PROPOSED BORROW PIT MR771/8.6/R/80 ON FARM VREDELUS (NO. 7), VAN WYKSVLEI, NORTHERN CAPE.

ENVIRONMENTAL MANAGEMENT PROGRAMME

(INCLUDING THE WASTE, WATER USE AND ELECTRICITY CONSUMPTION MINIMIZATION AND MANAGMENT PLAN)

Prepared for:

Kareeberg Municipality
Private Bag X226
Carnarvon
8925

Prepared by:

Guillaume Nel Environmental Consultants
P.O. Box 2632
Paarl
7620
Tel: 021 870 1874
Fax: 021 870 1873
Fax: 086 6933 802
Cell: 072 1571 321
E-Mail: guillaume@gnec.co.za

06 AUGUST 2018

TABLE OF CONTENTS

LIST OF TABLES

ABREVIATIONS

DEA ..... Department of Environmental Affairs
DENC……..……..Department of Environment and Nature Conservation
DWS .....Department of Water and Sanitation
EA.....Environmental Authorisation
EAP ..... Environmental Assessment Practitioner
ECO.....Environmental Control Officer
EIA.....Environmental Impact Assessment
EMP..... Environmental Management Programme
EO ..... Environmental Officer
ESO ..... Environmental Site Officer
GNEC ... .Guillaume Nel Environmental Consulting
I&AP .....Interested and Affected Parties

DEFINITIONS

Alien species - Plants and animals which do not arrive naturally in an area - they are brought in by humans. Alien plants often force indigenous species out of the area. Rooikrans is a good example of alien species in the Cape.

Alternative - A possible course of action, in place of another, that would meet the same purpose and need defined by the development proposal. Alternatives considered in the EIA process can include location and/or routing alternatives, layout alternatives, process and/or design alternatives, scheduling alternatives or input alternatives.

Aspect – Element of an organisation's activities, products or services that can interact with the environment.

Auditing - A systematic, documented, periodic and objective evaluation of how well the environmental management programmme is performing with the aim of helping to safeguard the environment by: facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems.

Biodiversity - The rich variety of plants and animals that live in their own environment. Fynbos is a good example of rich biodiversity in the Cape.

Built environment - Physical surroundings created by human activity, e.g. buildings, houses, roads, bridges and harbours.

Conservation - Protecting, using and saving resources wisely, especially the biodiversity found in an area.

Contamination - Polluting or making something impure.

Corrective (or remedial) action - Response required to address an environmental problem that is in conflict with the requirements of the EMP. The need for corrective action may be determined through monitoring, audits or management review.

Degradation - The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.

Ecology - The scientific study of the relationship between living things (animals, plants and humans) and their environment.

Ecosystem - The relationship and interaction between plants, animals and the non-living environment.

Environment - Our surroundings, including living and non-living elements, e.g. land, soil, plants, animals, air, water and humans. The environment also refers to our social and economic surroundings, and our effect on our surroundings.

Environmental Impact Assessment (EIA) - An Environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of a proposed development. The EIA includes an evaluation of alternatives; recommendations for appropriate management actions for minimising or avoiding negative impacts and for enhancing positive impacts; as well as proposed monitoring measures.

Environmental Management System (EMS) - Environmental Management Systems (EMS) provide guidance on how to manage the environmental impacts of activities, products and services. They detail the organisational structure, responsibilities, practices, procedures, processes and resources for environmental management. The ISO14001 EMS standard has been developed by the International Standards Organisation.

Environmental policy - Statement of intent and principles in relation to overall environmental performance, providing a framework for the setting of objectives and targets.

Fynbos - Low-growing and evergreen vegetation found only in the south Western Cape. Fynbos is known for its rich biodiversity.

Habitat - The physical environment that is home to plants and animals in an area, and where they live, feed and reproduce.

Hazardous waste – Waste, even in small amounts, that can cause damage to plants, animals, their habitat and the well-being of human beings, e.g. waste from factories, detergents, pesticides, hydrocarbons, etc.

Impact - A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

Indigenous species - Plants and animals that are naturally found in an area.

Infrastructure - The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage.

Integrated - Mixing or combining all useful information and factors into a joint or unified whole. See Integrated Environmental Management.

Integrated Environmental Management (IEM) - A way of managing the environment by including environmental factors in all stages of development. This includes thinking about physical, social, cultural and economic factors and consulting with all the people affected by the proposed developments. Also called "IEM".

Land use - The use of land for human activities, e.g. residential, commercial, industrial use.

Mitigation - Measures designed to avoid, reduce or remedy adverse impacts

Natural environment - Our physical surroundings, including plants and animals, when they are unspoiled by human activities.

Over-utilisation - Over-using resources - this affects their future use and the environment.

Policy - A set of aims, guidelines and procedures to help you make decisions and manage an organisation or structure. Policies are based on people's values and goals. See Integrated Metropolitan Environmental Policy.

Process - Development usually happens through a process - a number of planned steps or stages.

Proponent – Developer. Entity which applies for environmental approval and is ultimately accountable for compliance to conditions stipulated in the Environmental authorisation (EA) and requirements of the EMP.

Recycling - Collecting, cleaning and re-using materials.

Resources - Parts of our natural environment that we use and protect, e.g. land, forests, water, wildlife, and minerals.

Scoping Report - A report presenting the findings of the scoping phase of the EIA. This report is primarily aimed at reaching closure on the issues and alternatives to be addressed in the EIA (in the case of a full EIA process).

Stakeholders - A subgroup of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term includes the proponent, authorities and all interested and affected parties.

Storm water management – Strategies implemented to control the surface flow of storm water such that erosion, sedimentation and pollution of surface and ground water resources in the immediate and surrounding environments are mitigated. This is specifically important during the construction and decommissioning phases of a project.

Sustainable development - Development that is planned to meet the needs of present and future generations, e.g. the need for basic environmental, social and economic services. Sustainable development includes using and maintaining resources responsibly.

Sustainability - Being able to meet the needs of present and future resources.

Waste Management – Classifying, recycling, treatment and disposal of waste generated during construction and decommissioning activities.

Wetlands - An area of land with water mostly at or near the surface, resulting in a waterlogged habitat containing characteristic vegetation species and soil types e.g. vleis, swamps.

Zoning - The control of land use by only allowing specific type development in fixed areas or zones

REFERENCES

DEAT (1992) Integrated Environmental Management Guideline Series, Volumes 1-6, Department of Environmental Affairs, Pretoria.

DEAT (2004a) Environmental Management Plans, Integrated Environmental Management, Information Series 12, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

Department of Environmental Affairs and Development Planning Generic Environmental Management Plan Guideline, prepared by Strategic Environmental Focus, 2007

CITY OF CAPE TOWN: ENVIRONMENTAL MANAGEMENT PROGRAMME (2002) Specification EM – 02/07: ENVIRONMENTAL MANAGEMENT, Ver 5 (03/2002)

Lochner, P. 2005.Guideline for Environmental Management Plans. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

National Environmental Management Act 107 of 1998 (NEMA)

SECTION 1 - INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION AND BACKGROUND

The client, Kareeberg Municipality, proposes Borrow Pit MR771/8.6/R/80, and will use this Planning, Construction and Operational Phase Environmental Management Programme (EMP) as a tool in managing the impacts of the proposed project, after environmental approval from the Department of Mineral Resources in terms of the **NEW** Environmental Impact Assessment Regulations (GN R. No. 983, GN R. No. 984 and GN R. No. 985 [4 December 2014]) and amended 7 April 2017, under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), which replaced the 2010 regulations (GN R. No.543, R. No. 544 and R. No. 546 [June 2010]), is obtained.

This document is based on the EMP Guideline provided by DEA&DP which was compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development (DEAT, 1992). IEM is a key instrument of the National Environmental Management Act [NEMA] (Act No. 107 of 1998). NEMA promotes the integrated environmental management of activities that may have a significant effect on the environment, while IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all stages of the development process. It advocates the use of several environmental and management tools that are appropriate for the various levels of decision-making. One such tool is an Environmental Management Programme (EMP).

The IEM guidelines intend encouraging a pro-active approach to sourcing, collating and presenting information in a manner that can be interpreted at all levels. The basic principles underpinning IEM are that there be:

- informed decision-making;
- accountability for information on which decisions are taken;
- accountability for decisions taken;
- a broad meaning given to the term environment (i.e. one that includes physical, biological, social, economic, cultural, historical and political components);
- an open, participatory approach in the planning of proposals;
- consultation with interested and affected parties;
- due consideration of alternative options;
- an attempt to mitigate negative impacts and enhance positive aspects of proposals;
- an attempt to ensure that the 'social costs' of development proposals (those borne by society, rather than the developers) be outweighed by the 'social benefits' (benefits to society as a results of the actions of the developers);
- democratic regards for individual rights and obligations;
- compliance with these principles during all stages of the planning, implementation and decommissioning of the proposals (i.e. from 'cradle to grave'), and

- The opportunity for public and specialist input in the decision-making process.

These principles are in line with NEMA, which has repealed a number of the provisions of the Environment Conservation Act, 1989 [ECA] (Act No. 73 of 1989), and is focussed primarily on co-operative governance, public participation and sustainable development. The Environmental Impact Assessment Regulations that took effect in July 2006 regulate the procedures and criteria for the submission, processing, consideration and decision on applications for environmental authorisation of listed activities.

