APPENDIX G:

ENVIRONMENTAL MANAGEMENT PROGRAMME

UPGRADE OF N10 SECTION 3, CRADOCK, EASTERN CAPE (23.3KM)

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Prepared for:

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1 INTRODUCTION

The South African National Roads Agency (SANRAL) is proposing to upgrade a 23.3km section of the National Route (N10 section 3) between Bedford and Cradock in the Eastern Cape Province (Figure 3.1). WorleyParsons has been appointed by SANRAL as the project managers who subcontracted Coastal & Environmental Services (CES) as the Environmental Assessment Practitioner (EAP).

This Environmental Management Programme (EMPr) has been prepared as part of the basic assessment process to provide specific environmental guidance for the planning, construction and operational phase of the proposed N10 road upgrade in Cradock, Eastern Cape.

The competent authority, being the Department of Environmental Affairs (DEA), requires that an environmental management programme (EMPr) be submitted in accordance with Regulation 33 of the regulations published in Government Notice No. R. 543 of 18 June 2010, which should be read with Section 24 N of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998), as amended.

1.1 Objectives of an EMPr

The EMPr has been compiled to provide recommendations and guidelines according to which compliance monitoring can be done during the construction of the N10 road upgrade as well as to ensure that all relevant factors are considered to ensure for environmentally responsible development. The purpose of the EMPr is to provide specifications for "good environmental practice" for application during construction.

This EMPr informs all relevant parties [the Project Coordinator, the Contractor, the Environmental Control Officer (ECO) and all other staff employed by SANRAL at the site as to their duties in the fulfilment of the legal requirements for the construction, operation and decommissioning of the N10 road upgrade with particular reference to the prevention and mitigation of anticipated potential environmental impacts.

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

The objectives of an EMPr are to:

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

1.2 Form and function of an EMPr

An EMPr is focused on sound environmental management practices, which will be undertaken to minimise adverse impacts on the environment through the lifetime of a development. In addition, an EMPr identifies what measures will be in place or will be actioned to manage any incidents and emergencies that may occur during operation of the facility.

As such the EMPr provides specifications that must be adhered to, in order to minimise adverse environmental impacts associated with the operations of the Facility.

The content of the EMPr is consistent with the requirements as set out in Regulation 33 of the EIA regulations stated below, for the construction and operation phases.

According to regulation 33 of GN R 543, an environmental management programme must include:

(a) Details of –
  (i) The person who prepared the environmental management programme; and
  (ii) The expertise of that person to prepare an environmental management programme;
(b) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –
  (i) Planning and design;
  (ii) Pre-construction and construction activities;
  (iii) Operation or undertaking of the activity;
  (iv) Rehabilitation of the environment; and
  (v) Closure, where relevant.
(c) A detailed description of the aspects of the activity that are covered by the draft environmental management programme;
(d) An identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);
(e) Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;
(f) As far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures;
(g) A description of the manner in which it intends to –
  (i) Modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
  (ii) Remedy the cause of pollution or degradation and migration of pollutants;
  (iii) Comply with any prescribed environmental management standards or practices;
  (iv) Comply with any applicable provisions of the Act regarding closure, where applicable;
  (v) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;
(h) Time periods within which the measures contemplated in the draft environmental management programme must be implemented;
(i) The process for managing any environmental damage, pollution pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;
(j) An environmental awareness plan describing the manner in which –
  (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and
  (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment;
(k) Where appropriate, closure plans, including closure objectives.

1.3 Legal requirements

Construction must be according to the best industry practices, as identified in the project documents. This EMPr, which forms an integral part of the contract documents, informs the contractor as to 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 approved EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter shall prevail.

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

- The Constitution of the Republic of South Africa Act 108 of 1996
- Environment Conservation Act 73 of 1989
- National Environmental Management Act 107 of 1998
- National Environmental Management: Protected Areas Act 57 of 2003
- National Environmental Management: Biodiversity Act 10 of 2004
- National Water Act 36 of 1998
- National Road Traffic Act (No. 93 of 1996)
- Conservation of Agricultural Resources Act 43 of 1983
- Hazardous Substances Act 15 of 1973
- National Heritage Resources Act 25 of 1999
- Atmospheric Pollution Prevention Act 45 of 1965
- National Environmental Management: Air Quality Act 39 of 2004
- National Environmental Management: Waste Management Act 59 of 2008
- Health Act 63 of 1977
- Occupational Health and Safety Act 85 of 1993
- White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity
- All relevant provincial legislation, Municipal by-laws and ordinances.

1.4 Environmental authorisation

In accordance with the requirements of the National Environmental Management Act (Act No 107 of 1998) (NEMA), and relevant EIA regulations made in terms of this Act and promulgated August 2010 (Government Notice R543), and listed activities under (Government Notice R 544), the proposed upgrade of the N10 in Middelburg was subject to Basic Environmental Impact Assessment (BAR).

In terms of the EIA process, all reports generated from the environmental studies form part of a series of documents for the project. The BAR identified potentially significant environmental impacts and investigated potentially significant environmental issues and recommended appropriate mitigation measures.

This Environmental Management Programme (EMPr) interprets the findings of the BAR, and prescribes project-specific specifications to be achieved. In addition to the requirements of Regulation 33 of GNR 543, this EMPr is based on the principles of Integrated Environmental Management (IEM).

2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT TEAM

According to regulation 33 of GN R 543, an environmental management programme must include:

(a) details of –

(i) the person who prepared the environmental management programme; and

(ii) the expertise of that person to prepare an environmental management

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Project team:

- Jadon Schmidt
- Lara Crous
- Leigh-Ann de Wet
- Tarryn Martin

Coastal & Environmental Services (CES), established in 1990, is a specialist environmental consulting company based in Grahamstown (Eastern Cape Province). We believe that a balance between development and environmental protection can be achieved by skilful, considerate and careful planning.

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

Mr Jadon Schmidt, Senior Environmental Consultant,
Jadon holds a BSc degree in Geology and Botany, a BSc Honours degree in Botany (both from NMMU) and an MBA from Rhodes University with a core environmental management & sustainability focus. His MBA thesis addressed resource economic issues of marine protected areas. He is currently completing an MSc in estuarine ecology dealing specifically with sea level rise impacts on sediment and vegetation dynamics. Climate change, wetland ecology, renewable energy and resource economics are among his professional interests. Jadon is currently project leader/project manager for several EIAs in the large infrastructure & renewable energy sectors.

Ms Lara Crous, Environmental Consultant
Lara holds a BSc (Environmental Science and Geography) as well as a BSc Honours (Environmental Science) from Rhodes University. Her honours thesis evaluated Grahamstown's Municipal water supply, focussing on aluminium for which she received a distinction. She Is currently writing up her MSc (fisheries science) thesis on using constructed wetland technology in the treatment and beneficiation of brewery effluent. Lara presented her preliminary results at the International Water Association's conference on Wetland Systems for Water Pollution Control in Venice, 2010. She is interested in environmental, municipal and effluent water quality.

Ms Leigh-Ann de Wet, Botanical and Ecological Specialist.
Leigh-Ann holds a BSc (Botany and Entomology) as well as a BSc (Hons) and MSc in Botany from Rhodes University. She conducts vegetation sensitivity assessments including vegetation and sensitivity mapping, to guide developments and thereby minimising their impacts sensitive vegetation. Her experience ranges from local Eastern Cape Projects to those in different provinces including but not limited to Kwa-Zulu Natal, Western Cape and Mpumalanga. She has experience in many different vegetation types as well as different levels of vegetation degradation. Leigh-Ann has also worked on numerous international projects for the mining sector, the most recent of which was a botanical study for First Quantum Minerals in Zambia.

Ms Tarryn Martin, Environmental Consultant
Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and a MSc with distinction in Botany from Rhodes University. Tarryn's Master's thesis examined the impact of fire on the recovery of C_3 and C_4 Panicoid and non-Panicoid grasses within the context of climate change. She has spent time at Rhodes University working as a research assistant and has spent many years working within the corporate tourism industry as a project manager. Her research interests include biodiversity conservation, ecotourism and climate change.

3 PROPOSED ACTIVITY

According to regulation 33 of GN R 543, an environmental management programme must include:

(c) A detailed description of the aspects of the activity that are covered by the draft environmental management programme;

3.1 Description of proposed activity

The South African National Roads Agency (SANRAL) is proposing the upgrade of a 23.3km section of National Road (N10) between Cradock and Bedford in the Eastern Cape (Figure 3.1). Worley Parsons has been appointed by SANRAL as the project managers who subcontracted Coastal & Environmental Services (CES) as Environmental Assessment Practitioner (EAP).

3.1.1 Site Location

The following Figure show the location and layout of the proposed N10 road upgrade.

