

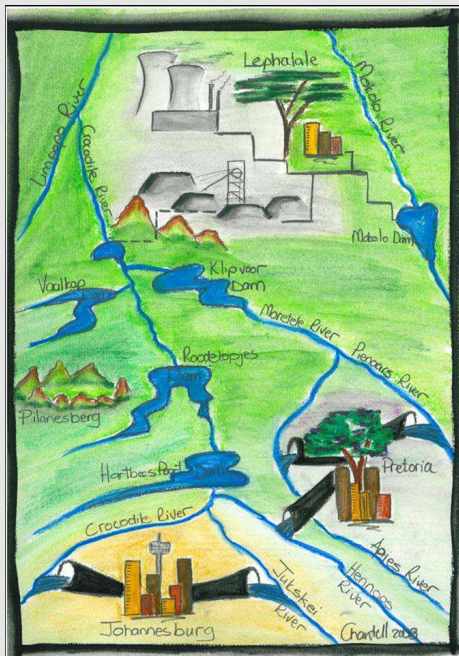


**water affairs**

Department:  
Water Affairs  
REPUBLIC OF SOUTH AFRICA

# **MOKOLO AND CROCODILE RIVER (WEST) WATER AUGMENTATION PROJECT (MCWAP)**

## **De-bottlenecking of an Existing Pipeline**



## **ENVIRONMENTAL MANAGEMENT PLAN**

December 2009



### **ENVIRONMENTAL AND SOCIAL CONSULTANTS**

P.O. BOX 1673  
SUNNINGHILL  
2157

147 Bram Fischer Drive  
FERNDAL  
2194

Tel: 011 781 1730  
Fax: 011 781 1731  
Email: [info@nemai.co.za](mailto:info@nemai.co.za)

## TABLE OF CONTENTS

<b>LIST OF ACRONYMS</b>	<b>5</b>
<b>DEFINITIONS</b>	<b>6</b>
<b>1 INTRODUCTION</b>	<b>11</b>
<b>2 OBJECTIVES OF THE EMP</b>	<b>12</b>
<b>3 ENVIRONMENTAL ASSESSMENT PRACTITIONERS</b>	<b>13</b>
<b>4 ENVIRONMENTAL ASPECTS AND IMPACTS</b>	<b>14</b>
4.1 Project Activities	14
4.2 Environmental Aspects	16
4.3 Environmental Impacts	17
<b>5 ENVIRONMENTAL LEGAL FRAMEWORK</b>	<b>19</b>
<b>6 LEGAL AND CONTRACTUAL AGREEMENTS</b>	<b>21</b>
6.1 Between Developer and DEA	21
6.2 Between Contractor and Landowner	22
6.3 General Information to be Supplied to the Landowner	23
<b>7 ORGANISATIONAL STRUCTURE</b>	<b>23</b>
7.1 Project Proponent	23
7.2 Environmental Monitoring Committee	24
7.3 Authorities Coordinating Committee	25

<b>7.4</b>	<b>Engineer</b>	<b>25</b>
<b>7.5</b>	<b>Engineer's Environmental Representative</b>	<b>26</b>
<b>7.6</b>	<b>Environmental Control Officer</b>	<b>26</b>
<b>7.7</b>	<b>Contractor</b>	<b>28</b>
<b>7.8</b>	<b>Contractor's Environmental Representative</b>	<b>29</b>
<b>8</b>	<b>MONITORING</b>	<b>29</b>
<b>9</b>	<b>EMP MITIGATION MEASURES</b>	<b>31</b>
<b>9.1</b>	<b>PROJECT PHASE: PRE-CONSTRUCTION AND CONSTRUCTION</b>	<b>32</b>
9.1.1	Agreement Statement	32
9.1.2	Commissioning of Tenders	32
9.1.3	Monitoring Controlling and Auditing	33
9.1.4	Construction Site Planning and Layout	34
9.1.5	Site Establishment	36
9.1.6	Fencing	38
9.1.7	Re-routing of Existing Services and Routing of new Services	41
9.1.8	Trench Excavations for Pipeline Construction	42
9.1.9	Earthworks	44
9.1.10	Borrow Pits and Quarries	45
9.1.11	Blasting	45
9.1.12	Materials Handling, Use and Storage	48
9.1.13	Hazardous Substances	49
9.1.14	Daily on Site Activities	50
9.1.15	Aesthetics	54
9.1.16	Waste Management	54
9.1.17	Water Management	55
9.1.18	Electricity Supply	56
9.1.19	Pollution Generation Potential	57
9.1.20	Geology and Soils	61

9.1.21	Vegetation	62
9.1.22	Rivers and Streams	65
9.1.23	Archaeology / Historical Resources	66
9.1.24	Emergency Procedures	67
9.1.25	Safety and Health	69
9.1.26	X-Ray of Pipeline Joints	71
9.1.27	Penalty Clauses	72
<b>9.2</b>	<b>PROJECT PHASE: OPERATION</b>	<b>74</b>
9.2.1	Site Access, Routine Maintenance and Maintenance Works	74
9.2.2	Access and Internal Routes	74
9.2.3	Waste Management	75
9.2.4	Electricity Provision	75
9.2.5	Noise Control	75
9.2.6	Vegetation Management	76
9.2.7	Fencing	76
<b>9.3</b>	<b>PROJECT PHASE: REHABILITATION AND DECOMMISSIONING</b>	<b>77</b>
9.3.1	Decommissioning of Structures	77
9.3.2	Vegetation	77
9.3.3	Soil and Land Capability	78

## LIST OF ACRONYMS

Acronym	Description
ACC	Authorities Coordinating Committee
CER	Contractor's Environmental Representative
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EER	Engineer's Environmental Representative
EIA	Environmental Impact Assessment
EMC	Environmental Monitoring Committee
EMP	Environmental Management Plan
EMP	Environmental Management Programme Report
I&AP	Interested and Affected Party
MCWAP	Mokolo Crocodile (West) Water Augmentation Project
PSP	Professional Service Provider

## DEFINITIONS

### Auditing

A systematic and objective assessment of an organisation's activities and services conducted and documented on a periodic basis.

### Catchment

All the land area from mountaintop to seashore, which is drained by a single river and its tributaries.

### Debushing

Clearing of the site of bush and undergrowth vegetation, but not including the removal of tree stumps.

### Environment

The surroundings in which humans exist and which comprise:

- The land, water and atmosphere of the earth.
- Micro-organisms, plant and animal life.
- Any part or combination of a) and b) and the interrelationships among and between them.
- The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that can influence human health and well-being.

### Environmental Aspect

Those components of the company's activities, products and services that are likely to interact with the environment.

### Environmental Authorisation

The written statement from the relevant environmental authority in terms of the National Environmental Management Act (Act 107 of 1998), with or without conditions, that records its approval of a planned activity and the implementation thereof and the mitigating measures required to prevent or reduce the effects of environmental impacts during the life of a contract.

### Environmental Awareness Training Course

A presentation given to the Contractor and its Sub-Contractors to raise environmental awareness and ensure that all staff, Contractor(s) and Sub-Contractors are familiar with or made aware of the contents of the environmental authorisation and the EMP.

Environmental Impact

The change to the environment resulting from an environmental aspect (an activity) on the environment, whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.

Environmental Impact Assessment (EIA)

The process of examining the environmental effects of a development in terms of the National Environmental Management Act (Act 107 of 1998) and the Environmental Impact Assessment (EIA) Regulations (Government Notice No. R385, R386 and R387).

Environmental Management Plan (EMP)

A detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and/or limiting or preventing negative environmental impacts are implemented during the life-cycle of a project.

Environmental Performance Certificate

The certificate issued by the Environmental Control Officer at the end of a Contract confirming that all environmental specifications applicable to the Contractor have been met.

Environmental Specification

Instructions and guidance for specific construction activities designed to help prevent, reduce and/or control the potential environmental implications of these activities.

Evaporation

The change by which any substance (such as water) is converted from a liquid state into and carried off in vapour.

Floodplain

A flat expanse of land bordering a river channel, formed through sediment deposition and other alluvial processes, and often characterized by frequent flooding as a result of bank overspill from the river channel.

Groundwater

Subsurface water in the zone in which permeable rocks, and often the overlying soil, are saturated under pressure equal to or greater than atmospheric.

Heritage Resource

Any place or object of cultural significance including buildings, structures, landscapes, graves and geological, archaeological and palaeontological sites.

*Landscape*

Land modified for human use and occupation, embracing both the natural (wilderness) environment and the urban.

*Monitoring*

A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.

*Natural Vegetation*

All existing vegetation species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on the site.

*Overburden*

The soil overlying desirable material extracted during borrowing or quarrying.

*Pollution*

Any change in the environment caused by substances, radioactive or other waves, or noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.

*Progressive Reinstatement*

Reinstatement of disturbed areas to topsoil profile on an ongoing basis immediately after selected construction activities (e.g. backfilling of a trench) are completed. This allows for passive rehabilitation (i.e. natural recolonisation by vegetation) to commence.

*Protected Plants*

Plant species officially listed on the Protected Plants List (each province has one), and which may not be removed or transported without a permit to do so from the relevant provincial authority.

*Red Data Species*

Plant and animal species officially listed in the Red Data Lists as being rare, endangered or threatened.

*Rehabilitation*

Rehabilitation is defined as the return of a disturbed area to a state, which approximates the state (where possible), which it was before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement revegetation of a disturbed area and the ensurance of a stable land surface.



Revegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.

Riparian Vegetation

Vegetation occurring on the banks of a river or a stream (i.e. vegetation fringing a water body).

Runoff

The total water yield from a catchment including surface and subsurface flow.

Subsoil

The soil horizons between the topsoil horizon and the underlying parent rock.

Topsoil

This is defined as the A horizon of the soil profile. Topsoil is the upper layer of soil from which plants obtain their nutrients for growth. It is often darker in colour, due to the organic (humic) fraction, but regardless of the fertility appearance, structure, agriculture potential, this profile constitutes the topsoil.

Transplanting

The removal of plant material and replanting the same plants in another designated position.

Veld

Unimproved areas of natural vegetation.

Wastewater

Means water contaminated by the project activities.

Watercourse

A geomorphological feature characterized by the presence of a streamflow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water.

Waterlogged

Soil or land saturated with water long enough for anaerobic conditions to develop.

Weeds and Invader Plants

Weeds and invader plants are defined as undesirable plant growth that shall include, but not be limited to all declared category 1, 2 and 3 listed invader species as set out in the Conservation of Agricultural Resources Act (No 43 of 1983) regulations. Other vegetation deemed to be invasive should be those plant species that show the potential to occupy in number, any area within the defined construction area.

Wetland

A seasonally, temporarily or permanently wet area, often exhibiting a specific vegetation community, for example, sedges, rushes, reeds, hydrophilic grasses, ground-covers and trees.

## 1 INTRODUCTION

Large parts of the Mokolo River catchment area are located on the Waterberg coalfields where, according to preliminary estimates, almost half of South Africa's in-situ coal reserves are situated. As such, the Waterberg has long been considered the country's major coal resource for the future, especially once the current mining areas in the Witbank-Highveld coalfields of the Mpumalanga province have been depleted. As a result, major developments are planned for the Lephalale area, which include:

- Construction of Eskom's Medupi Power Station (presently underway);
- Development of further Eskom power stations;
- Possible development of power stations by Independent Power Producers;
- Extension of the Exxaro mining operations and further mines;
- Possible petrochemical industries to be developed around the coal field further west of Lephalale;
- Possible exploitation of gas; and
- Accelerated growth in the population in the area.

As a direct result of the above developments, the demand for water in the Lephalale area will significantly increase over the next 20 years.

Due to the limited availability of water in the Lephalale area, the Department of Water Affairs (DWA) commissioned a feasibility study of the Mokolo Crocodile (West) Water Augmentation Project (MCWAP) to establish how the future water demands could be met. The phases for the proposed infrastructure for transferring water from the Mokolo Dam and Crocodile River (West) are tabulated below.

**Table 1: MCWAP Components**

Component	Brief Overview
<b>Phase 1</b>	<p>Parallel pipeline to augment the supply from Mokolo Dam to supply in the growing water use requirement for the interim period until a transfer pipeline from the Crocodile River West can be implemented. The solution must over the long term optimally utilise the full yield from Mokolo Dam. The infrastructure for this component consists of:</p> <ul style="list-style-type: none"> <li>• Rising main from Mokolo Dam to Wolvenfontein balancing dams;</li> </ul>

	<ul style="list-style-type: none"> <li>Gravity line from Wolvenfontein to Matimba Power Station; and</li> <li>New gravity line from Matimba Power Station to Steenbokpan.</li> </ul>
<b>Phase 2</b>	<p>Transfer scheme from the Crocodile River (West) at Vlieëpoort near Thabazimbi to the Lephalale area via a system consisting of:</p> <ul style="list-style-type: none"> <li>A weir and abstraction infrastructure, including a balancing reservoir, desilting works and high lift pumpstation at Vlieëpoort (near Thabazimbi);</li> <li>Transfer system (approximately 100 km): consisting of three potential pipeline routes for the rising pipeline, with the preferred route running primarily parallel to the railway line;</li> <li>A Break Pressure Reservoir;</li> <li>An Operational Reservoir; and a</li> <li>Delivery system, consisting of a gravity pipeline (approximately 30km) running from the Operational Reservoir to the Steenbokpan area.</li> </ul>
<b>De-bottlenecking</b>	<p><b>De-bottlenecking</b> of the existing pipeline that stretches from Mokolo Dam to Lephalale, which belongs to Exxaro. This entails the construction of the first 9km of the proposed gravity pipeline (for Phase 1) from Wolvenfontein balancing dams, with interconnections to the existing pipeline.</p>

This document serves as the Environmental Management Plan (EMP) for the MCWAP De-bottlenecking component. The project entails the de-bottlenecking of the existing pipeline that stretches from Mokolo Dam to Lephalale. The intention of the de-bottlenecking is to improve the hydraulic gradient at Rietspruitnek, where the existing pipeline passes over a ridge (approximately 16.5km from the Wolvenfontein Balancing Dams).

Note that this EMP is to be updated to incorporate any conditions stipulated in the environmental authorisation (should it be granted) and it should also take cognisance of further discussions with stakeholders affected by the proposed project.

