Fundo de Investimento e Património do Abastecimento de Água (FIPAG)

National Water Development Project

Generic Framework Environmental Management Plan for Construction Works

PROJECT No: J22046
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1 INTRODUCTION

1.1 Purpose of Environmental Management Plans

1.1.1 Purpose of an Environmental Management Plan (EMP)

The preparation of EMPs for the National Water Development Project (NWDP) sub-projects is a requirement of World Bank, African Development Bank and may also be required by MICOA.

The purpose of a sub-project EMP will be to control the potential negative environmental impacts associated with the construction phase of the sub-project in question, and/or to enhance any positive environmental impacts. The effective implementation of a sub-project EMP will ensure that the construction activities are conducted and managed in an environmentally sound and responsible manner.

EMP typically contain Environmental Specifications to which the Contractor will be required to adhere to throughout the duration of his contract, to reduce or prevent negative environmental impacts to the surrounding environment. An EMP also details the organisational authority and structure required to ensure the effective implementation of the EMP and measures to monitor and improve the application of the EMP.

1.1.2 Purpose of this Generic Environmental Management Plan

The purpose of this document is to provide guidance on a framework for the development of the NWDP sub-project specific EMPs which will be included in the contract documentation for the Contractor. This guidance document is referred to hereafter as the 'Generic EMP'.

The 'Generic EMP' will incorporate reference to the minimum requirements set by the World Bank and African Development Bank (AfDB) and will be submitted for approval to these bodies before distribution.

1.2 Scope of the Generic EMP

The scope of the Generic EMP is limited to the construction activities likely to be associated with the construction of the range of NWDP sub-projects. This includes:

- The pre-construction activities, such as the locating of the construction site, its demarcation and establishment;
- The construction activities; and
- Decommissioning activities and site rehabilitation at the end of the construction contract.

The Generic EMP contains a library of the minimum scope of environmental information that must be communicated by the Contractor to his staff, including all sub-contractors and on-site workers for the duration of his contract.

1 Depending on their 'pre-screening' review of a specific NWDP sub-project.
1.3 Use of the Generic EMP

In general terms, it is expected that the Generic EMP will be used to:

- Ensure that the minimum requirements set by the World Bank and African Development Bank as part of the funding agreements for the NWDP as a whole are reflected at the sub-project level for the construction phase through the contract documents for the works, where reasonable and practical (see Chapters 3, 4 and 5);

- Ensure that the World Bank and African Development Bank requirements are understood by the Consultants tasked to undertake the appropriate environmental studies during the design of the sub-projects (see Chapter 3 and 5);

- Ensure that the Consultant (or Contractor) has a benchmark with which to prepare a sub-project specific EMP – and specifically a benchmark which has been reviewed by the appropriate authorities (see Chapters 3, 4 and 5);

- Ensure that the Contractor clearly understands the level of environmental responsibility required during the execution of his construction phase contract (Chapters 3 and 4); and

- Enable FIPAG’s Environmental Engineer to measure compliance with the environmental management requirements for the NWDP as a whole and at a sub-project level.

Specifically, the Generic EMP will be used by the key parties listed below in order to undertake the following:

**FIPAG**

The Generic EMP will be used by FIPAG to ensure that a minimum scope of activities to manage the potential environmental impacts associated with the construction of its NWDP sub-projects is applied and maintained by appointed parties.

**Consultants**

Leading on from this, the Generic EMP will be used by Consultants as a framework to develop a sub-project specific EMP, taking into account local constraints, MICOA, World Bank and/or African Development Bank approval requirements and features of the construction activities and programme.

This in turn will incorporate environmental mitigation measures which have been identified during their environmental studies from the sub-project design phase. The sub-project EMP will then be incorporated as a contractual requirement into the Bidding Documents for bidding contractors, as prepared by the Consultant on behalf of FIPAG.

The sub-project EMP (based on the Generic EMP) will be implemented as a contractual requirement by the Contractor during the construction phase of the Project.

**Contractors**

Under some circumstances, the Consultant may pass the responsibility for producing the EMP to the Contractor\(^2\). In this case, the Generic EMP will be incorporated into the Bidding Documents as guidance on the expected

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\(^2\) While this approach is not encouraged, it is recognised that this approach may be adopted for some NWDP sub-projects.
content, focus and minimum scope of coverage of instructions for construction activities.

The Contractor will then use the Generic EMP as a framework to develop the sub-project EMP, taking into account local constraints, MICOA, World Bank and/or African Development Bank requirements and features of the construction activities and programme.

It is expected that the Consultant or Contractor will review the 'Library of Environmental Specifications' listed in Chapter 4 and will incorporate those deemed relevant and reasonably feasible (taking into account cost implications) into the sub-project EMP.

Additional environmental specifications may also be developed and included by the Consultant or Contractor into the sub-project EMP, depending on the nature of the sub-project, additional legal requirements, the environmental sensitivity of the area to be affected by the sub-project and/or requirements of the MICOA, World Bank and/or African Development Bank.

The development of all Environmental Specifications must be such that there is no conflict with other Specifications produced in connection with the contract. If any conflict occurs with statements made, these will need to be resolved through the FIPAG Environmental Engineer.

Any given sub-project EMP will need to be reviewed and approved by MICOA and/or the appropriate funding agencies before construction may commence.

1.4 Structure of the Generic EMP

In short, the Generic EMP is structured as follows:

Chapter 2  
Glossary of Terms, Definitions and Abbreviations

This chapter lists the terms, abbreviations and definitions used throughout the Generic EMP.

Chapter 3  
Organisation and Management Structure

This chapter describes the typical roles, responsibilities and lines of authority for those organisations and individuals who are to be associated with the implementation of sub-project EMPs.

Chapter 4  
Library of Environmental Specifications

This chapter sets out a library of environmental specifications that are likely to be associated with the construction of the NWDP sub-projects.

These specifications provide for the establishment of the construction site through to site decommissioning at the completion of the construction contract.
Chapter 5  Recommended Format and Content for Sub-Project EMPs

This chapter presents a suggested format and content for a typical sub-project EMP.

Supporting information to the Environmental Specifications listed in Chapter 4 has been included in a series of Annexures attached to the back of this document. These include:

Annexure A  Construction Activities That May Require Method Statements
Annexure B  Project Start Up Site Inspection Sheet
Annexure C  Routine Site Inspection Sheet
Annexure D  Site Decommissioning Inspection Sheet
Annexure E  Site Inspection Report Structure

As stated above, the Generic EMP focuses on managing the environmental consequences of the construction phase for the NWDP sub projects.*

1.5 References

The Generic EMP has been developed with due reference to the following:

- Environmental Assessment of the Mozambique National Water Development Project, Noragric (July 1997/August 1997) – this document includes an EMP;
- MICOA's Regulations on the procedure for Environmental Impact Assessment; and

The document also includes reference to and from:

- The results of a site visit undertaken by the Environmental Management Advisory Team in June 2002 to each of the five cities which are the current focus of the NWDP – see ‘Preliminary Environmental Management Recommendations Report, June 2002’;
- Extracts from the EMP for the NWDP Rehabilitation of the Pemba Water Supply System prepared by Dorsch Consulting, August 2002.

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* A framework for the management of environmental impacts during the operation of the sub-projects by the Operator is to be developed separately.
The following terms, definitions and abbreviations have been used in the Generic EMP:

*Listed in Alphabetical Order*

**AfDB**
African Development Bank
Funding agency for NWDP sub-projects in Maputo.

The AfDB has a set policy and a series of guidance and criteria for ensuring due consideration for the environment is taken into account during the design, construction and operation of AfDB funded projects.

**Consultant**
Consultancy or group of consultancies appointed by FIPAG to typically undertake the investigations and design of NWDP sub-projects. Also normally required to prepare bid documentation.

**Contractor**
Contractor appointed by FIPAG to typically construct a given NWDP sub-project as per the design and specifications prepared by a Consultant.

See Conditions of Contract.

**Contaminated water**
Means water contaminated by the Contractor's activities, e.g. concrete water and runoff from plant/personnel wash areas.

**Employer**
FIPAG
See Conditions of Contract.

**Environment**
Means the surroundings within which humans exist and that are made up of:

a) The land, water and atmosphere of the earth;

b) Micro-organisms, plant and animal life;

c) Any part or combination of a) and b) and the interrelationships among and between them; and

d) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

**Environmental Auditor**
This role to be performed by FIPAG's Environmental Engineer - this will comprise auditing the level of compliance with the EMP and assessing the environmental performance of the Contractor according to an agreed timetable.

**Environmental Control Officer (ECO)**
The ECO monitors compliance with the EMP during the construction phase and advises the Resident Engineer on environmental matters relating to construction.

**Environmental Impact Assessment (EIA)**
The process by which the environmental implications (positive and negative) of a given project may be systematically identified. EIA provides for the assessment of the nature, character and significance...
of these impacts and the identification of options for mitigating the adverse impacts and/or enhancing the positive impacts.

**EMP**

Environmental Management Plan

The EMP sets out instructions that will be included in a contract document for the construction phase of a sub-project. The EMP will ensure the construction activities are conducted and managed in an environmentally sound and responsible manner.

The EMP also details the organisational authority and structure required to ensure the effective implementation of the EMP and measures to monitor and improve the application of the EMP.

**Environmental Specifications**

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

**FIPAG**

Government agency tasked to coordinate the National Water Development Project for the five cities (Beira, Maputo, Nampula, Pemba and Quelimane).

Specifically, FIPAG was established to take over the duties and obligations of water service delivery in the four water companies of Beira, Quelimane, Nampula and Pemba, and to act as lessor in Maputo. The authority and responsibilities of FIPAG include (i) investment and financial management for rehabilitation and expansion of water supply assets, (ii) maximisation of efficiency and return on existing assets, and (iii) contract management, monitoring and enforcement of the contractual obligations of the Private Operator.

**Funding Agencies**

Refers to World Bank, the African Development Bank, Government of Netherlands and Agence Francaise de Developpement

**Generic EMP for Construction**

Document prepared for FIPAG to provide guidance on a framework for the development of NWDP sub-project specific EMPs.

Specifically, the Generic EMP provides a comprehensive library of environmental specifications that are considered pertinent to the NWDP as a whole.

**Interested and Affected Parties (I&APs)**

All persons who may be affected by the project either directly or indirectly, or who have an interest or stake in the area to be affected by the project.

I&APs include landowners, tribal and local authorities, public interest groups, individuals and so on.

**Machamba**

Small subsistence plot used for crop cultivation by subsistence farmers in Mozambique.

**Method Statement**

Is a written submission by the Contractor to the Resident Engineer in response to the Specification or a request by the Resident Engineer, setting out the plant, materials, labour, timing and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Resident Engineer when requesting the Method Statement, in such detail that the Resident Engineer and ECO is enabled to assess whether the Contractor's proposal is in accordance with the Specification and/or will produce results in accordance with the Specifications.
The Method Statement shall cover applicable details with regard to:

- Construction procedures
- Materials and equipment to be used
- Getting the equipment to and from site
- How the equipment/material will be moved while on site
- How and where material will be stored
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or solid material that may occur
- Timing and location of activities
- Compliance/non-compliance with the Specifications
- Any other information deemed necessary by the Resident Engineer

**MICOA**

Ministério Para a Coordenação da Acção Ambiental

(Ministry for the Coordination of Environmental Affairs)

MICOA is the national government department responsible for the protection of the environment and for authorising proposed development projects. Authorisation is provided only after appropriate studies have been undertaken to assess the environmental and social implications of proposed development project in accordance with the EIA Regulations.

**NWDP**

National Water Development Project

Title name for a strategic initiative to improve the water supply system of five cities in Mozambique, incorporating a mixture of the rehabilitation and upgrade of existing systems and the provision of new facilities.

**Potentially Hazardous Substance**

Is a substance which, in reasonable opinion of the Resident Engineer, can have a deleterious effect on the environment.

**Reasonable**

Means, unless the context indicates otherwise, reasonable in the opinion of the Resident Engineer after he has consulted with a person, not an employee of the Client Directorate, suitably experienced in 'environmental implementation plans' and 'environmental management plans'.

**Rehabilitation**

Rehabilitation is defined as the return of a disturbed area, feature or structure to a state which approximates to the state (where possible) which it was before disruption, or to an improved state.

**Resident Engineer (RE)**

The Resident Engineer will be appointed by the Consultant to oversee the construction stage both in terms of the engineering and environmental context.

See Conditions of Contract

**Solid Waste**

Means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans,
drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

**Sub-project EMP**

Document typically prepared by the Consultant for use during the construction phase.

Specifically, the sub-project EMP will describe those environmental specifications that are pertinent to the sub-project in question, the range of construction activities to be undertaken and the results of any environmental assessment carried out for the sub-project.

**Subsoil**

Subsoil refers to the soil horizons between the topsoil horizon and the underlying parent rock. Subsoil often has more clay like material than the topsoil. Subsoil is of less value to plants, in terms of nutrient, and oxygen supply than topsoil. When subsoil is exposed it tends to erode fairly easily.

**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 fraction.

Topsoil is deemed for the purposes of this specification as the layer of soil from the surface to the depth agreed upon on site between the Resident Engineer and Contractor.

**Water body**

Any open body of water including streams, dams, rivers, lakes and the sea.

**Wetland vegetation**

Vegetation that is indicative of a wetland environment, for example, sedges, rushes, reeds, hydrophilic grasses and ground covers.

**Wetland**

A seasonally, temporally or permanently wet area which also may exhibit a specific vegetation community. It is often marshy in character.

**Woodland**

This is defined for the purposes of this specification as indigenous vegetation consisting of grassland and trees that may form open, medium, dense or closed woodland.

**World Bank**

Funding agency for the NWDP –sub-projects for the four cities (Beira, Nampula, Pemba and Quelimane).

The World Bank has a set policy and a series of guidance criteria for ensuring due consideration of the environment is taken into account during the design, construction and operation of World Bank funded projects.
3 ORGANISATION AND MANAGEMENT STRUCTURE

3.1 Preamble

In order to ensure the sound development and effective implementation of a sub-project EMP, it will be necessary to identify and define the responsibilities and authority of the various persons and organisations that will be involved in the sub-project.

The following key roles will need to be provided for during the implementation of a sub-project EMP - either by separate individuals, or, for smaller projects, through one person assuming two roles:

- FIPAG (Environmental Engineer);
- Consultant;
- Resident Engineer;
- Contractor; and
- Environmental Control Officer (ECO).

A generic organogram illustrating the hierarchy of these roles and line of communication has been incorporated below:

4 Provided this does not compromise the protection and management of the environment through any conflict of interests associated with the other role.

5 For example, the role of Resident Engineer may include ECO duties where it is not practical to provide for two separate persons, or in the case of small projects, the ECO's duties may be undertaken by the FIPAG Environmental Engineer.
The following descriptions represent a recommended minimum level of roles and responsibilities for inclusion into any given sub-project EMP. The role and responsibilities of the key individuals described below are not exhaustive and may be modified and expanded as necessary.