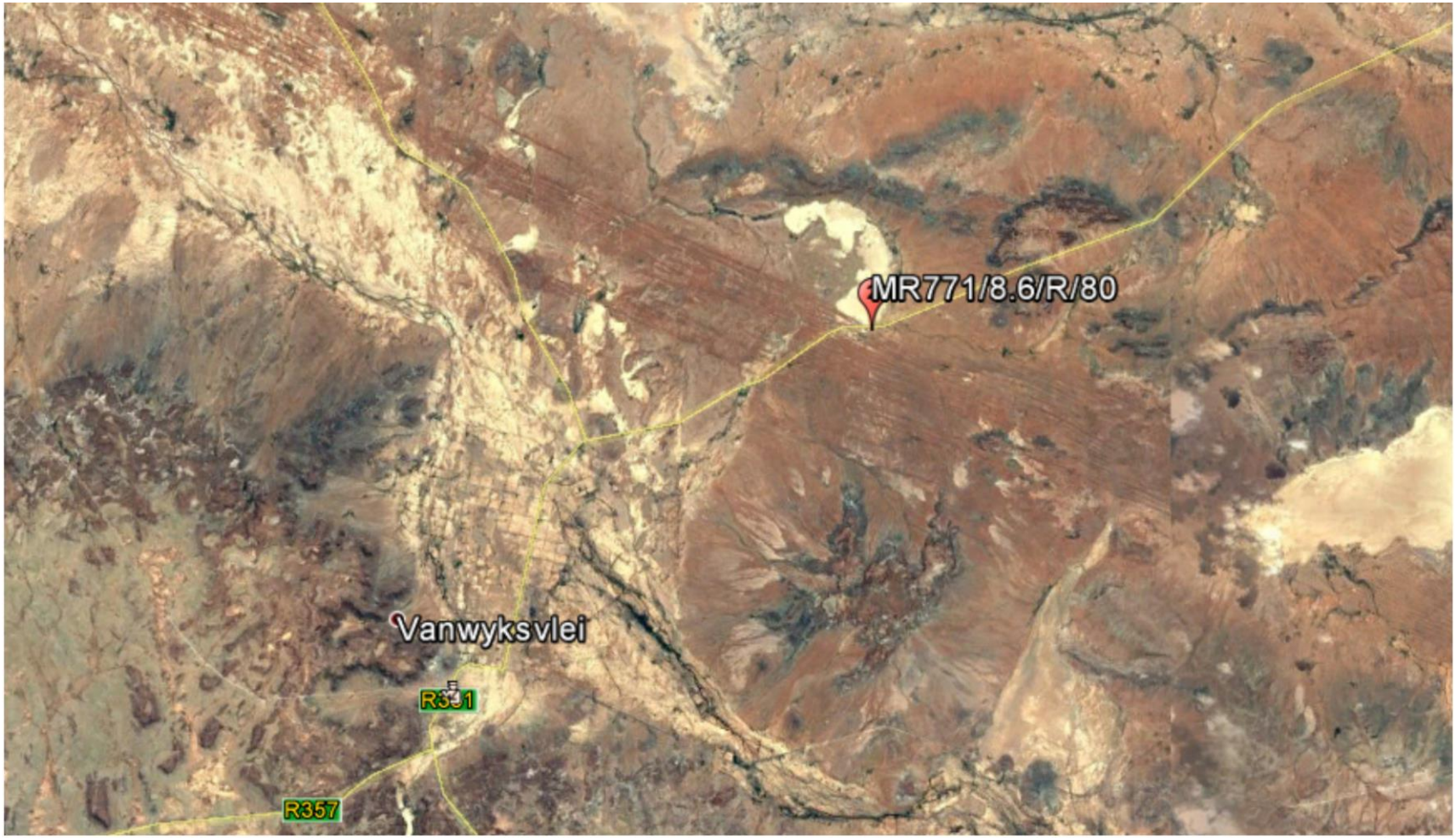
1.2 SCOPE AND TERMS OF REFERENCE

The general principles contained within this document apply to all **PRE-CONSTRUCTION, CONSTRUCTION AND OPERATIONAL** activities.

Principles of this EMP:

This EMP is compiled using the following concepts and implementation requirements so that the higher principles of sustainable development are realised:

- ***Continuous improvement***. The project proponent (or implementing organisation) must be committed to review and to continually improve environmental management, with the objective of improving overall environmental performance.
- ***Broad level of commitment***. A broad level of commitment will be required from all levels of management as well as the workforce in order for the development and implementation of this EMP to be successful and effective.
- ***Flexible and responsive***. The implementation of the EMP must be responsive to new and changing circumstances, i.e. rapid short-term responses to problems or incidents. The EMP is a dynamic "living" document and thus regular planned review and revision of the EMP must be carried out.
- ***Integration across operations***. This EMP is integrated across existing line functions and operational units such as health, safety and environmental departments in a company/project. This is done to change the redundant mind set of seeing environmental management as a single domain unit.
- ***Legislation***. It is understood that any development project during its construction phase is a dynamic activity within a dynamic environment. The Developer, Engineer, Contractor and sub-contractor must therefore be aware that certain activities conducted during construction may require further licensing or environmental approval, e.g. river or stream diversions, bulk fuel storage, waste disposal, etc. The Contractor must consult the RE, EO and ECO on a regular basis in this regard.



Proposed Borrow Pit MR771/8.6/R/80, Van Wyksvlei.	Guillaume Nel environmental consultants	N
Locality Map	Tel: (021) 870 1874 | Fax: 086 6933 802 | Cell: 072 1571 321	Figure 1

Figure 1 Proposed Borrow Pit MR771/8.6/R/80, Van Wyksvlei, Northern Cape.

SECTION 2 – SITE SPECIFIC INFORMATION

2.1 PROPOSED ACTIVITY AND LOCAL CONTEXT

The Kareeberg Municipality is applying to approve Borrow Pit MR771/8.6/R/80. The proposed material to be mined will be used as bedding material for the previously authorised water pipeline to be constructed between Carnarvon and Van Wyksvlei. GNEC was appointed as Independent Environmental Consultants to carry out the required EIA Process for the approval for the proposed Borrow Pit.

The proposed upgrade of the roads will:

- Provide bedding material to be used during the construction of the water pipeline from Carnarvon to Van Wyksvlei.
- Assist in providing much needed water to the citizens of Van Wyksvlei in order to address the current water shortages.
- Stimulate the local economy through providing job opportunities.
- Assist with shorter haulage distance in transporting the bedding material.

The proposed water pipeline and mining activities will positively contribute to the social, wellbeing, and economic environment of the areas.

2.1.1 Summary of impacts associated with the proposed activity

Noise pollution:

During mining activities: the proposed site is not located close to residential developments, thus the noise impacts will not be significant. All construction vehicles must be in a good working order to reduce possible noise pollution. Work hours during the construction phase shall be strictly enforced unless permission is given (07H00 – 18H00). Permission shall not be granted without consultation with the local industries, businesses and residents by the EO. No work to be done on Sundays.

Heritage impact:

No archaeological or historical material is expected to occur on the site since the site has been previously disturbed during agricultural activities. Agricultural activities on this site is an ongoing event. It is not foreseen that the site is of any heritage significance or that the proposed activities will have any significant impact on any heritage resources in the area. No structures are present on site. Should any artefacts be uncovered during the mining phase, a Specialist must be contacted in order to assess its significance.

Visual impact:

Mining activities will have an insignificant visual impact since the construction will only be temporary and is not in close proximity of any residential developments. No visual impacts during the operational phase are expected seeing that the site is existing agricultural land that will be rehabilitated back to its original state. Shade cloth must be utilised to conceal and minimise the visual impact of contractor camps, lay down and storage areas. Rubble and litter must be removed every week or more often as the need arises and be disposed of at a registered landfill site as designated by the Kareeberg Local Municipality, Solid Waste Removal Department. During rehabilitation the land will be ripped, levelled and shaped in such a way that it blends in with the natural contour and drainage lines of the site and the surrounding area. The site will be rehabilitated back to agricultural land.

Impact on fauna and flora:

Seeing that the proposed site is an existing agricultural field which was subject to grazing, it is not expected that the proposed borrow pit will have any significant impacts on the biological aspects of the site. During rehabilitation the land will be ripped, levelled and shaped in such a way that it blends in with the natural contour and drainage lines of the site and the surrounding area. The site will be rehabilitated back to agricultural land.

Should any faunal species be found on the existing agricultural field, they will be re-located to the nearest natural area. The construction footprint area will be clearly demarcated and the surrounding areas will be clearly seen as no go areas.

2.1.2 [Proponents] environmental management policy and commitments

The proponent understands the importance of conserving the environment, and will endeavour to apply all necessary mitigation measures to conserve and maintain sensitive areas and prevent environmental degradation.

2.1.3 Interpretations

The implementation of the EMP is not an additional or “add on” requirement. The EMP is legally binding through NEMA and the relevant EA. This EMP is to be used during the planning, construction and operational phases of the proposed project. The Environmental Control Office, appointed by the developer after environmental approval, must use this EMP during the ECO audits to determine the developer’s compliance to it.

Further on, the proponent is to ensure that through the project tender process the EMP forms part of the Project Construction Contract Document to be incorporated in line with:

- General project specifications; and
- SANS 1200 A or SANS 1200 AA, as applicable.

The proponent is also to ensure that through any tender or appointment process, the operational EMP forms part of the management contract with all service providers and contractors, for a period of time as stipulated by the DEA&DP during which the development will be audited for compliance to the operational EMP. This EMP is compiled in line with relevant legislation and general construction project specifications. However, to ensure sound environmental practice, the measures as described in the operational EMP should be implemented for the full operational life of the development.

2.1.4 Project phase

The first part of this EMP is specifically compiled for the ***period of time prior to commencement of and activities associated with construction of the above mentioned activity***, and for the ***operational phase*** of the proposed development.

If and when applicable, where specific activities of the proposed development fall outside of the general principles contained herein, the Department will attach further 'activity – specific' EMP's as appendices to this document.

2.1.5 Role players and responsibility matrix

In order for the EMP to be successfully implemented, all the role players involved in the project need to co-operate. For this to happen, role players must have a clear understanding of their roles and responsibilities in the project, must be professional, form respectful and transparent relationships, and maintain open lines of communication. The EMP therefore clearly defines the role players involved and indicates their role in the implementation of the generic EMP.

Typically, these role players or the project team may include the Authorities (A), Other Authority (OA), Developer/Proponent (D), Consulting Engineers (CE), Resident Engineer (RE), Environmental Officers (EO), Environmental Site Officer (ESO), Environmental Control Officer (ECO), Project Manager (PM), Contractors (C), Environmental Assessment and Practitioner (EAP). Further; landowners, interested and affected parties and the relevant environmental and project specialists are also important role players.

SECTION 3 – ENFORCEMENT, MONITORING AND AUDITING

3.1 PRE-CONSTRUCTION AND CONSTRUCTION PHASE

The Municipality must appoint, at his own cost, an **ECO** and full time EO (as part of the construction team) who will oversee the implementation of the EMP.

The Kareeberg Municipality, Engineers, the Department of Mineral Resources and DENC must be informed of the appointment of the **ECO** prior to construction activities. Please note that the responsibility of the particular ECO may end at the end of the construction period. In the event that an ECO is appointed during the operational phase, it must be noted that this ECO may be different from the original ECO and both DENC, Department of Mineral Resources, as well as Kareeberg Municipality must be notified of this appointment again.

