, habitat fragmentation and disturbance to watercourses and or wetlands	• The engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) generated by ay runoff in particular any access roads. • The final access road layout and any processing areas / stockpiles must make provision for stormwater management with the provision of suitable erosion protection features and or culverts. During the construction and operational /decommissioning phase, monitor culverts to see if erosion issues arise and if any erosion control is required. • Where possible culvert bases for any road crossings if needed, must be placed as close as possible with natural levels in mind so that these don't from additional steps / barriers. • Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. • It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas within aquatic environment, using selected species detailed in this report. • All alien plant re-growth must be monitored, and should it occur these plants should be eradicated. The scale of the operation does however not warrant the need of a Landscape Architect and / or Landscape Contractor.
	Impact on riparian / wetland systems through the possible increase in surface water runoff on downstream riparian form and function, due to impacts to the hydrological regime such as alteration of surface run-off pattern	• Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. • Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities

THEME	POTENTIAL ISSUES	MANAGEMENT ACTION / MITIGATION MEASURE
		• No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. • Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments
	Increase in sedimentation and erosion within the development footprints	• Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. • Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. • Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments
Ecological	Stormwater and erosion management	• Stormwater management structures must be monitored and maintained throughout the operation phase. • All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the EO is satisfied that all affected areas have been rehabilitated.
	Rehabilitation of disturbed areas	• All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the EO is satisfied that all affected areas have been rehabilitated.
	Control of Alien Species	• The approved Alien Vegetation Management Plan must be implemented to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.

THEME	POTENTIAL ISSUES	MANAGEMENT ACTION / MITIGATION MEASURE
		• Only topsoil from the mining site, which has been appropriately stored, must be used for rehabilitation. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as mining in the particular area is complete. • Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans.

4.3 MITIGATION MEASURES INCLUDED IN THE EIR

It is the recommendation of CES that the proposed N1-16 mining activities should be approved provided that the proposed mitigation measures are implemented and that the EMPr is implemented, maintained and adapted to incorporate relevant legislation, standard requirements and audit reporting, throughout the life of the development. The mitigation measures for all impacts identified in the EIR must be incorporated into the EMPr and must be used by the engineers during the detailed Planning & Design Phase, and by the contractors during the Construction, Operational and Decommissioning Phases.

The following recommendations must be included into the final EMPr:

- The project construction site must be demarcated prior to commencement of activities on site. All areas outside the demarcation will be considered as No-Go areas during construction.
- A qualified, independent ECO must be appointed prior to commencement of any activity on site.
- All mitigation measures indicated in this report must be included into the EMPr
- The following Management Plans must be developed prior to clearing and implemented during construction and operations of the proposed development. These management plans include:
    - Storm Water & Contingency Management Plan;
    - Erosion Action Plan;
    - Rehabilitation Management Plan; and
    - Alien Vegetation Management Plan

4.4 AUTHORITY-RECOMMENDED MITIGATION MEASURES

No specific recommendations have been made by DMR or any other competent authority to date however, all recommendations made by the DMR and/or other organs of state will be included in the Final EMPr.

4.5 SPECIALIST-RECOMMENDED MITIGATION MEASURES

The following recommendations stemming from the specialist studies undertaken for the EIR must also be adhered to:

4.5.1 Aquatic and Wetland Specialist

As the proposed activities have the potential to create erosion/sedimentation the following key recommendations and assumptions are provided:

- Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment.

- All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination. Washing and cleaning of equipment should also be done in berms or bunds, to trap any cement and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any stores should be more than 50m from any demarcated watercourses.
- It is also advised that an Environmental Control Officer, with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas, using selected species detailed in this report.
- All alien plant re-growth must be monitored, and should these alien plants reoccur these plants should be re-eradicated. The scale of the operation does however not warrant the use of a Landscape Architect and / or Landscape Contractor.
- It is further recommended that a comprehensive rehabilitation plan be developed from the project onset with particular reference to the watercourse areas (including of buffers) to ensure a net benefit to the aquatic environment when the project is decommissioned.

4.5.2 Ecological Specialist

- The project mining sites must be demarcated prior to commencement of activities on site. All areas outside the demarcated areas will be considered as No-Go areas during construction and mining.
- A qualified, independent Environmental Control Officer (ECO) must be appointed prior to commencement of any activity on site.
- The borrow pit and quarry operator(s) must appoint an Environmental Officer (EO) responsible for ensuring compliance with the conditions of the mining permit during operational phase.
- All mitigation measures indicated in this report must be included into the EMPr.
- The following Management Plans must be developed prior to clearing and implemented during construction and operation of the proposed borrow pits and quarries. These management plans must be incorporated into the EMPr:
    - Storm Water Management Plan;
    - Erosion Management Plan;
    - Rehabilitation Management Plan; and
    - Alien Vegetation Management Plan.
- A General Authorisation from the Department of Water and Sanitation must be applied for all mining sites within 500 m of a wetland or water course. This must be done prior to the commencement of mining.

4.5.3 Heritage Specialist

Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.

It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that the possibility of undetected archaeological remains occurring elsewhere in the project area should not be excluded. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development.

The following site-specific recommendations are provided:

- **Contemporary Period (CP) structure** – No action in terms of heritage mitigation is required for these features. However, cognisance should be taken of the fact that human burials might occur in association with the farmstead at precisely undated locations.
- **Features (FT)** – The possibility of some of the features indicating informal human burial sites should not be excluded and it is therefore recommended that the area be monitored by an informed ECO in order to avoid the destruction of previously undetected heritage remains or burials.
- **Historical Period structure (HP)**
    - The site is located along the western periphery of the proposed BP 77.7 site on the farm Hartplaats 77 and it is primarily recommended that the borrow pit be redesigned to avoid impact on the site where a heritage conservation buffer of at least 20 m around the heritage receptor is implemented.
    - If this measure proves unachievable it is recommended that the historical fabric of the site be conserved by means of a Phase 2 Specialist study (mapping, site sampling and possible conservation management and protection) and the necessary permits should be obtained from the relevant Heritage Resources Authorities.
- **Burial Site (CE)**
    - The Burial Grounds and Graves (BGG) Unit of SAHRA requires a 100m conservation buffer for all burials. It is therefore recommended that the burrow pit proposed for this area around the burial site be redesigned to avoid encroaching on the required 100 m conservation buffer.
    - In addition it is recommended that the burial site be fenced off with wire or palisade fencing placed no closer than 2 m from the burials. An access gate should be erected and access control should be applied to the site.
    - A heritage Site Management Plan (SMP) should be compiled for the burials to stipulate conservation measures, responsible persons and chance find procedures for further heritage mitigation.
    - The developer should carefully liaise with the heritage specialist, SAHRA as well as local communities and possible affected parties with regards to the management and monitoring of any human grave or cemetery in order to detect and manage negative impact on the sites.
    - Should impact on the burial site prove inevitable, full grave relocations are recommended for these burial grounds. This measure should be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains. A full social

consultation process with the Kamffer family and other affected parties should occur in conjunction with the mitigation of cemeteries and burials.

In addition to these site-specific recommendations, careful cognizance should be taken of the following:

- As Paleontological remains occur where bedrock has been exposed, all geological features should be regarded as sensitive.
- Water sources such as drainage lines, fountains and pans would often have attracted human activity in the past. As Stone Age material the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits.

4.5.4 Paleontological Specialist

The Chance Fossil Finds Procedure should be followed in the case of any significant fossil finds exposed by access road building, quarry or borrow pit excavations during development. The sites should be monitored by the ECO on an on-going basis for fossil remains such as blocks of petrified wood or mammalian bones and teeth. If fossils are found on site, the ECO protocol is as follows:

- Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately, safeguard site with security tape / fence / sand bags if necessary.
- Record key data while fossil remains are still *in situ*.
- If feasible to leave fossils *in situ*, alert Heritage Management Authority (HMA) and project palaeontologist. Safeguard fossil site until clearance is granted by eritage management Authority.
- If feasible to leave fossils *in situ*, carefully remove, photograph, wrap and safeguard fossil. Alert HMA and project palaeontologist.
- Appoint palaeontologist if required by HMA and implement further mitigation measures as recommended by HMA and palaeontologist.
- Palaeontologist to record, describe and judiciously sample fossil remains together with relevant contextual data.

5 ENVIRONMENTAL MANAGEMENT SYSTEM

An environmental management system (EMS) enables companies, organizations and operations to systematically manage, prevent and reduce their environmental impacts (or footprint) and associated costs. In terms of ISO 14001, an EMS is defined as, "*that part of the overall management system includes organizational structure, planning activities, responsibilities, procedures, processes and resources for developing, implementing, reviewing and maintaining the environmental policy*." This chapter of the EMPr outlines the EMS for the proposed development and is subdivided according to the three notable phases of the development namely, the pre-construction phase, the construction phase and the operational phase.

5.1 METHOD STATEMENTS

Before the contractor begins each construction activity, the contractor shall give to the ECO and project manager a written method statement setting out the following:

- The type of construction activity;
- Locality where the activity will take place;
- Identification of impacts that might result from the activity;
- Identification of activities or aspects that may cause an impact;
- Methodology and/or specifications for impact prevention for each activity or aspect;
- Methodology and/or specific actions for impact containment for each activity or aspect;
- Emergency/disaster incident and reaction procedures; and
- Treatment and continued maintenance of impacted environment.

The contractor may provide such information in advance of any or all construction activities provided that new submissions shall be given to the ECO and/or project manager whenever there is a change or variation to the original.

The ECO and/or project manager may provide comment on the methodology and procedures proposed by the contractor, but they shall not be responsible for the contractor's chosen measures of impact mitigation and emergency/disaster management systems. However, the contractor shall demonstrate at inception and at least once during the contract that the approved measures and procedures function properly.

5.2 PERFORMANCE MONITORING AND RECORD KEEPING

The project manager and ECO will continuously monitor the contractor's adherence to the approved impact prevention procedures and the engineer shall issue to the contractor a notice of non-compliance whenever transgressions are observed. The ECO should document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. The non-compliance shall be documented and reported to the project manager in the monthly report.

These reports shall be made available to the authorities when requested.

The contractor shall ensure that an electronic filing system identifying all documentation related to the EMPr is established.

A list of reports likely to be generated during all phases of the Project is provided below, and all applicable documentation must be included in the environmental filing system catalogue or document retrieval index.

- Environmental Management Programme;
- Final design documents and diagrams issued to and by the contractor;
- All communications detailing changes of design/scope that may have environmental implications;
- Complaints register;
- Medical reports;
- Incident and accident reports;
- Emergency preparedness protocol;
- Copies of all relevant environmental legislation;
- All relevant permits;
- All method statements from the contractor for all phases of the project.

5.3 DOCUMENT CONTROL

The contractor and project manager shall be responsible for establishing a procedure for electronic document control. The document control procedure should comply with the following requirements:

- Documents must be identifiable by organisation, division, function, activity and contact person;
- Every document should identify the personnel and their positions, who drafted and compiled the document, who reviewed and recommended approval, and who finally approved the document for distribution;
- All documents should be dated, provided with a revision number and reference number, filed systematically, and retained for a five-year period.

The contractor shall ensure that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations essential to the functioning of the EMPr are performed. All documents shall be made available to the independent external auditor.

Although all foreseeable actions and potential mitigations or management actions are contained in this document, the EMPr should be seen as a day-to-day management document. The EMPr thus sets out the environmental standards that are required to minimise the negative impacts and maximise the positive benefits of the proposed development as detailed in the EIR. The EMPr is a “live document”, and if continuously reviewed and managed correctly can result in successful construction and operation of the proposed development.

The EMPr will be shared with contractor, so that the contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr. Further guidance should also be taken on any conditions contained in the Environmental Authorisation, if the project is granted approval, and that these conditions must be incorporated into the final EMPr.

