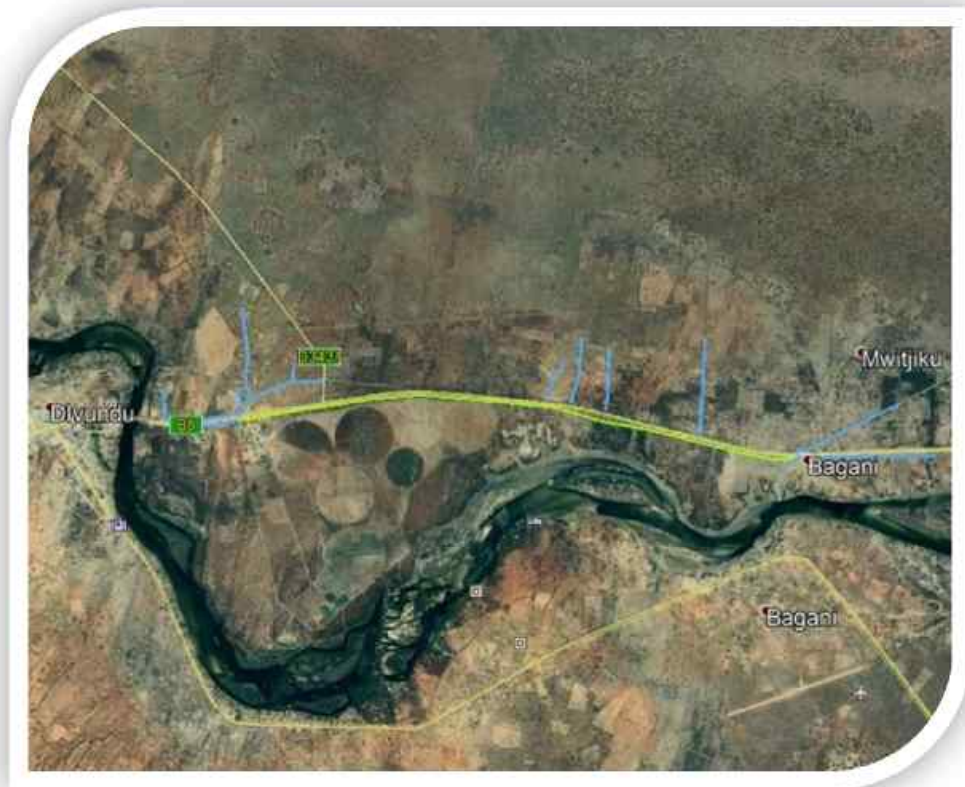


FINAL ENVIRONMENTAL MANAGEMENT PLAN

PROPOSED DIVUNDU SCHEME EXTENSION: DIVUNDU EAST
NAMWATER



OCTOBER 2019

CONTENTS

1	INTRODUCTION.....	1
1.1	BACKGROUND & RATIONALE FOR PROJECT:	1
1.2	Scope of the EIA:	1
2	Environmental Management Plan	3
2.1	What is an Environmental Management Plan?	3
2.2	What are the legal implications and obligations under this plan?....	3
3	PROJECT DESCRIPTION.....	4
3.1	Project Phases.....	6
4	PROJECT IMPACTS.....	6
5	GENERAL REQUIREMENTS FOR THE EMP	7
5.1	EMP administration	7
5.2	Roles and Responsibilities	7
5.3	The Contractor	9
5.4	Environmental Awareness Training and discipline	9
5.5	Public Participation.....	10
6	MANAGEMENT ACTIONS	12
6.1	Planning Phase.....	12
6.2	Site Establishment Phase	14
6.3	Construction Phase.....	19
6.4	Operation and Maintenance Phase	36
6.5	Decommissioning Phase.....	38
7	NON-COMPLIANCE	39
7.1	Procedures	39
7.2	Offences and Penalties	39

7.3 Fines..... 40

7.4 Penalties 41

TABLE OF FIGURES AND TABLES

FIGURE 1-1:	PROJECT AREA MAP	2
FIGURE 3-1:	SERVICE AREAS WITH VILLAGES AND INSTITUTIONS.	5
TABLE 5-1:	CONSULTATION GUIDELINES FOR NAMWATER.....	10

ABBREVIATIONS

CoC	Code of Conduct
DBWSS	Divundu Bulk Water Supply Scheme
DEA	Department of Environmental Affairs
ECO	Environmental Control Officer
EMP	Environmental Management Plan
ER	Environmental Representative
EMP	Environmental Management Plan
I&AP	Interested and Affected Party
RE	Resident Engineer
MET	Ministry of Environment and Tourism
NEM	NamWater Environmental Manager
PPE's	Personal Protective Equipment
UPVC	Unplasticized Polyvinyl Chloride

1 INTRODUCTION

1.1 BACKGROUND & RATIONALE FOR PROJECT:

The Kavango Region in the north-east of Namibia will be the destination for the proposed new bulk water supply scheme from NamWater. NamWater proposes to extend the Divundu Bulk Water Supply Scheme to east of the Okavango river with a water pipeline network and will provide water to the rural communities along the pipeline network.

Through this scheme NamWater now intends to provide high quality class A potable water to Mushashani village, Mutjiku village and Mutjiku Block D / Bagani East village supply areas, including institutional entities.

NamWater appointed Enviro Dynamics CC. to compile this EMP on their behalf. This document contains the EMP for the planning, construction and operation of the proposed water pipeline as described above.

1.2 Scope of the EIA:

The particular objectives of the EIA in terms of the Terms of Reference are to:

Comply with Namibia's Environmental Assessment Policy, Environmental Management Act (2007) and its Regulations (February 2012).

Confirm the justification of the project and to consider all alternatives that would meet the need;

Consult all Interested and Affected Parties (I&AP's) to ensure that their inputs are taken into account;

Review the legal and policy framework and their relevant requirements for this project;

Describe the biophysical and socio-economic environment of the project to determine its sensitivities and suitability for the route; and

Identify and assess impacts related to the construction and operation of the pipe line and to propose suitable mitigation strategies;

Compile an Environmental Management Plan for the construction and operation of the proposed pipeline.



Figure 1-1: Project Area Map

2 Environmental Management Plan

2.1 What is an Environmental Management Plan?

Environmental Management Plans (EMPs) are important tools that focus on the management actions that are required to ensure environmental compliance of a project. The Regulations (2012) of the Environmental Management Act (2007) state that “the environmental management plan shall set out steps that are intended to be taken to manage any significant environmental impact that may result from the operation of the undertaking”.

EMP implementation is a cyclical process that converts mitigation measures into actions and through cyclical monitoring, auditing, review and corrective action, ensures conformance with stated EMP aims and objectives. An EMP must respond to unforeseen events and changes in project implementation that were not considered before. Through monitoring and auditing, feedback for continual improvement in environmental performance must be provided and corrective action taken to ensure that the EMP remains effective.

2.2 What are the legal implications and obligations under this plan?

The Environmental Management Plan will be sent to the Directorate of Environmental Affairs (DEA) of the Ministry of Environment and Tourism (MET) for approval. Once the DEA is satisfied with the contents of the EMP, they will issue a pro-forma Environmental Clearance Certificate to NamWater. The Environmental Clearance Certificate is linked with the recommendations of the Environmental Management Plan.