3.2 **FIPAG Environmental Engineer**

FIPAG is the Client/Employer and has overall responsibility for ensuring that the implementation of the NWDP sub-projects is undertaken in an environmentally sound and responsible manner, and in particular, reflects the requirements of:

- MICOA;
- World Bank; and/or
- African Development Bank.

### 3.2.1 Role

FIPAG’s Environmental Engineer will be required to assume overall responsibility for the environmental aspects of the NWDP.

An important part of this role will be to:

- Ensure that the Generic EMP is provided to the Consultant for reference at the start of their contract.
- Ensure that the sub-project EMP is approved by MICOA and the Funding Agencies.
- Ensure that the sub-project EMP, produced by the Consultant, is included in the bid documentation issued to prospective contractors.
- Ensure that a copy of the Generic EMP is included in the bid documentation issued to the prospective contractors where the preparation of a sub-project EMP is to be delegated to the Contractor.
- Audit the implementation of the sub-project EMP by the Contractor (and/or the ECO) in order to ensure that compliance with the sub-project EMP is being achieved, maintained and improved on.
- Report on the implementation of the sub-project EMP to FIPAG Senior Managers, MICOA and/or the Funding Agencies as and when necessary.

### 3.2.2 Responsibilities

Specific to the sub-project EMP, the responsibilities of the FIPAG Environmental Engineer will include the following:

- Establish and maintain regular and proactive communications with the Consultant, Resident Engineer, Contractor and ECO.
3.2.3 Reporting Structure

The FIPAG Environmental Engineer will liaise and/or take instruction from the following:

- FIPAG Project Engineer as and when required.
- MICOA and/or the Funding Agencies.

The following will liaise with the FIPAG Environmental Engineer:

- The Resident Engineer, and/or
- The ECO.

3.3 Consultant

FIPAG will appoint a company or group of companies as its 'Consultant' to design a specific NWDP sub-project and to produce the appropriate Bid Documents for the contractor tendering process.

Within this process the Consultant will be typically required to fulfill both an engineering and environmental role, such that the following activities will generally be required:

- Prepare a concept design and consider the feasibility of the sub-project within an engineering, logistical, economic and environmental context.
- Prepare a preliminary design and undertake the required environmental assessment studies.
- Submit the Environmental Assessment Report to MICOA for approval and to provide the MICOA approved documents to FIPAG for submission to the pertinent Funding Agency for approval.
- Prepare an EMP on the basis of the results of the environmental assessment studies and submit to the relevant authorities for approval.
- Prepare the Bid Documents for the tendering process.
3.3.1 Role
The role of the Consultant will be to prepare a sub-project EMP and to appoint individuals to undertake the roles of Resident Engineer and Environmental Control Officer.

3.3.2 Responsibilities
The Consultant's responsibilities will include:

- Preparing a sub-project EMP with due reference to the Generic EMP.
- Ensuring that the sub-project EMP takes into account the results of his environmental studies, and any feedback received from MICOA, the funding agencies and/or FIPAG's Environmental Engineer.
- Ensure that the EMP is included in the Bid Documents for the contractor tender process.
- Listing incidents and associated penalty values for inclusion in the specific sub-project EMP for incorporation into the Bidding Documents for Bidding Contractors.
- Appoint competent, experienced and responsible individuals to undertake the roles of Resident Engineer and Environmental Control Officer to administer the implementation of the sub-project EMP from both an engineering and environmental context.

3.3.3 Reporting Structure
The Consultant will report to the FIPAG Environmental Engineer, as and when required.
The following will be expected to report to the Consultant in relation to environmental issues:

- Resident Engineer, as and when required.
- ECO, as and when required.

3.4 Resident Engineer (RE)
The Resident Engineer (RE) will be appointed by the 'Consultant' and will be required to oversee the construction programme and construction activities performed by the Contractor.

3.4.1 Role
Specific to the implementation of the sub-project EMP, the role of the RE will be to:

- Review and approve Method Statements produced by the Contractor in connection with the EMP.
• Oversee the general compliance of the Contractor with the EMP and other pertinent site specifications.

• Liaise between and with the Contractor, ECO and where necessary the FIPAG’s Environmental Engineer on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences.

3.4.2 Responsibilities

The RE will be required to:

• Be familiar with the contents of the sub-project EMP.

• Monitor the Contractor’s compliance with the Environmental Specifications on a daily basis, through the Site Diary, and enforce compliance.

• Communicate to the Contractor, verbally and in writing, the advice of the ECO and the contents of the ECO reports.

• Request for, review and approve the Method Statements prepared by the Contractor.

• Review and approve drawings produced by the Contractor in connection with, for example, the construction site layout, access/haul roads and so on.

• Designate and manage the working areas as per the approved construction site layout, including sensitive environments and ‘no-go’ areas.

• Advise on materials that may be used to designate working areas and materials to be used for the works as and when necessary.

• Issue site instructions giving effect to the ECO requirements where applicable.

• Communicate to the ECO, verbally and in writing, at least 10 working days in advance, any proposed actions which may have negative impacts on the environment.

• Undertake damage assessments where incidents, accidents and serious infringements have occurred on/off site.

• Review and approve all areas that have been rehabilitated by the Contractor.

• Review complaints received and make instructions as necessary.

• Accompany the ECO during site inspections and/or inform in writing, the ECO of any infringements of the Environmental Specifications and to issue instructions to the Contractor on the advise of the ECO.

• Discuss with the ECO the application of penalties for the infringement of the Environmental Specifications, and other possible enforcement measures when necessary.

• Issue penalties as and when necessary.

• Implement Temporary Work Stoppages where serious environmental infringements and non-compliances have occurred.
- Maintain a record of complaints from the public and communicate these to the Contractor and the ECO.
- Facilitate proactive communication between all role-players in the interests of effective environmental management.

Note:

In some cases where the project is a small-scale project, the RE will be identified as the 'Responsible Person' who will administer the implementation of the EMP instead of a separately appointed ECO. Under these circumstances, the RE will also undertake the role and responsibilities described for the ECO below, with appropriate assistance from the Consultant as needed.

### 3.4.3 Reporting Structure

The RE will report to the Consultant.

The Contractor will report to the RE:

The RE will liaise and/or receive recommendations on environmental issues from the ECO.

### 3.5 Environmental Control Officer (ECO)

An Environmental Control Officer (ECO) will generally be appointed by the 'Consultant' to monitor, review and verify the implementation of the sub-project EMP.

The ECO must be independent to the Contractor, and must have appropriate authority to ensure that the sub-project EMP is fully implemented and that appropriate actions are undertaken to address any discrepancies and non-compliances.

#### 3.5.1 Role

The overall role of the ECO is to be the on-site 'custodian' for the implementation, integration and maintenance of the sub-project EMP in accordance with the contractual requirements with FIPAG.

The ECO will be required to liaise to the FIPAG Environmental Engineer on the level of compliance with the sub-project EMP achieved by the Contractor on a regular basis for the duration of the contract.

#### 3.5.2 Responsibilities

The ECO will have the following responsibilities, at a minimum:

- To advise the RE on the interpretation and enforcement of the Environmental Specifications, including discussions on non-compliances.
- To supply environmental information as and when required.
- Review and approve Method Statements produced by the Contractor with the RE
• To demarcate particularly sensitive areas and pass instructions through the RE concerning works in these areas.

• To monitor any basic physical changes to the environment as a consequence of the construction works – e.g. evidence of erosion, dust generation and silt loading in runoff.

• To undertake regular inspections and submit reports on the Contractor’s compliance with the Environmental Specifications: these reports shall be copied to the RE and to the FIPAG Environmental Engineer.

• To undertake quarterly audits of the construction works and submit audit reports to the FIPAG Environmental Engineer for review.

• To communicate frequently and openly with the Contractor and the RE to ensure effective, proactive environmental management, with the overall objective of preventing or reducing negative environmental impacts and/or enhancing positive environmental impacts.

• Undertake damage assessments with the RE where incidents, accidents and serious infringements have occurred on/off site.

• To advise the RE on remedial actions for the protection of the environment in the event of any accidents or emergencies during construction, and to advise on appropriate clean-up activities.

• Review and approve all areas that have been rehabilitated by the Contractor.

• Review complaints received and make instructions as necessary.

• Identify and make recommendations for minor amendments to the sub-project EMP as and when appropriate.

• Prepare and maintain the material for the Environmental Training Awareness courses and Environmental Information Posters as part of the overall environmental training for the contract.

• Ensure that the Contractor, his employees and/or Sub-Consultants receive the appropriate environmental awareness training prior to commencing activities.

• Establish and maintain an Environmental Site Diary to record all environmental incidents related to the construction of the Project.

3.5.3 Reporting Structure

The ECO will report to the Consultant.

The ECO will liaise and/or receive instructions from:

• RE.

• FIPAG’s Environmental Engineer.

The ECO will advise the RE on environmental aspects.
3.6 Contractor

FIPAG will appoint a Contractor to undertake the construction of the given NWDP sub-project. The 'Contractor' will be contractually required to undertake his activities in an environmentally responsible manner, as described in the sub-project EMP.

3.6.1 Role

Specific to the sub-project EMP, the role of the Contractor will be to:

- Implement, manage and maintain the sub-project EMP for the duration of the contract.
- Designate, appoint and/or assign tasks to personnel who will be responsible for managing all or parts of the sub-project EMP.
- Assign appropriate authority, accountability and responsibility for these personnel to carry out their duties.
- Ensure that all sub-contractors and other workers appointed by the Contractor are aware of their environmental responsibilities while on site or during the provision of their services off site.
- Provide appropriate resources – budgets, equipment, personnel and training – for the effective control and management of the environmental risks associated with the construction of the sub-project.

3.6.2 Responsibilities

The Contractor will have the following responsibilities:

- Be familiar with the contents of the Project EMP.
- Comply with the Environmental Specifications contained in the sub-project EMP and subsequent revisions.
- Confirm legislative requirements for the construction works, and to ensure that appropriate permissions and permits have been obtained before commencing activities.
- Ensure that access to the land for the construction site and works has been acquired.
- Prepare Method Statements, programme of activities and drawings/plans for submission to the RE (and ECO).
- Undertake daily site inspections (with the RE) to monitor environmental performance and conformance with the Environmental Specifications.
- Review the site inspection reports and take cognisance of the information/recommendations contained therein.
- Notify the ECO and RE, verbally and in writing, immediately in the event of any accident infringements of the Environmental Specifications and ensure appropriate remedial action is taken.

- Notify the ECO and RE, verbally and in writing at least 10 working days in advance of any activity he has reason to believe may have significant adverse environmental impacts, so that mitigatory measures may be implemented timeously.

- Ensure environmental awareness among his employees, sub-contractors and workforce so that they are fully aware of, and understand the Environmental Specifications and the need for them.

- Maintain a register of environmental training for site staff and sub-contractor’s staff for the duration of the contract.

- Undertake rehabilitation of all areas affected by construction activities to restore them to their original states, as determined by the RE and the ECO.

- Undertake the required works within the designated working areas.

- Rehabilitating services, utilities, private/public property and other areas adversely affected by construction activities outside of demarcated areas in accordance with the RE's instructions.

- Communicate and liaise frequently and openly with the ECO and the RE to ensure effective, proactive environmental management with the overall objective of preventing or reducing negative environmental impacts while enhancing positive environmental impacts.

The Contractor will also set up his own management system to ensure and monitor the application of the sub-project EMP and associated Environmental Specifications. This system shall, at a minimum, provide for:

- The preparation of Method Statements as required by the sub-project EMP.

- The effective and accountable management of construction activities relative to the Environmental Specifications.

- Reporting on a regular basis and as required to the RE on environmental issues.

- Recording, in writing, all communication/correspondence with all pertinent stakeholders and other parties on environmental issues.

- The development of emergency and contingency plans for the key range of accidents and emergencies that may be associated with the sub-project.

- Regular, constructive and proactive liaison with the ECO.

### 3.6.3 Reporting Structure

The Contractor will receive instructions from the RE.
3.7 Sub-Contractors

3.7.1 Role
Sub-contractors will be appointed from time to time by the Contractor to perform certain services and/or provide certain products in association with the construction of the NWDP sub-project.

3.7.2 Responsibilities
Sub-contractors shall comply with the Environmental Specifications in the sub-project EMP and associated instructions issued by the Contractors to ensure compliance.

Sub-contractors and their staff will be required to take part in the environmental awareness training as instructed by the Contractor.

3.7.3 Reporting Structure
Sub-contractors will receive instructions from the Contractor.
4 LIBRARY OF ENVIRONMENTAL SPECIFICATIONS

4.1 Preamble

The following comprises a library of the minimum range of constraints, controls, procedures and standards that are typically required for the construction of projects associated with the NWDP.

It is intended that a selection of these Environmental Specifications be included into a sub-project EMP, and that these may:

- Either be included verbatim in the sub-project EMP; or
- Be amended to reflect, for example specific information regarding the sub-project, the area to be affected and/or any specific requirements made by FIPAG, MICOA, World Bank and/or African Development Bank.

Irrespective of the above, the content of the listed Environmental Specifications should not be regarded as exhaustive and any improvements should be made where reasonable or required.

The final number and scope of Environmental Specifications included in any given sub-project EMP will depend on:

- The nature of the sub-project;
- The associated range and extent of construction activities required;
- The results of the environmental impact assessment studies;
- The nature of comments received from MICOA, World Bank and or the African Development Bank;
- Comments made by the FIPAG Environmental Engineer.

Note:

Where any changes are made to the range of Environmental Specifications to be included in a sub-project EMP, it is important that the appropriate changes are made to, for example:

- The range of applicable penalties;
- Project Start-up Inspection sheets (Annexure B);
- Routine Site Inspection Sheet (Annexure C); and
- Decommissioning of the Site Inspection Sheet (Annexure D).
4.2 Index of Environmental Specifications (ES)

An index of the Environmental Specifications contained in this library is provided below. The Environmental Specifications have been listed as per the following key construction stage activities:

- Planning
- Site Establishment.
- Site Clearance.
- Site Housekeeping.
- Construction Activities.
- Rehabilitation.
- Monitoring and Management.
- Completion of Contract and Decommissioning of the Site.
- Measurement and Payment.

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4.3 Planning

4.3.1 Environmental Principles for the Construction Works

1. The environment is considered to be composed of both biophysical and social components.

2. Construction is a disruptive activity and all due consideration must be given to the environment, including the social environment during the execution of a project to minimise the impact on affected parties.

3. Minimisation of areas disturbed by construction activities (i.e. the ‘footprint’ of the construction area) should minimise many of the construction related environmental impacts of the sub-project and reduce rehabilitation requirements and costs.

4. All relevant standards relating to international, national, provincial and local legislation, as applicable, should be adhered to. This includes requirements relating to waste emissions, waste disposal practices, noise regulations, road traffic ordinances, etc.

5. All relevant permits and permissions shall be obtained from the relevant authorities to undertake construction activities as necessary.

