

ENVIRONMENTAL MANAGEMENT PLAN FOR
THE PROPOSED CONSTRUCTION OF
REDHOUSE CHELSEA ARTERIAL AND THE
EXTENSION OF WALKER DRIVE TO CAPE
ROAD, IN PORT ELIZABETH.

REF NUMBER: ECm1/LN2/M/10-88

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1. INTRODUCTION

This Construction Environmental Management Plan (EMP) has been compiled for the construction of the Redhouse Chelsea Arterial and Extension of Walker Drive in Port Elizabeth, in the Eastern Cape Province. The proposed road development project will entail the construction of the Redhouse Chelsea Arterial in the vicinity of the N2 and linking this with the extension of Walker Drive. The development will also include associated infrastructure such as two loops and two on/off ramps, bridges/culverts, electricity (street poles) and stormwater management.

The proponent, the Nelson Mandela Bay Municipality, appointed BKS (Pty) Ltd to compile preliminary designs for the proposed road construction, detailed design as well as design and construct tender documentation. BKS appointed Terratest (Pty) Ltd (Terratest) to undertake the required Environmental Impact Assessment as well as compile the Construction EMP.

1.1 Background

1.1.1 Land use and Vegetation

The access route and proposed interchanges with the N2 are located on the western perimeter of the Nelson Mandela Bay Metropolitan area adjacent to the Sherwood residential area. The proposed Redhouse Chelsea Arterial is located within the Sustainable Conservation Unit ["SCU"] 11 of the Western District. Apart from the proposed arterial fulfilling the requirements of improving connectivity and accessibility between suburbs of the NMBM whilst also alleviating present congestion and travel delays, it is also intended to fulfil requirements generally associated with "corridors", often required around Development Nodes. This area has been identified in the SDF as an intended "N2 Development Node", with the roads utilised as "corridors" that will allow connectivity of future mixed land use development and social integration.

The Nelson Mandela Bay Municipality Conservation Assessment and Plan (NMBMCAP) (Stewart and Reeves 2010), a regional systematic conservation assessment and plan, identified Critical Biodiversity Areas (CBAs) and Critical Ecological Process Areas (CEPAs) in the municipality. The Baakens Valley is listed as the sixth most important implementation site in terms of conservation priority, out of a total of 28 sites identified (Stewart and Reeves 2010).

The study area falls within a CBA, and includes 'Other Natural Areas' (Stewart and Reeves 2010) [Figure 3]. CBAs include 'all Critically Endangered habitats, ecological process areas and corridors, habitats for Species of Special Concern, and some Endangered, Vulnerable or Least Threatened habitats' (Stewart and Reeves 2010). The Land Management Objectives for CBAs state that 'such areas must be managed for biodiversity conservation purposes and incorporated into the protected area system' (Stewart and Reeves 2010). 'Other Natural Areas' are areas up for development, as per the municipal or local spatial development framework (Stewart and Reeves 2010). None of the areas in the study site are managed as conservation areas, although all the proposed alignments fall into a CBA and CEPA mapped in the NMBMCAP (Stewart and Reeves 2010). There are no recent signs of clearing of alien invasive plants or a conservation management strategy adopted on the site.

According to the NMBMCAP (Stewart and Reeves 2010), Baakens Thicket Forest Mosaic and Rowallan Park Grassy Fynbos (RPGF) vegetation types are found in the study area. These vegetation types were also identified in the study area during the site visit by Clayton Weatherall-Thomas, as part of the Vegetation Specialist study.

1.1.2 Heritage

The study area was not found to contain any areas of cultural significance; however the South African Heritage Resources Association has been registered as an Interested and Affected Party in this regard. No grave sites and sites of heritage importance were found under the alternative routes of the proposed alignments. There are graves that have been identified recently, 02 October 2012, within the Utopia Estate Development but these will not be affected by the proposed road development.

Where vegetation clearing will take place, the contractors must pay particular attention to the extracted soil and soil profiles, informing the environmental consultants immediately if any historical or cultural artefacts are noted. Archaeological specialists will then be contacted by the environmental consultants and if there is a need for such investigations, the appointment of such specialists will be made by the project managers.

1.2 Environmental Impact Assessment (EIA)

Due to the nature of the proposed project certain regulations of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) requires Environmental Authorisation (EA) from the competent provincial authority. An application was lodged in terms of the NEMA, 1998 (Act 107 of 1998), as amended, and the Environmental Impact Assessment Regulations as published in Government Notice No. R543, R544, R545 and R546 of 2010, for a Scoping and Environmental Impact Assessment (S&EIA).

This application has been submitted to the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT).

1.3 Aims of this Document

The purpose of this Construction EMP is to ensure that the impacts of the construction phase of the project on the environment are kept to a minimum. This includes ensuring that the mitigation measures described in the Amended Environmental Impact Report are implemented, to ensure continued monitoring of the construction phase and to ensure the involvement of Interested and Affected Parties (IAPs) in a meaningful way.

1.4 Status of this Document

The provisions of this Construction EMP are binding on the Contractor during the construction period and Defects Liability Period of the contract. This specification shall be read in conjunction with all the documents that comprise the contract documents for this contract. In the event that any conflict occurs between the terms of the Construction EMP and the Project Specification or the EA, the terms of the Construction EMP shall stand.

1.5 Definitions Used in this Document

For the purpose of this Construction EMP the following definitions will apply:

- **Alien vegetation** means all undesirable vegetation, defined as but not limited to, all declared Category 1 and Category 2 plants in terms of the Conservation of Agricultural Resources Act (43 of 1983) (CARA) amended regulations 15 and 16 as promulgated in March 2001.
- **Construction activity** refers to any action taken by the Contractor, his subcontractors, suppliers or personnel in undertaking the construction work.
- **Construction area(s)** refers to all areas used by the Contractor in order to carry out the required construction activities. This includes all offices, accommodation facilities, testing facilities/laboratories, batching areas, storage & stockpiling areas, workshops, spoiling areas, access roads, traffic accommodation (e.g. bypasses, haul roads), etc.
- **Environment** means the surroundings within which humans exist and that are made up of - land, water and atmosphere; micro-organisms, plant and animal life; any part or combination of the above and the interrelationships among and between them; the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

- **Environmental Impact** refers to any change to the environment, whether desirable or undesirable, that would result directly or indirectly from any construction activity.
- **Hazardous material/substances** refer to any substance that contains an element of risk and could have a deleterious effect on the environment.
- **Road reserve** refers to the proclaimed 40m wide corridor of land within which the road is located and that will be defined by the new fence line as part of the construction contract.
- **Vegetation rehabilitation** refers to the re-establishment of locally indigenous vegetation with a similar species composition to that which naturally occurs in the area.

1.6 Legislation Pertaining to this Document

The requirements for environmental authorisation are regulated by Government Notices 543, 544, 545 and 546, published in terms of Chapter 5 of NEMA. Under these regulations the proposed development contains activities that may potentially have a detrimental effect on the environment, in terms of the Regulations given in R544 and R545 of 18 June 2010.

The following activities contained in GNR 544 and GNR 545 of the new NEMA regulations, 2010, were applied for:

Number and date of the relevant notice	Activity No (in terms of the relevant notice)	Description of each listed activity as per project description
GN R544, 18 June 2010	11	<p>The construction of:</p> <ul style="list-style-type: none"> (i) Canals; (ii) Channels; (iii) Bridges; (iv) Dams; (v) Weirs; (vi) Bulk storm water outlet structures; (vii) Marinas; (viii) Jetties exceeding 50 square metres in size; (ix) Slipways exceeding 50 square metres in size; (x) Buildings exceeding 50 square metres in size; (xi) Infrastructure of structures covering 50 square metres or more, <p>where such construction occurs within a watercourse of within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.</p>
GN R544, 18 June 2010	18	<p>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soils, sand, shells, shell grit, pebbles or rock from:</p> <ul style="list-style-type: none"> (i) a watercourse;

Number and date of the relevant notice	Activity No (in terms of the relevant notice)	Description of each listed activity as per project description
GN R544, 18 June 2010	22	The construction of a road, outside urban areas,(i) with reserve wider than 13,5m or, (ii) where no reserve exists where the road is wider than 8 metres, or (iii) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in GN 387 of 2006 or activity 18 in Notice 545 of 2010
GN R544, 18 June 2010	47	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – (i) Where the existing road reserve is wider than 13.5 meters; or (ii) Where no reserve exists, where the existing road is wider than 8 metres – Excluding widening or lengthening occurring inside urban areas.
GN R545, 18 June 2010	18	The route determination of roads and design of associated physical infrastructure, including roads that have not yet been built for which routes have been determined before the publication of 03 July 2006 and of which have not been authorized by a competent authority in terms of the Environmental Impact Regulations, 2006 or 2009, made under section 24(5) of the Act and published in Government Notice No. R. 385 of 2006, where – (a) It is a national road as defined in section 40 of the South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998); (b) It is a road administered by a provincial authority; (c) The road reserve is wider than 30 metres; or (d) The road will cater for more than one lane of traffic in both directions.

Number and date of the relevant notice	Activity No (in terms of the relevant notice)	Description of each listed activity as per project description
GN R546, 18 June 2010	12	The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetation cover constitutes indigenous vegetation: (b) Within critical biodiversity areas identified in bioregional plans;
GN R546, 18 June 2010	13	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetation cover constitutes indigenous vegetation: (a) Critical biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority; (b) ...
GN R546, 18 June 2010	16	The construction of: (iv) infrastructure covering 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. (iii) In urban areas: (aa) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose;

The ***South African Constitution (No 108 of 1996)*** Chapter 2 - Bill of Rights makes provisions for Environmental rights - Section 24, Rights in property – Section 25, Administrative justice - Section 32 and Access to Information – Section 33.

The ***National Environmental Management Act (NEMA) (Act 107 of 1998)*** is a 'principles-based Act' and is an overarching statute regulating various aspects of natural resource use, integrated environmental management and pollution control. The Act provides for the right to an environment that is not harmful to the health and well-being of the South African people. Sustainable development, environmental protection, equitable distribution of natural resources; and the formulation of environmental management frameworks are also fundamental. The definition of the environment includes the land and water of the earth, micro-organisms, plant and animal life or a combination of those things, and the inter relationships among them.

The Act aims to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance, and procedures for co-ordinating environmental functions exercised by organs of state. Section 24 provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment.

