BASIC ASSESSMENT REPORT FOR THE ROCKY DRIFT BULK WASTEWATER SYSTEM UPGRADE AND EXPANSION OF THE WASTEWATER TREATMENT WORKS AND MSHOLOZI SEWER OUTFALL

Environmental Management Plan

Prepared for: Nathoo Mbenyane Engineers (Pty) Ltd

SLR Project No. 720.14048.00006
May 2021
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SLR

DOCUMENT INFORMATION

Title	Basic Assessment Report for the Rocky Drift Bulk Wastewater System Upgrade and Expansion of the Wastewater Treatment Works and Msholozi Sewer Outfall
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SLR Project No.	720.14048.00006
Keywords	Environmental Management Plan
Report Date	May 2021
Report Status	For Review and Decision Making

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BASIS OF REPORT

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
CARA	Conservation of Agricultural Resources Act (No. 43 of 1983)
COM	City of Mbombela Local Municipality
DEO	Designated Environmental Officer
DMRE	Department of Mineral Resources and Energy
DHSWS	Department of Human Settlements, Water and Sanitation
ECO	Environmental Control Officer
EMP	Environmental Management Plan
SAHRA	South African Heritage Resources Agency
SAPS	South African Police Services

1 INTRODUCTION

1.1 SCOPE

The following Environmental Management Plan (EMP) has been prepared by SLR Consulting (South Africa) (Pty) at the request of Nathoo Mbenyane Engineers (Pty) Ltd (NME) in respect of the proposed upgrade and expansion of the Rocky Drift wastewater treatment works (WWTW) and Msholozi bulk sewer pipeline. The purpose of the EMP is to provide environmental controls throughout the construction life cycle. The conditions of the EMP must be contractually binding to the contract until final sign-off by the client/their representative has been provided.

The EMP is considered a supporting document and is to be read in conjunction with the construction contract document and any other authority approval. In the event that any conflict occurs between the terms of the EMP and the project specifications or authority approval, the terms herein shall be subordinate

1.2 BACKGROUND INFORMATION AND PROJECT OVERVIEW

The Rocky Drift WWTW receives effluent from the town Rocky Drift, consisting of an industrial area, the formalised township of Phumlani and the informal settlement of Msholozi. There are currently no water services available within the Msholozi informal settlement although town planning approval has been obtained for the establishment and formalisation of the township. This process will include the provision of formalised water and sanitation services for Msholozi. The town of Phumlani is provided with water supply via metered house connections and the existing industries within Rocky Drift and the Phumlani township are already served by a waterborne sewerage system.

There are numerous sanitation projects currently being implemented within the COM. However, no other current projects are known to overlap with the scope of this project. The project is also in accordance with the COM's latest Water and Sanitation Masterplan (WSMP), compiled by GLS Consulting in 2016.

The existing 160 mm Ø bulk sewer pipeline from Phumlani to the existing Rocky's Drift WWTW is the only current residential sewer outfall supplying the works. This pipeline will however be too small to cater for the increased sewage flows once the Msholozi waterborne sewerage system commences operations. The CoM therefore propose the upgrade and expansion of the Rocky Drift WWTW and installation of a Msholozi sewer outfall to increase the current operational capacity of the WWTW and to provide Msholozi with access to formalised water and sanitation services. The proposed the upgrade and expansion of the Rocky Drift WWTW and installation of a Msholozi sewer outfall involves the following:

- Upgrading of Bulk Sewer Pipeline from Msholozi to the Rocky's Drift WWTW: A new 500 mm Ø bulk sewer pipeline will be installed to connect Msholozi to the Rocky's Drift WWTW. The existing 160 mm Ø pipeline from Phumlani will be retained up to the tie in point with the new pipeline from Msholozi.

- Upgrade of the Rocky Drift WWTW: Upgrade and expansion of the existing Rocky Drift WWTW to accommodate the increase in the treatment capacity as a result of the Msholozi sewer outfall connection. The Rocky Drift WWTW has capacity to treat between 1.5 and 2 Ml/day of effluent. The upgrade of the WWTW will involve construction of a new WWTW alongside the existing facility, allowing for the uninterrupted, continuous use of the existing WWTW while increasing treatment capacity. The upgrade of the WWTW will be undertaken at a later stage.

The proposed pipeline is anticipated to cross a watercourse. The area of the watercourse that the pipeline will cross is listed in Table 1-1 below.

TABLE 1-1 WATERCOURSE CROSSINGS

Latitude	Longitude
25°21'47.38"S	30°58'22.32"E

1.2.1 PROJECT ACTIVITIES

The proposed project activities involves the following:

- Clearance of vegetation to accommodate the bulk sewer pipeline and the footprint of the WWTW infrastructure.
- Excavation, laying, jointing, bedding and backfilling of proposed 1 730 m long 500 mm Ø uPVC UG Class 34 bulk sewer pipeline.
- Construction of pipeline ancillary items such as manholes.
- Connection of existing Phumlani bulk sewer pipeline to the new bulk pipeline.
- Tie-in of bulk sewer pipeline to the new inlet works of the Rocky's Drift WWTW.
- Construction of WWTW including the construction and installation of:
    - A new inlet works.
    - Activated sludge reactor (x1 anaerobic chamber and x2 aerobic chambers).
    - Clarifiers (x2)
    - Sludge thickeners (x2).
    - Six new sludge drying beds
    - Chlorine dosing and contact chambers (x2).
    - Emergency storage tank (x1)
    - Ancillary works such as:
        - Construction of a new office / control room.
        - Construction of new internal roads to enable access to the new sections of the works including attending to stormwater management issues on the site.
        - Erection of concrete palisade fencing around the entire site of the works.

1.3 DEFINITIONS

Alien Vegetation: undesirable plant growth which includes, but is not limited to all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA), 1983 regulations. Other vegetation deemed to be alien are those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable.

Construction Activity: any action taken by the contractor, his sub-contractors, suppliers or personnel during the construction process as defined in the contract documents.

Environment: the surroundings within which the contract exists and comprises land, water, atmosphere, micro-organisms, plant and animal life (including humans) in any part or combination thereof as well as any physical, chemical, aesthetic or cultural inter-relationship among and between them.

Environmental Aspect: any component of a contractor's construction activity that is likely to interact with the environment.

