Lidwala
Environmental & Planning Services

South African National Roads Agency (SOC) Limited (SANRAL)

EMPr for the rehabilitation of the N11 Section 10 from Middelburg to Loskop Dam and the Kranspoort Safety Improvement, Mpumalanga Province

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GLOSSARY OF TERMS AND ABBREVIATIONS

CONTRACTOR:
A person or company appointed by SANRAL to carry out stipulated activities.

EMERGENCY
An undesired event that does result in a significant environmental impact and requires the notification of the relevant statutory body such as a local authority.

EMISSIONS:
The release or discharge of a substance into the environment, which generally refers to the release of gases or particulates into the air.

EMPr:
Environmental Management Programme. A detailed plan of action prepared to ensure that recommendations for preventing the negative environmental impacts and where possible improving the environment are implemented during the life-cycle of a project.

ENVIRONMENT:
In terms of the National Environmental Management Act (NEMA) (No 107 of 1998), "environment" means the surroundings within which humans exist and that are made up of:

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

ENVIRONMENTAL CONTROL OFFICER:
A suitably qualified individual who would on behalf of SANRAL, on a regular basis monitors the project compliance with conditions of the Record of Decision, environmental legislation and recommendations of this Environmental Management Programme.

ENVIRONMENTAL IMPACT
A change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

SANRAL'S PROJECT MANAGER:
The SANRAL appointed person, appointed to act as the manager of the project on behalf of SANRAL.

INCIDENT

An undesired event which may result in a significant environmental Impact but can be managed through internal response.

CONSTRUCTION MANAGER:

The SANRAL appointed person, appointed to act as Construction Manager and is responsible for managing the construction process on site.

1 INTRODUCTION

1.1 Overview of the Proposed Project

The South African National Roads Agency Limited (SANRAL) (SOC) LIMITED was established in April 1998 by an Act of Parliament as an independent statutory company operating along commercial lines and at arm's length from Government. The purpose of the company is to strategically plan, design, construct, rehabilitate and maintain South Africa's national road network.

The project section of the National Route 11 Section 10 traverses flat to rolling terrain of very shallow cut and fills over most of its length. There are two pass sections (km 33 to km 38 and km 47 to km 50) where there are deep cuts and fills. The N11 Section 10 route is currently not constructed to SANRAL class 2 standards and is geometrically constrained through these two pass sections. The lanes are relatively narrow (3,5m) and have narrow gravel shoulders. Sight distances on many of the vertical / horizontal curves are limited. There is limited climbing or auxiliary lanes over these sections and passing or stopping in the two pass sections is very dangerous.

The road section though the Kranspoort Pass (km 33 to km 38) has a very high accident rate due to the sharp bends located at the bottom of the pass. These bends are preceded by a sustained downgrade, resulting in runaway trucks not being able to negotiate the bends. Many lives have been lost on this pass. In addition, the pass has to be closed for long periods of time when the resulting wreckage needs to be cleared.

The South African National Roads Agency (SOC) Limited [SANRAL] has therefore carefully considered the above and has identified the need to rehabilitate the N11 Section 10. The proposed Scope of Work includes the following:

<u>Road works:</u>

1. Widening of the existing road to include surfaced shoulders;
2. Addition of a fourth lane and safety improvements to the Kranspoort Pass, resulting in a major cut widening;
3. Provision of climbing lanes / overtaking lanes where required;
4. Upgrading of existing and installation of new storm water culverts;
5. Widening of major in-situ culverts;
6. Vertical and horizontal realignment of the road at several points along the route;
7. Widening of the existing road reserve / land acquisition will be necessary due to the out widening of the Kranspoort Pass;
8. Upgrading of existing intersections / rationalization of private road accesses; and
9. Relocation of utility services affected by the upgrading of the road.

<u>Bridges:</u>

1. Widening and rehabilitation of two (2) existing bridges.

Currently the N11 Section 10 is a single carriageway which links the towns of Middelburg and Groblersdal. SANRAL investigated a few solutions to compensate for the road degradation and safety aspect along the entire length of the N11 from Middelburg to Loskop Dam. First a patch and reseal solution was looked aimed at 5 to 10 years, however due to the road degradation, this was not seen as a feasible solution. The short term patch and reseal solution was rejected due to its volume and cost. Thereafter a medium term solution was investigated at Middelburg and Loskop Dam and while a long term solution for Kranspoort (i.e 20 to 25 years) was investigated. However, after consultation with SANRAL, it was decided that the long term solution will be the best suited for the entire N11 road rehabilitation from km 3,4 to km 53.4.

In terms of traffic loading the existing road has a cross section of two 3,5 m lanes and 1.5 m un-surfaced shoulders which equates to a road class 4. The projected traffic loading scenario would place the pavement structure for the N11 as a requirement at a ES10 category (3,0 - 10,0 million E80's) for the long term structural period of up to 20 - 25 years.

The designed pavement structure is made up of: a double seal over the surfaced roadway, gravel wearing course over the gravel shoulders; new 150mm G1 base; 200mm G5 sub-base (to be stabilised with existing base) , 150 mm G7 upper selected and fill G9 lower selected or better.

All culverts along the route are of concrete pipe type. Most of the culverts are in good condition however; their headwalls have either not been provided or are damaged stone pitched headwalls. These headwalls will be replaced with concrete headwalls and wing walls.

Five (5) bridges are located along the N11 Section 10 on route. Three (3) of the bridges will require minor upgrades and general enhancements in terms of guard railings, replace existing steel parapet with F-shape parapet, etc. Major upgrades are required for two (2) bridges:

Keerom Spruit (km 6.6): The existing bridge is 19.6 m in length with a 4 span simply supported structure. The bridge was found to be narrow and have damaged wingwalls. It is recommended to increase the roadway width to 12.4 m by widening the bridge and raising the gradeline, therefore increasing the radius of the vertical alignment of the bridge and improving the visibility over the bridge. The current bridge caters for a 1:5 year flood and failed to meet the required the class 3 standards for an existing bridge. Due to this, it needs to be upgraded to a class 2 to cater for the Q50 or 1:50 year flood.

Kranspoort Bridge (km 44.5): The bridge was found to be narrow with a road width of 7.8 m. It caters for the Q20 or 1:20 year reoccurring flood and meets the required class 3 standards for an existing bridge. It is therefore recommended to increase the roadway width to 12.4 m by widening the bridge.

Under the new EIA Regulations of 2010 the activities that require authorisation in terms of the Regulation 544 are:

- Activity No. 11 as per regulation R.544: The construction of Bridge where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development.

- Activity No. 18 as per regulation R.544: The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 cubic metres from a watercourse;

- Activity No. 39 as per regulation R.544: The expansion of bridges within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, where such expansion will result in an increased development footprint but excluding where such expansion will occur behind the development setback line.

- Activity No. 40 as per regulation R.544: The expansion of infrastructure by more than 50 square metres within a watercourse or within 32 metres of a watercourse measured from the edge of a watercourse, but excluding where such expansion will occur behind the development line.

- Activity No. 47 as per regulation R.544: The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre where the existing reserve is wider than 13,5 meters.

- Activity No. 12 as per regulation R.546: The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetation cover constitutes indigenous vegetation. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004 within critical biodiversity areas identified in bioregional plans.

- Activity No. 19 as per regulation R.546: The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre outside urban areas, in:
  (aa) A protected area identified in terms of NEMPAA, excluding conservancies;
  (bb) areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, or zoned for a conservation purpose.