6. Every effort should be made to minimise, reclaim and/or recycle ‘waste’ materials.

7. The Contractor will be required to prepare an Environmental Policy Statement that will state his commitment to achieving the basic principles for environmental protection and control for the duration of his contract. This statement will be displayed at the site as part of the Environmental Information Poster display.

4.3.2 Compliance with Environmental Legislation

1. The Contractor shall ensure that all pertinent legislation concerning the protection of the natural environmental and prevention of pollution is strictly enforced.

2. This includes:

   • Mozambican legislation (including any international standards and criteria that have been adopted in the absence of Mozambican standards).

   • World Bank requirements – as described in the Environmental Assessment Reports prepared in support of the project design.

   • AfDB requirements – as described in the Environmental Assessment Reports prepared in support of the project design.

3. The Contractor shall maintain a database of all pertinent legislation, regulations and guidance pertinent to the environmental management of the sub-project for the duration of the contract.
4.3.3 Permits and Permissions

The Contractor shall ensure that all pertinent permits, certificates and permissions have been obtained prior to any activities commencing on site and are strictly enforced/adhered to. This includes, for example, land mine clearance certificates.

The Contractor shall maintain a database of all pertinent permits and permissions required for the contract as a whole and for pertinent activities for the duration of the contract.

4.3.4 Negotiation for Land Access and Compensation

1. Negotiations for access to land and payment of compensation for permanent loss of property shall be undertaken by FIPAG.

2. The Contractor will be required to:
   - Negotiate with the appropriate landowners to use and access areas outside the designated construction site, and in particular provide appropriate compensation for the temporary loss of land.
   - Allow sufficient time for cropped areas to be harvested.
   - Make a representative available, where required by the RE, to discuss issues raised by residents regarding property and related issues and to help resolve any conflicts.

4.3.5 Construction Method Statements

1. The Contractor shall submit written Method Statements to the RE for the activities identified by the RE.

   [A list of activities that will require Method Statements is included in Annexure A.]

2. Method Statements indicate what will be done to comply with relevant environmental specification and shall state clearly:
   - Timing and location of activities.
   - Materials, equipment and staffing requirements.
   - Transporting the materials and/or equipment to, from and within the site.
   - The storage provisions for the materials and/or equipment.
   - Emergency procedures.
   - The proposed construction procedure designed to implement the relevant Environmental Specifications.
   - Other information deemed necessary by the RE and/or ECO.

3. Method Statements shall be submitted at least ten working days prior to the proposed commencement of work on an activity to allow the RE (and/or ECO) time to study and approve the method statement.
4. The Contractor shall not commence work on that activity until such time as the Method Statement has been approved in writing by the RE.

5. The Contractor shall carry out the activities in accordance with the approved Method Statement.

6. Under certain circumstances the RE may require changes to an approved Method Statement. In such cases the proposed changes must be agreed upon in writing between the Contractor and the RE, and appropriate records retained.

7. Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel.

8. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract.

4.3.6 Existing Services and Infrastructure

1. The Contractor shall ensure that existing services (e.g. roads, pipelines, powerlines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the RE.

2. The Contractor shall be responsible for the repair and reinstatement of any existing infrastructure that is damaged or services which are interrupted.

3. Such repair or reinstatement will be to the Contractor's cost and shall receive top priority over all other activities.

4. A time limit for the repairs may be stipulated by the RE in consultation with the Contractor.

5. It is the Contractor's responsibility to familiarise himself with the position of existing services and infrastructure that may get damaged due to construction activities.

4.3.7 Site Location and Contractor's Camp

1. The location and boundaries of the Construction Site shall defined in the contract.

2. The site for the Contractor's Camp shall be determined in collaboration with the RE such that it is effectively isolated from the surrounding environment and takes into consideration:
   - The need to be more than 20 meters from watercourses and wetlands in a position that will facilitate the prevention of stormwater runoff from the site from entering the watercourse.
   - The risk of public nuisance through for example, noise generation, visual intrusion, light pollution or disruption to access, is reduced.
   - Security implications are reduced.

3. The Contractor's Camp layout shall take into account availability of access for deliveries and services and any future works.
4. The Contractor’s Camp should also be of sufficient size to accommodate the needs of all sub-contractors that may work on the project.

5. Utilities and other Service Providers shall be advised of the construction activities. The Contractor will be responsible for any damage to these services/utilities.

6. Where possible, underground services for the Contractor’s Camp shall be located in common trenches.

7. The Contractor may be required to visually screen a specific part of the Camp as instructed by the RE. In these instances, the visual screening shall be aesthetically pleasing and shall be erected by the Contractor prior to commencing any activities. The Visual screening shall be maintained by the Contractor for the duration of the contract.

4.3.8 Environmental Training and Awareness

1. The Contractor and sub-contractors shall be aware of the environmental requirements and constraints on construction activities contained in the provisions of the EMP.

2. The Contractor will be required to provide for the appropriate Environmental Training and Awareness as described in this specification in his costs and programming.

3. The Contractor shall arrange for the ECO or the delegated responsible person to prepare and undertake awareness training for all site staff, including sub-contractor’s staff.

4. An initial environmental awareness training session shall be held prior to any work commencing on site.

5. The training should include reference, but not be restricted, to the following:
   • Basic awareness and understanding of the key environmental features of the work site and environs.
   • Understanding the importance of and reasons why the environment must be protected.
   • Ways to minimise environmental impacts.
   • Relevant requirements of the sub-project EMP.
   • Prevention and handling of fire.
   • Health risks pertinent to the site, including prevention of diseases such as malaria and cholera.
   • Awareness, prevention and minimisation of risk with regard to the contraction and spread of HIV/AIDS and other sexually transmitted diseases.
   • Risk of injury from land mines and other unexploded ordinance and the measures to minimise such risks.

6. The emphasis of the environmental awareness training should be on any (potential) environmental impacts relating to the construction activities to be undertaken on site and the related environmental precautions which need to be taken to avoid or mitigate these impacts.
7. Registers of attendance shall be maintained by the Contractor and ECO.

8. The Contractor shall erect and maintain Environmental Information Posters for his employees. These posters shall depict actions to be taken to ensure compliance with aspects of the Environmental Specifications.

9. The Environmental Information Posters shall be erected at the eating areas and any other locations specified by the RE.

4.3.9 Local Labour

1. Wherever possible, the Contractor should endeavour to use local labour.

4.4 Site Establishment

4.4.1 Site Identification

1. The Contractor will produce a plan illustrating the proposed construction camp and proposed working and 'no-go' areas. The plan must be approved by the RE. The plan should include reference to the following aspects where pertinent as and where these are required:

- Proposed working areas.
- 'No-go' areas.
- Contractor's Camp.
- All buildings, offices and/or hostels.
- Cooking and eating areas.
- Sanitation/ablution facilities.
- Storage, spoil, stockpile and lay down areas.
- Hazardous and fuel storage areas.
- Batching plant and workshop/equipment maintenance areas.
- Vehicle wash areas.
- Waste disposal facilities.
- Access routes.
- Security gates and gatehouses.
- Parking areas and other infrastructure required for the running of the site.
2. The working areas shall be kept to a minimum to reduce the total physical 'footprint' of the construction site and to reduce environmental damage.

3. The Contractor shall not use the land forming or connected with the construction site for any purpose other than for the proper carrying out of the works under the contract.

### 4.4.2 Working Areas and No-go Areas

1. The Construction Site shall be divided into working areas and 'no-go' areas and shall be marked on appropriate plans for reference.

2. Working areas are those areas required by the Contractor to construct the works and as approved by the RE.

3. 'No-go' areas are generally those large areas outside the designated working areas, and may include, but not be limited to:
   - Existing services and infrastructure.
   - Occupied villages and homesteads.
   - Grave sites.
   - Large trees (> 200 mm in diameter).
   - Cultivated lands and all fruit and nut trees.
   - Wetland areas.
   - Natural or special features as defined in the Environmental Specification.
   - 'Sensitive Environments' as defined in the Environmental Specification.

4. In the event that any damage is caused to the 'No-go' areas, the Contractor will be required to repair, restore, reinstate and/or rehabilitate these areas to a standard required by the RE and at the Contractor's cost.

### 4.4.3 Site Demarcation

1. Prior to construction commencing, the Contractor, RE and ECO shall inspect the site and identify any sensitive environments (as defined in the Environmental Specification) and other 'No-go' Areas.

2. Where necessary, the No-go areas shall be demarcated using materials as specified by the RE. These shall include fencing, plastic tape or other approved materials or means.

3. All trees which are to be retained are to be clearly indicated on a site plan and demarcated.

4. Trees are to be demarcated shall be clearly marked under the guidance of the RE using materials to be approved by the RE. Tagging by exclusion may be considered, i.e. where the number of trees to be cleared is fewer than those to be retained.

5. Trees shall remain demarcated for the duration of the works on site. Any damaged demarcation shall be repaired or replaced immediately.
6. The Contractor will be required to maintain all demarcation fencing and other demarcating materials for the duration of construction activities or as otherwise instructed by the RE.

7. The Contractor shall ensure that, insofar as he has the authority, no person, plant equipment or material enters the No-go areas at any time.

8. Any areas disturbed outside the demarcated areas or without the permission of the RE shall be subject to rehabilitation at the Contractor’s cost.

4.4.4 Contractor’s Camp

1. The Contractor shall implement the following, as required:

   • A suitable stormwater drainage system to prevent soil erosion, protect storage areas and to prevent stagnant ponds forming.

   • A suitable potable water supply.

   • An electricity supply which shall be negotiated with the local utility and/or provide his own generators as necessary.

   • Telecommunications which shall be negotiated with the local utility.

   • Suitable facilities for bathing, washing clothes or vehicles – site staff will not be permitted to use open water bodies for such activities.

   • Suitable sanitation facilities, adequate for the number of staff on site.

   • Facilities for solid waste collection.

   • Facilities for waste water management.

2. The method for provision of these services will be approved by the RE.

4.4.5 Water Supply

1. Abstractions from natural, municipal and/or private water resources (e.g. streams, lakes, boreholes, well points and pipelines) for potable water and construction water require a Method Statement for prior approval by the RE.

2. The Contractor shall arrange for the necessary approvals/permits from the relevant authorities/parties for the abstraction of water.

4.5 Site Clearance

4.5.1 Land Mines Clearance

1. It is possible that landmines may still occur in areas at or surrounding the construction site. It is the responsibility of the Contractor to obtain a de-mining certificate for the construction site.
2. The Contractor shall discuss the issue with the Governor or other local authority to identify high-risk areas and ensure that staff are made aware of the dangers.

3. The risk of encountering land mines must be minimised by instructing all staff to remain within the demarcated construction areas and not to move off established routes into open grass and bush land.

4.5.2 Site Clearance

1. The Contractor shall ensure that all negotiations and compensation for land, crops, trees, houses, grave sites and other relevant items have been satisfactorily completed as defined in the Environmental Specification, before the site is cleared.

2. Where specified, areas may be cleared of grassland and scrub vegetation. No large trees (trunk diameter > 200mm) shall be removed unless approved by the RE. The RE and ECO must satisfy themselves that such removal is unavoidable or absolutely essential.

3. Brushwood (i.e. <50 mm diameter) may be spread in the surrounding grass/bush and left to rot after approval has been received from the RE.

4. Wood obtained from clearing and grubbing operations remains the property of the Employer and may only be disposed of after consultation with the Employer.

5. No soil, vegetation or construction material shall be dumped in wetlands or water bodies.

6. No burning of vegetation to clear the Site will be permitted.

7. Topsoil shall be removed and stockpiled in accordance with the Environmental Specification.

8. The Contractor shall notify the RE if any previously unidentified graves or artefacts of archaeological or cultural significance are uncovered during site clearance. Work shall be stopped while the appropriate authorities are notified, they have inspected the site and given approval to proceed.

4.5.3 Topsoil Conservation and Stockpiling

1. Where specified, topsoil shall be excavated to the base of the organic rich A-Horizon and stockpiled separately. The topsoil shall not be mixed or contaminated with any other material.

2. Wherever practical the Contractor should use hand labour for topsoil removal.

3. Topsoil stockpiles should, where possible, be located in previously disturbed or cleared areas. Topsoil stockpiles shall be clearly demarcated and vehicle access restricted. The topsoil shall not be contaminated with any fuels, oils or other construction waste or materials.

4. Topsoil stockpiles are not to exceed 1.5 m in height.

5. Subsoil shall be stockpiled separately.

6. Compaction of the topsoil stockpiles is not permitted.
7. Topsoil stockpiles are to be maintained in a weed free condition.

8. Erosion of soil stockpiles will not be permitted and appropriate protection of the stockpiles from wind erosion and water erosion must be provided.

9. Where feasible, topsoil shall be replaced by direct return (i.e. replaced immediately on the area where construction is complete), rather than stockpiling it for extended periods.

10. The movement of soils from one part of the construction site to another should be minimised and undertaken with the consent of the ECO.

11. Where soil is to be stockpiled for several months, these stockpiles should be seeded with a quick germinating, annual grass species to stabilise the stockpiles. Alternatively, the stockpiles may be protected by a mulch cover (which is free from alien vegetation and seeds).

12. No materials classed in terms of this Specification as topsoil shall be used as backfill for any excavation.

### 4.5.4 Access Roads/Haul Roads

1. The Contractor will be required to prepare a Method Statement on the construction of any new roads, the method for upgrading an existing road and the proposed method for rehabilitation on completion of the construction works.

2. The Contractor shall comply with all applicable legislation and by-laws with regard to road safety and transport.

3. The Contractor shall notify the appropriate authorities in advance where road closures and similar activities will be required.

4. Access to the construction site and works area and haul routes are to be shown on a site plan and approved by the RE.

5. Access to the construction site and works area shall utilise existing roads and tracks where possible.

6. Upgrading of the access roads shall be undertaken within the existing confines of the road, unless otherwise agreed with the RE.

7. The Contractor is to maintain the haul roads. Maintenance includes adequate drainage and side drains, dust control and restriction of edge use as per the Environmental Specifications.

8. Movement of vehicles is to be confined to identified roads as far as possible and vehicles may not drive through or make turning circles in wetland areas, machambas or yards of homesteads under any circumstances.

9. All public roads shall be kept clear of mud and sand.

10. Disruption to regular road users must be minimised.

11. All temporary access routes shall be rehabilitated at the end of the contract to the satisfaction of the RE.
12. Damage to the existing access roads as a result of construction activities shall be repaired to the satisfaction of the RE. The cost of the repairs shall be borne by the Contractor.
4.6 Site Housekeeping

4.6.1 Site Housekeeping

1. The Construction Site and surrounds are to be maintained in a clean orderly and presentable condition at all times.

2. Regular inspections by the Contractor (and ECO) will be undertaken using checklists to ensure a minimum standard of orderliness is maintained.

3. Construction activities shall avoid causing unnecessary disruption and nuisance to adjacent settlements, landowners and the public as a whole.

4.6.2 Workshop, Equipment Maintenance and Storage

(a) Workshop

1. Where practical, all maintenance of equipment and vehicles on Site shall be performed in the workshop.

2. If it is necessary to do maintenance on site, but outside of the workshop area, the Contractor shall obtain the approval of the RE prior to commencing activities.