5.4 ROLES AND RESPONSIBILITIES

5.4.1 SANRAL (Proponent)

SANRAL is the applicant/proponent and shall therefore be the entity managing and monitoring the implementation of the EMPr and compliance with the authorisation for the duration of the planning, construction and operation phases. However, if SANRAL appoints a Contractor to implement the project and hence implement the proposed management and mitigation measures documented in this EMPr on their behalf, then the successful contractor's responsibilities are outlined in the section that follows.

5.4.2 Contractor

The successful Contractor shall:

- Be responsible for the finalisation of the EMPr in terms of methodologies which are required to be implemented ('method statements') to achieve the environmental specifications contained herein and the relevant requirements contained in the environmental authorisation, if issued by DMR;
- Be responsible for the overall implementation of the EMPr in accordance with the requirements of SANRAL and the environmental authorisation, if issued by DMR;
- Ensure that all third parties who carry out all or part of the Contractor's obligations under the Contract comply with the requirements of this EMPr;
- Be responsible for obtaining any environmental permits which are required for the design, construction and operation of the proposed development.
- Ensure that the appointments of the DEO subject to the approval of SANRAL.

5.4.3 Designated Environmental Officer

The Contractor shall appoint a nominated representative of the contractor as the Designated Environmental Officer (DEO) for the contract. The DEO will be site-based and shall be the responsible person for implementing the environmental provisions of the construction contract.

There shall be an approved DEO on the site at all times. It may be necessary to have more than one DEO employed.

The DEO's duties will include, inter alia, the following:

- Ensuring that all the environmental authorisations and permits required in terms of the applicable legislation have been obtained prior to construction commencing.
- Reviewing and approving construction method statements with input from the ECO and Engineer, where necessary, in order to ensure that the environmental specifications contained within the construction contract are adhered to.
- Assisting the Contractor in finding environmentally responsible solutions to problems.
- Keeping accurate and detailed records of all activities on site.
- Keeping a register of complaints on site and recording community comments and issues, and the actions taken in response to these complaints.
- Ensuring that the required actions are undertaken to mitigate the impacts resulting from non-compliance.

- Ordering the removal of, or issuing spot fines for person/s and/or equipment not complying with the specifications of the EMPr and/or environmental authorisation.
- Reporting all incidences of non-compliance to the ECO and Contractor.
- The DEO shall submit regular written reports to the ECO, but not less frequently than once a month.

The DEO must have:

- The ability to manage public communication and complaints;
- The ability to think holistically about the structure, functioning and performance of environmental systems; and
- The DEO must be fully conversant with the Environmental Impact Report and EMPr for the development and all relevant environmental legislation.
- The DEO must have received professional training, including training in the skills necessary to be able to amicably and diplomatically deal with the public as outlined in bullet point one above.

The ECO shall be in the position to determine whether or not the DEO has adequately demonstrated his/her capabilities to carry out the tasks at hand and in a professional manner. The ECO shall therefore have the authority to instruct the contractor to replace the DEO if, in the ECO's opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the construction contract. Such instruction will be in writing and shall clearly set out the reasons why a replacement is required and within what timeframe. The ECO shall visit the development site and in addition to the responsibilities listed in Section 5.4.5 below, review the performance of the DEO and submit regular performance reviews to SANRAL, but not less frequently that once a month.

5.4.4 Environmental Control Officer (ECO)

For the purposes of implementing the conditions contained herein SANRAL shall appoint an Environmental Control Officer (ECO) for the contract. The ECO shall be the responsible person for ensuring that the provisions of the EMPr as well as the environmental authorisation are complied with during the construction period. The ECO will be responsible for issuing instructions to the contractor and where environmental considerations call for action to be taken. The ECO shall submit regular audit reports to SANRAL at a frequency to be agreed or as required by the issued Environmental Authorisation.

The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr and conditions of the environmental authorisation. The ECO's duties in this regard will include, *inter alia*, the following:

- Site audit and to confirm that all the environmental authorisations and permits required in terms of the applicable legislation have been obtained prior to construction commencing.
- Monitoring and verifying that the EMPr, Environmental Authorisation and Contract are adhered to at all times and taking action if specifications are not followed.
- Monitoring and verifying that environmental impacts are kept to a minimum.
- Reviewing and approving construction method statements with input from the DEO and project manager where necessary, in order to ensure that the environmental specifications contained within this EMPr and environmental authorisation are adhered to.

- Inspecting the site and surrounding areas on a regular basis regarding compliance with the EMPr, Environmental Authorisation and Contract.
- Monitoring the undertaking by the Contractor to implement environmental awareness training for all new personnel on site.
- Ensuring that activities on site comply with all relevant environmental legislation.
- Undertaking a continual internal review of the EMPr and submitting any changes to SANRAL and/or DMR (in case of major changes) for review and approval.
- Checking the register of complaints kept on site and maintained by the DEO and ensuring that the correct actions are/were taken in response to these complaints.
- Checking that the required actions are/were undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidences of non-compliance in audit report that is submitted to SANRAL, stating the level of environmental performance in respect of the activities undertaken relating to the project.
- The ECO shall also submit compliance audit reports to DMR, in accordance with the requirements of the environmental authorisation. Such reports shall be reviewed by SANRAL, prior to submission.

- Keeping a photographic record of progress on site from an environmental perspective. This can be conducted in conjunction with the DEO as the DEO will be the person that will be onsite at all times and can therefore take photographic records weekly. The ECO would need to check and ensure that the DEO understands the task at hand.
  - Recommending additional environmental protection measures, should this be necessary.
  - Providing report back on any environmental issues at site meetings.

  The ECO must have:
  - A good working knowledge of all relevant environmental policies, legislation, guidelines and standards;
  - The ability to conduct inspections and audits and to produce thorough, readable and informative reports;
  - The ability to manage public communication and complaints;
  - The ability to think holistically about the structure, functioning and performance of environmental systems; and
  - Proven competence in the application of the following integrated environmental management tools:
    - Environmental Impact Assessment.
    - Environmental management plans/programmes.
    - Environmental auditing.
    - Mitigation and optimisation of impacts.
    - Monitoring and evaluation of impacts.
    - Environmental Management Systems.

  The ECO must be fully conversant with the EIR, EMPr, Environmental Authorisation (should the application succeed) for the proposed mining activities and all relevant environmental legislation.

  SANRAL shall have the authority to replace the ECO if, in their opinion, the appointed officer is not fulfilling their duties in terms of the requirements of the EMPr or this specification. Such instruction will be in writing and shall clearly set out the reasons why a replacement is required and within what timeframe.

6 CONSTRUCTION & OPERATIONAL PHASE EMPR

6.1 CLEARING OF THE SITE

In all areas where the contractor intends to, or is required to, clear the natural vegetation and soil, either within the mining area, or at designated or instructed areas outside the mining area, a plan of action shall first be submitted to the ECO for their approval. The inspection reports shall contain a photographic record and change/land reference of the areas to be disturbed. This shall be submitted to the project manager for their records before any disturbance/stockpiling may occur. The record shall be comprehensive and clear, allowing for easy identification during subsequent inspections.

The contractor shall be responsible for the re-establishment of natural vegetation within the development boundaries for all areas disturbed during construction. This includes, for example, service roads, stockpile areas, stop/go facilities, windrows and wherever material generated for, or from, road construction has to be stored temporarily or otherwise within the construction area, or at designated or instructed areas outside the construction area. This responsibility shall extend until expiry of the defects notification period.

6.2 SITE ACCESS AND DEMARCATION

The location, layout and method of establishment of the site camp including the following must be clearly indicated and demarcated prior to mining activity commencing:

- All contractor's buildings, and/or offices
- Lay down areas
- Vehicle wash areas (if any)
- Workshops and drip trays
- Fuel storage areas (including filling and dispensing from storage tanks)
- Cement/concrete mixing areas (including the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete)
- Other infrastructure required for the running of the project
- Road construction forewarning signs and detour signage if necessary

Details, including a drawing, showing where and how the access points and routes will be located and managed must be submitted to the ECO and developer that are supported by the following management requirements:

- On the site and within such distance of the site as may be stated, the contractor shall control the movement of all vehicles and plant including that of their suppliers so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic and that all relevant laws are complied with. In addition, such vehicles and plant shall be so routed and operated as to minimise disruption to regular users of the routes not on the Site.
- On gravel or earth roads on site and within 500m of the site, the vehicles of the contractor and their suppliers shall not exceed a speed of 45 km/h or as directed by the ECO.
- The contractor shall supply the ECO with a Method Statement detailing the location and management of all access points and roads.

The contractor shall erect and maintain permanent and/or temporary fences of the type and in the locations directed by the ECO. Such fences shall, if so specified, be erected before undertaking designated activities. Certain areas within or next to the Site shall be "no go" areas. The contractor shall ensure that, insofar as they have the authority, no person, machinery, equipment or materials enter the “no go" areas at any time.

6.3 Materials Handling, Use and Storage

- The contractor shall ensure that any delivery drivers are informed of all procedures and restrictions (including identified "no go" areas) required to comply with the EMPr.
- The contractor shall ensure that these delivery drivers are supervised during off loading, by someone with an adequate understanding of the requirements of the EMPr.
- Materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to sand, stone chip, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent them spilling from the vehicle during transit.
- The contractor shall be responsible for any clean-up resulting from the failure by their employees or suppliers to properly secure transported materials.
- All manufactured and/ or imported material shall be stored within the contractor's camp, and, if so required by the EMPr, out of the rain.
- All lay down areas outside of the construction camp shall be subject to the ECO's approval.
- Imported gravel, fill, soil and sand materials shall be free of weeds, alien invasive seed matter, plant material, litter and contaminants and shall be obtained from sources approved by the ECO.

6.4 Stockpiling

- Any stockpiling of gravel, cut, fill or any other material including spoil shall be in areas approved by the ECO within the defined working area.
- The contractor shall ensure that the material does not blow or wash away. If the stockpiled material is in danger of being washed or blown away, the contractor shall spray it with Dustex or cover it with a suitable material, such as hessian or plastic. Stockpiles of topsoil shall not be covered with plastic.
- No stockpiling of any material shall be allowed within 20m of any “no go” area.

6.5 Solid Waste Management

- No on-site burning, burying or dumping of any waste materials, litter or refuse shall occur.
- The contractor shall provide vermin and weatherproof bins with lids of sufficient number and capacity to store the solid waste produced on a daily basis. The lids shall be kept firmly on the bins at all times.
- Bins shall not be allowed to become overfull and shall be emptied at least once a day.
- The waste from bins may be temporarily stored on Site in a central waste area that is weatherproof and scavenger-proof, and which the ECO has approved.
- Recyclable waste shall be disposed of into separate skips/bins and removed off-site for recycling.
- All solid waste shall be disposed of off-site at an approved registered landfill site. The contractor shall supply the ECO with the appropriate disposal certificates.

6.6 WATER USE

- All sources of water for mining purposes must be approved by the ECO in writing before any such sources can be used to obtain water.
- Water may not be sourced from a river, natural watercourse or from a borehole without the appropriate authorisation from the Department of Water and Sanitation (DWS).
- Where possible all wash water will be recycled for use, as wash water again or for dust suppression where applicable.

6.7 CONTAMINATED WATER

- Potential pollutants of any kind and in any form shall be kept, stored, and used in such a manner that any escape can be contained and that the water table and surface water is not endangered. Water containing such pollutants as chemicals, washing detergents, sewerage, fuels, paints and solvents and hydrocarbons shall be contained and discharged into an impermeable storage facility for removal from the site or for recycling. This particularly applies to runoff from fuel depots/workshops/truck washing areas.
- Wash down areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas are not polluted. The contractor shall notify the ECO immediately of any pollution incidents on Site.