- Activity No. 24 as per regulation R.546: The expansion of infrastructure where the infrastructure will be expanded by 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the

edge of a watercourse, excluding where such construction will occur behind the development setback line outside urban areas, in:
(aa) A protected area identified in terms of NEMPAA, excluding conservancies;
(bb) National Protected Area Expansion Strategy Focus areas;
(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;
(dd) Sites or areas identified in terms of an International Convention ;
(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
(ff) Core areas in biodiversity reserves;
(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;
(hh)Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined.
Inside urban areas:
(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.

Therefore, the proposed expansion and widening of the bridge must undertake Basic Assessment (BA) process to satisfy the NEMA regulations. In order to comply with the requirements of the National Environmental Management Act, 1998, and respective EIA Regulations, this report will be submitted to the National Department of Environmental Affairs (DEA). This is to ensure also that the environmental impacts (negative or positive) of the proposed expansion and widening of the bridge structure are addressed, and that a management plan is put in place.

1.2 Applicable Documentation

The following environmental documentation is applicable for the project, and will be read in conjunction with this EMPr:

- The Basic Assessment Report for the upgrading of the N11 Bridge between Middelburg and Loskop Dam
- Environmental Authorisation issued by the Department of Environmental Affairs (still to be issued).
- All relevant Operational Control documents forming part of the SANRAL's Environmental Management System.

1.3 Structure of the Environmental Management Plan

The EMPr provides mitigation and management measures for the following phases of the project:

- *Construction Phase*
  This section of the EMPr provides management principles for the construction phase of the project. Environmental actions, procedures and responsibilities as required within the construction phase are specified. These specifications will form part of the contract documentation and, therefore, the Contractor will be required to comply with the specifications to the satisfaction of the Project Manager and Environmental Control Officer, in terms of the construction contract.

- *Operation 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 within the operation and maintenance phase are specified.

All relevant environmental legislation pertaining to the project is listed in **Section 3**. The Contractor and the client are required to comply with this legislation for all phases of the project. This list is intended to serve as a guideline only for the Contractor and is not exhaustive.

This EMPr is a dynamic document which will be updated as required on a continuous basis. Any amendments made, must be submitted to both the Environmental Control Officer (ECO) and Project Manager for approval prior to implementation.

1.4 Objectives of the EMPr

The EMPr has the following objectives:

- To outline functions and responsibilities of responsible persons.
- To state standards and guidelines, which are required to be achieved in terms of environmental legislation.
- To outline mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the project.
- To prevent long-term or permanent environmental degradation.

2 MANAGEMENT PROCEDURES

2.1 Organisational Structure and Responsibility

2.1.1 Functions and Responsibilities

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager, Construction Manager and Environmental Officer for the construction phase of this project are as detailed below.

The Project Manager will:

- Ensure that all stipulations within the EMPr is communicated and adhered to by SANRAL and its Contractor(s).
- Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- Be fully conversant with the EIA for the project and the conditions of the EA (once issued).

The Construction Manager (SANRAL's Representative) will:

- Be fully conversant with the EIA.
- Be fully conversant with the conditions of the EA.
- Be fully conversant with the EMPr.
- Have overall responsibility for the implementation of the EMPr.
- Liaise with the Project Manager or his delegate, the Environmental Control Officer (ECO) and relevant discipline Engineers on matters concerning the environment.
- Prevent actions that will harm or may cause harm to the environment, and take steps to prevent pollution on the site.
- Confine activities to the demarcated construction site.

The Environmental Control Officer (ECO) will:

- Be fully conversant with the EIA.
- Be fully conversant with the conditions of the EA
- Be fully conversant with the EMPr.
- Convey the contents of this document to the Contractor site staff and discuss the contents in detail with the Project Manager and Contractor.
- Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMPr.
- Take appropriate action if the specifications contained in the EMPr are not followed.
- Monitor and verify that environmental impacts are kept to a minimum, as far as possible.

- Review and approve construction methods, with input from the Construction Manager, where necessary.
- Ensure that activities on site comply with all relevant environmental legislation.
- Order the removal of person(s) and/or equipment in contravention of the specifications of the EMPr.
- Compile progress reports on a regular basis, with input from the Construction Manager, for submission to the Project Manager, including a final post-construction audit.
- Liaise with the Construction Manager regarding the monitoring of the site.
- Report any non-compliance or remedial measures that need to be applied.

Contractors and Service Providers:

All contractors (including subcontractors and staff) and service providers are ultimately responsible for:

- complying with the environmental management specifications;
- adhering to any instructions issued by the Project Manager on the advice of the ECO;
- adhere to the SANRAL incident reporting procedures and report incidents as soon as they occur;
- keep on file the list of transgressions issued by the ECO in the site office;
- maintaining a public complaints register; and
- arrange that all his employees and those of his subcontractors receive training before the commencement of construction.

2.2 Awareness and Competence

It is important to ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimisation of environmental harm.

To achieve effective environmental management, it is important that employees, Contractors and Subcontractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. Environmental training must include the following:

- Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment;
- Employees will be thoroughly familiar with the requirements of the EMPr.
- Employees must undergo training for the operation and maintenance activities associated with the project and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Records must be kept of those that have completed the relevant training.

- Training must include the environment, health and safety as well as basic HIV/AIDS education.

Training can be done either in a written or verbal format but will be in an appropriate format for the receiving audience. Where training has been done verbally, persons having received training must indicate in writing that they have indeed attended a training session and have been notified in detail of the contents and requirements of the EMPr.

2.3 Monitoring

The Environmental Control Officer will ensure compliance with the EMPr, and will manage the monitoring activities. The Environmental Control Officer will report to the Construction Manager should any non-compliance be evident or corrective action necessary. Only in severe cases of non-compliance, or repeated offences, will the Environmental Control Officer be required to report to the Project Manager.

All instruments and devices used for the measurement or monitoring of any aspect of this EMPr must be calibrated and appropriately operated and maintained.

2.4 Non-Conformance and Corrective Action

The auditing of the project may identify non-conformances of the EMPr. Non-conformances may also be identified though incidents, emergencies or complaints. In order to correct these non-conformances, the source must be determined and corrective actions must be identified.

2.4.1 Compliance with the Environmental Management Plan Specifications and/or Environmental Authorisation conditions

- The EMPr will be available on-site at all times.
- All persons employed by the Contractor or his sub-contractors will abide by the requirements of the EMPr.
- Any members of the construction workforce found to be in breach of any of the specifications contained within the EMPr may be ordered by the Construction Manager to leave the site. The order may be given orally or in writing. Confirmation of an oral order will be provided as soon as practically possible, but the absence of a written order will not be cause for an offender to remain on site. No extension of time will be granted for any delay or disadvantage to the Contractor brought about by an offender ordered to leave the site.
- The Contractor will not direct a person to undertake any activity which would place them in contravention of the specifications contained within the EMPr.
- Should the Contractor be in breach of any of the specifications contained in the EMPr, the Construction Manager will, in writing, instruct the Contractor responsible for the incident of non-compliance regarding corrective and/or remedial action required, specify a timeframe for implementation of these actions, implement a penalty and/or indicate that work will be suspended should non-compliance continue.