3. The Contractor shall ensure that there is no contamination of the soil, vegetation or surface water in his workshop and other plant or emergency maintenance facilities.

4. Where a workshop is required, the Contractor will be required to prepare and submit a Method Statement to the RE for approval on the design, construction and use of the workshop and pollution prevention and accident/emergency procedures. The Method Statement should include the following restrictions, at a minimum:

   • The workshop shall have a smooth impermeable floor either constructed of concrete or suitable plastic covered with sufficient gravel to protect the plastic from damage;

   • The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil);

   • Drip trays shall be used to collect the waste oil and lubricants during servicing and shall also be provided in construction areas for stationary plant (such as compressors).

   • The drip trays shall be inspected and emptied daily. Drip trays shall be closely monitored during wet weather to ensure that they do not overflow.

5. All static plant shall be located within a bunded area. The bunded area shall have a smooth impermeable surface (plastic) with an earth bund. The impermeable material shall extend to the crest of the earth bund. The floor of the bunded area shall be sloped towards an oil trap or sump to enable incidental spillage to be removed.

6. The workshop shall be kept tidy at all times.
(b) **Equipment Maintenance and Storage**

7. All vehicles and equipment shall be kept in good working order, are serviced regularly and stored in an area approved by the RE.

8. Leaking equipment shall be repaired immediately or removed from the site.

9. All washing of equipment shall be undertaken in the workshop or maintenance areas which shall be equipped with suitable impermeable floor and sump/oil trap. The use of detergents for washing shall be restricted to low phosphate/nitrate and low sudsing-type detergents.

10. Rivers and streams shall not be used for washing of equipment and vehicles.

4.6.3 **Cooking Facilities**

1. The Contractor shall designate cooking and eating areas, subject to the approval of the RE.

2. Any cooking on site shall be done on either well maintained gas cookers or by containing fires (e.g. in a drum) and locating them away from flammable vegetation or construction materials.

3. The following will not be permitted:
   
   - Cooking outside the designated areas and in particular beyond the site.
   - Open cooking fires or fires for heating.
   - The use of surrounding and/or indigenous vegetation for cooking or heating fires.
   - The feeding or leaving of food for animals.

4. Sufficient bins for waste disposal, as described in the Environmental Specification, shall be present in this area.

4.6.4 **Light ‘Pollution’**

1. The Contractor shall ensure that any lighting installed on site for his activities does not interfere with road traffic or cause a reasonably avoidable disturbance to the surrounding community or other uses or the area – particularly during the night time.

2. Where the Contractor has authorised night work, low flux and frequency lighting shall be used.

4.6.5 **Security**

1. Appropriate fencing, security gates, shelter and/or security guards are to be provided at the Construction Site to ensure the security of all plant, equipment and materials, as well as to secure the safety of site staff.

2. The Contractor must ensure that good relations are maintained with local communities and their leaders to help reduce the risk of vandalism and theft.
3. Valuables are to be stored in secure, locked areas.

4. Site staff that are found to be involved in incidences of theft or pose other security risks to the local community are to be dismissed and reported to the authorities.

4.6.6 General Materials Handling, Use and Storage

1. All materials shall be stored within the Contractor's camp unless otherwise approved by the RE.

3. Stockpile areas shall be approved by the RE.

4. All imported fill, soil and/or sand materials shall be free of weeds, litter and contaminants. Sources of imported materials shall be listed and approved by the RE.

5. Topsoil stockpiles shall be located and managed in accordance with the Environmental Specification.

6. The Contractor shall ensure that delivery drivers are informed of all procedures and restrictions (including 'No go' areas) required.

7. The Contractor shall ensure that these delivery drivers are supervised during off-loading, by someone with an adequate understanding of the requirements of the Environmental Specifications.

8. Materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to sand, stone chip, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent them from spilling from the vehicle during transit. The Contractor shall be responsible for any clean-up resulting from the failure by his employees or supplier to properly secure transported materials.

9. Temporary above ground storage tanks and handling areas for fuels, lubricants, chemicals and other hazardous substances shall be situated on a smooth impermeable surface (plastic liner or concrete) base with an earth bund. The floor of the bunded area shall be sloped towards an oil trap or sump to enable spilled liquids to be removed. A roofed area is to be provided to prevent the bunded area from filling with rainwater. The integrity of the liner for the bunded area is to remain intact for the duration of the contract until its removal.

10. Any water that collects in the bunded area shall not be allowed to stand and shall be removed within one day and taken off site for disposal as approved by the RE.

11. Open storage vessels are to be stored under cover to prevent 'splash' contamination of the surrounding area.

12. All products stored in 200 litre drums shall be dispensed from these drums using appropriate equipment – i.e. the products shall not be dispensed by tipping the drums.

13. Any electrical or petrol driven pumps shall be equipped and positioned so as not to cause any danger of ignition of the stored product.

14. Collection containers (e.g. drip trays) shall be placed under all dispensing mechanisms for hydrocarbons or hazardous liquid substances to ensure contamination from any leaks is reduced.
15. Regular checks shall be conducted by the Contractor on the dispensing mechanisms for all above ground storage tanks to ensure faulty equipment is identified and replaced timeously.

16. Only empty and externally clean tanks may be stored on bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.

4.6.7 Spoil Sites

1. Where the Contractor is required to spoil material, environmentally acceptable spoil sites must be identified and approved by the RE.

2. Spoil sites should be located within demarcated construction sites.

3. Material should ideally be spoiled in exhausted borrow pits or quarries and may not be located where stormwater runoff may result in sedimentation of wetlands or the pollution of other surface water bodies.

4. The development and rehabilitation of spoil areas shall include the following activities:
   - Stripping and stockpiling of topsoil.
   - Removal (to a nominal depth of 500mm) and stockpiling of subsoil.
   - Placement of spoil material.
   - Contouring of spoil site to approximate natural topography and drainage and/or reduce erosion impacts on the site.
   - Placement of excavated subsoil and then topsoil over spoil material.
   - Contouring and re-vegetation.

5. The Contractor shall ensure that the placement of spoil is done in such a manner to minimise the spread of materials and the impact on surrounding vegetation and that no materials 'creep' into 'no-go' areas.

4.6.8 Fuels, Oils, Hazardous Substances and other Liquid Pollutants

1. All potentially hazardous raw and waste materials are to be handled by the Contractor’s trained staff and stored on site in accordance with manufacturer's instructions and legal requirements.

2. Appropriate training for the handling and use of such materials is to be provided by the Contractor as necessary. This includes providing for any spills and pollution threats that may occur.

3. Products should be clearly labelled and symbolic safety/hazard warning signs should be provided.

4. Areas for the storage of fuel and other flammable materials shall comply with standard fire safety regulations.

5. The location of the fuel and chemical depot(s) shall be located at least 100m from any surface water body.
6. See also the Environmental Specification for the handling and storage of materials.

(a) Fuels (Petrol and Diesel) and Oil

7. Unless otherwise specified, fuel shall not be stored on site, but shall be transported to the site as and when required.

8. Where fuel is to be stored on site, all necessary approvals regarding storage and dispensing shall be obtained from the appropriate authorities.

9. The location of the fuel storage area shall be approved by the RE.

10. The fuel storage tank(s) shall be erected at least 3.5m from building, boundaries and any other combustible or flammable materials.

11. The Contractor shall ensure that all liquid fuels and oils are stored in tanks with lids and that these are kept firmly shut and locked at all times. The design and construction of the storage tanks shall be in accordance with a recognised code and as approved by the RE.

12. The tanks shall be situated in a bunded area which has a volume of at 110% of the volume of the largest tank. The floor of the bunded area shall be constructed as per the Environmental Specification.

13. The storage tank shall generally not exceed a capacity of 9000 litres and shall not be used for the storage of liquids other than those with a flash point in excess of 40 °C, and should allow for expansion of the stored product with any rise in temperature.

14. Areas for storage of fuels and other flammable materials shall comply with any standard fire safety regulations and may require the approval of the local Fire Brigade.

15. All storage tanks are to be designed and constructed in accordance with a recognised code.

16. Appropriate symbolic signage (No Smoking, No Naked Lights and Danger) must be prominently displayed in and around the fuel storage area.

17. The capacity of the tank shall be clearly displayed and the product contained within the tank clearly identified.

18. Storage tanks are to be removed on completion of the works.

19. No smoking shall be allowed in the vicinity of the fuel storage area.

20. There shall be adequate fire fighting equipment at the fuel storage and dispensing area or areas.

21. Fuel shall be kept under lock and key at all times.

22. The Contractor will be required to produce a Method Statement for the filling of and dispensing from the storage tanks.

23. Where reasonably practical, plant shall be refuelled at a designated refuelling area or at the workshop as applicable. If it is not reasonably practical then the surface under the temporary refuelling area shall be protected against pollution to the reasonable satisfaction of the RE prior to any refuelling activities, as per the Environmental Specification.
24. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown any spilled fuel and where possible is designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200l of hydrocarbon liquid spill. This material must be approved by the RE prior to any refuelling or maintenance activities.

(b) Hazardous Substances

25. If potentially hazardous substances are to be stored on site, the Contractor shall provide a Method Statement detailing the substances/materials to be used together with the procedures for the storage, handling and disposal of the materials in a manner which will reduce the risk of pollution that may occur from day to day storage, handling, use and/or from accidental release of any hazardous substances used.

26. Hazardous chemical substances used during construction shall be stored in secondary containers.

27. The relevant Material Safety Data Sheets (MSDS) shall be available on Site. Procedures detailed in the MSDS shall be followed in the event of an emergency situation.

4.6.9 Solid Waste Management

1. The site is to be kept clean, neat and tidy at all times.

2. No burying or dumping of any waste materials, vegetation, litter or refuse shall be permitted.

3. The Contractor will be required to prepare and submit a Method Statement on waste control and management at the site. At a minimum, the Contractor shall include the following in the Method Statement:

   * The provision of sufficient bins (preferably vermin and weatherproof) at the camp and work sites to store the solid waste produced on a daily basis.

   * The collection of refuse and waste generated by his staff on a daily basis.

   * The identification of an appropriate and/or approved temporary waste site for waste generated during the construction contract.

   * The final disposal of the site waste at an approved landfill site, or at a site as approved by the RE.

   * A litter control plan for the Camp and across the working areas.

   * Refuse screens shall be installed at runoff concentration points from large parking facilities, wash bays, stormwater outlets, inlets to detention ponds, workshop forecourt drainage points, ablution and eating areas. These facilities shall be serviced and monitored at the discretion of the RE.

   * Wherever possible, materials used or generated by construction shall be recycled.

   * Provision for responsible management of any hazardous waste generated during the construction works.
4.6.10 Sanitation

1. Adequate washing and toilet facilities are to be provided close to the works.

2. Portable chemical toilets at a ratio of 1 toilet per 15 workers shall be provided within 200m of each working front and shall be moved as the working front progresses.

3. Portable toilets shall not be located on flood plains where the possibility of flooding exists, and must be at least 50m from any water bodies.

4. All temporary/portable toilets shall be secured to the ground to the satisfaction of the RE to prevent them from toppling over.

5. The type and exact location of the toilets shall be approved by the RE prior to establishment. The use of septic tanks may only be used after appropriate investigations have been made and the option has been approved by the RE.

6. All toilets shall be maintained by the Contractor in a clean sanitary condition to the satisfaction of the RE.

7. Toilet paper shall be provided.

8. A wash basin with adequate clean water and soap shall be provided alongside each toilet. Staff shall be encouraged to wash their hands after use of the toilet, in order to minimise the spread of possible disease.

9. The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site to an appropriate location/facility.

10. The Contractor shall provide a contingency plan for controlling and containing any spills.

11. Discharge of waste from toilets into the environment and burial of waste is strictly prohibited.

12. The Contractor shall instruct their staff and sub-contractors that they must use toilets provided and not the veld, bush or streams.

13. Staff shall not be permitted to wash themselves or their personal effects in rivers.

4.6.11 Wastewater and Contaminated Water Management

1. No grey water runoff or uncontrolled discharges from the site/working areas (including washdown areas) to adjacent watercourses and/or water bodies shall be permitted.

2. The Contractor shall prepare a Method Statement on the control and management of wastewater and/or contaminated water on site – including providing for the appropriate disposal of contaminated water (particularly where this may be contaminated by hydrocarbon and hazardous materials).

3. Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site. This particularly applies to water emanating from concrete batching plants and concrete swills.
4. The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or water bodies.

5. Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered.

6. Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted.

7. The Contractor shall notify the RE of any pollution incidents on site.

8. Any evidence of water related erosion shall be addressed as per the Environmental Specification.

9. Contaminated water shall not be discharged to the Municipal sewer system unless approved by the RE.

### 4.6.12 Stormwater Management and Erosion Control

1. The Contractor shall take reasonable measures to control stormwater and the erosive effects thereof and shall provide a **Method Statement** for approval by the RE.

2. During construction the Contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking measures to prevent the surface water from being concentrated in streams and from scouring slopes, banks or other areas.

3. Areas affected by construction related activities and/or susceptible to erosion must be monitored regularly for evidence of erosion – this includes:
   - Areas stripped of topsoil.
   - Soil stockpiles.
   - Spoil sites.
   - Borrow pits.
   - River banks.
   - Steep slopes.

4. On any areas where the risk of erosion is evident, special measures may be necessary to stabilise the areas and prevent erosion. These may include, but not be restricted to:
   - Confining construction activities.
   - Using cut off berms.
   - Removing grass sods before construction and replacing them after backfilling.
   - Using mechanical cover or packing structures such as geofabric to stabilise steep slopes or hessian, gabions and mattress and retaining walls.
- Straw stabilising.
- Brushcut packing.
- Mulch or chip cover.
- Hydroseeding.
- Sprigging or sodding.
- Constructing anti-erosion berms.

5. The erosion prevention measures must be implemented to the satisfaction of the RE.

6. Where erosion does occur on any completed work/working areas, the Contractor shall reinstate such areas and areas damaged by the erosion at his own cost and to the satisfaction of the RE and ECO.

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

8. The Contractor shall be liable for any damage to downstream property caused by the diversion of overland stormwater flows.

4.6.13 Air Emissions and Odour Control

1. The Contractor will be required to ensure that all vehicles and plant used are maintained in good working order to help reduce air emissions.

2. Exhaust emission control devices are to be installed on vehicles and/or machinery where practical.

3. Lids and covers are to be kept on all containers holding materials, products and chemicals that may produce odours.

4. Store potentially odorous materials, products and/or chemicals downwind of sensitive areas where practical.

4.6.14 Noise Control

1. The Contractor shall keep noise level within acceptable limits and construction activities shall, where possible, be confined to normal working hours. The Contractor shall comply with all government regulations.

2. The use of all plant and machinery shall be appropriate to the task required in order to reduce noise levels and/or environmental damage.