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

Site: the site is defined in the conditions of contract and in the scope of works. It is bound by the limits of construction as shown in the drawings or the title of the project and extends to also include the following:

- Areas outside the construction zones where accommodation of traffic is placed;
- All borrow pits defined in the applications approved by the relevant Department of Mineral Resources and Energy (DMRE);

- All haul roads constructed by the contractor for purposes of access;
- Any non-adjacent sites specified in the contract documentation;
- The contractor's and his subcontractors' camp sites;

And for the purposes of this EMP includes areas outside of, but adjacent to, the pipeline route that may be affected by construction activities.

2 GENERAL PROJECT INFORMATION

2.1 APPLICANT DETAILS

The applicant for the proposed project is the COM LM. Details are provided in Table 2-1 below.

TABLE 2-1: APPLICANT DETAILS

Name:	City of Mbombela Local Municipality
Address:	PO Box 45 Nelspruit
Responsible person:	Theo Botha
Tel:	013 759 9111

2.2 PROJECT LOCALITY

The project is located within the CoM Local Municipality, Mpumalanga Province. The proposed pipeline will border and/or cross approximately 4 properties or farm portions as per Table 2-3 below. The CoM is located in the south-western portion of the Ehlanzeni District Municipality (EDM) and in the north-eastern part of Mpumalanga Province, abutting Swaziland and approximately 300 km west of Pretoria. The municipality is strategically placed between Gauteng, Swaziland and Mozambique and is linked by various national roads and railway lines. The Rocky Drift WWTW is located on the farm Dingwell 276 (See Table 2-2 for project locality details).

The COM has an area of 5 394 km² in extent, which equates to 19.3 % of the EDM area. The COM is bounded by Nkomazi Local Municipality to the east, Bushbuckridge Local Municipality to the north, Thaba Chweu Local Municipality and Nkangala District Municipality to the west and Gert Sibande District Municipality and Swaziland to the south.

The project area itself falls on the outskirts of the town of White River which is located approximately 20 km north of Nelspruit (see Figure 2-1 for a locality plan of the project area). The project area is made up of Rocky Drift, consisting of an industrial area, the formalised township of Phumlani and the informal settlement of Msholozi. The project area is accessed from the R40 national road between Nelspruit and White River. Land within the project footprint is zoned for agriculture.

As mentioned previously, this project deals specifically with the upgrading and expansion of the Rocky Drift WWTW pipeline in order to accommodate the increased sewage flows resulting from the new waterborne sewerage system to be provided within Msholozi.

The Rocky Drift industrial area is situated to the south-east of the Rocky Drift WWTW whilst Phumlani and Msholozi are located to the north-east of the works. The topography of the area slopes predominantly in a westerly direction towards the Rocky Drift WWTW. Elevations across the project area range from approximately 977 m at a localised high point on the south-eastern boundary of Msholozi to approximately 780 m at the works itself.

TABLE 2-2 PROJECT LOCALITY

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	DINGWELL	276	0	25°21'46.71S	30°58'6.92E	Farm
2	DINGWELL	276	8	25°22'2.63S	30°58'13.74E	Farm Portion
3	DINGWELL	276	0	25°22'35.93S	30°57'50.51E	Farm Portion
4	DINGWELL	276	6	25°21'49.91S	30°57'36.41E	Farm Portion

Affected Properties

Details of the land owner and adjacent landowners are included in Table 2-3 and Table 2-4 respectively.

TABLE 2-3: LAND OWNERSHIP

Portion	Landowner	Title Deed Number
Dingwell 276: Portion 8	White River Municipality (Now City of Mbombela Municipality)	T1108/993

Adjacent landowner details are provided below. Note the entire site is within the farm Dingwell 276 RE.

TABLE 2-4: ADJACENT LANDOWNERS

Portion	Landowner	Title Deed Number
Dingwell 276: RE	Matsafeni Trust	T168907/2003