NEMA contains a set of principles that govern environmental management, and against which all environmental management plans and actions are measured. Sustainable development requires the consideration of all relevant factors including the following:

- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
- That the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimized and remedied.
- That pollution and degradation of the environment are avoided, or, where unavoidable, are minimised and remedied.
- That waste is avoided, or where unavoidable is minimised and reused or recycled where possible and/or disposed of in a responsible manner.
- That a risk-adverse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions or actions.

- That negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimized and remedied.
- The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.
- The role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.
- Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.
- The participation of interested and affected parties in environmental governance must be promoted, and people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation.
- The participation by vulnerable and disadvantaged persons must be ensured.
- Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge.
- That the cost of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.
- Community well-being and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means; and
- Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.

The ***National Water Act (No 36 of 1998)*** makes provisions for the protection of surface water and groundwater resources and their sustainable management for the prevention and remediation of the effects of pollution, and for the control of emergency occurrences.

The primary purpose of this Act is to manage and control South Africa's water resources by:

- Meeting the basic human needs of present and future generations.
- Promoting the efficient, sustainable and beneficial use of water in the public interest.

- Facilitating social and economic development.
- Providing for growing demands for water use.
- Protecting aquatic and associated ecosystems and their biological diversity.
- Reducing and preventing pollution and degradation of water resources; and meeting international obligations.
- Landowners and users have an obligation not to pollute water, and prescribe certain measures to prevent pollution.
- When a bed, bank, course or characteristics of a watercourse is altered, the Act implies that a license has to be obtained.

The institutional roles of DWA and the catchment management agencies (CMAs), which are bodies charged with enforcing some aspects of this Act. The CMA may take measures it considers necessary to remedy a harmful situation and may recover all costs incurred.

The ***Conservation of Agricultural Resources Act (No 43 of 1983)***. The main focus of this act is upon agricultural resources but it has an indirect implication for rivers and provides for the protection of agricultural land while regulations provides for the implementation of control measures for alien and invasive plant species.

National Environmental Management: Air Quality Act (No 39 of 2004) which provides for the control of dust, noise and offensive odours.

The ***Occupational Health and Safety Act (No 85 of 1993)*** makes provisions in regulations Section 8 for the general duties of employers to their employees. Section 9 of the Regulations makes provisions for general duties of employers and self employed persons to persons other than their employees.

The ***Protected Areas Act (No 57 of 2003)*** aims to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity, natural landscapes and seascapes.

National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA), makes provisions for achieving the objectives of the United Nation's Convention on Biological Diversity, to which South Africa is a signatory.

The Bill promotes management, conservation and sustainable use of indigenous biological resources, and provides for:

- The management and conservation of biological diversity within the Republic.
- The use of indigenous biological resources in a sustainable manner; and
- The fair and equitable sharing of benefits arising from the commercialization through bio-prospecting of traditional uses and knowledge of generic resources.

The Bill gives effect to international agreements relating to biodiversity which are binding on the Republic and provides for co-operative governance in biodiversity management and conservation, and provides for a National Biodiversity Institute to assist in achieving the above objectives.

The Act gives wide powers to a National Biodiversity Institute to *inter alia* protect animals and micro-organisms in appropriate enclosures, the collection of information, undertaking and promotion of research on indigenous biodiversity and the sustainable use of indigenous biological resources, the prevention, control or eradication of listed invasive species, biodiversity planning and other functions.

The **Waste Act (Act 59 of 2008)**, reforms the law regulating waste management in order to protect health and the environment providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

2. DESIGN CONSIDERATIONS

The general design approach is set out in the preliminary design report of the engineering guidelines contract documents. The following additional environmental considerations need to be taken into account in the Contractor's design and construction procedures.

This section highlights several environmental constraints and/or recommendations that were identified during the EIA that need to be incorporated into the detailed design of the works.

2.1 *Visual Aspects*

Visual or aesthetic aspects should be taken into consideration in the treatment of structures such as bridges, culverts, side drains, retaining walls, etc. The detailed design should make use of natural finishes such as materials, colour, etc.

2.2 *Drainage*

Obtain the input of a freshwater ecologist during the final design of the road to ensure that, where necessary, drainage structures function as faunal underpasses that are:

- Appropriately located;
- Of adequate frequency;
- Of suitable design; and
- Maintain habitat connectivity, especially where the road crosses known ecological corridors and drainage lines (e.g. Baakens River and its tributaries). A freshwater Aquatic Assessment specialist study was conducted during the EIA phase of the project, by Scherman Colloty & Associates (September 2012), who's report and recommendations must be considered.

Underpasses must be sufficiently high to allow for movement of local fauna, and sufficiently wide to include a buffer along the margins of the riparian habitat.

Vertical walls that create a pit or narrow pipes (unless completely underground) must be avoided.

Design drainage channels along the road such that they minimise the release of water onto adjacent land, to avoid pooling of water on such land.

Ensure any open structures have low, sloping profiles without any vertical surfaces to facilitate animal movement and limit mortality.

Provide adequate drainage at the new interchange to avoid waterlogging of adjacent erven.

Ensure that appropriate drainage / crossing structures are constructed on the new access roads to maintain natural drainage patterns and connectivity of habitats. Obtain input from the aforementioned freshwater ecologist.

Create permanent roadside swales in places where runoff from the roads is not collected in a stormwater system to allow it to be biologically cleansed prior to seeping into natural drainages. Consult with the freshwater specialist to ensure appropriate and optimal placement and design of such swales.

Design kerbs and roadside gutters to have low, sloping profiles without any vertical surfaces to facilitate animal movement and limit mortality.

Continuous flow of the river systems must be allowed at all times during the construction period of the upgrading of the bridge structures at these places. No obstruction of flow will be allowed.

2.3 Areas of environmental exclusion

There are two areas of environmental exclusion that must be adhered to at all times during the construction phase. No construction activities will be allowed to take place within the following areas:

- ***Cyclopia pubescens* population:** This population must be demarcated and fenced with a minimum of a Bonnox fence before any construction is to commence on site. This demarcation should be done along a 20m buffer around the population and be completed by a registered vegetation specialist.
- **Rocky Outcrops:** The locality of the Rocky Outcrop habitat must be demarcated and fenced with a minimum of a Bonnow fence before any construction is to commence on site. This demarcation should be done along a 10m buffer around the outcrops and be completed by a registered vegetation specialist. **NO BLASTING** associated with the construction of the Redhouse Chelsea Arterial will be allowed in a 150m radius of the Rocky Outcrops.

2.4 General Road Design

Within required standards, choose road surfacing material that minimises the noise of tyres on the road surface.

Limit street lighting to the minimum requirement. To limit disturbance to fauna, aim to implement the following measures:

- Use only long-wavelength lights (red or orange) for exterior lighting or the “warm light” models of energy-saving lights.
- Use light sources of the lowest intensity (wattage) adequate for road safety.
- Use directional fittings for exterior lights. Fit lights with shades to direct light only to where it is needed, and to prevent it from spreading over a wide area.
- Position lights as low down as possible to reduce their visibility from a distance.
- Use only sealed light fittings.

Plant avenues of trees along the road to screen problem areas e.g. incongruent developments, in keeping with the historic tradition.

Minimise visual clutter in the form of non-essential lighting and signage.

2.5 Expropriation

Provide affected owners with fair and timely compensation for expropriated land and /or affected infrastructure.

2.6 Expropriation

The following General Recommendations have been brought forward from the Environmental Impact Report and must be considered and requirements for this EMP.

- The endangered *Brunsvigia littoralis* should be removed from the development footprint to be safeguarded from destruction if it is found to be occurring within the 40m alignment servitude. This removal and replanting should take place in consultation with conservation authorities and relevant botanical specialists.
- Protected plant species must be removed from the site prior to any construction activities are to commence. This removal should take place under the supervision of a qualified vegetation specialist.
- Clearing of *Acacia saligna* and *Acacia mearnsii*, from the road alignment servitude must be conducted on a regular basis. The alien invasive clearing should take place

during the operational phase of the road. Provision must be made in the vegetation management plan for the road verges for the clearing of alien invasive plants within the road reserve.

- Permission must be obtained from the provincial authorities to destroy or remove any protected plant species.
- Kikuyu grass must not be utilised during regressing of verges, properties and other landscaped areas within the site.
- No Construction Camps are to be located within the 1:100 year floodline of any drainage line or wetland (seep area) on site.
- No stockpile (temporary or permanent) may be located within the 1:100 year floodline of any drainage line or wetland (seep area) on site.
- No portable chemical toilets may be located within the 1:100 floodline of any drainage line or wetland (seep area) on site.
- No storage of dangerous substance (hydrocarbons, paints etc.) is permitted within the 1:100 floodline of any drainage line or wetland (seep area) on site.
- The flow of stormwater into the wetland areas must be controlled by the provision of energy dissipaters at the outlets of the temporary or permanent stormwater outlets.
- No hunting will be allowed on site.
- No open fires will be allowed on site.
- Provision for speed enforcement and appropriate road signage on the road must be made to limit the amount of animal strikes.
- The whole 40m road servitude of the road alignment must be fenced off upon completion of construction.
- Dust suppression measures (spraying of water or other dust allaying agents) must be used to control the dust generated during the construction phase.
- No waste will be burned on site.
- All construction vehicles and equipment must be equipped with the stock-standard noise dampening and air emission exhausts.
- Working hours during the construction phase will be limited to between 07:00 – 17:00 from Monday to Friday and from 07:00 – 15:00 on Saturdays. No work should be allowed on Sundays and Public Holidays.
- The contractor must be encouraged to employ local labour during the construction phase of the arterial road.
- A skills transfer programmes must be in place for the duration of the construction phase of the arterial road which will have as an outcome to transfer skills to empower unskilled labour.

- **No blasting** is to be allowed in the area of the intersection of the arterial and Walker Drive Extension.
- Small, localised blasting will be allowed for the pier foundations of the bridge structure over the Baakens River due to their limited size.
- All blasting must take place according to a blasting management plan.
- All blasting must be overseen by a qualified blasting specialist.

3. GENERAL REQUIREMENTS

3.1 EMP Administration

Copies of this EMP shall be kept at the site office and will be distributed to all senior contract personnel. All senior personnel shall be required to familiarise themselves with this contents of this document. All senior personnel will be required to sign a register confirming their understanding of the document. This register shall be continuously updated as changeover of senior personnel takes place.

3.2 Roles and Responsibilities

The implementation of this EMP requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the construction phase. The stakeholders are discussed below.