The independent ECO is responsible for monthly audits on compliance to relevant environmental legislation, conditions of the Environmental Authorisation (EA), and the EMP for the project.

The ECO shall conduct monthly independent environmental audits. **Monthly Audit reports** are to verify the projects compliance with the EMP and conditions of the Environmental Authorisation (EA).

Before any construction activities commence, the ECO must compile, for the approval by the Department, an audit checklist based on the contents of this EMP and conditions of the Environmental Authorisation (EA). The ECO shall at the request of the Department forward audit reports to the Department and the Kareeberg Municipality at a frequency determined by the Department which shall be stipulated in the Environmental Authorisation (EA).

Evidence of the following as **key performance indicators,** must be included in the audit reports:

- Complaints received from landowners and actions taken.
- Environmental incidents, such as oil spills, concrete spills, etc. and actions taken (litigation excluded).
- Incidents leading to litigation and legal contraventions.
- Environmental damage that needs rehabilitation measures to be taken.

A copy of all ESO and EO monitoring reports, contractor method statements and pro forma documentation must be held by the ESO and/or the EO on site and be made available to the Department and or the ECO upon request.

3.2 OPERATIONAL PHASE

The ECO shall conduct, at a frequency as determined by the Department of Mineral Resources and stipulated in the relevant Environmental Authorisation (EA) for the project, independent environmental audits. The audits are to verify the developments compliance with the operational EMP and conditions of the Environmental Authorisation (EA).

The ECO must compile, for the approval by the Department of Mineral Resources, an audit checklist based on the contents of this EMP and conditions of the Environmental Authorisation (EA). The ECO shall at the request of the Department of Mineral Resources forward audit reports to the Department at a frequency determined by the Department which shall be stipulated in the Environmental Authorisation (EA).

The following **Key Performance Indicators** must be included in the audit reports:

- Complaints received from landowners and actions taken.
- Environmental incidents, such as oil spills, fires etc. and actions taken.
- Incidents possibly leading to litigation and legal contraventions.
- Environmental damage that needs rehabilitation measures to be taken.

The minutes of site meetings, to which the ECO will have unrestricted access to, shall be the official record of environmental activities, complaints and communications. These minutes will be circulated to the entire project team. A copy of the standard site meeting agenda is available on request.

FORMAL ENVIRONMENTAL COMMUNICATION CHANNELS

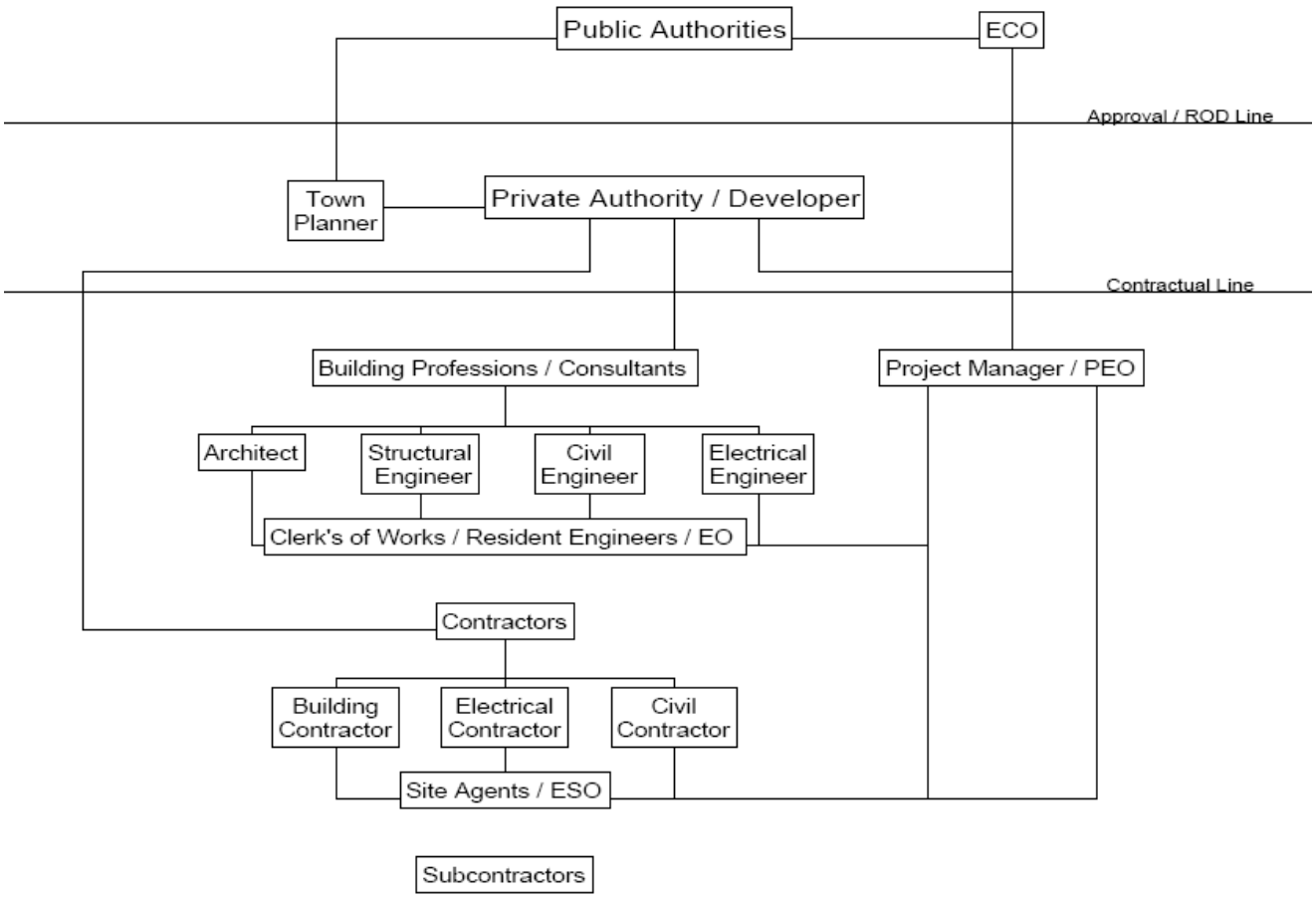


FIGURE 2: REPORTING STRUCTURE AND ROLE PLAYERS INVOLVED IN THE IMPLEMENTATION OF THE PROPOSED BORROW PIT MR771/8.6/R/80, NORTHERN CAPE, EMP

Please note that due to the time line of the development as well as the coming and leaving of consultants and contractors, as well as the many crossed channels of communication in the DEAD&DP EMP Guideline, it was decided by the project team to use the GACP-channels of communication whereby the Project Manager remains the central pivot between all the disciplines. All instructions and reports shall flow through the Project Manager (PM). In the environmental matters the PM becomes the Project Environmental Officer (PEO).

Please note that Figure 2 is a generic reporting structure and that the various role players identified that is not applicable, should be ignored. This includes for example the Architect, Structural Engineer, Electrical Engineer etc.

3.3 MEASUREMENT AND PAYMENT

It is understood that environmental requirements included in this EMP will entail costs over and above those of the civil requirements. These include provision for: mitigation and enhancement actions; training and environmental awareness requirements; monitoring;

auditing; and corrective actions. The proponent shall recognise this and make provision for it in the tender. Costing for management action should be done with inputs and advice from appropriate technical members of the project team and relevant EAP who has knowledge of the management actions being recommended as well as practical experience in implementing similar measures and techniques.

A lump sum must be allocated for the management of Environmental Specifications where it is not possible to cost requirements of the EMP.

3.4 GENERAL GUIDELINES

Guidelines as per standardised construction documentation must be used.

3.5 AWARENESS (INDUCTION) TRAINING

3.5.1 Construction Phase

The EO or ESO, or ECO are responsible in ensuring everyone on site is given an environmental awareness induction session which not only clearly defines what the environment is and specifics detailing the local environment but outlines the requirements of the EMP as a management tool to protect the environment.
Refresher courses must be conducted as and when required. The EO or ESO must ensure daily toolbox talks include alerting the workforce to particular environmental concerns associated with the tasks for that day or the area/habitat in which they are working. Awareness posters and a hand out must be produced to create awareness throughout the site.

3.5.2 Operational Phase

The ECO is responsible in ensuring everyone involved in the operation of the development at ground level receives an environmental awareness induction which not only clearly defines what the environment is and specifics detailing the local environment but outlines the requirements of the EMP as a management tool to protect the environment.

Awareness posters and a hand out must be produced to create awareness throughout the site.

3.6 SITE DOCUMENTATION

3.6.1 Construction Phase

The following is a list of documentation that must be held on site and must be made available to the ECO and/or DEA&DP on request.

- Access negotiations and physical access plan
- Site daily diary /instruction book
- Records of all remediation / rehabilitation activities
- Copies of EO reports (management and monitoring)
- Environmental Management Programme (EMP)
- Complaints register

3.6.2 Operational Phase

The following is a list of documentation which must be held on site and must be made available to the ECO and/or DMR on request.

- Environmental monitoring reports (if required)
- Records of all remediation / rehabilitation activities (if required)
- Environmental Management Programme (EMP)
- Complaints register

3.6.3 Pro forma documentation

3.6.3.1 Prior to the commencement of construction activities

The following attached pro forma documentation is to be filled out and is binding to the EMP and project contract and includes, but not limited to, the following:

- Declaration of understanding by the Developer
- Declaration of understanding by the Contractor

3.6.3.2 During construction activities

The following attached pro forma documentation is to be filled out and maintained. These are binding to the EMP and project contract. They include, but are not limited to, the following:

- Environmental incidents
- Records of all remediation / rehabilitation activities

3.6.3.3 During the Operational Phase

The following attached pro forma documentation is to be filled out and is binding to the EMP and project contract and includes, but not limited to, the following:

- Declaration of understanding by the Proponent
- Environmental incidents

3.7 TOLERANCES AND NON-COMPLIANCE

The independent ECO is responsible for monthly audits on compliance to relevant environmental legislation, conditions of the Environmental Authorisation (EA), and the EMP for the project.

The ECO shall conduct monthly independent environmental audits. **Monthly Audit reports** are to verify the projects compliance with the EMP and conditions of the Environmental Authorisation (EA).

Should the contractor show repeated non-compliance in terms of the audits, a range of fines may be issued to the contractor. These fines are included as part of the Construction EMP (Table 6).

The Engineer, in conjunction with the ECO, shall be the judge as to what constitutes a transgression in terms of this clause, subject to the General Conditions of Contract.