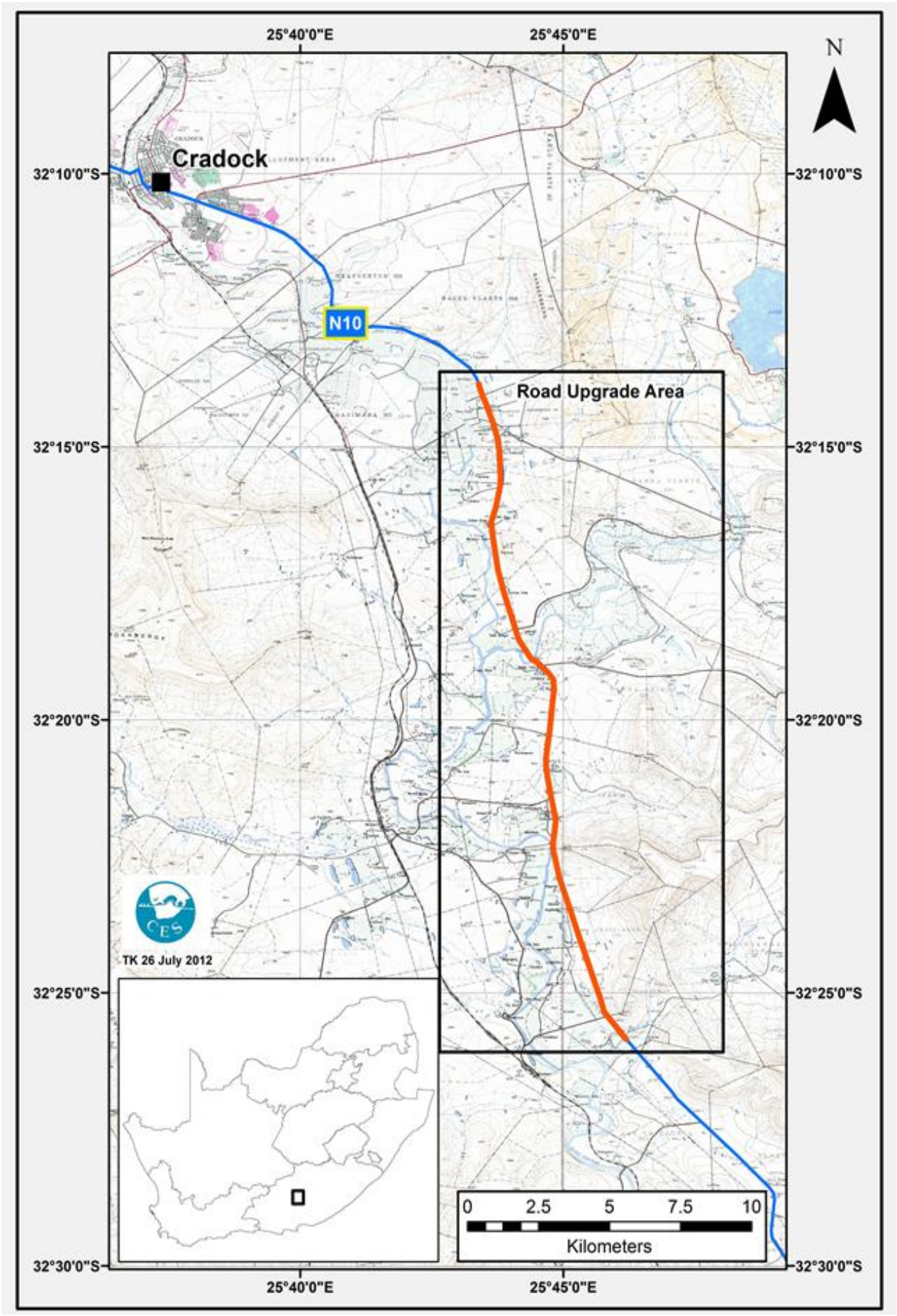


Figure 3.1. Locality map indicating the location of proposed N10 road upgrade.

3.1.2 Timescale for planning, construction and operation

The proposed works has been assessed to have an approximate construction period of 12 – 18 months.

The proposed N10 road upgrade section is expected to have an operational lifespan of 50 – 60 years during which it will require frequent maintenance.

4 SCOPE OF THE EMPr

In order to ensure a holistic approach to the management of environmental impacts during the construction and operation of the proposed substation, this EMPr sets out the methods by which proper environmental controls are to be implemented by the Contractor and all other parties involved.

The EMPr is a dynamic document subject to influences and changes as are wrought by variations to the provisions of the project specification.

4.1 Layout of the EMPr

The EMPr is divided into three phases of development. Each phase has specific issues unique to that period of the construction and operation of the distribution line and associated infrastructure. The impacts are identified and given a brief description. The three phases of the development are then identified as below:

4.1.1 Planning and Design Phase

This section of the EMPr provides management principles for the planning and design phase of the project. Environmental actions, procedures and responsibilities as required from SANRAL during the planning and design phase are specified. These specifications will form part of the contract documentation and therefore the Contractor will be required to comply with these specifications to the satisfactory of the Project Coordinator and Environmental Control Officer.

4.1.2 Construction Phase

This section of the EMPr provides management principles for the construction phase of the project. Environmental actions, procedures and responsibilities as required during the construction phase are specified. These specifications will form part of the contract documentation and therefore the Contractor will be required to comply with these specifications to the satisfactory of the Project Coordinator and Environmental Control Officer.

4.1.3 Operational and Maintenance Phase

This section of the EMPr provides management principles for the operation and maintenance phase of the project. Environmental actions, procedures and responsibilities as required from SANRAL during the operation and maintenance phase are specified.

5 ROLES AND RESPONSIBILITIES

According to regulation 33 of GN R 543, an environmental management programme must include:

(d) An identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);

5.1 South African National Roads Agency

SANRAL is the applicant and shall therefore be the entity monitoring the implementation of the EMPr and compliance with the authorisation. However, if SANRAL appoints a Contractor to implement the project and hence implement the proposed mitigation measures documented in this EMPr on their behalf, then the successful contractor's responsibilities are outlined in Section 5.2 that follows.

5.2 Contractor

The successful Contractor shall:

- Be responsible for the finalisation of the EMPr in terms of methodologies which are required to be implemented to achieve the environmental specifications contained herein and the relevant requirements contained in the environmental authorisation, if issued by DEDEA;
- Be responsible for the overall implementation of the EMPr in accordance with the requirements of SANRAL and the environmental authorisation, if issued by DEDEA;
- Ensure that all third parties who carry out all or part of the Contractor's obligations under the Contract comply with the requirements of this EMPr;
- Be responsible for obtaining any environmental permits which are required for the design, construction and operation of the N10 road upgrade.
- Ensure that the appointments of the ECO and ESO are subject to the approval of SANRAL.

5.3 Environmental Site Officer

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

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

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

- Ensuring that all the environmental authorisations and permits required in terms of the applicable legislation have been obtained prior to construction commencing.
- Reviewing and approving construction method statements with input from the ECO and Engineer, where necessary, in order to ensure that the environmental specifications contained within the construction contract are adhered to.
- Assisting the Contractor in finding environmentally responsible solutions to problems.
- Keeping accurate and detailed records of all activities on site.
- Keeping a register of complaints on site and recording community comments and issues, and the actions taken in response to these complaints.
- Ensuring that the required actions are undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidences of non-compliance to the ECO and Contractor.
- The ESO shall submit regular written reports to the ECO, but not less frequently than once a month.

The ESO must have:

- The ability to manage public communication and complaints;
- The ability to think holistically about the structure, functioning and performance of environmental systems; and
- The ESO must be fully conversant with the Environmental Impact Report and Environmental Management Plan for the N10 road upgrade and all relevant environmental legislation.
- The ESO must have received professional training, including training in the skills necessary to be able to amicably and diplomatically deal with the public as outlined in bullet point one above.

The ECO shall be in the position to determine whether or not the ESO has adequately demonstrated his/her capabilities to carry out the tasks at hand and in a professional manner. The ECO shall therefore have the authority to instruct the contractor to replace the ESO if, in the ECO's opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the construction contract. Such instruction will be in writing and shall clearly set out the reasons why a replacement is required and within what timeframe. The ECO shall visit the development site and in addition to the responsibilities listed in section 5.4 below, review the performance of the ESO and submit regular performance reviews to SANRAL, but not less frequently that once a month.

5.4 Environmental Control Officer

For the purposes of implementing the conditions contained herein SANRAL shall appoint an Environmental Control Officer (ECO) for the contract. The ECO shall be the responsible person for ensuring that the provisions of the EMP as well as the environmental authorisation are complied with during the construction period. The ECO will be responsible for issuing instructions to the contractor and where environmental considerations call for action to be taken. The ECO shall submit regular written reports to SANRAL, but not less frequently than once a month.