3.2.1 Department of Economic Development, Environmental Affairs and Tourism (DEDEAT)

DEDEAT is the designated provincial authority responsible for authorising the environmental application and the EMP related to the project. DEDEAT has overall responsibility for ensuring that the applicant (NMBM) complies with the conditions of EA as well as this EMP. DEDEAT shall be invited to join the Environmental Management Committee (EMC) (see below) and attend the monthly EMC meetings.

3.2.2 Employer: Nelson Mandela Bay Municipality (NMBM)

Under South African environmental legislation, the Applicant/Employer is accountable for the potential impacts of the activities that are undertaken and is responsible for managing these impacts. NMBM as the Applicant/Employer therefore has overall environmental responsibility to ensure that the implementation of this EMP complies with the relevant legislation and the conditions of the EA.

The Employer has appointed the Contractor to undertake the contract on a design and construct basis. NMBM shall join the EMC and attend the monthly EMC meetings.

3.2.3 Employer's Representative (ER)

BKS (Pty) Ltd as the Employer's Representative (ER) would act as the Employer's on-site implementing agent and has the responsibility to ensure that the Employer's responsibilities are executed in compliance with the relevant legislation and the EA.

In addition to general project management, the ER has the responsibility to appoint the Environmental Control Officer (ECO) (see 3.2.4). Any on-site decisions regarding environmental management are ultimately the responsibility of the ER. The on-site ER shall assist the ECO where necessary and will have the following responsibilities in terms of the implementation of this EMP:

- Ensuring that the necessary environmental authorisations and permits have been obtained.
- Reviewing and approving the Contract's Method Statements with input from the ECO (see 3.2.4) where necessary.
- Assisting the Contractor in finding environmentally responsible solutions to problems with input from the ECO and EMC (see 3.2.6) where necessary.
- Ordering the removal of person(s) and/or equipment not complying with the EMP specifications. Issuing fines for transgressions of site rules and penalties for contravention of the EMP.
- Providing input into the ECO's ongoing internal review of the EMP, which is submitted as a report to the Employer.
- Chairing the monthly EMC meetings which may co-inside with the onsite project review meetings.

3.2.4 Environmental Control Officer (ECO)

An independent Environmental Control Officer (ECO) will have to be appointed to monitor and review the on-site environmental management and implementation of this EMP by the Contractor. The ECO must do so by conducting monthly site audits for the duration of the contract and supply monthly audit reports for submission to the EMC.

The ECO's duties will include the following:

- Assisting the ER in ensuring that the necessary environmental authorisations and permits have been obtained prior to construction commencing.
- Maintaining open and direct lines of communication between the ER, Employer, Contractor and EMC with regard to environmental matters.
- Reviewing the Contractor's construction Method Statements together with the ER.
- Monthly site inspections of all construction areas with regard to compliance with the EMP.
- Monitoring and verifying adherence to the EMP, the EA and approved Method Statements at all times.
- Monitoring and verifying that environmental impacts are kept to a minimum.
- Taking appropriate action if the specifications are not followed, this includes reporting the transgressions to the ER.
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel coming onto site.
- Advising on the removal of person(s) and/or equipment not complying with the specifications (via the ER).
- Recommendations regarding the issuing of fines for transgressions of site rules and penalties for contraventions of the EMP (via the ER).
- Auditing the implementation of the EMP and compliance with the EA on a monthly basis.
- Compiling a final audit report regarding the EMP and its implementation during the construction period after completion of the contract and submitting this report to the Employer and the authorising authority.

3.2.5 Contractor's Environmental Liaison Officer (ELO)

The Contractor refers to this team appointed by the Employer to undertake the detailed design and the construction activities for the road upgrade project. The appointed Contractor will be required to appoint a competent individual as the Contractor's on-site Environmental Liaison Officer (ELO). The selected ELO must be at least at Foreman level appointment and must fully familiarise him-/herself with the contents of this EMP. He/she will be required to sign the register confirming his/her familiarity with the document. The ELO should furthermore possess the necessary skills to action environmental management to all personnel involved in the contract.

The ELO will be responsible for overseeing the Contractor's internal compliance with the EMP requirements and ensuring that the environmental specifications are adhered to. The ELO will be responsible for keeping detailed records of all site activities that may pertain to the environment and include all these aspects in a Environmental Register. This register must be presented at each EMC meeting and be made available to the ECO during his/her monthly audits. In addition to the environmental register, the ELO must keep a register of complaints from any community members on environmental issues. Finally, the ELO will be required to keep a record of all on-site environmentally related incidents and how these incidents were dealt with.

3.2.6 Environmental Management Committee (EMC)

The EMC shall be a multidisciplinary team tasked with monitoring the progress of the EMP and resolving any environmental problems that may arise during the course of the project. The EMC shall be accountable for ensuring that environmentally sound principles guide the project during the construction phase.

The EMC shall consist of all relevant stakeholders in the construction phase, as well as representatives of interested and affected parties, for example:

- NMBM's representative
- ER's representative
- Contractor's representative (the ELO)
- Any affected landowners and/or communities and,

The EMC shall meet on a monthly basis.

3.2.7 Organizational structure

Details of the organizational structure are presented in Figure 1. The structure illustrates the reporting procedures for stakeholders in the implementation of this EMP.

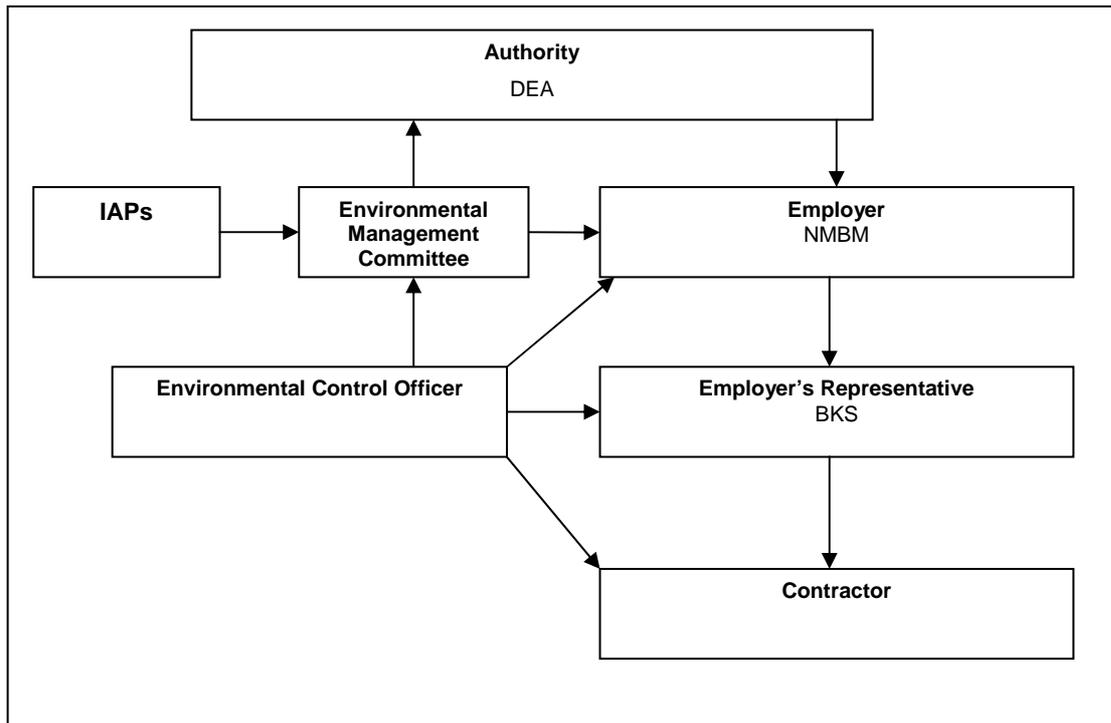


Figure 1: EMP implementation organisational structure.

3.3 Environmental Awareness Training

The Contractor shall ensure that adequate environmental awareness training of senior site personnel takes place and that all construction workers receive an induction presentation on the importance and implications of the EMP. The presentation shall be conducted, as far as possible, in the employees' language of choice.

As a minimum, training shall include:

- Explanation of the importance of complying with the EMP.
- Discussion of the potential environmental impacts of construction activities.
- The benefits of improvement personal performance.
- Employees' roles and responsibilities, including emergency preparedness.
- Explanation of the mitigation measures that must be implemented when carrying out their activities.
- Explanation of the specifics of this EMP and its specification.
- Explanation of the management structure of individuals responsible for matters pertaining to the EMP.

The contractor shall keep records of all environmental training sessions, including names, dates and the information presented. These records will be presented at the EMC meetings and to the ECO on request during his/her monthly audits.

2.7 Method Statements

Method Statements (MS) are written submissions by the Contractor to the ER in response to the requirements of this EMP or to a request by the ER. The Contractor shall be required to prepare Method Statements for several specific construction activities and/or environmental management aspects.

The Contractor shall not commence the activity for which a Method Statement is required until ER has approved the relevant Method Statement.

Method Statements must be submitted at least 20 working days prior to date on which approval is required to the ER. The ER must in turn accept or reject the Method Statement within 10 working days of receipt.

Failure to submit a Method Statement may result in suspension of the activity concerned until such time as a Method Statement has been submitted and approved.

An approved Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract. However, any damage caused to the environment through activities undertaken without an approved Method Statement shall be rehabilitated at the Contractor's expense.

The Method Statements shall cover relevant details with regard to:

- Construction procedures and location of the construction site.
- Start date and duration of the procedure.
- Materials, equipment and labour to be used.
- How materials, equipment and labour would be moved to and from the site as well as on site during construction.
- Storage, removal and subsequent handling of all materials, excess materials and waste materials of the procedure.
- Emergency procedures in case of any reasonably potential accident/incident which would occur during the procedure.
- Compliance/non-compliance with the EMP specification and motivation if non-compliant.

Method statements (MS) required:

Based on the specifications in this EMP, the following Method Statements (MS) are required as a minimum:

MS1: Site clearing (4.1)

MS2: Site layout and establishment (4.2.1)

MS3: Hazardous substances (4.3.4)

MS4: Cement and concrete batching (for each operation) (4.3.6)

MS5: Traffic accommodation (4.4)

MS6: Solid waste control system (4.5.1)

MS7: Wastewater control system (4.5.3)

MS8: Erosion remediation and stabilisation (4.8.2).