SECTION 4 - GENERIC CONSTRUCTION PHASE EMP - IMPLIMENTATION

4.1 PREAMBLE

The point of departure for the proposed Borrow pit MR771/8.6/R/80, Van Wyksvlei, EMP is to empower a pro-active rather than re-active approach to environmental performance by addressing potential problems before they occur. This will limit corrective measures needed during the construction phase of the project. Therefore the purpose of this EMP is to provide management measures that must be implemented by Kareeberg Municipality and all contractors and sub-contractors alike to ensure that the potential impacts of the proposed project are minimised. It must also be ensured that the *EMP is maintained and upheld as a dynamic document* in order for the *project team to add or improve on issues* that might be considered left out or not relevant to the project. In such instances the DENC may authorise the ECO to make such changes.

The following tables form the core mitigation measures appropriate to the pre-construction and construction phase. The tables present, the objectives to be achieved and the management actions that needs to be implemented in order to mitigate the negative impacts and enhance the benefits of the project. Associated responsibilities, criteria/targets and timeframes are clearly specified.

The **'pre-construction'** section of this generic EMP, refers to the period of time leading up to and prior to commencement of construction activities, and is included to ensure pro-active environmental management measures with the goal of identifying avoidable environmental damage at the outset and sustain optimal environmental performance throughout the construction phase. Most impacts will occur during the construction phase and must be mitigated through the contingency plans identified in the pre-construction phase.

The bulk of environmental impacts will have immediate effect during the 'construction' phase (e.g. noise, dust, and water pollution). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the measures outlined in this section, together with a commitment to sound environmental management from the project team.

The "construction" section refers to all construction and its operation-related activities that will occur within the approved area and access roads, until the project is completed. This "construction" section is divided into three functional areas, namely "materials"; "plant"; and "construction". Each of these functional areas within the EMP contains specific generic mitigation requirements and requested contractor method statements stipulated where required.

Many potential environmental impacts will have immediate or long term effects during the 'operational' phase (e.g. noise, waste management, and water pollution). If the development is monitored on a continual basis during operations, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the measures outlined in this section, together with a commitment to sound environmental management from the proponent and management team.

It must be noted that the responsible party for the majority of the mitigation measures is that of the Management body, unless otherwise stipulated. The names of the responsible parties must be made available to the Department of Mineral Resources for record purposes.

The management body must ensure that a maintenance team is employed with the correct equipment and skill to maintain boardwalks, pathways, fences etc. The following tables will refer to the responsible party as "Management body: 'to be announced' and "maintenance crew".

4.2 STRUCTURE AND CONTENTS OF THE TABLES

The table consists of seven parts as follows:

"Phase of development" - This row will identify either pre-construction (planning) or actual construction phase.

"Impact / issue" - This row will identify the issue being addressed, e.g. Materials, site demarcation, heritage, etc.

Mitigation Measure - This column will include all the necessary mitigation measures for each impact/issue'.

Management objectives - This column will indicate what the management objectives to be achieved for each mitigation measure are.

Measurable targets - This column will indicate what evidence is to be used as an indication to whether or not the 'Management objectives' have been implemented and hence achieved.

Responsible party - This column will provide information as to which role player, e.g. ECO, RE, etc. is responsible for the implementation and or management of each mitigation measure.

Frequency of action - These columns provide time guidelines for the 'Responsible party' by which he/she is to action or manage the required mitigation.

4.2.1 SPECIALIST RECOMMENDATIONS

4.2.1.1 Pre-Construction and Construction Phases

The last part of the table provides space for the EAP to add specialist recommendations that need to be addressed during the pre-construction and construction phases.

4.2.1.2 Operational Phase

Additional requirements may need to be added to the table pending conditions required in the Environmental Authorisation (EA). The last part of the table provides space for such conditions, which must be added before the "declaration of understanding" is signed by the proponent and ECO.

Table 1: PROPOSED BORROW PIT MR771/8.6/R/80, VAN WYKSVLEI, NORTHERN CAPE, PRE-CONSTRUCTION (PLANNING) PHASE EMP

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Public Liaison ▪ The Contractor is responsible for erecting public information boards at key locations where public access may be affected by construction activities. The ECO shall approve the number and locations of these information boards. ▪ The content of the boards will essentially be to advise the public of the construction activities to be undertaken, or being undertaken and to advise of the prohibition of entering demarcated "no-go" areas. ▪ The Contractor shall make allowance for the supply, erection, maintenance and removal of the information boards. **Information boards shall also provide the name and contact number of the ECO, to ensure that the public has access to the ECO to request information and/or to lodge any complaints**.	To advise the public of the construction activities to be undertaken, and to advise of the prohibition of entering demarcated "no-go" areas	Erection of info boards	Contractor	During Site Establishment

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Traffic Impact A specific area for delivery vehicles needs to be clearly specified to all contractors. Comply with Kareeberg Municipality road rules and signs. The necessary sign will be erected. Trained "Red Flag" workers will also be on site.	• To reduce possible traffic impact to expectable standards.	• The existing level of traffic.	Project team.	Design and implementation.
Project contract and programme A copy of this EMP must be available on site. The Contractor shall ensure that all the personnel on site, sub-contractors, suppliers, etc. are familiar with and understand the specifications contained in the EMP.	• Contingencies for minimising negative impacts anticipated to occur during the construction phase. • Ensure environmental awareness and formalise environmental responsibilities and implementation.	• Contract records. • Signed declaration pro forma's.	Project team.	-
Site demarcation and development and signage The surveys for the overall project area and construction footprint as approved in the Environmental Authorisation (EA) must be complete and clearly demarcated before the contractors set	• Contingencies for minimising negative impacts anticipated to occur during the construction phase	• Demarcated area's • Filled in section of this document	EAP specialist, Engineer, contractor	As and when required

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
up their crew camps or begin construction. The boundaries of the mining area needs to be demarcated with stone beacons on corners as indicated on plan. Secure perimeter of mining area with stock-proof fencing as indicated on Borrow Pit plan. Secure the existing gateway with a suitable lock. Erect signage as per SARTSM at location indicated on the Borrow Pit Plan. No unauthorised access signs at Borrow Pit gates. Heavy vehicle crossing sign at intersection of access gates and MR771. Caution signs and 40km/h signs at regulation distance from heavy vehicle crossing signs.				

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Emergencies, non-compliance and communication The contractor **must provide method statements** on the protocols to be followed, and contingencies to be put in place for the following, before construction may begin: • Emergency spills procedures for the contamination of soils from spills and fire. • Handling & storage of oils and chemicals • Cement and concrete batching, which includes the storage, washing & disposal of cement, packaging, tools and plant. • Diesel tanks and refuelling procedures • Crew camps and construction lay down areas • Workshop maintenance and cleaning of plant Communication in emergencies must follow the suggested lines of communication as stipulated figure 2.	• Contingencies for minimising negative impacts anticipated to occur during the construction phase	• Method statements	Contractor, Engineer	As and when required

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Flora **Indigenous vegetation within the site boundary is to be preserved and not damaged.** Adjacent areas and areas where natural vegetation is present, need to be clearly cordoned off and seen as no go areas. This needs to be done in accordance with the ECO before any construction activities may commence The disturbance footprint should be as narrow as possible	• To protect possible fauna and flora species on the site from being exterminated.	• Should sensitive species be present on the site, the correct re-establishment of these species	Contractor and Developer	Before construction commences
Fauna All possible sensitive faunal species found within the construction footprint must be rescued and relocated to the nearest natural areas. Consult the ECO.	•	•		
Topsoil It is not expected that the proposed mining will have an impact on topsoil, due to the fact that the activities will not include subsurface mining.	• Minimise scarring of the soil surface and land features. • Minimise disturbance and loss of soil. • Minimise construction footprint.	• No visible erosion scars once construction is completed. • The footprint has not exceeded the agreed site in terms of EA etc.	Contractor	Daily

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
	• Minimise contamination of storm water run-off.	• Minimal invasive weed and grass growth. • No signs of sedimentation and erosion.		
Appointments and duties of project team The contact details for the ECO, RE, EO, Contractor and ESO shall be completed on the attached pro forma and a copy kept on site. This document must be made available to the Department of Mineral Resources on request. Before construction activities commence, role players must have a clear indication of their role in the implementation of this EMP. Subcontractor(s) contracts with the principle contractor must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP.	• Contingencies for minimising negative impacts anticipated to occur during the construction phase.	• Contract records. • Signed declaration pro forma's.	Project team.	-
Rehabilitation Planning The following basic principles of rehabilitation will be followed once construction is completed. These	•	•		

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
principles should be taken into account before construction commences: • Prepare a rehabilitation plan prior to the commencement of mining (which has been completed). • Agree on the long-term post - mining land use objective for the area with the relevant government departments, local government councils and private landowners. The land use must be compatible with the climate, soil, topography of the final landform and the degree of the management available after rehabilitation. • Progressively rehabilitate the site, where possible, so that the rate of rehabilitation is similar to the rate of mining. • Prevent the introduction of noxious weeds and pests. • Minimise the area cleared for mining and associated facilities to that absolutely necessary for the safe operation of the mine. • Reshape the land disturbed by mining so that it is stable, adequately drained and suitable for the desired long-term land use. • Minimise the long-term visual impact by				

Phase of development	**PRE-CONSTRUCTION (PLANNING)**
Impact / issue	**GENERAL**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
creating landforms which are compatible with the surrounding landscape. • Reinstate natural drainage patterns disrupted by mining wherever possible. • Minimise the potential for erosion by wind and water both during and following mining. • Consider spreading the cleared vegetation on disturbed areas. • Deep rip compacted surfaces to encourage infiltration, and allow plant root growth. • Ensure that the surface one or two metres of soil is capable of supporting plant growth.				