- Should non-compliance continue, further written notification will be forwarded to the Contractor responsible for the incident of non-compliance outlining the required corrective and/or remedial action, the timeframe for implementation, penalties and/or work will be suspended as specified previously.
- The Contractor will be responsible and will bear the cost of any delays, corrective or remedial actions required as a result of non-compliance with the specifications and clauses of the EMPr.
- Departmental officials will be given access to the property referred to in the EA for the purpose of assessing and/or monitoring compliance with the conditions contained in the EA, at all reasonable times.

2.5 Documentation and Reporting

The following documentation must be kept on site in order to record compliance with the EMPr:

- Record of Complaints
- Record of Emergencies and Incidents.

The Contractor will report on the following

- incidents involving the Contractor and/or public;
- environmental complaints and correspondence received from the public to the Construction Manager or the Environmental Control Officer; and
- incidents that cause harm or may cause harm to the environment.

The above records will form an integral part of the Contractors' Records. These records will be kept with the EMPr, and will be made available for scrutiny if so requested by the Construction Manager or his delegate and the Environmental Control Officer.

The Contractor will ensure that the following information is recorded for all complaints / incidents / emergencies:

- Nature of complaint / incident / emergency;
- Causes of complaint / incident / emergency;
- Party / parties responsible for causing complaint / incident / emergency;
- Immediate actions undertaken to stop / reduce / contain the causes of the complaint / incident / emergency;
- Additional corrective or remedial action taken and / or to be taken to address and to prevent reoccurrence of the complaint/incident / emergency;
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions;
- Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented; and
- Copies of all correspondence received regarding complaints/incidents/emergency.

2.6 Public Communication

A signboard must be erected at the entrance to the construction site, informing the public of the construction activities taking place. The signboard must include the following information:

- The name of the contractor; and
- The name and contact details of the site representative to be contact in the event of emergencies or complaint registration.

3 ENVIRONMENTAL GUIDELINES, STANDRADS AND PERMITS

3.1 Legal Summary

The following is a summary of the applicable environmental legislation for the project.

APPLICABLE LEGISLATION ALREADY IN EFFECT AT DATE OF THIS EMPr
National Legislation
Constitution of South Africa (Act No. 108 Of 1996)
Environment Conservation Act (Act No. 73 Of 1989)
National Environmental Management Act (Act No. 107 Of 1998)
Occupational Health and Safety Act (Act No. 85 Of 1993)
National Water Act (Act No.36 of 1998)
Water Service Act, 1997 (Act No. 108 of 1997)
National Environmental Management Amendment Act, 2004 (Act No. 8 of 2004)
South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998)
National Heritage Resources Act, 1999 (Act No. 25 of 1999)
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
National Forests Act (Act No. 84 of 1998)

3.2 Environmental Guidelines and Standards

All applicable environmental standards contained within the environmental legislation will be adhered to. At the time of compiling this draft EMPr, the following environmental guidelines and standards were identified as being applicable.

3.2.1 Air Quality Guidelines

Currently air pollution in South Africa is regulated under the National Environmental Management: Air Quality Act 39 of 2004, which replaced the Atmospheric Pollution Prevention At 45 of 1965 (APPA). The new Act was signed by the President and gazetted in February 2005 and sections of the act have come into force subsequently.

3.2.2 Blasting Regulations and Standards

Wherever blasting activity may be required on the site, the Contractor will rigorously adhere to the relevant statutes and regulations that control the use of explosives. It is, however, unlikely that blasting will be required for this project.

3.2.3 Control of Alien Vegetation

In terms of Government Notice R1048, the following regulations are applicable with regards to the control of invasive alien vegetation and declared weeds:

- It is illegal to have declared weed species or invasive alien vegetation on one's property;
- The landowner must immediately take steps to eradicate them by using the methods prescribed in the regulations, namely:
  - uprooting and burning, or
  - the application of a suitable chemical weed-killer (herbicide), or
  - any other method of permanent eradication.
- One may not uproot or remove such plants and dump or discard them elsewhere to re-grow or allow their seeds to be spread or blown onto other properties; and
- If the landowner does not comply with requirements above, a person may be found guilty of a criminal offence.

3.2.4 Waste Disposal

All waste (general and hazardous) generated during the construction phase may only be disposed of at appropriately licensed waste disposal sites (in terms of the National Environmental Management: Waste Act No 59 of 2008).

3.2.5 Removal of Protected trees

In terms of the National Forests Act (Act No. 84 of 1998), a permit is required to be obtained for the removal of any protected tree, as listed in the National Forests Act.

3.3 Environmental Permitting Requirements

Environmental permits, which will be required to be obtained for construction and operation, are discussed briefly below. These will be required to be obtained before construction commences.

3.3.1 Abstraction of Water

SANRAL must ensure that they comply with the provisions of the National Water Act, and obtain the relevant water use licence from DWA in terms of Section 21 of the National Water Act (No 36 of 1998).

3.3.2 Heritage Sites

In terms of the National Heritage Resources Act (No 25 of 1999), a permit is required to be obtained for the disturbance, removal or destruction of any national and provincial heritage sites, archaeological and paleontological sites, burial grounds and graves and public monuments and memorials.

3.3.3 Public Health

Ablution facilities must be approved by the nearest local authority in terms of their by-laws and relevant provincial standard by-laws. These facilities do not fall under provisions

of the National Water Act (No 25 of 1999). Chemical toilets must be provided on site during the construction phase and must be emptied at regular intervals. No other types of ablution facilities are permitted on site.

4 SITE SPECIFIC MITIGATION MEASURES

This section details the specific mitigation measures as outlined by the specialists involved in the Basic Assessment study.

4.1.1 Construction

Environmental management at the crossing site

Before construction is initiated at the wetland crossing, a detailed construction method statement should be provided in accordance with all applicable authorisations. The method statement should include but not be limited to the following:

- A biophysical description of the site (profile, depth and width of channel(s), geo-technical drawings, detail vegetation cover, etc);
- The proposed timing and duration of wetland crossing construction;
- A list of the typical types of equipment that will be used for construction activity and for the control of water;
- Measures that will be used to control the following risk:
    - Suspended sediment and turbidity (e.g. berms, hay bales, bidem curtains, river diversions, settling ponds).
    - Damage to riparian (seasonal/temporary zone) vegetation.
    - Spillage of fuels and oils, cement and other foreign materials.
- Measures that will be used to stabilise wetland bed and banks after construction and to return the channel to its pre-construction profile or to a more stable profile.

It is important that the construction activity complies with any condition set worth by applicable authorities. Additionally, during construction the riparian and in-stream damage should be controlled. In the event of aquatic organism stress caused by the earthworks which, in the judgment of a specialist, could have irreversible effects on the associated ecosystem or individual species, construction activities should halt until corrective measures have been taken.

With reference to the actual crossing technique, the construction team will probably have to isolate or divert flow to create a dry working area. Flow diversions are associated with increased risk of erosion and sedimentation. The following general guidelines will help manage to decrease the associated sediment/erosion risk:

- Elimination of surface flow through the construction site.
- The use of non-erodible materials for the construction of any berms, coffer dams or other isolation structures used in a works within a flowing watercourse.
- The use of silt fences or hay bales to isolate the construction area from the water body.
- Spoils should be placed above the high water mark in distinct piles and adequate erosion measures need to be implemented in order to minimise and reduce erosion and siltation into the watercourse.
- The treatment of any water removed from the isolation area, prior to discharge back into the downstream river course, to remove suspended sediment.