6.8 CEMENT AND MIXING OF CONCRETE

- The proposed location of cement mixing areas (including the location of cement stores and sand and aggregate stockpiles) shall be indicated on the site layout plan and approved by the ECO.
- All wastewater generated from the operation and cleaning of concrete mixing equipment and other sources of concrete shall be passed through a concrete wastewater settlement system. The water from this system shall not be allowed to flow into any “no go” area or water course but must permeate through the ground before it reaches any such water course. The accumulated sludge in the settlement system must be regularly cleaned out and appropriately disposed of as solid waste.
- The contractor shall ensure that minimal water is used for washing of concrete and cement mixing equipment.
- Used cement bags shall be temporarily stored in separate weatherproof bins on site to prevent the generation of wind-blown cement dust and the bags from blowing away. These used cement bags must then be correctly disposed of as hazardous waste.
- During construction and operation, the contractor must ensure that concrete is mixed on mortar boards, all visible remains of concrete are removed and disposed of as waste and that all surplus aggregate is removed.

6.9 FUEL (PETROL AND DIESEL) AND OIL

6.9.1 Fuel Storage

- All construction/mining materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination into nearby rivers, wetlands or drainage lines. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion. These sites must be re-vegetated after construction has been completed. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any drainage

line or waterbody.

- The location of the fuel storage area will be approved by the ECO and will be situated at least 20m away from any “no go” areas. All necessary approvals with respect to fuel storage and dispensing shall be obtained from the appropriate authorities. Symbolic safety signs depicting “No Smoking”, “No Naked Lights” and “Danger” conforming to the requirement of SABS 1186 shall be prominently displayed in and around the fuel storage area. There shall be adequate fire-fighting equipment at the fuel storage area.
- The contractor shall ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and under lock and key at all times. The capacity of the tank shall be clearly displayed and the product contained within the tank clearly identified using the emergency information system detailed in SABS 0232 part 1. Fuel storage tanks shall have a capacity not exceeding 9 000 litres and shall be kept on site only for as long as fuel is needed for construction activities, on completion of which they shall be removed.
- Tanks on site shall not be linked or joined via any pipe work, but shall remain as separate entities. The tanks shall be situated on a smooth impermeable base with a bund. The volume inside the bund shall be 110 % of the total capacity of the largest storage tank. The base may be constructed of concrete, or of plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The impermeable lining shall extend to the crest of the bund. The floor of the bund shall be sloped to enable any spilled fuel and/or fuel-contaminated water to be removed. Appropriate material approved by the ECO that absorbs / breaks-down or encapsulates minor hydrocarbon spillage and which is effective in water shall be installed in the sump.
- The tanks and bunded areas shall be covered by a roofed structure, taken off site to a disposal site approved by the ECO, and the material that absorbs / breaks-down or encapsulates minor hydrocarbon spillage shall be replenished.
- Only empty and externally clean tanks may be stored on the bare ground. Empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.
- Adequate precautions shall be provided to prevent spillage during the filling of any tank and during the dispensing of the contents. The dispensing mechanism for the fuel storage tanks shall be stored in a waterproof container when not in use.
- As part of the required site layout for the construction camp, a plan shall be submitted to the ECO detailing the design, location and construction of the fuel storage area as well as for the filling and dispensing from storage tanks and for the type of absorbing / breaking-down or encapsulating material to be used.

6.9.2 Refuelling

- Where reasonably practical, the plant shall be refuelled at a designated re-fuelling area/depot or at a workshop as applicable. If this is not reasonably practical, then the surface under the refuelling area shall be protected and appropriately bunded against pollution to the reasonable satisfaction of the ECO prior to any refuelling activities.
- If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel. The contractor shall ensure that the appropriate fire-fighting equipment is present during refuelling operations.
- The contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown or where possible, be designed to encapsulate minor hydrocarbon spillages. The quantities of such materials shall be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill. Prior to any refuelling or maintenance activities, the ECO must approve this material.

6.9.3 Used oil and hydrocarbon contaminated materials

- Used oil shall be stored at a central location on site prior to removal off site for disposal at

an approved disposal or recycling site.

- Old oil filters and oil, petrol and diesel-soaked material shall be treated as hazardous waste. The contractor shall remove all oil, petrol, and diesel-soaked sand immediately and shall dispose of it as hazardous waste or treat it on site with material that breaks-down or encapsulates such spillages as approved by the ECO.

6.10 Ablution Facilities

- Washing, whether of the person or of personal effects, and acts of excretion and urination are strictly prohibited other than at the facilities provided. The contractor shall provide the necessary ablution facilities for all their personnel prior to the commencement of work and shall ensure that their personnel make use of the facilities.
- Toilet facilities shall be supplied by the contractor for the workers at a ratio of at least 1 toilet per 20 workers in areas approved by the ECO. Every 1-man urinal will be taken as supplying the equivalent of 5 men in addition to the 20 men per toilet on site. No toilets will be erected within 20m of any “no go” areas. Toilets shall be situated within 200m of any area where work is taking place in numbers sufficient to meet the ratio depicted above for the workers in the area. Mobile toilets (e.g. trailer mounted) should be considered for sites, where workers may be expected to cover large distances every day.
- The facilities shall be maintained in a hygienic state and serviced regularly. Toilet paper shall be provided. Temporary / portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause, to the satisfaction of the ECO.
- Discharge into the environment and burial of waste is strictly prohibited. The contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site. Toilets shall be emptied before the contractors’ holidays or any other temporary site closure.

6.11 Eating Areas

- The contractor shall designate eating area(s), subject to the approval of the ECO. No cooking is allowed outside of the contractor’s camp area on site.
- At meal times all workers must eat in designated eating areas. These areas shall have shade for the workers. The eating areas may be in existing structures or in temporary / transportable structures that shall be well constructed using wood or metal for the frame and screened on the top and sides with shade cloth/canvas or other material to the satisfaction of the ECO. These areas shall be well demarcated and in locations approved by the ECO and shall not be within 20m of any “no go” areas, on or adjacent to the site.
- Sufficient bins shall be present in these areas. All disposable food packaging must be disposed of in the bins after every meal.
- The area must be cleaned after every meal.
- The feeding or leaving of food for animals is strictly prohibited.

6.12 Site Structures

- All site establishment components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of the land area disturbed. The type and colour of roofing and cladding materials to the contractor's temporary structures shall be selected to reduce reflection.
- The contractor shall supply and maintain adequate and suitable sheds for the storage of materials. Sheds for the storage of materials that may deteriorate or corrode if exposed to the weather shall be weatherproof, adequately ventilated and provided with raised floors.

6.13 LIGHTS

- The contractor shall ensure that any lighting installed on the site for their activities does not cause a reasonably avoidable disturbance to the naturally-occurring fauna.

6.14 DUST CONTROL

- The contractor shall be responsible for the continued control of dust arising from their operations. The contractor shall take all reasonable measures to minimize the generation of dust as a result of construction activities to the satisfaction of the ECO. Appropriate dust suppression measures include: spraying or dampening with water, using a commercial dust binder (such as Hydropam or Dustex), rotovating straw bales, planting of open cleared space and the scheduling of dust-generating activities. If the conditions are such that the contractor cannot satisfactorily dampen the dust, then the ECO may halt operations until such time as the conditions are more suitable for lower dust generating construction.
- Damping of all gravel haul and access roads (if constructed) with water must be ongoing and special attention must be given to roads close to construction areas. Should dust still be a problem on any specific road, the allowable speed will be reduced to 20km/h. If dust is still a problem the road should be treated with a commercial dust binder, as required, to form a cohesive layer that will control the dust on the road.
- Areas that are to have the topsoil stripped for construction purposes must be limited and only stripped when work is about to take place.
- Other activities and situations that may result in a dust nuisance include: site clearance and other earth moving operations, open cleared space, stockpiles of topsoil or sand and activities associated with concrete mixing.
- The appropriate health and safety equipment (e.g. dust masks) must be worn by workers during the phases of dust-producing construction activity.
- During periods of strong winds, construction work which tends to produce large amounts of dust should be paused until such a time that the wind subsides.

6.15 FIRE CONTROL

- The contractor shall take all the necessary precautions to ensure that fires are not started as a result of their activities on site.
- No open fires shall be permitted on the site.
- Smoking shall not be permitted in those areas where there is a fire hazard. Such areas shall include the workshop and fuel storage areas and any areas where the vegetation or other material is such as to support the rapid spreading of an initial flame.
- The contractor shall ensure that there is basic fire-fighting equipment available on site at all times. This shall include at least rubber beaters when working in urban open spaces and natural areas, and at least one fire extinguisher of the appropriate type when welding or other “hot” activities are undertaken.

6.16 PROTECTION OF NATURAL FEATURES

- The contractor shall not deface, paint, damage or mark any natural features (e.g. rock formations or trees) situated in or around the site for survey or other purposes unless agreed beforehand with the ECO.
- Any features affected by the contractor in contravention of this clause shall be restored / rehabilitated to the satisfaction of the ECO.
- The contractor shall not permit their employees to make use of any natural water sources

for the purposes of swimming, personal washing and the washing of machinery or clothes.

6.17 Protection of Flora and Fauna

- All clearing activities must deploy search and rescue teams in-front of clearing machinery to assist in relocating slower moving faunal species e.g. tortoises.
- Protected plant species must be removed from the designated construction footprint and relocated to adjacent areas of similar habitat that will not be affected by construction and used in landscaping once construction is complete.
- Except to the extent necessary for the carrying out of the works, flora shall not be removed, damaged or disturbed nor shall any vegetation be planted.
- The removal and stockpiling of topsoil must also be carried out in accordance with the EMPr.
- Trapping, poisoning and/or shooting of animals is strictly forbidden. No domestic pets or livestock are permitted on site.
- The use of chemicals of all forms must be carefully controlled and monitored to avoid contamination of areas.
- The environmental education programme must explain to staff why species of concern are ecologically significance.

6.18 Vegetation Clearance

- Vegetation clearing and trampling must be avoided in areas outside of the fenced CTC area.
- Vegetation clearing must occur in parallel with the construction progress to minimise erosion and/or run-off.
- The contractor must work according to a plan, which demarcates areas to be cleared. The plan must be part of the Project Layout Plan developed in the Site Design Phase.
- The minimum amount of vegetation clearance must take place.
- All plants not interfering with construction must be left undisturbed.
- Collection or wilful damage to any plants outside of the areas demarcated for clearing is not allowed.
- No breaking of branches on indigenous trees, outside of the demarcated areas, will be allowed without prior approval from the ECO.

6.19 Alien Vegetation Clearance

- The construction and operational phase must employ eradication programmes to remove existing invasive species as well as the removal of any new invasive species, especially those categorized as 1, 2 and 3 on the NEMBA list.
- Long-term operational eradication programs to eradicate invasive species must be implemented if possible.

6.20 Re-vegetation

- All areas disturbed during mining shall be reinstated to a state that approximates or betters the state that they were in before mining.
- Areas compacted by vehicles during construction must be scarified to allow penetration of plant roots and the regrowth of natural vegetation.
- The revegetation programme must take cognisance of the climatic and seasonal

conditions with the most favourable period being in spring and early summer.

- The rehabilitated areas will be weeded by the nominated rehabilitation contractor for a period of 6 months.
- It is also advised that the Environmental Control Officer, to be appointed during the construction phase, must have a good understanding of the local flora. The ECO must be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas, using species selected by an appropriate botanist. All alien plant re-growth must be monitored, and should it occur these plants must be eradicated.