Table 2: ADDITIONAL CONDITIONS FOR THE PROPOSED BORROW PIT MR 771/8.6/R/80, VAN WYKSVLEI, NORTHERN CAPE, EMP

Phase of development	**PLANNING**	**EA reference number**	
Impact / issue	**EA Conditions**		**……**

MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
NO ADDITIONAL MITIGATION MEASURES HAVE BEEN IDENTIFIED.	•	•		
	•	•		

Table 3: PROPOSED BORROW PIT OP MR 771/8.6/R/80, VAN WYKSVLEI, NORTHERN CAPE, CONSTRUCTION PHASE EMP (MATERIALS)

Phase of development	**CONSTRUCTION**
Impact / issue	**Materials**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Handling				
Stockpiles All stockpiled material must be easily accessible on site without any environmental damage of the surrounding properties. All temporarily stockpiled material must be stockpiled in such a way that the spread of materials are minimised. In the case of strong wind and/or rain all stockpiled material must be covered with a tarpaulin in order to prevent erosion. The stockpiles may only be placed within the demarcated areas the location of which must be approved by the RE, EO or ECO. Stockpiles are to be stabilised if signs of erosion are visible. Stockpiles must not be higher than 1.5m to avoid compaction thereby maintaining the soil integrity and chemical composition.	• Minimise scarring of the soil surface and land features. • Minimise disturbance and loss of soil. • Minimise construction footprint. • Minimise contamination of storm water run-off.	• No visible erosion scars once construction is completed. • The footprint has not exceeded the agreed site in terms of EA etc. • Minimal invasive weed and grass growth. • No signs of sedimentation and erosion.	Contractor	Daily
Materials Any imported material used during the construction needs to be obtained from an approved source. Sand without any seed from invasive species must				

Phase of development	CONSTRUCTION
Impact / issue	Materials

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
be used. No sea sand may be used for mixing in cement and for in-filling. Any redundant materials left over after works are complete, need to be removed off site to a designated spoils site.				
Oil and chemicals The contractor **must provide method statements** for the "handling & storage of oils and chemicals", "fire", and "emergency spills procedures". These substances must be confined to specific and secured areas within the contractor's camp, and in a way that does not pose a danger of pollution even during times of high rainfall. These areas must be imperviously bunded with adequate containment (at least 1.1 times the volume of the fuel) for potential spills or leaks. Drip trays (minimum of 10cm deep) must be placed under all machinery and vehicles. The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak from the vehicle while standing. The depth of the drip tray must be determined considering the total amount / volume of oil in the	• Prevention of pollution of the environment. • Minimise chances of transgression of the acts controlling pollution.	• No pollution of the environment. • No litigation due to transgression of pollution control acts. • No complaints from I & AP's. • Method statements.	Contractor	Daily

Phase of development	CONSTRUCTION
Impact / issue	Materials

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
vehicle. The drip tray must be able to contain the volume of oil in the vehicle. Any spills larger than 100ℓ should be reported to all local authorities. Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits must be made up of material/product that is in line with environmental best practice (sunsorb is a recommended product that is environmentally friendly). All spilled hazardous substances must be contained in impermeable containers for removal to a General & Hazardous Waste Landfill site, (this includes contaminated soils, and drenched spill kit material).				
Cement **It is suggested that ready-mix cement be used as far as possible to minimize the possible impact on the surrounding environment.** Cement must be mixed and transported in leak and splash proof containers.	• Minimise the possibility of cement residue entering into the surrounding environment. • Minimise pollution of soil, surface and ground water	• No evidence of contaminated soil on the construction site • No evidence of contaminated water resources	Contractor	Monitored daily

Phase of development	CONSTRUCTION
Impact / issue	Materials

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Should a cement spill occur, then the spilled material, as with all waste materials, must be removed completely and spoiled in a designated spoils site. Cement batching areas must be located in consultation with the RE, EO or ECO to ensure residues are contained and that the proposed location does not fall within sensitive areas such as river systems. The contractors **must provide and maintain a method statement** for "cement and concrete batching" which includes the storage, washing & disposal of cement, packaging, tools and plant. The mixing of concrete shall only be done at selected sites on mortar boards or similar structures to contain run-off into natural vegetation, soils, and streams. Mixing of cement directly on soil will not be tolerated and fines will be issued. Cleaning of cement mixing and handling equipment shall be done using proper cleaning trays. All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a Licensed Landfill site. All	resources	• Method statement		

Phase of development	CONSTRUCTION
Impact / issue	Materials

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
empty cement bags are to be picked up immediately to ensure that cement dust is not blown away. Cement dust is poisonous and will be detrimental to the environment and especially to the river. Any spillage that may occur must be investigated and immediate remedial action shall be taken. The visible remains of concrete, either solid, or from washings, shall be physically removed immediately and disposed of as waste to a Licensed Landfill site. Washing of the remains into the ground is unacceptable.				
DANGEROUS AND TOXIC MATERIALS **Provision of storage facilities** Materials such as fuel, oil, paint, herbicide and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas. Storage facilities should be bunded, roofed, secure, rain, wind and tamper proof. Storage areas shall display the required safety signs depicting “no smoking”, No Naked lights” and “Danger” containers shall be clearly marked	• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments • Minimise chances of transgression of the acts controlling pollution	• No visible signs of pollution • No litigation due to transgression of pollution control acts	Contractor	Monitor daily

Phase of development	CONSTRUCTION
Impact / issue	Materials

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
to indicate contents as well as safety requirements. Sufficient care must be taken when handling these materials to prevent pollution. Training on the handling of dangerous and toxic materials must be conducted for all staff prior to the commencement of construction. In the case of pollution of any surface or groundwater, the Regional Representative of the **Lower Orange Catchment Management Agency (LOCMA)** must be informed immediately. Empty containers shall be removed to a General & Hazardous Waste Landfill site. **Material Safety Data Sheets (MSDS)** must be prepared for all hazardous substances on site and supplied by the supplier where relevant. MSDS's must be updated as required.				
Bulk storage of fuels and oils The contractors must **provide and maintain a method statement** for "Diesel tanks and refuelling procedures". Bulk fuel storage tanks on the site shall be on an impervious surface that is bunded and able to contain at least 110% of the volume of the tanks.	• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments. • Minimise chances of transgression of the acts controlling	• No visible signs of pollution. • No litigation due to transgression of pollution control acts. • Method statement.	Contractor.	Once off, as required.

Phase of development	CONSTRUCTION
Impact / issue	Materials

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
A Flammable Liquid License must be obtained for diesel volumes greater than 200 litres. As no application was lodged for this activity, it should be noted that Environmental Authorisation is required for the storage of Diesel and/or Petrol with volumes greater than 30 000 litres. Bulk fuel storage tanks shall be located in a portion of the construction camp where they do not pose a high risk in terms of water. Bulk fuel storage tanks shall be placed so that they are out of the way of traffic, so that the risk of the tanks being ruptured or damaged by vehicles is minimised. Bulk fuel storage should be covered during the rainy season.	pollution.			
Use of dangerous and toxic materials The contractor shall keep the necessary materials and equipment on site to deal with spills/ fire of the materials present should they occur. The contractor shall set up a procedure for dealing with spills/ fire, which will include notifying the ECO and the relevant authorities prior to commencing with construction. These procedures must be developed in consultation and approval by the	• Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments • Minimise chances of transgression of the acts controlling pollution	• No pollution of the environment • No litigation due to transgression of pollution control acts	Contractor	As required

Phase of development	CONSTRUCTION
Impact / issue	Materials

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
appointed EO. All staff should receive some form of fire training. Fire buckets and hoses shall be in good working order and easily accessible on site. A record must be kept of all spills and the corrective action taken.				

Table 4: PROPOSED BORROW PIT MR 771/8.6/R/80, VAN WYKSVLEI, NORTHERN CAPE, CONSTRUCTION PHASE EMP (Plant)

Phase of development	**CONSTRUCTION**			
Impact / issue	**PLANT**			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
Eating areas and camp followers The contractors must **provide and maintain a method statement** for "Crew camps and construction lay down areas". The Contractor shall, in conjunction with the EO, designate the restricted eating area for eating during normal working hours. Two refuse bins with lids must be provided and cleaned on a daily basis. The bins are to be secure, wind, weather and scavenger proof. Designated areas for smoking must be provided. **No fires will be allowed on site.** No animals, domestic or otherwise are allowed on the premises. The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited. Camp followers/informal traders must not be allowed to congregate on pavements or outside the construction site. However, at the contractors discretion facilities can be made available within the designated eating area. Litter (even if originating outside the camp) and concrete bags etc. must be picked up and put into suitably closed bins.	• Control potential influx of vermin and flies • Neat work place and hygienic environment • Minimise negative social impacts to local businesses and residences.	• No visual sign of vermin and flies • No complaints from I & AP's	Contractor, EO	Once off, monitor daily

Phase of development	CONSTRUCTION			
Impact / issue	PLANT			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
Toilets and ablution facilities The contractor will be responsible for providing all sanitary arrangements for his and the sub-contractors team. A minimum of **one chemical toilet** shall be provided **per 15 persons**. Sanitary arrangements shall be to the satisfaction of the ECO and the local authority. The contractor shall keep the toilets in a clean, neat and hygienic condition. The **contractor shall supply toilet paper at all toilets at all times**. Toilet paper dispensers shall be provided in all toilets. Toilets provided by the contractor must be easily accessible and a maximum of 150m from the works area to ensure they are utilised. All toilets will be located within the contractor's camp. Should toilets be needed elsewhere, their location must first be approved by the RE, EO or ECO. The contractor (who must use reputable toilet-servicing company) shall be responsible for the cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) shall ensure that all toilets are cleaned and emptied before the builders' or other public holidays. Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times.	• Ensure proper sanitation is achieved which will encourage the workforce to utilise toilets provided and not the surrounding habitat • Minimise potential of diseases on site • Minimise potential to pollute soils, water resources and natural habitats	• Workforce use toilets provided • No complaints received from I & AP's as well as members of the workforce • No visible or measurable signs of pollution of the environment (soils, ground and surface water)	Contractor, RE or EO	As and when required

Phase of development	CONSTRUCTION			
Impact / issue	**PLANT**			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
Waste management **Please refer to the waste minimization plan as part of the EMP.** Any illegal dumping of waste will not be tolerated. Proof of legal dumping must be able to be produced on request. All refuse bins must have a lid secured so that animals cannot gain access. Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris and builders wastes generated on the site. Subcontractor(s) must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP. Proof of this undertaking must be issued to the ECO. All solid and chemical wastes that are generated must be removed and disposed of at a licensed waste disposal site. The contractor is to provide proof of such to the EO and ECO. Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site.	• Sustainable management of waste by recycling. • To keep the site neat and tidy. • Minimise litigation and complaints by I&AP's. • Reduce visual impact. • Control potential influx of vermin and flies thereby minimising the potential of diseases on site and the surrounding environment. • Minimise potential to pollute soils, water resources and natural habitats.	• Disposal of rubble and refuse in an appropriate manner with no rubble and refuse lying on site. • Site is neat and tidy. • No complaints from surrounding residents and businesses. • Sufficient containers available on site. • No visible or measurable signs of pollution of the environment (soils, ground and surface water). • Method statement.	Contractor, EO.	Daily.