The EMP, once accepted with the issuance of the Environmental Clearance, therefore becomes a legally binding document and each role-player including contractors and sub-contractors who are made responsible to implement the relevant sections of this EMP, are required to abide to the conditions stipulated in this EMP document.

3 PROJECT DESCRIPTION

The project consists of the following elements:

- A bridge crossing up the 136m³ main eastern reservoir;
- The Divundu to Bagani East main pipeline; and
- Branch line to three service areas with the following facilities:
 - ✓ Service Area 1
 - ü HDPE line to Divundu Prison Correctional Services and NDF hostels tower (136m³ steel elevated tank, with a 13m tower).
 - ü HDPE branch lines to Bangani Agricultural Research Station, Police check point, Divundu Prison Correctional Services, , NDF hostel and Martin Ndumba School.
 - ü Mushashani village
 - ✓ Service Area 2
 - ü Mutjiku village (two separate sets of 2.5m³ plastic tank / 6m tower and 5m³ plastic tank / 6m tower).
 - ü Mutjiku village, Mutjilku School and Mutjiku clinic (5m³ plastic tank / 6m tower).
 - ✓ Service Area 3
 - ü Mutjiku block D village (43.5m³ steel tank / 6m tower).
 - ü Bagani East village (two sets of 5m³ plastic tank / 6m tower and one 5m³ plastic tank / 6m tower).

Figure 3-1 gives a layout of the infrastructure of the project.

The existing water abstraction structure and purification plant is located in Divundu. The abstraction rates (including this extension), design and operation parameters of the plant is covered in the existing Divundu Bulk Water Scheme EIA and EMP and operates under a valid Environmental Clearance.

The main pipeline material will consist of high-pressure un-plasticized Polyvinyl Chloride (uPVC) pipes. The branch pipeline material will consist of flexible High-density polyethylene (HDPE).

The main storage tanks are galvanised steel and the community tanks will be plastic.



Figure 3-1: Service Areas with villages and institutions.

3.1 Project Phases

The life cycle of the project constitutes different phases, and the EMP's contents have been arranged accordingly, i.e.:

Planning and Design Phase;

Site establishment Phase

Construction Phase;

Operation and Maintenance Phase;

Decommissioning Phase

This EMP includes principles for the decommissioning of the project. However, due to the long time-lapse before decommissioning will take place, NamWater should review the principles at the decision to decommission to determine whether improved methods of decommissioning exist.

4 PROJECT IMPACTS

The final list of potential impacts which are of medium or high significance are as follows:

- Job Creation.
- Access to Potable Water.
- Non-affordability of water and defaulting of bills.
- Damage to crop fields as a key livelihood activity.

These potential impacts can all be mitigated by means of design adjustments and practical mitigation measures.

5 GENERAL REQUIREMENTS FOR THE EMP

5.1 EMP administration

Copies of this EMP shall be kept at the site office and will be distributed to all senior contract personnel. All senior personnel shall be required to familiarize themselves with the contents of this document and assure that all personnel under their authority are properly inducted in the content of the EMP.

5.2 Roles and Responsibilities

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

These are the:

- Resident Engineer
- Environmental Control Officer
- Contractor

Employer's Representative/Resident Engineer (RE)

NamWater will appoint their own Employer's Representative, also called the Resident Engineer (RE), who will act as the on-site implementing agent and has the responsibility to ensure that the Employer's responsibilities are executed in compliance with relevant legislation and the EMP. In addition to general project management, the RE has the responsibility to appoint the Environmental Control Officer (ECO) (see below).

Any on-site decisions regarding environmental management are ultimately the responsibility of the RE. The on-site RE shall assist the ECO where necessary and will have the following responsibilities in terms of the implementation of this EMP:

- Ensuring that the necessary environmental authorizations and permits have been obtained, via the Environmental Section in NamWater.
- Assisting the Contractor in finding environmentally responsible solutions to problems with input from the ECO where necessary.

- Ordering disciplinary action (e.g. disciplinary hearing) against repeated non-compliance which may lead to the removal of person(s) and/or equipment not complying with the EMP specifications.
- Issuing fines for transgressions of site rules and penalties for contravention of the EMP.
- Providing input into the ECO's on-going internal review of the EMP, this review report shall be submitted to the Employer.

Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) will be a competent person appointed by the RE to implement, monitor, and review the on-site environmental management and implementation of this EMP by the Contractor.

The ECO's duties will include the following:

- Assisting the RE in ensuring that the necessary environmental authorizations and permits have been obtained by the Environmental Section in NamWater.
- Maintaining open and direct lines of communication between the RE, Employer (through the NamWater Environmental Manager (NEM), Mr. NP du Plessis), Contractor and stakeholders with regard to environmental matters.
- Regular site inspections of all construction areas to monitor EMP compliance.
- Taking appropriate action if the specifications are not followed.
- Assisting the Contractor in finding environmentally responsible solutions to problems.
- Monitoring the undertaking by the Contractor of environmental awareness training for all personnel coming onto site.
- Advising the RE on disciplinary action (e.g. disciplinary hearing) cases against repeated non-compliance. This may lead to the removal of person(s) and/or equipment not complying with the EMP specifications.
- Recommending the issuing of fines for transgressions of site rules and penalties for contraventions of the EMP (via the RE). Section 7 of this report provides guidelines for fines and penalties. Fines are recommended for the contractor and not the individual worker. It is also recommended that first time transgressors are retrained before they are fined.
- Undertaking a continual review of the EMP and recommending additions and/or changes to the document. The continuous review of the EMP is NamWater's responsibility.

5.3 The Contractor

Before commencing with construction the RE will provide training on the EMP to the contractor. Once this has been completed, the contractor shall be responsible for the implementation of the EMP and the action plan, onsite monitoring and evaluation of the EMP.

The Contractor shall then ensure that adequate environmental induction (on the EMP and Code of Conduct) takes place and that all construction workers receive an induction presentation on the importance and implications of the EMP. All attendees should sign off on the training once they've attended.

5.4 Environmental Awareness Training and discipline

The Contractor shall ensure that adequate environmental awareness training of senior site personnel takes place and that all construction workers receive an induction presentation on the importance and implications of the EMP.

The presentation shall be conducted, as far as is possible, in the employees' language of choice. The contractor shall keep records of all environmental training sessions, including names, dates and the information presented.

If an employee is found violating the conditions of the EMP, the first step of discipline is to subject the employee to a repeat of the training module by the Contractor and the direct Supervisor of the employee, which include a written warning that explains that fines may be given to an employee for violating the conditions of the EMP.

Fines and penalties are given to the Contractor who must then comply and determine how to discipline his personnel internally.

As a minimum, training should include:

- Explanation of the importance of complying with the EMP.
- Discussion of the potential environmental impacts of construction activities.
- The benefits of improved personal performance, such as health and safety.
- Employees' roles and responsibilities, including emergency preparedness.
- Explanation of the specifics of this EMP and its specification (no-go areas, etc.) and of the mitigation measures that must be implemented when carrying out their activities.
- Explanation of the management structure of individuals responsible for matters pertaining to the EMP.