6.21 TOPSOIL MANAGEMENT

- Topsoil can only be stripped from the areas as indicated below:
  - Any area which is to be used for temporary storage of materials
  - Areas which could be polluted by any aspect of the mining activity and;
  - Areas designated for the dumping of soil.
- Stripping of topsoil will be undertaken in such a manner as to minimise erosion by wind or runoff.
- Areas from which the topsoil is to be removed will be cleared of any foreign material which may come to form part of the topsoil during removal including bricks, rubble, any waste material, litter, excess vegetation and any other material which could reduce the quality of the topsoil.
- The contractor shall ensure that subsoil and topsoil are not mixed during stripping, excavation, reinstatement and rehabilitation. If mixed with clay sub-soil the usefulness of the topsoil for rehabilitation of the site will be lost.
- Soils should be exposed for the minimum time possible once cleared.
- Topsoil will be temporarily stockpiled, separately from (clay) subsoil and rocky materials in areas designated by the ECO.
- Stockpiles will either be vegetated with indigenous grasses or covered by a suitable fabric to prevent erosion and invasion of weeds. Stockpiled topsoil will not be compacted.

6.22 STORMWATER MANAGEMENT

- Stormwater should be managed using suitable structures such as swales, gabions and rock rip-wrap so that any run-off from the development site is attenuated prior to discharge.
- Silt and sedimentation should be kept to a minimum, through the use of the above-mentioned structures by also ensuring that all structures do not create any form of erosion.
- Natural run-off must be diverted to the nearest stormwater drains.

6.23 EROSION AND SEDIMENTATION CONTROL

- The contractor shall take all reasonable measures to limit erosion and sedimentation due to mining activities and shall, in addition, comply with such detailed measures as may be required by the EMP.
- Re-vegetate areas that have been disturbed as soon as possible.
- Cut and fill slopes must be made stable and be revegetated as soon as possible during the mining phase.
- Where erosion and/or sedimentation, whether on or off the site, occurs despite the contractor complying with the foregoing, rectification shall be carried out in accordance with details specified by the ECO. Where erosion and/or sedimentation occur due to the fault of the contractor, rectification shall be carried out to the reasonable requirements of the ECO and at the expense of the contractor.

6.24 AESTHETICS

- The contractor shall take reasonable measures to ensure that mining activities do not have an unreasonable impact on the aesthetics of the area.

6.25 COMMUNITY RELATIONS

- If required, the contractor shall erect and maintain information boards in the positions, quantities, designs and dimensions specified. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the ECO.
- The contractor shall keep a "Complaints Register" on site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself and note the date and time that the complaint was resolved. The ECO shall be responsible for responding to queries and/or complaints and may request assistance from the Contractor's Management Staff.
- Construction materials and other purchases relating to the project should be done, where possible, within the nearby community and at local shops.

6.26 TEMPORARY SITE CLOSURE

If the Site is closed for a period exceeding 5 days, the contractor's DEO in consultation with the ECO shall carry out the following checklist procedure and ensure that the following conditions pertain and report on compliance with this clause:

6.26.1 Fuels / flammables / hazardous materials stores

- Fuel stores are as low in volume as practicable.
- There are no leaks.
- The outlet is secure and locked.
- The bund is empty.
- Fire extinguishers are serviced and accessible.
- The area is secure from accidental damage through vehicle collision and the like.
- Emergency and contact numbers are available and displayed.
- There is adequate ventilation in enclosed spaces.

6.26.2 Safety

- Site safety checks have been carried out in accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) prior to site closure.
- An inspection schedule and log for use by security or contracts staff is developed.
- All trenches and manholes are secured.
- Applicable notice boards are in place and secured.
- Emergency and Management contact details are prominently displayed.
- Security personnel have been briefed and have the facilities to contact or be contacted by relevant management and emergency personnel.
- Night hazards such as reflectors, lighting, traffic signage etc. have been checked.
- Fire hazards identified and the local authority notified of any potential threats e.g. large brush stockpiles, fuels etc.
- Pipe stockpiles are wedged / secured.
- Scaffolds are secure.

- Structures vulnerable to high winds are secure.

6.26.3 Erosion

- Wind and dust mitigation measures such as straw, brush packs, irrigation etc. is in place.
- Excavated and filled slopes and stockpiles are at a stable angle and capable of accommodating normal expected water flows.
- Re-vegetated areas have a watering schedule and the supply to such areas is secured.
- There are sufficient detention ponds or channels in place.

6.26.4 Water contamination and pollution

- Hazardous fuel stores are secure.
- Cement and materials stores are secure.
- Toilets are empty and secured.
- Refuse bins are empty and secured.
- Bunding is clean and treated with appropriate material that will absorb/ breakdown and where possible be designed to encapsulate minor hydrocarbon spillage.
- Drip trays are empty & secure.

6.27 Excavation, Hauling and Placement of Spoil

- The contractor shall provide the ECO with detailed plans of their intended construction processes prior to starting any cut or fill or layer. The plans shall detail the number of personnel and plant to be used and the measures by which the impacts of pollution (noise, dust, litter, fuel, oil, sewage), erosion, vegetation destruction and deformation of landscape will be prevented, contained and rehabilitated.
- Particular attention shall also be given to the impact that such activities will have on the adjacent built environment. The contractor shall demonstrate their “good housekeeping”, particularly with respect to closure at the end of every day so that the site is left in a safe condition from rainfall overnight or over periods when there is no construction activity.

6.28 Mining Activities and Equipment

- Mining will be restricted to normal daytime working hours (07:00 – 18:00);
- No mining activities will take place during weekday evenings and night-time (after 18:00), on Saturdays after midday (12:00) and the entire day on Sundays;
- All noise-making equipment shall be turned off when not in use;
- All equipment shall be kept in good working order;
- All equipment shall be operated within specifications and capacity (i.e. do not overload machines);
- Compliance with the appropriate legislation with respect to noise is mandatory;
- The contractor will familiarise himself with, and adhere to, any local bylaws and regulations regarding the generation of noise;
- Staff should be given “noise sensitivity” training;
- The contractor will endeavour to keep noise generating activities associated with mining activities to a minimum;
- Modern low noise emission vehicles and equipment shall be favoured on site. The details of all mining machinery and vehicles must be determined prior to mining in order to identify potentially noisy machinery and to seek possible alternatives. These details will include the manufacturer, type and noise emission data of each machinery/vehicle and how many will be used at any time. Note that manufacturers of modern vehicles and machinery

provided for the international market are obliged to provide noise emission data. Where this information is not available, noise measurements must be conducted prior to use of such machinery or vehicles;
- A well planned and co-ordinated “fast track” procedure is implemented to complete the total mining process in the area in the shortest possible time.

6.29 Emergency Protocol

- An emergency response protocol (for construction and operation) should be drawn up, to the approval of the ECO, prior to construction and operation taking place;
- All pollution incidents must be reported immediately to the Authorities;
- Record(s) of environmental related incidents should be maintained and communicated to the ECO.

6.30 Protection of Natural Features

- The contractor shall not deface, paint, damage or mark any natural features (e.g. rock formations or trees) situated in or around the site for survey or other purposes unless agreed beforehand with the ECO.
- Any features affected by the contractor in contravention of this clause shall be restored / rehabilitated to the satisfaction of the ECO.

6.31 Aesthetics

- SANRAL shall take reasonable measures to ensure that operational activities do not have an unreasonable impact on the aesthetics of the area.

6.32 Effluent Handling/ Storm Water Management

- Stormwater must be managed using suitable structures. Silt and sedimentation must be kept to a minimum, through the use of the above-mentioned structures by also ensuring that all structures do not create any form of erosion.
- Natural run-off must be diverted to the nearest stormwater drains.
- The clean (e.g. surface runoff from the driveway) and dirty (e.g. contaminated water from the forecourt and filling points) water systems must be separated to prevent contaminated run-off from entering the surface water, groundwater and soil;
- All surface spillages must be contained on-site through channels and trenches and diverted to an appropriate oil or water separator system of sufficient capacity;
- No fuels or oils must be allowed to be discharged directly into stormwater pipes or drains and sewage manholes or pipes;
- All waste oils, greases, fuels, chemicals etc. should be collected and disposed of in an appropriate manner off site. The contents of grease traps or other waste oil, grease and/or fuel disposal or storage containers should under no circumstances be emptied and dumped to the surrounding area. Outflow must be directed to the municipal sewer system.

6.33 Site Structures

- All site components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of the land area disturbed.

- The contractor shall supply and maintain adequate and suitable areas for the storage of materials. The areas that may deteriorate or corrode if exposed to the weather shall be weatherproof, adequately ventilated and provided with raised floors.

6.34 LIGHTING

- The contractor shall ensure that any lighting installed on the site for their activities does not cause a reasonably avoidable disturbance to the naturally occurring fauna.
- Lights should be orientated so as not to cause any unnecessary visual impacts on sensitive receptors.

7 MONITORING AND EVALUATION

The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. The overall monitoring and auditing of the site will be the responsibility of the ECO; however SANRAL / SMEC must provide the necessary environmental control and audit measures and integrate these through their Environmental Management Systems. The monitoring protocol which must be adhered to for the proposed development is included below (Table 7.1). In addition to the monitoring provisions included in Table 7.1, the following monitoring protocol should be included at a minimum:

- Invasive species monitoring, control and eradication for land/activities under the control of the proponent should be developed as part of the method statement in accordance with CARA and NEMBA;
- Post construction monitoring must occur for one year after completion of the site, at quarterly intervals, to ensure that the site is re-vegetated; and
- The operational phase of the proposed development is predicted to continue into perpetuity. It is recommended that the DEO conduct quarterly monitoring for the first year following the completion of construction to ensure that the revegetation of the disturbed areas has been completed successfully.

Below lists the impact management actions (mitigation measures) for the proposed development. Each impact management action must undergo a monitoring method (e.g. visual inspections), at a specific frequency (e.g. monthly), by a specific role player (e.g. the ECO), at a particular phase or at particular phases of the development (e.g. construction) and will need to be reported via a specific reporting mechanism (e.g. an ECO audit report). Certain mitigation measures will only be relevant during certain phases of the development, while others will remain applicable in perpetuity.