3. Silencers are to be installed and maintained in good working order on machinery, plant and equipment where practical.

4. Appropriate directional and intensity settings are to be maintained on all hooters and sirens.
5. No amplified music shall be allowed at the site. The use of radios, tape recorders, compact disc players, television sets etc. shall not be permitted unless the volume is kept sufficiently low as to avoid any intrusion on members of the public or residents within range.

6. The Contractor shall not use sound amplification equipment on site unless in emergency situations or as instructed by the RE.

7. Noise levels exceeding 85dB shall only be permitted where approved by the RE.

8. Any such approved construction activities generating output levels of 85 dB(A) or more, in residential areas, shall be confined to the hours 08h00 to 17h00 Mondays to Fridays.

9. The Contractor shall inform nearby residents at least 5 days in advance of any excessive noise that is anticipated due to specific construction activities.

10. Schools, hospitals and other noise sensitive communities shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity. Any excessively noisy activity shall be conducted outside of school hours, where approved by the RE.

11. Should the RE sanction any construction activities outside of normal working hours, affected residents shall be notified at least 5 days in advance of the event.

12. Any complaints received by the Contractor regarding noise will be recorded and communicated to the RE.

4.6.15 Traffic Control

1. The Contractor will be required to prepare Method Statements on traffic safety measures for construction traffic entering, exiting public roads and for the general control of construction traffic.

2. On the gravel or earth roads within the site and within 500m of the site, the vehicles of the Contractor and his suppliers shall not exceed a speed of 45 km/h.

3. Appropriate traffic warning signs shall be erected and maintained.

4. Trained and equipped flagmen shall be used where access roads intersect any public roads.

5. Any complaints received by the Contractor regarding traffic disruption will be recorded and communicated to the RE.

4.6.16 Disruption of Access to Property

1. Disruption of access to property must be kept to a minimum at all times.

2. Where such disruption is unavoidable, the Contractor shall advise the affected parties and the RE at least seven working days in advance of such disruption.

4.6.17 Dust Control
1. Dust is regarded as a nuisance when it reduces visibility, soils private property, is aesthetically displeasing or affects palatability of grazing. Dust generated by construction related activities must be minimised.

2. The Contractor shall be responsible for the control of dust arising from his operations and activities.

3. Control measures shall include regular spraying of working/exposed areas with water at an application rate that will not result in soil erosion or runoff. The frequency of spraying will be agreed with the RE.

4. The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilised as soon as practically possible.

5. The excavation, handling and transport of erodable materials shall be avoid under high wind conditions.

6. Where possible, soil stockpiles shall be sheltered from the wind.

7. Vehicle speeds shall be limited to minimise the generation of dust on site and on access/haul roads.

8. Any complaints received by the Contractor regarding dust will be recorded and communicated to the RE and ECO.

4.6.18 Conservation of Vegetation and Wildlife

1. Except to the extent necessary for establishing the construction site and carrying out the construction works, vegetation shall not be removed, damaged or disturbed. Nor should any unauthorised planting of vegetation take place.

2. The clearance of the site for construction purposes shall be kept to a minimum. The use of existing cleared or disturbed areas for the Contractor's Camp, stockpiling of materials etc shall be encouraged.

3. Areas of indigenous forest vegetation are not to be removed unless required for construction purposes, nor shall new access routes be cut through indigenous vegetation.

4. Trees should be trimmed rather than removed wherever possible.

5. Areas where construction will occur in close proximity to indigenous forest/bush must be strictly controlled. The minimum of indigenous plants/bush must be disturbed and the limits of construction activity must be clearly demarcated as per the Environmental Specification.

6. The Contractor's staff must not remove or harvest trees or medicinal plants, nor must they poach (through trapping, poisoning or shooting) or otherwise harm wild animals in the area.

7. The use of indigenous plants as firewood is prohibited unless they are obtained from approved cleared areas.

8. No domestic pets or livestock are permitted on site.
9. There is a possibility of encountering harmful species of snakes during the construction works – these snakes should be avoided where possible and may only be killed if posing a direct and real danger to staff and where approved by the RE.

10. Before cutting or trimming indigenous trees (as authorised by the RE), the Contractor with the ECO shall ensure that no nests are in the portion to be cut and that orchids are removed and relocated.

11. Protected plants which cannot be avoided shall be transplanted to a safe position with similar conditions close by, at the direction and instruction of the RE and the ECO.

12. Where the use of herbicides, pesticides and other poisonous substances has been specified, the Contractor shall submit a Method Statement.

**4.6.19 Alien Invasive Plant Control**

1. Disturbance to the natural vegetation will encourage the establishment of exotic/alien plant invader species.

2. Wherever alien plants are cut or excavated, the cuttings, roots etc must be gathered into heaps and not spread around in order to prevent cuttings from taking root and re-establishing themselves.

3. Alien plants must be eradicated where they begin to establish themselves in areas previously disturbed by the construction activities, in the working areas and construction camp. Eradication must take place before the plants reach maturity.

4. The ECO will assist in the identification of alien plant species to be removed and will advise on the methods of eradication. Methods may involve hand removal, hoeing by hand, or the application of herbicides.

**4.6.20 Protection of Features of Cultural, Historical and/or Archaeological Importance**

1. The Contractor will be required to produce Method Statements for all construction activities that will occur within or close to grave sites, graveyards or other cultural, historical or archaeologically sensitive areas.

2. If remains or artefacts are discovered on site during earthworks, work shall cease and the Contractor shall immediately inform the RE and contact the relevant authority.

**4.6.21 Protection of Sensitive Environments and Natural Features**

1. Sensitive environments and natural features within and/or close to a construction site will be designated as ‘no-go’ areas and will be subject to the conditions described in the Environmental Specification.

2. The protection of indigenous vegetation (including forests and bush) has been provided for in the Environmental Specification.

(a) **Intertidal Zones and Estuaries**

3. The Contractor will be required to ensure that any works carried out within intertidal zones, lagoons and/or estuaries is compliant with any legislation and regulatory requirements.
4. No vehicle shall be permitted onto a beach without a permit having first been obtained from the relevant authority.

(b) Rivers and Streams

5. The Contractor shall ensure that the footprint of construction activities is minimised at river and stream crossings.

6. The Contractor shall submit a Method Statement for review 10 working days prior to commencing any construction activities within the 1:50 year floodline. The Method Statement should highlight (but not be limited to):
   - Providing a detailed plan for any crossings, including pipe protection works.
   - How water flow will be diverted.
   - Containment of contaminated runoff and wastewater.
   - Extent of working area.
   - Final expected profile of river/stream banks.
   - Reinstatement and rehabilitation of river/stream banks.

7. Sedimentation from the construction works of rivers and streams must be minimised.

8. No construction materials shall be stockpiled within areas that are at risk of flooding.

9. The Contractor shall ensure that all construction activities within the flood plain and lagoon, including the removal of vegetation, stockpiling of top material, excavating of pipeline route, laying of pipeline, backfilling of excavations and rehabilitation occur within as short a period as possible.

10. All temporary and permanent fill used adjacent to, or within, the river / streambed shall be of clean sand or larger particles. Silts and clays shall not be permitted in the fill.

11. Plastic sheeting, sandbags or geofabric approved by the RE shall be used to prevent the migration of fines through the edges of the fill into the river.

12. Banks shall be suitably stabilised incrementally immediately after construction allows. Upkeep of stabilisation facilities shall be continuously maintained.

13. The Contractor shall not modify the banks or bed of a watercourse other than necessary to complete the specified works. If such unapproved modification occurs, the Contractor shall restore the affected areas to their original profile.

14. The Contractor shall preserve all riparian and wetland vegetation for use in rehabilitation of those environments. This vegetation shall be kept moist until replanting. Replanting is to be undertaken immediately after surface reinstatement has been completed.

15. The Contractor shall not pollute the watercourse through any construction activities.

16. Rocks for use in any gabion baskets or other structures must not be obtained from a watercourse.
(c) **Wetlands**

17. Wetlands shall be avoided where at all possible and practicable. Where unavoidable, the footprint for construction activities and associated damage to the wetland shall be minimised.

18. Construction shall not permanently alter the surface or subsurface flow of water through the wetland.

19. Wetlands shall not be drained at any stage.

20. If construction activities unavoidably affect a wetland, the Contractor shall remove and store all wetland vegetation with their rootballs intact as indicated by the RE and ECO. This vegetation shall be kept moist until replanting. Replanting is to be undertaken immediately after surface reinstatement has been completed.

21. No construction materials shall be stockpiled in any wetland areas.

22. No spoil material shall be deposited in any wetland areas.

23. No vehicles shall be driven through wetland areas.

24. No drains channelling concentrated runoff shall be directed into wetlands of any type.

25. Any affected wetland areas are to be restored to as similar state as before construction commenced. The surface reinstatement of wetland areas is to ensure that no depressions, ridges or channel features remain that could affect the hydrological regime of the wetland.

(d) **Residential Dwellings or Machambas**

26. The Contractor shall avoid working near residential dwellings, machambas and cultivated lands wherever possible.

27. Where this is not possible, the Contractor shall minimise impacts of construction by abiding by the relevant terms of this EMP and instructing all site staff accordingly.

(e) **Natural Features**

28. The Contractor shall not deface, paint, damage or mark any natural features (such as rock formations) situated within or around the site for survey or other purposes unless agreed with the RE.

29. Any features affected by the Contractor shall be restored/rehabilitated to the satisfaction of the RE at the expense of the Contractor.

30. The Contractor shall not permit his staff to make use of any natural water feature, including springs, streams or open water bodies for the purposes of swimming, personal washing and the washing of machinery or clothes.

4.6.22 **Fire Prevention and Control**

1. The Contractor shall take all reasonable and precautionary steps to ensure that fires are not started as a consequence of his activities on site.
2. Fires within National Parks, Nature Reserves and other natural areas are prohibited.

3. Permitted heating and cooking facilities are described in the Environmental Specification. No cooking fires are to be left unattended.

4. The Contractor shall ensure that there is basic fire-fighting equipment available on site. This shall include, but not be limited to:
   - Rubber beaters when working in grass/bush areas.
   - At least one fire extinguisher of the appropriate type when welding or other 'hot' activities are undertaken.

5. The Contractor shall supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other areas identified by the RE with tested and approved fire fighting equipment.

6. Flammable materials should be stored under conditions that will limit the potential for ignition and the spread of fires.

7. 'Hot' work activities shall be restricted to a site approved by the RE.

8. Smoking shall not be permitted in those areas where there is a fire hazard. These areas shall include:
   - Workshop.
   - Fuel storage areas.
   - Any areas where vegetation or other material is such as to make liable the rapid spread of an initial flame.

9. The Contractor shall ensure that all site personnel are aware of the fire risks and how to deal with any fires that occur. This shall include, but not be limited to:
   - Regular fire prevention talks.
   - Posting of regular reminders to staff.

10. Any fires which occur shall be reported to the RE immediately and then to the relevant authorities.

11. In the event of a fire, the Contractor shall immediately employ such plant and personnel as is at his disposal and take all necessary action to prevent the spread of the fire and bring the fire under control.

12. Costs incurred through fire damage will be the responsibility of the Contractor, should the Contractor’s staff be proven responsible for such a fire.

### 4.6.23 Emergency Procedures

1. The Contractor shall submit Method Statements covering the procedures for the main activities which could generate emergency situations through accidents or neglect of responsibilities. These situations include, but are not limited to:
   - Accidental fires.
• Accidental leaks and spillages.
• Vehicle and plant accidents.

2. Specific to accidental leaks and spillages:
• The Contractor shall ensure that his employees are aware of the procedure for dealing with spills and leaks.
• The Contractor shall also ensure that the necessary materials and equipment for dealing with the spills and leaks is available on site at all times.

3. Specific to hydrocarbon spills:
• The source of the spill shall be isolated and the spillage contained using sand berms, sandbags, sawdust, absorbent material and/or other materials approved by the RE.
• The area shall be cordoned off and secured.
• The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown the spill.
• The quantity of such materials shall be able to handle a minimum of 200 l hydrocarbon liquid spill.
• The Contractor shall notify the relevant authorities of any spills that occur.

4. The Contractor shall assemble and clearly list the relevant emergency telephone contact numbers for staff and brief staff on the required procedures. These contact details shall be listed in Portuguese and English.

5. The treatment and remediation of areas affected by emergencies shall be undertaken to the reasonable satisfaction of the RE at the cost of the Contractor where his staff have been proven to be responsible for the emergency.

4.6.24 Health and Safety

1. The Contractor shall comply with all standard and legally required health and safety regulations as promulgated by Mozambican law.

2. The Contractor shall provide a standard first aid kit at the site office.

(a) Public Liability

3. The Contractor shall ensure that staff are made aware of the risks of contracting or spreading sexually transmitted diseases, particularly HIV/AIDS and how to prevent or minimise such risks.

4. The Contractor shall be responsible for the protection of the public and public property from any dangers associated with construction activities, and for the safe and easy passage of pedestrians and traffic in areas affected by the construction activities.

5. All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the RE. If appropriate, symbolic warning signs must be erected.
6. Speed limits appropriate to the vehicles driven are to be observed at all times on access and haul roads. Operators and drivers are to ensure that they limit their potential to endanger humans and animals at all times by observing strict safety precautions.

7. Telephone numbers of emergency services shall be posted conspicuously in the Contractor's office near the telephone.

8. No unauthorised firearms are permitted on site.

(b) Diseases, Heat Stress and Wounds

9. Consideration must be given to the following:

- Malaria is prevalent in the area and the Contractor must ensure that regular monitoring occurs amongst construction staff for symptoms of malaria to enable timeous treatment.

- Open trenches and other depressions that accumulate stagnant water should be backfilled as soon as possible to prevent the creation of breeding areas for malaria carrying mosquitoes.

- Cholera and dysentery outbreaks are possible during times of flood. Outbreaks of these diseases must be prevented by providing uncontaminated potable water, suitable ablution, sanitation and eating facilities for site staff.

- The Contractor should be aware of the signs of heat stress/heat stroke. Plenty of drinking water must be made available on site to prevent dehydration and overheating.

- Open wounds must be treated timeously with antiseptic/antibiotics to prevent the development of tropical ulcers.

4.6.25 Community Relations and Control of Community Disruption

(a) General

1. The Employer (FIPAG) and or the RE shall liaise with local communities on a regular basis to keep them informed of activities that may affect them.

2. Liaison shall be through recognised local leaders.

3. If so required, the Contractor shall erect and maintain information boards in the position, quantity, design and dimensions required by the RE.

4. Such boards shall include contact details for complaints by members of the public.

(b) Community Disruption

5. Operations that are likely to be noisy, dusty or otherwise disruptive shall only commence after due notice and consultation with the community likely to be affected has been carried out.
6. The Contractor shall minimise any disruption to adjacent communities through any or all of the following, at a minimum through the application of the relevant specifications in this EMP:

- Noise nuisance
- Dust nuisance
- Visual intrusion
- Disruption to access
- Risk of accidents from traffic or the works themselves

7. The Contractor's employees shall in no way be a nuisance to nearby residents. Any complaints received will be addressed and if necessary the relevant persons will be suspended from the project.