5.5 Public Participation

An ongoing process of public participation shall be maintained to ensure the involvement of stakeholders in a meaningful way. For this project it would be prudent to have regular meetings with the Ministry of Environment and Tourism and the Kavango Regional Council to discuss progress and any construction issues that may arise.

If a public matter arises, the Contractor must arrange a forum immediately to resolve the issue with the I&APs involved. These meetings shall be arranged by the ECO but shall be facilitated by the ER. A complaints register shall be held on site to deal with issues raised by the public.

It is proposed that NamWater take note of the following guidelines for continued communications during both the construction and operational phases of the proposed project (Table 5-1).

Table 5-1: Consultation Guidelines for NamWater

ACTIVITY	METHOD
PRIOR TO CONSTRUCTION	
<ul style="list-style-type: none"> • Consult with the Constituency Councillor and community members in the project area regarding the process they have to follow to benefit from this new water scheme, i.e. the pipe they will have to buy, the costs of water, water committees versus individuals, etc. • Communicate with the Regional and Constituency Councillors, and Traditional Authorities as to when the planned construction is to commence. • Walk the proposed branch pipeline routes accompanied by representatives from the Mukwe Constituency and Traditional Authority of the area in order for them to physically see where the route will go. The detailed route is confirmed with the assistance of the Councillor and traditional headmen. This will assist in the Traditional Authorities not giving land to someone which may be in conflict with the proposed route, avoiding issues concerning compensation for damage to property. • Consult with the owners of any affected crop fields, kraals and homesteads regarding the construction period and the size of their land or property that will be affected. • Ask the assistance of nearby schools to inform their learners of the construction that will take place and associated 	<ul style="list-style-type: none"> • Community Meeting
	<ul style="list-style-type: none"> • In writing and at the meeting • Can also be announced over the radio
	<ul style="list-style-type: none"> • Site visit to finalise branch route positions.
	<ul style="list-style-type: none"> • Focal meetings
	<ul style="list-style-type: none"> • In writing

ACTIVITY	METHOD
<p>safety risks, i.e. learners should be urged to stay clear of the construction site.</p> <ul style="list-style-type: none"> Warn them of the effects of HIV/AIDS. 	
CONSTRUCTION PHASE	
<ul style="list-style-type: none"> Keep the affected community members informed on the progress of the construction. Apply Namwater policy to employ community members in the construction of the pipeline with the assistance of the traditional headmen and Councillor. Identify and introduce a go-to-person from the community in Divundu East, who can be informed about any leakages along the pipeline route. This person should then in turn inform NamWater of such situations. There should be a committee established, depending on the structure of communication and collaboration decided upon for this community at the outset. 	<ul style="list-style-type: none"> Direct employment Constituency councillor to announce over the radio Identify person at the community meeting Telephonic or in writing

6 MANAGEMENT ACTIONS

6.1 Planning Phase

Responsibility: NamWater's Engineering Team shall consider these aspects in conjunction with the Environmental Manager.

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
CONSERVATION OF BIODIVERSITY	To optimise the routes in terms of avoidance of sensitive plant and animal habitat.	<ul style="list-style-type: none"> Avoid large trees by re-aligning the route if possible. Use the new route south of the B8 road for the main pipeline as proposed by the EIA. 	NamWater Engineer NEM
POVERTY ALLEVIATION AND GENDER EQUALITY	<p>To ensure that the project renders the maximum level of poverty alleviation possible, and to promote gender equality in economic opportunities.</p> <p>Optimise local service and contractor procurement.</p>	<ul style="list-style-type: none"> During drafting of tender documents, NamWater shall include provisions designed to maximise the use of local labour. All unskilled labour shall be sourced from local communities according to the relevant NamWater policy. NamWater shall consider how to structure the various components of the projects so as to optimise benefits to local contractors and SMEs. 	NamWater Kavango Regional Council

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
PREPARATION OF CONTRACT DOCUMENTS	To ensure that all tenderers are aware of the provisions of this EMP.	<ul style="list-style-type: none"> The EMP should be included in the tender documents so that tenderers can make provision for implementation of the EMP. 	NamWater
PIPELINE ROUTE AND PRIVATE PROPERTY	To ensure that pipeline route does not infringe on any property of the local residents.	<ul style="list-style-type: none"> The detailed branch routes is to be confirmed with the assistance of the Councillor and traditional headmen before setting out and construction. The pipeline route should be at least 5m from the foundations of any structure and 2.5m from fences. Tender document should clearly state that construction of the pipeline in areas used for cultivation should take place between May and October so as not to interfere with seed-time and harvest. 	NamWater

6.2 Site Establishment Phase

Responsibility: The Contractor; to be monitored by the ER and NEM.

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
MANAGEMENT AND MONITORING	To ensure that the provisions of the EMP are implemented during construction.	<ul style="list-style-type: none"> Namwater will appoint an ECO to ensure that all aspects of the EMP are implemented during construction. The ECO shall attend all site inspections and meetings and minutes shall make provision for reporting on every aspect of the EMP. NamWater will be responsible for all compliance monitoring. The ECO will report performance to the Namwater Environmental Manager (NEM), who, in turn will report this and any issues and concerns to the DEA on a quarterly basis. The Contractor is also responsible for compliance to this EMP by all personnel and sub-contractors. Make sure that all sub-contractors have a copy of this EMP and that they understand its contents. Include the EMP in the sub-contracts/agreements with sub-contractors. The EMP must be available at all site offices. Management and supervisors must lead by example. 	Contractor ER NEM DEA
COMMUNICATION AND STAKEHOLDER CONSULTATION	To ensure that all stakeholders are adequately informed throughout construction and that there is effective	<ul style="list-style-type: none"> The ECO will be the liaison person between the Contractor, community, client, and consultants (unless another person is appointed for this). The Contractor must list the stakeholders of the Project and their contact details, with whom communication would be required throughout the Contract. This list, together with an indication of 	ECO Contractor Consultants Regional Council

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
	communication with and feedback to all stakeholders.	<p>how stakeholder communication will be done throughout construction must be agreed upon and given to the ER before construction commences.</p> <ul style="list-style-type: none"> • All communication with the stakeholders must take place through the ECO. • A copy of the EMP and NamWater's Code of Conduct (CoC) must be given to all stakeholders, who must be invited to raise any concerns and issues and the project progresses. • The Contractor shall inform the Regional Council and the Directorate of Wildlife and National Parks two weeks before construction commences on the project programme and they shall be regularly kept up to date with the programme. • A register will be kept where all complaints received from the public and other stakeholders should be recorded. • The register should be under the authority of the ER. • A sign off procedure will be in place to address any concerns raised. • Management measures to address the complaint should be indicated in the register. • The register will be submitted to the NEM prior to site meetings. • All people on the stakeholders' list should be informed about the availability of the complaints register in writing by the ER prior to the commencement of construction activities. 	<p>ECO</p> <p>ER</p> <p>NEM</p>