## 2 OBJECTIVES OF THE EMP

The EMP provides the management actions required to reduce environmental impacts generated during the pre-construction, construction, operational and decommissioning activities for the proposed project, as well as gives recommendations for the rehabilitation of impacted areas. This Report must be read in conjunction with the De-bottlenecking Basic Assessment Report.

The primary objectives of the EMP include the following:

- Describe actions that when implemented will achieve mitigation of environmental impacts, or result in improved management of activities thereby reducing the probability of impacts occurring;
- Define organisational and administrative arrangements for environmental management and monitoring of the work contract, including defining the responsibilities of staff and co-ordination, liaison and reporting procedures;
- Ensure that discussions are held with site supervision staff, regarding pro-active environmental management, such that potential problems can be identified and mitigation measures adopted prior to rehabilitation work being carried out; and
- Define procedures for environmental control, in the event of pollution (spillage) or similar events requiring action.

### 3 ENVIRONMENTAL ASSESSMENT PRACTITIONERS

Nemai Consulting was appointed by DWA as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental assessment for MCWAP. The members of Nemai Consulting that were involved with compiling the MCWAP de-bottlenecking EMP are provided below.

**Table 2: Person involved with compiling MCWAP De-bottlenecking EMP**

Name	Qualifications	Experience
Mr D. Henning	MSc (Aquatic Science)	9 years experience. Prepared EMPs and acted as the ECO on various projects, including: <ul style="list-style-type: none"> <li>• 80km bulk water pipeline from Randfontein to Rustenburg;</li> <li>• Fish barrier on the Mooi River upstream of Spring Grove Dam;</li> <li>• Johannesburg Water sanitation and water supply projects for 2003/2004 and 2004/2005 financial years.</li> </ul>
Ms. S. van Eden	BA. Hons (Geography and Environmental Management)	5 years experience. Prepared EMPs for various projects, including: <ul style="list-style-type: none"> <li>• Golf Estate Development in Randfontein;</li> <li>• Micro Community Development in the Cradle of Humankind;</li> </ul>

		<ul style="list-style-type: none"> <li>Railway line and related infrastructure at the Port of Richards Bay.</li> </ul>
Mr S. Pienaar	BSc Hons (Environmental Management)	<p>2 years experience. Prepared EMPs and acted as the ECO on various projects, including:</p> <ul style="list-style-type: none"> <li>Northern Waste Water Treatment Works, Unit 5 Expansion;</li> <li>Zandspruit pumpstation and rising main;</li> <li>Olievenhoutbosch Extension 37, bulk services and reticulation;</li> <li>Rehabilitation of Derelict Asbestos Mines in North West and Northern Cape Provinces.</li> </ul>

## 4 ENVIRONMENTAL ASPECTS AND IMPACTS

### 4.1 Project Activities

De-bottlenecking is to be achieved through the construction of the first 9km of the proposed gravity pipeline (for MCWAP Phase 1), with a diameter of up to 1 100mm, from Wolvenfontein Balancing Dams, with interconnections to the existing pipeline. By utilising the existing pump station at Mokolo Dam, water could then be delivered at a rate higher than the capacity of the existing pipeline. The capacity will increase from 0.51 m<sup>3</sup>/second to 0.61 m<sup>3</sup>/second.

The following facilities and structures normally associated with pipelines will be installed en-route:

- Air valves;
- Scour valves;
- Pipe access points;
- Road crossings;
- River crossings;
- A Cathodic protection system;
- AC mitigation;

- Protective measures required to curb surge in a pipeline such as, reflux valves, surge tank(s);
- Farmers off takes;
- Construction and operation of a site camp with offices, storerooms and workshops, overnight accommodation for security and emergency staff, ablutions and facilities for the storage of explosives;
- Storage and handling of construction materials;
- Storage and handling of hazardous substances including diesel, engine oils and other listed substances; and
- Excavation of borrow pits.

The methodology for the installation of the pipeline is as follows:

- Pegging of route.
- Marking of protected trees Mark
- Remove topsoil in construction area and stockpile separately for later re-instatement;
- Excavate pipe trench;
- Install and compact pipe bedding;
- Install pipe sections by means of side booms (special cranes) and weld joints;
- Repair field joints and backfill and compact pipe trench in layers;
- Construct valve and access chambers;
- Re-shape the impacted area to its original topography and replace stripped topsoil;
- Install final Cathodic Protection measures; and
- Install pipeline markers.

Watercourse crossings at the Rietspruit and its tributary will consist of pipe sections encased in concrete in accordance with the relevant DWA criteria. The typical construction methodology for a river crossing is as follows:

- An earthen berm (coffer dam) and temporary bypass canal is constructed to divert the water around the construction site.
- The trench is excavated across the dry river channel.

- A concrete bedding is constructed first, followed by the installation and restraining of the pipe to prevent flotation. Encasement is completed by the construction of further concrete lifts.
- Once the concrete has set, the coffer dam is removed and the bypass canal is backfilled to re-instate flow.
- The impacted area is re-shaped to its original topography.
- The disturbed area is rehabilitated.
- If erosion of the disturbed river banks is a concern, gabion cut-off walls will be installed on either side.

## 4.2 Environmental Aspects

---

Environmental aspects are regarded as those components of an organisation's activities, products and services that are likely to interact with the environment. The following environmental aspects have been identified for MCWAP de-bottlenecking:

1. Waste Water discharge;
2. Noise;
3. Vibration;
4. Labour force;
5. Construction solid waste (hazardous & non-hazardous);
6. Disturbed areas to be rehabilitated;
7. Domestic solid waste, hazardous substances, hazardous waste and non-hazardous construction waste and by products;
8. Dust;
9. Flammable materials inclusive of fuels and oils;
10. Odours;
11. Groundwater;
12. Materials sourcing;
13. Movement of construction material;
14. Opening and establishing of borrow pits;
15. Potential incidents or emergency situations;



16. River crossings;
17. Use of existing public roads and private roads by construction vehicles; and
18. Water washing and toilet facilities at construction camps and work areas.

### 4.3 Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable. Significant environmental impacts associated with MCWAP de-bottlenecking are shown in **Table 3**.

**Table 3: Significant environmental impacts associated with MCWAP de-bottlenecking**

PLANNING AND DESIGN PHASE	
Feature / Aspect	Impact
Socio-economic aspects	<ul style="list-style-type: none"> <li>Possible impact of alignment on structures (e.g. farm buildings).</li> </ul>
Infrastructure & Services	<ul style="list-style-type: none"> <li>Possible impact of alignment on infrastructure (e.g. R510 road, access road to Wovenfontein, existing pipeline).</li> </ul>
Flora	<ul style="list-style-type: none"> <li>Possible impact of alignment on protected trees.</li> </ul>
Watercourse	<ul style="list-style-type: none"> <li>Possible impact of alignment on watercourses (i.e. Rietspruit main stem and tributaries).</li> <li>Impacts of existing river crossings to watercourse characteristics (i.e. flow, biota, habitat) may be exacerbated by the new pipeline crossings.</li> </ul>
CONSTRUCTION PHASE	
Feature / Aspect	Impact
Watercourses	<ul style="list-style-type: none"> <li>The pipeline crossings of the Rietspruit main stem and eastern tributary could lead to the alteration of the structure (i.e. bed and banks), damage to the riparian habitat, lead to increased siltation and adversely affect aquatic biota (e.g. clogging of gills, influence movement).</li> </ul>
Soil	<ul style="list-style-type: none"> <li>Erosion on slopes.</li> <li>Loss of topsoil.</li> <li>Establishment of borrow pits.</li> <li>Blasting-related impacts</li> </ul>

<b>Flora</b>	<ul style="list-style-type: none"> <li>• Damage to / removal of protected trees and medicinal plants.</li> <li>• Damage to riparian vegetation at river crossings.</li> <li>• Encroachment by exotic species.</li> </ul>
<b>Fauna</b>	<ul style="list-style-type: none"> <li>• Poaching.</li> <li>• Obstruction of movement.</li> <li>• Preventing access to watering points.</li> <li>• Harm from construction activities.</li> <li>• Loss of animals due to improper access control</li> </ul>
<b>Air</b>	<ul style="list-style-type: none"> <li>• Dust from use of dirt roads, transportation of fill and spoil material and from bare areas</li> </ul>
<b>Noise</b>	<ul style="list-style-type: none"> <li>• Noise associated with construction activities (e.g. vehicle movement, trenching, generators).</li> </ul>
<b>Aesthetics</b>	<ul style="list-style-type: none"> <li>• Impacts to visual quality of the area through poor housekeeping and construction-related activities</li> </ul>
<b>Safety and Security</b>	<ul style="list-style-type: none"> <li>• Danger trench collapse.</li> <li>• Uncontrolled access</li> <li>• Criminal activities associated with construction</li> </ul>
<b>Waste</b>	<ul style="list-style-type: none"> <li>• Use of veld for ablution purposes.</li> <li>• Land, air and water pollution through poor waste management practises</li> </ul>
<b>Construction camp</b>	<ul style="list-style-type: none"> <li>• Siting of construction camp – visually obtrusive, vegetation clearing, poaching, security.</li> <li>• Improper storage of material.</li> </ul>
<b>Socio-economic aspects</b>	<ul style="list-style-type: none"> <li>• Damages to property, including structures, fencing, gates, animals.</li> <li>• Establishment of temporary construction servitude.</li> <li>• Loss of income (e.g. temporary loss of agricultural land, influence to eco-tourism activities) due to construction-related activities</li> <li>• Influx of job seekers.</li> <li>• Use of local labourers and suppliers, as far as possible (positive impact)</li> </ul>
<b>Infrastructure and Services</b>	<ul style="list-style-type: none"> <li>• Damage to existing river crossings at the Rietspruit main stem and eastern tributary.</li> <li>• Influence to traffic along roads (R510 and dirt road to Wovenfontein).</li> <li>• Damage to dirt road to Wovenfontein through use by heavy vehicles.</li> <li>• Use of R510 and major road network by trucks delivering pipe material.</li> </ul>

#### OPERATIONAL PHASE

Feature / Aspect	Impact
Watercourses	<ul style="list-style-type: none"> <li>• De-stabilisation of encased pipeline at river crossing or tie-ins at riverbanks.</li> <li>• Erosion during scouring</li> </ul>
Flora	<ul style="list-style-type: none"> <li>• Spreading of exotic vegetation.</li> </ul>
Fauna	<ul style="list-style-type: none"> <li>• Obstruction of movement of aquatic biota at river crossings</li> </ul>
Socio-economic aspects	<ul style="list-style-type: none"> <li>• Loss of land with registration of permanent servitude</li> </ul>
Aesthetics	<ul style="list-style-type: none"> <li>• Visual impacts associated with aboveground infrastructure (i.e. access/valve chambers at approximately 500m intervals along the route; pipeline markers)</li> </ul>

Infrastructure and Services	<ul style="list-style-type: none"> <li>• Temporary interruption of water supply from existing pipeline to allow for tie-in of de-bottlenecking section with MCWAP Phase 1 pipeline</li> <li>• Continual use of maintenance road will lead to erosion and damage to road surface</li> </ul>
Operation & Maintenance	<ul style="list-style-type: none"> <li>• Construction-related impacts for any maintenance related work to pipeline infrastructure.</li> </ul>

OPERATIONAL PHASE	
Feature / Aspect	Impact
Watercourses	<ul style="list-style-type: none"> <li>• Should the encased pipeline crossings be removed, the characteristics of the watercourse (i.e. flow, habitat, water quality and aquatic biota) could potentially be adversely affected.</li> </ul>
Aesthetics	<ul style="list-style-type: none"> <li>• Impacts to visual quality of the area during the demolition of aboveground structures.</li> </ul>
Waste	<ul style="list-style-type: none"> <li>• Improper disposal of waste material generated during the demolition of structures.</li> </ul>

## 5 ENVIRONMENTAL LEGAL FRAMEWORK

Construction shall be undertaken according to recognised best industry practices and will include measures prescribed within this EMP. This EMP shall form part of the contract documents, and informs the Contractor about his duties in the fulfilment of the project objectives, with particular reference to the mitigation of environmental impacts caused by construction activities associated with the project. The Contractor shall note that obligations imposed by the EMP are legally binding in terms of environmental legislation.

All project activities must adhere to and comply with all relevant South African legislation and regulations. All environmental statutory requirements should be included in the Contractors' conditions. Specific legislation that must be complied with includes, but is not necessarily limited to:

- Constitution of the Republic of South Africa, (No. 108 of 1996);
- National Environmental Management Act (Act 107 of 1998);
- National Environmental Management Protected Areas Act (Act 57 of 2003);
- Environmental Conservation Act (Act 73 of 1989);
- National Water Act (Act 36 of 1998);
- Animal Protection Act (Act 71 of 1962);
- Atmospheric Pollution Prevention Act (Act 45 of 1965);

- Conservation of Agricultural Resources Act (Act 43 of 1983);
- Constitution of South Africa (Act 108 of 1996);
- Hazardous Substances Act (Act 15 of 1973);
- Mineral and Petroleum Resources Development Act (Act 28 of 2002);
- National Environmental Management: Biodiversity Act (Act 10 of 2004);
- National Environmental Management: Waste Act 59 of 2008
- National Heritage Resources Act (Act 25 of 1999);
- National Veld and Forest Fire Act (Act 101 of 1998);
- Occupational Health and Safety Act (Act 85 of 1993);
- Limpopo Environmental Management Act (No. 7 of 2003); and
- Explosives Act (Act 15 of 2003).

The following authorisations will be required for MCWAP de-bottlenecking:

1. Approval required from DEA for listed activities associated with the project. Basic Assessment conducted under NEMA, in accordance with the EIA Regulations.
2. Permit to be obtained under National Forests Act (No. 84 of 1998) if protected trees are to be cut, disturbed, damaged, destroyed or removed.
3. Permit to be obtained from SAHRA under the National Heritage Resources Act (No. 25 of 1999) if heritage resources are to be impacted on.
4. Environmental Management Programme to be submitted for approval to DMR for burrow pits, under the Minerals and Petroleum Resources Development Act (No. 28 of 2002).
5. Blasting permits are required from DMR in accordance with the Explosives Act (Act No 26 of 1956).
6. Tar and macadam preparation processes are scheduled in terms of the Atmospheric Pollution Prevention Act (Act No 45 of 1965).
7. All wastes (general and hazardous) generated during the construction may only be disposed of at appropriately licensed sites (in terms of National Environmental Management: Waste Act 59 of 2008).
8. Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which may include the Hazardous

Substances Act, the Occupational Health and Safety Act, relevant associated Regulations, and applicable SABS and international standards.