Pollution Prevention/Control at Keerom and Kranspoort River crossings

The following section provides a generic overview of pollution prevention measures that should be adhered to during the construction phase:

- No dumping of any building rubble, soil, litter, organic matter or chemical substances may occur within the associated wetland. Dumping and temporary storage of the above shall only occur at predetermined locations.
- Construction works should not use the water body for sanitation purposes.
- Erosion and silt control mechanisms must be in place prior to the onset of construction within any wetland
- The treatment of any water removed from the isolation area, prior to discharge back into the downstream river course, to remove suspended sediment.
- Clearing needs to be limited in order to prevent erosion and the loss of riparian habitat and clearing of the banks and slopes should only take place immediately before construction commences
- Erosion control measures should be inspected regularly during the course of construction and necessary repairs need to be are carried out if any damage has occurred.
- Silt fences or hay bales need to be placed near the base of a slope in order to limit the amount of silt entering the watercourse. Silt fences need to be inspected regularly, especially after heavy rainfall events.
- Contingency plans need to be established in case of fuel or hazardous waste spills, storm water runoff and flood events.
- With regards to construction equipment, changing the oil, refueling and lubricating mobile and immobile construction equipment needs to be carried out well away from the normal high water mark of the system in order to minimize spillage and prevent the potential for water pollution.
- It is also recommended that construction activity should make use of "seasonal construction window" (March to September). This will further reduce the risk associated with erosion/siltation.

4.1.2 Rehabilitation

The main rehabilitation objectives from an aquatic functionality point include the following:

- Full restoration of hydrological functionality at crossings.
- Full rehabilitation of wetland bed and banks.
- Erosion and sediment control.

Full restoration of hydrological functionality

Here the actual channel depth, width and discharge velocity at the point of crossing should be comparable to baseline conditions after rehabilitation. The following questions should have a positive answer:

- After rehabilitation, is the channel width, depth and water velocity comparable to pre-crossing conditions?

- Has all excess material used for or generated from the crossing activity been removed from the site?
- Has all temporary works been removed?

Full rehabilitation of bed and banks

Wetland bed and banks should be reinstated. The following questions should have a positive answer.

- In cases were excessive sedimentation occurred, has the sediment been removed and is the watercourse bed comparable to baseline conditions?
- Have the contours of the watercourse been re-constructed to the original profile?
- Did rehabilitation of bed and banks occur as soon as possible after in-stream construction activity was done?
- Are post-rehabilitation erosion control measures in place?
- Did cleanup commence immediately following erosion control operations?

Erosion and sediment control

Questions to consider with regards to adequate erosion and sediment control measures during rehabilitation:

- Have the embankments been stabilised?
- Have erosion control measures been installed and will they be maintained until disturbed areas are re-vegetated?
- Do the re-constructed banks line up with both the upstream and downstream banks?

4.1.3 Monitoring

Construction phase monitoring

It is important to implement a monitoring programme during the construction phase. Moreover, this monitoring plan should provide rapid feedback on the efficacy of control measures. The following aspects should be monitored:

- Effects of construction on downstream sediment loads. Subsequently water should be sampled upstream and downstream from the construction activity at day intervals, and tested for Total Suspended Solids (TSS). TSS levels should not vary more than 10 % during that of background levels. The turbidity reading provided in this report (Section) may be used as a baseline surrogate for TSS to which future monitoring values can be compared.
- Descriptive monitoring of efficacy of erosion/siltation control measures on a weekly basis. This will also aid the early identification and rectification of erosion/siltation related problems.

Post-construction/Operational phase monitoring

A number of post-rehabilitation problems (i.e. erosion, siltation, alien vegetation infestation) can occur a while after decommissioning of construction activities.

Accordingly, a post-rehabilitation monitoring plan should be implemented. The importance of such a plan should be highlighted, and appropriate response measures should also be in place.

5 CONSTRUCTION

5.1 Contractor Selection and Performance

- SANRAL must ensure that this EMPr forms part of any contractual agreements with sub-contractors for the execution of the proposed project
- The contractor must monitor the performance of the construction team from time to time to ensure compliance with the requirements of this EMPr

5.2 Legal and Other Requirements

- SANRAL and the Contractor must comply with the relevant provisions of the applicable environmental legislation and associated regulations promulgated in terms of these laws.

5.3 Social Interaction

- All neighbours must be notified and advised of the timing of the intended construction activities.
- It is suggested that the SANRAL Environmental Manager deal with community complaints.
- Contractors must prevent and prohibit their employees from entering neighbouring land and homes.
- All construction activities must take place within the demarcated footprint. If it is necessary for activities to take place outside of this area, permission must be obtained from the ECO.
- Movement of construction personnel on site, outside of the demarcated development areas, must be strictly prohibited.

5.4 Labour

- Normal working hours must be maintained as far as possible.
- Night-time activities should be limited as far as possible, and construction activities must be contained to reasonable hours during the day and early evening.

5.5 Employment – Local Preference

- As far as possible, it is suggested that SANRAL should encourage its contractors to give employment preference to residents of the local communal area in accordance with approved agreements and procedures.

5.6 Safety and Security

5.6.1 General Procedures

All provisions of the Occupational Health and Safety Act, 83 of 1993, and any other applicable legislation, must be adhered to by SANRAL and its contractors.

5.7 Emergency Response

Contractors must comply with the relevant SANRAL Emergency Preparedness and Response Procedures.

5.8 Fire Control

Element	Management Plan
Sources	Open fires / flames on site
Controls	• All construction personnel will receive training on fire hazards and techniques to extinguish any fire that may be initiated on the site. • The equipment required to extinguish any fires that may be initiated by construction activities must be installed on the site. • Flammable materials will be stored under conditions that will limit the potential for ignition and the spread of fires. • Burning of vegetation cut during site clearing and establishment will not be permitted. All cleared vegetation will be removed to a landfill site designated by the ECO. • The Contractor will supply fire-fighting equipment in proportion to the fire risk presented by the type of construction and other on-site activities and materials used on site. This equipment will be kept in good operating order. • No fires must be allowed the construction site. • Any welding or other sources of heating of materials must be done in a controlled environment, wherever possible and under appropriate supervision, in such a manner as to minimise the risk of veld fires and/or injury to staff. • The Contractor will take reasonable and active steps to avoid increasing the risk of fire through his activities on site. Accidental fires must be prevented through proper sensitisation of employees towards the associated risks, dangers and damage of property. • The use of open fires for cooking of food is prohibited. • Restrict smoking activities to demarcated smoking areas.
Corrective Action	• Report any fires which occur to the local fire department immediately

5.9 Site Establishment and Management

5.9.1 Construction Camp and Construction Staff

Prior to the establishment of the site camp(s), the Contractor will produce a layout plan showing the positions of all buildings, vehicle wash areas, fuel and cement storage areas and other infrastructure for approval of the Construction Manager. If possible, it is considered preferable to locate the site camp as close as possible to the construction site on an already impacted / degraded area.

Construction staff must be adequately educated by the Environmental Control Officer or the Construction Manager as to the provisions included in the EMPr and general environmentally friendly practice.

The following activities must be prohibited at site camp(s), and by the construction staff in general:

- The irresponsible use of welding equipment, oxy-acetylene torches and other naked flames which could result in veld fires or constitute a hazard.
- Indiscriminate disposal of rubbish or rubble.
- Littering of the site.
- Spillage of potential pollutants, such as petroleum products.
- Collection of firewood.
- No fires allowed on site.
- Interference with any wildlife, fauna or flora.
- Use of any ablution facility other than those provided.
- Burning of wastes and cleared vegetation under any circumstances.
- Entering areas outside of the demarcated construction area without relevant permissions.