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
ACCOMMODATION AND CONSTRUCTION SITE ESTABLISHMENT	To ensure that living conditions of workers is not hazardous to their health or safety.	<ul style="list-style-type: none"> • The Contractor must establish an: <ul style="list-style-type: none"> ◦ Accommodation Camp with proper accommodation, ablution and cooking facilities, and a ◦ Construction camp consisting of an equipment and storage facility for the storing and servicing of construction material and equipment. • Both of these camp sites should be fenced off separately. • The accommodation camp must have adequate toilets (portable chemical toilets) with hand-wash basins provided along the route not further than 500m from any staff members at any one time. There must be separate facilities for males and females and must provide privacy. • Only a guard will be allowed to reside at the materials camp. The guard should be provided with toilet facilities and sleeping quarters on site. • Materials storage may only be at designated sites that have been determined by the ECO in conjunction with the NEM. • No servicing of any construction vehicles or equipment will be allowed on the construction site. 	Contractor NEM ECO ER MET
RECRUITMENT	To ensure that recruitment takes place in a legal and fair manner and so minimise conflict.	<ul style="list-style-type: none"> • Adhere to the legal provisions for the recruitment of labour (target percentages for gender balance, optimal use of local labour and SME's, etc) in the Contract. • The recruitment process must be formal and organised in accordance with the relevant NamWater policy. 	Contractor NEM Regional Council

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • Get assistance from the Regional Council and headman to announce the recruitment process (in line with NamWater policy) for the project amongst the communities • Do not recruit at construction sites. • Ensure that all sub-contractors are aware of recommended recruitment procedures and discourage any recruitment of labour outside the agreed upon process. • Keep to the specific labour provisions in the Labour Act. • Encourage contractors to recruit local Namibian labourers. • Encourage contractors to recruit people who already live in surrounding towns, i.e. Divundu, Bagani and Rundu with their families. • Inform job seekers that they are hired for a contract period only and spend time to make sure that they understand all other conditions of contract. 	
<p>PLANNING OF THE ACCESS TRACK</p>		<ul style="list-style-type: none"> • No New access tracks will be constructed since the existing roads and tracks follow the pipeline routes. • The large interlink trucks that deliver the pipe material may not use informal tracks. All materials must be stored at the Construction Camp or along the designated storage sites along the district road/main road (see ACCOMMODATION AND CONSTRUCTION SITE ESTABLISHMENT). From here, the materials may only be transported by light trucks/vehicles along the pipeline route. 	<p>ECO</p> <p>NEM</p> <p>ER</p> <p>Contractor</p>

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> Inspect the route for possible endemic or rare fauna and flora. All drivers will be made aware of the sensitivity of the environment and need to keep to the existing roads. A 30km/h speed limit must be imposed on any informal track. The track must be restored to its natural state after construction. 	
PROTECT VEGETATION DIVERSITY	To protect specific species of vegetation, especially large, protected and fruit bearing trees.	<ul style="list-style-type: none"> Identify and mark large trees (diam. of 150mm +) used by the community, protected trees, and fruit bearing trees before the route is opened for construction. If possible, realign the route to avoid the tree. If a tree needs to be removed, the approval of MET, the community leader and/or the necessary permit to harvest protected species must first be obtained (from the nearest forestry office) and recorded at the ECO. Do not remove any tree within 100 m from the riverbed and do not create new access point to the river bank. This is to protect sensitive riparian forest vegetation. Discuss the construction programme with the community leader and the community members which may be affected by the pipeline crossing their fields. Adjust the pipeline construction schedule allow farmers the effective use of their field or compensate as required for the loss of crop during the season. 	ECO ER Contractor

6.3 Construction Phase

Responsibility: Contractor, to be assisted by his appointed ECO, and monitored by the ER and NEM.

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
EMPLOYEE AWARENESS RAISING	To ensure that the entire construction workforce is aware of the provisions of this EMP and the reasons for enforcing them.	<ul style="list-style-type: none"> All staff will receive an induction course prior to commencing work. The ECO must discuss the EMP and Code of Conduct (CoC) with all employees and make sure that all understand the contents and importance thereof. The employees must be explained why this EMP is being enforced, i.e. the need to protect the environment. Constant reinforcement is crucial. New employees who join the project later must receive an induction course before they commence with work. Acknowledgement of attending the induction course and understanding the contents of it must be signed off and the attendance register kept on record. Personnel performance appraisal must include environmental compliance issues. 	Contractor ECO ER NEM
HEALTH, SAFETY AND SECURITY	<p>To aim for zero incidents and accidents on the construction site.</p> <p>To ensure there are emergency response</p>	<ul style="list-style-type: none"> Visitors should be made aware of the fact that they will be required to wear the necessary PPEs (Personal Protective Equipment) on site. The Contractor must ensure the least possible disruption to traffic and potential safety hazards during construction. The 	ECO ER Contractor NEM

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
	<p>procedures in place in case of incidents and accidents.</p> <p>To ensure security measures are in place to protect property and life for the duration of the contract.</p>	<p>Contractor must liaise with the local Traffic Authorities for their approval in this regard.</p> <ul style="list-style-type: none"> • Proper traffic and safety warning signs must be placed at access points to the construction sites to the satisfaction of the Engineer and the Roads Authority. • The Contractor must adhere to the regulations pertaining to Health and Safety of the Labour Act, including the provision of protective clothing. Failing to adhere is a criminal offence. • The contractor must enforce relevant Health and Safety Regulations for all work related activities. • Provide an AIDS awareness programme to all staff. • Provide access to condoms to all construction workers. • Make sure that all staff are equipped and know how to use safety and personal protective equipment (PPE). This includes goggles, ear plugs, dust masks, steel-toed shoes, gloves, overalls, etc. • The use of PPE must be enforced. • Signage indicating the use of PPE will be erected at appropriate locations. • Hazard identification signage should be erected at appropriate locations. • Limit open trenches to sections that can be completed in 2 days. • Keep a comprehensive first aid kit at all construction points. 	<p>Traffic authorities</p> <p>local Authorities</p>

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • All items for treatment as specified in the material safety data sheets for hazardous materials should be available in the first aid kit. • Ensure that all staff knows where the first aid kits are located and who is trained in first aid. • At least one person should be available on each site that is trained in first aid. • All injuries and near miss incidents will be reported to the ER and recorded in a Health and Safety report to be submitted to NamWater on a monthly basis. Measures to prevent recurrence will be implemented and included in the monthly report. • Establish an emergency rescue system for evacuation of seriously injured people. • Emergency procedures for accidents should be communicated to all employees. • Emergency facilities are available at Rundu, west on the B8 (police, and hospitals). Emergency telephone numbers should be prominently displayed in the site office as well as outside of the site office. • Contact details of the resident engineer and the second in charge must be forwarded in writing to the Divundu Local Authority. • Enough fire extinguishers and fire fighting equipment should be kept on each site. 	

