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THE GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (GLeWaP)

ENVIRONMENTAL IMPACT ASSESSMENT

(DEA Ref No. 12/12/20/978)

ANNEXURE O: GENERIC CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

AUGUST 2010

Compiled by: ILISO Consulting (Pty) Ltd

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REPORT DETAILS PAGE

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ABBREVIATIONS

CEMP	Construction Environmental Management Plan
DEA	Department of Environmental Affairs (formerly Department of Environmental Affairs and Tourism and Tourism)
DWA	Department of Water Affairs (formerly Department of Water Affairs and Forestry)
ECO	Environmental Control Officer
EO	Environmental Officer
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EM	Environmental Manager
EMC	Environmental Monitoring Committee
EMP	Environmental Management Plan
EMP's	Environmental Management Plans
EO	Environmental Officer
GLeWaP	Groot Letaba River Water Development Project
IAPs	Interested and Affected Parties
IEA	Independent Environmental Officer
MSDS	Material Strategy Data sheets
LPG	Low Pressure Gas
MAR	Mean Annual Runoff
MPRDA	Mineral Petroleum Resources Development Act (No. 28 of 2002)

NEMA	National Environmental Management Act (No.107 of 1998)
OHSA	Occupation Health and Safety Act (Act 85 of 1993)
PAYE	Pay as you Earn
PCMT	Project Co- Ordination Management Team
PSP	Professional Service Provider
SAPS	South African Police Services
UIF	Unemployment Insurance Fund

1. STUDY INTRODUCTION

This document is a generic Construction Environmental Management Plan (CEMP), for the implementation of the Groot Letaba River Water Development Project (GLeWaP). The CEMP is aimed at ensuring that optimal environmental protection is achieved during the construction phase of the project.

This CEMP covers the principles, responsibilities and requirements applicable in order to implement effective environmental management during the construction and rehabilitation phases of the project.

Mitigation measures in the form of environmental management and mitigation plans are specified for purposes of minimising environmental impacts likely to be incurred during construction activities.

The CEMP is a dynamic document, which will be reviewed, revised and updated during the life span of the project construction phase.

1.1 STRUCTURE OF THE REPORT

The report is structured as follows:

- **Chapter 1** of the CEMP serves to outline the background to the project.
- **Chapter 2** provides a project description.
- **Chapter 3** an organisational structure and the roles and responsibilities of the various departments and construction team.
- **Chapter 4** specifies compliance monitoring requirements.
- **Chapter 5** highlights all relevant legislative requirements and principles.
- **Chapter 6** provides a list of all management and mitigation plans.
- **Chapter 6.1** Socio-economic management and mitigation plan.
- **Chapter 6.2** Public Consultation and disclosure management and mitigation plan.
- **Chapter 6.3** Construction site management and mitigation plan.
- **Chapter 6.4** Solid Waste management and mitigation plan.
- **Chapter 6.5** Visual Aesthetics management and mitigation plan.
- **Chapter 6.6** Air quality management and mitigation plan.

- **Chapter 6.7** Noise Control management and mitigation plan.
- **Chapter 6.8** Traffic management and mitigation plan.
- **Chapter 6.9** Water management and mitigation plan.
- **Chapter 6.10** Aquatic Ecosystem management and mitigation plan.
- **Chapter 6.11** Material Sourcing and Earthfill Stockpiles management and mitigation plan.
- **Chapter 6.12** Topsoil management and mitigation plan.
- **Chapter 6.13** Spoil management and mitigation plan.
- **Chapter 6.14** Fauna and Flora management and mitigation plan.
- **Chapter 6.15** Heritage management and mitigation plan.
- **Chapter 6.16** Health and Safety management and mitigation plan.
- **Chapter 6.17** Rehabilitation management and mitigation plan.
- **Chapter 6.18** Monitoring requirements.
- **Chapter 6.19** Site Closure requirement

1.2 ENVIRONMENTAL AUTHORISATION PROCESS

Environmental authorisation in terms of Section 24 (5) of the National Environmental Management Act (NEMA) and other legislation is required before the infrastructure components of the project can be implemented. An Environmental Impact Assessment (EIA) process commenced in June 2007 and is expected to be completed in the first quarter of 2009. The Environmental Impact Assessment Report (EIR) has been prepared in terms of Regulation 32 of GN 385, and will include a draft Construction EMP (this report) that complies with Regulation 34 of GN 385.