5.9.2 Sanitation

Element	Management Plan
Controls	• A minimum of one chemical toilet must be provided per 20 persons per shift. • Suitable toilets will be provided for the staff at all points at which workmen are carrying out duties under the contract • Toilets must be strategically placed (easily accessible to workers) and will not be situated within 150m of any borehole or drainage line. • Toilets must be secure, clean and functional throughout the construction period. • All ablution activities must take place in these facilities, and the waste material must be stored and disposed of at the registered waste disposal site or collected by a suitable waste contractor on a regular basis. Safe disposal certificates are to be provided. • The Contractor will ensure that no spillage occurs when the toilets are cleaned or emptied. • All temporary / portable toilets must be secured to the ground to prevent them from toppling due to wind or any other cause. • The Contractor will ensure that the entrances to toilets are adequately screened from public view. • Discharge of waste from toilets into the environment and burying of waste is strictly prohibited.
Monitoring	• The Contractor will monitor that toilet facilities are used by personnel and that use of non-designated areas is actively discouraged.

5.9.3 Site Management

Element	Management Plan
Controls	• The Contractor must take responsibility for the camp to conform to all contractual aspects and environmental standards applicable. This includes aspects related to stormwater management and waste management. • The Contractor must provide adequate refuse bins that must be cleaned / emptied and the waste removed from site on a regular basis. • The construction camp must be kept neat and tidy at all times. • Water sources / taps available for drinking water etc. must be pointed out by the ECO. It is not advisable that a contractor makes use of or collects water from any other source other than those pointed out to them as being suitable for use. • No Food preparation on site.

5.9.4 Site Access

Element	Management Plan
Controls	• Access in and out of the site must be allowed only at one point to minimise impacts during construction. • Construction activities must be limited to areas which are deemed to be safe, and deemed as the minimum area needed for the construction activity. All sites that are identified by the Construction Manager as being unsafe will be indicated as such with warning signs in all relevant languages. • Livestock / domestic animals will be not be permitted access to construction sites.

5.9.5 Site Clearing

Element	Management Plan
Controls	• The size of areas subjected to land clearance will be kept to a minimum. • Only areas as instructed by the Construction Manager must be cleared. • Cleared vegetation debris which has not been utilised or collected by local communities will be collected and disposed of to a suitable waste disposal site. It will not be burned on site. • No vegetation will be cut or collected off construction sites for burning or for any other purpose without the prior permission of the Construction Manager. • All vegetation not required to be removed will be protected against damage.

5.9.6 Plant Repair, Maintenance & Cleaning

Element	Management Plan
Controls	• No vehicle maintenance and repairs will be undertaken on site, emergency repairs only. • Drip trays etc. are to be provided by the contractor, this also applies to the storage of vehicles overnight. • Adequate collection facilities such as diversion mounds, ditches, drains, oil separation sumps and sedimentation ponds will be constructed at each location with a pollution potential. • All emergency repair work away from bunded areas will make use of drip trays. • Regular inspections will be carried out to detect leaks and spillages on vehicles and machinery.

5.10 Noise

Element	Management Plan
Potential Impact	Nuisance noise from construction activities affecting the surrounding areas
Sources	• Site preparation and earthworks • Construction related transport • Building activities
Controls	• Noise control measures must be implemented by the contractor. All noise levels must be controlled at the source. • Affected parties must be informed of any excessive noise factors. • No loud music is allowed on site and in construction camps. • A speed restriction of 40km/h will be imposed on all construction vehicles on site, in order to limit additional noise generated by these vehicles. • The ECO will be advised in advance when unavoidable out-of-hours work will occur. • Noise from vehicles and on-site powered machinery and equipment will not exceed the manufacturer's specifications, based on the installation of noise attenuation measures.
Maintenance	• All construction equipment must be maintained in good working order. • Silencers on construction equipment will be maintained to ensure no deterioration in noise-dampening capacity.
Corrective Actions	• The Contractor will respond timeously in the event of any complaints by local residents or others about disturbing noise. The noise source will be identified and appropriate noise mitigatory measures instituted in consultation with the affected party(ies). • In the case of legitimate complaints the noise level must be tested by a specialist

5.11 Vegetation

5.11.1 Vegetation Clearing

All vegetative matter will be physically removed from all areas where construction is to take place. All cleared areas will be stabilised as soon as possible in order to minimise the

risk of erosion. In the cuttings area at Kranspoort trees will be removed at at least 25 m from the existing reserve.

In terms of the Environment Conservation Act (No 73 of 1989), the disposal of vegetation by burying or burning is prohibited. No vegetative matter will be burnt or removed for firewood by any SANRAL employee or contractor prior to the necessary permission from the relevant authorities. The use of herbicides will only be allowed after a proper investigation into the necessity, the type to be used, the long term effects and the effectiveness of the agent.

The Contractor will ensure:

- The areas needing to be cleared and the degree of clearing required must be determined and demarcated in consultation with the ECO before clearing begins.
- The ECO must be present during vegetation clearing.
- Areas and licenses for the approved removal of indigenous trees and Red Data plants should be kept onsite by the contractor.

The Contractor will ensure that all works are undertaken in a manner, which minimises the impact on vegetation outside of the site area as designated in the construction site layout. However, it may be necessary in certain instances to remove or prune vegetation outside of the development in order to prevent possible damage to the facilities. This must be undertaken in consultation with the Construction Manager.

5.11.2 Alien Vegetation

Monitoring the potential spread of declared weeds and invasive alien vegetation to neighbouring land and protecting the agricultural resources and soil conservation works are regulated by the Conservation of Agricultural Resources Act (No 43 of 1983) and must be addressed on a continual basis, through an alien vegetation control and monitoring programme.

In view of the fact that the presence of declared weeds is illegal, the landowner/manager must comply with the following legally prescribed requirements (refer to Sections 1, 2, 5 and 6 of the Conservation of Agricultural Resources Act (No 43 of 1983), as well as government notice GN R1048):

a. The landowner/manager must take steps to eradicate the declared weeds by using the methods prescribed in the regulations, namely
    - uprooting and burning, or
    - the application of a suitable chemical weed-killer (herbicide), or
    - any other method which will ensure their permanent eradication.
b. One may not uproot or remove such plants and dump or discard them elsewhere to re-grow or to allow their seeds to be spread or blown onto other properties.
c. If the landowner/manager does not comply with the requirements under a) and b) above, he/she is guilty of a criminal offence.

The Contractor will remove all alien vegetation on Site as listed in the Conservation of Agricultural Resources Act (No 43 of 1983), or as directed by the Environmental Officer during the construction period.

5.11.3 Herbicide Use

The use of herbicides will be in compliance with the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947). In terms of this Act, a registered pest control operator will apply herbicides, or will supervise the application of herbicides. Herbicide use will only be allowed with the approval of SANRAL and the ECO. The application will be according to set specifications and under supervision of a qualified technician.

Therefore, the Contractor will:

- Ensure that a registered pest control operator applies or supervises the application of all herbicides.
- Ensure that all herbicides are stored in a well-ventilated demarcated storage area.
- Ensure that a register of all contents of the storage area is kept and updated on a regular basis.
- Ensure that a daily register of all relevant details of herbicide usage is kept, and that such a register is maintained by the relevant SANRAL custodian.