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • No alcohol/drugs are allowed on any site and anyone found to be under the influence of alcohol/drugs will be disciplined. • All drivers must adhere to traffic regulations at all times. No speeding shall be allowed. • The speed limit at the construction sites will be 30km per hour. • Make sure all drivers/operators have licenses for the vehicles/equipment they are driving. Copies of these records must be kept on file and must be accessible for inspection. • Fire extinguishers should be readily available at the construction site office. Staff members from the construction team must be designated and trained to handle emergency situations such as fires, and trained to handle the necessary emergency equipment. Fire extinguishers must be available at all high risk areas. Staff should be trained to handle such equipment. • Emergency procedures must be in place for incidents and accidents on site and staff trained in these procedures. • Indiscriminate walking outside the construction zones must be avoided. The maximum area to be used for construction should be demarcated. • It is important that the necessary precautions be taken to protect property against theft. • Nobody will carry any firearm, or store it in his vehicle or at the construction site. 	

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • No night driving is allowed. If night driving is required, a safe arrival confirmation system should be implemented. • Dangerous areas must be clearly marked and access to these areas controlled or restricted. • All visitors must report to the site office before entering the construction sites. No visitors will be allowed on site without the permission of the Contractor. • Train people who handle fuels in the correct procedure / technique to transfer fuels. • Make sure all vehicles are roadworthy. Repair faulty brakes, exhausts etc. immediately. • Cooking places should be located at a safe distance from fuel / explosives storage areas and vehicle parking sites. No cooking will take place and no fires will be lit on the construction site. • Smoking is prohibited in areas where it is a fire hazard, e.g. fuel storage areas, workshops, etc. • Remind personnel that the project takes place in a National Park and that wildlife will be active in the project area. Wildlife will have right of way at all times. 	
SOCIAL RESPONSIBILITY AT OUTSET	To keep communication channels open between the contractor and the community.	<ul style="list-style-type: none"> • At the outset (i.e. before commencement) of the construction programme, consultations will have to be held with all land and property owners along the route affected, in the presence of constituency councillors. 	NamWater RE/ER

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • Written records of permission requisition from affected property owners must be created and kept before any removal of such property can commence. • In the event of damage to private property, the Contractor is liable to compensate the affected person(s). An evaluation of the damage should be carried out in each instance and the existing compensation policy guideline used where applicable. • It should also be stressed that no homestead that has been built on the pipeline route after it has been surveyed and communicated, nor after it has been constructed, will be compensated for. • A community communications and complaints register must be set up by the contractor and be accessible to the public. The register must provide for feedback and actions taken to investigate rectify the complaint, as well as how the process was communicated to the community. The register will be inspected on a monthly basis by Namwater. 	
CONSERVATION OF THE NATURAL AND	To minimise damage to soil, vegetation, habitat and	<ul style="list-style-type: none"> • The project is in a national park and must prioritise conservation of fauna and flora. 	ECO ER

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
HISTORICAL ENVIRONMENT	heritage resources during the construction phase.	<ul style="list-style-type: none"> • At the outset of construction (or during construction as may be applicable), the ECO and the contractor shall visit all areas along the route to be disturbed. Work should be carefully planned before entering the worksite to keep the total footprint of the operations at each worksite as small as possible. • Store all excavated material in a safe way that will not erode. • Store the first 150mm topsoil separately for rehabilitation purposes. • Access and parking at work sites should be planned and organized in order to facilitate the work intended at each site while preventing the creation of unnecessary tracks around work sites. • Areas to be disturbed shall be clearly demarcated, and no land outside these areas shall be disturbed or used for construction activities. When deciding on the final route positions, the RE and contractor shall agree on detailed instructions. These instructions will be included in the onsite instruction book. • Consult the ECO before any new areas are disturbed which have not yet been visited. • No off-road driving shall be allowed. • All vehicles must stay strictly in the existing track – drive carefully in this track and do not deviate from it. 	NEM NBRI

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • No trees may be felled or fire wood in the project area removed by any member of the construction team, including sub-contractors. • Note that the collection of animals, plants and minerals is prohibited by law. • No animal (including fish) may be illegally be killed, chased, baited or harassed, and no eggs may be removed from a bird's nest, nor may the nest be tampered with or damaged. • Only fishing with normal rod or hand line is allowed. Fishing requires a permit that can be obtained from the Ministry of Fisheries in Rundu. • Construction workers not indigenous to the Divundu/Rundu area must respect the local traditions and authority structures with regard to the use of the natural resources. Authorization should be obtained from the local authorities before fishing in the River. • Any staff member caught in such an activity must be handed over to the authorities or should be disciplined. • Avoid small mammal / reptile and bird nesting where possible. Do not hurt, kill, or unnecessarily disturb birds or animals. • No wood may be collected and no open fires are allowed at the construction site. At the accommodation camp site, the Contractor must provide either meals, cooking gas or wood for the workforce to cook their own meals. 	

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> Under the Heritage Act of 2004, it is illegal to remove artefacts or a fossil without the consent of the National Heritage Council of Namibia. Should any new finds come to light at any stage during the construction phase, the site should be demarcated to prevent damage and should immediately be reported to the National Heritage Council. (Contact no 061 244 375) Do not disrupt any potential archaeological sites. 	
ROAD CREATION AND DRIVING	<p>To ensure the proliferation of roads are kept to a minimum, so as to avoid unnecessary damage to the fragile floodplains.</p> <p>To ensure that track discipline is maintained at all times by the entire construction team.</p> <p>To minimise amount of dust generated.</p>	<ul style="list-style-type: none"> Do not create new roads when the quality of existing roads deteriorates. Where possible, repair or upgrade existing roads. Prevent cutting of corners. Demarcate areas that are prone to corner cutting so that this is avoided. Activities causing dust should be limited along access roads by keeping to the driving speed (30km/hr) on all tracks. As far as possible existing tracks within the present servitude should be utilized for both construction and maintenance. These should be clearly indicated, together with designated turning points. When applicable, vehicles driving along the service route should engage four-wheel drive to prevent excessive track making. In order to promote visibility and communication between drivers (and prevent accidents with consequent environmental impacts) vehicles should always be driven with their lights on and indicators should be used as normal. 	<p>ECO</p> <p>ER</p> <p>NEM</p> <p>Contractor</p>

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • Markers must be used to delineate the chosen access tracks into the construction area. • Erect signage at the access points to warn motorists about construction activities and heavy vehicle movement where appropriate. • Use 3-point turns and not U-turns. • Prevent shortcuts between roads. • Tyre pressures should be as low as possible to reduce impacts. • All material for road or site construction to be brought in from outside the National Park area and to be approved by the NEM, ECO and ER. • Roads no longer in use should be rehabilitated immediately. (See Rehabilitation section). 	
HAZARDOUS CHEMICAL MANAGEMENT	To avoid potential chemical / hazardous substance pollution	<ul style="list-style-type: none"> • Designated areas for the storage of potentially hazardous material will be lined with concrete and secured. The bunded area will be of adequate capacity to contain 1,5 times the volume of the hazardous material to be stored in the bunded area. • Cement should be stored on pallets. The mixing of cement should always be done in a container. When washing the cement mixer, the cement water should not come into contact with the surrounding soil. This should be managed in the following manner: 	Contractor ECO ER