9. Construction Regulations (2003) published under the Occupational Health and Safety Act (Act No 85 of 1993) apply to construction activities including “the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work”. A “health and safety plan” which addresses hazards identified, and includes safe work procedures to mitigate, reduce or control the hazards identified, is required under this Act.

Note that authorisation of water use, in terms of Section 21 of the National Water Act (No. 36 of 1998), is not required for MCWAP as DWA cannot simultaneously fulfil the roles of project proponent and authorising agent. Nonetheless, the principles of this Act need to be adhered to.

## 6 LEGAL AND CONTRACTUAL AGREEMENTS

### 6.1 Between Developer and DEA

DWA, through the Trans-Caledon Tunnel Authority (TCTA) as its implementing agent, must supply the Department of Environmental Affairs (DEA) with the following legal agreements and information before construction commences:

- An agreement stating that TCTA knows and understands the contents of the EMP and that he / she is able and shall comply with all legislation pertaining to the nature of the work to be undertaken and all things incidental thereto.
- TCTA must agree to provide DEA with the names and contact details of the persons who will be responsible for ensuring and monitoring of compliance to the EMP, before construction commences.
- TCTA will provide DEA with details on the construction timeframes including a detailed description of the phasing of the project.

## 6.2 Between Contractor and Landowner

---

- The Contractor must negotiate with the landowners and adjacent landowners for permission and the right for the establishment of a Contractor's Camp on their land. A written contractual agreement regarding the specific terms and conditions of the use of the land, should be developed between the landowner and Contractor. The Contractor may not commence with any activities related to Contractor's Camp establishment, prior to the signing of the contractual agreement by the landowner;
- The Contractor must negotiate with the landowners and adjacent landowners for permission and the right to make use of access roads / private roads during the construction and operational phases. Negotiations should include details on who will be responsible for the maintenance and repair of access roads damaged during construction and operation, and details on the timeframes in which repairs should take place. A written contractual agreement regarding the specific terms and conditions of the use, maintenance and repair of the roads should be developed between the landowner, Contractor and TCTA. No construction related vehicles may make use of access roads or private roads prior to the signing of the contractual agreement by the landowner;
- The landowner should formally request information regarding the construction programme and details on the preparation of the site for construction, as well as details on the construction activities which will be undertaken on the landowner's property, prior to the commencement of construction activities from the Contractor. The construction activity details could include the following:
  - a) Layout plan showing the exact location of the proposed pipeline, the width of the construction and final servitude, the location of the air valves, scour valves and pipe access points;
  - b) Activities involved in the preparation of the site to commence with construction activities, and the timeframe in which this will be undertaken;
  - c) Details on the temporary fencing which will be erected on site during the construction phase, e.g. fencing alongside the construction servitude or trenches, around construction camp sites, and temporary perimeter fences;

- d) Details on repairs and re-construction of permanent fencing which was damaged or removed during the construction activities. This should include details on the materials which will be used and proposed construction timeframe;
- e) Details on how fencing will be maintained, frequency of inspections, and the response timeframe for the repair of damaged fencing;

An agreement between the landowner and Contractor should be signed as proof that the landowner agrees to all the above and that rehabilitation will be undertaken to the satisfaction of the landowner.

### 6.3 General Information to be Supplied to the Landowner

1. The Contactor / TCTA / Environmental Control Officer (ECO) will make copies of the approved Construction EMP available to any landowner on request;
2. In negotiation with the respective landowners, the Contractor and ECO should prior to the commencement of construction activities identify water reticulation pipelines associated with the current off-take points from the existing pipeline. Measures should be put in place to protect these pipelines.

## 7 ORGANISATIONAL STRUCTURE

The following role-players will be responsible for the implementation of the EMP.

### 7.1 Project Proponent

DWA will be the Project Proponent for all components of the work related to MCWAP, and the TCTA will act as the implementing agent for the scheme.

Ultimately, the liability associated with environmental non-compliance rests with the Project Proponent. In terms of the EMP, the Department is responsible for the following:

- Compilation and submission of an EMP for the construction of the project to DEA for approval prior to commencement of construction.
- Implementation of the approved EMP.
- Submission of any substantial changes, updates or amendments to the EMP to DEA.
- Ensuring that the provisions of the EMP are binding on all Contractors operating on the site during construction of the project.
- Ensuring that monthly environmental inspections are conducted during construction to establish how well the Contractor is complying with conditions of authorisation and the EMP.
- Submitting a copy of the environmental audit report to DEA within five working days of each audit.
- Ensuring that compliance/non-compliance records are kept in good order and made available on request by the authorities.
- Ensuring that a copy of the environmental authorisation and the approved EMP is available at the construction site at all times and all staff, Contractors and Sub-Contractors are familiar with or made aware of the contents of the environmental authorisation.
- Complying with all applicable environmental legislation, regulations and guidelines, and ensuring that Contractors undertake responsibility to do the same.
- Being committed to the principles contained within NEMA, including the prevention of pollution and sustainable development.

## **7.2 Environmental Monitoring Committee**

---

An Environmental Monitoring Committee (EMC) must be established before commencement of any construction activities. This EMC must meet on a bi-monthly basis from the inception of the project. This EMC must report to the Director-General of DEA on a bi-monthly basis. The purpose of the EMC is to execute the following:

- To monitor and audit project compliance to the specific conditions of the environmental authorisation, environmental legislation and specific measures stipulated in the environmental report and the EMP.



- To make recommendations to the Director-General: DEA on issues related to the monitoring and auditing of the project.
- The EMC shall be able to vary the frequency of meetings should the need arise to review the prescribed frequency of meetings. Any changes should be communicated to the Department for acceptance.
- The EMC will be disbanded at a time to be determined by DEA in consultation with DWA.

### **7.3 Authorities Coordinating Committee**

---

A Regional Authorities Coordinating Committee (ACC) will be established, and the responsibilities of this committee shall include but not necessarily be limited to the following:

- To oversee that all commitments in the environmental authorisation and the EMP are met.
- To provide guidance for the functioning of the EMC.
- To take into account all relevant information and issues raised by stakeholders when making project decisions.
- Evaluate the reports and correspondence received from the independent Chairperson of the EMC.

### **7.4 Engineer**

---

The Project Proponent appoints an Engineer as its responsible agent to ensure that the Contractor adheres to construction specifications, the environmental authorisation and the EMP. It is noted that in terms of the construction contract, the Engineer may delegate certain authorities and responsibilities to the Engineer's Representative.

The Contractor may only take instructions from the Engineer, whilst all major decisions, affecting programme or costs, regarding environmental procedures or protocols are to also be approved by the Project Proponent, via the Engineer. The Engineer also has the

power to stop any construction activity in contravention of this specification. When the direction is given by the Engineer to the Contractor in terms of the EMP, it is deemed to be after due consultation with the ECO.

### **7.5 Engineer's Environmental Representative**

---

The Engineer's Environmental Representative (EER), employed by the Engineer, is responsible for the day-to-day monitoring of the Environmental Specifications. In addition, the EER must act as liaison and advisor on all environmental and related issues, give advice to the Contractors Environmental Representative (CER) when necessary and ensure that any complaints received from the public are duly recorded and forwarded to the Engineer and the Project Proponent. The Engineer's Environmental Representative should:

- Be well versed in environmental matters.
- Understand the relevant environmental legislation and processes.
- Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- Know the background of the project and understand the implementation programme.
- Be able to resolve conflicts and make recommendations on site in terms of the requirements of the Specifications.
- Keeping accurate and detailed records of all EMP-related activities on site.
- Report to the ECO on monitoring of environmental issues.

### **7.6 Environmental Control Officer**

---

The Environmental Control Officer (ECO) is an independent representative, who acts on behalf of the EMC and will:

- Regularly, via the Engineer, monitor specifications on site and project compliance with the conditions of the environmental authorisation, environmental legislation and recommendations of the EMP.

- Monitoring and verifying compliance with the EMP and environmental authorisation, and keeping a register of compliance/non-compliance on behalf of the EMC..
- Identifying and assessing previously unforeseen, actual or potential impacts of the project on the environment.
- Ensure the maintenance of the on-site public complaints register.
- Ensure that a monthly environmental performance audit is undertaken; verifying the monitoring reports submitted by the Engineer's and Contractor's Environmental Representative and maintain a register of these audits.
- Conducting site inspections during the defects liability period, and bringing any environmental concerns to the attention of the Developer.
- Recommending to the Engineer and Developer that the Contractor suspend any or all works on site if the third parties who carry out all or part of the Contractor's obligations fail to comply with the environmental specifications.
- Advising on the rectification of any pollution, contamination or damage to the project site, rights of way and adjacent land.
- Attending site meetings (scheduled and ad hoc).
- Maintaining a filing system meeting the Projects Quality Management Plan.
- Arranging the presentation of the environmental awareness training course to all staff, Contractors and Sub-Contractors and monitoring the undertaking by the Contractor(s) of environmental awareness training for all new personnel on-site.
- Ensuring that a copy of the environmental authorisation and latest version of the EMP are available on site at all times.
- Ensuring that the Project Proponent and TCTA are made aware of all applicable DEA-approved changes to the EMP.

The role of the ECO will be fulfilled by an appointed PSP, well versed in environmental aspects related to large construction projects, who is able to make meaningful and workable recommendations as required.

The ECO provides feedback to both DEA and the EMC. The ECO will also submit reports to DEA if required in addition to the reports submitted by the TCTA on site environmental manager. Issues of non-compliance raised by the ECO must be taken up

by the Implementing Agent, and resolved with the Contractor, via the Engineer, as per the conditions of the contract.

Decisions regarding environmental procedures, specifications and requirements, which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Specification) must be endorsed by the Developer, and conveyed to the Contractor via the Engineer.

The ECO shall provide a secretariat service to the EMC, which shall include convening meetings, preparing agendas in cooperation with the EMC Chairperson, taking, compiling and distributing minutes and or/any other relevant information to the EMC members.

## **7.7 Contractor**

---

It is the responsibility of the Contractor to do whatever is necessary to ensure that he and his appointed advisor (Contractor's Environmental Representative) are well versed in environmental matters so that they may accurately and efficiently carry out the requirements of this Specification. The Contractor shall:

- Be responsible for the implementation of the applicable environmental specifications in accordance with the requirements and provisions of this EMP.
- Ensure that all third parties who carry out all or part of the Contractor's obligations comply with the requirements and provisions of this EMP.
- Report any non-compliance to the Engineer within 12 hours of the event occurring.
- Report any non-compliance event that constitutes an emergency immediately and in line with the protocol applicable to that particular emergency event.
- Ensure that all employees and sub-contactors attend the environmental awareness training course and are familiar with or are made aware of the contents of the environmental authorisation.

The Contractor is liable for any and all remedial work required in terms of this Specification, resulting from his environmental negligence, mismanagement and/or non-compliance.

## 7.8 Contractor's Environmental Representative

The Contractor's Environmental Representative (CER), employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this Specification, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the CER must act as liaison and advisor on all environmental and related issues, seek advice from the EER when necessary and ensure that any complaints received from the public are duly recorded and forwarded to the Engineer. The Contractor's Environmental Representative should:

- Be well versed in environmental matters.
- Understand the relevant environmental legislation and processes.
- Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- Know the background of the project and understand the implementation programme.
- Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
- Keeping accurate and detailed records of all EMP-related activities on site.

## 8 MONITORING

Monitoring will take place at least every month during construction, and every three months during the Defects Notification Period. Completed Monitoring Reports will be submitted to the Engineer and the EMC who will attend to issues.

Anything of a significant environmental nature that arises in between the monthly site meetings must be recorded in the site diary by the ECO and be reflected in written correspondence (email/fax/letter) directed to the Engineer and copied to the Client. If required, the Engineer, in consultation with the ECO, must conduct a site visit to address the matter.

The following registers are to be maintained and kept on site by the ECO at all times:

- A daily site diary.
- A non-conformance register.
- A public complaints register.
- A register of audits.

## 9 EMP MITIGATION MEASURES

During its lifecycle, projects journey through four distinctive phases, as presented in Figure 1.

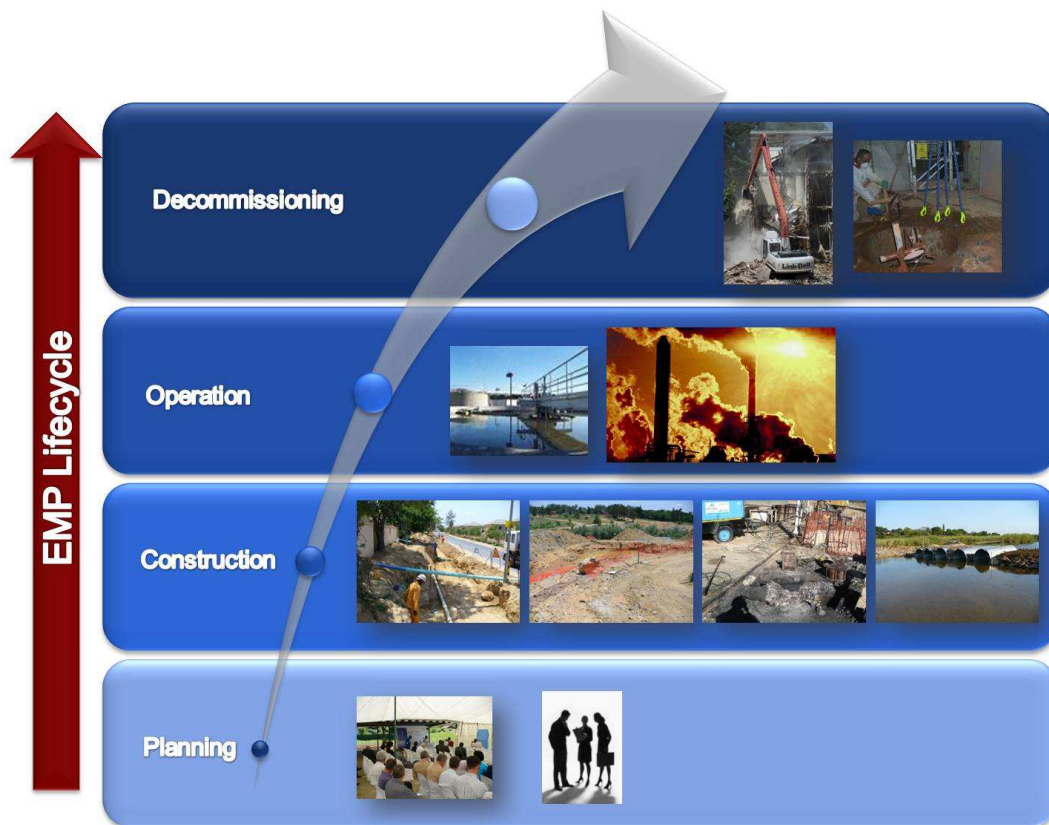


Figure 1: Four Generic Phases of a Project Lifecycle

Likewise, the mitigation measures to follow for MCWAP de-bottlenecking are categorised under the following main sections:

- Pre-construction (i.e. planning) and Construction;
- Operation; and
- Decommissioning.