MS9: Bridge/Culvert construction (for each operation) (4.9.1)

MS10: Fire control and emergency procedures (4.12)

MS11: Alien vegetation clearing programme (5)

MS12: Vegetation rehabilitation plan (6)

4 CONTROL OF CONSTRUCTION ACTIVITIES

4.1 Site Clearing

MS1: The Contractor shall submit a site clearing method for all areas where the Contractor is required to, or intends to, clear vegetation, either within the road reserve or at the other designated construction areas outside the road reserve. The Method Statement will include:

- A clear indication of land reference;
- Details of any search and rescue and/or seed collection to take place;
- Which areas will be cleared;
- How these areas will be cleared; and
- How the cleared materials will be stored or disposed off.

4.1.1 Vegetation clearing

No vegetation clearing shall take place without written approval of the Method Statement of the ER.

No vegetation clearing will take place until seed collection has been undertaken in the area, unless the area is not deemed suitable for seed collection.

Before clearing of vegetation, the Contractor shall ensure that all litter and non-organic materials are removed from the area to be cleared.

Vegetation clearing shall take place in a phased manner in order to retain vegetation cover for as long as possible.

Vegetation clearing in watercourses and estuarine/ wetland areas shall be conducted by hand. No heavy machinery shall be permitted in watercourses to clear vegetation. Vegetation cleared from watercourses shall be removed from the watercourses immediately to prevent flooding.

All indigenous plant material removed from the cleared areas shall be stockpiled for mulching. All remaining vegetation shall be removed and disposed of at a municipal registered landfill site.

Mitigation Measures

- *All construction areas should be demarcated prior to construction to ensure that the footprint of the impacts are limited (including areas where vehicles may traverse);*
- *The sensitive vegetation unit (*Cyclopia pubescens*) must be avoided and construction barred from the edge of the wetlands and streams;*
- *All alien invasive species within the construction and development footprint must be removed and follow up monitoring and removal programmes should be initiated once construction is complete;*
- *Re-seed cleared areas with an indigenous seed mix to prevent soil erosion;*
- *Hunting and/or fishing activities on site is prohibited. This includes the setting of traps, or the killing of any animal caught in construction works;*
- *No animal, reptile or bird of any sort found on site may be killed. This specifically includes snakes or other animals considered potentially dangerous discovered on site. If such an animal is discovered on site an appropriately skilled person should be summoned to remove the animal from the site. Consideration should be given to selection and nomination of such a person prior to site establishment. If no-one is available, training should be provided to at least two site staff members.*

Mitigation measures according to the specialist Aquatic Assessment conducted include:

- *Bridges rather than culverts are used*
- *Any embankments are outside of the floodline areas*
- *No bridge piers occur within the in-stream areas*

4.1.2 Topsoil

The Contractor shall remove topsoil from all areas where topsoil will be impacted on by construction activities, including temporary activities such as storage and stockpiling areas, mining areas and detours.

Stripped topsoil shall be stockpiled in areas agreed with by the ER for later use in re-vegetation and shall be adequately protected. Topsoil is considered to be the natural soil covering, including all the vegetation and organic matter. The depth of the soil may vary and due to this reason, the top 300mm of soil must be removed and preserved as topsoil.

Topsoil stockpiles shall be convex and no more than 2m high. Stockpiles shall be shaped so that no surface water ponding can take place.

Topsoil stockpiles shall be protected from erosion by wind and rain by providing suitable stormwater and cut-off drains (approved by the ER) and/or the establishment of temporary indigenous vegetation.

Topsoil stockpiles shall not be subject to compaction greater than 1 500 kg/m² and shall not be pushed by a bulldozer for more than 50m.

Topsoil stockpiles shall be monitored regularly to identify any alien plants. If any occurs, they must be removed when they germinate to prevent contamination of the indigenous seed bank. Before topsoil is to be re-used the stockpiles shall be analysed by a suitably qualified Landscape Contractor/Horticulturalist and, if necessary, be fertilised before use.

Any topsoil contaminated by hazardous substances shall not be used but shall be disposed of at a registered landfill site.

The Contractor shall be held responsible for the replacement, at his expense, for any unnecessary loss of topsoil due to his failure to work according to the approved Method Statement and the requirements of this EMP.

Mitigation Measures

- *Spread absorbent sand on areas where oil spills have occurred;*
- *Oil-contaminated soils are to be removed to a contained storage area and disposed of at a licensed facility;*
- *Soil should be stockpiled in such a way as to minimize erosion.*

4.2 Management of Site Facilities

The construction, layout and extent of the construction site and its components shall be planned, designed and managed in such a manner that environmental impacts are minimised. Temporary structures and facilities shall be decommissioned to the satisfaction of the ER and clean-up after construction shall be effectively undertaken.

4.2.1 Site layout and establishment

The Contractor shall establish construction camps, offices, workshops, testing facilities, stockpiling areas, staff accommodation etc. in a manner that does not adversely affect the environment.

The construction areas shall be kept to a minimum.

Site establishment shall not take place on steep slopes, within 50m of wetland areas and watercourses or sites declared as no-go areas (see 4.2.2 below).

The site layout shall take cognisance of access for deliveries and services. Likely disturbance to neighbours as well as security implications shall be considered. Any site establishment near any settlements shall be discussed with and agreed to by the local community. These negotiations must be commissioned and chaired by the CLO.

MS2: Before construction can begin, the Contractor shall submit to the ER for approval a Method Statement detailing:

- ***A layout plan and the method of establishment of the construction camp, i.e. all offices, accommodation facilities, testing facilities/laboratories, batching areas, storage and stockpiling areas, workshops, vehicle washing areas and all other areas/facilities required for the undertaking of activities required for completion of the project.***

• ***The plan shall include the location and layout of waste storage and treatment facilities, ablution facilities, stockpiling and spoil areas and hazardous material storage areas. The demolition and removal of these facilities on completion of construction works shall also be detailed.***

• ***If applicable, written agreement from any affected local community shall be included.***

The Contractor shall restrict all his activities, materials, equipment and personnel to within the area specified. The Contractor shall ensure that the approved construction area will be adequate to cover the project without further space adjustments being required at a later date.

4.2.2 No-go areas

Areas where construction activities (including traffic accommodation) are prohibited are referred to as no-go areas. Entry into these areas by any person, vehicle or equipment without the ER's written permission will result in a penalty.

All declared no-go areas will be demarcated by temporary fencing (4.2.3), the position of which shall be agreed to by the ER and the ELO, and appropriate signage.

All private property outside of the construction areas (including any detour routes) as set out in the site layout plan shall be considered no-go areas.

The ER may declare additional no-go areas at any time during the construction phase as deemed necessary and/or at the request of the ECO and/or the EMC.

Demarcation materials (fencing, signage, etc.) shall not be moved or removed at any stage of the project without the written consent of the ER.

4.2.3 Temporary fencing

The Contractor shall erect temporary fencing along the perimeter of designated no-go areas. Temporary fencing shall, as a minimum, consist of wooden or metal posts at 3m intervals, with two plain wire strands tensioned horizontally at heights of 300mm and 900mm above the ground, threaded with commercial type danger tape.

The Contractor shall maintain in good order all demarcation fencing and barriers for the duration of construction activities, or as otherwise instructed.

4.2.4 Ablution facilities

The Contractor is responsible for the erection and maintenance of adequate ablution facilities and for enforcing the use of these facilities.

The Contractor shall be responsible for ensuring that all ablution facilities are maintained in a clean and sanitary condition to the satisfaction of the ER.

Ablution facilities (chemical toilets, etc.) must be provided at all construction camp areas where there will be a concentration of labour. Toilet paper must be provided.

4.2.5 Eating areas

If none are available, the Contractor shall provide adequate temporary shade within the construction areas to ensure that site personnel do not move off site to eat.

The Contractor shall provide adequate refuse bins at all eating areas to the satisfaction of the ER.

If deemed necessary by the ER, the Contractor shall demarcate designated eating areas.

No feeding of wild animals shall be allowed.

4.2.6 Workshop, equipment maintenance and storage

All vehicles and equipment shall be kept in good working order to maximise efficiency and minimise pollution.

All maintenance, including washing and refuelling of plant on site shall take place at designated locations at the workshop area.

The Contractor shall ensure that no contamination of soil or vegetation occurs around workshops and plant maintenance facilities.

All machinery servicing areas shall be bunded.

Drip trays shall be used to collect used oil, lubricants, etc. during maintenance. Drip trays shall be provided for all stationary plant.

Washing of equipment shall be restricted to urgent maintenance requirements only.

Adequate wastewater collection facilities shall be provided (4.5.3).

4.2.7 General aesthetics

The Contractor shall ensure that the type and colour of roofing and cladding materials of any new buildings and structures constructed as part of the project are selected to reduce reflection and blend with the natural environment.

The Contractor shall not deface, paint, damage or mark any natural feature (e.g. rocks, etc.) situated on or around the site for survey or any other purposes unless agreed beforehand with the ER. Any features, affected by the Contractor in contravention of this clause shall be restored/rehabilitation to the satisfaction of the ER.

All construction areas must be kept neat and tidy at all times. Different materials and equipment must be kept in designated areas and storing/stockpiling shall be kept orderly.

Lighting shall be of the downward facing spill-off type.

4.3 Materials Handling, Use and Storage

The potential environmental impact of the handling, use, storage and disposal of materials used during construction shall be minimised.

4.3.1 General

Environmental considerations shall be taken into account in the siting of any material storage areas.

4.3.2 Transportation

The Contractor shall ensure that all suppliers and their delivery drivers are aware of procedures and restrictions (e.g. no-go areas) in terms of this EMP.

Material shall be appropriately secured to ensure safe passage between destinations during transportation. Loads shall have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.

4.3.3 Stockpiling

The Contractor shall plan his activities so that materials can be transported direct to and placed at the point where it is to be used.

Should temporary stockpiling become necessary, the areas for the stockpiling of excavated imported material shall be indicated and demarcated on the site plan submitted in writing to the ER for his approval (MS1), together with the Contractor's proposed measures for prevention, containment and rehabilitation against environmental damage.

Stockpiles shall be positioned and sloped to create the least visual impact.

No foreign material generated/deposited during construction shall remain on site. Areas affected by stockpiling shall be reinstated to the satisfaction of the ER and the ECO.