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> ○ Make a small (depending on the volume of water to be dumped), flat dam on the ground and line it with uPVC sheeting. Ensure that the mound is high enough so that water will not overflow. ○ The cement water is then dumped in the dam and left to evaporate. ○ Once it is dry, it needs to be cleaned regularly or left to accumulate. The dry cement can then be treated as building rubble. 	
<p>WASTE MANAGEMENT AND WATER RESOURCE MANAGEMENT</p>	<p>To avoid potential surface and groundwater pollution.</p> <p>To ensure that sound waste management practices are adhered to during construction.</p>	<ul style="list-style-type: none"> • The Contractor shall dispose of hazardous and general waste, as described hereunder: • Do not allow the washing of equipment or clothes in uncontained facilities that dispose of the wastewater directly into the environment. • All sewerage waste must be removed regularly and disposed of at a sewerage treatment facility, likely to be at Divundu (i.e. not to be disposed of anywhere at the construction site). • Make sure the portable chemical toilets to be provided along the route are in good working order and that they are cleaned daily. • All on site waste (including domestic and construction waste) produced daily should be contained daily. • No waste may be buried. 	<p>ECO ER NEM</p>

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • All recyclable waste need to be taken to a recycling depot in Rundu, since there are no other sites closer. • Adequate separate containers for hazardous and domestic waste must be provided on site. They must be clearly marked. • The workforce must be sensitised to dispose of waste in a responsible manner and not to litter. • The construction area will be kept free of waste at all times. All construction sites will be cleaned on a daily basis before leaving the construction site. • Cement spilled should be treated as hazardous waste and removed immediately. • Provide sufficient waste bins at work sites. Make sure that all waste is removed from work and campsites. • Refuse bins must be stable, i.e. cannot be tipped by animals, and have scavenger and baboon proof lids. • Make sure that the bins are regularly emptied and the waste taken to an appropriate waste dumpsite (i.e. Rundu for general waste and Windhoek / Walvis Bay for hazardous waste). • No waste may remain on site after completion of the project. • Servicing of vehicles in the field or at the construction site is not permitted. 	

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • Emergency repairs in the field should only be done as a last resort. Equipment should include waste management tools such as a drip tray and waste containers. • The workshop area must be lined with concrete and must have an oil-water separator. • Drip trays should be available for all vehicles that are intended to be used during construction. These trays should be placed underneath each vehicle while the vehicles are parked overnight. The drip trays should be cleaned every morning and the spillage handled as hazardous waste. • Accidental spills must be cleaned immediately. The contaminated soil must be treated as hazardous waste. • In the event of a hazardous spill: <ul style="list-style-type: none"> ○ Immediately implement actions to stop or reduce the spill activity. ○ Contain the spill. ○ Arrange implementation of the necessary clean-up procedures. ○ Collect contaminated soil, water and other materials and store it in an appropriate container for later disposal at the Windhoek / Walvis Bay hazardous waste disposal site. ○ All spills should be reported and a "spills register" kept. 	

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • A hazardous material spill kit must be available at the construction site and there must be at least one person with appropriate authority who is trained in hazmat response. • Refuelling vehicles should be equipped with specific vehicle spill kits. Drivers should be trained in relevant spill response procedures. • Explosives should be stored according to the prescribed regulations. • Designated areas for the storage of potentially hazardous material will be lined with concrete. The bunded area will be of adequate capacity to contain 1,5 times the volume of the hazardous material to be stored in the bunded area. • Corrosive, explosive, toxic, and flammable material will be stored in separated areas. • All hazardous materials must be stored in separate containers (concrete liner, container, or metal or plastic drip tray) and stored for transport and disposal at an approved waste disposal site (Kupferberg, Windhoek) or for collection by an oil recycling company such as WESCO Salvage (this company collects significant quantities of oil from central locations throughout the country). • The nearest Hazardous waste disposal site is in Windhoek or Walvis Bay and all hazardous waste shall therefore be stored and disposed of there. No hazardous waste may be burned. 	

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> • Fuel tanks on site must be properly bunded. The volume of the bunded area must be sufficient to hold 1.5 times the capacity of the storage tanks. The floor of the bunded area must be concrete and the sides high enough to achieve the 1.5 times holding capacity. • Foam fire extinguishers must be in close proximity to fuel storage stations. There should be trained personnel to handle this equipment. At least two extinguishers should be placed at every fuel storage area. • The contractor shall submit a water use plan to the RE for approval. The contractor shall utilise water only as specified in the approved water use plan for the project. • Water will be used sparingly and all faulty and leaking taps, toilets and pipes shall be immediately repaired. 	
REHABILITATION OF THE PROJECT DISTURBANCE	Re-establishment of pre-disturbance form and ecological function (soil crusts, plants and animal burrows)	<ul style="list-style-type: none"> • Rehabilitation should be done in the following manner: <ul style="list-style-type: none"> ○ Compacted areas can be ripped by using picks and rakes, avoiding parallel furrows that will promote erosion. ○ Ripping should occur to full rooting depth. ○ The disturbed area should be remodelled to, as far as possible, resemble previous conditions and fit in with the adjacent landscape. 	Contractor ECO ER NEM

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
		<ul style="list-style-type: none"> ○ Return the stockpiled topsoil as the last 150 mm layer of backfill on the pipeline trench. Do not compact this layer. ○ Soil and gravel should be raked from adjacent areas to try and recreate the same texture and look as surrounding areas. Stones should be redistributed with rakes so that the surface texture resembles the surroundings. ○ In order to prevent re-disturbance of rehabilitated tracks, physical barricades (e.g. rocks or sign boards) should be implemented as an interim deterrent. 	
REHABILITATION OF FACILITIES	To rehabilitate the site office, work sites, servitude areas, tracks and other areas disturbed during construction as close to their original state as reasonably possible.	<ul style="list-style-type: none"> • All equipment, waste, temporary structures, stockpiles etc must be removed from the work sites. • Alien vegetation particularly the Downy thorn apple (<i>Datura innoxia</i>) and Wild tobacco (<i>Nicotiana glauca</i>) that occur in the project corridor must be weeded. • Final payment will not be issued unless NamWater is satisfied with the obligations listed under this section (“rehabilitation”). Outstanding environmental issues should be integrated into a final snag-list, on which the final payment will depend. • Main contractor should be held responsible for all unnecessary damage due to non-compliance, whether caused by his/her company or by subcontractors. 	

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIP
MONITORING	To ensure successful rehabilitation	<ul style="list-style-type: none"> • During the first month of rehabilitation, monitoring is very crucial and it is recommended that the ECO visit all rehabilitated sites at least twice a week. During this visit, the ECO shall check for any signs of erosion and check the progress on re-establishing the surface vegetation. • The ECO shall oversee the project and implement management and monitoring recommendations. • Workers should be familiarized with the management recommendations and contractually bound to its stipulations. • The ECO should conduct regular site inspections and submit reports in this regard to the NEM. 	ECO NEM

6.4 Operation and Maintenance Phase

Responsibility: NamWater's Environmental Manager.