## 9.1 PROJECT PHASE: PRE-CONSTRUCTION AND CONSTRUCTION

### 9.1.1 Agreement Statement

Primary Objectives	Monitoring Criteria
Ensure that the TCTA knows and understands the contents of the EMP and is able and willing to comply with all legislation pertaining to the nature of the work to be done, and all things incidental thereto.	A declaration form should be signed by the developer. One original copy of this agreement must be submitted to DEA with EMP Document

### 9.1.2 Commissioning of Tenders

Primary Objective: Ensure that proper environmental foundations are established prior to commencing with construction by informing all parties of appropriate environmental protection measures.

Core Criteria	Monitoring Criteria
All tendering Contractors will be made aware of the contents of this EMP and any penalties arising from non-compliance prior to the commencement of work	Signed Declaration by Contractor.
All tendering Contractors will be made aware of the audit and monitoring requirements as stipulated in this EMP	Signed Declaration by Contractor.
Appoint an Environmental Control Officer (ECO) who will be responsible to monitor compliance to the EMP.	Appointment Letter
Inform ECO of any proposed alterations to the EMP. DEA should be notified well in advance of any alternations to the EMP.	Signed Decision Note



### 9.1.3 *Monitoring Controlling and Auditing*

**Primary Objective:** To establish mechanisms for monitoring compliance to environmental protection criteria outlined in the EMP.

Core Criteria	Monitoring Criteria
The TCTA will inform the ECO of the construction commencement date.	Notification Letter
The ECO to inform the relevant authority of the due date that work will commence.	Letter to authorities
Introduce the ECO to the Project Team	ECO to be introduced to project team and contact details of the ECO to be made available to the project team.
The ECO to induct all Contractors on the EMP and environmental authorisation prior to commencement of any works.	Presentation, induction checklist and attendance register
ECO is to undertake monthly audits of all construction activities for compliance against the EMP.	ECO Audit Dates.
Include an agenda item for environmental issues on the monthly project meeting on site.	Review Agenda and Meeting Minutes.
An electronic database of all audit findings must be available for authority review.	Active database of audit findings, recommendations & follow ups.
The name and contact details of the person/people responsible for ensuring and monitoring of compliance to the EMP should be made available to DEA prior to the commencement of construction activities.	Letter to the relevant DEA officer, providing relevant contact details.
Notify representatives from the community (I&APs) on the commencement of construction and introduce him-/ herself to the representatives..	(a) Regular meetings to discuss issues, and (b) Distribution of monitoring reports.

Core Criteria	Monitoring Criteria
Notify the representatives from the community (I&APs) on the communication channels to be followed.	(a) Complaints register to be made available, and (b) All communication and complaints must be directed to the ECO and CLO to escalate it to the relevant parties.

#### 9.1.4 *Construction Site Planning and Layout*

**Primary Objective:** To ensure that environmental constraints outlined in the EMP are adhered to during site planning and layout.

Core Criteria	Monitoring Criteria
Construction Camp site selection should be done in consultation with authorities, land owners, traditional leaders, and all other stakeholders, to ensure that mutually accepting sites are chosen for camp construction.	Written comment and recommendations from authorities, landowners, traditional leaders, and all other stakeholders.
The Contractor must negotiate with landowners and adjacent landowners for permission and the right to establish a Construction Camp on their land.	Written comment and recommendations from the landowner regarding the negotiations.
A written contractual agreement regarding the specific terms and conditions of the use of the land, should be developed between the landowner and Contractor. The Contractor may not commence with any site establishment activities, prior to the signing of the contractual agreement by the landowner.	Written Contractual Agreement between the landowner and Contractor.
Details on the sites chosen for the construction camp establishment, as well as a Method Statement for the establishment of the Construction Camp will be submitted to TCTA for approval.	Construction Site Layout Plans; Method Statement; and TCTA recommendations and approval letter.
Prior to commencement of construction, the Contractor will inform the construction manager and ECO of the intended actions and programme for site establishment.	Record of notification and minutes of meetings.
The Contractor's hard park and storage yard will be located at the designated area as specified by the construction manager.	Site Plan.
The construction site, construction road for access to the site, and materials lay down area will be demarcated prior to construction by the Contractor. No disturbance outside the demarcated road will be permitted.	Relation of disturbance to site plan. Presence of demarcation.
The Contractor will supply a site plan for the Contractor's camp for the TCTA's approval. Structures must be located to reduce visual intrusion, and minimal disturbance to the biophysical environment.	Signed and dated approved site plan.

Core Criteria	Monitoring Criteria
Special features (e.g. rock outcrops, rivers and wetlands, designated trees, natural vegetation) must be indicated on a map and demarcated as no-go areas on site prior to construction.	Audited site plan, and demarcation on the ground.
The Contractor shall not locate campsites in any areas marked as 'no-go' areas, or within 100m of any watercourse.	Audited site plan, and demarcation on the ground.
The Contractor shall not locate campsites in any areas that could cause a nuisance or safety hazards to surrounding landowners, inhabitants or the general public.	Audited site plan, and demarcation on the ground.
Documentation for each proposed camp site should be prepared by the Contractor prior to the commencement of construction activities, and should be submitted to TCTA for approval. This documentation should include, but should not be limited to the following: <ul style="list-style-type: none"> <li>• site layout including access points and material storage areas;</li> <li>• topsoil management;</li> <li>• cuts and fills;</li> <li>• sewage treatment;</li> <li>• erosion control;</li> <li>• fencing;</li> <li>• general waste management;</li> <li>• provision for vehicle and plant servicing;</li> <li>• management of hazardous materials,</li> <li>• water supply;</li> <li>• management of veld fire risk;</li> <li>• Rehabilitation.</li> </ul>	Construction Camp Environmental Report
The extent of sensitive areas needs to be clearly demarcated including buffer zones.	Auditing of the demarcation material with findings and recommendations documented in active database.
A temporary fence must be erected to ensure that sensitive areas are protected from construction activities.	Audit of fence – findings & recommendations recorded in active database.
Damage to sensitive areas will incur a fine and all impacts must be rehabilitated and/or environmental compensation must be made.	Audit of special features during construction – findings and recommendations recorded in active database.

Core Criteria	Monitoring Criteria
Movement of construction vehicles and machinery must be restricted to areas outside of the sensitive habitats on site.	Auditing of vehicle traffic and machinery with findings and recommendations recorded on database.
The site planning should prevent stormwater entering watercourses directly, but rather be diverted and dispersed into the natural vegetation for absorption.	The site plan should include stormwater management measures and these must be audited and recorded.
The site plan should ensure that no artificial channels are constructed for stormwater diversion, but that other engineering measures are utilised to adhere to the stormwater management plan.	Stormwater management plan must be submitted to DEA and be audited against by the ECO.

#### 9.1.5 Site Establishment

**Primary Objective:** To ensure that the site is established in line with pre-approved plans, and maintained in a safe manner throughout the duration of the project.

Core Criteria	Monitoring Criteria
The Contractor's hard park and storage yard will be fenced, to the satisfaction of the construction manager. It is a requirement that the fence is maintained until such time that the project is completed.	Inspections of all fences.
The construction site must be barricaded off to prevent access by unauthorised persons.	Erection of barricades, daily inspection of all barricades.
A site notice must be erected at the construction site informing persons of restricted access, the nature and time frames of the construction activities, and contact details.	Site notice. Weekly inspection of site notices. Notices should be replaced where necessary.
Site structures, must be fitted with appropriate cladding and colouring to ensure reduced reflection and visual pollution.	Observation of visual intrusiveness of structures.
Access to the site will only be permitted via the designated construction road as specified on site by the construction manager. The Contractor will control the movement of all vehicles and plant (including suppliers), such that they remain on designated routes, comply with relevant laws, and ensure they are distributed so as not to cause an undue concentration of traffic.	Observations of construction activities, and site disturbances. Incidence reports and corrective action.

Core Criteria	Monitoring Criteria
Speed limits to be strictly adhered to.	Intermittent observation.
Access roads will be maintained by the Contractor. The Contractor will erect and maintain marker pegs along the boundaries of the working areas, access roads, haul roads or paths, to the satisfaction of the Construction Manager, before commencing any other work. If proved insufficient for control, these will be replaced by fencing, with the additional cost being borne by the Contractor.	Observations of marker pegs, on plan and on the ground. Observation of disturbances and construction practices.
The movement of any vehicles and/or personnel outside of designated working areas will not be permitted.	Observations of areas surrounding the construction area.
Dust control measures, such as dampening with water will be implemented where necessary.	Number of water trucks. Observations of dust levels.
Construction debris will be cleared regularly.	Signed removal and dumping slips. Site observations.
Damage to the existing access roads as a result of construction activities (during construction), will be repaired to the satisfaction of the ECO. The cost of the repairs will be borne by the Contractor.	Signed off by ECO.
All existing farm roads (private roads) damaged during the construction phase, should at the end of construction be repaired to the satisfaction of the landowner, as per the conditions of the written contractual agreement between the landowner and the Contractor.	Written contractual agreement.
Traffic safety measures (e.g. traffic warning signs, flagmen) will be erected to the satisfaction of the ECO where required.	To be monitored according to specific requirements.
Ensure that access to the site, including related infrastructure and machinery is restricted to authorised personnel only.	Security Register.
Ensure that 'No-Go' areas are clearly demarcated and/or fenced before construction starts. Barriers are to be maintained in good order throughout the course of the construction.	Site photographs and intermittent observations.

Core Criteria	Monitoring Criteria
The Contractor is to ensure that no machinery, personnel, material, or equipment enters 'No-Go' areas at all times during the course of the project.	Observations of disturbance in No Go areas.

#### 9.1.6 *Fencing*

**Primary Objective:** To ensure that fences damaged or removed during the construction activities of the proposed pipeline are adequately restored or rebuilt to an acceptable standard.

Core Criteria	Monitoring Criteria
On farms or in areas where animals/game occur, temporary and permanent fences for fencing off the Contractor's camps and trenches during the construction phase to protect animals/game from falling into the trenches, and from not entering into the construction camp area should be constructed according to certain specification.	The Contractor should consult with the local agricultural extension officer or conservation authority, on specific prescriptions or requirements before erecting a fence. After construction of the fence, the fence should be inspected by the landowner and the local agricultural extension officer, or conservation authority, and an acceptance and approval form should be signed by both parties.
Should a game fence be damaged as a result of construction activities, the fence should be repaired or rebuilt according to certain specifications.	
Fences to be constructed over dongas or streams should meet additional specific requirements as fences over such features can become insecure and lead to the escape of valuable animal or provide access to predators.	As above
The area between the existing fence and the new erected fence, under construction, should be fenced off overnight to prevent any game/ animals to go into this area.	Daily erecting and removal of this portion of fence.
All fences constructed for construction purposes (e.g. fences around camp sites, fencing around trenches, etc.) should be inspected on a daily basis to detect whether any damage has occurred, and should be repaired immediately, to prevent animals from escaping, to prevent easy access for poaching, and intrusion by predators.	Daily inspections
Where necessary electrified fences should be erected according to certain specifications and should meet certain requirements. Requirements include, but should not be limited to the requirements as tabled below (fencing specifications).	The Contractor should consult with the local agricultural extension officer or conservation authority, on specific prescriptions or requirements before erecting a fence. After construction of the fence, the fence should be inspected by the landowner and the local agricultural extension officer, or conservation authority, and an acceptance and approval form should be signed by both parties.

Core Criteria	Monitoring Criteria
Mechanisms should be put in place to allow for faults on electrified fences to be traced as quickly as possible.	Fencing control mechanisms and inspections.
Electrified fences should be safe for contact by Humans.	Heath and Safety Act; Health and Safety Plan
Safety precautions should be implemented for electrified fences. All electrified fences should comply with minimum safety standards as tabled below (fencing specifications).	Heath and Safety Act; Health and Safety Plan
Where necessary game screens should be erected to minimize the impact on game, especially on narrow farm portions.	Fencing control mechanisms and inspections.

**Fencing Specifications**

**Fencing Specifications** (Bothma, J. du P, et al, 2002: **Game Ranch Management**. Van Schaik Publishers. Pretoria)

**1. Wire Fences**

The type of fence constructed should be determined by:

- the types of animal kept;
- the nature of the terrain; and
- the type and availability of material.

All game fences should be constructed to meet the following certain specific requirements:

- The fence should be straight and vertical;
- All the straining posts should be firmly and vertically anchored;
- All the posts should extend to the same height above ground level by corresponding to the terrain form;
- The straining posts and droppers should not be too far apart – the closer they are, the firmer the fence;
- Each wire strand should be firmly attached to the standards or line posts at a specific height above ground level and should be a certain distance apart from each other;
- The droppers should be neatly and evenly spaced between the standards. The wire strands should be firmly attached to maintain the proper space between the strands and to prevent vertical movement;
- Fences should never be constructed of inferior quality material. Therefore, fencing material with the SABS mark should be used.