The Department of Environmental Affairs (DEA) is the lead authority for the EIA, and will make the final decision on whether the proposed project may go ahead or not, and under what conditions.

1.3 REGULATORY REQUIREMENTS AND EXTENT OF EMPS

In discussions with the DEA at the pre-application consultation on 8 March 2007 it was agreed that although the project would probably ultimately require a suite of EMPs for the various components, only the draft pre-construction and a draft generic construction EMP will be compiled during the environmental authorization process.

EMPs for the operational and decommissioning phases will not be included. The draft generic construction EMP will be used in the implementation phase as the basis for the full suite of EMPs required.

For the purposes of the environmental investigations and these EMPs, pre-construction activities are defined as all activities prior to site handover. These will typically include investigations (e.g. soil sampling and drilling).

The draft generic CEMP will include all activities related to all components of the project (as described below) including the raising of the Tzaneen Dam, the construction of the proposed dam at the site known as Nwamitwa, the road re-alignment, upgrading of the water treatment works, and construction of pump station, pipelines and reservoirs.

1.4 PURPOSE OF THE EMPS

The EMP applies to the contract issued for the construction of the proposed dam at the site known as Nwamitwa, the raising of the Tzaneen Dam wall and all accompanying relevant components that form part of the Groot Letaba River Water Development Project (GLeWaP) – bulk water infrastructure contract. The GLeWaP entails the construction of a large storage dam on the Groot Letaba River and associated National Bulk Water Distribution Infrastructure (pipelines, pump stations, balancing dams, off-takes and reservoirs) in the Limpopo Province of South Africa.

The GLeWaP EMPs will ensure that the environment is appropriately considered during the design and construction phases of the project. The EMPs should provide a practical implementation framework for the mitigation measures recommended in the EIR, as well as monitoring, auditing and taking corrective actions during implementation.

1.5 PROJECT TEAM

ILISO Consulting was appointed as the independent Environmental Assessment Practioner (EAP) to undertake the EIA and the Draft pre-construction EMP and the Generic Construction EMP. ILISO Consulting has used input from the specialists mentioned below.

Dr Martin van Veelen is a professional engineer with a PhD in aquatic health. He is the Business Unit Head of the ILISO Environmental Management Discipline Group and a certified Environmental Assessment Practitioner with 30 years experience. He specialises in project management, environmental impact assessments and water resource planning. He specifically has extensive experience in water quality, especially water quality management, water quality monitoring and water quality assessment. Martin has experience in managing projects that involve multi-disciplinary teams, and projects that involve public consultation and participation. Martin is the project leader and undertook the water quality specialist study.

Terry Baker is a certified Environmental Assessment Practitioner (EAP), has a MA in Environmental Management and specialises in Environmental Impact Assessments and Project Management. She has been involved in a variety EIAs including for transmission lines, water supply projects, dams, roads and airports, in South Africa, Botswana, Uganda, Lesotho, and Mozambique. She has been involved in public participation programmes, water quality assessments, socio-economic and institutional development projects and the use of Geographic Information Systems on a number of projects. Terry is actively involved in the International Association for Impact Assessment, and served on the National Executive Committee of the South African Affiliate from 2005 to 2008. Terry is the Project Manager.

Deon Esterhuizen has a MSc in Environmental Management with 16 years of experience in water related projects, which include water quality management, registration and licensing of water users, completion of Environmental Impact Assessments in support of the issuing of Record of Decisions, development of a management guide for domestic water use, project management, and implementation of the Resource Directed Measures as required by the Department of Water Affairs. He was part of the team that compiled the Environmental Management Plan for the Gautrain Rapid Rail Link Project. Deon is responsible for compiling the EMPs for this project.