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIPS
CONTINUITY OF SOCIAL AND ENVIRONMENTAL MANAGEMENT	To ensure continuity of environmental and social management actions once the pipeline is operational.	<ul style="list-style-type: none"> • NamWater should apply a policy/guidelines on how to deal with defaulters and communicate to water users how defaulters will be dealt with. • The NEM shall include particular aspects and impacts related to this project into NamWater's overall Environmental Management System. • The NEM shall provide NamWater staff with appropriate guidelines for environmental management during operation of the pipeline, including: <ul style="list-style-type: none"> ○ All relevant provisions contained in the "construction" EMP such as keeping a complaints register, sound disposal of hazardous and general waste, track discipline, health and safety precautions, etc. ○ Keeping a complaint register. ○ The NEM will design a record system for environmental, health and safety incidents and accidents along this pipeline. ○ The NEM shall inspect the route at least twice annually to inspect any environmental issues of concern. 	NEM NAMWATER

ASPECT	OBJECTIVE	MANAGEMENT AND MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIPS
COMPENSATION	To ensure that any agricultural losses incurred as a direct result of repairs to the operational pipeline are duly compensated.	<ul style="list-style-type: none"> If maintenance and fixing of leakages are to occur during the crop growing season, crop losses must be compensated for in kind or in cash. 	NEM NAMWATER
HAZARDOUS CHEMICAL MANAGEMENT	To avoid potential chemical / hazardous substance pollution	<ul style="list-style-type: none"> Designated areas for the storage of potentially hazardous material will be lined with concrete and secured. The bunded area will be of adequate capacity to contain 1,5 times the volume of the hazardous material to be stored in the bunded area. 	Contractor ECO ER

6.5 Decommissioning Phase

COMPONENT	TARGET	MANAGEMENT/MONITORING MEASURES	RESPONSIBILITY/PARTNERSHIPS
DECOMMISSIONING	To ensure that the project does not have cumulative negative effects after completion of the pipeline.	<ul style="list-style-type: none"> No waste may remain on site after completion of the project. Eradication of all exotic or invasive plants that occurs along the water pipeline route should be conducted before decommissioning. See Appendix 1 for a list of common alien species. All labourers working on the final stages of the construction should be notified at least 30 days before completion of the project. This will ensure proper socio-economic decision-making on the part of the labourers. All areas used during the construction (haul roads, site offices, etc) should be cleared and inspected for decommissioning approval. Before approval, the contractor will still be liable for any costs to ensure proper decommissioning. Decommissioning should take place between May and October so as not to interfere with seed-time and harvest. 	Engineer and contractor.

7 NON-COMPLIANCE

7.1 Procedures

The Contractor shall comply with the environmental specifications and requirements on an ongoing basis and any failure on his part to do so will entitle the ER to impose a penalty. In the event of on-compliance the following recommended process shall be followed:

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

The Contractor shall act to correct the non-conformance within 24 hours of receipt of the notice, or within a reasonable period that may be specified within the notice.

The Contractor shall provide the ER with a written statement describing the actions to be taken to discontinue the non-conformance, the actions taken to mitigate its effects and the expected results of the actions. A copy shall be provided to the ECO.

In the case of the Contractor failing to remedy the situation within the predetermined time frame, the ER shall impose a monetary penalty based on the conditions of contract.

In the case of non-compliance giving rise to physical environmental damage or destruction, the ER shall be entitled to undertake or to cause to be undertaken such remedial works as may be required to make good such damage and to recover from the Contractor the full costs incurred in doing so.

In the event of a dispute, difference of opinion, etc. between any parties in regard to or arising out of interpretation of the conditions of the EMP, disagreement regarding the implementation or method of implementation of conditions of the EMP, etc. any party shall be entitled to require that the issue be referred to specialists for determination.

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

7.2 Offences and Penalties

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

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

- Unauthorized entrance into no-go areas;
- Unauthorized damage to natural vegetation;
- Unauthorized camp establishment (including stockpiling, storage, etc.);
- Hydrocarbons / hazardous material: negligent spills / leaks and insufficient storage;
- Ablution facilities: non-use, insufficient facilities, insufficient maintenance;
- Insufficient solid waste management (including clean-up of litter, unauthorized dumping etc.);
- Erosion due to negligence / non-performance;
- Excessive spillage / contamination'
- Insufficient fire control and unauthorized fires;
- Preventable damage to water courses or pollution of water bodies; and
- Non-induction of staff.

7.3 Fines

Fines will be issued for the transgressions listed below. Fines may be issued per incident at the discretion of the ER. Such fines will be issued in addition to any remedial costs incurred as a result of noncompliance with the EMP. The ER will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due under the Contract.

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

A. Any persons, vehicles, plant, or thing related to the Contractors operations within the designated boundaries of a "no-go" area	N\$4,000
B. Any vehicle driving in excess of designated speed limits	N\$1,000
C. Any vehicle being driven, and items of plant or materials being parked or stored outside the demarcated boundaries of the site.	N\$2,000
D. Persons walking outside the demarcated boundaries of the site	N\$500

E. Persistent and un-repaired oil leaks from machinery.	N\$3,000
F. Litter on site.	N\$1,000
G. Deliberate lighting of illegal fires on site.	N\$ 5,000
H. Individuals not making use of the site toilet facilities.	N\$1,000
I. Dust or excess noise on or emanating from site.	N\$1,000
J. Any person, vehicle, item of plant, or anything related to the Contractors operations causing a public nuisance.	N\$2,000

For each subsequent similar offence the fine may, at the discretion of the ER, be doubled in value to a maximum value of N\$10, 000.

The Engineer shall be the judge as to what constitutes a transgression in terms of this document.

7.4 Penalties

1. Where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications, he shall be liable to pay a penalty fine over and above any other contractual consequence.
2. The Contractor is deemed NOT to have complied with this Specification if:
 - within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of the Specification;
 - environmental damage due to negligence;
 - the Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time;
 - the Contractor fails to respond adequately to complaints from the public;
3. Payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

4. The following penalties are suggested for transgressions:

Impact	Penalty
Erosion	Penalty equivalent in value to the cost of rehabilitation plus 20%
Oil Spills	Penalty equivalent in value to the cost of clean- up operation plus 20%
Damage to indigenous vegetation	Penalty equivalent in value to the cost of restoration plus 20%.
Damage to sensitive environments	Penalty equivalent in value to the cost of restoration plus 20%.
Damage to cultural sites	Penalty to a maximum of N\$100 000 shall be paid for any damage to any cultural/historical sites
Damage to trees	Penalty to a maximum of R10 000 shall paid for each tree removed without prior permission, or a maximum of R5 000 for damage to any tree, which is to be retained on site
Damage to natural fauna:	Penalty to a maximum of N\$5 000 for damages to any natural occurring animal.