The height of the fence to be constructed depends on the type of animals which occurs in the area. Wild animals are grouped into various categories on the basis of their potential to move over, under or through fences. The following fence-crossing groups can be distinguished:

- Animals that jump over fences: Kudu, impala, mountain reedbuck, grey rhebok, eland and waterbuck;
- Animals that crawl underneath or through fences: Ungulates like the warthog, bushpig, duiker, steenbok, klipspringer, gemsbok, springbok, sable antelope, red hartebeest and tsessebe, and predators such as jackals, caracal, cheetah, leopard and lion;
- Animals that break fences: Buffalo, white and black rhinoceroses, giraffe and waterbuck, and also eland, blue wildebeest, and sable antelope bulls;
- Animals that usually do not jump over fences: Springbok, blesbok, steenbok, duiker and oribi.

Animals that jump fences can be fenced in effectively by erecting a 2.25 to 2.4m high fence consisting of 17 to 21 strands of wire. In areas where there are no animals that dig holes underneath fences, such as warthogs, it may be advantageous to attach diamond, pig or jackal wire mesh or netting to the bottom section of the fence. This may prevent stray dogs or predators from moving freely through the fence. A standard 1.5m wire mesh fence with a strand of wire 150mm above the mesh and another one 150mm above this, should keep most non-jumping animals within the ranch.

The type of wire used for the construction of fences should be carefully considered:

- **High-Strain Wire:**  
Is cheaper, easier to erect and more resilient than barbed wire, but is often used by poachers to snare animals.
- **Barbed Wire:**  
Is more visible to animals, is to a certain extent more respected by animals, and is more expensive than smooth steel wire. It is difficult to erect, takes longer to put up and can cause injuries to animals.

**2. Electrified Fences**

Where required, electrified fences should be erected. These fences can either be erected on its own or in combination with a normal wire fence. Electrified fences are particularly suitable for keeping in elephants, hippopotamuses, baboons and predators.

Electrified fences should meet certain requirements to be effective, and the following requirements should at least be met:



- The fence should be planned and designed for the specific animal species that it must control. Therefore the power of the energizer and the placement of the wire strands and other posts should be suitable for the target animal species;
- The cost of the fence should be as low as possible, but inferior quality material should not be used;
- The fence should be neat and permanent and require minimum maintenance. It should allow faults to be traced as quickly as possible;
- The after-sales service by the manufacturers should be of a high standard;
- The fence should be safe for contact by humans.

When erecting an electrified fence in combination with an ordinary wire game fence, the following guidelines should be implemented:

Placement of Wire	Height above ground level in mm	Distance from game fence in mm	Type of animal to be controlled
Base Wire	250-300	225	Crawlers such as warthog, sable antelope, gemsbok and roan antelope.
First Middle Strand	750	225	Breakers such as hippopotamus, rhinoceros, buffalo; and free movers such as nyala, bushbuck and impala.
Second Middle Strand	1200	225	Jumpers such as eland, kudu, waterbuck; and breakers such as young elephant.
Top Wire	1800-2000	450	Breakers such as elephant and giraffe.

All electrified fences should comply with the following minimum safety standards:

- The main energizer should be erected in such a way that it cannot be damaged mechanically, or be accessible to an unqualified person;
- The main energizer should not be mounted on power or telephone poles. The design of the fence should also not allow contact with power or telephone lines. There should be a minimum distance of 2m between an electrified fence and a powerline;
- Warning notices that meet certain specifications should be placed on the fence. From a conservation point of view, it may be desirable to leave out the bottom wire strand because it may shock and kill small animals such as the pangolin. However, this may render the fence vulnerable to breaching by other crawling animals;
- Barbed wire should never be electrified;
- Earthing electrodes should not be erected in the vicinity of other earthing systems.

#### 9.1.7 *Re-routing of Existing Services and Routing of new Services*

**Primary Objective:** To ensure that correct manner of trenching for the re-routing of services is implemented with limited environmental impact.

Core Criteria	Monitoring Criteria
Main bulk service providers (e.g. Telkom, Eskom, water, sewerage, roads), and Exxaro will be advised of the construction schedule and activities, as well as the requirements of this document.	Notification letter to be sent to service providers.
Should it be necessary to re-route existing services as a result of the pipeline construction, the Site Manager will be responsible for managing the activities undertaken by the bulk service provider within their work areas.	Ensure compliance to EMP.
Should any trenches be dug for the re-routing of services, managing and monitoring measures as detailed in Section 9.1.8 below should be adhered to.	Ensure compliance to the EMP.

Core Criteria	Monitoring Criteria
Trenching for electrical cables to supply electricity to the Cathodic Protection System should be managed and monitored as described in Section 9.1.8 below.	Ensure compliance to the EMP.

#### 9.1.8 *Trench Excavations for Pipeline Construction*

Primary Objective: To ensure limited environmental impact during pipeline construction.

Core Criteria	Monitoring Criteria
Prior to undertaking any pre-construction or construction activities, a site-specific construction timeframe and details on daily construction activities should be provided to the landowner. This should be done to inform the landowner on the length of trench lengths which will be excavated on a daily basis, etc.	Signed letter of acceptance from landowner / Construction timeframe and details on daily construction activities.
The proposed trench route will be indicated on the Site Development Plan, and will consider environmental factors such as areas sensitive to erosion and "no go" areas.	Intermittent observations
Trench routes and the associated permitted working areas will be clearly defined and marked with painted stakes prior to excavation.	Intermittent observations
The demarcated construction servitude should be fenced off prior to commencing with trenching activities. The management and monitoring measures as prescribed in Section 9.1.6 should be adhered to.	Intermittent observations
In addition to the fencing, all trenches must be clearly marked in order to alert people to the potential hazard. Barrier tape will be erected around all open trenches.	Intermittent observations
All open trenches must be patrolled on a minimum of a daily basis to ensure that animals have not become trapped. Such animals will be removed and released. Special equipment for handling of venomous snakes should be available on site to ensure safe removal.	Intermittent observations
Stripping and separation of topsoil will occur as stipulated by the Site Manager.	Intermittent observations

Core Criteria	Monitoring Criteria
Soil will be excavated and used for re-filling trenches using the rollover method.	Intermittent observations
In areas to be affected by construction activities a minimum of 300mm of topsoil should be removed and stockpiled separately. On completion of pipeline construction and after backfilling of the trenches, the topsoil stockpile should be placed as the final soil layer prior to seeding.	Rehabilitation Plan / EMP
The topsoil stockpile should be protected by preventing compaction (vehicle movement), contamination and mixing with any other material.	Rehabilitation Plan / EMP
Any excess spoil material must be removed from the site to an approved location.	Rehabilitation Plan / EMP
Wind and water erosion-control measures should be implemented to prevent loss of topsoil.	Rehabilitation Plan / EMP
Areas where soil was compacted should be ripped to allow for penetration of root systems.	Rehabilitation Plan / EMP
Trench lengths will be kept as short as practically possible.	Intermittent observations
Trenches will be re-filled to the same level as the surrounding land surface or slightly higher to allow for settlement to minimise erosion. Excess soil will be stockpiled in an appropriate manner.	Intermittent observations
Immediately after refilling, the disturbed areas will be stabilised.	Intermittent observations
Installation of other pipeline related infrastructure such as the Cathodic Protection System, scour valves, air valves, etc. should where possible, be synchronised such that the trench needs to be rehabilitated only once.	Intermittent observations

Core Criteria	Monitoring Criteria
Prior to undertaking any pre-construction or construction activities, a site-specific traffic management plan drafted, in consultation with the relevant landowners, for approval by the ECO. This should be done to inform the landowner on the access routes to be used as well as to give him the opportunity to give his input.	Contractual Agreement between Contractor and landowner.
The Contractor must ensure all existing and new gates used for access to the site is managed in accordance with the agreement with the specific landowner, i.e. gates to be left in condition originally found, etc.	Contractual Agreement between Contractor and landowner.

### 9.1.9 Earthworks

Primary Objective: To ensure that earthworks are undertaken in an appropriate manner

Core Criteria	Monitoring Criteria
Physical demarcation of the working area ahead of construction must be undertaken to ensure that construction remains within the works area.	Site photographs and intermittent observations.
Excavation of any material on site will be done in accordance with the relevant SABS codes.	Site photographs and intermittent observations.
Earthworks will be undertaken in such a manner so as to minimise the extent of the impacts thereof.	Site plan and intermittent observations

#### 9.1.10 *Borrow Pits and Quarries*

**Primary Objective:** To ensure that borrow pits and quarries are undertaken in an appropriate manner

Core Criteria	Monitoring Criteria
All borrow pits must be done in accordance with the EMPR as authorised by the Department of Mineral Resources for the identified borrow pit areas.	EMPR requirements to be strictly followed.
Stockpiling of topsoil.	Topsoil not to be stockpiled in any wetland or surface water drainage lines. Stockpile area to be approved by the ECO.
Minimise/ prevent any water from entering	Borrow pits not to be situated near existing water ways. Storm water runoff to be diverted from borrow areas. Allow for the natural free draining of borrow areas unless otherwise specified.
Contamination of soil	Material imported must be controlled in terms of weed and alien invasive plants imported.

#### 9.1.11 *Blasting*

**Primary Objective:** To ensure that blasting is undertaken in an appropriate manner

Core Criteria	Monitoring Criteria
The Contractor shall employ industry standard methods to control the impact of blasting and limit the risk of damage to buildings and structures by reducing blast vibrations induced in the rock mass, eliminating fly rock and limiting air-blast and noise to acceptable levels.	Explosives Act (Act 15 of 2003), SABS codes / Peak Particle Velocity (PPV) guidelines
In order to limit potential damage to structures, the blasting Contractor shall adhere to all published Peak Particle Velocity (PPV) limits for built-up or potential risk areas. Regular PPV measurements should be taken along the route where blasting will be undertaken in close proximity to buildings, using a velocity seismograph. The results from the PPV measurements should be kept on site and should be readily available to the pipeline construction engineers.	PPV Measurements Records

Core Criteria	Monitoring Criteria
Blast mats should be used wherever fly-rock may result in damage to any infrastructure, including existing pipeline, R510 road buildings, access roads, powerlines, etc. or where it could result in death or injury of animals, or where damage could be caused to sensitive ecological areas.	EMP / Site Layout Plan / Sensitivity Mapping.
Due diligence and all industry-accepted methods should be implemented and adhered to in order to prevent damage to property and infrastructure as a result of: <ul style="list-style-type: none"> <li>• Ground Vibrations;</li> <li>• Fly Rock; and</li> <li>• Air Blasts.</li> </ul>	ISO Standards / Health and Safety Standards / SABS codes / Industry Accepted Methods
Blasting operations should be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level of 140 decibels.	SABS codes / Industry Accepted Methods
In areas where blasting is due to any reason, only pneumatic tools or chemical breaking of the rock should be permitted.	SABS codes / Industry Accepted Methods
Where blasting is anticipated in close proximity to boreholes, the landowner should be consulted with and mitigation measures to be implemented should be discussed. Mitigation measures should include: <ul style="list-style-type: none"> <li>• Pump testing of boreholes prior to blasting to determine yields, in order to determine the impact of blasting activities on borehole yields;</li> <li>• Implement special methods to limit potential damage to boreholes in areas where blasting will take place;</li> <li>• Implementation of controlled blasting or mechanical excavation techniques in areas where normal blasting techniques could potentially damage or destroy boreholes; and</li> <li>• Implementing standard monitoring practices for monitoring of blast shock.</li> </ul>	Landowner and blasting Contractor agreement / Yields data

Core Criteria	Monitoring Criteria
<p>In order to monitor potential damage to structures, the following monitoring methods should be implemented:</p> <ul style="list-style-type: none"> <li>A crack survey should be undertaken for all infrastructure located in close proximity of where blasting will take place. This survey involves taking photographs of existing cracks in structures prior to undertaking blasting. This could be used as a reference to determine what damaged was caused as a result if blasting activities;</li> <li>In areas where infrastructure is located within 15m or less of where blasting will take place, the construction servitude should be narrowed;</li> <li>In areas where impact to structures or infrastructure as a result of blasting cannot be avoided, a compensation agreement should be signed between the landowner and TCTA before the blasting takes place.</li> </ul>	Photographic Survey data / Geotechnical Investigations
Landowners should report damages which occurred as a result of blasting to the ECO. A register should be kept on site in which all complaints regarding damage to property as a result of blasting should be documented. The photographic survey should be used as a benchmark to determine whether blasting caused damage to infrastructure.	Complaints Register / Photographic Survey
Where damage was caused to property as a result of blasting, TCTA should consult with the landowner on compensation for damages occurred.	Complaints Register / TCTA and landowner agreement letter
A complaint register should also be kept on site in which complaints from the community could be documented regarding blasting activities.	Complaints Register
Prior to commencing with blasting activities, the blasting Contractor should submit a Method Statements which should comply with all relevant SABS standards and health and safety standards for all methods of blasting mitigation to the Engineer for approval.	Method Statement
Waste rock from blasting activities which is not used to backfill the trench, should be removed from site to an approved location on completion of construction activities. No waste rock may be left in the pipeline servitude.	Intermittent observations
Should rock crushers be utilised to crush rock on site to be used as backfill material or to ensure easy removal from site, the landowner should be made aware of the additional noise levels to be expected.	Construction timeframe and details on daily construction activities.

Core Criteria	Monitoring Criteria
No blasting activities may be undertaken during times when animals are under quarantine.	Construction timeframe and details on daily construction activities / Landowner agreement.

#### 9.1.12 *Materials Handling, Use and Storage*

**Primary Objective:** Effective and safe management of materials on site, in order to minimise the impact of these materials on the natural environment.

Core Criteria	Monitoring Criteria
The Contractor will ensure that delivery drivers are informed of all procedures and restrictions required to ensure compliance with this document. Such drivers will be supervised during off-loading, by a person knowledgeable of the requirements.	Signed declaration by driver, Intermittent observation.
Materials will be appropriately secured to ensure safe passage between destinations. Loose loads (e.g. sand, stone chip, refuse, paper and cement) will be covered. The Contractor will be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.	Intermittent observation
Imported fill / soil / sand materials will be free of weeds, litter and contaminants.	Intermittent observation
All material lay-down areas and stockpiles will be subject to the Site Manager's approval	Intermittent observation
Storage areas will be roofed with an impervious material, with a suitable overhang or side-cladding. Rainwater run-off will be channelled away from the storage area as required.	Site photographs and intermittent observations.