Table 7.1: Monitoring of the implementation of the impact management actions during the construction, operational and decommissioning phases.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Legal and policy compliance	• All construction related conditions in the Environmental Authorisation, EMPr and other permits must be adhered to. • SANRAL must employ an independent Environmental Control Officer (ECO) for the construction phase to ensure that construction is implemented according to specifications in the EA and EMPr. • Copies of all applicable licenses, permits and managements plans (EA, EMPr, etc.) must be available on-site at all times. • Environmental Awareness Training must be included in site meetings/talks with all workers. • The proponent must ensure that operations of the mines are compliant with the relevant legislation and policy. • These should include (but are not restricted to): NEMA, EA, EMPr and any other permits/authorisations.	Visual inspection of record keeping, including licenses, permits, management plans and registers of toolbox talks, as well as visual inspection of compliance.	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly (i.e. every second month)	ECO		Bi-monthly ECO audit reports.
	• The application for closure of the mines must be submitted together with all relevant documents as indicated in Section 43 of Mineral and Petroleum Resources Development Act (Act 28 of 2002), as amended.		Once off	ECO	Decommissioning phase	Mine closure report
Infrastructure	• A Stormwater, Rehabilitation, Alien Vegetation and Erosion Management Plan must be compiled during the planning and design phase of the proposed mining activities and implemented during the site establishment, mining and decommissioning phases. • The construction contractor should clearly demarcate construction areas so as to minimise site disturbance.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Material Stockpiling	• Material stockpiles must be located away from sensitive areas and they must be monitored for erosion and alien vegetation. • Material stockpiles locations must be approved by the ECO.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
	• All structures comprising the site camp are to be removed from site. • All rubble must be removed from the site to an approved disposal site as approved by the ECO. • Fences, barriers and demarcations associated with the construction phase must be removed from the site. • All residual stockpiles must be removed or spread on site as directed by the ECO. • All leftover building materials must be removed from the site.	Visual inspection	Once off	ECO	Decommissioning phase	Mine closure report
Stormwater management	• The construction site must be managed in a manner that prevents pollution to downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. • Berms and swathes must be placed in areas that may be prone to erosion. • Temporary cut-off drains and berms may be required to capture storm water and promote infiltration.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
	• All surfaces hardened due to construction activities must be ripped and imported material thereon removed. • The Contractor must check that all watercourses are free from building rubble, spoil materials and waste materials. • A programme for controlling invasive species must be implemented within disturbed zones to ensure that it does not become a conduit for the propagation and spread of invasive exotic plants.	Visual inspection	Once off	ECO	Decommissioning phase	Mine closure report

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Waste Management	• All general waste must be disposed of in bins/waste skips labelled “general waste”. • Sufficient waste bins must be provided throughout the construction site for collecting waste. • All general waste collected on site must be disposed of at a licensed general waste disposal site. • All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. • Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site. • Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground. • Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages. • Concrete and cement mixing must be conducted at a single location which should be centrally located, where practical. This mixing must take place on an impermeable surface, and dried waste concrete and cement must be disposed of with building rubble. • No concrete mixing must take place within 32 m of any watercourse.	Visual inspection of record keeping, (including waste removal slips/receipts), as well as visual inspection of compliance on site.	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
	• The area that previously housed the site camp is to be checked for spills of substances such as oil, paint, etc., and these must be cleaned up and contaminants disposed of appropriately. • All rubble must be removed from the site to an approved disposal site as approved by the ECO. Burying of rubble on site is prohibited. • The site must be cleared of all litter.		Once off	ECO	Decommissioning phase	Mine closure report

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Hazardous substances	• Any storage tanks containing hazardous materials (ie fuel, diesel) must be placed in bunded containment areas with sealed surfaces and the capacity of the bunded containment areas must be 110% the volume of the storage tanks within it. • Barrels, bitumen must be stored in a secured area and all used barrels must be properly maintained and secured. • Cement and concrete must not be mixed directly on the ground, or during rainfall events when the potential for transport of pollutants to watercourses is the greatest. • Used cement bags should be collected and stored in containers to prevent wind-blown cement dust and water contamination. • Mixed cement/concrete must not be allowed to flow into any watercourses. • Drip trays must be placed under stationary construction machinery overnight to avoid soil contamination from oil and fuel leaks. • Absorbent materials in the form of a spill kit must be provided on site. • Contaminated soil must either be excavated or treated on-site, depending on the nature and extent of the spill. • The ECO must determine the precise method of treatment of polluted soil. This could involve the application of soil absorbent materials or oil-digestive powders to the contaminated soil. • Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in suitable containers until appropriate disposal. • All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. • Proof of receipt of hazardous waste by a licensed service provider must be maintained on the site.	Visual inspection of record keeping, (including waste removal slips/receipts), as well as visual inspection of compliance on site.	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Health and safety	• A health and safety plan in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) must be adhered to and enforced by a HSE officer to ensure workers safety. • Roadside safety protocols need to be implemented during construction and operational phases.	Visual inspection of record keeping, including incidence reports and registers of toolbox talks, as well as visual inspection of compliance.	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Air quality and dust control	• During windy periods un-surfaced and un-vegetated areas must be dampened down. • Vegetation must be retained where possible as this will reduce dust travel. • Any complaints or claims emanating from dust issues must be attended to immediately and noted in the complaints register. • Vehicles and construction plant must be serviced regularly so as to reduce excessive vehicle emissions.	Visual inspection of record keeping, including vehicle service records, as well as visual inspection of compliance.	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Noise	• Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm). • There must be a complaints register on site for nearby residents to make complaints. These must be addressed and recorded.	Visual inspection of record keeping, including complaints register, as well as inspection of compliance.	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
On-site fire risk	• In order to reduce the risk of fires: • All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. • Smoking must not be permitted near flammable substances. • All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. • No open fires must be allowed on site. • Fire extinguishers must be available onsite.	Visual inspection of record keeping, including extinguisher service records and incidence reports, as well as inspection of compliance on site.	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Traffic	• Activities which include the movement of construction vehicles and the operation of machinery should be restricted to normal working hours (07:00am – 17:00pm). • There must be a complaints register on site for nearby residents to make complaints. These must be addressed and recorded. • Local residents should be made aware of the presence of construction vehicles by making use of high-visibility signage. • All traffic safety (flagmen) and traffic calming measures should be in place within the site and where traffic enters the main road. • It is recommended that any damage to the road as a result of construction activities and vehicles should be repaired immediately and maintained in the original or improved state prior to construction.	Visual inspection of record keeping, including complaints register, as well as inspection of compliance.	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Visual – construction activities	• Construction activities should only take place during normal working hours (7am to 5pm) • The construction contractor should clearly demarcate construction areas so as to minimise site disturbance.	Visual inspection of record keeping,	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
	• The site should be kept neat and tidy. Littering should be fined, and the SHE officer should organise rubbish clean-ups on a regular basis. • Night lighting of the construction sites should be minimised within requirements of safety and efficiency. • Implement mitigation measures as recommended in the EMPr.	including waste removal slips and complaints register, as well as inspection of compliance.	Bi-monthly	ECO		Bi-monthly ECO audit reports.
Inadequate rehabilitation and maintenance	• All areas affected during the site establishment and mining phases must be rehabilitated. • All disturbed areas must be re-vegetated with an indigenous seed mix in consultation with an indigenous plant expert, ensuring that during rehabilitation only indigenous shrubs, trees and grasses are used in restoring the biodiversity. • A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO. • The programme for controlling invasive species must be implemented within disturbed zones to ensure that it does not become a conduit for the propagation and spread of invasive exotic plants. • Final inspection in order to ensure adherence to EMPr guidelines, completion of localised/ remaining areas of impact, monitoring of rehabilitation success, etc.	Visual inspection	Weekly	DEO	Construction and operational phases for ongoing rehabilitation	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
			Once off	ECO	Decommissioning phase for final rehabilitation	Mine closure report
Loss of riparian and wetland systems, habitat fragmentation and disturbance to watercourses	• The engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) generated by ay runoff in particular any access roads.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
and or wetlands	• The final access road layout and any processing areas / stockpiles must make provision for stormwater management with the provision of suitable erosion protection features and or culverts. During the construction and operational /decommissioning phase, monitor culverts to see if erosion issues arise and if any erosion control is required. • Where possible culvert bases for any road crossings if needed, must be placed as close as possible with natural levels in mind so that these don't from additional steps / barriers. • Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. • It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas within aquatic environment, using selected species detailed in this report. • All alien plant re-growth must be monitored, and should it occur these plants should be eradicated. The scale of the operation does however not warrant the need of a Landscape Architect and / or Landscape Contractor.		Bi-monthly	ECO		Bi-monthly ECO audit reports.
			Once off	ECO	Decommissioning phase	Mine closure report
Increase in sedimentation and erosion within the development footprints	• Vegetation clearing should occur in in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. • Any storm-water within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
			Once off	ECO	Decommissioning phase	Mine closure report

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
	• No stormwater runoff must be allowed to discharge directly into any water course along roads / platforms, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. • Stormwater from hard surfaces must be managed using appropriate channels and swales when located within steep areas or have steep embankments					
Impact on localized surface water quality	• Strict use and management of all hazardous materials used on site in line with the specific material safety data sheets, e.g. fuels must be stored within a contained / bunded site with the necessary and spill kits available. • Strict management of potential sources of pollution (e.g. litter, hydrocarbons from vehicles & machinery, cement during construction, etc.). • Containment of all contaminated water by means of careful run-off management on the development site. • Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the sites. • Strict control over the behaviour of construction workers, with regard littering, use and storage of chemicals. • Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced. Additional details in this regard in contain in Section 9 of this report and have also been considered in the mitigation assessment process.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Watercourses	• Mining activities must be kept to the approved and demarcated footprint of each borrow pit and quarry. • Surrounding watercourses and wetlands (artificial or natural) must be avoided.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Material stockpiling	• No mining material must be stored within 32 m of any watercourse. • Stockpiles within 50 m of watercourses must be monitored for erosion and mobilisation of materials towards watercourses. If this is noted by the EO, suitable cut-off drains or berms must be placed between the stockpile area and the watercourse.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Natural vegetation	• The mining footprint must be surveyed and demarcated prior to mining commencing. • No mining activities must be allowed outside the demarcated footprint. • No mining activities must be allowed where untransformed areas of natural vegetation occur. • Mining activities must be limited to the absolute necessary area only. • Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken. • Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation may be mulched and used as ground cover during rehabilitation. • The contractor's staff must not harvest any natural vegetation.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Terrestrial and aquatic habitats	• Construction activities must be restricted to the demarcated mining project footprints. • The appointed ECO must ensure that the project footprint has been properly demarked and that activities are restricted to the demarkaed areas.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
	• Surrounding terrestrial and aquatic habitats (i.e. watercourses and wetlands, whether artificial or natural) must be avoided.					
Stormwater and erosion management	• A Stormwater and Erosion Management Plan must be implemented during the construction phase. • Appropriate stormwater structures must be used during the construction phase. • The Stormwater and Erosion Management Plan and Rehabilitation Plan must be approved by the appointed ECO prior to implementation. • Disturbed areas must be rehabilitated as soon as possible after construction. • Regular monitoring for erosion after construction must take place to ensure that no erosion problems have developed as result of the disturbance. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and vegetation techniques. • All cleared areas (not used for the development footprint) should be vegetated with indigenous perennial shrubs and grasses from the local area as soon as possible. • Natural vegetation that was removed onsite may be used as soil stabilisers by placing them on cleared areas if natural recovery is slow. • Only topsoil from the project site, which has been appropriately stored, must be used for rehabilitation. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. • Restoration must be conducted as per the approved Erosion Management Plans. • Stormwater management structures must be monitored and maintained throughout the operation phase.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Rehabilitation of disturbed areas	• All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete. Restoration must be conducted as per a Rehabilitation Management Plan. • Only topsoil from the development site, which has been appropriately stored, must be used for rehabilitation. • All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the ECO is satisfied that all affected areas have been rehabilitated.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
	• All cleared areas must be continuously rehabilitated with indigenous vegetation for 6 months after the Operational Phase of the project begins, or until such time that the ECO is satisfied that all affected areas have been rehabilitated.		Once off	ECO	Decommissioning phase	Mine closure report
Species of Conservation Concern	• The approved Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc. in accordance with the NEMBA: Alien Invasive Species Regulations.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Control of Alien Species	• Only topsoil from the project site, which has been appropriately stored, must be used for rehabilitation. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction. • Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans. • The approved Alien Vegetation Management Plan must be implemented to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations. • Only topsoil from the mining site, which has been appropriately stored, must be used for rehabilitation. • All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as mining in the particular area is complete. • Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
	• The approved Alien Vegetation Management Plan must be implemented to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.		Once off	ECO	Decommissioning phase	Mine closure report
Wildlife mortalities	• All staff on site must be trained regarding the proper management and response should animals be encountered on site. • No hunting, baiting or trapping must be permitted on site on adjacent land.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.