Mitigation Measures

- *Temporary stormwater control measures should be installed in the event that rain should occur which has the potential to cause erosion of exposed soil;*
- *Cut-off drains must be installed to facilitate the control of surface water runoff velocities;*
- *Stormwater control barriers should be used to divert surface water runoff into grassland buffers and not directly into the exposed workings;*
- *A stormwater management plan should be compiled during the detailed engineering design phase to ensure that adequate stormwater management measures are incorporated into the design of the surface infrastructure;*
- *Stockpiles of soils and material should be located on high ground out of the reach of flood flows; and*
- *Stockpiles will be sited in areas demarcated for such purposes prior to the commencement of construction activities.*

4.3.4 Hazardous substances

All hazardous material/substances (e.g. petrochemicals, oils, paints, etc.) shall be stored on site only under controlled conditions. All hazardous materials/substances shall be stored in a secured, appointed area that is fenced and has restricted entry. All storage shall take place using suitable containers to the approval of the ER. Hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or containment structure.

Fuel shall be stored in a steel tank supplied and maintained by the fuel suppliers. The tanks shall be located in a secure, demarcated area and an adequate bund wall (110% of the total volume of the tank) shall be provided. The floor and wall of the bund area shall be impervious to prevent infiltration of any spilled/leaked fuel into the soil. No possible spillages or accumulated stormwater within this bunded area will be allowed to be flushed from the bund into the surrounding area. All fluids accumulated within the bunded area shall be removed by a registered service provider and disposed off at a DWA approved landfill site which is registered to deal with waste of this nature.

Weighbills shall be sourced from the service provider and be kept on site for inspection by the ECO during his/her audits.

Mitigation Measures

- *Ensure that any hydrocarbons spills are cleaned up as soon as possible;*
- *Provide drip-trays for vehicles that leak hydrocarbons and fix these leaks off site immediately*
- *Ensure that a proper spill-kit is available at all times where hydro-carbon handling will be undertaken;*
- *Ensure that raw materials stockpiles are enclosed and bunded; and*
- *Ensure that hazardous materials are stored on a lined surface and that water runoff from the area is contained.*

MS3: The Contractor shall provide a Method Statement detailing the hazardous substance/material that are to be used during construction, as well as the storage, handling and disposal procedures for each substance/material and emergency procedures in the event of misuse or spillage that might negatively affect people or the environment.

4.3.5 Surfacing materials

Over spray of bitumen products outside of the road surface and onto roadside vegetation shall be prevented using a method approved by the ER.

When heating of bitumen products, the Contractor shall take cognisance of appropriate fire control measures (see 4.12).

Stone chip/gravel excess shall not be left on road/paved areas. This shall be swept/raked into piles and removed to an area approved by the ER.

Water quality from runoff from any fresh bitumen surface shall be monitored by the ER and remedial actions taken where necessary.

4.3.6 Cement and concrete batching

Concrete mixing directly on the ground shall not be allowed and shall take place on impermeable surfaces to the satisfaction of the ER.

The concrete batching activities shall be located in an area of low environmental sensitivity to be identified by the ER.

All runoff from batching areas shall be strictly controlled and cement-contaminated water shall be collected, stored and disposed of at a DWA registered landfill site authorised to deal with these substances.

Contaminated water storage facilities shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented. The storage facilities shall be completely closed systems such as JoJo tanks with adequate capacities.

Unused cement bags shall be stored out of the rain where runoff won't affect them.

Used (empty) cement bags shall be collected and stored in weatherproof containers to prevent wind-blown cement dust and water contamination. Used cement bags shall not be used for any other purpose and shall be disposed of on a regular basis at a DWA registered landfill site.

All excess concrete shall be removed from site on completion of concrete works and disposed of at a DWA registered landfill site.

Washing of the excess concrete into the ground is not allowed.

All excess aggregate shall be removed.

MS4: The Contractor shall submit a Method Statement detailing cement storage, concrete batching areas and methods, method of transport of cement and concrete, storage and disposal of used cement bags and spill contingencies for each concrete batching operation.

4.4 Traffic Accommodation

The Contractor shall be required to ensure that traffic along the N2 as well as at the affected interchanges is accommodated and that general traffic flow continues with as little congestion as is possible.

No new bypass or traffic accommodation routes shall be cleared or established without the approval of the ER.

Mitigation Measures

- *Provide enough heavy vehicle storage areas within the construction site;*
- *Ensure that all road diversions and closures are considered as part of the development footprint and do not add any unnecessary roads;*
- *Ensure that vehicle traffic which may obstruct traffic flow is scheduled outside of peak travelling time in the morning or afternoon;*
- *Ensure that heavy / large load traffic is appropriately routed and appropriate safety precautions are taken to prohibit road collisions and traffic incidences; and*
- *Ensure that vehicle operators are suitably licensed, have had appropriate environmental and safety induction, are aware of specific site procedures, and are well rested and cognisant when operating heavy or unsafe vehicles / machinery.*

MS5: The Contractor shall submit a Method Statement for approval detailing how traffic is to be accommodated along the road during construction. Cognisance must be taken of No-Go areas within the road reserve. Details should include stop-go locations, estimated delays, start date and duration as a minimum.

4.5 Waste Management

Waste management on site shall be strictly controlled and monitored. Only approved waste disposal methods shall be allowed.

The Contractor shall ensure that all site personnel are instructed in the proper disposal of all waste.

4.5.1 Solid waste

The Contractor shall ensure that all facilities are maintained in a neat and tidy condition and the site shall be kept free of litter. Measures shall be taken to reduce the potential for litter and negligent behaviour with regard to the disposal of all refuse. At all places of work the Contractor shall provide litter bins, containers and refuse collection facilities for later disposal at a DWA registered landfill site.

Solid waste may be temporarily stored on site in a designated area approved by the ER prior to collection and disposal at a DWA registered landfill site. Waste storage containers shall be covered, tip-proof, weatherproof and scavenger proof. The waste storage area shall be fenced off to prevent wind-blown litter.

No burning, on-site burying or dumping of waste shall be allowed.

All solid waste shall be disposed of at a DWA registered landfill site. The Contractor shall supply the ER with the Weighbills for these disposals who will keep them on record for the duration of the project.

DEPARTMENT OF WATER AFFAIRS – WATER QUALITY MANAGEMENT SECTION

SOLID WASTE MANAGEMENT

- “All waste material generated must be disposed off at a permitted landfill site that is authorised to accept such waste. Safe disposal certificates must be kept on record.
- Contaminated soil or hazardous material must be disposed off at a permitted hazardous landfill site that is authorized to accept the said material.
- Should private contractors be used, all solid waste must be disposed off at a permitted landfill site, and proof of this must be made available to this Department when required.
- All waste generated from this project must be placed in skips stored in a designated storage/ collection area prior to being safely disposed off.”

MS6: The Contractor shall submit a Method Statement detailing a solid waste control system (storage, provision of bins, site clean-up schedule, bin clean-out schedule and point of disposal as a minimum) to the ER for approval.

4.5.1.1 Domestic waste

The Contractor shall provide metal refuse bins or equivalent plastic refuse bins, all with lids, for all buildings. Refuse shall be collected and removed from all facilities at least twice a week. Domestic waste shall be transported to a DWA registered landfill site for disposal in covered containers or trucks.

4.5.1.2 Construction rubble/waste

Inert construction rubble and waste materials shall be disposed of by burying in a site approved by the ER. Asphalt residue does not constitute “inert construction rubble or waste materials”. It is classified as a hazardous waste and must be disposed off at a DWA registered landfill site that has the capacity to deal with hazardous waste.

4.5.1.3 Scrap metal

Scrap metal shall be disposed of off-site at a DWA registered landfill site. Weighbills of this disposal will be submitted to the ER for record keeping.

4.5.2 Hazardous waste

All hazardous waste (including bitumen, paint and all petrochemicals) shall be disposed of at a DWA registered hazardous landfill site. The Contractor shall provide the ER with the appropriate Weighbills for record keeping.

Used oil and grease shall be removed from site and disposed of at a DWA registered hazardous landfill site.

Under no circumstances shall the spoiling of tar or bituminous products on the site, over embankments, or any burying, be allowed.

Unused or rejected tar or bituminous products shall be returned to the supplier's production plant.

Used oil, lubricants and other cleaning materials from the maintenance of vehicles and machinery shall be collected in holding tanks and sent back to the supplier or removed from site by a specialist oil recycling company for disposal at a DWA registered hazardous landfill site.

4.5.3 Wastewater

The ER's approval shall be required prior to the discharge of contaminated water into sewer systems.

Water from kitchens, showers, laboratories and other washing areas shall be discharged into a conservancy tank for removal from the site by a registered service provider.

Runoff from fuel depots, workshops, machinery washing areas and concrete batching areas shall be collected into a conservancy tank and disposed of at a site approved by the ER. If the runoff contains petrochemicals (diesel, petrol, oil and grease) it shall be collected by a registered service provider and disposed of at a DWA registered landfill site capable dealing with waste of this nature.

Mitigation Measures

- *Demarcated areas where waste can be safely contained and stored on a temporary basis during the construction phase should be established. When adequate volumes (not more than 1 month) have accumulated all waste is to be removed from site and disposed of at a licensed facility;*
- *Waste is not to be buried on site;*
- *Hydro-carbons should be stored in a bunded storage area;*
- *All hazardous materials including paints, turpentine and thinners must be stored appropriately to prevent these contaminants from entering the environment;*
- *Spill-sorb or similar type product must be used to absorb hydrocarbon spills in the event that such spills should occur.*

DEPARTMENT OF WATER AFFAIRS – WATER QUALITY MANAGEMENT SECTION

SEWAGE AND WASTEWATER MANAGEMENT

- “The use of chemical toilet facilities during the construction phase of the road must not cause any pollution to any water resources as well as pose a health hazard. In addition, these toilets must be situated out of the 1:100 year floodline of any watercourse.
- It is also this Department’s experience that projects of this nature may result in the generation of small volumes of water containing waste. In this instance, the following is applicable:
 - Water containing waste must not be discharged into the natural environment.
 - Measures to contain the water containing waste and sagely dispose of it must be implemented.”

MS7: The Contractor shall submit a Method Statement to the ER detailing how wastewater would be collected from all wastewater generating areas, as well as storage and disposal methods. If the Contractor intends to carry out any on-site wastewater treatment, this should also be included. Please note that if wastewater treatment plants are to be erected they will require licensing under the Waste Act of 2008 (Act 59 of 2008), the costs and responsibilities for such an application will be carried by the Contractor.

4.6 Noise Control

The Contractor shall endeavour to keep noise generating activities to a minimum.

The Contractor shall restrict all operations that result in undue noise disturbance to local communities and/or dwellings (e.g. blasting and crushing) to daylight hours on workdays (Monday to Saturday) or otherwise agreed with the ER.

The Contractor shall warn any local communities and/or residents that could be disturbed by noise generating activities such as blasting, well in advance and shall keep such activities to a minimum.