FIGURE 2-1 LOCAL SETTING OF THE PROJECT

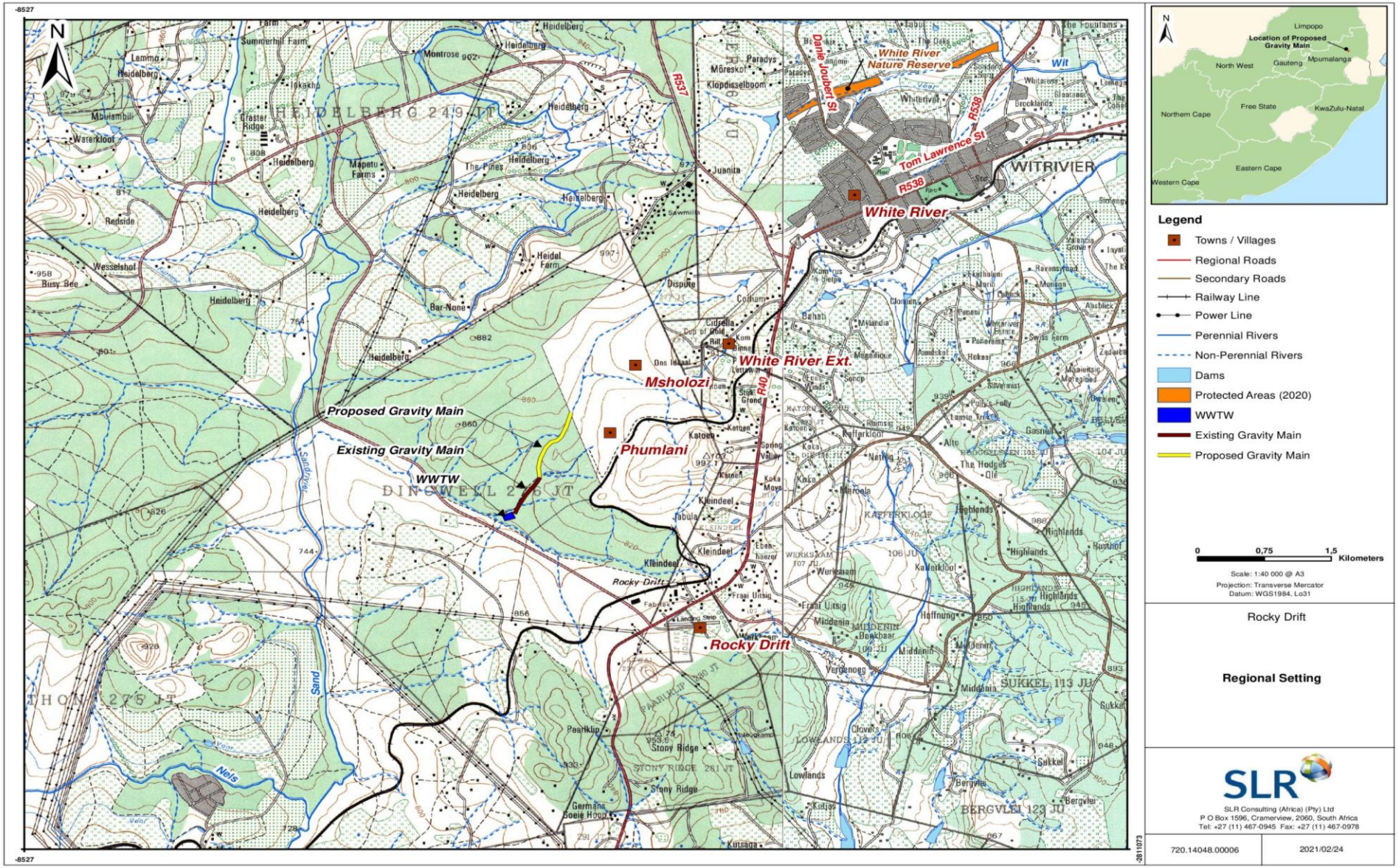

FIGURE 2-2: REGIONAL SETTING OF THE PROJECT

3 LEGAL REQUIREMENTS

3.1 GENERAL

Construction shall be according to the best industry practices, as identified in the project documents. This EMP, which forms an integral part of the contract documents, informs the contractor as to his duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project. The contractor should note that obligations imposed by the EMP are legally binding in terms of this contract.

3.2 STATUTORY AND OTHER APPLICABLE LEGISLATION

The contractor is deemed to have made himself conversant with all legislation pertaining to the environment, including provincial and local government ordinances, which may be applicable to the contract. Major environmental legislation, as amended from time to time, includes but is not limited to the following:

a. The Constitution (No. 6 of 1996)

The Constitution states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected through reasonable legislative and other measures to prevent pollution and ecological degradation; promote conservation and ensure ecologically sustainable development and use of natural resources.

b. Conservation of Agricultural Resources Act (No. 43 of 1983)(CARA)

This act provides for control over the utilisation of the natural agricultural resources of South Africa in order to promote the conservation of soil, water sources and vegetation, as well as combating weeds and invader plants.

c. Mineral and Petroleum Resources Development Act (No. 28 of 2002)

This act makes provision for equitable access to, and sustainable development of, minerals and petroleum resources.

d. National Environmental Management Act (NEMA), (No. 107 of 1998)

This act supports the Bill of Rights within the Constitution and highlights principles of sustainable development including preservation of ecosystems and biological diversity and avoidance, minimisation and remediation of pollution and environmental degradation. It also sets the stage for the control of listed activities and the procedural requirements for authorisation thereof through the Environmental Impact Assessment Regulations, 2014.

Environmental authorisation must be obtained prior to the commencement of any activities listed in the EIA Regulation Listing Notices, 2014

e. National Environmental Management: Air Quality Act (No. 39 of 2004)

This act provides reasonable measures for the prevention of pollution and ecological degradation from activities with emissions to atmosphere; and provides for specific air quality measures; for national norms and standards regulating air quality monitoring, management and control by all spheres of government.

f. National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA)

This act makes provisions to accomplish the objectives of the United Nations' Convention on Biological Diversity. COM may be required to apply for permits to conduct certain listed activities which, together with the listed threatened or protected species, may be identified by the Minister.

Section 73 (3) of this act empowers a competent authority to direct a person to take steps to remedy any harm to biodiversity resulting from the actions of that person or as a result of occurrence of listed invasive species occurring on land on which that person is the owner.

g. National Environmental Management: Protected Areas Act (No. 57 of 2003)

This act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity, natural landscapes and seascapes.

h. National Environmental Management: Waste Act (No. 59 of 2008)

This act aims to regulate waste management practices through provision of national norms and standards, specific waste measures, licensing and control of waste activities, remediation of contaminated land as well as providing for compliance and law enforcement. It sets the stage for the control of listed waste management activities and the procedural requirements for authorisation thereof through the Environmental Impact Assessment Regulations, 2014.

i. **National Forests Act (No. 84 of 1998)**

This act makes provision for promoting the sustainable management and development of forests, and for the protection of certain forests and trees for environmental, economic, educational, recreational, cultural, health and spiritual purposes.

j. National Heritage Resources Act No. 25 of 1999)

This act provides for an integrated and interactive system for identification, assessment and management of South Africa's heritage resources, and empowers civil society to nurture and conserve their heritage resources. It provides for the control of specific activities that could impact heritage resources and for the procedural requirements for authorisation thereof from the heritage authority.

Importantly, the Provincial Heritage Authority, Mpumalanga Heritage Resources Agency, must be notified immediately if any items of cultural heritage importance are noted during construction activities.

k. National Water Act (Act No. 36 of 1998)

This act makes provision for the protection of surface water and groundwater and their sustainable management for the prevention and remediation of the effects of pollution, as well as for the management of emergency situations.

Importantly, authorisation is required for any activity which may compromise the water resource quality objectives

3.3 ADMINISTRATION OF ENVIRONMENTAL OBLIGATIONS

Copies of this EMP shall be kept at the site office and must be distributed to all senior contract personnel who shall familiarise themselves with its contents.

Implementation of this EMP requires the involvement of several stakeholders, each fulfilling a different but vital role as outlined herein, to ensure sound environmental management during the construction phase of a project.

a. City of Mbombela Local Municipality (CoM)

CoM, and anyone acting on their behalf, is accountable for the potential environmental impacts of any activities that are undertaken on this contract and is ultimately responsible for managing these impacts.

As the developer, the CoM is responsible for obtaining any approval/ authorisation required for the contracts implementation

b. The Engineer

The engineer appointed by, and acting for, COM as its on-site implementing agent, carries the responsibility to ensure that the contractor undertakes the construction activities in such a way that COM's environmental responsibilities are not compromised.

The engineer will, within seven days of receiving a contractor's request for approval of a nominated Designated Environmental Officer (DEO), approve, reject or call for more information on the nomination.

The engineer will be responsible for issuing instructions to the DEO where environmental considerations call for action to be taken. If in the opinion of the engineer the DEO is not fulfilling his/her duties in terms of this EMP, the engineer may, after discussion and agreement with COM, instruct replacement of the DEO in writing and with stated reasons.

c. The Contractor

The contractor is responsible for project delivery in accordance with the contract specifications, amongst which this EMP shall be included.

The contractor shall receive and implement any instruction issued by the engineer relating to compliance with the EMP, including the removal of personnel or equipment.