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

- Confirming that all the environmental authorisations and permits required in terms of the applicable legislation have been obtained prior to construction commencing.
- Monitoring and verifying that the EMPr, Environmental Authorisation and Contract are adhered to at all times and taking action if specifications are not followed.
- Monitoring and verifying that environmental impacts are kept to a minimum.
- Reviewing and approving construction method statements with input from the ESO and Engineer, where necessary, in order to ensure that the environmental specifications contained within this EMPr and environmental authorisation are adhered to.
- Inspecting the site and surrounding areas on a regular basis regarding compliance with the EMPr, Environmental Authorisation and Contract.
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel on site.
- Ensuring that activities on site comply with all relevant environmental legislation.
- Ordering the removal of, or issuing spot fines for person/s and/or equipment not complying with the specifications of the EMPr and/or environmental authorisation.
- Undertaking a continual internal review of the EMPr and submitting any changes to SANRAL and/or DEDEA (in case of major changes) for review and approval.
- Checking the register of complaints kept on site and maintained by the ESO and ensuring that the correct actions are/were taken in response to these complaints.
- Checking that the required actions are/were undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidences of non-compliance to SANRAL.

- Conducting annual environmental performance audits in respect of the activities undertaken relating to the project. The ECO shall also submit compliance audit reports to DEDEA, in accordance with the requirements of the environmental authorisation. Such reports shall be reviewed by SANRAL, prior to submission.
- Keeping a photographic record of progress on site from an environmental perspective. This can be conducted in conjunction with the ESO as the ESO will be the person that will be onsite at all times and can therefore take photographic records weekly. The ECO would need to check and ensure that the ESO understands the task at hand.
- Recommending additional environmental protection measures, should this be necessary.
- Providing report back on any environmental issues at site meetings.

The ECO must have:

- A good working knowledge of all relevant environmental policies, legislation, guidelines and standards;
- The ability to conduct inspections and audits and to produce thorough, readable and informative reports;
- The ability to manage public communication and complaints;
- The ability to think holistically about the structure, functioning and performance of environmental systems; and
- Proven competence in the application of the following integrated environmental management tools:

    - Environmental Impact Assessment.
    - Environmental management plans/programmes.
    - Environmental auditing.
    - Mitigation and optimisation of impacts.
    - Monitoring and evaluation of impacts.
    - Environmental Management Systems.

The ECO must be fully conversant with the Environmental Impact Assessment, Environmental Management Plan/Programme, Environmental Authorisation (if issued) for N10 road upgrade and all relevant environmental legislation.

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

6 PLANT RESCUE AND PROTECTION PLAN

6.1 Introduction

This Management Plan must be implemented prior to commencement of the construction phase for the proposed Upgrade of the N10 near Cradock and monitored by the Environmental Control Officer (ECO).

6.2 Plant protection

Plant species that have been recorded or that are likely to occur, for which permits will be required in terms of the **Cape Nature & Environmental Conservation Ordinance No. 19 of 1974 (Cape NECO)**, are listed in Table 2.1 below.

The following list of species that required protection was taken from the Basic Assessment Report (CES Document, 2012).

Table 2.1. List of protected plants and trees (Source: CES BAR)

Plant name	Conservation
Aloe variegata	Cape NECO
All species of the Family Mesembryanthemaceae	Cape NECO

6.3 Plant rescue & relocation

Protected plant species will be removed from the designated construction footprint and relocated to adjacent areas of similar habitat that will not be affected by construction. Plant search and rescue will only be conducted within the area where direct construction activities are to occur as per attached project EMPr. In terms of a site survey conducted, it is noted that the type of plant species together with the amount of plant species, setting up of a nursery is not necessary for this project.

6.4 Mitigations

The following mitigations must be incorporated into the final EMPr for the proposed Rehabilitation of the N10/3 near Cradock.

6.4.1 During site clearing

1. Before clearing of vegetation, the Contractor shall ensure that all litter and non-organic material is removed from the area to be cleared.
2. All seed bearing invasive alien vegetation shall be removed from site.
3. No removed vegetation will be dumped onto intact vegetation adjacent to the road reserve.
4. Topsoil will be removed separately.
5. All indigenous plant material removed from cleared areas may be stockpiled for mulching or temporarily stockpiled in a demarcated area, which meets the satisfaction of the ECO.
6. Indigenous plant material removed from cleared areas in the road reserve must be re-spread on the impacted areas after construction to aid regrowth and prevent soil erosion.
7. All remaining stockpiled plant material must be removed from the site. No stockpiles will be allowed after construction.
8. The use of herbicides is prohibited unless approved by the RE and ECO.

6.4.2 Site demarcation

1. The '*site*' refers to the total area where the contract will take place (i.e. the cadastral entity(ies) awarded to the Contractor and any other area reasonably required by the Contractor to undertake the construction activities in order to fulfil the contract.

2. The Contractor shall be responsible for any clean-up and/or rehabilitation of all areas impacted inside and outside the site.

6.4.3 Soil removal

1. Soil stockpiles shall be located in areas agreed to by the ECO and RE.
2. All excavated soil must be re-used during rehabilitation of removed completely. No stockpiles will be allowed after construction.
3. Appropriate measures, as agreed with the ECO/RE, shall be taken to protect excavated soil stockpiles from erosion by wind or water by using temporary covering (e.g. hessian bags).
4. The Contractor shall be held responsible for the replacement, at his/her own cost, for any unnecessary loss of excavated soil due to his failure to work according to the requirements of the EMPr.

6.4.4 Plant removal

1. Areas outside the road reserve to be cleared of vegetation will be clearly demarcated before clearing commences.
2. Areas should only be stripped of vegetation as and when required and in particular once species of special concern have been relocated from that area.
3. Once site boundaries are demarcated, the area to be cleared of vegetation will be surveyed by the plant search and rescue team under the supervision of the botanical specialist and ECO to identify species suitable for rescue and commence to removal of plants. The ECO in consultation with the botanical specialist will finalise the Plant Rescue and Relocation Plan
4. Rescued plants must be appropriately removed from its locality and immediately relocated into adjacent areas of similar habitat that will not be disturbed by construction.
5. Wherever possibly any seed-bearing material will be collected immediately and planted as soon as possible.
6. Permits from DEDEAT must be kept on site and in the possession of the ECO and flora search and rescue team at all times.
7. No routes other that the pre-approved routes shall be used by construction vehicles or personnel for the purpose of gaining access to the site.
8. Once search and rescue and plant relocation is complete, a short audit report and certificate of clearance will be issued to the respective contractor by the botanical specialist in consultation with the ECO and copies will be supplied to DEDEAT.

7 RE-VEGETATION AND HABITAT REHABILITATION PLAN

7.1 Introduction

The Re-vegetation and Habitat Rehabilitation Plan must be implemented during the construction and operational phases for the proposed Upgrade of the N10 near Cradock. Restoration timeframes must indicate rehabilitation aims within the shortest possible time period after completion of construction activities in order to reduce the amount of habitat converted at any one time, and to speed up the recovery of natural environments.

7.2 Rehabilitation

In terms of the scope of the construction activities, rehabilitation will be minimal and in many instances will only require clean-up activities together with planting ground stabilizing vegetation.

The Rehabilitation Plan will rehabilitate the following areas:

- Work camps;
- Stormwater soak away features;
- Areas where pockets of alien invasive species have been removed;
- Road reserve
- All areas outside the road reserve impacted by construction activities (e.g. service roads etc.).

Impacted areas may be rehabilitated with indigenous graminoids. No herbaceous vegetation, scrubs or trees are required. Only graminoids on the approved list (Table 3.1) may be used for rehabilitation purposes. This list may be changed/upgraded at any time with approval of the ECO.

Table 3.1. List of approved graminoids to use during rehabilitation.

Plant name
Aristida congesta
Aristida duffusa
Cynodon incompletes
Digitaria eriantha
Eragrostis bergiana
Eragrostis bicolor
Eragrostis lehmanniana
Eragrostis obtusa
Sporobulus fimbriatus
Sporobulus ludwigii
Sporobulus tenellus
Stipagrostis ciliata
Stipagrostis obtusa
Chloris virgata
Themeda triandra
Tragus berteronianus
Heteropogon contortus

7.3 Rehabilitation process

Rehabilitation of impacted areas will involve the following process.

1. Removal of all construction equipment from the site.
2. Fill all dug trenches with excavated soil.
3. Removal/spreading of all excess excavated soil.
4. Remove all construction rubble and rubbish.
5. Re-vegetation

7.3.1 Removal of all construction equipment from the site.

All construction equipment must be removed from the site. This includes vehicles, temporary structures, fencing, unused pipes/culverts etc.