Consultant Name	Company Name	Specialist Study Name
Dr Johnny van Schalkwyk	National Cultural History museum	Heritage Impact Assessment
Mr Bert de Vries	ILISO Consulting (Pty)	Traffic Impact Assessment

	Ltd	
Mr Derek Cosijn	Jongens Keet and Associates	Noise Impact Assessment
Mr Peter Kimberg	Golder and Associates	Aquatic Ecology Specialist Study
Mr Cameron von Bratt	Golder and Associates	Aquatic Ecology Specialist Study
Mr Graham Deal	Ecorex	Terrestrial Ecology Specialist Study
Ms Renee Thomas	Airshed	Air Quality Specialist Study
Mr Russell Arid	Kayamandi	Economic Specialist Study
Ms Nanja Churr	Kayamandi	Economic Specialist Study
Ms Anita Bron	MasterQ Research	Social Impact Assessment
Ms Karen James	Insite	Visual Impact Assessment
Ms Jo- Anne Thomas	Savannah	Environmental Management Programmes
Mr Andrew Dickson	Margot Saner and Associates	Health Impact Assessment
Prof Gerrit Basson	ASP Technology	Sedimentation Impact Assessment

1.6 APPROACH

Twelve specialist studies were undertaken during the environmental assessment of the GLeWaP, which considered the potential impacts of the GLeWaP and associated infrastructure on the receiving environment.

The findings of all the specialist studies were distilled, examined and captured in the EIR. All mitigation measures prepared by the twelve specialists were assessed for relevance and summarised in the EIR. The proposed mitigation measures have been incorporated into the relevant EMPs through the development of management and mitigation plans. The various management and mitigation plans that are needed to address the potential impacts of the proposed project are described later.

2. DESCRIPTION OF THE PROJECT

The Groot Letaba River Water Development Project is aimed at improving the management of the water resources in the catchment and consists of non-infrastructure options to manage the available water as well as the construction of infrastructure components. Although only the construction of the infrastructure components require authorisation from the DEA and are subject to the EIA, they must be seen as being complemented by the non-infrastructure components.

2.1 INFRASTRUCTURE COMPONENTS OF THE PROJECT

The infrastructure components of the project that have been subjected to the EIA include:

- Construction of a dam at the site known as Nwamitwa on the Groot Letaba River, downstream of the confluence of the Nwanedzi River. The Environmental Impact Assessment was based on a dam wall that could be up to 36 m high and have a gross storage capacity of 144 million m^3. The catchment area of the proposed dam at the site known as Nwamitwa is up to 1 400 km^2 and the Mean Annual Runoff (MAR) is approximately 122,6 million m^3 under natural undeveloped conditions. The estimated increase in system yield available for domestic use is up to 18 million m^3/a after providing for the Reserve;

- Parts of the R529, D1292 and P43/3 roads will have to be re-aligned to accommodate the dam;

- Raising of the Tzaneen Dam could result in increasing the storage from 157,5 million m^3 to approximately 203 million m^3 ;

- Upgrading of water treatment works;

- Construction of bulk water pipelines and pump stations from the dam for water supply for domestic use to communities in the area. Currently four pump stations and four reservoirs are envisaged;

- Borrow areas from which materials required will be sourced;

- Construction activities will take approximately 5 years with several construction teams working concurrently in different areas at the proposed dam site and along the pipeline routes;

- Residential accommodation for construction staff will be established in the vicinity of the proposed dam or in established towns. Housing, internal roads, water and electricity supply, water treatment, solid waste disposal, emergency facilities and recreational amenities will be provided; and

- Construction sites will include offices, internal roads, water and electricity supply, waste water treatment, solid waste disposal, emergency facilities, areas for the handling of hazardous substances, workshops, wash bays, areas for the safe storage of fuel and explosives and communication infrastructure.

3. ORGANISATIONAL STRUCTURE

Effective environmental management during the design, construction and rehabilitation phases of the project will be initially dependent on a number of project personnel. The purpose of this section is to define roles for personnel and allocate responsibilities in the execution of the CEMP. The various parties that act in accordance with environmental management responsibilities for this project during design and construction is also described.

3.1 ORGANISATIONS

3.1.1 Department of Environment Affairs (DEA)

The DEA, on behalf of the minister, plays a lead role in the implementation of national environmental policies, legislation and regulations. Their role is to ensure that the GLeWaP is implemented in a sustainable manner, in compliance to the relevant environmental legislation. DEA will be responsible for authorising the CEMP for GLeWaP. As the decision maker, DEA is accountable for the decisions taken with regard to authorising identified activities.