9.1.13 *Hazardous Substances*

**Primary Objective:** To ensure the safety and protection of the natural environment and all personnel on site, by the correct management and handling of hazardous substances.

Core Criteria	Monitoring Criteria
Cement mixing will occur in a designated area on an impervious layer (e.g. plastic or cement mixing pit). The runoff water will be contained for re-use in cement mixing or disposed of to the waste water system. Contaminated water will not be dispersed to the environment.	Visual inspection of cement mixing site
Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent hardening or leakage of cement.	Cement lay down area
No paint products may be disposed of on the site. All paint containers will be removed from the site.	Disposal record to proof that containers have been removed to a licensed hazardous waste landfill site.
Oil based paints and chemical additives and cleaners (e.g. thinners and turpentine) will be strictly controlled.	Disposal record to proof that containers have been removed to a licensed hazardous waste landfill site.
A painting control work instruction must be established for the site, including disposal of material and the washing of brushes / rollers. No contaminated water or solvents may be disposed of to the veld.	Sign off from ECO.
The Contractor may not store in above ground containers a combined volume of fuel equal to or greater than 30 cubic meters on the site without the appropriate Environmental Authorisation. All fuel storage areas will be bunded to contain at least 110 % of the volume stored and will be provided with a hard impervious surface.	Site photographs and intermittent observations.
The Contractor will ensure that there is a supply of absorbent material (e.g. sawdust, supazorb) readily available to absorb, breakdown and where possible encapsulate minor hydrocarbon spillage. The amount and type of absorbent material will be appropriate to the volumes of hydrocarbons kept on site. Each construction must have a spill kit available during all times.	Site photographs and intermittent observations.
Potential pollutants will be kept, stored, and used in such a manner that any escaped pollutants can be contained and the water table not endangered (e.g. bunded hydrocarbon storage area). Bund walls must be of a sufficient height to contain at least 110% of the volume of any materials stored within the bunded area.	Site photographs and intermittent observations.

Core Criteria	Monitoring Criteria
Pollution prevention and management measures are to be implemented throughout the site and should be concentrated at high risk locations. In the event of spillages of hazardous substances the appropriate clean up and disposal measures are to be implemented. These measures are to be detailed in the Contractors Method Statement for approval by the Engineer.	Disposal records and intermittent observations.
Hazardous materials will be disposed of at registered sites or handed to registered hazardous waste disposal facilities for disposal / recycling.	Disposal records
The Contractor will notify the ECO immediately of any pollution incidents.	Incident reports and intermittent observations.
The Contractor must prevent any hazardous substance from draining into wetlands or directly into any drainage lines.	Visual inspections and proper storage facilities for hazardous substances. To be monitored in consultation with the CLO.

#### 9.1.14 Daily on Site Activities

**Primary Objective:** To ensure the day to day functioning of the site is well managed and orderly with minimum impact to the surrounding natural environment.

#### Workshop, Equipment Maintenance and Storage

Core Criteria	Monitoring Criteria
No maintenance or repair of construction vehicles or machinery will occur on site during the construction phase. Maintenance of equipment and vehicles will be performed off-site at a suitably designed workshop.	Intermittent observations.
Movement of construction vehicles and machinery must be restricted to areas outside of sensitive areas on site.	Intermittent observations.
No washing of plant may occur on the site.	Intermittent observations.
The Contractor will ensure that if emergency plant maintenance occurs on site, that there is no contamination of the soil or vegetation (e.g. use of drip trays).	Intermittent observations.

Core Criteria	Monitoring Criteria
Drip trays will be provided for the stationary plant and for the "parked" plant.	Intermittent observations.
All vehicles and equipment will be kept in good working order and serviced regularly. Leaking equipment will be repaired immediately or removed from the site.	Service Records, and Intermittent observations.
The relevant Contractor must ensure that facilities for the collection of hydraulic and other vehicle oils are provided within the hard park area.	Site Plan and Intermittent observations.

Labour and Social Issues

Core Criteria	Monitoring Criteria
The Contractor shall ensure proper supervision of employees at all times.	Intermittent observations.
The Contractor shall ensure workers refrain from trespassing on surrounding private property. Immediate and decisive action shall be taken should this occur.	Intermittent observations.
Machine / vehicle operators shall receive clear instructions to remain within demarcated access routes and construction areas.	Intermittent observations.
Designated smoking areas should be provided, with special bins for discarding of cigarette butts.	Intermittent observations.

Toilet / Ablution Facilities

Core Criteria	Monitoring Criteria
The Contractor must provide sufficient ablution facilities, in the form of mobile / portable / VIP toilets, at the Construction Camps and along construction sites, and shall conform to all relevant health and safety standards and codes. No pit latrines, french drain systems or soak away systems shall be allowed and toilets may not be situated within 100 meters of any water body or within the 1:100 year flood line. A sufficient number of toilets shall be provided to accommodate the number of personnel working in any given area. Toilet facilities supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 15 workers. All temporary / portable / mobile toilets shall be secured to the ground to prevent them from toppling due to wind or any other cause. Toilets may not be further than 100m from any working area.	Site Plan and intermittent observations
Prior to establishment of the ablution facilities, the Site Manager will approve an appropriate location.	Site Plan and intermittent observations
The Contractor shall ensure the provision and proper utilisation, maintenance and management of toilet, wash and waste facilities.	Site Plan and intermittent observations
The entrances to the toilets will be adequately screened from public view.	Intermittent observations
These facilities will be maintained in a hygienic state and serviced regularly. Toilet paper will be provided.	Service Records and intermittent observations
The Contractor will ensure that no spillage occurs when the toilets are cleaned or emptied and that a licensed service provider removes the contents from site.	Service Records, waste collection slips and intermittent observations
Disposal of such waste is only acceptable at a licensed waste disposal facility.	Waste collection slips

Core Criteria	Monitoring Criteria
Should shower facilities be provided for use by staff staying on site, the following controls must be imposed:	Site Plan and intermittent observations
<ul style="list-style-type: none"> <li>Positioning of the shower, and specifically its discharge point, will be carried out to ensure that erosion and build up of detergents does not occur.</li> </ul>	Site Plan and intermittent observations
<ul style="list-style-type: none"> <li>All discharge from the shower and other washing facilities must pass through a suitable filter to reduce the load of detergents to the environment.</li> </ul>	Contractor to provide ECO with details on discharge design and filtering system. Site Plan and intermittent observations
<ul style="list-style-type: none"> <li>Filtered water discharge may thereafter be released to the environment, but mechanisms should be investigated to ensure that the water is evenly dispersed so as not to lead to “greening up” and/or swampy conditions in one limited area.</li> </ul>	Contractor to provide ECO with details on discharge design and filtering system. Site Plan and intermittent observations
<ul style="list-style-type: none"> <li>Use of the shower facilities must be limited to staff or authorised persons only.</li> </ul>	Intermittent observations

Contractors Camp and Eating Areas

Core Criteria	Monitoring Criteria
Open uncontrolled fires will be forbidden at the site camp. Rather, ‘contained’ cooking mechanisms will be used – e.g. gas stoves or an enclosed braai facility.	Intermittent observations
The cooking area will be positioned such that no vegetation is in close proximity thereto, including overhanging trees. An area around the cooking area will be cleared such that any escaping embers will not start an uncontrolled fire.	Intermittent observations
Eating areas will be designated and demarcated.	Site Plan and Intermittent observations
The feeding, or leaving of food for animals, is strictly prohibited.	Intermittent observations

Core Criteria	Monitoring Criteria
Sufficient vermin / weatherproof bins will be present in this area for all waste material.	Intermittent observations
No fires for the purpose of cooking or warming purposes will be permitted other than within designated areas, for instance, at the site camp.	Intermittent observations
Dish washing facilities will be provided. These may be very basic, but a process must be put in place to ensure that wastewater is disposed of appropriately.	Intermittent observations

#### 9.1.15 *Aesthetics*

**Primary Objective:** To ensure that the visual appearance of the construction site is not an eyesore the adjacent areas.

Core Criteria	Monitoring Criteria
Advertising and lighting will be in accordance with the South African National Roads Agency requirements and will not constitute an eyesore / hazard to users of the road.	Lighting direction and down lighting
Lighting will be sufficient to ensure security but will not constitute 'light pollution' to the surrounding areas.	Lighting direction and down lighting
The site will be shielded from the adjacent landowners to minimise the visual impact where this is feasibly possible.	Lighting direction and down lighting
Site structures, albeit temporary, must be fitted with appropriate cladding and colouring to ensure reduced reflection and visual pollution.	Intermittent observations.

#### 9.1.16 *Waste Management*

**Primary Objective:** To ensure the efficient management of waste on site to ensure that minimal impacts occur on the surrounding natural environment.

Core Criteria	Monitoring Criteria
---------------	---------------------

Core Criteria	Monitoring Criteria
Vermin / weatherproof bins will be provided in sufficient number and capacity to store all solid waste produced on a daily basis. These bins must be kept closed to reduce odour build-up and emptied regularly (minimum weekly) such that they are not overfilled.	Intermittent Observations.
Waste must be separated at source (e.g. containers for glass, paper, metals, plastics, organic waste and hazardous wastes).	Intermittent Observations.
The Contractor must ensure the provision of waste skips on site. These skips should be sufficient in number, the skip storage area should be kept clean, skips should be emptied and replaced before overflowing or spillage occurs.	Intermittent Observations.
A general site-wide litter clean-up will occur at least once a week.	Intermittent Observations.
The Contractor will ensure that no burying, dumping or burning of waste materials, vegetation, litter or refuse occurs. All solid waste will be disposed of at suitable licensed disposal sites.	Disposal Records and Intermittent Observations
Wherever possible, materials will be recycled via a "Greens waste site".	Disposal Records
Containers of brake and clutch fluid, oil etc. although initially containing potentially hazardous wastes when disposed of contain minimal amounts thereof and may be disposed of to standard domestic waste.	Disposal Records
Wastes should be removed during off-peak periods to minimise impacts on local traffic patterns.	Intermittent Observations.
Must prevent any waste from draining into wetlands or directly into any drainage lines.	Visual inspections and proper storage facilities for waste. To be monitored in consultation with the CLO.

#### 9.1.17 Water Management

**Primary Objective:** To ensure effective water management in order to prevent incorrect diversions of water which result in soil erosion and storm water run-off with negative environmental impacts.

Core Criteria	Monitoring Criteria
Water supply during the construction phase for construction activities will be obtained from the existing pipeline and water tankers. All connections and decommissioning will be the Contractor's responsibility on approval of the construction manager.	Design Plans
The Contractor will ensure that no leakage occurs from pipes or dripping taps.	Design Plans
The Contractor will comply with the stormwater management plan.	Design Plans
The Contractor will be responsible for preventing erosion on temporary construction roads.	Design Plans
Monitoring points shall be established wherever so required by either municipal authorities or DWAF and water quality results shall be provided to these bodies upon request.	Water quality variables at selected monitoring points.

#### 9.1.18 Electricity Supply

**Primary Objective:** To ensure that electricity is supplied to the site with minimum impact to the surrounding environment.

Core Criteria	Monitoring Criteria
Electricity during the construction phase will be supplied by Eskom via an existing electrical network.	Design Plans
Should the use of generators be necessary, the generators will be placed within an enclosed area to limit the noise impact.	Design Plans
Maintenance of generators will be in line with specification as prescribed above in Section 9.1.14 (Workshop, Equipment Maintenance and Storage)	Design Plans



9.1.19 *Pollution Generation Potential*

**Primary Objective:** To ensure that all possible causes of pollution are mitigated as far as possible to ensure the minimum impact on the surrounding environment.

Lights

Core Criteria	Monitoring Criteria
Prior to construction the position and type of lighting will be planned to ensure unnecessary light pollution will be eliminated.	Site Plan
All lighting installed on site must not interfere with road traffic	South African National Roads Agency requirements
During construction only directional / down lighting will be used for security purposes.	Intermittent Observations
All lighting installed on site must not interfere with road traffic or lead to unacceptable light pollution to the surrounding community and natural environment (e.g. use of down-lighters).	Down lighting.

Noise

Core Criteria	Monitoring Criteria
The provisions of SABS 1200A will apply to all areas within audible distance of residents.	Intermittent Observations
No amplified music will be allowed on the site. The use of radios, tape recorders, compact disc players, television sets etc. will not be permitted unless at a level that does not serve as an intrusion to adjacent land-owners.	Intermittent Observations
Construction activities generating output levels of 85 dB or more will be confined to the hours during normal working hours.	Intermittent Observations
The Contractor will take preventative measures (e.g. screening, muffling, timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisances from sources such as power tools.	Intermittent Observations

Dust Generation

Core Criteria	Monitoring Criteria
Contractors will be solely responsible for the control of dust arising from their operations and for any costs against the Project Proponent for damages resulting from the dust.	Number of water carts and Intermittent Observations
Appropriate dust suppression measures or temporary stabilising mechanisms will be used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather.	Number of water carts and Intermittent Observations
Removal of vegetation will be avoided until such time as soil stripping is required.	Intermittent Observations
Excavation, handling and transport of erodible materials will be avoided under high wind conditions or when a visible dust plume is present. If dust-dampening measures are deemed inadequate, working will cease until wind speeds drop to an acceptable level.	Intermittent Observations and Complaint Register.
Soil stockpiles will be located in sheltered areas to limit the erosive effects of the wind.	Site Layout Plan
Speed limits to be strictly adhered to.	Intermittent Observations
The Contractor will take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, pre-notification of affected parties).	Intermittent Observations

Erosion and Sediment Control

Core Criteria	Monitoring Criteria
During construction, the Contractor will protect areas susceptible to erosion by installing necessary temporary and / or permanent drainage works as soon as possible and by taking suitable measures to prevent surface water concentration into nearby roadways.	Stormwater Management Plan