7.3.2 Fill all dug trenches with excavated soil.

Ensure that all trenches/holes dug in the construction phase is refilled with soil and all relevant anti-erosion mitigations are in place.

7.3.3 Removal/spreading of all excess excavated soil.

All unused soil excavated during the construction phase that was not used to refill trenches must be removed from the site and dumped at a licenced dumping site.

7.3.4 Remove all construction rubble and rubbish.

All construction rubble and rubbish must be removed from the site and dumped at a licenced dumping site.

7.3.5 Re-vegetation

The re-vegetation process will not only focus on the rehabilitation of the road reserve but includes all exposed soil, transformed areas and areas where alien invasive plant species have been removed within the site.

Indigenous grass species, mentioned in Table 3.1 may be incorporated into these areas to create initial cover.

In order to rehabilitate the transformed and invaded areas the following landscaping techniques will be employed:

- Clearing of invaded areas should be undertaken as per the Alien Management Plan.
- Any stockpiled indigenous vegetation from the clearing operations should be reduced to mulch and scattered over the impacted areas. Indigenous plant material shall be kept separate from alien material. Alien material must not be used. The vegetative material shall be reduced by either mechanical means (chipper) or by hand-axing to sticks no longer than 100 mm. The chipped material may be mixed with the topsoil at a ratio not exceeding 1:1.
- Mulch is to be harvested from areas that are to be denuded of vegetation during construction activities, provided that they are free of seed-bearing alien invasive plants;
- No harvesting of indigenous vegetation may be done outside the area to be disturbed by construction activities.
- Irrigation is not required.
- The Contractor will be responsible for controlling any woody alien/invasive species. The Contractor shall ensure that all weeds and alien/invasive species are removed.
- Alien management should be as per recommendation of Alien Management Plan (Section 4).
- The areas where alien vegetation must be removed:
  - Areas within the demarcated development footprint.
  - If the alien vegetation is currently used by people such as farm workers etc. for firewood, then the vegetation may be left for this purpose.
- Soil stockpiles during the construction phase should be placed in such a manner that natural drainage patterns are not disrupted (i.e. no stockpiles should be located in or adjacent to any seepage or drainage areas).
- No imported soil material should be used, unless it can be ensured that it is free of exotic and alien vegetation seeds;

- Where necessary, appropriate dust suppression techniques should be employed, such as regular watering of exposed areas and stockpiles;
- It is recommended that exposed areas of soil be stabilised as soon as possible, either through appropriate surfacing (e.g. roads) or through landscaping (e.g. road reserve, etc.);
- The natural topography of the site must be maintained during and after construction (i.e. indiscriminate levelling or elevating of the site must be avoided);
- In the case of existing surface wash-away and wind erosion, the Contractor shall implement remedial measures as soon as possible in order to prevent further erosion;
- Appropriate erosion control/ soil stabilisation measures are to be implemented;
- During construction the Contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking other measures necessary to prevent the surface water from being concentrated in streams and from scouring the slopes, banks or other areas.
- Additional stabilisation of cleared areas to prevent and control erosion must be actively managed. The method of stabilisation should be determined in consultation with the ECO and RE. The following methods (or a combination) may be considered, depending on the specific conditions of the site:
  - Brushcut packing
  - Mulch or chip cover
  - Straw stabilising (at the rate of one bale/m² and rotated into the top 100mm of the completed earthworks)
  - Watering
  - Planting / sodding
  - Hand seeding
  - Hydroseeding
  - Soil binders and anti-erosion compounds
  - Mechanical cover or packing structures:
    - Geofabric
    - Hessian cover
    - Armourflex
    - Log / pole fencing
    - Retaining walls
- Traffic and movement over stabilised areas is to be restricted and controlled, and damage to stabilised areas shall be repaired and maintained to the satisfaction of the ECO;

7.4 Monitoring

A monitoring programme shall be in place not only to ensure compliance with the EMPr throughout the construction phase, but also to monitor any environmental issues and impacts.

An ECO must be appointed to ensure compliance with the EMPr and to carry out monitoring activities.

8 ALIEN INVASIVE MANAGEMENT PLAN

All alien invasive species and declared weeds, in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983, are to be systematically eradicated.

The Alien Invasive Management Plan is to commence in a phased manner in parallel with construction phases.

The following provides guidelines for onsite alien plant management. The appropriate alien management strategy pertinent to the situation/environment should be identified and implemented by the ECO.

The Alien Invasive Management Plan for alien vegetation includes three phases:

I. ***Initial control:*** drastic reduction of the existing population;
II. ***Follow-up control:*** reduction of seedlings, root suckers and coppice growth;
III. ***Maintenance control:*** sustain low alien plant numbers/density with low annual costs. At this phase, alien plants must no longer be considered a problem. Monitor the situation two-three times each year (spring, mid-summer and autumn) to avoid alien plant re-infestation, spread and densification, and thereby avoid increased control costs.

8.1 Initial Control

8.1.1 Fell trees - control stumps - plant grass (Wattle, Bugweed, etc.)

a) Fell trees, treat stumps, remove wood and plant grass

This strategy is suitable where infestations are easily accessible and can be harvested (i.e. for firewood, charcoal, building materials, mulch production). It is also suitable for trees that need removal for utility or aesthetic purposes or where they pose a potential hazard to waterways, building structures, etc.

b) Control Method for trees

Use chainsaws, bow saws, brush cutters or cane knives to fell trees and saplings. Stump height should be less than 15 cm. Apply a registered herbicide mix with hand sprayers, paint brushes or knapsack sprayers at low pressure, using solid cone nozzles. Use a suitable dye to ensure that stumps are not missed.

I. *Cut stump treatment:* Apply the recommended herbicide mixed in water to the cut surface of stumps. Do **NOT** spray the sides of stumps. Apply herbicide mix up to one hour after felling or the cut wood will seal.
II. *Total Stump treatment:* Apply the recommended herbicide mixed in diesel to the cut surface, down the sides of stumps and to any exposed roots. The herbicide mix can be applied even several days after felling. Ensure herbicide can be mixed with diesel.
III. *Stump treatment with herbicide plugs:* After felling, make holes in the stumps and insert plugs containing the herbicide, which is released into the stumps.

c) Control method for seedlings, saplings and coppice:

In a mixed age stand, where there are young plants and coppice growth, cut the plants with a brush cutter and treat the stumps. Hand-pull seedlings. Do not spray foliage as many plants may be damaged during felling and may not absorb enough of the herbicide for effective control. Untreated plants can be controlled with foliar herbicide during follow-up work.

d) Disposal of brushwood:

Where wild fires are a potential hazard, spread out the brushwood evenly over a large area. Avoid large heaps as this is a fire hazard and burning will cause breakdown of the soil structure. Trees that cannot be utilised should be controlled standing to avoid burning large amounts of wood lying on the soil surface.

e) Rehabilitation:

Sow grass in the bare soil around the stumps immediately after the first reliable rains. Spread brushwood over the buried grass seed to aid seedling establishment. Brushwood can be used as fences/barriers and pegged to stabilise slopes where necessary.

8.1.2 Control for shrubs(such as Lantana camara, etc.)

a) Alien shrubs less than 1 m tall

I. Foliar application of a registered herbicide is required.
II. Where grass is present use selective broadleaf herbicides that do not harm the grass.
III. Where grass is absent, use selective or non-selective herbicides.
IV. When dense seedling growth of uniform height is present use knapsack sprayers with flat fan nozzles.
V. Use solid cone nozzles for seedlings of uneven height, coppice growth, root suckers and short saplings.

b) Alien shrubs taller than 1 m

I. *Mechanical Control pre-treatment:* Where shrubs are taller than 1.5 m, the height must be reduced by cutting, using sharpened hoes, cane knives or motorised brush cutters. For large areas of dense growth, use a tractor-mounted gyro-mower (set as low as possible) after slashing or cutting plants, either treat the freshly cut stumps or allow re-growth to knee height and then spray with a suitable registered herbicide.
II. *Cutting for stump treatment:* This is suitable for low - medium density infestations but is usually not practical for high density infestations. Slash plants below 15 cm in height for stump application. Control the stumps immediately after cutting the plants. Stump application is best during the active growing season.
III. *Cutting from coppice treatment*: This is suitable for medium - high density infestations. Slash plants at a convenient height (e.g. knee height for foliar application to coppice re-growth. Cutting dense plants is good winter work but is tiring so must be well organised. Spray coppice re-growth during the active growing season, when there is enough leaf cover to absorb the herbicide.
IV. *Flattening:* Roll empty 200L metal drums or place large pieces of corrugated iron to make paths through dense thickets of plants (e.g. Bramble). This increases access for foliar or stump application.
V. *Cut pathways:* This increases access for control work.
VI. *Mechanical uprooting:* Uprooting of shrubs with mattocks results in soil disturbance, especially where large plants are present in dense thickets. Use only where not susceptible to erosion or where soil can be stabilised effectively.

c) Disposal of small amounts of cut material

Small amounts of cut top growth material do not impede access for follow-up control work. Leave the material to act as mulch and to decompose, or spread over planted grass seed to aid seedling establishment. This adds organic material to the soil.

d) Disposal of large amounts of cut material

Cut the plants and use long poles/branches to roll the material away from stumps. Where cut material hampers access for follow-up control, roll into heaps and burn. Alternatively, spread large amounts of cut material over a large area for a cool burn. This avoids hot intense fires that would destroy the soil surface. Burn during the wet season for a cooler burn.