POTENTIAL ISSUE	IMPACT MANAGEMENT ACTION	MONITORING				
		METHOD	FREQUENCY	RESPONSIBLE ENTITY	TIME PERIOD	MECHANISM & REPORTING
Loss/ fragmentation of habitats	• The clearance of vegetation within aquatic habitats must be avoided as far as possible. • Should avoidance be impractical, vegetation clearance must be minimised as much as possible. • Indigenous tree species should be pruned using loppers or saws where they pose safety threats. If their presence compromises safety mandates entirely, fell and stump treat with appropriate herbicide.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Damage to Colonial Period sites	• Site monitoring, avoidance, 20m conservation buffer. • Phase 2 Study and destruction permitting if impacted on.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Damage to Colonial Period Features	• Frequent site monitoring by heritage specialist / ECO.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Damage to burial sites	• Site monitoring, avoidance, 100m conservation buffer, site management • Grave relocation subject to authorisations and permitting if impacted on.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.
Impact on possible paleontological findings	• In the case of any significant fossil finds exposed by access road building, quarry or borrow pit excavations during development, these should be safeguarded - preferably in situ - and reported by the ECO as soon as possible to SAHRA • This is so that appropriate mitigation (i.e. recording, sampling or collection) by a paleontological specialist can be considered and implemented before rehabilitation of the access road cuttings, quarries or borrow pits takes place • These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the proposed quarry and borrow pit developments.	Visual inspection	Weekly	DEO	Construction and operational phases	Weekly DEO checklists.
			Bi-monthly	ECO		Bi-monthly ECO audit reports.

8 ENVIRONMENTAL AWARENESS TRAINING

8.1 INTRODUCTION

Contractors shall ensure that its employees and any third party who carries out all or part of the Contractor's obligations are adequately trained with regard to the implementation of the EMPr, as well as regarding environmental legal requirements and obligations. Training shall be conducted by an independent person where necessary. Environment and health awareness training programmes should be targeted at two distinct levels of employment, i.e. management and labour. Environmental awareness training programmes shall contain the following information:

- The names, positions and responsibilities of personnel to be trained;
- The framework for appropriate training plans;
- The summarised content of each training course; and
- A schedule for the presentation of the training courses.

The person conducting training shall ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMPr. The training records shall verify each of the targeted personnel's training experience.

8.2 ENVIRONMENTAL AWARENESS REQUIREMENTS

SANRAL / SMEC shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness and the content of the EMPr. The presentation needs to be conducted in the language of the employees to ensure it is understood. The environmental training shall, as a minimum, include the following:

- The importance of conformance with all environmental policies.
- The environmental impacts, actual or potential, of their work activities.
- The environmental benefits of improved personal performance.
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures, including emergency preparedness and response requirements.
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities.
- Environmental legal requirements and obligations.
- Details regarding protected floral/faunal species and the procedures to be followed should these be encountered during the construction of the development.
- The importance of not littering.
- The importance of using supplied toilet facilities.
- The need to use water sparingly.
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible.

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, a translator should be called to the site to further explain aspects of environmental

or social behaviour that are unclear. An environmental training and awareness course material has been provided in Appendix E4.

8.3 Environmental Awareness Training

Environmental awareness training courses shall be run for all personnel on site (See Appendix E4 for a proposed Basic Environmental Education Course). Two types of courses shall be run, one for the contractor's and Subcontractor's management and one for all site staff and labourers. Toolbox talks shall be held in the morning during normal working hours at a suitable venue provided by the contractor. All attendees shall remain for the duration of the course and sign an attendance register on completion that clearly indicates participant's names, a copy of which shall be handed to the ECO.

The size of each session shall be limited to 30 people. The contractor shall allow for sufficient sessions to train all personnel. Subsequent sessions shall be run for any new personnel coming onto site.

Notwithstanding the specific provisions of this clause it is incumbent upon the contractor to convey the sentiments of the EMPr to all personnel and subcontractors involved with the project.

8.3.1 Training course for management and foremen

- The environmental awareness training course for management shall include all management staff and foremen. The course, which will be presented by the ECO, will be of approximately one-hour duration.
- The initial course shall be undertaken not less than 7 days prior to commencement of work on site. Subsequent courses shall be held as and when required.

8.3.2 Training course for site staff and labour

- The environmental awareness training course for site staff and labour shall be presented by the contractor's DEO from material provided by the ECO unless otherwise required by the Project Specification. The course will be approximately one-hour long.
- The course shall be run not more than 7 days after commencement of work on site with sufficient sessions to accommodate all available personnel. Subsequent courses shall be held as and when required.

8.3.3 Construction personnel information posters

- The contractor shall erect and maintain information posters for the information of their employees depicting actions to be taken to ensure compliance with the Environmental EMPr. Construction personnel information posters shall be laminated and erected in all eating areas, workshops and site offices. The contractor shall ensure that the construction personnel information posters are not damaged in any way, and shall replace them if any part becomes illegible.
- Examples of these posters will be supplied to the contractor by the ECO in electronic format.

9 CLOSURE PLANNING

Final site cleaning - the contractor shall clear and clean the site and ensure that everything not forming part of the permanent works is removed from site before issuing the completion certificate or as otherwise agreed.

Rehabilitation - the contractor (landscape architect/horticulturist) shall be responsible for rehabilitating and re-vegetation of all areas disturbed/areas earmarked for conservation during construction to the satisfaction of the engineer and ECO.

9.1 POST-CONSTRUCTION ENVIRONMENTAL AUDIT

A post-construction environmental audit must be carried out and submitted to DMR at the expense of the developer so as to fulfil conditions of the Environmental Authorisation granted. Objectives should be to audit compliances with the key components of the EMPr, to identify main areas requiring attention and recommend priority actions. The audit should be undertaken annually and should cover a cross section of issues, including implementation of environmental controls, environmental management and environmental monitoring.

Results of the audits should inform changes required to the specifications of the EMPr or additional specifications to deal with any environmental issues which arise on site and have not been dealt with in the current document.

9.2 MANAGEMENT REVIEW AND REVISION OF THE EMPR

The EMPr is to be reviewed annually for the first three years and then once every five years thereafter, by an independent environmental consultant, unless otherwise specified by the authorities. The auditor is to highlight issues to be addressed in the EMPr or changes required during the annual audit. These points are to be included as an annexure to the EMPr and to be considered during the review process. Recommended changes to the EMPr must be forwarded to DMR for approval and comment, before subsequently being incorporated into the EMPr.

9.3 GENERAL REVIEW OF EMPR

The EMPr will be reviewed by the ECO on an on-going basis. Based on observations during site inspections and issues raised at site meetings, the ECO will determine whether any procedures require modification to improve the efficiency and applicability of the EMPr on site.

Any such changes or updates will be registered in the ECO's record, as well as being included as an annexure to this document. Annexure of this nature must be distributed to all relevant parties.

10 CONCLUSION

Although all foreseeable actions and potential mitigations or management actions are contained in this document, the EMPr should be seen as a day-to-day management document. The EMPr thus sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the proposed mining activities as detailed in the EIR and specialist reports. The EMPr could thus change daily, and if managed correctly lead to a successful construction and operational phases.

Further guidance should also be taken for any conditions contained in the Environmental Authorisation, if the project is granted approval, and that these DMR conditions must be incorporated into the final EMPr.

All attempts should be made to have this EMPr available, as part of any tender documentation, so that the engineers and contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these.

11 APPENDIX E1: CURRICULUM VITAE

ALAN ROBERT CARTER
Curriculum Vitae

CONTACT DETAILS

Name of Company	**Coastal and Environmental Services (Pty) Ltd. t/a CES**
Designation	East London Branch – Executive
Profession	Executive
Years with firm	18 (Eighteen) Years
E-mail	a.carter@cesnet.co.za
Office number	+27 (0) 43 – 7267809 / 8313
Nationality	South African
Professional Affiliations	SACNASP: South African Council for Natural Scientific Profession EAPSA: Environmental Assessment Practitioners Southern Africa IWMSA: Institute Waste Management Southern Africa TSBPA: Texas State Board of Public Accountancy (USA)
Key areas of expertise	• Marine Ecology • Environmental and coastal management • Waste management • Financial accounting and project feasibility studies • Environmental management systems, auditing and due-diligence

PROFILE

Dr Alan Carter

Alan has extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He is a member of the American Institute of Certified Public Accountants (licensed in Texas) and holds a PhD in Plant Sciences. He is also a certified ISO14001 EMS auditor with the American National Standards Institute. Alan has been responsible for leading and managing numerous and varied consulting projects over the past 25 years.

ALAN ROBERT CARTER
Curriculum Vitae

EMPLOYMENT EXPERIENCE	• October 2013 – Present: Executive (EOH Coastal & Environmental Services, East London, South Africa) • January 2002 – September 2013: Director (Coastal & Environmental Services, East London, South Africa) • January 1999 – December 2001: Manager (Arthur Andersen LLP, Public Accounting Firm, Chicago, Illinois USA) • December 1996 – December 1998: Senior Accountant/Auditor (Ernst & Young LLP, Public Accounting Firm, Austin, Texas, USA).) • January 1994 – December 1996: Senior Accountant/Auditor (Ernst & Young, Charteris & Barnes, Chartered Accountants, East London, South Africa) • July 1991 – December 1994: Associate Consultant (Coastal & Environmental Services, East London, South Africa) • March 1989 – June 1990: Data Investigator (London Stock Exchange, London, England, United Kingdom)
ACADEMIC QUALIFICATIONS	• Ph.D. Plant Science (Marine) Rhodes University 1987 • B. Compt. Hons. Accounting Science University of South Africa 1997 • B. Com. Financial Accounting Rhodes University 1995 • B.Sc. Hons. Plant Science Rhodes University 1983 • B.Sc. Plant Science & Zoology Rhodes University 1982
CONTINUING PROFESSIONAL DEVELOPMENT	• Environmental Management Systems Lead Auditor Training Course - American National Standards Institute and British Standards Institute (2000) • ISO 14001:2015 Implementing Changes - British Standards Institute (2015) • Numerous other workshops and training courses

ALAN ROBERT CARTER
Curriculum Vitae

PROFESSIONAL EXPERIENCE

Environmental Impact Assessment, Feasibility and Pre-feasibility Assessments:-

- Managed numerous projects and prepared environmental impact assessment (EIA) reports in terms of relevant EIA legislation and regulations for development proposals including: Infrastructure projects: bulk water and waste water, roads, electrical, mining, ports, aquaculture, renewable energy (solar and wind), industrial processes, housing developments, golf estates and resorts, etc. (2002 – present).
- Projects have also included preparation of applications in terms of other statutory requirements, such as water-use and mining licence /permit applications.
- Managed projects to develop pre-feasibility and feasibility assessments for various projects, including various tourism developments, infrastructure projects, etc.
- Managed project for the East London Industrial Development Zone (ELIDZ) to develop a Conceptual Framework for a Mariculture Zone within the ELIDZ (2009).
- Managed pre-feasibility study to establish a Mariculture Zone within the Coega Industrial Development Zone (2014).
- Assisted City of Johannesburg in the process to proclaim four nature reserves in terms of relevant legislation (2015-2016).
- Acted as Environmental Control Officer (ECO) for numerous projects including solar and wind farms, roads, industrial processes, etc.

Strategic Environmental Assessment:-

- Managed Strategic Environmental Assessment (SEA) project toward the development of a Biofuel Industry in the Eastern Cape Province of South Africa (2014-2016)
- Managed Strategic Environmental Assessment (SEA) projects for two South African ports (2006 – 2007).
- Managed Strategic Environmental Assessment (SEA) projects for five (5) local municipalities in the Eastern Cape as part of the municipal Spatial Development Framework plans (2004 – 2005).
- Involved in the financial assessment of various land-use options and carbon credit potential as part of a larger Strategic Environmental Assessment (SEA) for assessing forestry potential in Water Catchment Area 12 in the Eastern Cape of South Africa (2006).

Climate change, emissions trading and renewable energy:-

- Provided specialist peer review services for National Department of Environmental Affairs relating to climate change impact assessments for large infrastructure projects (2017-2018).
- Conducted climate change impact assessment for a proposed coal-fired power station in Africa (2017-2018).