Compliance with the provisions contained herein or any condition imposed by the environmental approvals shall become the responsibility of the contractor through an approved DEO. The contractor shall nominate a person from among his site personnel to fulfil this function and submit to the engineer for his approval the curriculum vitae of the proposed DEO. This request for approval shall be given, in writing, at least fourteen days before the commencement of any construction activity clearly setting out reasons for the nomination, and with sufficient detail to enable the engineer to make a decision.

d. The Designated Environmental Officer

Once a nominated representative of the contractor has been approved he/she shall become the DEO and shall be the responsible person for ensuring that the provisions of this EMP are complied with during the life of the contract. The role of the DEO cannot be underestimated and once approved he/she shall be on the site at all times. The DEO shall submit regular written reports to the engineer, but not less frequently than once a month.

As a minimum the DEO shall have an accredited diploma qualification in environmental or natural sciences or equivalent and a minimum of 2 years' experience in a similar role in construction or other environmental regulatory field.

The DEO may undertake other construction duties unless the Appendix to Tender prescribes this position as 'dedicated' as opposed to the standard position being 'designated'. However, the DEO's environmental duties shall hold primacy over other contractual duties and the engineer has the authority to instruct the contractor to reduce the DEO's other duties or to replace the DEO if, in the engineer's opinion, he/she is not fulfilling his/her duties in terms of the requirements of this EMP. Such instruction will be in writing clearly setting out the reasons why a replacement is required.

In addition to the compliance duties relating to EMP, the DEO shall provide full cooperation whenever the contractor is subjected to an environmental audit.

i. Environmental Control Officer

The Environmental Control Officer (ECO) is an independent environmental specialist appointed by the engineer to objectively and regularly monitor the contractor's compliance with the EMP.

3.4 TRAINING

a. Qualifications

The DEO shall have the minimum qualifications as prescribed above, and must be conversant with all legislation pertaining to the environment applicable to the contract. He/she must be appropriately trained in environmental management and possess the skills necessary to impart environmental management skills to all personnel involved in the contract.

The contractor shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the employees.

b. Content

Inductions to contractor' staff must include environmental training which, as a minimum, includes the course content below and no induction or course should be given until the engineer has been afforded the opportunity to appraise it and provide comment.

i. The importance of conformance with all environmental policies and the consequences of departure from standard operating procedures;
ii. Environmental impacts, actual or potential, caused by work activities, prevention measures to avoid them and mitigation measures when they occur;
iii. Work force roles and responsibilities in achieving conformance with the environmental policy and procedures, including emergency preparedness and response requirements; and
iv. The environmental benefits of improved personnel performance.

c. Induction

In the case of permanent staff the contractor shall provide evidence that such induction courses have been presented. In the case of new staff (including contract labour) the contractor shall inform the engineer when and how he intends concluding his environmental training obligations.

4 ACTIVITIES/ASPECTS CAUSING IMPACTS

Typical environmental aspects and impacts associated with pipeline construction are listed in Table 4-1. Actual impacts will differ from project to project and, therefore, so may the mitigation measures employed. The commonest aspects and impacts are addressed separately and typical avoidance and/or mitigation measures described. The list and descriptions are not exhaustive and should be used for guideline purposes only.

TABLE 4-1: ASPECTS AND IMPACTS ASSOCIATED WITH PIPELINE CONSTRUCTION

Aspect	Impact
Waste generation/storage	Water pollution; nuisance; visual impact
Water use and stormwater discharge	Change in flow regime and/or reduction in downstream availability; soil erosion; water pollution
Vehicle use and maintenance	Air pollution; noise; soil and water pollution
Chemical/fuel storage	Water/air/soil pollution; health impacts; accidents e.g. spills, fire
Site clearing; earthworks; layer-works; seal works	Change in landform; impact on heritage resources; noise; soil erosion; air pollution (dust)
River bridges; installing drainage structures	Water pollution; impact on river flows; noise
Land acquisition	Loss of land &/or livelihood; change in land use
Acquisition of building material from borrow pits	Change in landform and use; dust; water pollution

4.1 GENERAL APPROACH

Before the contractor begins each construction activity he/she shall give to the engineer a written statement setting out the following:

i. The type of construction activity about to be started.
ii. Locality where the activity will take place.
iii. Identification of the environmental aspects and impacts that might result from the activity.
iv. The methodology of impact prevention for each activity or aspect.
v. The methodology of impact containment for each activity or aspect.
vi. Identification of the emergency/disaster potential for each activity (if any) and the reaction procedures necessary to mitigate impact severity.
vii. Treatment and continued maintenance of impacted environment.

The contractor shall programme his work in such a way that the cause and effect of each construction activity is identified and the activity planned to prevent any impact from happening. Where impacts are unavoidable, the contractor shall demonstrate that he is capable of carrying out repair and reinstatement of the damaged environment. These requirements shall be concurrent with the time constraints to produce method statements for each construction activity in compliance with the provisions of these project specifications.

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

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

4.2 SPILLAGES

Streams, rivers and dams shall be protected from direct or indirect spillage of pollutants such as refuse, garbage, cement, concrete, sewage, chemicals, fuels, oils, aggregate, tailings, wash water, organic materials and

bituminous products. In the event of a spillage, the contractor shall be liable to arrange for professional service providers to recover the spilt material and remediate the affected area.

Responsibility for spill containment and treatment (whether hazardous or not) lies with the contractor. The individual causing a spill, or who discovers a spill, must report the incident to his/her DEO and to the engineer. The DEO will assess the situation in consultation with the engineer and act as required. In all cases, the immediate response shall be to contain the spill. The exact treatment of polluted soil / water shall be determined by the contractor in consultation with the DEO and the engineer. Areas cleared of hazardous waste shall be re-vegetated according to the engineer's instructions.

Should water downstream of the spill be polluted, and fauna and flora show signs of deterioration or death, specialist hydrological or ecological advice must be sought for appropriate treatment and remedial procedures to be followed. The requirement for such input shall be agreed with the engineer. The costs of containment and rehabilitation shall be for the contractor's account, including the costs of specialist input as well as the sampling and testing of the water quality upstream and downstream of the spill. Water quality sampling and testing, and further treatment shall continue until upstream and downstream results correspond with each other

4.3 WATER USE AND CONTROL

The contractor's use of water shall take into consideration that it is a scarce commodity, and shall be optimised. Water shall only be obtained from sources where it is lawful to draw water and authorisation shall be obtained from the Department of Human Settlements, Water and Sanitation (DHSWS) or other authority where this is required. Any work within the boundary of a watercourse shall only be undertaken with the required authorisation.