Rehabilitation: Avoid sowing on compacted soil or soil with a 'crust' as the seed will be washed away after the first rains. In such cases light soil disturbance is necessary e.g. using rakes for broadcast sowing or sharp-pointed hoes for row sowing. Sow suitable grass species on bare soil. Cover the buried seed with small amounts of cut top growth material to aid grass establishment. The material retains moisture in the soil, traps soil after heavy rains, and by rotting ads organic material to the soil to aid seedling establishment.

8.1.3 Chemical control of alien herbs:

a) Herbaceous alien (soft/non-woody) species called alien herbs are likely to occur sporadically along the length of the proposed pipeline development.
b) Alien herbs are called broadleaf weeds and some have pre and post-emergent herbicides registered for their control.
c) However, where alien herbs are associated with woody alien plants, herbicides registered for control of woody aliens are often also used for control of broadleaf weeds.
d) Alternatively, glyphosate is used, as this is often registered for both woody and non-woody species. Glyphosate is a post-emergent (foliar applied) herbicide that is inactivated by soil.

   Rehabilitation: Alien herbs usually occur in disturbed areas, where rehabilitation is not generally a high priority. However in some situations, rehabilitation with grass is required for control of alien herbs.

   Perennial grasses can are often planted after a disturbance to stabilise the soil and suppress alien herbs. Alternatively creeping species that have good soil binding ability prevent erosion. Planting a quick-growing grass on bare soil results in a dense rapid cover that successfully competes with establishing alien herbs.

8.2 Follow-up control

Follow up control of alien seedlings, saplings and coppice re-growth is essential to achieve and sustain the progress made with initial control work. If this phase is neglected, the cleared area will soon become infested with dense alien vegetation again, arising either from re-invasion by the original species or from invasion/encroachment by another species. Follow-up control is essential to prevent alien seedlings suppressing planted or colonizing grasses. Before starting initial control operations in new infestations, all required follow-up control and rehabilitation work must be completed or in progress in areas initially prioritised for clearing and rehabilitation.
Follow-up control should combine the following methods:

a) Chemical control methods (always use registered herbicides);
b) Mechanical control methods, and
c) Available biological control agents

Evaluate and select methods for follow-up control work according to species, and the type and density of re-growth.

8.2.1 Control methods for dense re-growth

a) Dense re-growth may arise after initial control operations, as seedlings, root suckers or stump coppices. For example wattle seedlings are stimulated to germinate after fire or seedlings may arise from a high seed bank in the soil.
b) Do not uproot or hoe out dense seedlings. This would result in soil disturbance that promotes germination and flushes of alien seed growth.
c) Do not cut plants to control stumps where stump density is high. Stump application would be impractical with many untreated stumps.
d) Instead cut tall dense re-growth with brush cutters or bush knives. Remove top growth to allow access for foliar spray of coppice re-growth.

e) Burn high fuel loads of grass below the alien plant infestations. The fire spreads into the infestations, kills many seedlings and opens up access to the infestations. Spot spray coppice re-growth of plants that survive burning.
f) Livestock graze palatable seedlings (e.g. wattle), thereby effectively removing most of the seedlings. Plant grass after the area has been cleared of competition from dense alien seedlings.

8.2.2 Control methods for low-medium density re-growth

Areas with low-medium density re-growth are considered high priority for control as neglect of these areas will result in densification and spread that is more costly to control. Large areas of low density growth can be controlled rapidly.

a) *Cut plants and control the stumps:* Stump height should be less than 15 cm. Use a recommended registered herbicide. Apply the herbicide mix with hand sprayers, paint brushes of knapsack sprayers at low pressure, using solid con nozzles. Use a suitable dye to ensure no stumps are missed. For cut stump treatment, apply the herbicide mixed in water to the cut surface of stumps. Do NOT spray the sides of the stumps. Apply the herbicide within 1 hour of cutting the plants before the wound seals. For total stump treatment, apply a herbicide mixed with diesel to the cut surface, down the sides of stumps and to exposed roots. The herbicide mix can be applied up to several days after cutting the plants.
b) *Foliar spray on coppice re-growth and saplings:* Re-growth can be sprayed up to a height of 1 m. Apply the herbicide in knapsack sprayers using solid cone nozzles with a suitable dye to avoid over- or under-spraying.
c) Mechanical control options:

I. Hand pull seedlings when the soil is wet, using gloves to protect the hands.
II. Grazing will kill palatable seedlings as grass is utilised.
III. Burn grass to control saplings - the control burning of high grass fuel loads is another option in an integrated control programme. Any burning must be done in a controlled, safe manner and according to local burning regulations. Protect neighbouring veld during the burn. Fire can destroy the seedlings of invader species and increase the competitive ability of the grass sward. The control of saplings can only be effective if the fuel load is high. Aim for at least tons of grass per hectare in dry areas and 5 tons per hectare in moist areas. Rest the veld for a period prior to the burn to ensure the accumulation of sufficient fuel loads and burn when conditions will favour a hot fire. Fire alone will not kill the trees, it only kills top growth. Many shrubs and trees coppice after burning. treat any coppice growth with herbicides. If this is not done, the coppices will form multi-stemmed plants.

8.3 Maintenance Control

Aim to keep the area stabilised by maintaining a good grass cover. Prevent further soil disturbance. Planted grass must be maintained as a healthy mat to achieve the aims of rehabilitation. If the grass is neglected, it can become rank and moribund or suppressed by alien plant seedlings. Annual inspection of grass cover and alien plant re-growth is essential. Follow-up and maintenance control work each year will protect the panted grass cover. If this is neglected, the rehabilitated area will revert to dense patches of alien plants, resulting in increased control costs and loss of grass cover.

To keep grass healthy:

a) Use correct animal stocking rates to avoid loss of palatable grass vigour and long-term replacement with unpalatable species in open space areas.
b) Use correct burning frequency and timing of burns in open space areas to allow grasses between 1 and 3 years to become established.
c) Follow-up control work is essential using appropriate measures.

8.4 Integrated Control

Areas should be ranked into high, medium and low priority work areas, where high priority areas would be controlled first.

8.4.1 High Priority Areas for control

a) ***Low density infestations***

I. Start maintenance control in areas with low alien plant numbers, targeting especially mature seed-producing trees (identifiable by the presence of flowers during the flowering season and/or presence of seed), or parent trees that are a source of seed to the site. This may include trees outside of the site, within a minimum of 100 m from the site boundary.

II. Maintenance control is rapid an cost effective.

III. This will protect the grass that is already there, prevent formation of thickets, and halt encroachment (spread) of alien plants into surrounding areas.

b) ***Areas near the top of slopes, water courses, steep bare slopes or long bare slopes***

I. Start control at the top end of water courses or at the top of slopes.

II. This prevents seed spreading downstream or downhill to infest new areas.

III. Plant grasses on bare soil, especially on steep slopes or long bare slopes, to prevent erosion.

c) ***Areas where initial control work is completed and re-growth is present***

I. Complete major follow-up control and rehabilitation work in all areas before starting initial control in new infestations.

II. Control of seedlings protects newly planted grass.

III. Failure to control re-growth results in densification and spread of infestations, with increased control and loss of grass cover.

IV. Continued maintenance is a long-term ongoing exercise to prevent re-infestation.

d) **Newly disturbed areas**

I. Areas where mechanical disturbance (such as removal of alien plants), loss of grass cover or where intense uncontrolled fires occurred provides an ideal seed bed for pioneer alien plant seedling establishment.

II. This re-growth should be controlled while still less that 0.5 m tall.

III. If this is neglected, re-growth will become taller and more dense, resulting in more costly control work and loss of grass cover.

e) ***Edges of dense spreading infestations***

I. Confine infestations when there are insufficient funds to control the whole infestation and where the alien plants are likely to spread and invade neighbouring areas.

II. To prevent spread, control trees, saplings, seedlings, coppice re-growth or shrubs in a 5 - 10 m wide strip around the edges of such infestations to confine them.

III. Move inwards from the edges with control work as funds become available.

f) ***Low density areas inside dense infestations***

I. Thin inside infestations to prevent densification (i.e. control all low-density areas inside the infestations to encourage grass growth. This will break up the large infestations into several smaller infestations that are more easily controlled.