3.1.2 Department of Water Affairs (DWA)

Under the South African environmental law, applicants are accountable for the potential impacts of activities being undertaken as well as managing these impacts. Since DWA is the applicant it has the overall environmental responsibility to ensure that the implementation of the CEMP complies with national and provincial legislation as well as with the conditions of the Environmental Authorisation.

3.1.3 Environmental Monitoring Committee (EMC)

The EMC is a constituted voluntary body, representative of parties interested in and affected by the project, that does not have any decision-making power over the developer or authorities. Its key objective is to promote communication and the flow of information particularly with regard to monitoring and reporting on environmental, social and economic aspects and impacts of the project with the aim of minimising negative impacts and maximising benefits of the development.

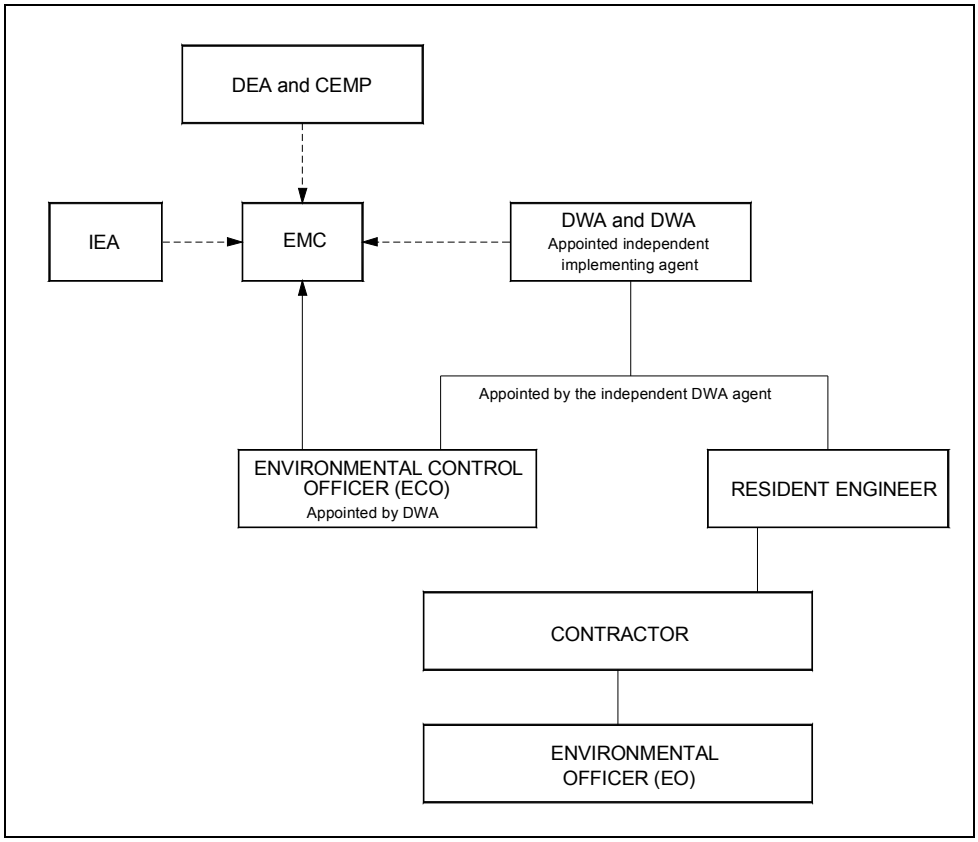
3.1.4 DWA Communication Strategy

The DWA communication strategy would be used as a communication tool between the project team, construction workers and the stakeholders. The strategy would convey information to the relevant stakeholders in their own languages if necessary and provide useful information about the GLeWaP project. The strategy is aimed at alleviating conflict between the project site team and the local residents, and raise awareness amongst the construction workers about local traditions and practices.

3.2 ROLES AND RESPONSIBILITIES

There are several role-players who will play different but vital roles to ensure sound environmental management for the GLeWaP during the planning, design and construction phases. The environmental responsibility of each role-player is described below and depicted in **Figure 3.1**:

Figure 3.1: Organisational structure



3.2.1 Department of Water Affairs (DWA)

The DWA, as the holder of the Environmental Authorisation, is overall responsible to comply with the CEMP.