The contractor shall also ensure that any stream deviations or diversions are undertaken in such a manner that the impact on the environment is minimised. Method statements shall be submitted to the engineer for comment, detailing how the work will be undertaken, what risks are foreseen and what measures will be employed to minimise such risks. Notwithstanding any comments by the engineer, such work shall be undertaken in accordance with the conditions of the authorisation.

The quality, quantity and flow direction of any surface water runoff shall be established prior to disturbing any area for construction purposes. Cognisance shall be taken of these aspects and incorporated into the planning of all construction activities. Before a site is developed or expanded, it shall be established how this development or expansion will affect the drainage patterns. Recognised water users / receivers shall not be adversely affected by the expansion or re-development. No water source shall be polluted in any way due to proposed changes.

Streams, rivers, pans, wetlands, dams, and their catchments shall be protected from erosion and flooding by dredging, daylighting, removal of debris and vegetation, etc. These shall also be protected from direct or indirect spillage of pollutants such as refuse, garbage, cement, concrete, sewage, chemicals, fuels, oils, aggregate, tailings, wash water, organic materials and bituminous products.

The contractor shall submit to the engineer his proposals for prevention, containment and rehabilitation measures against environmental damage of the identified water and drainage systems that occur on the site. Consideration shall be given to the placement of sedimentation ponds or barriers where the soils are of a dispersive nature or where toxic fluids are used in the construction process. The sedimentation ponds must be large enough to contain runoff so that they function properly under heavy rain conditions up to 1:5 year severity.

The contractor shall submit to the engineer the results of the baseline water quality test taken above and below the site of the proposed activity; and thereafter monthly testing results or at the frequency as may be specified by the Water Use Licence / General Authorisation where applicable. No site hand-over can be authorised until the water quality is shown to be at pre-construction levels or better.

4.4 VEGETATION MANAGEMENT

The contractor shall be responsible for the management of vegetation by protection of indigenous vegetation, especially identified protected species, and the prevention of alien vegetation germinating in areas disturbed by construction activities. This includes, for example, service roads, stockpile areas, stop/go facilities, windrows and wherever material generated for or from construction has been stored temporarily. . No areas of protected vegetation shall be disturbed without the required authorisation. No areas disturbed by construction activities may be left without vegetation post construction and alien species shall not be allowed to establish on any area disturbed by construction activities.

This responsibility shall continue for the duration of the defects notification period. The project specification may instruct the removal of CARA and/or NEMBA-listed category 1 and 2 alien species and planting of specified indigenous species.

4.5 DUST CONTROL

Dust caused by construction activities shall be controlled by means such as water spray vehicles. The controls shall be applied at sufficient frequency so as not to cause nuisance to adjacent habitation or affect farming activities or natural vegetation. Vegetation cover should also be kept for as long as possible to reduce the area of exposed surfaces. Dust emissions from batching and screening plants shall be subject to the relevant legislation and shall be the subject of inspection by the relevant authorities.

4.6 NOISE CONTROL

The contractor shall endeavour to keep noise generating activities to a minimum. Noises that could cause a major disturbance, for instance blasting and crushing activities, should only be carried out during the hours prescribed by the conditions of contract (i.e. normal working hours). Should such noise generating activities have to occur at any time outside normal hours the people in the vicinity of the noise-generating activity shall be warned about the noise well in advance and the activities kept to a minimum. Relevant legislation shall also be taken into consideration, and any practical mitigation measures adopted. No noise generating activity outside of normal hours, regardless of its proximity to residences, can take place without application to the engineer for approval. The application shall be accompanied by the noise containment measures proposed.

4.7 ENERGY CONSUMPTION

The contractor shall take into consideration the impacts of high energy consumption, both from a cost and emissions point of view. Energy use shall be minimised, and where possible, alternative energy sources shall be utilised.

5 ENVIRONMENTAL MANAGEMENT OF CONSTRUCTION ACTIVITIES

The contractor shall undertake "good housekeeping" practices during construction to:

- care for and preserve the environment within which the site is situated;
- provide a safe and healthy working environment;
- ensure a stable site that is less susceptible to extreme weather events;
- allow for the smooth running of the contract as a whole; and
- help to avoid disputes on responsibility.

The construction activities addressed below shall be part of the contractor's obligations regarding his programme of work and incorporated into the required method statements for workmanship and quality control.

5.1 SITE ESTABLISHMENT

a. Site Plan

The site refers to an area with defined limits on which the project is located. The contractor shall establish his construction camps, offices, workshops, staff accommodation and testing facilities on the site in a manner that does not adversely affect the environment. However, before any site establishment can begin, the contractor shall submit to the ECO for his/her comments and to the engineer for his approval, plans of the exact location, extent and construction details of these facilities and the impact mitigation measures the contractor proposes to put in place. The site plan shall have been submitted and approved before establishment commences.

The site plan shall detail the locality as well as the layout of the waste management facilities for litter, kitchen refuse, sewage and workshop-derived effluents. The site offices should not be sited in close proximity to steep areas, as this will increase soil erosion. Preferred locations would be flat areas along the route. If the route traverses water courses, streams and rivers, it is recommended that the offices, and in particular the ablution facilities, aggregate stockpiles, spoil areas and hazardous material stockpiles are located as far away as possible from any water course. No camp establishment, including satellite camps, can be placed within 150 metres of an identified wetland unless the contractor has applied to DWS and received authorisation to do so. Regardless of the chosen site, the contractor's intended mitigation measures shall be indicated on the plan.

Detailed, electronic colour photographs shall be taken of the proposed site before any clearing may commence. These records are to be kept by the ECO and the engineer for consultation during rehabilitation of the site in order that rehabilitation is, as a minimum, done to a standard similar to pre-construction activities.

b. Vegetation

The contractor has a responsibility to inform his staff of the need to be vigilant against any practice that will have a harmful effect on vegetation. The natural vegetation encountered on the site is to be conserved and left as intact as possible. No areas of protected vegetation shall be disturbed without the required authorisation. Protected trees may not be removed without a permit from the Department of Agriculture, Forestry and Fisheries. Special attention shall be given to any search and rescue operation identified during the environmental assessment process, and any removal to an on-site nursery for continuous nurturing and protection and later replanting.

Only trees and shrubs directly affected by the works, and such others as may be indicated by the engineer in writing, may be felled or cleared.