APPENDIX 1

LIST OF "NASTY NINE" ALIEN PLANT SPECIES

Datura innoxia
Downy thorn apple
Harige stinkblaar



Family: Solanaceae
 Description: Trailing or bushy herb up to 2 m high, softly grey velvety on all parts
 Leaves: grey-velvety turning dark green and less velvety, with unpleasant smell
 Flowers: white, solitary, large funnel-shaped, Oct-May
 Fruits: brown, hardened capsule, reflexed (nodding) globose, densely covered with slender spin
 Cultivated for: ornament
 Invades: river-beds, road sides, water edges, wastelands
 Origin: North and Central America, Mexico
 Invasive status: competitive in watercourses
 Poisonous: whole plant, seeds
 Irritant: Skin (leaves, flowers, fruit)

Pennisetum setaceum
Fountaingrass
Pronkgras



Family: Poaceae
 Description: Sparsely branching tussock-forming grass
 Leaves: up to 40 mm long and 3 mm wide, not rigid or ending in sharp points, dark green
 Inflorescens: cylindrical 100-250 mm long/more, usually purple or rose-coloured, bristled, Jan-May
 Fruits: small, dry seeds enclosed by glumes and bristles
 Cultivated for: ornament
 Invades: road sides, disturbed sites
 Origin: North Africa
 Invasive status: special effect weeds

Salvinia molesta
 Kariba weed
 Watervaring



Family: Salviniaceae

Description: perennial, mat-forming, free-floating fern with horizontal stems 60-250 mm long
 Leaves: two different types: those floating on the water's surface are green to yellow, oval, 10-60 mm wide, in pairs, with a water-repelling, very velvety surface due to a dense cover of branched hairs; modified, feathery, root-like leaves hang down in the water

Fruiting bodies: sterile, reproduces from detached fragments

Cultivated for: ornament

Invades: slow moving waters in rivers and dams in frost free regions

Origin: South America (Brazil)

Invasive status: transformer

Leucaena leucocephala
 Leucaena
 Reuse wattel/wonderboom



Family: Fabaceae

Description: unarmed shrub or small tree up to 4 m high, branchlets densely grey-hairy

Leaves: bi-pinnately divided, dark green, often grey hairy, drooping

Flowers: white or pale yellow in globose heads, singly or in groups, Jul-Dec

Fruits: brown pods, flattened but raised over the seeds, in distinctive clusters, splitting into two non-recurving halves

Cultivated for: fodder, fire wood, construction poles, ornament, sand-binding

Invades: forest margins, road sides, wastelands, river-banks

Origin: Central America

Invasive status: potential transformer

Poisonous: whole plant toxic to livestock in quantity (more than 25% of diet)

***Prosopis* spp.**
Mesquite
Prosopis



Family: Fabaceae

Description: Multi-stemmed, glabrous. Acacia-like shrub or tree up to 10 m, armed with paired, straight spines. Hybridises. Identification to species level difficult

Leaves: bi-pinnate, leaflets dark green, 10-25 mm long

Flowers: yellow in axillary spikes, Aug-Nov

Fruits: slender, woody pods, non-dehiscent and compressed, yellow to deep brown

Cultivated for: fodder, shade, fuel, honey source

Invades: wastelands, beds and banks of drainage lines in semi-arid to arid landscapes

Origin: South and Central America

Invasive status: transformer

Irritant: Respiratory tract (pollen)

***Opuntia* sp.**
Prickly pear
Turksvy



Family: Cactaceae

Description: succulent shrub/tree 3-5 m high

Leaves: cladodes, flattened, spines dense/sparse (depending on species)

Flowers: yellow

Fruits: green to blue-green or purple

Cultivated for: ornament, hedging, edible fruit, animal fodder

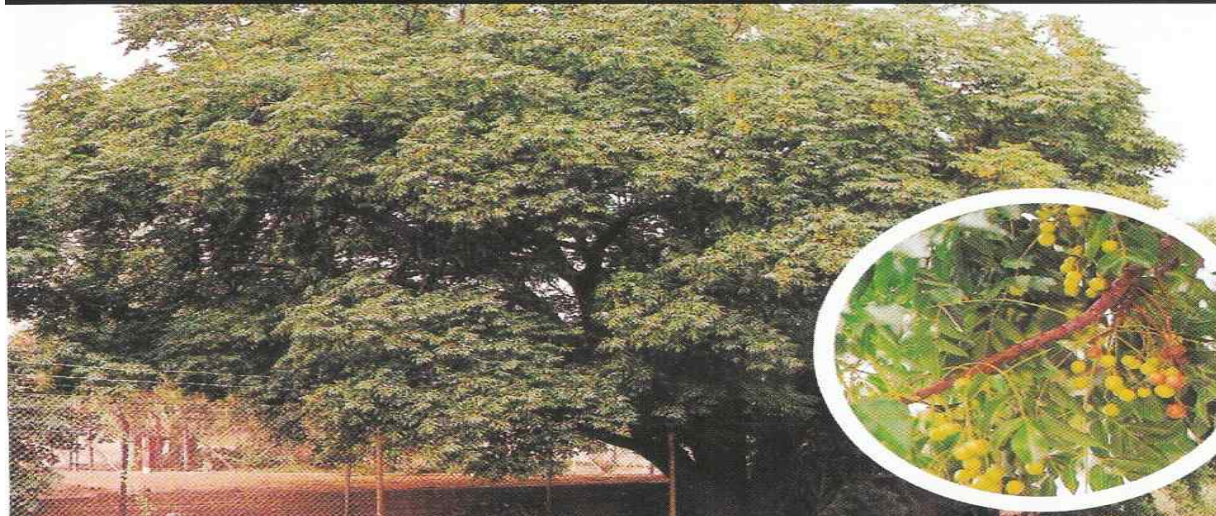
Invades: savanna grasslands

Origin: South America

Invasive status: potential transformer

Irritant: skin (spines)

Melia azedarach
Syringa
Serig



Family: Meliaceae
 Description: Deciduous spreading tree up to 23 m high
 Leaves: deep green and glossy, leaflet margins are irregularly toothed
 Flowers: lilac in large terminal, heavily perfumed sprays, Sept-Nov
 Fruits: berries, green turning yellow, thinly fleshy
 Cultivated for: ornament, shade
 Invades: savannas, road sides, urban open spaces, wastelands, river-banks
 Origin: Asia, Australia
 Invasive status: potential transformer
 Poisonous: leaves, bark, flowers, especially ripe fruits
 Irritant: respiratory (flowers)

Argemone ochroleuca* subsp. *ochroleuca
White-flowered mexican poppy
Witblom bloudissel



Family: Papavaraceae
 Description: annual, very spiny herbs up to 0.9 m
 Leaves: grey/bluish green, prominent white veins
 Flowers: creamy white, all year
 Fruits: spiny capsules, oblong, splitting into five lobes
 Cultivated for: ornament
 Origin: Central America (Mexico)
 Invades: road sides, wastelands, abandoned lands, cultivated lands, river-banks, river-beds, water edges
 Invasive status: special effect weed
 Irritant: skin (sap, spines)

Nicotiana glauca
 Wild tobacco
 Wilde tabak



Family: Solanaceae

Description: Slender evergreen shrub or small tree up to 6 m high
 Can form dense stands along river-beds after floods, disturbed sites

Leaves: blue-green, leathery on long petioles

Flowers: yellow, tubular, in terminal drooping clusters, all year

Fruits: brown, four-valved capsules, seeds minute

Cultivated for: ornament

Invades: road sides, road cuttings, wastelands,
 river-banks, river-beds, water edges

Origin: South America

Invasive status: ruderal and special effect weed

Poisonous: whole plant