Core Criteria	Monitoring Criteria
Silt trap mechanisms will be installed on all temporary stormwater channels. These silt traps will be regularly checked and serviced as required.	Stormwater Management Plan
All excavated and filled slopes and stockpiles must be of a stable angle and capable of accommodating normal expected water flows.	Stormwater Management Plan
Any erosion channels will be backfilled and compacted, and the area/s restored to a proper condition.	Intermittent Observations of erosion.
Stabilisation of cleared areas to prevent and control erosion will be actively managed. The method chosen (e.g. watering, planting, retaining structures, commercial anti-erosion compounds) will be selected according to the site specifics and ensure acceptable rehabilitation.	Intermittent Observations of erosion.
Traffic and movement over stabilised areas will be restricted. Any damage to stabilised areas will be repaired and maintained to the satisfaction of the Site Manager.	Intermittent Observations of erosion.
Where erosion and/or sedimentation occur, rectification will be carried out in accordance with details specified by the Site Manager.	Intermittent Observations of erosion.
All efforts to prohibit ponding on surface and ensure stormwater runoff is channelled from the site must be made. The method used will be appropriate to the expected stormwater flows and the topography and geology of the site.	Intermittent Observations of erosion.
The Contractor will be liable for any damage to downstream property caused by the diversion of overland stormwater flows.	Complaints Register

Cement and Concrete Batching

Core Criteria	Monitoring Criteria
Concrete will not be mixed directly on the ground or any other permeable surface.	Intermittent Observations

Core Criteria	Monitoring Criteria
The batching / mixing area will be kept neat and clean at all times.	Intermittent Observations
No batching / mixing activities will occur on a permeable surface.	Intermittent Observations
All runoff from such areas will be strictly controlled, with contaminated water collected, stored / contained and disposed of at an approved waste disposal site.	Stormwater Management Plan, Intermittent Observations, Disposal Records
Unused cement bags will be stored so as not to be affected by rain / runoff.	Intermittent Observations
Used cement bags will be stored so as to prevent wind blown dust and potential water contamination. Used bags will be disposed of regularly via the solid waste management system detailed previously.	Intermittent Observations
Concrete transportation will not result in spillage.	Intermittent Observations
Cleaning of equipment and flushing of mixers will not result in pollution, with all contaminated wash water entering the waste water collection system.	Stormwater Management Plan, Waste Water Collection System, Intermittent Observations
To prevent spillage onto roads, ready mix trucks will rinse off the delivery shoot into a suitable sump prior to leaving the site.	Waste Water Collection System, Intermittent Observations
Suitable screening and containment will be in place to prevent wind blown contamination from cement storage, mixing, loading and batching operations.	Intermittent Observations
All contaminated water and fines from exposed aggregate finishes will be collected and stored in sumps for disposal at an approved waste disposal site.	Intermittent Observations, Disposal Records

Core Criteria	Monitoring Criteria
All visible remains of excess concrete will be physically removed on completion of the plastering or concrete pouring and disposed off in an acceptable manner.	Intermittent Observations, Disposal Records

#### 9.1.20 *Geology and Soils*

**Primary Objective:** To ensure that the guidelines prescribed in the Geotechnical Report are met with regards to construction activities and those soils are stockpiled in the correct manner to prevent erosion and contamination of surface water runoff.

Core Criteria	Monitoring Criteria
The site and surrounding area should be shaped to permit the ready drainage of surface water and to prevent ponding.	Intermittent observations
Drainage ports should be incorporated where necessary to permit the passage of surface water runoff.	Intermittent observations
Methodology for trench excavations as described in the engineering specifications / Geotechnical Report must be followed.	Geotechnical Investigations Report
The developer and design team must ensure that the design, positioning and layout of the proposed development and construction methodologies are suitable in light of the determined nature / characteristics of the geological substrate.	Geotechnical Investigations Report
All such layouts must be captured on an approved Site Development Plan. The Site Manager must approve any deviations from the Site Development Plan in consultation with the ECO. The Project Manager should be supplied with information indicating the requirement for the deviation. Significant deviations must be reported to T with motivational information.	Site Development Plan and Intermittent observations
The Contractor must determine the correct position of the topsoil stockpile/s within the construction servitude.	Site Development Plan and Intermittent observations
The position of construction related materials must be approved by the Project Manager and must ensure minimal impact to the area outside of the construction servitude.	Site Development Plan and Intermittent observations

Core Criteria	Monitoring Criteria
Measures for the safety of workers in areas where potentially unstable geologic conditions are encountered should be put in place, and engineering solutions should be put in place to address potential risks.	Geotechnical Investigations Report / Engineering Solutions
Areas where unstable geological conditions occur could be stabilized by using rock anchors or temporary retaining structures to stabilize slopes. In areas of severe instability, the pipeline route should be re-aligned to avoid these sensitive geological areas.	Geotechnical Investigations Report / Engineering Solutions

### 9.1.21 Vegetation

Primary Objective: To ensure the control of alien invasive species and that the rehabilitation of indigenous vegetation to as close to the original state as possible.

**Note:**

- The rehabilitation of vegetation refers to the actual footprint of the site, and the area of the site that has been disturbed by construction activities;
- The footprint is taken to include the parking areas, all formal stormwater channels, as well as the access roads, including the verges thereof;
- Seeding requirements and the area to be vegetated will need to be established by ECO.

Core Criteria	Monitoring Criteria
No construction equipment, vehicles or unauthorised personnel will be allowed onto areas that have been rehabilitated.	Complaints register and intermittent observations and ECO to Monitor
Only persons / equipment required for maintenance thereof will be allowed to operate on rehabilitated areas.	ECO to monitor
Removal of indigenous plant material from the site or surrounding and adjacent land will not be allowed.	Intermittent observations
Marking of all protected trees in accordance with <b>National Forests Act (Act 73 of 1998)</b> e.g. Marula tree, which exists in the pipeline servitude. These trees must be marked and left in place, untouched except for when the tree falls within the direct right of way of the pipeline.	To be done before any Busch clearing commences. ECO to monitor.
All reseeded activities will be undertaken at the end of the dry season (middle to end September) to ensure optimal conditions for germination and rapid vegetation establishment.	Site Development Plan

Core Criteria	Monitoring Criteria
The rehabilitated and seeded areas must be harrowed after spreading the topsoil and fertilizer uniformly.	Site Development Plan
Inspect rehabilitated area at three monthly intervals during the first and second growing season to determine the efficacy of rehabilitation measures.	ECO to monitor
Take appropriate remedial action where vegetation establishment has not been successful or erosion is evident.	Intermittent observation
Control of alien invasive species in line with the requirements of the Conservation of Agricultural Resources Act will be undertaken. Strict control to prevent the establishment and spread of Sickle Bush should be implemented.	Intermittent observation.
Alien invasive plant material will be preferentially removed in entirety through mechanical means (e.g. chainsaw, bulldozer, hand-pulling of smaller specimens). Chemical control is only required as a last resort.	Site Development Plan and Intermittent observation
All exotic trees must be identified and marked for removal.	Site Development Plan
A limited number of workers must be used to remove the vegetation i.e. 2-4.	Site Development Plan
A single ingress and egress point for all workers must be used.	Site Development Plan
Planks are to be removed on completion of alien control activities.	Site Development Plan
Alien invasive plant material will not be stockpiled on site. All such material removed will be removed from the site and dumped at an approved disposal site.	Site Development Plan

Core Criteria	Monitoring Criteria
All eradicated plant material must be removed from the site to an approved location, unless the landowner request otherwise.	Site Development Plan and Intermittent observation
If during the establishment period, any noxious or excessive weed growth occurs, such vegetation will be removed.	Site Development Plan and intermittent observation
Only indigenous vegetation is to be used in any landscaping which may be undertaken.	Design Evaluation
It is the developer's responsibility to implement a monitoring programme that will be instituted to ensure that re-growth of alien invasive plants species does not occur, or that such re-growth is controlled.	Site Development Plan and intermittent observation



9.1.22 *Rivers and Streams*

**Primary Objective:** To ensure that the rivers and streams are protected and incur minimal negative impact from the development as possible.

Core Criteria	Monitoring Criteria
The Contractor will minimise the extent of any damage to flood plains that is necessary to complete the works, and will not pollute any river as a result of construction activities.	Stormwater Management Plan and Site Development Plan
Temporary diversion to be built to maintain a dry works area. Tie-in points at riverbanks must be suitably safeguarded with gabion cut-off walls to prevent erosion.	Method statement
Diversion to be removed and affected area to be reinstated following the installation of the pipeline and the concrete encasing.	Method statement
The Contractor will not cause any physical damage to any aspects of a watercourse, other than that necessary to complete the works as specified and in accordance with the accepted method statement.	Stormwater Management Plan and Site Development Plan
Intercept silt-laden runoff from construction site along eastern tributary of the Rietspruit.	Stormwater Management Plan and Site Development Plan
The introduction of any construction related effluent water into any natural stream must be approved by the ECO.	Stormwater Management Plan and Site Development Plan
Construction activities will not permanently alter the surface or subsurface flow of water through a flood plain area.	Site Development Plan
Do not locate any septic tank or French drain within the 1:100 year flood line, or within a horizontal distance of 100 m (whichever is greater) of a stream or identified wetland.	Site Development Plan
>95% of recovered topsoil from disturbed areas to be stored above the 1:20 year flood line for future use	Method statement

Core Criteria	Monitoring Criteria
In order to avoid erosion at stormwater discharge points proper erosion and sedimentation prevention techniques should be implemented.	Stormwater Management Plan
Under no circumstances may rocks from any watercourse be used for erosion and sedimentation control.	Stormwater Management Plan
Pipelines to be encased with concrete to prevent any damage.	Method statement
The Contractor will not cause any physical damage to any aspects of a watercourse.	Stormwater Management Plan
Riparian areas must be rehabilitated, and exotic-invasive species must be removed and replaced with indigenous riparian vegetation	Stormwater Management Plan
Erosion protection measures to be implemented at scour valves.	Site Development Plan

#### 9.1.23 *Archaeology / Historical Resources*

**Primary Objective:** To ensure that no artefacts of historical or cultural value are negatively impacted, damaged or destroyed.

Core Criteria	Monitoring Criteria
Should remains and/or artefacts be discovered on the site during earthworks, all work will cease in the area affected and the Contractor will immediately inform the Construction Manager.	Intermittent Observations
Should any heritage resources be exposed during excavation or be found on site, a registered heritage specialist must be called to site for inspection.	Intermittent Observations

Core Criteria	Monitoring Criteria
Should any heritage resources be exposed during excavation or be found on site, the relevant heritage resource agency must be informed about the finding.	Intermittent Observations
Under no circumstances may any heritage material be destroyed or removed from site.	Intermittent Observations
Should any remains be found on site that is potentially human remains, the South African Police Service should also be contacted.	Intermittent Observations

#### 9.1.24 Emergency Procedures

Primary Objective: To ensure that all Contractors and employees are aware of emergency procedures should an incident occur and that the necessary emergency facilities and equipment are in working order.

##### Fire

Core Criteria	Monitoring Criteria
A Fire Management Plan and Fire Protection Plan should be put in place by the Contractor. Landowners should be consulted prior to the compilation of these plans in order to incorporate their site specific fire fighting measures. The plan will identify sources of fire hazard, and appropriate management measures to reduce the identified risk. The relevant authority will be notified of such potential fire hazards.	Fire Management Plan and Fire Protection Plan
The Fire Protection Plan and Fire Management Plan should be reviewed and approved by the National Department of Agriculture and the Local Municipality.	Fire Management Plan, Fire Protection Plan and Authority Approval.
Preferentially no fires will be lit on the site, if however required, fires must be limited to use for cooking and heating use only within a designated area. This area will be at a suitable distance from fuel sources. A fire will be constantly monitored while present.	Fire Management Plan and Fire Protection Plan
In terms of the Atmospheric Pollution Prevention Act (APPA), burning is not permitted for waste disposal.	Fire Management Plan and Fire Protection Plan

Core Criteria	Monitoring Criteria
Suitable precautions will be taken (e.g. suitable fire extinguishers, water bowsers, welding curtains) when working with welding or grinding equipment.	Fire Management Plan and Fire Protection Plan
The Fire Protection Plan should contain a detailed section on undertaking welding and grinding activities.	Fire Management Plan and Fire Protection Plan
Welding and grinding should not be permitted under high wind conditions.	Fire Management Plan and Fire Protection Plan
The site manager should be notified when welding will take place, to ensure that precautionary measures are put in place.	Fire Management Plan and Fire Protection Plan
Welded joints should be inspected after welding to ensure that the joint cooled off properly, and that there are no smouldering material lying around, and that smoke is not emitted from the welded joint.	Fire Management Plan and Fire Protection Plan
All fire control mechanisms (fire fighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof and be approved by local fire services. Such mechanisms will be present and accessible at all times.	Fire Management Plan and Fire Protection Plan
All staff on site will be made aware of general fire prevention and control methods, and the name of the responsible person to alert to the presence of a fire.	Fire Management Plan and Fire Protection Plan
The Contractor will advise the relevant authority of a fire outside of a demarcated area as soon as it starts and will not wait until he can no longer control it.	Fire Management Plan and Fire Protection Plan
The Contractor will be responsible to compensate the landowner for damages caused by a fire as a result of the Contractor's working activities.	Fire Management Plan and Fire Protection Plan

Accidental Leaks and Spillages

Core Criteria	Monitoring Criteria
The Contractor will ensure that his employees are aware of procedures to be followed for dealing with spills and leaks, which will include notifying the relevant authorities.	Disposal Records and intermittent observation
The Contractor will ensure that the necessary materials and equipment for dealing with spills and leaks are available on site at all times.	Disposal Records and intermittent observation
Treatment and remediation of the spill areas will be undertaken to the reasonable satisfaction of the Site Manager in consultation with the ECO.	ECO to monitor
In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of an appropriate absorbent material readily available to absorb, breakdown and where possible, encapsulate a minor hydrocarbon spillage.	Disposal Records and ECO to monitor
Monitoring of all known boreholes in close proximity will be undertaken to determine the contamination extent and movement.	In the event of a major spill, a suitably qualified specialist should be appointed to undertake water quality testing.

9.1.25 Safety and Health

**Primary Objective:** To ensure that the safety and health components are effectively communicated to Contractors and employees. Contractors must be aware and educated of the safety and health procedures at all times.