The Contractor shall be responsible for compliance with the relevant legislation with the respect to noise.

4.7 Dust Control

The Contractor shall ensure that the generation of dust is minimised and shall implement a dust control programme to maintain a safe working environment, minimise nuisance for surrounding residential areas/dwellings and protect damage to natural vegetation, crops etc.

Construction vehicles shall comply with speed limits and haul distances shall be minimised. Material loads shall be suitably covered and secured during transportation.

Exposed soils and material stockpiles shall be protected against wind erosion. The location of stockpiles shall take into consideration the prevailing wind directions and locations of sensitive receptors.

The Contractor shall implement dust suppression measures (e.g. Water spray vehicles, covering material stockpiles, etc.) if and when required.

Mitigation Measures

- *Heavy vehicles and machinery should be serviced regularly to minimise exhaust fume pollution;*
- *Soil stockpiles will be located in areas to limit the erosive effects of the wind, which will limit dust;*

- *Removal of vegetation will be avoided until such time as soil stripping is required, which will limit dust.*
- *Limit vehicle speeds on unpaved roads to 20 km/h to limit the amount of dust generated;*
- *Haulage distances should be at a minimum;*
- *Water should be sprayed onto gravel roads when required;*
- *Environmental friendly soil stabilisers may be used as additional measures to control dust on gravel roads and construction areas;*
- *All equipment should be kept in good working order;*
- *Equipment should be operated within its specifications and capacity and should not be overloaded;*
- *All machinery/plant should be serviced and lubricated regularly to ensure a good working order;*
- *Ensure that the potential noise source will conform to the South African Bureau of Standards recommended code of practice, SANS Code 0103:1983, so that it will not produce excessive or undesirable noise when it is released;*
- *All the Contractors' equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice and the South African National Standard (SANS) Code 0103:1983, for construction plant noise generation; and*
- *All of the Contractors' vehicles shall be fitted with effective exhaust silencers and shall comply with Road Traffic Act (Act 29 of 1989) when any such vehicle is operated on a public road.*

4.8 Soil Erosion and Sedimentation Control

4.8.1 During construction

The Contractor shall, as an ongoing exercise, implement erosion and sedimentation control measures to the satisfaction of the ER.

During construction, the Contractor shall protect all areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking any other measures necessary to prevent stormwater from concentrating in streams and scouring slopes and steep banks.

Any runnels or erosion channels developed during the construction or maintenance period shall be backfilled and compacted and the areas restored to a proper condition similar to the condition before the erosion occurrence.

Stabilisation of cleared areas to prevent and control erosion and/or sedimentation shall be actively managed. The method of stabilisation shall be determined in consultation with the ER. Consideration and provision shall be made for the following methods (or combination thereof):

- Brushcut packing;
- Mulch or chip cover;
- Straw stabilising;
- Watering, planting or sodding;
- Soil binders;
- Anti-erosion compounds;
- Mechanical cover; and
- Packing structures (including the use of geofabric and log/pole fencing)

Traffic and movement over stabilised areas shall be restricted and controlled and damage to stabilised areas shall be repaired and maintained to the satisfaction of the ER.

In areas where construction activities have been completed and where no further disturbance would take place, rehabilitation and re-vegetation should commence as soon as possible.

4.8.2 Remediation of existing eroded areas

The Contractor shall be required to undertake actions to correct and stabilise existing areas of erosion along the road, within the road reserve and outside the road reserve if the source of the erosion originates within the road reserve. These areas will be identified by the Client as part of the Tender Documentation.

Mitigation Measures

- *Care must be taken to ensure that in removing vegetation adequate erosion control measures are implemented;*
- *A stormwater management plan, including sufficient erosion-control measures, must be compiled in consultation with a suitably qualified environmental practitioner / control*

*officer during the detailed design phase prior to the commencement of construction;
and*

- *The propagation of low-growing dense vegetation suitable for the habitat such as grasses, sedges or reeds is the best natural method to reduce erosion potential in sensitive areas.*
- *In-stream water flow should not be hindered throughout the construction phase.*

DEPARTMENT OF WATER AFFAIRS – WATER QUALITY MANAGEMENT SECTION
<p>EROSION CONTROL</p> <ul style="list-style-type: none"> • “Soil erosion on site must be prevented at all times i.e. pre-, during- and post- construction activities. • Erosion control measures must be implemented in areas sensitive to erosion such as near water supply points, edges of slopes, etc. These measures could include the use of sand bags, hessian sheets, retention or replacement of vegetation.”

MS8: The Contractor shall submit a Method Statement to the ER for approval detailing the method of erosion remediation and stabilisation in each of these areas.

4.9 Stormwater Management

To prevent stormwater damage, the increase in stormwater runoff resulting from the construction activities must be estimated and the drainage system accessed accordingly. A drainage plan must be submitted to the Engineer for approval and must include the location and design criteria of any temporary stream crossings.

During site establishment, stormwater culverts and drains are to be located and covered with metal grids to prevent blockages if deemed necessary by the Engineer (e.g. due to demolition work).

Temporary cut off drains and berms may be required to capture stormwater and promote infiltration.

DEPARTMENT OF WATER AFFAIRS – WATER QUALITY MANAGEMENT SECTION**STORMWATER MANAGEMENT**

- “It is imperative there is proper management of stormwater on the site during and after construction. The development of a stormwater management plan and subsequent implementation of the said plan would help facilitate this.
- After construction, the site should be contoured to ensure free flow of run-off and to prevent ponding of water.
- Drainage must be controlled to ensure that runoff from the site will not culminate in off-site pollution or result in damage to properties downstream of any stormwater discharge.”

MS9: The Contractor shall submit a Method Statement to the ER for approval detailing the method of stormwater control measures for the entire project area.

4.10 Working in Watercourses and Wetland Areas

As far as is reasonably possible, work in watercourses and estuary/ wetland areas shall take place outside of the expected rainy season and allow sufficient time for rehabilitation processes to be effected before the rains commence, i.e. between the months of March to August. This includes any work requiring the diversion of rivers or streams or section of rivers or streams, the stabilisation of eroded drainage lines and any construction activities involving the crossing of watercourses and wetland areas.

All watercourses and wetland areas shall be protected from erosion and direct or indirect spills of pollutants, e.g. sediment, refuse, sewage, cement, oils, fuels, chemicals, wastewater and bituminous products.

In the event of a spill, the Contractor shall take prompt action to clear polluted areas and prevent spreading of the pollutants. The Contractor shall be liable to arrange for professional service providers to clear affected areas, if required.

Any work requiring the fording of watercourses or wetland areas by machinery and vehicles shall be undertaken at slow speed and with clean vehicles (no hydraulic fuel, oil or other fuel leakages) and along a single track.

Drip trays shall be used for all pumps, generators or other stationary equipment that will be used in watercourses or wetland areas in order to prevent water contamination as a result of fuel spillages or leaks.

4.10.1 Bridge construction

MS10: The Contractor shall submit a bridge construction Method Statement to the ER for approval, detailing the location of the temporary bypasses, spill prevention measures, erosion and sedimentation control measures, surface water flow diversions and reinstatements for each bridge demolition and construction site along the road alignment.

4.10.1.1 Bridge structures over the Baakens River and its tributaries

The Contractor shall ensure that no equipment or vehicles are permitted to enter the wetland areas associated with this construction site.

No detour shall be allowed outside the road reserve, it is preferred that the traffic be accommodated on the existing structure and that the lane construction will take place in such a way to ensure the flow of one lane of traffic over the structure at all times.

The Contractor shall ensure that no material stockpiles, vehicle or equipment stores or other construction related substances are stored outside of the road reserve at this site.

No hazardous substances such as diesel and oil will be allowed to be stored at this site.

All construction waste shall be removed by the Contractor and disposed of at a DWA registered landfill site.

4.10.2 Protection of surface water quality

The Contractor shall ensure uninterrupted flow of clean surface water past the construction works to the satisfaction of the ER and the ECO. This shall be done by diverting surface water flow or piping the surface flow past the works. No watercourse may be diverted dammed or modified without the approval of the Method Statement (3.8.1) by the ER.

Contaminated water (silt-laden, cement-contaminated, etc.) pumped from the construction area shall be pumped into settlement ponds and not straight back into the watercourse or wetland areas. Water shall not be pumped from the settlement ponds into the river without the approval of the ER.

Washing of clothes and equipment, bathing and swimming in rivers, streams and dams, is strictly forbidden.

4.10.3 Reinstatement

After the bridge construction, the works area, stream diversion, settlement pond areas and temporary bypasses shall be reinstated to the satisfaction of the ER.

4.11 Protection of Indigenous Vegetation

The Contractor shall be responsible for informing all employees about the need to prevent any harmful effects on indigenous vegetation on or around the construction site as a result of their activities.

Clearing of indigenous vegetation shall be kept to a minimum. The removal, damage and disturbance of indigenous vegetation without the written approval of the ER, is prohibited.

Before vegetation clearing takes place in any construction area, search and rescue and seed collection shall be undertaken.

The use of herbicides is prohibited unless approved by the ER.

4.12 Protection of Fauna

The Contractor shall ensure his employees do not undertake any hunting, trapping, shooting, poisoning or other disturbance of any fauna on-site or in the areas surrounding the road reserve.

The feeding of any wild animals is prohibited.

The use of pesticides is prohibited unless approved by the ER.

No domestic pets or livestock are permitted on site.

4.13 Fire Control

The Contractor shall take all reasonable steps to avoid increasing the risk of fire through activities on site.

The Contractor shall ensure that basic fire-fighting equipment is available at all construction activities on site.

The Contractor shall appoint a fire officer who shall be responsible for ensuring immediate and appropriate action in the event of a fire.

The Contractor shall ensure that all site personnel are aware of the procedure to be followed in the event of a fire.

MS11: The Contractor shall submit a fire control and fire emergency Method Statement to the ER for approval. The Method Statement shall detail the procedures to be followed in the event of a fire and the name of the appointed fire officer.

Any work that requires the use of fire may only take place in a designated area approved by the ER and must be supervised at all times. Fire-fighting equipment shall be available at all times.

4.14 Blasting

Wherever blasting activity is required on the site, the contractor shall rigorously adhere to the relevant statutes and regulations that control the use of explosives. In addition, the contractor shall, prior to any drilling of holes in preparation for blasting, supply the engineer with a locality plan of the blast site on which shall be shown the zones of influence of the ground and air shock-waves and expected limits of fly-rock. The plan shall show each dwelling, structure and service within the zones of influence and record all details of the dwellings/structures/services including existing positions, lengths and widths of cracks, as well as the condition of doors, windows, roofing, wells, boreholes etc.