8. Appropriate advance warning (at least 5 days) of potentially disruptive activities (such as blasting) shall be provided to adjacent communities prior to the activity commencing.

(c) Private Land and Community Properties

9. Prior to commencing construction activities, the Contractor shall provide appropriate advance warning as described in the Environmental Specification.

10. Where construction activities require the removal of fences from around private property, the land owners/occupants shall be warned at least 5 days in advance. These fences must be reinstated as soon as construction is completed at that site.

11. Temporary fences may be required in certain circumstances as instructed by the RE.

12. Care shall be taken not to damage trees, crops, structures and roads etc on properties of members of the local community. No site clearance will be allowed to proceed without the prior written approval of the RE and the Community.

13. No access to homesteads, gardens and private plots will be permitted without the express written permission of the resident or his/her representative.

(d) Grievance Mechanism

14. The RE is to establish a formal grievance mechanism through which affected people can lodge a grievance and to help ensure a speedy satisfactory resolution of any disputes.

15. The Contractor will be required to minimise the risk of grievances with the local communities through implementing the specifications described in the EMP.

16. Where grievances occur, the Contractor will be required to assist in the process to investigate and resolve the grievance as effectively and quickly as reasonable.

17. The Contractor shall keep a 'Complaints register' on Site. The register shall contain:

- All contact details of the person who made the complaint and information regarding the complaint itself.
• The investigations undertaken and response provided
• Actions taken and by whom
• Any follow-up actions taken.

18. Copies of complaints received are to be copied to the RE, and where pertinent, the ECO.

4.7 Construction Activities

4.7.1 Manual Excavation

1. Wherever practically possible, excavation activities shall be done manually and not with machine excavators. This is necessary to reduce negative environmental impacts and to enhance the economic benefits to the local communities.

4.7.2 Cement/Concrete Batching

1. A Method Statement for the layout and preparation for the batching plant will be required.

2. Concrete batching plants shall generally be located in an area of low environmental sensitivity, as identified by the RE (in consultation with the ECO).

3. In particular, the concrete batching plant shall be located more than 20 m from the nearest stream/river channel.

4. Topsoil shall be removed from the batching plant site and stockpiled as per the Environmental Specification.

5. The batching plant site shall be bunded with earth berms or sandbags such that runoff cannot escape from the plant site.

6. Concrete shall not be mixed directly on the ground.

7. The concrete batching works shall be kept neat and clean at all times.

8. Contaminated stormwater and wastewater runoff from the batching area and aggregate stockpiles shall not be permitted to enter streams but shall be led to a pit where the water can soak away.

9. Unused cement bags are to be stored so as not to be effected by rain or runoff events.

10. Used bags shall be stored and disposed of in a manner which prevents pollution of the surrounding environment (e.g. via wind blown dust).

11. Concrete transportation shall not result in spillage.

12. Cleaning of equipment and flushing of mixers shall not result in pollution of the surrounding environment.
13. Suitable screening and containment shall be in place to prevent wind blown contamination associated with any bulk cement silos, loading and batching.

14. Waste concrete and cement sludge shall be scraped off the site of the batching plant and removed to an approved disposal site.

15. All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete and disposed at an approved disposal site. Washing the remains into the ground is not acceptable.

16. All excess aggregate and sand shall also be removed.

17. After closure of the batching plant or any area where concrete was mixed all waste concrete/cement sludge shall be removed together with contaminated soil. The surface shall then be ripped to a depth of 150mm and the topsoil replaced evenly over the site and re-grassed as per the Environmental Specification.

4.7.3 Planning Borrow Pits and Quarries

1. All borrow pits sites shall be clearly indicated on a plan and approved by the RE.

2. The Contractor will be responsible for ensuring that appropriate authorisation to use the proposed borrow pits and quarries has been obtained before commencing activities.

3. The operation of borrow pits and/or quarries shall, at all times, be in accordance with any pertinent national or local legislation (e.g. mineral extraction, safety and noise levels).

4. The Contractor shall give 14 days notice to nearby communities and farmers of his intention to begin excavation in the borrow pits or quarries.

4.7.4 Construction and Operation of New Borrow Pits and Quarries

1. Topsoil shall be stripped prior to removal of borrow and stockpiled on site, as per the Environmental Specification. This soil shall be replaced on the disturbed areas once operation of the borrow site or quarry is complete. The worked floor area and access roads shall be ripped and topsoiled during the decommissioning phase. This shall be undertaken so as to ensure adequate drainage of the affected area without producing a risk of erosion.

2. Vegetation shall be cleared from the borrow site or quarry and surrounding areas shall be protected from further damage as per the relevant Environmental Specifications.

3. Trees and debris shall not be permitted to fall outside of the clearing limits. Trees shall be cleared or felled so as not to damage other trees or vegetation

4. Borrow pits and quarries shall be fenced to prevent unauthorised persons and vehicles from entering the area. Fences shall also be stock and game proof.

5. Unauthorised access to the borrow pits and quarries shall be prevented using methods as approved by the RE.

6. Excavation of materials from the borrow pits or quarries should take place systematically and progressively so that areas which are worked out may be rehabilitated while other areas are being mined.
7. Only single lane access will be provided to a borrow pit and the need to construct a new access road will require approval from the RE.

8. Stormwater and groundwater controls shall be implemented to prevent runoff entering streams and the slumping of soil from the hillside above.

9. Vehicles leaving borrow pits shall not deposit/shed mud, sand and debris onto any public road.

10. All loads shall be covered with a tarpaulin or similar to prevent dangers and nuisance to other road users.

11. The Contractor shall ensure that the condition of all areas disturbed by borrow or quarry activities are returned to a state that approximated to pre-operations and to the satisfaction of the RE. Specifically:
   - All contaminated soils shall be excavated to the depth of contaminant penetration and removed to the nearest approved landfill site
   - The slopes of the borrow areas shall be graded so that they do not present a threat to any grazing livestock or the community using the land in the future.
   - The slope of the borrow pit shall be graded to blend with the natural terrain and be stabilised to prevent erosion.
   - All drainage lines affected by construction and operation shall be reinstated to approximately their original profile
   - All compacted areas (including stockpile areas) shall be ripped along the contour to a depth of 150mm prior to replacement of topsoil, except where otherwise instructed by the RE.
   - The blasted faces of the pit shall be shape-blasted to the approval of the RE.
   - Topsoil shall be replaced to a depth of no less than 75 mm and fertilised if necessary.
   - The Contractor shall ensure all areas disturbed by construction activities are re-vegetated to the satisfaction of the RE.
   - Alien invasive plant species will be dealt with as per the Environmental Specification.
   - The rehabilitation of a borrow pit or quarry should take into account the needs of an adjacent community where feasible – for example the area may be required for a livestock watering hole.

12. Where required, dust and fly-rock prevention methods shall be detailed in a Method Statement to be approved by the RE.

13. The use of borrow pits or quarries for material spoil sites may be approved by the RE (and/or with the appropriate consent of the landowner). Where this occurs, the materials spoiled in the borrow pit shall be profiled to fit into the surrounding landscape and covered with topsoil.

4.7.5 Blasting
1. The Contractor will be responsible for obtaining a current and valid authorisation from the relevant authorities prior to any blasting activity. A copy of this authorisation shall be given to the RE.

2. A Method Statement shall be required for any blasting related activities. No blasting will be permitted unless the Contractor has satisfied the RE that his proposed blasting methods and controls are such that no damage will be caused to any adjoining structures, pipelines, service or surrounding sensitive environmental areas.

3. All Mozambican laws and regulations relating to blasting activities shall be adhered to at all times.

4. A qualified and registered blaster shall supervise all blasting and rock-splitting operations at all times.

5. The Contractor shall ensure that appropriate pre blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area).

6. The Contractor shall allow for good quality vibration monitoring equipment and record keeping on Site at all times during blasting operations as required by the RE.

7. The Contractor shall ensure that emergency services are notified, in writing, a minimum of 24 hours prior to any blasting activities commencing on Site.

8. The Contractor shall take necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly-rock. Environmental damage caused by blasting/drilling shall be repaired at the Contractor's expense to the satisfaction of the RE.

9. The Contractor shall ensure that adequate warning is provided to the local communities immediately prior to all blasting. All signals shall also be clearly given.

10. The Contractor shall use blast mats for cover material during blasting. Topsoil shall not be used as blast cover.

11. During demolition the Contractor shall ensure, where possible, that trees in the area are not damaged.

12. Appropriate blast shaping techniques shall be employed to aid in the landscaping of blast areas, and a Method Statement to be approved by the RE, shall be required in this regard.

13. At least one week prior to blasting, the relevant occupants/owners of surrounding land shall be notified by the Contractor and any concerns addressed. Buildings within the potential damaging zone of the blast shall be surveyed preferably with the owner present, and any cracks or latent defects pointed out and recorded either using photographs or video. Failing to do so shall render the Contractor fully liable for any claim of whatsoever nature, which may arise. The Contractor shall indemnify the Employer in this regard.

4.7.6 Asphalt, Bitumen and Paving

1. The site of the asphalt plant shall be selected and maintained according to the following basic criteria:
   - The plant should be situated on flat ground.
Topsoil shall be removed prior to site establishment and stockpiled for later rehabilitation of the site.

Bitumen drums/products shall be stored in an area approved by the RE. This area shall be indicated on the construction camp layout plan. The storage area shall have a smooth impermeable (concrete or thick plastic covered in gravel) floor. The floor shall be bunded and sloped towards a sump to contain any spillages of substances.

The area shall be covered to prevent rainwater from contacting the areas containing fuels, oils, bitumen etc and potentially generating contaminated runoff.

The plant shall be secured from trespassers and animals through the provision of fencing and a lockable gate to the satisfaction of the RE.

Well-trained staff shall be responsible for plant workings.

Within the bitumen plant site, areas shall be demarcated/marked for plant materials, wastewater and contaminated.

An area should be clearly marked for vehicle access.

Drums/tanks shall be safely and securely stored.

Materials requiring disposal shall be disposed of at an appropriate waste facility.

During the application/use of the bitumen products, the following shall apply:

- Over spray of bitumen products outside of the road surface and onto roadside vegetation shall be prevented using a method approved by the RE.
- When heating bitumen products only LPG or a similar zero emission fuel shall be used and the Contractor shall take cognisance of appropriate fire risk controls.
- Stone chip/gravel excess shall not be left on road/paved area verges. This shall be swept/raked into piles and removed to an area approved by the RE.
- Milled or cut out bitumen shall be removed to an area approved by the RE.
- Water quality from runoff from newly/fresh bitumen surfaces shall be monitored by the RE and remedial actions taken where necessary.

4.7.7 Open Trench Length

1. 'Open trench' includes the period from initial removal of topsoil to replacement of topsoil/original cover after backfilling.

2. Trenching shall be kept to a minimum through the use of single trenches for multiple service provision.

3. Trench lengths shall be kept as short as practically possible before backfilling and compacting. Unless permitted otherwise by the RE, no more than 300m of trench per working gang shall be open at any time.
4. The planning and selection of trench routes shall be undertaken in liaison with the RE and cognisance shall be given to minimising the potential for soil erosion.

5. The permitted working areas along the trench route shall be clearly defined and marked with painted stakes prior to excavation.

6. At least one end of any open trench shall be sloped to allow egress of any animal or person falling into the trench.

7. Trenches shall be shored where they may pose a safety hazard to workers.

8. Trenches shall be re-filled to the same level as (or slightly higher to allow for settlement) the surrounding land surface to minimise erosion. Excess soil shall be stockpiled in an appropriate manner.

9. Backfilling shall generally be undertaken as soon as practically possible in order to limit the risk of erosion and to encourage the rapid natural regeneration of the disturbed area.

10. Open trench time shall be strictly limited to within 14 days where trenches pass through wetlands, streams and on steep slopes.

11. Immediately after back filling, trenches and associated disturbed working areas shall, where specified, be planted with a suitable plant species. Where there is a particularly high erosion risk, a fabric such as Geojute (biodegradable) shall be used in addition to planting.

4.7.8 Bridges, Culverts and Pipe Crossings

1. The Contractor shall ensure that provision is made to facilitate continuity of base water flow at all times during construction of these features across streams, rivers, lagoons and flood plains.

2. Reduction of baseline water quality through construction actions/activities shall be prevented (for example coffer dams, silt traps or plastic lining).

3. Water quality monitoring regimes shall be established prior to the onset of any construction activities within watercourses.

4. The Contractor shall not divert, dam or modify any watercourse without the approval of the RE.

5. The Contractor shall submit a Method Statement to the RE for approval prior to commencing construction of bridges or culverts.

6. The fording of watercourses by machinery and vehicles shall be undertaken at slow speed and with clean vehicles (i.e. no oil leaks, etc) and along a single track. The methodology of vehicle crossings via fording shall be detailed in a Method Statement.

4.7.9 Scour Valves

1. The route of the discharge water from scour valves shall be checked on site by the ECO, RE and Contractor prior to construction to ensure that scouring will not cause erosion or damage to agricultural lands or property.

2. Erosion protection measures shall be installed if required.
4.7.10 Work Stoppage and Temporary Site Closure

1. The RE shall have the right to order work to be stopped in the event of significant infringements of the Environmental Specifications contained within this EMP, until the situation is rectified in compliance with the specifications. In this event, the Contractor shall not be entitled to claim for delays or incurred expenses.

2. In the event of temporary site closure (i.e. a period exceeding one week) the Contractor’s Safety Officers shall check the site, to ensure that the following conditions pertain and report on compliance with this clause. The check shall be made in consultation with the RE.

(a) Fuels/Flammables/Hazardous Materials Stores

3. Fuel stores are as low in volume as practicable.

4. There are no leaks.

5. The outlet is secure and locked.

6. The bund is empty.

7. Fire extinguishers are serviced and accessible.

8. The area is secure from accidental damage through vehicle collision and the like.

9. Emergency and contact numbers are available and displayed.

10. There is adequate ventilation in enclosed spaces.

11. There are no stores or containers within the 1:50 year flood line.

(b) Safety

12. Site Safety checks have been carried out in accordance with the pertinent Occupational Health and Safety requirements prior to site closure.

13. That there is an inspection schedule and log for use by security or contracts staff.

14. All trenches and manholes are secured.

15. Fencing and barriers in place.

16. Applicable notice boards are in place and secured.

17. Emergency and Management contact details are prominently displayed.

18. Security personnel have been briefed and have the facilities to contact or be contacted by relevant management and emergency personnel.

19. Night hazards such as reflectors, lighting, traffic signage etc are in order and have been checked.

20. Fire hazards identified and the local authority notified of any potential threats e.g. large brush stockpiles, fuels etc.
21. Pipe stockpiles are wedged/secured.
22. Scaffolds are secure.
23. Structures vulnerable to high winds secure.

(c) Erosion
24. Wind and dust mitigation measures such as straw, brush packs, irrigation etc are in place.
25. Excavated and filled slopes and stockpiles are at a stable angle and capable of accommodating normal expected water flows.
26. Re-vegetated areas have a watering schedule and the supply to such areas is secured.
27. There are sufficient detention ponds or channels in place.