Contravention of a notice of listed protected tree species under the National Forests Act, 1998 is regarded as a first category offence that may result in a fine or imprisonment for a period up to three years, or to both a fine and imprisonment. The DEO must be conversant with the latest gazette of declared protected trees.

No areas disturbed by construction activities may be left without vegetation post construction. Rehabilitation shall be undertaken using only indigenous tree, shrub and grass species and in accordance with instructions issued by the engineer.

Any proclaimed weed or alien species that propagates during the contract period shall be cleared by hand before seeding and regularly during the contract maintenance period.

Fires shall only be allowed in facilities or equipment specially constructed for this purpose. The need for a firebreak shall be determined in consultation with the Engineer and the relevant authorities, and if required a firebreak shall be cleared and maintained around the perimeter of the camp and office sites.

c. Water management

Water for human consumption shall be available at the site offices and at other convenient locations on site.

All effluent water from the camp / office sites shall be disposed of in a properly designed and constructed system, situated so as not to adversely affect water sources (streams, rivers, pans, dams etc). Only domestic type wastewater shall be allowed to enter this system.

d. Heating and cooking fuel

The contractor shall provide adequate facilities for his staff so that they are not encouraged to supplement their comforts on site by accessing what can be taken from the natural surroundings. The contractor shall ensure that energy sources are available at all times for construction and supervision personnel for heating and cooking purposes.

5.2 SEWAGE MANAGEMENT

Particular reference in the site establishment plan shall be given to the management of sewage generated at the site offices, site laboratory and staff accommodation and at all localities on the site where there will be a concentration of labour. Sanitary arrangements should be to the satisfaction of the engineer, the local authorities and legal requirements.

Safe and effective sewage treatment will require one of the following sewage handling methods: septic tanks and soak-aways, dry-composting toilets such as “enviro loos”, or the use of chemical toilets which are supplied and maintained by a specialist service provider. The type of sewage management will depend on the geology of the area selected, the duration of the contract and proximity (availability) of providers of chemical toilets. Should a soak-away system be used, it shall not be closer than 800 metres from any natural water course or water retention system. The waste material generated from these facilities shall be serviced on a regular basis and be disposed by a qualified contractor, to an authorised facility.

Toilets and latrines shall be easily accessible and shall be positioned within walking distance from wherever employees are employed on the works. Use of the veld for this purpose shall not, under any circumstances, be allowed. The positioning of chemical toilets shall be done in consultation with the engineer and no chemical toilet shall be placed within 100m of a natural water course and be outside areas susceptible to flooding.

Outside toilets shall be provided with locks and doors and shall be secured to prevent them from blowing over. The contractor shall arrange for regular emptying of toilets and shall be entirely responsible for enforcing their use and for maintaining such latrines in a clean, orderly and sanitary condition to the satisfaction of the Engineer. The disposal of waste from the chemical toilets shall be disposed by a qualified contractor, to an authorised facility.

5.3 WASTE MANAGEMENT

The contractor’s intended methods for waste management shall be outlined at the outset of the contract, and shall be to the satisfaction of the engineer. Opportunities for avoiding, reducing, reusing and recycling of materials should be identified upfront, as should constraints for their implementation. All personnel shall be instructed to dispose of all waste in the proper manner.

a. General waste

General waste shall be stored in an appointed area in covered, tip-proof metal drums or similar container for collection and disposal. General waste shall be stored in areas where they cannot disperse or contaminate water resources. Disposal of solid waste shall be at a licensed landfill site or at a site approved by the relevant authority in the event that an existing operating landfill site is not within reasonable distance from the project area. No waste shall be burned or buried at or near the project area.

b. Litter

No littering by construction workers shall be allowed and particular emphasis on litter control measures shall apply at stop/go facilities.

During the construction period, the various contractor's facilities shall be maintained in a neat and tidy condition and the site shall be kept free of litter. At all places of work the contractor shall provide litter collection facilities for later safe disposal at approved sites.

c. Hazardous waste

Hazardous waste such as oils shall be placed in appropriate containers and disposed of at an approved landfill site. Hazardous waste containers shall be marked / labelled and placed in areas where they cannot contaminate water resources.

d. Construction and demolition waste

Construction and demolition wastes must be inert and may not contain any general waste or hazardous contaminants. Construction and demolition wastes with different properties and or use should not be mixed but be stored separately. Construction and demolition wastes shall be stored in areas where they cannot disperse or contaminate water resources.

The contractor is encouraged to actively engage with authorities and landowners adjacent to the site and identify where such 'spoil' materials can be usefully deployed to repair existing environmentally damaged areas such as erosion dongas. Spoiling of material may only be undertaken with the prior, informed consent of the authorities and landowners and in compliance with legislation.

5.4 CONTROL AT THE WORKSHOP

The contractor's management and maintenance of his plant and machinery will be monitored according to the criteria given below:

a. Hazardous Material Storage

All hazardous materials shall be stored in a secured, appointed area that is suitably fenced, bunded and has restricted entry. Storage of hazardous materials shall only take place using suitable containers to the approval of the ECO and the engineer.

The contractor shall provide proof to the engineer that relevant authorisation to store such substances has been obtained from the relevant authority. In addition, hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or containment structure. Before containment or storage facilities can be erected the contractor shall furnish the engineer with details of the preventative measures he proposes to install in order to mitigate pollution of the surrounding environment from leaks or spillage. The preferred method shall be a concrete floor that is bunded. Any deviation from the method will require proof from the relevant authority that the alternative method proposed is acceptable to that authority. The proposals shall also indicate the emergency procedures in the event of misuse or spillage that will negatively affect an individual or the environment.

b. Fuel and gas storage

The contractor shall take cognisance of the limits set by legislation for the storage of fuels and acquire the necessary authorisation for storage capacity beyond these. An adequate bund wall, with capacity for 110% of stored volume, shall be provided for fuel and diesel areas to accommodate any leakage spillage or overflow of these substances. The area inside the bund wall shall be lined with an impervious lining to prevent infiltration of the fuel into the soil. Any leakage, spillage or overflow of fuel shall be attended to without delay. All refuelling shall be done over an impervious surface or a drip tray.

Gas welding cylinders and LPG cylinders shall be stored chained in a secure, well-ventilated area exterior to any building wall.

c. Oil and lubricant waste

Used oil, lubricants and cleaning materials from the maintenance of vehicles and machinery shall be collected in a holding tank and sent back to the supplier. Water and oil should be separated in an oil trap. Oils collected in this manner, shall be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at approved waste disposal sites for toxic/hazardous materials. Oil collected by a mobile servicing unit shall be stored in the service unit's sludge tank and discharged into the safe holding tank for collection by the specialist oil recycling company.