The contractor, alone, shall be responsible for any costs that can be attributed to blasting activities, including the collection of fly-rock from adjacent lands and fields. The submission of such a plan shall not in any way absolve the contractor from his responsibilities in this regard. The contractor shall also indicate to the engineer the manner in which he intends to advertise to the adjacent communities and/or road users the times and delays to be expected for each individual blast.

The Contractor shall notify any occupants/owners of surrounding land at least one week prior to blasting and shall address any concerns that they may have to the satisfaction of the ER.

4.15 Water Provision

The Contractor shall make available safe drinking water fit for human consumption at the site offices and all other working areas.

All drinking water must be from a legal source and comply with recognised standards for potable use. The Contractor shall comply with the provisions of the National Water Act, 1998 (Act 36 of 1998) and its Regulations pertaining to the abstraction of waters from rivers and streams and the use thereof.

If water is stored on site, drinking water and multi-purposed water storage facilities shall be clearly distinguished and demarcated.

4.16 Protection of Heritage and Cultural Features

If any archaeological or paleontological artefacts or remains are uncovered during earthmoving activities, work in the vicinity of the find shall cease immediately. The Contractor shall immediately notify the ER, who shall contact the South African Heritage Resources Agency (SAHRA) who will take appropriate steps.

The Contractor will be required to abide by the specifications as set out by SAHRA or the heritage specialist appointed to investigate the find.

The Contractor may not, without permit issued by the relevant heritage resources authority, destroy, damage, excavate, alter, deface or otherwise disturb archaeological material.

Mitigation Measures

- *During excavations should any other archaeological or cultural materials be unearthed, all construction will cease immediately, and appropriate authorities will be notified. In the event that skulls or bones are unearthed the South African Police Service (SAPS) will also be notified; and*
- *The project manager will notify the heritage authority, SAHRA, of any artefacts or sites uncovered and obtain permission to continue construction.*

5 ALIEN VEGETATION CLEARING PROGRAMME

5.1 General Requirements

MS12: The Contractor shall liaise with DWA's Working for Water Programme (or another experienced organisation approved by the ER) in compiling and implementing an alien vegetation clearing programme (AVCP), which shall indicate eradication areas, vegetation types, method of eradication, an order of priority for all the actions to be undertaken and disposal of the collected plant material. The AVCP shall be submitted to the ER for approval and only pertain to the areas within the road reserve and areas that are disturbed by the Contractor for any purpose associated with the construction project.

The Contractor shall ensure that unskilled labour for vegetation eradication is sourced from the local labour database to be drawn up in conjunction with the local Public Steering Committee (PSC).

The AVCP shall comprise specifications on the biological, mechanical, and chemical control methods as required for the management of the alien species.

The AVCP shall provide for short, medium and long-term eradication and maintenance programmes for this project. The programme shall include the following phases:

- Initial control (reduction of existing population).
- Follow-up control (control of seedlings after initial eradication).
- Maintenance control (longer term monitoring and eradication of alien vegetation in areas that have been cleared) for the duration of the contract period).

The Contractor shall ensure that cognisance is taken of the possibility of fire hazards and the spread of alien vegetation seeds released when mature vegetation is chopped down.

The AVCP should also include the safe, effective disposal of removed vegetation. This is particularly important in terms of stormwater management. Removed vegetation shall be disposed of at a DWA registered landfill site and weighbills collected to present to the ER for record keeping.

5.2 General Eradication Guidelines

All alien vegetation within the road reserve shall be cleared. If any alien vegetation clearing is required within No-Go areas, this shall not take place without the written approval of the ER and shall be undertaken under supervision of the ELO. Special care shall be taken to protect indigenous vegetation in No-Go areas from trampling herbicide drift or any other activity that might impact on them.

The use of herbicides is encouraged in preference to vehicle-driven brush cutting and grading. No herbicide use will however be allowed within streams, rivers or other drainage lines.

All trees and saplings need to be cut down at ankle height where possible and herbicides applied immediately after cutting. Cutting without the use of herbicide treatment would stimulate re-growth.

Eradication must start in the least infected areas and from highest lying areas.

Herbicides shall not be applied when conditions are windy, so as to avoid spray drift.

No herbicides should be applied when rain is forecast within two days.

Protective clothing and masks must be worn at all times during application of herbicides.

Colour dyes must be used with the herbicides to clearly mark areas that have been treated.

Herbicide drift onto other plants must be avoided and care must be taken not to trample indigenous vegetation or stack alien vegetation on top of it.

Always read and follow the instructions on the labels of herbicides and make sure that the employees that will be working with these substances are familiar with its uses and application methodology.

Unused herbicides and empty herbicide containers shall not be disposed of on site, but collected, stored at a point on site approved by the ER and disposed of by a registered service provider at a DWA registered landfill site capable of receiving hazardous materials such as this. Weighbills must be collected and provided to the ER for record keeping.

6 VEGETATION REHABILITATION

6.1 *Vegetation Rehabilitation Plan*

MS13: The Contractor shall appoint a suitably experience landscaping contractor/horticulturist to compile a Vegetation Rehabilitation Plan that shall detail search and rescue, seed collection, seed mixing, seeding methods, planting and vegetation establishment in all construction area. The Contractor shall submit the Vegetation Rehabilitation Plan to the ER for approval.

The landscaping contractor/horticulturist shall be familiar with the Baakens Mesic Succulent Thicket Forest Mosaic and Rowellan Park Grassy Fynbos vegetation types and his/her appointment must be approved by the ER.

The Vegetation Rehabilitation Plan shall include the following:

- Seed requirements, harvesting methods and locations and seed storage methods;
- Search and rescue procedures;
- Handling of plant materials rescued (transplantation areas, propagation etc.);
- Establishment and maintenance of project specific nursery, if required;
- Topsoil, mulch, fertiliser and soil stabiliser requirements and application;
- Landscaping and re-vegetation methods for each area, i.e. hydroseeding/hydromulching, planting, including locations and timing;
- Procurement requirements and list of species of plants to be procured, if any;
- Vegetation establishment and maintenance requirements (irrigation, fertilisation, etc.) for all re-vegetated areas; and
- The use of any herbicides, pesticides and other poisonous substances, if required.

6.2 *General*

All areas disturbed by construction activities, including temporary bypasses, storage and stockpiling areas, etc. shall be rehabilitated to the satisfaction of the ER. The new road reserve and road verges, cut/fill slopes etc., shall receive special attention during rehabilitation.

Hydroseeding/hydromulching is expected to be the most suitable method of re-vegetation for most areas.

Certain areas may be identified where specific plants/trees could be planted (e.g. viewing sites). All plants/trees used in re-vegetation shall be locally indigenous species only.

Avoidance is preferred over translocation and search and rescue should be undertaken only for plants/trees for which translocation is likely to be successful.

Re-vegetation of construction areas shall take place as soon as possible after completion of construction works. The timing of re-vegetation shall take cognisance of maintenance requirements and provision shall be made for any irrigation requirements.

No construction equipment, vehicles or unauthorised personnel shall be allowed onto areas that have been re-vegetated.

6.3 Seed Collection and Storage

Indigenous seed shall be harvested from areas that are free of alien vegetation, either within construction areas prior to site clearing or from suitable neighbouring areas with the consent of the relevant landowners.

Harvested seed shall be free of excessive quantities of organic and/or substrate material.

If it is required to collect seed from selected species by hand, this seed shall be treated and stored separately.

Following harvesting, seed shall be dried under cool airy conditions. Seed shall be insect-free and shall be stored in suitable containers under cool conditions that are free of rodents or insects. No wet, mouldy or otherwise damaged seed is acceptable.

The Contractor shall provide adequate facilities for the storage of collected seed in rodent- and insect-free, cool, dry conditions to the satisfaction of the ER.

Seed collection shall be an ongoing exercise throughout the construction period (at least twice a year) in order to ensure that sufficient seed is collected for use in re-vegetation.

Only if the harvested seed quantities are not sufficient may additional seed be bought. Any procurement of seed for use in re-vegetation shall be from reputable sources only. The seed mix quantities and purity levels shall be as specified in the approved method statement.

6.4 Search and Rescue

Search and rescue of all rare or localised plant species within construction areas shall be undertaken before any site clearing takes place. Search and rescue shall include the collection of plants, cuttings and, where applicable, seed.

Search and rescue of seed and cuttings for propagation purposes may be undertaken within No-Go areas under the supervision of the ELO.

Rescued plant material shall either be planted nearby within suitable habitats in areas that will not be disturbed in the foreseeable future.

The Contractor shall provide nursery facilities for the holding of any rescued plant material that is deemed suitable for later use in re-vegetation to the satisfaction of the ER.

6.5 Nursery

The establishment of an on-site nursery to propagate and supply indigenous plants for use in re-vegetation is preferred to the procurement of plants / trees from commercial sources.

Nursery plants shall be grown from locally obtained seed, cuttings and plants.

The use of plants/trees bought from commercial sources in re-vegetation of specific areas (e.g. viewing sites) or for use in propagation at the nursery may be allowed if approved by the ER.

All plant material shall be obtained from reputable nurseries and shall be locally indigenous species only.

6.6 Mulch

Mulch shall be used in all areas where re-vegetation has to take place. Mulch shall be obtained from all areas where vegetation is cleared, after removal of alien vegetation and search and rescue of conservation-worthy species.

Mulch shall be free of alien species.

Plant material shall be reduced by either mechanical means (chipper) or by hand-axing to pieces no longer than 100mm.

No harvesting of mulch vegetation outside of construction areas shall be allowed.

Every effort shall be taken to ensure the retention of as much seed as possible in mulch made from indigenous vegetation and mulches shall be collected in such a manner that the loss of seed is restricted.

Bush-cut mulch shall be stored for as short a time-period as possible, and seed released from stockpiles shall be collected for use in re-vegetation.

Compost from a local source may be used as mulch during re-vegetation, but must be approved by the ER. Compost shall be well decayed, friable and free from weed seeds.

Seed free, half-composted material, such as mulled-bark, may be used as an additive to extend indigenous mulch. No more than 50% compost shall be used under these circumstances.

Wood chips (including bark), which are half composted and have not been treated with preservatives can also be used as mulch during re-vegetation. Wood chips shall only be obtained from indigenous species removed during site clearing of construction areas. Chips shall be no longer than 50mm in length or breadth and the ER shall approve the source of the chips.