(d) Water Contamination and Pollution
28. Hazardous fuel stores are secure.
29. Cement and materials stores are secured.
30. Toilets are empty and secured.
31. Refuse bins are empty and secured.
32. Bunding is clean.
33. Drip trays empty and secure.

4.7.11 Pipeline Cleaning
1. Cleaning/flushing of pipelines shall not impair (down grade) downstream baseline water quality. The water quality of receiving waters shall be monitored by the Contractor during cleaning/flushing operations. A Method Statement including water quality monitoring shall be approved by the RE.
2. Materials used in the sterilisation of pipelines, viz. chlorine solutions shall be treated as hazardous substances and disposed of at an approved landfill site.
3. Litter traps shall be installed and maintained at the outflow of all pipelines.

4.7.12 Crushing
1. The positioning of the crusher plant shall take cognisance of minimising noise nuisance to adjacent communities and landowners.
2. The site of the crusher shall be fenced and sign-posted, and access to all unauthorised persons and vehicles shall be strictly prohibited.
3. In order to minimise dust a water spray system may be required at the crusher and pre- and post-crush stockpiles.

4. All fuels and oils required for the crusher infrastructure shall be stored in the fuel store, if one is present on Site, or in an appropriately bunded and secured area.

4.7.13 Demolition

1. Hazardous building materials, including asbestos shall be identified prior to demolition of any buildings and dealt with in accordance with the safety and health legislation. A Method Statement, outlining the proposed approach to the disposal of these materials, must be supplied for approval by the RE.

2. The Contractor shall be responsible for ensuring that the buildings to be demolished do not require any specific permits for demolition or are designated as of cultural value and/or are protected as a consequence.

3. Municipal and other services shall be isolated prior to any demolition occurring.

4. Safety legislation shall be strictly adhered to in demolishing buildings and structures.

5. A Safety officer shall be appointed to oversee the safe demolition of buildings and structures.

6. Demolition sites shall be kept in a neat, tidy and safe condition.

7. Hazardous and non-hazardous materials shall be separated on Site and disposed off at appropriate licensed disposal sites. The Contractor shall supply the RE with a certificate of disposal.

4.7.14 Drilling and Jackhammering

1. The Contractor shall submit a Method Statement detailing his proposals to prevent pollution during drilling operations. This shall be approved by the RE prior to the onset of any drilling operations.

2. The Contractor shall take all reasonable measures to limit dust generation as a result of drilling operations.

3. Noise and dust nuisances shall comply with the applicable standards.

4. The Contractor shall ensure that no pollution results from drilling operations, either as a result of oil and fuel drips, or from drilling fluid.

5. All affected parties shall be informed at least one week prior to the onset of the proposed drilling/ jackhammering operations, and their concerns addressed.

6. Any areas or structures damaged by the drilling and associated activities shall be rehabilitated by the Contractor to the satisfaction of the RE and at cost to the Appoint Contractor.

4.7.15 Piling, Jacking and Thrust Boring
1. Piling, jacking and thrust boring operations require a **Method Statement**, which shall detail the type of operations to be undertaken, e.g. *in situ* casting or pre-cast pile structures. *In situ* piles shall take cognisance of possible groundwater impacts.

2. The Contractor shall take preventative measures to minimise nuisance, caused by these activities such as screening, muffling, dust control, and identifying appropriate timing for the activities. Pre-notification of affected parties shall be implemented to minimise complaints regarding dust, noise and vibration nuisances.

3. The area shall be adequately fenced and warning signs erected for the duration of these activities.

### 4.7.16 Pumping and Sumping

1. A drip tray shall be placed beneath pumps in order to prevent fuel spills and leaks from contaminating the water in the pumped area.

2. Contaminated water from the pumps may not be discharged into existing watercourses or streams and a **Method Statement** for discharge of this contaminated water shall be required.

3. Silt-laden water may be cleaned by using any one of the following or other approved methods:
   - A perforated 200l drum containing sand and stone separated by geotextile fabric with a central delivery water pipe.
   - Ensuring that the overland flow of water disperses widely through vegetation.
   - Tying a geotextile sock on the delivery pipe of the pump. Other filtration methods may be used and shall be approved by the RE.
   - A settlement pond.

### 4.7.17 Settlement Ponds

1. The Contractor shall submit a **Method Statement** proposal in connection with settlement ponds prior to the construction of any such ponds. The Contractor shall size settlement ponds in accordance with the envisaged scale of operation.

2. Suspended solids and contaminants including oils shall be removed and disposed of by the Contractor at frequent intervals at a site as approved by the RE.

### 4.7.18 Retaining Walls and Gabions

1. A **Method Statement**, approved by the RE, shall be required to deal with these structures.

2. Rocks for use in gabion baskets/reno mattresses shall be obtained from a source approved by the RE.

3. Rocks for use in gabion baskets/reno mattresses shall not be obtained from a watercourse.
4.7.19 Rock Breaking

1. Mechanical methods of rock breaking, including Montabert type breakers, jackhammers and 'boulder busting', have noise and dust impacts that shall be addressed.

2. Boulder buster use requires that blasting protocols shall be followed.

3. Residents shall be notified at least one week prior to these activities commencing, and their concerns addressed.

4. Chemical breaking shall require a Method Statement approved by the RE before commencing.

4.8 Rehabilitation

4.8.1 Rehabilitation

1. Rehabilitation shall be required for all specified areas disturbed by the works.

2. Where possible, the natural re-vegetation of the areas should be encouraged.

3. Rehabilitation shall ensure that all specified areas disturbed by the works are returned to a similar or better state than before the construction works commenced.

4. The Contractor shall rehabilitate all disturbed areas to the satisfaction of the RE.

5. The Contractor should implement a programme of progressive rehabilitation, i.e. once works are complete in particular areas, rehabilitation and/or re-vegetation could begin.

6. A programme of progressive rehabilitation will provide an opportunity to assess whether or not the methods employed are suitable and successful and would help prevent erosion in impacted areas. Where rehabilitation of an area is not successful, the Contractor will rehabilitate these areas at no additional cost to the Employer.

7. The Contractor shall provide the RE with a comprehensive plan for the rehabilitation of the entire site for approval. The following points must be taken into account when drawing up the Rehabilitation Plan:
   
   • The plan should be flexible – i.e. where measures are found to be inefficient, the plan shall be modified at no additional cost to the Employer.
   
   • Restoration will include, at a minimum, removing unused materials, rubble and foundations, ripping any compacted ground to loosen soil, spreading topsoil evenly over the former site and re-establishing grass cover.
   
   • The Contractor shall be responsible for the successful rehabilitation and/or re-vegetation of the site within the contract defect/warranty period.
   
   • Successful re-vegetation means ≥ 80% of the seeded area is covered with grass/groundcover.
   
   • The inclusion of grass seed mixes for summer and winter.
- The inclusion of suitable fertilisers and application rates.

- The rehabilitation of all temporary access tracks, haul roads and any other disturbed areas outside of the approved working areas to their original condition will be at the Contractor’s expense.

8. Rehabilitation may include the following activities:

- Clearance of rubble associated with construction, including removal of surplus materials, excavation and disposal of consolidated waste concrete and concrete wash water, litter etc.

- Covering and capping of boreholes as specified and/or as directed by the RE.

- Removal of all soil contaminated by hydrocarbons by excavation to the depth of contaminant penetration and removal to an appropriate landfill site.

- Backfilling and contouring using stockpiled subsoil removed during site clearing.

- Finishing and grading of final levels of all disturbed areas shall be consistent with the natural topography of the area, where feasible.

- Rehabilitation of all drainage lines affected by construction to approximately their original profile. Where this is not feasible due to technical constraints, the profile is to be agreed upon by the RE.

- Ripping along the contour of compacted disturbed areas, including stockpile areas, to a depth of 150mm prior to the replacement of topsoils, except where otherwise specified by the RE.

- Replacing topsoil to the required depth and scarification consistent with the natural contour.

- Re-vegetation if insufficient topsoil is available, e.g. selective sodding or seeding.

- The method of vegetation removal and establishment where required may be specified by the RE.

- The eradication of young invasive/alien species that may have grown up during the construction period in impacted and rehabilitated areas.

- The removal of visually detracting or environmentally unacceptable piles of blast rock and boulders to an approved spoil site.

4.8.2 Grass Seeding

1. Grass seeding shall be carried out where specified by the RE under the guidance of the ECO. In most cases, replacement of existing topsoil and original groundcover should be sufficient.

2. In assessing the need for seeding, the RE shall take into account the following conditions:

- On slopes where the gradient exceeds 15% in long or cross section.
• On high-lying exposed slopes where the soil will dry out easily.
• Where existing topsoil is thin (less than 80 mm).
• Where soil is very infertile.
• Adjacent to a watercourse.
• On embankments of permanent roads created as part of the Contract.
• The need to inhibit re-infestation of alien invasive weeds.

3. The RE shall assess the conditions timeously before final cut or filling is undertaken and specify areas which are to be seeded.

4. Where grass seeding is deemed to be necessary, the whole of the disturbed corridor shall be seeded and not only the width of the excavation.

5. Seeding is to be undertaken during the growing season.

4.8.3 Rehabilitation of Trenches and Impacted Areas

1. After backfilling the trench, the topsoil shall be replaced on top and only lightly compacted, e.g. by trampling under foot.

2. Where grass seeding is required, it must be carried out within 2 days of topsoil replacement and before lightly compacting the soil and preferably during the growing season.

3. Care shall be taken to ensure that the surface is finished in a manner which does not result in the channelling of water or the concentration of flows.

4. Where slope gradients exceed 15% in long section, anti erosion berms shall be made which are angled at ± 10° across the contours such that they lead water off the disturbed corridor.

5. The erosion berms shall be made after backfilling and before topsoil replacement.

4.9 Management and Monitoring

4.9.1 General Inspection Monitoring and Reporting

1. The RE shall:
   • Liaise with the Employer and ECO as appropriate.

2. The ECO shall:
   • Conduct regular "audits" to ensure that the system for implementation of the EMP is operating effectively. The audit shall check that a procedure is in place to ensure that:
- The Method Statements and EMP being used are the up to date versions.
- Variations to the EMP/Method Statements and non-compliance and corrective action are documented.
- Appropriate environmental training of personnel is undertaken.
- Emergency procedures are in place and effectively communicated to personnel.
  
  • Keep a register of major incidents (spills, injuries, complaints, legal transgressions, spot fines and penalties etc) and other documentation related to the EMP.
  
  • Liaise with the RE on a regular basis.
  
  • Ensure that appropriate corrective and preventive action is taken by the Contractor once instructions have been issued through the RE.

3. The Contractor shall:

  • Inspect the site on a daily basis to ensure that the environmental specifications are adhered to.
  
  • Provide the RE with a verbal report, on a weekly basis, detailing both compliance with the EMP as well as environmental performance.
  
  • Maintain a record of major incidents (spills, impacts, complaints, legal transgressions etc) as well as corrective and preventive actions taken, for submission to the Responsible Person at the scheduled weekly report back meetings.

4. The FIPAG Environmental Engineer shall:

  • Undertake independent environmental audits to ensure that the system for implementation of the EMP is operating effectively, and that the ECO is undertaking his tasks effectively.

4.9.2 Compliance with the EMP

1. The Contractor and/or his agents are deemed not to have complied with the EMP and remedial action if:

  • Within the boundaries of the site, extensions, haul/access roads and in adjacent water/wetland bodies, there is evidence of contravention of the EMP clauses.

  • Environmental damage ensues due to negligence.

  • The Contractor fails to comply with corrective or other instructions issued by the RE, within a time period specified by the RE.

4.9.3 Tolerances
1. 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.

2. Tolerance with respect to environmental matters applies not only to the finished product but also to the standard of the day-to-day operation required to complete the Works.

3. It is thus required that the Contractor shall comply with the environmental requirements on an ongoing basis and any failure on his part to do so will entitle the RE to certify the imposition of a penalty subject to the details set out.

4.9.4 Penalties

1. Penalties will be issued for the transgressions and non-compliances 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 over and above any other contractual consequence. The Contractor is deemed NOT to have complied with this Environmental Specification if:

- There is evidence of contravention of the Environmental Specification within the boundaries of the site, site extensions and/or haul/ access roads.

- Environmental damage ensues due to negligence.

- The Contractor fails to comply with corrective or other instructions issued by the RE with in a specific time.

- The Contractor fails to respond adequately to complaints from the public.

2. A list of incidents and associated penalty value shall be prepared by the Environmental Consultant for inclusion in the specific sub-project EMP and incorporated into the Bidding Documents for Bidding Contractors.

3. Penalties may be issued per incident at the discretion of the RE. The value of the penalty imposed shall be as defined in the contract and enforcement shall be at the discretion of the Employer.

4. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the EMP. The RE will inform the Contractor of the contravention and the amount of the penalty, and will deduct the amount from monies due under the Contract.

5. The penalty monies will become the property of the Employer.

6. The RE shall be the judge as to what constitutes a transgression in terms of this clause subject to the provisions of the General Conditions of Contract. In the event that transgressions continue, the Contractor’s attention is drawn to the provisions of the General Conditions of Contract, under which the RE may cancel the Contract.

7. For each subsequent similar offence, the penalty may, at the discretion of the RE be doubled in value to a maximum value to be determined by the RE.

8. Payment of any penalty in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.
9. An Environmental Performance Guarantee of at least 5% of Contract Value shall form part of the ‘Performance Bank Guarantee (Unconditional)’ which the Contractor is required to provide as part of the Contract with FIPAG. This Guarantee shall be used in the event of non-conformance or contraventions of the EMP.

10. Penalties for the typical incidents detailed below, will be imposed by the RE on the Contractor and/or his Sub-contractors – the typical incidents listed below are not exhaustive.