5.12 Fauna

Element	Management Plan
Potential Impacts	Impact on both terrestrial and aquatic fauna and avifauna as a result habitat destruction due to construction activities.
Sources	• Construction site and labour • Mobile construction equipment • Traffic to and from site
Controls	• No disturbing, injuring or killing of any fauna (including snakes) for any purposes. • No feeding of wildlife. • No domestic animals are to be brought onto the site. • The construction site will be kept clean and tidy and free from rubbish which would attract animal pest species. • SANRAL will advise all contractors and subcontractors of the penalties associated with the needless destruction of wildlife, as set out in the Animals Protection Act (Act 71 of 1962) sec. 2 (fine R2 000 and/or 12 months imprisonment).
Corrective actions	• The Contractor will, as soon as reasonably possible, but within 24 hours of becoming aware of a complaint relating to wildlife interaction, respond to the complaint and register the complaint in the Environmental Register. In addition, the complaint must be reported to the ECO as soon as possible such that the incident can be investigated by the ECO.

Element	Management Plan
	• In the event that a snake or any other problem animal is encountered, a relevant trained person must be called in to remove the problem animal from site.

5.13 Heritage

Element	Management Plan
Potential Impacts	Heritage objects or artefacts found on site and inappropriately managed.
Controls	• All relevant legislation regarding the conservation of national heritage sites must be adhered to. • Under no circumstances must the contractor, his employees, his sub-contractor's employees remove, destroy or interfere with archaeological artefacts.
Maintenance	Awareness of procedures for dealing with heritage objects must be updated where necessary.
Corrective Action	• In the event that any heritage sites are found within the footprint of the construction site all work will cease immediately, and the event reported to the South African Heritage Resources Agency (SAHRA) immediately. • In the event that any heritage sites are found the site must be examined by an archaeologist as soon as possible. The ECO will advise the Contractor of necessary actions to be taken after receiving advice from the archaeologist. All necessary actions to ensure that delays to construction are minimised must be taken. • If any human remains are discovered they must be treated with respect and SAHRA notified immediately. An archaeologist/palaeontologist must be contracted to remove the remains at the expense of the developer.

5.14 Air Pollution Management

5.14.1 Air Quality

Element	Management Plan
Sources	• Fuel burning engines • Fire
Controls	• All activities on-site must comply with the requirements of the National Environmental Management: Air Quality Act (Act 39 of 2004). • Burning of materials including wood, grass and refuse which emit visible smoke will not be permitted on construction sites. • Waste must be disposed, as soon as possible at a municipal transfer station, skip or on a permitted landfill site. Waste must not be allowed to stand on site to decay, resulting in malodours and attracting vermin. • No open fires are to be allowed on site.
Maintenance	• The Contractor will ensure that all vehicles and machinery are fitted with appropriate emission control equipment, are maintained frequently and serviced to the manufacturers' specifications.
Corrective Actions	• If monitoring results or complaints indicate inadequate compliance with the EMPr, the source of the problem must be identified and existing

Element	Management Plan
	procedures or equipment modified to ensure that the problem is rectified. • Non-compliance with the EMPr must be reported to the department, in writing, within 24 hours of an incident.

5.14.2 Dust Control

Element	Management Plan
Potential Impacts	Dust and particulates from vehicle usage, excavation, temporary stockpiles and land clearing affecting the surrounding community and site visibility
Sources	• Clearing of vegetation and topsoil • Excavation, grading / scraping and transport of material • Loading and unloading of trucks • Re-entrainment of deposited dust by vehicle movement • Wind Erosion from stockpiles and unsealed roads and surfaces
Controls	• Speed limits must be enforced in all areas, including public roads and private property to limit the levels of dust pollution • Dust must be suppressed on access roads and construction sites during dry periods by the regular application of water or a biodegradable soil stabilisation agent. Water used for this purpose must be used in quantities that will not result in the generation of run-off. • Dust dispersion from construction activities, un-surfaced roads, spoil dumps and other construction locations will be limited and suppressed to the maximum extent practical. • Spoil dumps will be positioned such that they are not vulnerable to wind erosion. • Spoil and other dust-generating dumps which are left unused for 28 days or longer will be sprayed with water or chemically inert stabilisers to control dust, and treated with mulch and seeded. • An appropriate freeboard will be maintained in trucks hauling dirt, sand, soil and other loose material when leaving the road reserve.
Maintenance	• Roads must be sealed as soon as possible and maintained to ensure that dust from road or vehicle sources will not exceed prescribed levels • Any cleared areas must be watered to ensure that dust levels are minimised prior to sealing or re-vegetation
Corrective Actions	• In the event of serious levels of dust pollution, the implementation of constant dust monitoring by qualified consultants must be undertaken • If monitoring results or complaints indicate inadequate compliance with the EMPr, the source of the problem must be identified and existing procedures modified to ensure that the problem is rectified

5.15 Water Management

5.15.1 Water for Domestic Use

The Contractor will implement measures to ensure that the construction workforce present on the site has access to sufficient potable water.

Element	Management Plan
Controls	• The provision of potable water and safe drinking utensils at various points on the site. • Provision of facilities for hand washing at all ablution facilities and near all toilet facilities. • Contractors must ensure construction crews are provided with an appropriate portable water supply, safe and healthy sanitary facilities and protection against exposure to environmentally dangerous or unhealthy situations or conditions.

5.15.2 Water Consumption

Element	Management Plan
Controls	• The contractor must create awareness and encourage the construction workforce to use water sparingly such that there is no water wastage. • The contractor must ensure that no natural water sources (i.e. rivers or wetlands) are used for domestic purposes by the construction workforce. • The contractor will not make use of / collect water from any other source than those pointed out to them as suitable for use.

5.15.3 Water Pollution Management

Element	Management Plan
Controls	• The contractor must ensure that working areas where hazardous substances (such as cement and vehicle fuels) are handled or stored are designed to collect and contain these hazardous substances. • The contractor must ensure that no pollution enters surface water or has the potential to pollute groundwater by ensuring that there is containment of spillages (e.g. diesel, oils, etc) and that there is an emergency plan in place to deal with accidental spillage. • It is expected that the contractor has at least 50 bags of zorb (or other suitable product) in storage at all time so that it can be taken to spillages immediately • The contractor must ensure that washing of containers, equipment, vehicles and other surfaces only occurs at designated washing areas. • The contractor must ensure that sufficient ablution facilities are provided (at least one toilet for every 20 members of the construction workforce per shift). Adequate numbers and placement of portable chemical toilet facilities at construction sites is crucial to prevent unnecessary pollution of the surrounding environment. • The contractor must ensure that all fuel, chemical, oil, etc spills are confined to areas where the drainage of water can be controlled and managed to confine spillages such that they do not interfere with stormwater and groundwater (referred to as 'clean water'). This can be achieved through the use of appropriate structures and methods such as the construction of bunded areas, berms and pans, or through the application of surface treatments that neutralise toxic effects.

5.15.4 Water Flows Across Construction Sites

Element	Management Plan
Controls	• The contractor must ensure that adequate measures are put into place to control surface water flows across and around all construction sites. • The quantity of uncontaminated stormwater entering cleared areas will be minimised by appropriate site design and by installation of control structures and drains which direct such flows away from cleared areas and slopes to stable (vegetated) areas or effective treatment installations. • Site drainage lines will be identified and control measures installed to handle predicted stormwater and sediment loads generated in the mini catchment.