Phase of development	**CONSTRUCTION**			
Impact / issue	**PLANT**			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
A skip, with a cover, must be used to contain refuse from campsite bins, rubble and other construction material.				

Phase of development	CONSTRUCTION			
Impact / issue	PLANT			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
Dust ***<u>The contractors must provide and maintain a method statement for "dust control". The method statement must provide information on the proposed source of water to be utilised and the details of the licenses acquired for such usage.</u>*** **Water abstraction for dust control from any river is strictly prohibited.** **Potable water cannot (as far as possible) be used as a means of dust suppression**, alternative measures must be sourced. The use of 'grey' water must be investigated as an alternative. The contractor will be responsible to source this water and obtain the required approvals. The construction camp shall be watered during dry and windy conditions to control dust fallout. All vehicles transporting material that can be blown off (e.g. soil, rubble etc.) must be covered with a tarpaulin, and speed limits of 20 km/h must be adhered to. Excessive dust conditions shall be reported to the ECO.	• Reduce dust fall out. • Reduce visual impact. • Minimise loss of valuable soil material.	• No visible signs of dust. • No complaints from Interested and Affected Parties. • No incidences reported to ECO. • No visible evidence of dust contamination on the surrounding environment. • Method statement. • Baseline targets not exceeded during regular monitoring of dust counts.	RE, Contractor, EO.	Monitored daily.
Workshop equipment, maintenance and storage The contractors **must provide and maintain a**	• Prevent pollution of the environment • Minimise chance of	• No pollution of the environment • No litigation due to	RE, Contractor, EO	Monitor daily

Phase of development	CONSTRUCTION			
Impact / issue	**PLANT**			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
method statement for "workshop maintenance and cleaning of plant". All maintenance and washing of vehicles and equipment shall be done off-site as far as possible. During servicing of vehicles or equipment, a suitable drip tray shall be used to prevent spills onto the soil. Leaking equipment shall be repaired immediately or be removed from site to facilitate repair. Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediated to the satisfaction of the EO or RE. Cleaning and remediation must be done with products that are in line with best environmental practice i.e. Sunsorb. The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site. The Contractor must ensure that senior and the other relevant members of the workforce are trained in dealing with spills by using emergency spill kits. All spills of hazardous substances must be reported to the ESO, EO, RE or ECO. The contractor must comply with the regulations of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) as well as specific specifications set forth by the health and safety agent.	transgression of the acts controlling pollution • Disposal of hazardous substances to a General & Hazardous Waste Landfill site.	transgression of pollution control acts • Method statement		

Phase of development	CONSTRUCTION			
Impact / issue	**PLANT**			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
Noise All construction vehicles must be in a good working order to reduce possible noise pollution. Work hours during the construction phase shall be strictly enforced unless permission is given (07H00 – 18H00). Permission shall not be granted without consultation with the local industries and businesses by the EO. No work to be done on Sundays. Noise reduction is essential and Contractors shall endeavour to limit unnecessary noise, especially loud talking, shouting or whistling, radios, sirens or hooters, motor revving, etc. The use of silent compressors is a specific requirement. All machinery to be muffled where possible. Noisy activities shall take place only during working hours. The EO must inform the residents of houses and businesses adjacent to the development in writing 24 hours prior to any planned activities that will be unusually noisy or any other activities that could reasonably have an impact on the adjacent sites. These activities could include, but are not limited to use of pneumatic jack-hammers and compressors etc. No noise louder than 70dB from the ambient	• Maintain noise levels below “disturbing” as defined in the National Noise Regulations. • Minimise the nuisance factor of the development.	• No complaints from surrounding landowners or I&APs.	Contractor, EO.	As and when required.

Phase of development	**CONSTRUCTION**			
Impact / issue	**PLANT**			
MITIGATION MEASURE	**MANAGEMENT OBJECTIVES**	**MEASURABLE TARGETS**	**RESPONSIBLE PARTY**	**FREQUENCY OF ACTION**
noise level. Machinery and equipment on site must be maintained so as to avoid any unnecessary noises.				

Table 5: PROPOSED BORROW PIT MR771/8.6/R/80, VAN WYKSVLEI, NORTHERN CAPE CONSTRUCTION PHASE EMP (Construction)

Phase of development	**CONSTRUCTION**
Impact / issue	**CONSTRUCTION**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Crew camps Accommodation for members of the workforce will not be permitted on site unless authorisation has been given in terms of the Environmental Authorisation issued for the site. If accommodation is to be provided for workers, details need to be provided as to the location and facilities to be provided for the workers. Dedicated wash areas must be situated away from any surface water sources and natural areas. The contractor's camp shall be monitored for dust fallout and dust suppression applied as required. This may include the laying of gravel, the use of grey water can be considered as an option if the required permits have been acquired. The contractor's camp, offices and storage facilities shall be located within the site boundaries. If this is not feasible an alternative should be designated in consultation with the ECO. The contractor shall provide labourers to clean up the contractor's camp and construction site on a daily basis. These areas shall then be inspected by the contractor or his/her ESO to ensure compliance with this requirement. The contractor shall be responsible for cleaning the contractor's camp and construction site of all structures, equipment, residual litter and building materials at the end of the construction period and, the topsoil restored in areas where landscaping is to take place.	• Minimise water pollution. • Minimise dust fallout. • Minimise unwarranted environmental damage outside the footprint. • Maintain a clean and healthy working environment. • Minimise visual impact to surrounding environment.	• No signs of water or soil pollution. • No complaints from surrounding landowners or I&APs. • No visible signs of litter. • Method statements.	Contractor, EO, ESO.	Monitor daily.

Fires No fires will be allowed on site. **The Contractor shall ensure that there is appropriate fire-fighting equipment available on site at all times.**	• Minimise risk of veldt fires. • Minimise destruction of natural fauna and flora. • Maintain safety on site.	• No veldt fires started by the contractor's workforce. • No claims from landowners for damages due to veldt fires. • Method statement.	Contractor, EO, ESO.	Monitor daily.
Erosion and sedimentation To reduce the loss of material by erosion, the contractor shall ensure that disturbance on site is kept to a minimum. The contractor shall be responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed. (Please refer to rehabilitation section as part of this EMP and Rehabilitation Plan.)	• Minimise erosion damage. • Minimise scarring of the soil surface and land features. • Minimise disturbance and loss of topsoil. • Re-growth of disturbed areas.	• No erosion scars. • No loss of topsoil. • No interference with the natural flow of water. • No visible erosion scars once construction is completed. • The footprint has not exceeded the agreed boundaries. • All damaged areas successfully rehabilitated.	Contractor, EO, ESO.	As and when required.

Fauna <u>All activities on site must comply with:</u> The regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962); and Marine Living Resources Act, 1998 (Act No. 18 of 1998). All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. Employees must be trained on how to deal with fauna species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake a specialist must be called in to safely relocate the animal if the EO or ECO is not able to. All possible sensitive faunal species present on the site must be rescued and relocated to another suitable location prior to the commencement of construction activities (Consult the ECO).	• Minimise disturbance to animals. • Minimise destruction of habitat.	• No complaints from Nature Conservation. • No litigation concerning applicable animal protection acts. • No measurable or visible signs of habitat destruction.	RE, Contractor, EO, ESO.	Monitor daily.

Flora **Indigenous vegetation within the site boundary is to be preserved and not damaged (if present).** Adjacent areas and areas where natural vegetation is present, need to be clearly cordoned off and seen as no go areas. This needs to be done in accordance with the ECO before any construction activities may commence. The disturbance footprint should be as narrow as possible.	• Minimise scarring of the soil surface and land features. • Minimise disturbance and loss of topsoil. • Minimise risk of veldt fires. • Minimise risk of fauna and flora destruction.	• No exotic plants used for landscaping. • No visible erosion scars once construction is completed. • The footprint has not exceeded the agreed boundaries. • All damaged areas successfully rehabilitated. • No veldt fires started by contractor's work force. • No claims from landowners for damages due to veldt fires. • Method statement.	Contractor, EO, ESO, Landscape Architect.	As and when required.

Topsoil It is not foreseen that the topsoil will be impacted upon due to the fact that the mining includes the sand pile on the property, and not subsurface material.	• Minimise the potential for the spread of the construction footprint. • Reduce loss of fauna and flora habitat. • Minimise the potential for loss of protected and or endangered fauna and flora species.	• No sign of movement through "no go" areas. • Containment of footprint.	RE, Contractor, ESO, EO.	Monitor daily.
Access route/haul roads Access to site from MR771 only using installed gateways.	• Minimise loss of topsoil and enhancement of erosion. • Minimise fauna and flora displacement by destruction of natural habitats.	• No erosion on access roads after completion of construction. • No loss of topsoil due to runoff water on access roads.	Contractor, RE or EO.	As required, monitor daily.
Crime, safety and security No site staff, other than security personnel and skeleton staff shall be housed on site unless otherwise stipulated in the Environmental Authorisation. Security personnel and skeleton staff shall be supplied with adequate protective clothing, ablution facilities, water and refuse collection facilities. A boundary fence will serve to prevent public access to the site, for public safety and security reasons. The access to the site must be controlled so as to restrict unauthorised personnel from entering the site. The workers on	• Reduce the risk of potential incidences. • Minimise the potential impact on the environment. • Reduce the risk of possibly fatal incidents occurring on site.	• No incidences reported.	RE, Contractor, ESO, EO.	Monitor daily.

site must retain some means of identification. The ESO and the contractor are responsible for ensuring that only authorised personnel are on site at all times. The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations. Site specific conditions and regulations as set forth by the health and safety agent should also be adhered to. The contractor shall ensure that all emergency procedures are in place prior to commencing work. Emergency procedures shall include (but not be limited to) fire, spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc. The contractor shall ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site. The nearest emergency service provider must be identified during all phases of the project as well as its capacity and the magnitude of accidents it will be able to handle. The contact details of this emergency centre, as well as the police and ambulance services must be available at prominent locations around the construction site and the construction crew camps.				