Safety Requirements / Precautions

Core Criteria	Monitoring Criteria
Contractor to provide an Occupational Health and Safety Management Plan to the Construction Manager for approval prior to the commencement of works in terms of the Construction regulations.	Health and Safety Management Plan
Ensure that there is an inspection schedule and log for use by security or contracts staff.	Intermittent observation and Health and Safety Management Plan

Core Criteria	Monitoring Criteria
All trenches and manholes will be secured.	Health and Safety Management Plan
Fencing and barriers will be in place in accordance with the Occupational Health and Safety Act (Act No. 85 of 1993).	Health and Safety Management Plan
Applicable notice boards and hazard warning notices will be put in place and secured. Night hazards will be indicated suitably (e.g. reflectors, lighting, traffic signage).	Health and Safety Management Plan
Emergency and Management contact details will be prominently displayed.	Health and Safety Management Plan
Security personnel will be briefed and have facilities to contact relevant management and emergency personnel.	Health and Safety Management Plan
Security personnel must be stationed at all construction heads, construction camps, construction vehicle yards, etc. during times when the construction crew is not present i.e. nighttimes, weekends, etc.	Health and Safety Management Plan
The Contractor to ensure he has sufficient first aid boxes and certified first aid attendants available at each construction head. The necessary procedures must be in place for is an employee is bitten by a snake. Prior arrangements must also be made with the local medical facilities regarding these procedures.	Health and Safety Management Plan
Two-Way Radio Systems should be used where cell phone coverage is poor.	Health and Safety Management Plan
No unauthorised firearms or weapons of any kind will be permitted on the site.	Health and Safety Management Plan
Should scaffolding be required, it should be secured during both use and storage.	Health and Safety Management Plan
Structures vulnerable to high winds will be secured.	Health and Safety Management Plan

Core Criteria	Monitoring Criteria
All landowners adjacent to areas where construction activities are imminent must be alerted timeously. Potential risks and hazards must be communicated effectively.	Health and Safety Management Plan
All construction personal must be issued with the same type and colour clothing to enable better identification of them. All employees must also be issued with employee cards for landowners to identify them on.	Health and Safety Management Plan
Fire hazards will be identified in the Fire Protection Plan and Fire Management Plan.	Health and Safety Management Plan and Fire Management Plan
All workers will be supplied with the required Personal Protective Equipment as per the Occupational Health and Safety Act (Act No. 85 of 1993).	Health and Safety Management Plan

#### 9.1.26 *X-Ray of Pipeline Joints*

**Primary Objective:** To ensure that x-rays to inspect welded pipeline joints are undertaken in a way which will result in minimal environmental and health and safety impact.

Core Criteria	Monitoring Criteria
The Code of Practice for Industrial Radiography as compiled by the Department of Health should be adhered to when undertaking industrial radiography for pipeline joint inspection. X-Ray equipment used in industrial radiography is subject to regulatory control in terms of Article 3(1) of the Hazardous Substances Act, 1973 (Act 15 of 1973), as amended.	Code of Practice for Industrial Radiography, EMP, Health and Safety Management Plan and the Hazardous Substances Act, 1973 (Act 15 of 1973).
Proper shielding should be provided when undertaking x-rays, as industrial radiography units emit sufficient ionising radiation to constitute a significant health hazard unless adequately shielded and handled with proper care.	Code of Practice for Industrial Radiography, EMP, Health and Safety Management Plan and the Hazardous Substances Act, 1973 (Act 15 of 1973).
TCTA / the Contractor should obtain a license from the Directorate of the Department of Health to undertake industrial x-rays on site. A copy of this valid license should be kept on site.	Valid License
Landowners and farm labourers should be made aware of the risks involved when undertaking industrial x-rays. Landowners and farm labourers should be notified of when x-rays will take place.	Code of Practice for Industrial Radiography, EMP, Health and Safety Management Plan and the Hazardous Substances Act, 1973 (Act 15 of 1973).

Core Criteria	Monitoring Criteria
Industrial X-Ray license holders may not dispose of X-Ray equipment without the approval of the Directorate. An application form for the disposal of X-Ray equipment should be submitted to the Directorate.	Code of Practice for Industrial Radiography, EMP, Health and Safety Management Plan and the Hazardous Substances Act, 1973 (Act 15 of 1973).

Fuels / Flammables / Hazardous Materials Stores

Core Criteria	Monitoring Criteria
<p>Should the site be closed for a period of more than one week, a report on compliance will be lodged with the Construction Manager, and the following will be confirmed:</p> <ul style="list-style-type: none"> <li>• Stores will be left at as low a volume as practicable, with no leaks.</li> <li>• The store area will be secure and locked.</li> <li>• Fire extinguishers will be serviced and accessible.</li> <li>• The area will be secure from accidental damage through vehicle collision, etc.</li> <li>• Emergency contact numbers will be available and prominently displayed.</li> <li>• Toilets will be empty and secured.</li> <li>• Refuse bins will be empty and secured.</li> </ul>	Health and Safety Management Plan and Fire Management Plan

9.1.27 Penalty Clauses

Primary Objective: To establish the framework in which penalties will be applied for non-compliance with the EMP.

Note:

- Environmental management is concerned not only with the final results of the Contractor's operations to carry out the works, but also with the control of how those operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product but also to the standard of the day-to-day operations required to complete the Works;
- A Schedule of Fines should be compiled in line with relevant legislation by the ECO prior to the commencement of construction activities. The Contractor will be made aware of the Schedule of Fines and the enforcement thereof prior to the commencement of construction activities.

Core Criteria	Monitoring Criteria
The Contractor will comply with the environmental requirements on an ongoing basis, and any failure on their part to do so will entitle TCTA, in consultation with the Construction Manager and ECO, to certify the imposition of a fine subject to the details set out in the EMP.	Intermittent Observations



Core Criteria	Monitoring Criteria
The TCTA and ECO and any other specific personnel as designated by the TCTA may alter the schedule of Fines.	Signed Decision Note
Fines may be issued per incident at the discretion of the Construction Manager. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the EMP requirements. Fines may be omitted from construction guarantees as supplied by the Contractor.	Incident Reports and Signed Decision Note.
The TCTA will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due under the Contract. For each subsequent similar offence the fine may, at the discretion of TCTA, be doubled in value. TCTA Manager will be the judge as to what constitutes a transgression in terms of the above clause. Further note that in the event that transgressions continue to an unacceptable level the client may cancel the Contract.	Incident Reports and Signed Decision Note.
Where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental requirements, they will be liable to pay a penalty fine over and above any other contractual consequence.	Incident Reports and Signed Decision Note.
Accordingly, where a Contractor causes damage, TCTA can either enforce a penalty or make the Contractor repair the damage, but not both.	Incident Reports and Signed Decision Note.
Note that on agreement between TCTA and the ECO, the schedule of Penalties may be altered for this specific project.	Signed Decision Note.
<p>The Contractor is deemed NOT to have complied with the this specification if:</p> <ul style="list-style-type: none"> <li>• Within the boundaries of the site, site extensions and haul / access roads there is evidence of contravention of the Specification,</li> <li>• Environmental damage ensues due to negligence,</li> <li>• The Contractor fails to comply with corrective or other instructions issued by the Site Manager with in a specific time,</li> <li>• The Contractor fails to respond adequately to complaints from the public, and/or,</li> <li>• Legal action is instituted against the developer in terms of the Environmental laws,</li> </ul>	Incident reports Signed Decision Note.
Payment of any fines in terms of the contract will not absolve the offender from being liable from prosecution in terms of any law.	Signed Decision Note.

## 9.2 PROJECT PHASE: OPERATION

### 9.2.1 Site Access, Routine Maintenance and Maintenance Works

**Primary Objective:** To ensure that the maintenance activities and maintenance works are undertaken in an acceptable manner.

Core Criteria	Monitoring Criteria
The landowner should be notified that pipeline and servitude maintenance inspections will be undertaken, at least 10 working days prior to undertaking the inspection. The relevant person from TCTA who will be undertaking the maintenance inspections should at all times be escorted by the landowner, or a representative of the landowner.	Landowner Agreement
A Maintenance Inspection Agreement form should be signed by the landowner or relevant representative as proof that maintenance activities were undertaken without causing any damage to access gates, access roads, or fencing.	Landowner Agreement and EMP
Should the landowner or suitable representative not be available to undertake the maintenance inspection with the TCTA representative, the landowner should in writing provide permission to the representative to undertake the inspections.	Landowner Agreement and EMP
All access gates should be closed and locked as per the instruction of the landowner.	Landowner Agreement and EMP
No fences may be damaged during maintenance inspections or undertaking of maintenance work.	Landowner Agreement and EMP
Should maintenance or repair work be required on site, the landowner should be notified well in advanced. Maintenance work should be undertaken as per the conditions as stipulated under the Pre-Construction and Construction Phase above.	EMP

### 9.2.2 Access and Internal Routes

**Primary Objective:** To ensure that road maintenance and upgrade are undertaken and traffic sufficiently controlled.

Core Criteria	Monitoring Criteria
---------------	---------------------

Core Criteria	Monitoring Criteria
All roads used for maintenance inspections and maintenance works should be maintained and repaired where necessary.	Landowner Agreement
All vehicle traffic will be restricted to roadways and maintenance roads only.	EMP
On private farm roads, maintenance vehicles may not exceed a speed of 40km/h.	EMP

### 9.2.3 Waste Management

Primary Objective: To ensure the proper management of Wastes.

Core Criteria	Monitoring Criteria
Should repair maintenance activities take place for the pipeline, or associated infrastructure, waste managed as described in the Pre-Construction and Construction Phases should be adhered to.	EMP

### 9.2.4 Electricity Provision

Primary Objective: To ensure effective provision of electricity throughout the life of the proposed pipeline and associated infrastructure.

Core Criteria	Monitoring Criteria
The supply and maintenance of electricity during the operational phase to the pipeline infrastructure and Cathodic Protection System is the responsibility of Eskom. Maintenance activities as described above in Section 9.2.1 should be implemented.	Formal agreement

### 9.2.5 Noise Control

Primary Objective: To ensure the effective control of noise throughout the life of the pipeline and associated infrastructure.

Core Criteria	Monitoring Criteria
Should maintenance or repair works be undertaken, noise control measures as prescribed for the pre-construction and construction phase should be implemented.	EMP

### 9.2.6 *Vegetation Management*

Primary Objective: To ensure the effective establishment of vegetation in the servitude area, and to control alien invasive species.

Core Criteria	Monitoring Criteria
At the end of the construction phase a vegetation monitoring and a management plan should be compiled. This plan should provide details on how vegetation establishment within rehabilitated areas should be managed and how alien invasive control should be undertaken.	Vegetation Management Plan
Should maintenance or repair works be undertaken, vegetation should be managed as described in the Pre-Construction and Construction Phase.	Vegetation Management Plan, and EMP.

### 9.2.7 *Fencing*

Primary Objective: To ensure protection of animals during maintenance activities.

Core Criteria	Monitoring Criteria
Should maintenance and repair works be undertaken by TCTA, the management measures for construction and damage to fences as described in the Pre-Construction and Construction Phase should be implemented.	EMP

### 9.3 PROJECT PHASE: REHABILITATION AND DECOMMISSIONING

---

On completion of pipeline construction and backfilling of trenches, all areas impacted should be rehabilitated, and the Vegetation Management Plan and Alien vegetation Control measures should be implemented by TCTA. Furthermore, should the proposed pipeline and associated infrastructure be decommissioned, for whatever reason, a Decommissioning Plan must be compiled and the following basic rehabilitation conditions should be implemented and adhered to. In addition to all management measures described in the construction phase specific rehabilitation activities are required to address decommissioning of structures, soil, land capability, and vegetation establishment.

#### 9.3.1 Decommissioning of Structures

- Prior to the removal of the pipeline and associated infrastructure an assessment of the end land use will be undertaken to determine which infrastructure will be removed or retained;
- Any specific requirements to prevent pollution during demolition of infrastructure will be identified prior to the commencement of the demolition and rehabilitation activities;
- Disposal requirements will be identified prior to the commencement of infrastructure removal and rehabilitation;
- Equipment, structures, and building material that can be reused will be identified prior to the commencement of rehabilitation activities;
- Scrap metal and equipment will be sold as scrap or disposed of at a suitably licensed facility; and

#### 9.3.2 Vegetation

##### **Traffic on vegetated areas**

- No construction equipment, vehicles or unauthorised personnel will be allowed onto areas that have been re-vegetated; and
- Only persons / equipment required for maintenance thereof will be allowed to operate on such areas.

##### **Plant material**

- All plant material used on site will be obtained from an approved nursery;
- Each plant brought onto site will be handled and packed in an approved manner for that species or variety, and that all necessary precautions are taken to ensure that the plants arrive on the site in a proper condition for successful growth (e.g. good plant specimens chosen, disease and/or pest free, potting material weed free, plants covered during transportation, containers in good condition);
- The Contractor will remove plants containing any diseases and/or pests from the site;

- On planting, there will be sufficient topsoil around each plant to prevent desiccation of the root system. Where plants are stored on site prior to planting they will be maintained to ensure that the root systems remain moist; and
- Propagation of suitable indigenous vegetation that is quick to establish such as grasses, should be encouraged in areas where vegetation has been removed.

**Reseeding of disturbed areas**

- All reseeded activities will be undertaken at the end of the dry season (middle to end September) to ensure optimal conditions for germination and rapid vegetation establishment;
- The seedmix will be approved by the ECO prior to seeding;
- Seeds should be covered by use of an agricultural roller or similar mechanism;
- Inspect rehabilitated area at three monthly intervals during the first and second growing season to determine the efficacy of rehabilitation measures; and
- Take appropriate remedial action where vegetation establishment has not been successful or erosion is evident within the first two growing seasons.

**Alien plant control and monitoring**

Alien plant control will be conducted as described in the operational phase for a period of 12 months after the rehabilitation phase is completed.

**9.3.3 Soil and Land Capability**

- All excess building material and rubble must be collected and suitably disposed of.
- Soils must be ripped to refusal or a minimum of 300mm prior to seeding;
- All areas must be profiled to tie in with adjacent terrain. Where necessary suitable soil must be imported to obtain a suitable profile;
- Suitable erosion control measures must be installed in areas where erosion may occur;
- Apply a suitable mixture of N:P:K fertiliser prior to seeding;
- Harrow the disturbed areas after spreading the topsoil and fertilizer uniformly;
- Rehabilitated and profiled areas must be inspected for erosion every three months for the first year. Additional measures must be implemented to remediate erosion where it is observed.