II. Grass will gradually spread into the controlled areas as the alien plants die or are removed. The direction of grass spread therefore follows the control work, as the alien plants die. Sow grass seed in bare soil for a more rapid ground cover, especially on steep slopes or on easily eroded soil.

III. Monitor confined and thinned infestations 2 - 3 times each year. repeat follow-up control operations as required, to ensure the controlled areas remain clear of re-growth and that the planted grass has established and remains healthy. Seedling re-growth will be evident in spring and early summer while re-growth and coppice will be easily observed in summer. When a re-infestation is observed it should be controlled immediately.

8.4.2 Low priority areas for control

a) Stabilised areas where there is a healthy dense grass cover, and any alien plants are very sparse, difficult to detect and with little or no impact at present. Monitor alien plant growth and grass cover 2-3 times a year to ensure timely maintenance work.
b) Areas where dense infestation could become worse. Confine these dense infestations to prevent spread into new areas.
c) Areas where alien plants have little or no impact.

Thus, high priority areas are identified where resources should be concentrated to achieve the desired aims. Control in these areas gives the greatest total benefit, and allows the best use of the limited available resources.

The low priority areas would consume resources with little benefit, and should therefore be ignored or re-evaluated each year for attention at a later date.

9 OPEN SPACE MANAGEMENT PLAN

All recommendations of the Alien Invasive, Plant Rescue & Protection and Re-vegetation & Rehabilitation, Management Plans are applicable to Open Space Areas. For the purposes of the EMPr, Open Space areas should include those areas directly adjacent to the road reserve and infrastructure footprints.

In addition, the following issues should be addressed:

1. Open space areas should be kept as contiguous blocks of vegetation as far as possible and no additional barriers (except for approved roads and fences) should be constructed that may impede faunal movement;
2. All open space areas must be kept alien and weed free;
3. Only indigenous species from a list approved by the ECO may be used for any rehabilitation work in open space areas;
4. No waste should be disposed of in open space areas, including but not restricted to cigarette butts and uneaten foodstuffs (i.e. fruit cores and peels) that may attract scavengers. It is recommended that receptacles be placed strategically to minimise this, especially during the construction phase;
5. A search and rescue operation must be undertaken by a qualified botanist/ horticulturalist prior to construction commencing and species of special concern identified within the development footprints transplanted to a refuge area, this will be once off.
6. Vegetation cleared from the development footprints must not be piled onto adjacent intact vegetation outside of the designated footprint, even for temporary storage.
7. No collection of indigenous plants may be allowed on the property outside of those undertaken by the designated person(s).
8. Employees should undergo environmental awareness training and be sensitized to the need to avoid disturbance to the indigenous vegetation outside the development footprints.
9. Rehabilitation guidelines for the development as a whole must prioritise the use of indigenous grass, tree and shrub species are to be used in the soil stabilisation landscaping of the development once construction is completed, if required.

9.1 Water courses and Wetlands

The following is recommended for the conservation of water courses and wetland habitats onsite:

1. A buffer of 32 m from the channel edge to be kept free of hard standing surface, except for roads and pipeline crossings.
2. Any storm-water management features must be suitably designed and constructed to maintain storm-water flow to acceptable levels and minimise risk of erosion and scouring.
3. No storm-water runoff should be discharged directly into the drainage line/seep, where it could lead to erosion.
4. Alien vegetation growing within the water courses and wetlands and/or buffers directly adjacent to the proposed development should be removed as soon as possible and these areas should be kept weed free.

10 MITIGATION AND/OR MANAGEMENT MEASURES

According to regulation 33 of GN R 543, an environmental management programme must include:

(b) information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –
  (i) planning and design;
  (ii) pre-operations and operations activities;
  (iii) operation or undertaking of the activity;
  (iv) rehabilitation of the environment; and
  (v) closure, where relevant.

(f) As far as reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally acceptable principle of sustainable development, including, where appropriate, concurrent or progressive or progressive rehabilitation measures;

(g) A description of the manner in which it intends to –
  (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
  (ii) remedy the cause of pollution or degradation and migration of pollutants;
  (iii) comply with any prescribed environmental management standards or practices:
  (iv) comply with any applicable provisions of the Act regarding closure where applicable;
  (v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;

(i) the process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;

A variety of potential impacts are associated with the construction activities for this project. These impacts can be categorised as general construction related impacts as well as construction impacts specifically related to this site. General best practice rules to construction should be followed at all times. In addition to this the specific mitigation measures and recommendations as highlighted by the BAR and various specialists for this specific site is highlighted below.

10.1 Planning and Design Phase

RISK	MITIGATION MEASURES
Policy Compliance	• Development should coincide with relevant legislation and/or policy, e.g. ECBCP, Municipal By-laws, SDFs, etc.
Stormwater Management	• Flood attenuation and storm water management plans must be drawn up by a qualified engineer and approved by DEA and DWA. • Flood attenuation and storm water management plans must be drawn up by a qualified engineer and approved by DEA and DWA.
Road design	• Road design plan must be drawn up by a qualified engineer and approved by DEA and DWA. • Ensure that the new road layout does not negatively impact the Riet, and Tarka, Blaukrant and Great Fish Rivers and surrounding area.
Bridge design	• Submit water use licenses for the bridge upgrades. Ensure that DWA approves these licenses before construction starts. • Ensure DWA approves the stream deviation. The deviation must not permanently affect stream flow.

RISK	MITIGATION MEASURES
Heritage	1. The historical distance marker (Hist1) should be treated as a no-go area and must be clearly demarcated and cordoned off to avoid any impact during the construction phase ofupgrade of the N10 (Section 3). 2. If concentrations of archaeological heritage material and human remains are uncovered during construction, all work must cease immediately and be reported to the Albany Museum (046 622 2312) and/or the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/ excavation can be undertaken. 3. Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.
Paleontology	• It is concluded that the construction of the road itself will have a very low chance of impacting on palaeontological resources and this only in a very limited area. No mitigation will therefore be required before, during or after the envisioned cutting.
Waste Management	• Ensure that a proper Waste Management Plan is designed and implemented.
Quarry site	• Refer to the mining EMPr in Appendix G of the BAR.

10.2 Construction Phase

ACTIVITY	COMPLIANCE SPECIFICATION
Site Establishment	• The contractor shall establish his construction camps, offices, workshops and any other infrastructure in previously impacted areas and in a manner that does not adversely affect the environment. • The contractor shall submit a method statement for site clearance for approval by the Project Coordinator in consultation with the ECO. • The Construction camp shall have the necessary ablution facilities with chemical toilets at commencement of construction activities to the satisfaction of the Project Coordinator. Ablution facilities shall be within 100m from workplaces but not closer than 100m from any natural water bodies or boreholes. There should be enough toilets available to accommodate the workforce. • Safe drinking water for human consumption shall be available at the site offices and at other convenient locations on site. • No fires will be allowed outside of the construction camp. Activities which may pose a risk of fire must be identified and suitable measures must be put in place to prevent any possible damage by fire. Firefighting equipment shall be supplied by the Contractor at suitable locations. • The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at a municipal registered landfill. Under no circumstances may solid waste be burnt on site.
Environmental training	• Ensure that all site personnel have a basic level of environmental awareness training. Topics covered should include; o What is meant by “Environment” o Why the environment needs to be protected and conserved o How construction activities can impact on the environment o What can be done to mitigate against such impacts o Awareness of emergency and spills response provisions o Social responsibility during construction of the office park e.g. being

ACTIVITY	COMPLIANCE SPECIFICATION
	considerate to local residents • The need for a "clean site" policy also needs to be explained to the workers.
Erosion	• Wind screening and stormwater control should be undertaken to prevent soil loss from the site. • All erosion control mechanisms need to be regularly maintained. • Re-vegetation of disturbed surfaces should occur immediately after the construction activities are completed.
Air Quality	**Dust control** • Damping down of un-surfaced and un-vegetated areas during dusty periods is required. • Retention of vegetation where possible will reduce dust travel. • Excavations and other clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas. • A speed limit of 30km/h must not be exceeded on dirt roads (if any). • Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. **Emissions control** • Regular servicing of vehicles in order to limit gaseous emissions (to be done off-site). • Regular servicing of on-site toilets to avoid potential odours. • Allocated cooking areas must be provided. **Fire prevention** • All cooking shall be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. • The Contractor shall have operational fire-fighting equipment available on site at all times. The level of firefighting equipment must be assessed and evaluated thorough a typical risk assessment process. It may be required to increase the level of protection, especially during the winter months.
Water Quality	**Sanitation** • Adequate sanitary and ablutions facilities must be provided for construction workers • The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution. **Hazardous materials** • Use and /or storage of materials, fuels and chemicals which could potentially leak into the ground must be controlled in a manner that prevents such occurrences. • All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. • The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential high runoff stormwater events. • Any hazardous substances must be stored at least 100m from any of the water bodies on site. • Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp shall be collected and removed from the site for appropriate disposal at a licensed commercial