The DWA may delegate environmental compliance / responsibility to nominated agents such as the Resident Engineer.

3.2.2 Resident Engineer

The Resident Engineer is responsible for design of the works and supervision of the contract. The Resident Engineer is the DWA's representative onsite and is ultimately responsible for:

- Compliance with legal environmental requirements.
- Confirming that the CEMP forms part of the contract documents.
- Placing the CEMP on the site meeting agenda.
- Directs on site teams implementation and compliance with the CEMP.
- Consults and co-operates with ECO appointed by DWA on environmental matters.
- Reports to DWA.

3.2.3 Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) will be appointed by the DWA to monitor and audit compliance and report environmental compliance to the DEA via the Environmental Monitoring Committee (EMC).

- Plan and direct the implementation of the CEMP.
- Confirm that the requirements of the CEMP are communicated understood and implemented by personnel on site.
- Manage scheduled audits and inspections on contractors' performance on site.
- Reporting at site construction meetings and PSC meetings.
- Provides Environmental Awareness training for site managers and staff.
- Monitors CEMP compliance through regular site visits and inspections during the pre-construction, construction and rehabilitation phases.

- Provides support and advice, via the Engineer/Resident Engineer regarding environmental matters during the entire project lifecycle.
- Submits checklists/reports to the Engineer for circulation to relevant contractual parties.
- Submits compliance reports to DEA.
- Makes reports available to an external auditor.
- Maintain open and direct lines of communication with the Engineer / Resident Engineer, contractors, the DWA and EMC.
- Distribute all statutory requirements, including permits, authorisations and licences.

3.2.4 Contractor

The Contractor implements the CEMP specifications on site through communicating with the ECO on environmental matters, via the Resident Engineer. The Contractor may appoint an environmental representative (Environmental Officer) to assist with the implementation of the CEMP.

3.2.5 Independent Environmental Auditor (IEA)

The EMC will identify an IEA to audit environmental compliance on site and submit an audit report to the EMC and DEA.

3.2.6 Contractor's Environmental Officer (EO)

The contractor could appoint a competent individual as the Contractor's EO to oversee the Contractor's compliance with the CEMP requirements. The EO will be responsible for daily site inspections, supervise environmental work and inform the Contractor and ECO. The contractor will also be required to compile monthly monitoring reports/checklists and submit to the Contractor and ECO. The EO must also prepare method statements based on the management and mitigation plans incorporated in the CEMP as and when required.

3.3 CONTRACTOR MANAGEMENT

Contractor management will be affected through specific activities as listed below:

- At the tender briefing meeting environmental management expectations during the project should be highlighted.
- The CEMP should be included with the tender document/ specifications.
- Once the Contractor is appointed they should be requested to develop a document that should indicate how they plan to ensure compliance with the CEMP.
- A trust fund for environmental management should be established and maintained by the DWA. All fines and penalties for environmental non-compliance should be deposited into the trust fund and used for environmental programmes or projects related to GLeWaP.
- A contractual performance guarantee of 10% should be implemented, this guarantee should be released pending the level of significance the offence has on the environment. Normally 5% is released at the end of the contract and the remainder is released one year after completion.

3.3.1 Penalties and fines

A system of penalties and fines for offences in terms of this CEMP is proposed for use as a guideline on site. Penalties and fines will be imposed on contractors and funds will be deposited into the Environmental Trust set up for this purpose. This will be based on non-compliance findings made during formal audits, monitoring or day-to-day inspections on site.

A guideline of minimum fine values is provided for minor, moderate and serious offences in the table below.