Fire **NO** open fires shall be allowed on site under any circumstances (the Forest Act, 1984 (Act No. 122 of 1984). The contractor shall have firefighting equipment available at crew camps and on all vehicles working on site.	• Minimise risk of veldt fires. • Minimise risk of fauna and flora destruction.	• No veldt fires started by contractor's work force. • No claims from landowners for damages due to veldt fires.	Contractor, ESO.	Monitor daily.
Visual impact Shade cloth must be utilised to conceal and minimise the visual impact of contractor camps, lay down and storage areas. The contractor must rehabilitate the construction camp and any other disturbed areas once construction activities have terminated. (Please refer to the rehabilitation procedures as part of this EMP). Once construction is complete, rehabilitation must be undertaken in order to restore the aesthetic & ecological value of the area. This specific borrow pit will be rehabilitated back to agricultural land. Rubble and litter must be removed every two weeks or more often as the need arises and be disposed of at a registered landfill site as designated by the Kareeberg Municipality, Solid Waste removal department.	• Minimise visual impact.	• No complaints from I & AP's.	Contractor, landscape contractor, ESO.	Monitor daily.

Hydrology Increased run-off during construction must be managed using berm and other suitable structures, including sand bags as required to ensure flow velocities are reduced; this must be done in consultation with the Resident engineer as well as the ECO. The Contractor shall take reasonable measures to control the erosive effects of storm water runoff. Run-off from hard surfaces needs to be channelled away from sensitive slopes and to be designed to reduce runoff water flow speeds. Storm water, wherever possible, should be allowed to soak into the land in the area on which the water fell. Sand bags or similar features must also be used to divert water to ensure that particles settle before being released onto adjacent properties.	• Minimise pollution of soil, surface and ground water resources in the immediate and surrounding environments. • Minimise impeding the natural flow of water. • Minimise the impact on natural water flow dynamics. • Minimise scarring of the soil surface and land features.	• No visible signs of pollution. • No signs of siltation of water courses. • No visible erosion scaring once construction is completed. • Minimum loss of topsoil.	RE, Contractor, EO.	As and when required, monitor daily.

Soil and Ground water Stock piles may not be ridden on by any machinery or walked on by staff. Backfill will require contouring to ensure that it blends in with the surrounding environment.	• Minimise scaring of the soil surface and land features. • Minimise disturbance and loss of soil. • Minimise construction footprint. • Minimise sedimentation of nearby drainage lines. • Containment of invasive plant growth.	• No visible erosion scars once construction is completed. • The footprint has not exceeded the agreed site in terms of EA etc. • Minimal invasive weed growth. • No signs of sedimentation and erosion. • Method statement.	Contractor.	Daily.

Phase of development	CONSTRUCTION
Impact / issue	TOLERANCES

MITIGATION MEASURE	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Fines Environmental management is concerned not only with the final results of the Contractor's operations, but also to the standard of the day-to-day operations required to complete the works. Penalties may be instituted for non-compliance. The penalty is over and above the cost of rectifying the problem and / or damage. Penalties will vary on a sliding scale from **R 1 000 to R 5 000** for non-serious issues as determined by the Engineer / RE / ECO. For each subsequent similar offence the fine shall be doubled in value to a maximum value of R **20 000.** The Engineer together with the ECO will decide how the penalties, if any, are to be spent on measures improving the environment. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications. The Engineer will inform the Contractor of the contravention and the amount of the fine, the amount will be deducted from the monies due in payment certificates issued under the Contract. Maximum fines for the following contraventions by either the Contractor and / or his subcontractors may be imposed by the Engineer / ECO, as follows: a) Any persons, vehicles, plant, or material related to the Contractors operation within the designated boundaries of a "no-go" area. **R 5 000** b) Persistent failure to demarcate "no-go" areas. **R 2 000** c) Damage to trees not specified to be removed. **R 3 000** d) Persistent and unrepaired oil leaks from machinery / not using a drip tray to collect waste oil and other lubricants / not using specified absorbent material to encapsulate hydrocarbon spillage / using inappropriate methods of refuelling. **R 3 000**		

Fines e) Litter on site associated with construction activities. **R 2 000** f) Deliberate lighting of illegal fires on site. **R 1 000** g) Burning of waste without a permit. **R 2 000** h) Any employee eating meals on site, outside of defined eating area. **R 500** i) Employees not making use of the site ablution facilities. **R 2 000** j) Failure to implement specified noise controls. **R 1 000** k) Failure to empty waste bins/skips/litter structures on a regular basis. **R 2 000** l) Inadequate dust control or failure to apply dust suppression. **R 2 000** m) Any water abstraction activities from a watercourse without approval. **R 5 000** n) Inadequate handling of bitumen. **R 3 000** o) Inadequate handling of concrete. **R 2 000** Any activity, that in the reasonable opinion of the Engineer, RE and ECO, constitutes a deliberate contravention of the requirements of the specifications relating to environmental matters. **R 4 000**.	Engineer	Monitor daily

Table 6: PROPOSED BORROW PIT MR 771/8.6/R/80, VAN WYKSVLEI, NORTHERN CAPE, OPERATIONAL PHASE EMP (General)

Phase of development	**OPERATIONAL**
Impact / issue	**General**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
Waste management Please refer to the waste Minimization Plan Herewith attached.	• Sustainable management of waste by recycling. • To keep the development neat and tidy. • Minimise litigation and complaints by I&AP's. • Reduce visual impact. • Control potential influx of vermin and flies thereby minimising the potential of diseases at the site and the surrounding environment.	• Disposal of refuse in an appropriate manner with no refuse polluting the development. • Development is neat and tidy. • No complaints from surrounding industries and businesses. • Sufficient containers available on site. • No visible or measurable signs of pollution of the environment (soils, ground and surface water).	ECO.	6 Monthly.
Waste Management Continue	• Minimise the potential loss of topsoil. • Minimise the potential of flooding of the development,	• No evidence of silt build-up at the discharge points. • No complaints from I & AP's.	ECO.	As and when required. Monitor seasonally.

Phase of development	**OPERATIONAL**
Impact / issue	**General**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
	or its neighbouring properties.			
Dust Surface dust should be minimized during the operational phase of the development in order to prevent the dust from being blown to adjacent properties. The area needs to be rehabilitated back to functioning agricultural land. Water abstraction from the watercourses is strictly prohibited.	• No dust blown from the development to adjacent properties.	• No complaints from I&AP's		
Rehabilitation process Rehabilitation Measures: Infrastructure, equipment, plant, fencing, temporary service, foreign material, rubble and waste to be removed from site. Floor of the borrow pit to be made good, levelled off and rendered free-draining. Intern access tracks to be obliterated by breaking the surface crust and scarifying the area to a depth of 250mm.				

Phase of development	**OPERATIONAL**
Impact / issue	**General**

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
After construction the site needs to be ripped, levelled and shaped in such a way that it blends in with the natural contour and drainage lines of the site and surrounding area. Grass seeds should be spread across the borrow pit area that was subject to mining.				

Table 7 PROPOSED BORROW PIT MR 771/8.6/R/80, VAN WYKSVLEI, NORTHERN CAPE, OPERATIONAL PHASE EMP (EA conditions)

Phase of development	OPERATIONAL	GNEC-Guillaume Nel	
Impact / issue	EA Conditions		.....

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
NO ADDITIONAL MITIGATION MEASURES HAVE BEEN IDENTIFIED.	•	•		
	•	•		

PROPOSED BORROW PIT MR 771/8.6/R/80, VAN WYKSVLEI, NORTHERN CAPE.

ENVIRONMENTAL MANAGEMENT PROGRAMME

(INCLUDING THE WASTE, WATER USE AND ELECTRICITY CONSUMPTION MINIMIZATION AND MANAGMENT PLAN)

Prepared for:

Kareeberg Municipality
Private Bag X226
Carnarvon
8925

Prepared by:
Guillaume Nel Environmental Consultants cc
P.O. Box 2632
Paarl
7620
Tel: 021 870 1874
Fax: 021 870 1873
Fax: 086 6933 802
Cell: 072 1571 321
E-Mail: guillaume@gnec.co.za

REFERENCES

DEA&DP, 2003. A Waste Minimization Guideline Document for Environmental Impact Assessments (2003) by Common Ground in association with deVilliers Brownlie Associates.

National Environmental Management Act 107 of 1998 (NEMA)

Stellendale Village DRAFT Green Building Guidelines by Steadfast Greening, 2008

SUB SECTION 1 - INTRODUCTION

1.1 INTRODUCTION

The client, Kareeberg Municipality, of the proposed borrow pit MR 771/8.6/R/80, Van Wyksvlei, will use this Planning, Construction and Operational Phase Environmental Management Programme (EMP) as a tool in managing the impacts of the proposed project, after environmental approval from the Department of Mineral Resources in terms of the **NEW** Environmental Impact Assessment Regulations (GN R. No. 983, GN R. No. 984 and GN R. No. 985 [4 December 2014], as Amended on 7 April 2017) under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), which replaced the 2010 regulations (GN R. No.543, R. No. 544 and R. No. 546 [June 2010]).

This document is based on the Waste Minimization Guideline Document on the DEA&DP website (by Common Ground in association with deVilliers Brownlie Associates) and the Stellendale Village DRAFT Green Building Guidelines by Steadfast Greening.
The regulation of activities that have a significant impact on the environment as well as the protection of the environment itself, have improved significantly in the last decade and a half with the promulgation of the Constitution, and general environmental legislation, such as the National Environmental Management Act (NEMA) and the National Water Act. One of the main impacts of human activities on the environment is that of waste disposal (Common Ground & deVilliers Brownlie Associates, 2003).

Waste may be in solid, liquid or gaseous form. It may be benign, toxic, or hazardous. The management of hazardous waste, with associated negative impacts on the environment, is generally covered by legislation. The longer term, cumulative impacts of relatively benign waste disposal is poorly addressed by our laws (DEA&DP Waste Minimization Guideline, 2003).

“Waste” in this document is primarily interpreted as solid waste. Waste minimization per se is not specifically legislated in South Africa at present. Similarly, there are no legal instruments that can be used to enforce reduction in wastage of electricity and water although the National Water Act No 36 of 1998 prohibits wastage of water without specifying what wastage means and how this section will be enforced. However, there are a number of laws and overarching policies that are aimed at sustainable development and sound environmental

management, and which are relevant to waste and wastage minimisation.

Wastage is defined in the Oxford Dictionary as…"expend or employ to no purpose or for inadequate result, use extravagantly or ineffectually, squander". Part of the obligation to protect the environment would be to limit wastage of resources. Thus limiting wastage of water would fall within this obligation. So too would be limiting the wastage of electricity that results in pollution at the site of electricity generation (Common Ground & deVilliers Brownlie Associates, 2003).