ACTIVITY	COMPLIANCE SPECIFICATION
	facility. **Water resources** • Site staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction related activities. • Municipal water (or another source approved by the ECO) should be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc. • Compaction of backfilled material must attain low soil permeability. • Site design and operation must ensure that surface/storm water is diverted away from excavation trenches. • Backfilling of trenches must be done in such a way that water ponding and erosion of the backfilled trench are avoided. **Stormwater** • The site must be managed in a manner that prevents pollution of drains, downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. • Temporary cut-off drains and berms may be required to capture stormwater and promote infiltration. • Hazardous substances must be stored at least 100m away from any water bodies on site to avoid pollution.
Noise	• Construction site yards, workshops, and other noisy fixed facilities should be located well away from noise sensitive areas. • Heavy vehicle traffic should be routed away from noise sensitive areas, where possible. • Blasting operations (if required) are to be strictly controlled with regard to the size of explosive charge in order to minimise noise and air blast, and timings of explosions. The number of blasts per day should be limited, blasting should be undertaken at the same times each day and no blasting may be allowed at night. • Noisy activities to take place during allocated construction hours only as per section 25 of the Noise Control Regulations of the Environment Conservation Act, 1989 (Act No. 73 of 1989) • The contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance.
Waste Management	**Construction rubble** • Construction rubble shall be disposed of in demarcated spoil dumps that have been approved by Inxuba Yethembu Municipality. • Sufficient waste bins must be provided at the construction site for different types of waste disposal and for recycling purposes. • Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. • Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. • All waste must be removed from the site and transported to a landfill site as approved by the Inxuba Yethembu Municipality. **Hazardous waste** • All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of off-site at a licensed landfill site.

ACTIVITY	COMPLIANCE SPECIFICATION
	• Machinery must be properly maintained to keep oil leaks in check. **Remedial actions** • Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. • The ECO must determine the precise method of treatment of polluted soil. • This could involve the application of soil absorbent materials or oil-digestive powders to the contaminated soil. • If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent materials. • Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal.
Security	• No person shall enter the site unless authorised to do so by the contractor, Project Coordinator and ECO. • The site must be secured in order to reduce the opportunity for criminal activity in the locality of the construction site
Social Environment	• A complaints register should be kept on site. Details of complaints should be incorporated into the audits as part of the monitoring process. This register is to be tabled during monthly site meetings. • Where possible unskilled job opportunities should be afforded to local community members.
Traffic Management	• A Traffic Management Plan must be implemented. • The Contractor shall properly mark all access roads. Markers shall show the direction of travel to which the road leads. Roads not to be used shall be marked with a "NO ENTRY" sign. Where required, speed limits shall be indicated on the roads. All speed limits shall be strictly adhered to at all time.
Visual	• Limited mitigation to contain the impact of auxiliary activities such as clearance of vegetation, road construction and control of waste and littering on camp sites.
Soil removal	• Excavated soil can be removed from site and used elsewhere. There are no limitations with regard to disposal or remediation.
Cultural and Heritage Artifacts	• Cultural and Heritage Artifacts, Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artifacts are uncovered in the affected area and mitigation measures recommended by SAHRA should be followed. • The contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ECO so that appropriate action can be taken. • Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. • Permits shall be obtained from the South African Heritage Resources Agency.
Rivers & Streams	• Ensure that no construction rubble is left in these rivers and streams after completion of work. • The river/stream must be returned to its natural state after construction. • Assessment from a specialist is required after completion of the bridge upgrades and must be included in the final ECO report.
Construction site decommissioning	**Removal of equipment** • All structures comprising the construction camp are to be removed from

ACTIVITY	COMPLIANCE SPECIFICATION
	site. • The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc, and these shall be cleaned up and contaminants disposed of appropriately. • All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines as set out in the section on Flora and Fauna that forms part of this document. **Temporary services** • The Contractor must arrange the cancellation of all temporary services. • Temporary roads must be closed and access across these blocked. • All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO. **Associated infrastructure** • Surfaces are to be checked for waste products from activities such as concrete batching and cleared in a manner approved by the ECO. • All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. • All rubble is to be removed from the site to an approved disposal site as approved by the ECO. Burying of rubble on site is prohibited. • The site is to be cleared of all litter. • The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials. • Fences, barriers and demarcations associated with the construction phase are to be removed from the site. • All residual stockpiles must be removed or spread on site as directed by the ECO. • All leftover building materials must be removed from the site. • The Contractor must repair any damage that the construction works has caused to neighboring properties, specifically, but not limited to, damage caused by poor storm water management. • Final inspection in order to ensure adherence to EMPr guidelines, completion of localised/ remaining areas of impact, monitoring of rehabilitation success, etc.
Quarry site	• Refer to the mining EMPr in Appendix G of the BAR.

10.3 Operational Phase

RISK	MITIGATION MEASURES
Maintenance	• Regular inspection of the road by SANRAL must take place to monitor its up keep.

11 ENVIRONMENTAL MONITORING

According to regulation 33 of GN R 543, an environmental management programme must include:

(e) proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;

11.1 General environmental monitoring

A monitoring programme will be implemented for the duration of the construction of the N10 road upgrade in Middelburg. This programme will include:

- Establishing a baseline through the taking of photographs of identified environmental aspects and potential impact sites along the routes prior to construction
- Bi-weekly (fortnightly) monitoring during the first month of construction where after monthly audits will be conducted by the Environmental Control Officer for the remainder of the construction phase to ensure compliance to the EMPr conditions, and where necessary make recommendations for corrective action. These audits can be conducted randomly and do not require prior arrangement with the Project Coordinator.
- Compilation of an audit report with a rating of compliance with the EMPr. The ECO shall keep a photographic record of any damage to areas outside the demarcated site and construction area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage should be directed to the ECO for appraisal. The Contractor shall be held liable for all unnecessary damage to the environment. A register shall be kept of all complaints from the Landowner or community. All complaints / claims shall be handled immediately to ensure timeous rectification / payment by the responsible party.

12 ENVIRONMENTAL AWARENESS

According to regulation 33 of GN R 543, an environmental management programme must include:

(j) An environmental awareness plan describing the manner in which –

(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and

(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment;

Contractors shall ensure that its employees and any third party who carries out all or part of the Contractor's obligations are adequately trained with regard to the implementation of the EMPr, as well as regarding environmental legal requirements and obligations. Training shall be conducted by the ECO where necessary.

Environment and health awareness training programmes should be targeted at three distinct levels of employment, i.e. the executive, middle management and labour. Environmental awareness training programmes shall contain the following information:

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

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

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

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

Recommended Environmental Education Material is provided in Appendix 1

12.1 Monitoring of environmental training

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

13 COMPLIANCE WITH THE EMPr

According to regulation 33 of GN R 543, an environmental management programme must include:

(e) Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;

(i) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;

A copy of the EMPr must be kept on site at all times during the construction period. The EMPr will be binding on all contractors operating on the site and must be included within the Contractual Clauses.

It should be noted that in terms of the National Environmental Management Act No 107 of 1998 (Section 28) those responsible for environmental damage must pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and/or environmental damage (The 'polluter pays' principle).

13.1 Non-compliance

The contractors shall act immediately when 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. The ECO should be made aware of any complaints.

Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant authority for them to deal with the transgression, as it deems fit.

The Contractor is deemed not to have complied with the EMPr if, *inter alia*:

- there is evidence of contravention of the EMPr specifications within the boundaries of the construction site, site extensions and roads;
- there is contravention of the EMPr specifications which relate to activities outside the boundaries of the construction site.
- environmental damage ensues due to negligence;
- construction activities take place outside the defined boundaries of the site; and/or
- the Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time period.

It is recommended that the engineers/contractors institute penalties for the following less serious violations and any others determined during the course of work as detailed below:

- Littering on site.
- Lighting of illegal fires on site.
- Persistent or un-repaired fuel and oil leaks.
- Any persons, vehicles or equipment related to the Contractor's operations found within the designated "no-go" areas.
- Excess dust or excess noise emanating from site.
- Possession or use of intoxicating substances on site.
- Any vehicles being driven in excess of designated speed limits.
- Removal and/or damage to fauna, flora or cultural or heritage objects on site.
- Urination and defecation anywhere except at designated facilities.