All used filter materials shall be stored in a secure bin for disposal off site. Any contaminated soil shall be removed and replaced. Soils contaminated by oils and lubricants shall be collected and disposed of at a facility designated by the local authority to accept contaminated materials.

d. Vehicle and plant maintenance

Vehicles and plant should be regularly maintained to ensure high availability, efficient operation and reduce the likelihood of breakdowns. Schedule maintenance and servicing of vehicles and plant may not be undertaken on site.

Where break downs occur, the vehicle or plant should ideally be removed to a workshop for repair. Any emergency repair work should be undertaken in a manner that prevents the risk of hazardous material spillages onto the ground. Wastes and contaminated materials must be appropriately managed and disposed.

5.5 CLEARING THE SITE

In all areas where the Contractor intends to, or is required to clear the natural vegetation and soil, a plan of action shall first be submitted to the Engineer for his approval. Working areas shall be clearly defined and demarcated on site to minimise the construction footprint. 'No-go- areas' and other sensitive areas shall also be clearly demarcated on site, and staff must be made aware of them.

The plan of action shall contain a photographic record of the areas to be disturbed. This shall be submitted to the engineer for his records before clearance may occur. The record shall be comprehensive and clear, allowing for easy identification during inspections.

5.6 SOIL MANAGEMENT

a. Topsoil

Topsoil shall be removed from all areas where physical disturbance of the surface will occur and shall be stored and adequately protected. The contract will provide for the stripping and stockpiling of topsoil from the site for later re-use. Topsoil is considered to be the natural soil covering, including all the vegetation and organic matter. Depth may vary at each site. The areas to be cleared of topsoil shall include all storage areas. The topsoil stockpiles shall be stored, shaped and sited in such a way that they do not interfere with the flow of water to

cause damming or erosion, or itself be eroded by the action of water. All topsoil stockpiles and windrows shall be maintained throughout the contract period in a weed-free condition. Weeds appearing on the stockpiled or windrowed topsoil shall be removed by hand.

The Contractor shall ensure that no topsoil is lost due to erosion – either by wind or water or to contamination by waste or hazardous substance. Soils contaminated by hazardous substances shall be remediated or disposed of at an approved waste disposal site, at the discretion of the engineer. Topsoil may only be used for beneficial purposes and no topsoil shall be disposed.

Areas to be top-soiled and grassed shall be done so systematically to allow for quick cover and reduction in the chance of heavy topsoil losses due to unusual weather patterns. The Contractor's programme shall clearly show the proposed rate of progress of the application of topsoil and grassing. The Contractor shall be held responsible for the replacement, at his own cost, for any unnecessary loss of topsoil due to his failure to work according to the progress plan approved by the Engineer. The Contractor's responsibility shall also extend to the clearing of drainage or water systems within and beyond the boundaries of the site that may have been affected by such negligence.

b. Subsoil

The subsoil is the layer of soil immediately beneath the topsoil. It shall be removed, to a depth instructed by the engineer, and if not used for backfilling it shall be stored and maintained separately from the topsoil so that neither stockpile is contaminated by the other. This soil shall be used for rehabilitation purposes by first spreading it over the excavated slopes without interfering with or contaminating the stockpiled topsoil.

Whilst in stockpile it shall be maintained free from erosion and weed infestation in the same way as for topsoil stockpile maintenance.

5.7 EARTHWORKS AND LAYERWORKS

This section includes all construction activities that involve the mining of all materials, and their subsequent placement, stockpile, spoil, treatment or batching, for use in the permanent works, or temporary works in the case of deviations. Before any stripping prior to the commencement of construction, the Contractor shall have complied with the requirements of this EMP. In addition, the Contractor shall take cognisance of the requirements set out below.

a. Quarries and borrow pits

The Contractor's attention is drawn to the requirement of the Department of Mineral Resources and Energy (DMRE), that before entry into any quarry or borrow pit, an Environmental Authorisation for the establishment, operation and closure of a quarry or borrow pit shall have been approved by the Department. It is the responsibility of the Contractor to ensure that he is in possession of the authorisation prior to entry into the quarry or borrow pit. The conditions imposed by the relevant authorisation are legally binding on the Contractor and may be more extensive and explicit than the requirements of this specification. In the event of any conflict occurring between the requirements of the specific authorisation and this EMP the former shall apply.

b. Excavation, hauling and placement

The Contractor shall provide the ECO and the Engineer with detailed plans of his intended construction processes prior to starting any cut or fill or layer. The plans shall detail measures by which the impacts of pollution (noise, dust, litter, fuel, oil and sewage), erosion, vegetation destruction and deformation of landscape will be prevented, contained and rehabilitated. Particular attention shall also be given to the impact that such activities will have on the adjacent built environment. The Contractor shall demonstrate his "good housekeeping", particularly with respect to closure at the end of every day so that the site is left in a safe condition.

c. Spoil sites

The Contractor shall be responsible for the safe siting, operation, maintenance and closure of any spoil site the uses during the contract period, including the defects notification period. This shall include existing spoil sites that are being re-entered. Before spoil sites may be used proposals for their locality, intended method of operation, maintenance and rehabilitation shall be given to the ECO for his/her comments and to the Engineer for his approval. The location of these spoil sites shall have signed approval from the affected landowner before submission to the ECO and the Engineer. No spoil site shall be located within 500m of any watercourse. A photographic record shall be kept of all spoil sites for monitoring purposes. This includes before the site is used and after re-vegetation.

The use of approved spoil sites for the disposal of any waste shall be prohibited.
Spoil sites will be shaped to fit the natural topography. Depending on availability, these sites shall receive a minimum of 75mm topsoil and be grassed with the recommended seed mixture. Appropriate grassing measures to minimise soil erosion shall be undertaken by the Contractor. This may include both strip and full sodding. The Contractor may motivate to the Engineer for other acceptable stabilising methods. The engineer may only approve a completed spoil site at the end of the defects notification period upon receipt from the Contractor of a landowner's clearance notice.

d. Stockpiles

The contractor shall plan his activities so that materials excavated from borrow pits and cuttings, in so far as possible, can be transported direct to and placed at the point where it is to be used. However, should temporary stockpiling become necessary, the areas for the stockpiling of excavated and imported material shall be indicated and demarcated on the site plan submitted in writing to the Engineer for his approval. The contractor s proposed measures for prevention of environmental damage, containment and subsequent rehabilitation shall also be submitted.