6.7 Fertiliser

The use, storage and handling of fertiliser shall be strictly controlled by the Contractor.

Fertilisers shall be suitably stored in sealed containers in areas approved by the ER.

Care shall be taken when using fertilisers near No-Go areas, watercourses and estuarine/wetland areas and other sensitive natural areas.

Soil shall be well watered and moist before any fertiliser is applied.

6.8 Landscaping and Ground Surface Preparation

Cut and fill slopes shall be shaped and trimmed to reflect the natural condition and contours as closely as possible. Cut and fill slopes shall be left as rough as possible and shall be shaped to contain ridges that would facilitate the accumulation of topsoil.

Prior to re-vegetation, the Contractor shall ensure that the area is clear of any building materials and other foreign debris.

All visible weeds shall be removed from the area before replacing topsoil. Compacted soil shall be ripped along the contour and hand-trimmed, topsoil shall then be spread evenly over the surface.

The final prepared ground surface shall be furrowed to follow the natural contours of the land and not smooth.

6.9 Hydroseeding/ Hydromulching

The hydroseeder shall be capable of pumping the specified seed mix, fertiliser, soil stabiliser, etc. at the specified rates over the areas to be seeded, according to the Method Statement approved by the ER.

The hydroseeder shall have an agitation system, which shall be sufficient to agitate, suspend and homogeneously mix the specified slurry.

The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with hydraulic spray nozzles suitable for the even distribution of the slurry on the various slopes to be seeded.

6.10 Plants/ Trees

The handling, maintenance and planting of plant/trees shall be undertaken under supervision of the appointed landscape architect/horticulturist.

The Contractor shall ensure that each plant/tree is handled and packed in the approved manner for that species or variety, and that all necessary precautions are taken to ensure that the plants arrive on site in a proper condition for successful growth.

Plants shall be protected from wind during transportation.

No plants with exposed roots shall be subjected to prolonged exposure to drying winds and sun, or subjected to water logging or force-feeding at any time after purchase.

The Contractor shall ensure that the plants are in a good condition and free from plant diseases and pests. The Contractor shall immediately remove plants containing any diseases and/or pests from the site.

All plants supplied by the Contractor shall be healthy, well formed, and well rooted. Roots shall not show any evidence of having been restricted or deformed at any time. The potting materials used shall be weed free.

There shall be sufficient topsoil around each plant to prevent desiccation of the root system.

6.11 Timing

Re-vegetation of disturbed construction areas shall take place as soon as possible after construction work is completed.

As much as is possible, re-vegetation shall take place at the start of the summer rains to maximise water availability and minimise the need for watering.

If re-vegetation takes place during the dry season, irrigation of planted areas may be necessary.

6.12 Establishment of Vegetation

6.12.1 Irrigation

The Contractor shall be responsible for maintaining the desired level of irrigation necessary to maintain vigorous and healthy growth, as advised by the appointed landscaping contractor/horticulturist.

Water used for the irrigation of re-vegetated areas shall be free of chlorine and other pollutants that will have a detrimental effect on the plants.

Where hydroseeding was undertaken, the commencement of watering may be postponed until seeds have germinated and growth begins.

Where an irrigation system is required, the Contractor shall be responsible for its installation prior to seeding or planting. The Contractor shall supply all required water as well as all equipment as required by the approved Method Statement.

Every effort shall be made to avoid irrigation overspray into No-Go areas and other areas with natural vegetation.

6.12.2 Weed, disease and pest control

The Contractor shall be responsible for ensuring that all re-vegetated areas remain free of all alien and indigenous weed species during the contract and establishment period.

Weeding, removal methods and storage of this material shall be undertaken in such a manner that prevents the re-infestation of the cleaned areas.

All dead plant material shall be removed immediately as it may become a fire hazard and disposed of at a DWA registered landfill site.

The Contractor shall ensure that all plants are disease and pest free. Any methods used to control any diseases and/or pests, including the use of herbicides and pesticides, must be approved by the ER.

6.12.3 Tree establishment

Any trees planted as part of the re-vegetation shall be watered once weekly in summer, three times weekly in winter or otherwise as specified by the appointed landscaping contractor/horticulturist.

Trees that die or become diseased so that they appear to be in a badly impaired condition shall be promptly removed and replaced as soon as possible.

Trees shall be kept free from dead wood, broken branches, etc.

7 NON-COMPLIANCE

7.1 Procedures

The Contractor shall comply with the environmental specifications and requirements on an on-going basis and any failure on his part to do so will entitle the ER to impose a penalty.

In the event of non-compliance the following recommended process can be followed:

- The ER shall issue a notice of non-compliance to the Contractor, stating the nature and magnitude of the contravention. A copy shall be provided to the ECO during his/her site audit.

- The Contractor shall act to correct the non-conformance within 24 hours of receipt of the notice, or within a period that may be specified within the notice.
- The Contractor shall provide the ER with a written statement describing the actions to be taken to discontinue the non-conformance, the actions taken to mitigate its effects and the expected results of the actions. A copy shall be provided to the ECO.
- In the case of the Contractor failing to remedy the situation within the predetermined time frame, the ER shall impose a monetary penalty based on the conditions of contract.
- In the case of non-compliance giving rise to physical environmental damage or destruction, the ER shall be entitled to undertake or to cause to be undertaken such remedial works as may be required to make good such damage and to recover from the Contractor the full costs incurred in doing so.
- In the event of a dispute or difference of opinion between any parties arising out of the interpretation of the conditions of the EMP, or a disagreement regarding the implementation or method of implementation of conditions of the EMP, any party shall be entitled to require that the issue be referred to specialists for arbitration.

The ER shall at all times have the right to stop work and/or certain activities on site in the case of non-compliance or failure to implement remediation measures.

7.2 Offences and Penalties

Any avoidable non-compliance with the conditions of the EMP shall be considered sufficient ground for the imposition of a penalty.

Possible offences, which should result in the issuing of a contractual penalty, include, but are not limited to:

- Unauthorised entrance into No-Go areas;
- Unauthorised damage to natural vegetation;
- Unauthorised camp establishment (including stockpiling, storage etc.);
- Hydrocarbons/hazardous material: negligent spills/leaks and insufficient storage;
- Ablution facilities: non-use, insufficient facilities and insufficient maintenance;
- Late Method Statements or failure to submit Method Statements;

- Insufficient solid waste management (including clean-up of litter, unauthorised dumping and absence of weighbills as proof of disposal at a DWA registered landfill site);
- Erosion due to negligence/non-performance;
- Excessive cement/concrete spillage/contamination;
- Insufficient fire control and unauthorised fires;
- Preventable damage to water courses or pollution of water bodies; and
- Non-induction of staff.

7.2.1 Indicative List of Transgressions

Fines will be issued for the transgressions listed below. Fines may be issued per incident at the discretion of the ER. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the EMP. The ER will inform the Contractor of the contravention and the amount of the fine, and will be imposed by the ER on the Contractor and/or his Sub-contractors.

Fines for the activities detailed below, will be imposed by the ER on the Contractor and/or his Sub-contractors.

Table 1: Indicative fines for transgressions of the EMP

ITEM	TRANSGRESSION	FINE
A	Any persons, vehicles, plant or anything related to the Contractor's operations within the designated boundaries of a No-Go area	R 5 000.00
B	Any vehicle driving in excess of designated speed limits	R 1 500.00
C	Any vehicle being driven, and items of plant or materials being parked or stored outside the demarcated boundaries of the site	R 2 500.00
D	Persons walking outside the demarcated boundaries of the site	R 750.00
E	Persistent and un-repaired oil leaks from machinery. The use of inappropriate methods of refuelling such as the use of a funnel rather than a pump	R 3 500.00
F	Litter on site	R 1 500.00
G	Deliberate lighting of illegal fires on site	R 5 500.00
H	The eating of meals on site outside the defined eating area. Individuals not making use of the site ablution facilities	R 1 500.00
I	Dust or excessive noise on or emanating from the site	R 1 500.00
J	Any person, vehicle, item of plant, or anything related to the Contractors operations causing a public nuisance	R 2 500.00

For each subsequent similar offence the fine may, at the discretion of the ER, be doubled in value to a maximum value of R 50 000.00.

The ER shall be the judge as to what constitutes a transgression in terms of this clause, subject to the provisions of the General Conditions of Contract.

7.2.2 Indicative List of Penalties

Where the Contractor and/or his/her Sub-contractor(s) inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications, he/she shall be liable to pay a penalty fine over and above any other contractual consequences.

The Contractor is deemed not to have complied with this EMP if:

- Within the boundaries of the site, site extensions and haul/access roads there is evidence of contravention of the EMP.
- Environmental damage ensues due to negligence on the Contractor's and/or his/her Sub-contractor's part.
- The Contractor and/or his/her Sub-contractor fail to comply with the corrective or other instructions issued by the ER within a specific time.
- The Contractor and/or his/her Sub-contractor fail to respond adequately to complaints from the public.

Payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

An Environmental Performance Guarantee of 5% of the contract value shall be deposited by the Contractor with BKS. This fund shall be used in the event of penalties or rehabilitation costs for non-conformance or contraventions of the EMP. The balance shall be given back to the Contractor at Contract Closure.

The following penalties are suggested for transgressions:

Table 2: Indicative penalties for non-compliance with EMP

Item	Penalty
Erosion	A penalty equivalent in value to the cost of rehabilitation plus 20%
Oil spills	A penalty equivalent in value to the cost of cleanup operation plus 20%
Damage to indigenous vegetation	A penalty equivalent in value to the cost of restoration plus 20%.
Damage to sensitive environments	A penalty equivalent in value to the cost of restoration plus 20%.
Damage to cultural sites	A penalty to a maximum of R 100 000 shall be paid for any damage to any cultural/ historical sites
Damage to trees	A penalty to a maximum of R100 000 shall paid for each tree removed without prior permission, or a maximum of R5 000 for damage to any tree, which is to be retained on site.
Penalties for removing or damaging trees	See Table 3 below

Penalties for removing or damaging trees:

Table 3: Indicative fines related to the damage or removal of trees

Girth of trunk (1m above ground level)	Replacement value per tree
0 - 15mm	R100.00
16 - 30mm	R200.00
31 - 50mm	R500.00
51 - 75mm	R1 000.00
76 - 100mm	R2 500.00
101 - 150mm	R5 000.00
150 - 300mm	R10 000.00
Larger than 300mm	R15 000.00 to R100 000.00