<table>
<thead>
<tr>
<th>TYPICAL INCIDENTS INCURRING PENALTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to submit Method Statements timeously.</td>
</tr>
<tr>
<td>Failure to demarcate working servitudes and/or maintain demarcation tape.</td>
</tr>
<tr>
<td>Working or parking vehicles outside of the demarcated servitude and/or within the boundaries of a no-go area.</td>
</tr>
<tr>
<td>Failure to strip topsoil with intact vegetation.</td>
</tr>
<tr>
<td>Failure to stockpile topsoil correctly.</td>
</tr>
<tr>
<td>Failure to stockpile materials in designated areas.</td>
</tr>
<tr>
<td>Pollution of water bodies - including increased suspended solid loads.</td>
</tr>
<tr>
<td>Failure to provide adequate sanitation, waste disposal facilities or services.</td>
</tr>
<tr>
<td>Failure to demarcate ‘No-go’ Areas before commencing construction clearance and other activities</td>
</tr>
<tr>
<td>Insufficient education of staff regarding environmental matters and site housekeeping practices</td>
</tr>
<tr>
<td>Use of soil in an unspecified manner</td>
</tr>
<tr>
<td>Stockpile of soils and materials outside demarcated areas</td>
</tr>
<tr>
<td>Inappropriate mixing of cement/concrete and poor management of slurry</td>
</tr>
<tr>
<td>Untidiness and litter at camp.</td>
</tr>
<tr>
<td>Unauthorised removal of indigenous trees, fruit or nut trees, medicinal or other plants.</td>
</tr>
<tr>
<td>Failure to erect temporary fences as required.</td>
</tr>
<tr>
<td>Failure to reinstate disturbed areas within the specified timeframe.</td>
</tr>
<tr>
<td>Fire – costs of runaway fires will be borne by the Contractor, should he/she be proven responsible for such fires.</td>
</tr>
<tr>
<td>Failure to provide equipment for emergency situations</td>
</tr>
<tr>
<td>Animal poaching.</td>
</tr>
<tr>
<td>Defacing, painting or damaging natural features</td>
</tr>
<tr>
<td>Damaging cultural, historical and/or archaeological sites of importance</td>
</tr>
<tr>
<td>Failure to maintain basic safety measures on site.</td>
</tr>
<tr>
<td>Failure to obey site protection measures specified by the RE.</td>
</tr>
<tr>
<td>Failure to carry out required community liaison, damage to property etc, without prior negotiation and/or compensation and other social infringements.</td>
</tr>
<tr>
<td>Persistent and un-repaired oil leaks from machinery. The use of inappropriate methods of refuelling.</td>
</tr>
</tbody>
</table>
TYPICAL INCIDENTS INCURRING PENALTIES

<table>
<thead>
<tr>
<th>Incident</th>
<th>Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to provide drip trays and/or empty them frequently.</td>
<td></td>
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<tr>
<td>Inappropriate use of bins and poor waste management on site.</td>
<td></td>
</tr>
<tr>
<td>Inappropriate offsite disposal of waste from site.</td>
<td></td>
</tr>
<tr>
<td>Deliberate lighting of illegal fires on site.</td>
<td></td>
</tr>
<tr>
<td>The eating of meals on site outside the defined eating area. Individual not making use of the site ablution facilities.</td>
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</tr>
<tr>
<td>Dust or excess noise on or emanating from the site.</td>
<td></td>
</tr>
<tr>
<td>Inappropriate use of adjacent watercourses and water bodies – such as for unapproved water abstraction, washing of vehicles, wastewater disposal and use by staff for washing.</td>
<td></td>
</tr>
<tr>
<td>Any person, vehicle, item of plant, or any thing related to the Contractor’s operations causing a public nuisance.</td>
<td></td>
</tr>
<tr>
<td>Improper use of plant or equipment.</td>
<td></td>
</tr>
<tr>
<td>Construction vehicles not adhering to speed limits</td>
<td></td>
</tr>
<tr>
<td>Failure to maintain a register of incidents on site.</td>
<td></td>
</tr>
<tr>
<td>Failure to remove all temporary features and leftovers from the construction site and works areas upon completion of the works.</td>
<td></td>
</tr>
<tr>
<td>Any other contravention of the environmental specification.</td>
<td></td>
</tr>
</tbody>
</table>

4.10 Completion of Contract and Decommissioning of the Site

4.10.1 Completion of Contract

1. Prior to completion of the Contract, the RE is to timeously notify the ECO and the Employer’s Environmental Engineer of ‘Practical Completion’ meetings and ‘snagging lists’ to provide an opportunity to identify work outstanding or incomplete.

2. The RE is to timeously inform the ECO and the Employer’s Environmental Engineer of Contract Completion so that a final audit can be arranged.

4.10.2 Decommissioning of the Site

1. On completion of the Contract, the Contractor shall decommission the Contractor’s Camp and works. This shall include the following:
   - Removal of all remaining structures, services, facilities, unless sold of given to the landowner.
   - Removal of all remaining construction rubble and waste, to be disposed of at an appropriate waste disposal site.
   - Reinstatement and rehabilitation of all remaining disturbed area, including temporary access routes, turning circles, parking areas, etc.
4.11 Measurement and Payment

4.11.1 Measurement and Payment

The Contractor shall include all costs for the EMP in his Contract with the Employer.
5 RECOMMENDED FORMAT AND CONTENT FOR SUB-PROJECT EMPS

The following presents a suggested format and content for a typical sub-project EMPs which will be included in the contract documents for the works Contractor:

**Introduction**
By way of setting the context for the sub-project EMP, this section should outline the following:
- Purpose of the sub-project EMP.
- Scope of application of the sub-project EMP.

**Statement on Environmental Management**
This should describe in a simple statement, the Contractor’s understanding and commitment to implementing the sub-project EMP.
It should also include reference to the management of the EMP itself, to ensure that the document remains pertinent to the activities on site.

**Organisation and Management Structure**
This should outline the roles and responsibilities for each of the key staff who will implement and/or monitor the implementation of the sub-project EMP.

**Environmental Specifications**
This should contain the key specifications pertinent to the nature of the sub-project, the scale of the sub-project and the environment within which construction will occur.
Environmental specifications may be grouped according to broad activities, such as:
- Planning.
- Site Establishment.
- Site Clearance.
- Site Housekeeping
- Construction Activities.
- Rehabilitation.
- Contract Completion and Decommissioning of the Site.
Alternatively the specifications may be listed in alphabetical order – whichever suits the potential users best.

**Programme for Implementation**
This should include reference to the following:
- Procurement of equipment and materials and programme for arrival on site.
- Environmental Training programme.
- Timing of construction activities linked to implementation of Environmental Specifications.
- Preparation of Method Statements.
- Environmental and other auditing schedules.

This section may best be represented with the addition of plans and drawings rather than plain text alone.

Management and Monitoring

This should describe the manner in which the implementation of the EMP will be managed and how the potential impacts of the works may be monitored for the duration of the contract.

Penalties

A list of incidents and the designated penalty should be included here, together with details of how and who will impose the penalty.

Measurement and Payment

This should include a statement or instructions on the coverage of costs for the contract.

Annexures

Annexures should be used to store supporting information to the main document, such as:

- List of Definitions, Terms and Abbreviations.
- Contact details.
- Forms and checklists to be used during the implementation and/or monitoring of the sub-project EMP.
ANNEXURES

Annexure A: Construction Activities that will require Method Statements
Annexure B: Project Start Up and Site Inspection Sheet
Annexure C: Routine Site Inspection Sheet
Annexure D: Site Decommissioning Inspection Sheet
Annexure E: Site Inspection Report Structure
### ANNEXURE A:

**Construction Activities that will require Method Statements**

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>SPECIFICS</th>
</tr>
</thead>
</table>
| Access Routes                 | • Upgrading and construction of access routes  
                                 • Rehabilitation of temporary access routes  
                                 • Location of proposed access routes        |
| Alien Plant Clearing          | Method of control to be used for the eradication or control of alien vegetation                |
| Anchors                       | Use of rock or ground anchors                                                                  |
| Blasting                      | Details of all methods and logistics associated with blasting                                  |
| Bunding                       | Method for the bunding of static plant                                                         |
| Site Establishment            | • Layout and preparation of the construction camp  
                                 • Method of installing fences required for 'no go' areas, working areas and construction camp areas  
                                 • Preparation of working area                  |
| Cement/Concrete Batching     | • Location, layout and preparation of cement/concrete batching facilities including the methods employed for the mixing of concrete including the management of runoff water from such areas |
| Contaminated Water            | Contaminated water management plan, including the containment of runoff and polluted water     |
| Demolition                    | Proposed methods of demolition                                                                 |
| Drilling and Jack Hammering   | • Method of drill coring with water or coolant lubricants  
                                 • Methods to prevent pollution during drilling operations                                      |
| Dust                          | Dust control plan                                                                               |
| Earthwork                     | • Method for the control of erosion during bulk earthworks operations  
                                 • Method of undertaking earthworks, including hand excavation and spoil management         |
| Emergency                     | Emergency construction Method Statements                                                        |
| Environmental Awareness Course| • Logistics for the environmental awareness course for all the Contractor's employees  
                                 • Logistics for the environmental awareness course for the Contractor's management staff   |
| Erosion Control               | Method of erosion control, including erosion of spoil materials                                  |
| Fire, hazardous and Poisonous substances | • Handling and storage of hazardous waste  
                                 • Emergency spillages procedures and compounds to be used  
                                 • Emergency procedures for fire  
                                 • Use of herbicides, pesticides and other poisonous substances                               |
<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>SPECIFICS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>substances</td>
</tr>
<tr>
<td></td>
<td>Methods of the disposal of hazardous building materials, including asbestos, fibre claddings, refrigerants and coolants.</td>
</tr>
<tr>
<td>Fuels and Fuel Spills</td>
<td>Methods of refuelling vehicles and plant</td>
</tr>
<tr>
<td></td>
<td>Details of methods for fuel spills and clean up operations</td>
</tr>
<tr>
<td></td>
<td>Refuelling of construction vehicles in high flow areas</td>
</tr>
<tr>
<td></td>
<td>Method of refuelling dredgers during dredging operations</td>
</tr>
<tr>
<td>Piling, jacking and thrust Boring</td>
<td>The method of piling operation (e.g. driven or bored) or in situ casting or pre-cast pile structures</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>Rehabilitation of disturbed areas and re-vegetation after construction is complete</td>
</tr>
<tr>
<td></td>
<td>Retaining walls and gabions</td>
</tr>
<tr>
<td></td>
<td>Method for construction and installation of retaining walls/gabion baskets</td>
</tr>
<tr>
<td>Riverine corridors</td>
<td>Method of diverting the river during construction</td>
</tr>
<tr>
<td></td>
<td>Details of methods to control downstream sedimentation</td>
</tr>
<tr>
<td></td>
<td>Details of methods to control in stream and floodplain erosion</td>
</tr>
<tr>
<td></td>
<td>Details of methods to cross rivers or streams during construction activities</td>
</tr>
<tr>
<td></td>
<td>Details of the release of any construction related effluent water into any natural stream or river</td>
</tr>
<tr>
<td></td>
<td>Method for all construction activities within the 1 in 50 year flood plain</td>
</tr>
<tr>
<td></td>
<td>Method of laying pipelines across water bodies including the details of methods to control sedimentation</td>
</tr>
<tr>
<td>Rock breaking</td>
<td>Details of chemical applications to be used for rock breaking</td>
</tr>
<tr>
<td>Sediment ponds and sumps</td>
<td>Layout and preparation of settlement ponds and sumps</td>
</tr>
<tr>
<td>Solid waste management</td>
<td>Solid waste control and removal of waste from site</td>
</tr>
<tr>
<td></td>
<td>Methods for the disposal of vegetation cuttings, tree trunks and/or building materials</td>
</tr>
<tr>
<td>Sources of materials</td>
<td>Details of materials imported to the site (where applicable)</td>
</tr>
<tr>
<td>Sensitive environments</td>
<td>Proposed construction methods within sensitive environments (as defined by the ECO)</td>
</tr>
<tr>
<td>Traffic</td>
<td>Traffic safety measure for entry/exit onto/off public roads</td>
</tr>
<tr>
<td>Vegetation clearing</td>
<td>Method of vegetation clearing during site establishment</td>
</tr>
<tr>
<td>Wash areas</td>
<td>Location, layout, preparation and operation of all wash areas, including vehicle wash, workshop washing and paint washing and clearing.</td>
</tr>
</tbody>
</table>
## PROJECT START UP INSPECTION SHEET

<table>
<thead>
<tr>
<th>ES</th>
<th>ENVIRONMENTAL ASPECT</th>
<th>YES NO</th>
<th>N/A</th>
<th>COMMENTS</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PLANNING</td>
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<td></td>
<td>ESTABLISHMENT</td>
<td></td>
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<tr>
<td></td>
<td>CLEARANCE</td>
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</tr>
</tbody>
</table>
ANNEXURE C:
Routine Site Inspection Sheet
# ROUTINE SITE INSPECTION SHEET

<table>
<thead>
<tr>
<th>Project:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract No.:</td>
<td>Completed by:</td>
</tr>
<tr>
<td>Contractor:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ES</th>
<th>ENVIRONMENTAL ASPECT</th>
<th>YES NO</th>
<th>N/A</th>
<th>COMMENTS</th>
<th>ACTION</th>
</tr>
</thead>
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<tr>
<td></td>
<td>HOUSEKEEPING</td>
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</tr>
<tr>
<td></td>
<td>CONSTRUCTION ACTIVITIES</td>
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</tr>
<tr>
<td></td>
<td>REINSTATEMENT AND REHABILITATION</td>
<td></td>
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</tbody>
</table>
## SITE DECOMMISSIONING INSPECTION SHEET

<table>
<thead>
<tr>
<th>ES</th>
<th>ENVIRONMENTAL ASPECT</th>
<th>YES NO</th>
<th>N/A</th>
<th>COMMENTS</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DECOMMISSIONING OF THE SITE</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
ANNEXURE E:

Site Inspection Report Structure
Purpose of the Site Inspection Report

The purpose of the Site Inspection Report is to describe the results of the site inspections undertaken by the ECO or delegated responsible person so that the level of compliance with the EMP can be monitored throughout the contract.

In particular, it will be expected to summarise the following:

- The key results;
- Trends observed;
- Key issues observed;
- Problems encountered;
- Actions required and response taken or to be taken; and
- Recommendations.

The Site Inspection Report should conclude with a commentary on the overall performance of the Contractor in terms of meeting the requirements of individual/groups of Environmental Specifications and/or EMP as a whole.

Preparation of the Site Inspection Reports

Site Inspection Reports are expected to be prepared regularly throughout a given construction contract, including (but not be limited to) the following:

- Prior to the handover of the site to the Contractor;
- At regular stages throughout the construction works, and particularly with the commencement of particularly significant activities; and
- At the decommissioning of the site and prior to the handover of the site to the Employer/Operator.

Recommended Structure for the Site Inspection Reports

The following report structure is suggested for the Site Inspection Report:

**Introduction**

By way of setting the context for the Site Inspection Report, this section should outline the following:
- The need for the Site Inspections, and reporting.
- Purpose of the Site Inspection Report.
- The scope of coverage of the Site Inspection Report.
**Environmental Management**

This section should summarise the environmental requirements for the contract and for the construction works, and against which environmental performance is assessed.

**Methodology**

This should describe the activities undertaken during the particular site inspection, such as:

- A site walkabout with the RE.
- A review of documents and records, such as complaints records and/or incidents reports maintained by the Contractor and/or ECO.
- Consultations with pertinent parties on site.

**Findings of the Site Inspection**

This should contain reference to the following:

- A commentary on the level of compliance with key aspects of the Environmental Specifications, as listed in the checklist(s).
- Details of issues, infringements, problems and non-compliances encountered.
- Recommendations on actions to be undertaken to address any issues, infringements and/or non-compliances.

**Conclusions**

This should include an overall statement on the level of compliance observed during the site inspection.

**Annexures**

Annexures should be used to store supporting information to the main document, such as:

- Photographs.
- A quick reference, summary table of issues of concern and the necessary corrective measures required to address these issues.