SUB SECTION 2 - WASTE REDUCTION

2.1 BACKGROUND TO WASTE REDUCTION

A key element of environmentally friendly buildings is to promote awareness and change behaviour around all aspects of waste management.

Waste minimisation can therefore be assessed as a component of waste management that aims to reduce the amount of waste, which has to be disposed of. In this regard waste minimisation is aimed at tackling the causes and sources of waste rather than just trying to address and mitigate the symptoms (e.g. through treatment). Waste management can be depicted as a hierarchy, as shown in Figure 3 below. In the hierarchy, source reduction options are considered as a priority, followed by re-use and recycling options. Treatment options are considered only when acceptable waste minimisation techniques have been investigated. As a "last resort" disposal should be considered.

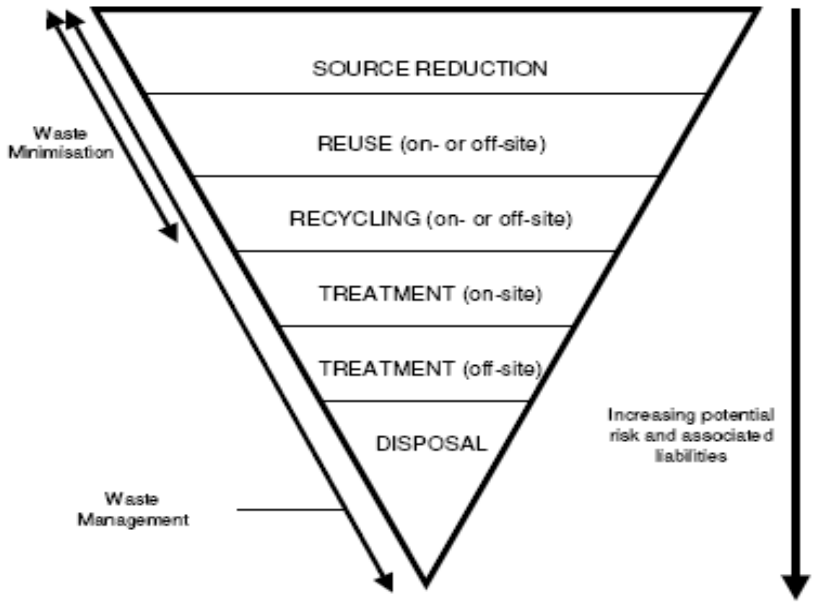


Figure 3 Waste Management Hierarchy (Common Ground & deVilliers Brownlie Associates, 2003).

Waste Management, therefore, involves interventions to minimize waste generation in the planning, operation, management and maintenance of the built environment, and includes waste prevention, waste reduction, waste re-use, and recycling.

A further aspect is minimizing the environmental and health impacts by reducing toxicity, and ensuring environmentally sound treatment and disposal of remaining waste. The ultimate is however to promote a zero waste concept where all the related materials can be used again over the longer term with life-cycle assessments, cradle to cradle.

Zero Waste is a goal, a process, a way of thinking that is different to the way we think about products and processes. Not only is Zero Waste about recycling and avoiding waste going to landfill, it also changes production and distribution systems to prevent waste from being manufactured in the first place. It is a way of changing how materials flow through society in such a way that, as in nature, they flow in a closed loop – resulting in efficient use of material and other resources, such as energy and water (Steadfast Greening, 2008).

Zero Waste therefore aims to:

- Prevent rather than manage waste.
- Turn resource that would normally be thrown away into economic value instead of loss.
- Support sustainable development.
- Follows natural processes where everything is recycled.
- Promote the efficient flow of energy and materials.

It is thus essential to ensure that waste avoidance is built into the process at a design phase, referring to the construction and maintenance of the building. This will be done through selection of the appropriate building materials and managing the construction process in a responsible manner.
Opportunities for the separation of waste at source must also be built into the design of the building to encourage people to recycle their waste.

2.2 BENEFITS OF WASTE REDUCTION

The benefits of waste reduction as described in the DEA&DP Waste Minimization Guideline (Common Ground & deVilliers Brownlie Associates, 2003) include the following benefits.

2.2.1 Financial benefits

- Reduced transportation costs for waste materials (less transportation because of less material wasted). This includes transportation to and from the site and disposal.
- Reduced disposal costs of waste materials (disposal costs are likely to rise significantly in the near future).
- Reduced purchase quantity and price of raw materials by waste minimisation.
- Reduced purchase price of new materials when considering reuse and recycling (depending on materials).
- Increased returns can be achieved by selling waste materials to be reused.

2.2.2 Environmental benefits

Some of the environmental benefits are:

- Reduced quantity of waste generated.
- Efficient use of waste generated.
- Minimised amounts of waste disposed of at landfills, which therefore extend the lifespan of landfills.
- Reduced environmental effects as a result of disposal, e.g. noise, pollution.
- Reduced transportation of waste to be disposed of (hence less noise, vehicle emission pollution, and energy used).

2.2.3 Social benefits

- Increased site safety.
- Increased work efficiency.
- Enhanced company image.
- Job creation through recycling initiatives.

2.3 GENERATED WASTE

2.3.1 Examples of waste generated during construction:

- Waste wood from cutting structural elements, broken structural elements and damaged elements from incorrect storage
- Damaged or off-cut steel components
- Off-cut electrical wiring and cabling
- Broken or off-cut tiles
- Packaging
- Off-cut and broken bricks
- Surplus material from cut and fill activities
- Spoil from cut and fill activities
- Off-cut, or broken conduit and plumbing
- Off-cut or damaged insulation elements
- Surplus paint and paint containers
- Broken or redundant plant and equipment
- Surplus concrete, cement and grouting
- General waste

SUB SECTION 3 - WASTE MINIMIZATION PLAN

3.1 WASTE MINIMIZATION DURING CONSTRUCTION

Issue	Minimization Plan
General Considerations	
Material Selection	The developer will, for as far as it is economically feasible select: • materials for least waste generation during preparation and use during construction, • materials used in the construction which are durable in order to minimise maintenance or replacement, • standard materials to increase re-use/ recycling potential, • materials which are sourced locally.
Pre-Fabrication	The developer will, for as far as it is economically feasible make use of pre-fabricated components in order to minimise waste on site and permit re-use by the manufacturers of any waste generated during construction of the units.
Hazardous Substances	The developer will, for as far as it is economically feasible make use of non hazardous substances to replace hazardous substances such as replacing asbestos with fibre glass etc.

Ordering	The developer will strive to order materials “just-in-time” to avoid deterioration/ breakage during storage The developer will strive to (as far as reasonably possible) order materials only from suppliers which will take back any unused/ off-spec or broken materials favoured. The developer will strive to (as far as reasonably and economically possible) order materials in bulk to reduce packaging but without over-ordering resulting in waste generation. Suppliers which take back the packaging will be favoured by the developer.
Load and unloading of materials	The construction site staff will be trained to load and unload materials correctly to avoid breakage and wastage.
Storing of materials	Care will be taken to ensure that materials are stored appropriately according to supplier specifications to reduce the risk of damage or deterioration.
The use of temporary structures	The developer will attempt to keep temporary structures on site to a minimum. Where unavoidable the temporary structures used on this site, will be re-used on other sites.

General	The **contractors must provide and maintain a method statement** for "solid waste management". The method statement must provide information on the proposed licensed facility to be utilised and details of proposed record keeping for auditing purposes. For the disposal of clean building rubble, a General & Hazardous Waste Landfill sites can be utilized. • Waste shall be separated into recyclable and non-recyclable waste, and shall be separated as follows: Hazardous waste: including (but not limited to) old oil, paint,etc, • General waste: including (but not limited to) construction rubble, • Reusable construction material. Recyclable waste shall preferably be deposited in separate bins. The contractor is advised that "Collect-a-Can" collect tins, including paint tins, chemical tins, etc. and "Consol" collect glass for recycling. Any illegal dumping of waste will not be tolerated. Proof of legal dumping must be able to be produced on request. Bins must be clearly marked for ease of management. All refuse bins must have a lid secured so that animals cannot gain access. Under no circumstances may any waste be burnt. All waste must be managed in accordance with the Minimum Requirements for waste disposal by landfill 2nd ed 1998. The minimum requirements for easy access by waste disposal service trucks will be met in order for vehicles to effectively access the waste. All waste must be disposed of at a registered site. It is the management bodies' responsibility to ensure that the contracted party responsible for waste disposal disposes of the waste at the correct facility. This facility refers to a General & Hazardous Waste Landfill site as referred to by the Kareeberg Municipality Solid Waste management Department. These landfill sites are permitted by Department of Environmental Affairs and Development Planning with operating numbers in place.

	The use of building materials which result in least amount of waste generated (e.g. pre-fabrication as opposed to on-site construction/ fabrication) will be favoured by the developer as far as economically feasible. Materials will be re-used on site wherever possible. Off-cuts and equipment will be re-used on other jobs wherever possible.

SUB SECTION 4 – WATER USE AND MANAGEMENT PLAN

4.1- WATER USE MINIMIZATION AND MANAGEMENT DURING CONSTRUCTION AND OPERATION

CONSTRUCTION PHASE	
Issue	Management Plan
General Considerations	
ABLUTIONS	The developer will reuse as much of the water from wash basins on site as possible.
CONCRETE AND CEMENT PREPARATION	The developer/contractor will order concrete and cement from supplier for as far as possible. The mixing area should not contain any liquids, to prevent contamination of soil and storm water

GENERAL CLEANSING OPERATIONS	All hoses will be fitted with trigger gun spray nozzles to limit wastage. Dry sweeping will be used (for as far as possible) in preference to washing of areas and equipment. **Wherever possible** biodegradable and non-toxic detergents, soaps and degreasers will be used. Regular Maintenance of equipment will be conducted in order to prevent wastage.

ANNEXURE 1 DECLARATION OF UNDERSTANDING BY THE DEVELOPER

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

ANNEXURE 2 DECLARATION OF UNDERSTANDING BY THE ENGINEER

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

ANNEXURE 3 DECLARATION OF UNDERSTANDING BY THE CONTRACTOR

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

ANNEXURE 4 INCIDENT AND ENVIRONMENTAL LOG

ENVIRONMENTAL INCIDENT LOG				
Date	**Env. Condition**	**Comments** *(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)*	**Corrective Action Taken** (*Give details and attach documentation as far as possible)*	*Signature*