- Participated in the development of a web-based Monitoring & Evaluation (M&E) system for climate change Mitigation and Adaptation in South Africa for National Department of Environmental Affairs (DEA) (2015-2016.
- Managed project to develop a Climate Change Strategy for Buffalo City Metro Municipality (2013).
- Managed projects to develop climate change strategies for two district municipalities in the Eastern Cape Province (2011).
- Conducted specialist carbon stock and greenhouse gas emissions impact and life cycle assessment as part of the Environmental, Social and Health Impact Assessment for a proposed sugarcane to ethanol project in Sierra Leone (2009 - 2010) and a proposed Jatropha bio-diesel project in Mozambique (2009 - 2010).
- Managed project to develop the Eastern Cape Province Climate Change Strategy (2010).
- Managed project to develop a Transnet National Ports Authority Climate Change Risk Strategy (2009)
- Participated in a project to develop a Renewable Energy roadmap for the East London Industrial Development Zone (ELIDZ) (2013).
- Participated in a project for the East London Industrial Development Zone (ELIDZ) and Eastern Cape Government to prepare a Renewable Energy Strategy (2009).
- Contributed to the development of Arthur Andersen LLP's International Climate Change and Emissions Trading Services (2001).
- Conducted carbon credit (Clean Development Mechanism - CDM) feasibility assessment for a variety of renewable energy projects ranging from biogas to solar PV.
- Participated in the preparation of CDM applications for two solar PV projects in the Eastern Cape.

Waste Management:-

- Managed project to develop Integrated Waste Management Plans for six local municipalities on behalf of the Sarah Baartman District Municipality in the Eastern Cape Province (2016).
- Managed project to develop Integrated Waste Management Plans for four local municipalities on behalf of Alfred Nzo District Municipality in the Eastern Cape Province (2015).
- Managed project to develop Integrated Waste Management Plans for eight local municipalities on behalf of Chris Hani District Municipality in the Eastern Cape Province (2011).
- Managed a project to develop a zero-waste strategy for a community development in the Eastern Cape Province (2010).
- Managed waste management status quo analysis for a District Municipality in the Eastern Cape Province (2003).
- For three consecutive years, managed elements of the evaluation of the environmental financial reserves of the three largest solid waste companies (Waste Management, Inc., Republic Services, Inc., Allied Waste, Inc.) and number of smaller waste companies in the USA as part of the annual financial audit process for SEC reporting purposes. Ensured compliance with RCRA and

CERCLA environmental regulations.

- Managed elements of the evaluation of the environmental financial reserves of the largest hazardous waste company in the USA (Safety-Kleen, Inc.), as part of the audit process for SEC reporting purposes. Ensured compliance with RCRA and CERCLA environmental regulations.

Environmental Due Diligence and Business Risk:-

- Conducted environmental due diligence projects on behalf of the German Development Bank for a forestry pulp and paper operation in Swaziland (2010) and for a large diversified South African agricultural/agro-processing company (2011)
- Managed project for the Transnet National Ports Authority to identify the environmental risks and liabilities associated with the operations of the Port of Durban as part of a broader National initiative to assess business and financial risks relating to environmental management (2006).
- Managed project to determine the financial feasibility of various proposed tourism developments for the Kouga Development Agency in the Eastern Cape Province (2006)
- Contributed significantly to a study to determine the financial and environmental feasibility of three proposed tourism development projects at Coffee Bay on the Wild Coast (2004).
- Conducted sustainability and cost/benefit analysis of various waste water treatment options (including a marine pipeline at Hood Point) for the West Bank of East London (2004).
- Conducted analysis of permit fees and application processing costs for off-road vehicle use on the South African coastline for the Department of Environmental Affairs and Tourism, Marine & Coastal Management (2003).
- Involved in the determination of the historical cost element of environmental remediation insurance claims for a number of multinational companies, including Dow Chemicals, Inc. and International Paper, Inc.
- Evaluated the environmental budgeting process of the US Army and provided best practice guidance for improving the process.

Policy and Guidelines:-

- Development of Administration / Application Fee Structure for the Reclamation of Land, Coastal Use Permits, Coastal Waters
- Discharge Permits, Dumping Of Waste at Sea, Off-Road Vehicle Regulations Promulgated in Terms of the National Environmental Management Act: Integrated Coastal Management Act (Act No. 24 Of 2008) (2017).
- Managed project to develop an Estuarine Management Plan for the Buffalo River Estuary for the National Department of Environmental Affairs (2017).
- Managed project to develop a Coastal Management Programme for Amathole District Municipality, Eastern Cape (2015 – 2016).
- Managed project to develop a sustainability diagnostic report as part of the development of the Eastern Cape Development Plan and Vision 2030 (2013).
- Managed project for the Department of Environmental Affairs and Tourism, Marine & Coastal Management to determine the cost implications associated

with the implementation of the Integrated Coastal Management Act (2007).

- Managed project to develop a Conservation Plan and Municipal Open Space System (MOSS) for Buffalo City Municipality (2007)
- Managed project to develop a Sanitation Policy and Strategy for Buffalo City Municipality, Eastern Cape (2004 – 2006).
- Managed project to develop an Integrated Environmental Management Plan and Integrated Coastal Zone Management Plan for Buffalo City Municipality, Eastern Cape (2004 – 2005).
- Managed projects to develop and implement an Environmental Management System (EMS) for the Chris Hani and Joe Gqabi (formerly Ukhahlamba) District Municipalities in the Eastern Cape generally in line with ISO14001 EMS standards (2004 – 2005).
- Managed project to develop a State of the Environment Report and Environmental Implementation Plans for Amathole, Chris Hani, OR Tambo and Joe Gqabi District Municipalities in the Eastern Cape Province (2005 – 20010).
- Conducted analysis of permit fees and application processing costs for off-road vehicle use on the South African coastline for the Department of Environmental Affairs and Tourism, Marine & Coastal Management (2003).

Environmental auditing and compliance:-

- Conducted environmental legal compliance audit for various large Transnet Freight Rail facilities (2018).
- Managed projects to develop Environmental & Social Management Systems (ESMS) in line with IFC Performance Standards for three (3) wind farms in South Africa (2015-2018).
- Managed project to develop an Environmental & Social Management System (ESMS) in line with IFC Performance Standards for a telecoms company in Zimbabwe on behalf of the German Development Bank (2013)
- Participated in numerous ISO14001 Environmental Management System (EMS) audits for large South African corporations including SAPPI, BHP Billiton, SAB Miller, Western Platinum Refinery, Dorbyl Group and others (2002 – present).
- Reviewed the SHE data reporting system of International Paper, Inc. (IP) for three successive years as part of the verification of the IP SHE Annual Report, which included environmental assessments of 12 IP pulp and paper mills located throughout the USA.
- Conducted Environmental Management System (EMS) reviews for a number of large US corporations, including Gulfstream Aerospace Corporation

Public financial accounting:-

- While with Ernst & Young LLP, (USA), functioned as lead financial auditor for various public and private companies, mostly in the technology business segment of up to $200 million in annual sales. Client experience included assistance in a $100 million debt offering, a $100 million IPO and SEC annual and quarterly reporting requirements.
- Completed three years of articles (training contract) in fulfilment of the certification requirements of the South African Institute of Chartered

Accountants which included auditing, accounting and preparation of tax returns for many small to medium sized commercial entities.

Refereed Publications:-

- Carter, A.R. 1985. Reproductive morphology and phenology, and culture studies of Gelidium pristoides (Rhodophyta) from Port Alfred in South Africa. Botanica Marina 28: 303-311.
- Carter, A.R. 1993. Chromosome observations relating to bispore production in Gelidium pristoides (Gelidiales, Rhodophyta). Botanica Marina 36: 253-256.
- Carter, A.R. and R.J. Anderson. 1985. Regrowth after experimental harvesting of the agarophyte Gelidium pristoides (Gelidiales: Rhodophyta) in the eastern Cape Province. South African Journal of Marine Science 3: 111-118.
- Carter, A.R. and R.J. Anderson. 1986. Seasonal growth and agar contents in Gelidium pristoides (Gelidiales, Rhodophyta) from Port Alfred, South Africa. Botanica Marina 29: 117-123.
- Carter, A.R. and R.H. Simons.1987. Regrowth and production capacity of Gelidium pristoides (Gelidiales, Rhodophyta) under various harvesting regimes at Port Alfred, South Africa. Botanica Marina 30: 227-231.
- Carter, A.R. and R.J. Anderson. 1991. Biological and physical factors controlling the spatial distribution of the intertidal alga Gelidium pristoides in the eastern Cape Province, South Africa. Journal of the Marine Biological Association of the United Kingdom 71: 555-568.

Published reports:-

- Water Research Commission. 2006. Profiling Estuary Management in Integrated Development Planning in South Africa with Particular Reference to the Eastern Cape. Project No. K5/1485.
- Turpie J., N. Sihlophe, A. Carter, T, Maswime and S. Hosking. 2006. Maximising the socio-economic benefits of estuaries through integrated planning and management: A rationale and protocol for incorporating and enhancing estuary values in planning and management. Un-published Water Research Commission Report No. K5/1485

Conference Proceedings:-

- Carter, A.R. 2002. Climate change and emission inventories in South Africa. Invited plenary paper at the 5th International System Auditors Convention, Pretoria. Held under the auspices of the South African Auditor & Training Certification Association Conference (SAATCA).
- Carter, A.R. 2003. Accounting for environmental closure costs and remediation liabilities in the South African mining industry. Proceedings of the Mining and Sustainable Development Conference. Chamber of Mines of South Africa, Vol. 2: 6B1-5
- Carter, A.R. and S. Fergus. 2004. Sustainability analysis of wastewater treatment options on the West Bank of East London, Buffalo City. Proceedings of the Annual National Conference of the International Association for Impact

ALAN ROBERT CARTER
Curriculum Vitae

Assessment, South African Affiliate: Pages 295-301.

- Carter, A., L. Greyling, M. Parramon and K. Whittington-Jones. 2007. A methodology for assessing the risk of incurring environmental costs associated with port activities. Proceedings of the 1st Global Conference of the Environmental Management Accounting Network.
- Hawley, GL, McMaster AR and Carter AR. 2009, Carbon, carbon stock and life-cycle assessment in assessing cumulative climate change impacts in the environmental impact process. Proceedings of the Annual National Conference of the International Association for Impact Assessment, South African Affiliate.
- Hawley, GL, McMaster AR and Carter AR. 2010. The Environmental and Social Impact Assessment and associated issues and challenges. African, Caribbean and Pacific Group of States (ACP), Science and Technology Programme, Sustainable Crop Biofuels in Africa.
- Carter, A.R. 2011. A case study in the use of Life Cycle Assessment (LCA) in the assessment of greenhouse gas impacts and emissions in biofuel projects. 2nd Environmental Management Accounting Network- Africa Conference on Sustainability Accounting for Emerging Economies. Abstracts: Pages 69-70.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Alan Robert Carter Date: 22 January 2020

AIDAN JOHN GOUWS
Curriculum Vitae

CONTACT DETAILS

Name of Company	**CES – Environmental and Social Advisory Services**
Designation	Centurion Branch
Profession	Environmental Consultant
Years with firm	1
E-mail	a.gouws@cesnet.co.za
Office number	+27 (0)10 045 1372
Nationality	South African
Professional body	SACNASP (*Cand.Nat.Sci*)
Key areas of expertise	➢ Environmental Authorisation ➢ GIS ➢ Ecological Studies ➢ Database management

PROFILE

Mr Aidan Gouws

Aidan obtained his MSc in Environmental Science (*Cum laude*) from Rhodes University, having conducted research on the spatio-temporal dynamics of *Acacia dealbata* invasions and broader land-use and cover changes in the northern Eastern Cape, funded through a study bursary awarded by the Agricultural Research Council (ARC). Prior to this, he obtained his BSc Honours in Geographical and Environmental Sciences (*Cum laude*) from the University of Pretoria, studying plant ecology and EIA methodology amongst others. He is also member of the Golden Key Honours Society. Aidan joined CES in 2018 and has been involved in several projects, including Basic Assessments, Full Scoping and Environmental Impact Assessments, Environmental Audits and Resettlement Action Plan (RAP) Audit. He works from the Johannesburg office and his interests include the general Environmental Impact Assessment (EIA) process, GIS mapping, ecological studies and the Public Participation Process (PPP).