13.2 Emergency preparedness

The Contractor shall compile and maintain environmental emergency procedures to ensure that there will be an appropriate response to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the construction period. Such activities may include, *inter alia*:

- Accidental discharges to water and land.
- Accidental exposure of employees to hazardous substances.
- Accidental fires.
- Accidental spillage of hazardous substances.
- Accidental toxic emissions into the air.
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans shall include:

- Emergency organisation (manpower) and responsibilities, accountability and liability.
- A list of key personnel and contact details.
- Details of emergency services available (e.g. the fire department, spill clean-up services, etc.).
- Internal and external communication plans, including prescribed reporting procedures where required by legislation.
- Actions to be taken in the event of different types of emergencies.
- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.
- Training plans, testing exercises and schedules for effectiveness.

The Contractor shall comply with the emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), the NEMA, 1998 (Act No 107 of 1998), the National Water Act, 1998 (Act No 36 of 1998) and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) as amended and/or any other relevant legislation.

13.3 Incident reporting and remedy

If a leakage or spillage of hazardous substances occurs on site, the local emergency services must be immediately notified of the incident. The following information must be provided:

- the location;
- the nature of the load;
- the extent of the impact; and
- the status at the site of the accident itself (i.e. whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records must be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

13.4 Penalties

Where environmental damage is caused or a pollution incident, and/or failure to comply with any of the environmental specifications contained in the EMPr, the developer and/or contractor shall be liable.

The following violations, and any others determined during the course of work, should be penalised:

- Hazardous chemical/oil spill and/or dumping in non-approved sites.
- Damage to sensitive environments.
- Damage to cultural and historical sites.
- Unauthorised removal/damage to indigenous trees and other vegetation, particularly in identified sensitive areas.
- Uncontrolled/unmanaged erosion.
- Unauthorised blasting activities (if applicable).
- Pollution of water sources.
- Unnecessary removal or damage to trees.

14 CLOSURE PLANNING

According to regulation 33 of GN R 543, an environmental management programme must include:
(k) where appropriate, closure plans, including closure objectives.

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

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

14.1 Post-Construction environmental audit

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

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

14.2 Management review and revision of the EMPr

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

14.3 General review of EMPr

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

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

15 REPORTING

15.1 Administration

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

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

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

The ECO and/or engineer may provide comment on the methodology and procedures proposed by the Contractor 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.

15.2 Good housekeeping

The contractor shall undertake "good housekeeping" practices during construction. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole. Good housekeeping extends beyond the wise practice of construction methods that leaves production in a safe state from the ravages of weather to include the care for and preservation of the environment within which the site is situated.

15.3 Record keeping

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

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

A list of reports likely to be generated during all phases of N10 Road Upgrade Project is provided below, and all applicable documentation must be included in the environmental filing system catalogue or document retrieval index.

- Final Environmental Impact Assessment Report.
- Environmental Management Plan.
- Final design documents and diagrams issued to and by the Contractor.
- All communications detailing changes of design/scope that may have environmental implications.

- Daily, weekly and monthly site monitoring reports.
- Complaints register.
- Medical reports.
- Training manual.
- Training attendance registers.
- Incident and accident reports.
- Emergency preparedness and response plans.
- Copies of all relevant environmental legislation.
- Permits and legal documents, including letters authorising specific personnel of their duties as part of emergency preparedness teams e.g. fire teams, etc.
- Crisis communication manual.
- Disciplinary procedures.
- Monthly site meeting minutes during construction.
- All relevant permits.
- Environmental Authorisation on the EIA from the DEDEA.
- All method statements from the Contractor for all phases of the project.

15.4 Document control

The Contractor and resident engineer shall be responsible for establishing a procedure for electronic document control. The document control procedure should comply with the following requirements:

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

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

16 CONCLUSIONS

Although all foreseeable actions and potential mitigations or management actions are contained in this document, the EMPr should be seen as a day-to-day management document. The EMPr thus sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the N10 road upgrade as detailed in the BAR and specialist reports. The EMPr could thus change daily, and if managed correctly lead to a successful construction and operational phases.

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

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

APPENDIX 1

PROPOSED ENVIRONMENTAL EDUCATION COURSE

WHAT IS THE ENVIRONMENT?

- Soil
- Water
- Plants
- People
- Animals
- Air we breathe
- Buildings, cars and houses

WHY MUST WE LOOK AFTER THE ENVIRONMENT?

- It affects us all as well as future generations
- We have a right to a healthy environment
- A contract has been signed
- Disciplinary action (e.g. construction could stop or fines issued)

HOW DO WE LOOK AFTER THE ENVIRONMENT?

- Report problems to your supervisor/ foreman
- Team work
- Follow the rules in the EMP

WORKING AREAS

Workers & equipment must stay inside the site boundaries at all times

RIVERS & STREAMS

- Do not swim in or drink from streams
- Do not throw oil, petrol, diesel, concrete or rubbish in the stream
- Do not work in the stream without direct instruction
- Do not damage the banks or vegetation of the stream

ANIMALS

- Do not injure or kill any animals on the site
- Ask your supervisor or Contract's Manager to remove animals found on site

TREES AND FLOWERS

- Do not damage or cut down any trees or plants without permission
- Do not pick flowers

SMOKING AND FIRE

- Put cigarette butts in a rubbish bin
- Do not smoke near gas, paints or petrol
- Do not light any fires without permission
- Know the positions of fire fighting equipment
- Report all fires
- Do not burn rubbish or vegetation without permission

PETROL, OIL AND DIESEL

- Work with petrol, oil & diesel in marked areas
- Report any petrol, oil & diesel leaks or spills to your supervisor
- Use a drip tray under vehicles & machinery
- Empty drip trays after rain & throw away where instructed

DUST

Try to avoid producing dust – Use water to make ground & soil wet

NOISE

- Do not make loud noises around the site, especially near schools and homes
- Report or repair noisy vehicles

TOILETS

- Use the toilets provided
- Report full or leaking toilets

EATING

- Only eat in demarcated eating areas
- Never eat near a river or stream
- Put packaging & leftover food into rubbish bins

RUBBISH

- Do not litter – put all rubbish (especially cement bags) into the bins provided
- Report full bins to your supervisor
- The responsible person should empty bins regularly

TRUCKS AND DRIVING

- Always keep to the speed limit
- Drivers - check & report leaks and vehicles that belch smoke
- Ensure loads are secure & do not spill

EMERGENCY PHONE NUMBERS

Know all the emergency phone numbers:

- Ambulance:
- Fire:
- Police:

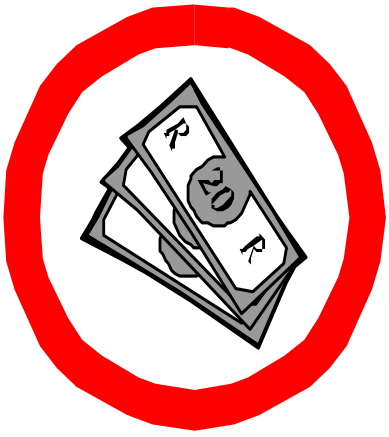
Chris Hani District Municipality:

FINES AND PENALTIES

- Spot fines of between

To be confirmed by Engineer

- Your company may be fined
- Removal from site
- Construction may be stopped



PROBLEMS - WHAT TO DO!

- Report any breaks, floods, fires, leaks and injuries to your supervisor
- Ask questions!

APPENDIX 2

PRO-FORMA: PROTECTION OF THE ENVIRONMENT

To be signed by Contractors

PRO FORMA

Employer_____
Contract No_____
Contract title_____

PROTECTION OF THE ENVIRONMENT

The Contractor will not be given right of access to the site until this form has been signed.

I/ we_____(Contractor) record as follows:

1. I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the increasing requirement by society that construction activities shall be carried out with due regard to their impact on the environment.

2. In view of this requirement of society and a corresponding requirement by the Employer with regard to this Contract, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate employees, plant, materials and methods of construction, in so far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognise and accept the need to abide by the "precautionary principle" which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.

3. I/ we acknowledge and accept the right of _____ to deduct, should they so wish, from any amounts due to me/us, such amounts (hereinafter referred to as fines) as the Resident Engineer and Environmental Site Officer shall certify as being warranted in view of my/ our failure to comply with the terms of the Contract dealing with protection of the environment, subject to the following:

3.1 The Resident Engineer and Environmental Officer, in determining the amount of such fine, shall take into account *inter alia*, the nature of the offence, the seriousness of its impact on the environment, the degree of prior compliance/non-compliance, the extent of the Contractor's overall compliance with environmental protection requirements and, in particular, the extent to which he considers it necessary to impose a sanction in order to eliminate/reduce future occurrences.

3.2 The Resident Engineer and Environmental Officer shall, with respect to any fine imposed, provide me/ us with a written statement giving details of the offence, the facts on which the Resident Engineer and Environmental Officer has based his assessment and the terms of the Contract (by reference to the specific clause) which has been contravened.

Signed_____
CONTRACTOR

Date_____