5.16 Soil Management

5.16.1 Topsoil

Element	Management Plan
Controls	• Topsoil[1] will be sourced from areas which are cleared for construction and spoil dumps, conserved and used judiciously in the rehabilitation of disturbed land. • Topsoil stripping will be scheduled for the dry season, as far as possible. • Topsoil is to be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify. • Topsoil must not be compacted in any way, nor should any object be placed or stockpiled upon it. No vehicles may be allowed access onto the stockpiles after they have been placed • Land to which topsoil has been applied will be vegetated as soon as possible after application. • Stockpiled topsoil must be either vegetated with indigenous grasses or covered with a suitable fabric to prevent erosion and invasion by weeds.
Maintenance	• As far as possible, stored topsoil will be free of deleterious matter such as large roots, stones, refuse, stiff or heavy clay and noxious weeds which would adversely affect its suitability for planting. • Topsoil, which is to be stockpiled for periods exceeding 28 days, must be treated with mulch, roughened and seeded with an approved grass mixture or ground cover specified by the ECO. The mulch cover must kept free of alien vegetation/seeds

[1] Topsoil is defined as the top layer of soil that can be mechanically removed to a depth of about 100mm without ripping or blasting.

5.16.2 Erosion Control

Element	Management Plan
Controls	• Areas susceptible to erosion must be protected by installing the necessary temporary and / or permanent drainage works as soon as possible. • Any erosion channels developed during the construction period or during the vegetation establishment period shall be backfilled and compacted, and the areas restored to a proper condition. • Anti-erosion compounds shall consist of an organic or inorganic material to bind soil particles together and shall be a proven product able to suppress dust and erosion. The application rate shall conform to the manufacturer's recommendations. The material used shall be of such quality that grass seeds may germinate and not prohibit growth. • Installed erosion control measures will be appropriate to site conditions to handle a one-in-two-year storm event for temporary structures, and a one-in-fifty year storm event for permanent structures which provide ongoing sediment control after a site has been rehabilitated. • Contingency plans will be in place for extreme storm events. • All cleared areas will be promptly rehabilitated and in accordance with specific instructions from the Construction Manager. • Soil must be exposed for the minimum time possible once cleared of invasive vegetation. The timing of clearing and grubbing must be co-ordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion.

5.17 Waste Management

Element	Management Plan
Potential Impacts	• Inefficient use of resources resulting in excessive waste generation • Litter or contamination of the site or water through poor waste management practices.
Sources	• Packaging • Construction wastes • Waste dirt or rock from excavation • Storage of oils and fuels • Domestic waste form site offices and construction camp
Controls	• Where possible, construction wastes on site must be reused or recycled • Disposal of waste must be in accordance with relevant legislative requirements. • The Contractor must familiarise themselves with the definitions of waste and the handling, storage and transport of it as prescribed in the applicable environmental legislation.

Element	Management Plan
	• The contractor will appoint a person to manage and control waste. • Integrated waste management on site will be carried out by applying, in order of preference, waste avoidance, reuse, recycling and disposal. • Burning of waste material will not be permitted. • The Contractor will provide and maintain adequate facilities for litter collection (e.g. bins) at strategic locations around the site camp. • Waste will be sorted at source (i.e. the separation of tins, glass, paper etc). Recycled waste of this sort will be collected by a local contractor. • A high quality of housekeeping will be maintained on all construction sites to ensure that materials are not left where they can be washed or blown away to become litter. • Littering must be prohibited. • Stockpiled waste must not remain on site for longer than 7 days. • All waste (general and hazardous) generated during the construction phase may only be disposed of at appropriately licensed sites in terms of applicable Environmental legislation • Illegal dumping must be prohibited.
Maintenance	• Litter collection at all construction sites will be undertaken at least once per working day. Work teams will be supplied with refuse bags which can be disposed of daily in skips at centralised locations. • All waste containers will be emptied at least once a week. • Waste documentation must be completed and kept onsite.
Corrective actions	• A complaints register must be maintained, in which any complaints from the community must be logged. All complaints must be investigated and, if appropriate, acted upon • Corrective actions are required to be undertaken immediately after a complaint is made or a non-conformance is identified.

5.18 Storage and Handling of Hazardous Substances

Element	Management Plan
Potential Impacts	• Generation of contaminated water from contact with spilt chemicals • Fuel source for on-site fires • Generation of contaminated wastes from used chemical containers.
Controls	• The storage of flammable and combustible liquids such as oils will comply with all relevant legislation and regulations. • Any spills will be rendered harmless and arrangements made for appropriate collection and disposal including cleaning materials, absorbents and contaminated soils.

Element	Management Plan
	• Ensure that spill kits are available on site to clean up spills and leaks. The contractor shall have kept at least 50 bags of zorb (or other suitable product) in storage at all times. • Cleaned up spills must be dealt with as per SANRAL requirements. • Ensure that any delivery drivers are appropriately supervised by an individual familiar with all procedures and restrictions on site. This is of particular importance during off and on-loading of materials. • Ensure that only designated areas are used for the handling or storage of hazardous materials. • All hazardous materials must be stored at one location, to be approved by the ECO. • The Contractor must comply with all national, regional and local legislation with regard to the storage, transport, use and disposal of hazardous substances and materials. • The Contractor will furthermore be responsible for the training and education of all personnel on site who must be handling the hazardous material about its proper use, handling and disposal as well as spill response. • The Contractor will be responsible for establishing an emergency procedure for dealing with spills. • Storage of all hazardous materials is to be safe, tamper proof and under strict control. • Fuels, solvent and other wastes must be stored in vessels equipped with secondary containment structures and must be removed from the construction area for disposal in compliance with relevant legislation and regulations. • The containers in which hazardous substances are kept must, in compliance with hazardous material management procedures, be removed from the site once empty. • Hazardous products must be stored on adequately bunded surfaces in the designated hazardous material storage areas. • All manufactured and/or imported hazardous materials must be stored in an appropriate manner in the Construction camp. Depending of the type of material, storage areas will be roofed with impervious material (e.g. cement and chemicals). • Hazardous fluids must not be stored together with hazardous solids; instead fuels, lubricants, transmission and hydraulic fluids must be stored in a designated area for fluids. • All hazardous material storage areas must be sited away from ecologically sensitive areas. • Hazardous chemicals used during construction must be stored in containers. The relevant Material Safety Data Sheets (MSDS) must be available on site. • The Contractor must provide adequate and approved facilities for the storage and recycling of used oil and contaminated hydrocarbons. Such facilities must be designed and situated with the intention of preventing pollution of the surrounding

Element	Management Plan
	area and environment. • The contractor must identify and maintain a register of all activities that involve the handling of potentially hazardous substances, as well as devise and supervise the implementation of protocols for the handling of these substances. This will include all fuels, oils, lubricants and grease. • The contractor must ensure that all hazardous substances are handled in accordance with the manufacturer's specifications and legal requirements. • The contractor must store all hazardous substances (including oils, fuels, chemicals, etc.) in a manner prescribed in the relevant Acts and Regulations.
Maintenance	• Any accidental chemical / fuel spills to be corrected immediately. • Waste records must be kept available for review • Implement appropriate actions and measures to reduce, stop or contain a spill of potentially hazardous substances (e.g. fuel or lubricating oil). • Implement appropriate actions and measures to reduce or prevent contamination of the ground and surface water as a result of a spill of potentially hazardous substances
Corrective Actions	• The contractor must ensure the observation and supervision of chemical storage and handling practises and vehicle maintenance throughout the construction phase. • The contractor must arrange and supervise the implementation of clean-up operations and appropriate disposal of contaminated materials at the hazardous waste disposal site. • A complaints register must be maintained, in which any complaints from the community must be logged. All complaints must be investigated and, if appropriate, acted upon • Keep written records detailing the type of spill, the corrective and remedial measures implemented in the stopping or reduction of the spill, and the cleanup of the spill. Such progress reporting is important for monitoring and auditing purposes and the written reports may afterwards be used for training purposes in an effort to prevent similar future occurrences. • Report the nature and extent of the spill to the ECO, and RE as soon as reasonably possible. • The ECO will prescribe measures to be implemented in order to prevent spills of potentially hazardous substances.