AIDAN JOHN GOUWS
Curriculum Vitae

CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

EMPLOYMENT EXPERIENCE

Environmental Consultant, CES – Environmental and Social Advisory Services
July 2018 – current
- Responsible for conducting a range of environmental studies in the broad fields of Environmental Impact Assessment and Environmental Management.
- Sourcing small to medium projects by preparing proposals under supervision.
- Taking responsibility for Basic Assessments, and small projects under the guidance and supervision of a more senior staff member.
- Taking responsibility for specialist ecological, database management and GIS tasks when required

Volunteer, Khulisa Social Solutions
May 2018 – July 2018
- Responsible for refining the organisational participatory research and intervention methodology guidelines.

Departmental tutor, Department of Environmental Science, Rhodes University
January 2016 – December 2017
- General assistance: helping staff and fellow post-graduate students with GIS- and statistics-related queries.
- Demonstrator: assistance with undergraduate environmental science practical sessions and marking of practical reports.

Demonstrator, Department of Plant Science, University of Pretoria
July 2015 – December 2015
- Assisting third year students in practical plant identification using dichotomous keys and family recognition by diagnostic reproductive and vegetative characters

ACADEMIC QUALIFICATIONS

Rhodes University, Grahamstown, Eastern Cape.
- M.Sc. Environmental Science (*Cum laude*)
  January 2016 – January 2018

University of Pretoria, Pretoria, Gauteng.
- B.Sc. Hons. Geographical and Environmental Sciences (*Cum laude*)
  January 2015 – December 2015

University of Pretoria, Pretoria, Gauteng
- B.Sc. Environmental Sciences (*Cum laude*)
  January 2012 – December 2014

PUBLICATIONS

- Gouws, A. J., & Shackleton, C. M. (2019). A spatio-temporal, landscape perspective on *Acacia dealbata* invasions and broader land use and cover changes in the northern Eastern Cape, South Africa. Environmental Monitoring and Assessment, 191(2), 74.
- Gouws, A. J., & Shackleton, C. M. (2019). Abundance and correlates of the *Acacia dealbata* invasion in the northern Eastern Cape, South Africa. Forest Ecology and Management, 432, 455-466.

MEMBERSHIPS

- Golden Key International Honour Society – University of Pretoria Chapter.

AIDAN JOHN GOUWS
Curriculum Vitae

CONSULTING EXPERIENCE

Basic Assessments

1. Ramotshere Moiloa Local Municipality Residential Extension Projects, Zeerust, North West Province (2 BARs) (2019–)
   - Project manager, Ecological Specialist, PPP, Reporting

2. SANRAL Koster N52 Road Upgrade, Koster, North West Province (2018–)
   - Mapping, PPP, Reporting

3. Transnet Freight Rail Installation of Telecommunications Masts and Associated Infrastructure at Various Locations in South Africa (3 BARs) (2019–)
   - Project manager, PPP, Reporting

Full Scoping and Environmental Impact Assessments

4. SANRAL Masekwaspoort N1 Road Upgrade BAR and Quarry S&EIAR Authorisation, Musina, Limpopo Province (2018– On hold)
   - Mapping, PPP, Reporting

5. SANRAL Zandkraal-Winburg N1 Road Upgrade Quarry S&EIR Authorisation, Winburg, Free State Province. (2018–)
   - Mapping, PPP, Reporting

Environmental Auditing

6. SANRAL Hendrina N11 Road Upgrade ECO Audits, Hendrina, Mpumalanga Province (2018–2019)
   - ECO, Reporting

7. South African National Biodiversity Institute (SANBI) Office Complex Development, Pretoria, Gauteng Province (2018)
   - ECO, Reporting

Resettlement Action Plan (RAP) Auditing

8. Millennium Challenge Account Malawi (MCA-M) RAP Audits (2018–2019)
   - Database support, Auditor, Training, Assistant Reporting
9. Malawi Millennium Development (MMD) Trust RAP Audits (2019)
   - Database manager, Auditor, Training

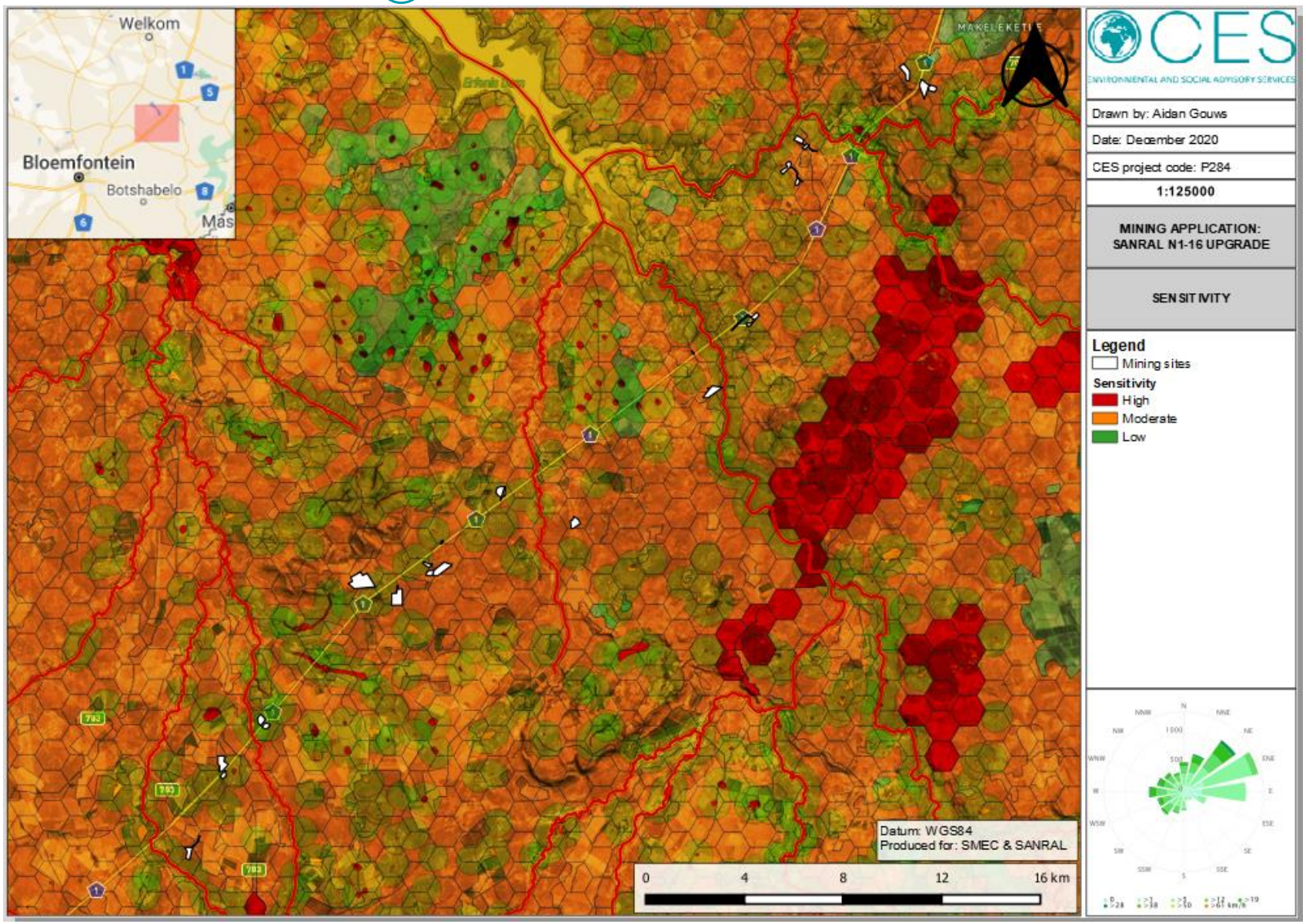
CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

AIDAN GOUWS

Date: January 2020

12 APPENDIX E2: SITE SENSITIVITIES


Welkom
Bloemfontein
Botshabelo
Mas
MAKELEKETLE
CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES
Drawn by: Aidan Gouws
Date: December 2020
CES project code: P284
1:125000
MINING APPLICATION:
SANRAL N1-16 UPGRADE
SENSITIVITY
Legend
Mining sites
Sensitivity
High
Moderate
Low
Datum: WGS84
Produced for: SMEC & SANRAL
0
4
8
12
16 km

13 APPENDIX E3: METHOD STATEMENTS

Method statements need to be compiled by the Contractor for approval by the ECO. For the purposes of the environmental specification, a method statement is defined as a written submission by the Contractor to the ECO setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, in such detail that the ECO is enabled to assess whether the Contractor's proposal is in accordance with the EMPr and / or will produce results in accordance with EMPr.

The method statement shall cover applicable details with regard to:

- Construction procedures,
- Materials and equipment to be used,
- Getting the equipment to and from site,
- How the equipment/ material will be moved while on site,
- How and where material will be stored,
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
- Timing and location of activities,
- Compliance/ non-compliance with the Specifications, and
- Any other information deemed necessary by the Engineer.

The Contractor shall abide by these approved method statements, and any activity covered by a method statement shall not commence until the ECO has approved the method statement. The method statement shall be submitted to the ECO not less than 20 days prior to the intended date of commencement of the activity, or as directed by the ECO.

METHOD STATEMENT

CONTRACT: ……..... **DATE**: …….

PROPOSED ACTIVITY (give title of method statement and reference number from the EMPr):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

Start Date:	End Date:

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated sketches and plans where possible):

* Note: please attach extra pages if more space is required

DECLARATIONS

1) ENVIRONMENTAL CONTROL OFFICER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

_____ _____

(Signed) (Print name)

Dated:._____

2) PERSON UNDERTAKING THE WORKS

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the ECO will audit my compliance with the contents of this Method Statement

_____ _____

(Signed) (Print name)

Dated: _____

14 APPENDIX E4: BASIC ENVIRONMENTAL EDUCATION COURSE

http://www.webweaver.nu/clipart/environmental.shtml

Reasons why should we look after the environment

- We have a right to a clean environment
- A clean environment is essential to healthy living
- All our basic needs come from the environment
- A contract has been signed – development vs the environment
- Penalties / fines could be issued

How to look after the environment

- Report issues
- Teamwork
- Follow the set rules and guidelines (EA, EMPr, Method statements etc.)
- Conserve, reuse and recycle

Tips and Guidelines

- Workers and equipment should not be allowed outside demarcated areas
- No swimming or polluting of water bodies allowed
- No damage / disturbance to vegetation or water bodies without consent / permits
- No disturbance allowed in no-go areas
- No hunting of animals
- Report all fires
- No burning or burying of waste
- No smoking near hazardous materials
- Training on fire fighting equipment
- Hazardous materials to be stored in designated and bunded areas
- Spill kits and drip trays a must
- Report all spills
- Control dust and Noise
- Maintain construction vehicles
- Availability and maintenance of sanitation facilities

Tips and Guidelines

- Only eat is designated areas
- Do not litter
- Vehicles to remain on approved tracks and adhere to speed limit
- Ensure emergency phone numbers are available
- Ensure PPE is worn
- Report fires, leaks and injuries
- Ask if unsure