The areas chosen shall have no naturally occurring indigenous trees and shrubs present that may be damaged during operations. Care shall be taken to preserve all vegetation in the immediate area of these temporary stockpiles. During the life of the stockpiles the Contractor shall at all times ensure that they are positioned and sloped to create the least visual impact, constructed and maintained so as to avoid erosion of the material and contamination of surrounding environment and kept free from all alien/undesirable vegetation.

After the stockpiled material has been removed, the site shall be re-instated to its original condition. No foreign material generated / deposited during construction shall remain on site. Areas affected by stockpiling shall be landscaped, top soiled, grassed and maintained at the Contractor's cost until clearance from the Engineer and land owner is received.

Material milled from the existing surface that is temporarily stockpiled in areas approved by the Engineer within the route area, shall be subject to the same condition as other stockpiled materials. Excess materials from windrows, in situ milling or any leftover material from construction activities may not be swept off the route and left unless specifically instructed to do so in the contract documentation or under instruction from the Engineer.

The ECO shall comment on and the engineer shall approve the areas for stockpiling and disposal of construction rubble before any operation commences and shall approve their closure only when they have been satisfactorily rehabilitated.

e. Blasting activities

Wherever blasting activity is required on the site (including quarries and/or borrow pits) the Contractor shall rigorously adhere to the relevant statutes and regulations that control the use of explosives.

5.8 ON SITE PLANT

a. Crusher, screening plants and concrete batching plants

Crushing plants and concrete batching plants, whether sited inside or outside of defined quarry or borrow pit areas, shall be subject to the requirements of the applicable industrial legislation that governs gas and dust emissions into the atmosphere. Such sites will be the subject of regular inspections by the relative authorities during the life of the project. In addition, the selection, entry onto, operation, maintenance, closure and rehabilitation of such sites shall be the same as for those under Section 5.7 (a) of this EMP, with the exception that the Contractor shall provide additional measures to prevent, contain and rehabilitate against environmental damage from toxic/hazardous substances. In this regard the Contractor shall provide plans that take into account such additional measures as concrete floors, bunded storage facilities, linings to drainage channels and settlement dams. Ultimate approval of these measures shall be from the relevant authority, as shall approval of closure. The Engineer will assist the Contractor in his applications to the relevant authority.

Screening activities shall be undertaken so that dust and noise is minimised. This can be done by carefully choosing the site for the activity, and by using slightly damp material.

Effluent from concrete batch plants and crusher plants shall be reused where possible or treated in a suitable designated sedimentation dam to the legally required standards to prevent surface and groundwater pollution. The designs of such a facility should be submitted to the engineer for approval.

5.9 AREAS OF SPECIFIC IMPORTANCE

Any area, as determined and identified within the project documents as sensitive or of special interest within the site shall be treated according to the express instructions contained in these specifications or the specific environmental authorisation as well as the approved EMPr. The Contractor may offer alternative solutions to the Engineer in writing should he consider that construction will be affected in any way by the hindrance of the designated sensitive area or feature. However, the overriding principle is that such defined areas requiring protection should not be changed. Every effort to identify such areas within the site will have been made prior to the project going out to tender. The discovery of other sites with archaeological, palaeontological or historical interest that have not been identified shall receive ad hoc treatment.

a. Archaeological sites

If an artefact on site is uncovered, work in the immediate vicinity shall be stopped immediately. The Contractor shall take reasonable precautions to prevent any person from removing or damaging any such article and shall immediately upon discovery thereof inform the engineer of such discovery. The South African Heritage Resource Agency (SAHRA) is to be contacted, and a SAHRA-registered archaeological consultant may undertake the necessary work involved in confirming the find and advising on how it should be preserved or removed. Work may only resume once clearance is given in writing by the archaeologist.

If a grave or midden is uncovered on site, or, then all work in the immediate vicinity of the graves/middens shall be stopped and the engineer informed of the discovery. The South African Heritage Resource Agency and the South African Police Services (SAPS) should be contacted and in the case of graves, arrangements made for an undertaker to carry out exhumation and reburial. The undertaker will, together with SAHRA, be responsible for attempts to contact family of the deceased and for the place where the exhumed remains can be re-interred.

5.10 REHABILITATION

The Contractor shall be responsible for the rehabilitation of all areas disturbed during construction re-establishment of vegetation . This includes, for example, the road reserve, service roads, stockpile areas, stop/go facilities, windrows and wherever material generated for, or from, construction has to be stored temporarily, and in designated or instructed areas. It also includes the area where site offices were erected which may require rehabilitation at the end of the contract. All materials introduced by or for construction

activities shall be removed from the site on completion of the contract unless written approval from the engineer / relevant landowner demonstrates it is to be left in place.

The Contractor shall be responsible for the re-establishment of vegetation in all areas disturbed during construction. Responsibility for re-establishment of vegetation shall extend until expiry of the defects notification period. However, COM reserves the right to continue holding retention monies (or not releasing guarantees in lieu of retention) depending upon the state of cover at the end of the defects notification period. Such extension may continue until closure of the relevant quarry or borrow pit has been secured,

Rehabilitation of affected areas should be undertaken as early as possible when the relevant activities are done in order to reduce further environmental damage. All re-vegetation should be undertaken using indigenous vegetation. The standard of rehabilitation should be to the satisfaction of the Engineer and the relevant authorities. The Department of Minerals Resources will only issue closure certificates for borrow pits and quarries when they are satisfied with the rehabilitation undertaken. It should also be noted that in some cases there is a requirement for a final environmental audit covering the extent of the project.

6 ADMINISTRATION

6.1 RECORD KEEPING

The Engineer and the DEO will continuously monitor the contractor's adherence to the approved impact prevention procedures and the DEO shall submit regular written reports to the ECO and to the Engineer, at least once a month. The DEO will report the environmental compliance performance of the project at regular site meetings. The ECO shall insect the site monthly and provide reports thereof to the Engineer and DEO. The Engineer shall issue to the Contractor a notice of non-compliance whenever transgressions are observed. The DEO shall document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. The non-compliance shall be documented and reported to the engineer in the monthly report.

Copies of all authorisations shall be kept on site and made available for inspection by visiting officials from COM, relevant authorities or internal/external auditors.

6.2 COMPLIANCE AND PENALTIES

The Contractor shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the construction site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. This record shall be submitted with the monthly reports and an oral report given at the monthly site meetings.

Any non-compliance/ omissions with the procedures in this EMP, constitute a breach of the Conditions of Contract. Regulatory financial penalties imposed on COM shall be passed onto the defaulting parties.