5.18.1 Fuel storage

Element	Management Plan
Controls	• All legal compliance requirements with respect to Fuel storage and dispensing must be met. • All fuel storage tanks (temporary) and associated facilities must be designed and installed in accordance with the relevant oil industry standards, SANS codes and other relevant requirements. • The Contractor must ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and under lock and key at all times. • Symbolic safety signs depicting "No Smoking", "No Naked Flames" and "Danger" are to be prominently displayed in and around the fuel storage area. • The capacity of the fuel storage tanks must be clearly displayed and the product contained within the tank clearly identified. • There must be adequate fire- fighting equipment at the fuel storage and dispensing area or areas. • The fuel storage tank must be removed on completion of the construction phase of the project. • Tanks must be situated in a bunded area, the volume of which must be at least 110% of the proposed volume of the tank. • The floor of the bunded area must be smooth and impermeable, constructed of concrete or plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The floor of the bunded area will be sloped towards an oil trap or sump to enable any spilled fuel and/or fuel – soaked water to be removed. • Any water that collects in the bund must not be allowed to stand and must be removed and the hydrocarbon digestion agent within must be replenished. • All waste fuel and chemical impregnated rags must be stored in leak-proof containers and disposed of at an approved hazardous waste site. • The amounts of fuel and chemicals stored on site will be minimised. • Storage sites will be provided with bunds to contain any spilled liquids and materials.
Maintenance	• Regular inspections will be carried out to detect leaks and spillages. All storage facilities will be maintained as regularly as is necessary to ensure they meet the original specification. Inspections will be carried out on a daily, weekly and monthly basis by the ECO. • All equipment that leak oil or fuel must be repaired immediately or removed from the construction site
Corrective Actions	• Absorbent material must be available at tanks to absorb any spills

5.19 Traffic and Transport

Element	Management Plan
Potential Impacts	• Traffic, and thus accident potential, increase at the proposed access points • Traffic, and thus accident potential due to traffic accommodation such as "stop-go's"
Controls	• Optimal use must be made of existing access roads. The construction of new access roads must be minimised. • A responsible person must be given the duty of monitoring the traffic and to see that the correct and sufficient warning signs are in place. • Transport of all hazardous substances must be in accordance with the relevant legislation and regulations. • All drivers will be in possession of an appropriate valid driver's license. • All maintenance vehicles travelling on public roads will adhere to the specified speed limits. • Moderate speeds will be employed and adhered to on all access/service roads. • The movement of all vehicles will be controlled such that they remain on designated routes. • No member of the workforce will be permitted to drive a vehicle under the influence of alcohol or narcotic substances. • No deviation from approved access roads will be allowed. If necessary, new access routes can be designed, but must initially be approved by the ECO. • Traffic control mechanisms must be implemented to limit vehicle entrained dust from unpaved roads. • Appropriate traffic accommodation measures must be put in place together with the regulatory warning signs to ensure the public's safety during the construction period
Maintenance	• Appropriate maintenance of all vehicles • Appropriate maintenance of access roads and deviations
Corrective Actions	• Visual monitoring of dust produced by traffic in order to minimise dust emissions • Visual monitoring of traffic control measures to ensure they are effective • A complaints register must be maintained, in which any complaints from the community must be logged. All complaints must be investigated and, if appropriate, acted upon.

5.20 Site Clean -up

Element	Management Plan
Controls	• The contractor must ensure that all temporary structures, materials, waste and facilities used for construction activities are removed upon completion of the project. • The contractor must fully rehabilitate (e.g. clear and clean area, rake, pack branches etc) all disturbed areas and protect them from erosion. • Only indigenous plants that adapted to the local conditions must be considered for rehabilitation purposes. • Before final decisions about the choice of plant species are taken the ECO must be approached for their advice

6 OPERATION AND MAINTENANCE

6.1 Labour

6.1.1 Conduct of Employees

The following restrictions or constraints will be placed on the operation and maintenance staff in general:

- No indiscriminate disposal of rubbish or rubble.
- No littering of the servitude and the surrounding areas.
- No collection of firewood.
- No interference with any fauna or flora.

6.2 Fauna and Flora

Element	Management Plan
Potential Impacts	• Impact of operational activities on flora and fauna in the surrounding areas.
Sources	• Movement of employee and visitor vehicles within and around the site
Actions/Controls	• Use of indigenous plants in landscaping and rehabilitation activities especially the cuttings area at Kranspoort. • Schedule regular alien plant identification and eradication activities. • No staff may harm or kill any fauna during operation or maintenance activities. • Wildlife interaction will be investigated by the Environmental Officer. • The active control of all alien invasive species
Maintenance	• Maintenance of rehabilitated areas to ensure sustainability.
Monitoring	• Observation of site appearance by SANRAL Environmental Staff • A complaint register, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon. • Regular alien plant inspections (6 – 12 monthly)
Corrective Actions/Reporting	• An incident reporting system will record and mange follow up of resolution of non-conformances. • In the event of an incident, the Environmental Officer will write a report regarding the incident, and make recommendations. A follow up site inspection will be conducted by the Environmental Officer in order to assess the effectiveness of the recommendations.

6.2.1 Use of herbicides in the Alien Control Programme

The use of herbicides will be in compliance with the terms of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947). In terms of this Act, a registered pest control operator will apply herbicides, or will supervise the application of herbicides.

Therefore, SANRAL will:

- Ensure that a registered pest control operator applies or supervises the application of all herbicides.
- Ensure that all herbicides are stored in a well-ventilated demarcated storage area.
- Ensure that a register of all contents of the storage area is kept and updated on a regular basis.
- Ensure that a daily register of all relevant details of herbicide usage is kept, and that such a register is maintained by the relevant SANRAL custodian.

6.3 Maintenance of Rehabilitated areas

Element	Management Plan
Controls	• Monitoring of plant growth in rehabilitated areas will be conducted on a weekly basis during initial phases and on a monthly basis when plants have become firmly established. • Vegetation must be replanted in areas where vegetation cover has decreased due to dieback, or has failed otherwise to successfully establish. • Noxious weeds and invasive and alien species will be controlled by pulling, cutting or any other means approved by the Construction Manager. Bare patches will be replanted.

6.4 Traffic and transport

Element	Management Plan
Controls	• Access and Traffic control ∗ All drivers will be in possession of an appropriate valid driver's license. ∗ All maintenance vehicles travelling on public roads will adhere to the specified speed limits. ∗ No member of the workforce will be permitted to drive a vehicle under the influence of alcohol or narcotic substances.