Table 3.1: Table depicting guidelines for fines and offences

Offences	Fine
Minor offences Littering Possession of intoxication substances on site. Failure to use ablutions. Moving on areas recently landscaped. Disturbing grassed areas. Not parking in demarcated areas. Not using safety equipment	R 1500 - 00

Wasting of water and electricity. Not removing domestic waste off site. Not stockpiling topsoil adequately.	
<u>Moderate offences</u> Oil spills Persistent oil leeks on vehicles. Generation of excessive dust and noise. Transgression of the speed limit. Illegal fires. Burying of waste. Use of intoxicate substances on site. Lack of erosion control. Entering non-demarcated areas. Hunting and snaring. Damaging of pre- identified trees.	R 5000-00
<u>Serious offences</u> Large oil/ hazardous waste spill. Removal of pre-identified trees. Damage of pre- identified heritage sites or objects. Continually exceed noise limits. Transgression of legal requirements. Sanitation facilities not adequate. Pollution of groundwater. Removal of any protected plant or other species. Damage or pollution of wetlands.	R15 000.00

These fines should be issued in addition to any remedial costs included as a result of the non-compliance, as well as any statutory penalty or fine (if applicable) which will also be for the offender's expense.

4. COMPLIANCE MONITORING

4.1 CHECKING AND CORRECTIVE ACTION

4.1.1 Monitoring

A series of environmental variables that are to be monitored during the pre-construction phase should be developed for identified aspects, such as surface and ground water monitoring, noise monitoring, air quality monitoring etc. Monitoring results should be presented monthly. Where the target values are not met, further mitigation action (development of detailed method statements) should be considered.

4.1.2 Inspections

Some potential impacts are difficult to monitor quantitatively such as soil erosion and waste management. Daily visual inspections of all construction sites should be undertaken.

4.1.3 Internal Audits

Where monitoring data and the inspection reports highlight problems, an internal audit could be initiated. The purpose of the audit is to ascertain the source of the problem and define what action must be taken to prevent its re-occurrence. Detailed method statements could be the outcome of the internal audit.

4.1.4 Corrective action

There are several levels at which corrective action can be affected, namely verbal instructions, written instructions and contract notices.

5. LEGISLATIVE REQUIREMENTS AND PRINCIPLES

5.1 ENVIRONMENTAL PRINCIPLES

The following principles should be considered at all times during the pre-construction phase activities.

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

- 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.
- 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 project and reduce rehabilitation requirements and costs.
- As minimum requirements, all relevant standards relating to international, national, provincial and local legislation, as applicable, shall be adhered to. This includes requirements relating to waste emissions (e.g. hazardous, airborne, liquid and solid), waste disposal practices, noise regulations, road traffic ordinances, etc.
- Every effort should be made to minimise, reclaim and/or recycle "waste" material.

5.2 ENVIRONMENTAL PERMITS, LICENCES AND AUTHORISATIONS

The following authorisations and permits are required prior to the activity commencing:

- **Blasting** - Blasting permits are required from the Department of Mineral Resources in accordance with the Explosives Act (Act No 26 of 1956).
- **Waste disposal** - All wastes (general and hazardous) generated during the construction may only be disposed of at appropriately licensed sites (in terms of Section 20 of the Environment Conservation Act (Act No 73 of 1989). Regulations terms of the Environment Conservation Act (sections 19, 19A and 24A) pertaining to litter should be noted and implemented.

- **Storage of hazardous substances** - Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which may include the Hazardous Substances Act, the Occupational Health and Safety Act, and relevant associated Regulations.
- **Health and safety of work teams** - Construction Regulations (2003) published under the Occupational Health and Safety Act (Act No 85 of 1993) apply to construction activities including "the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work". A "health and safety plan" which addresses hazards, and includes safe working procedures to mitigate, reduce or control the hazards identified, is required under this Act. A risk assessment must also be undertaken by an appropriately qualified person(s) and the Contractor shall ensure that all employees under his or her control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures before any work commences, and thereafter at such times as may be determined in the risk assessment.
- **Heritage resources –** Before any heritage resources are demolished or damaged a permit should be obtained prior to any actions been taken. Permit applications must be submitted to South African Heritage Resources Agency (SAHRA).
- **Removal of trees –** The removal of trees from the dam basin requires a permit in terms of the National Forest Act (No 84 of 1998).
- **Removal and transportation of endangered fauna and flora -** The removal and transportation of indigenous and endangered species to nurseries or green houses require permits in terms of the National Biodiversity Act (No10 of 2004), Section 30.
- **Water abstractions –** Water abstracted from any sources for construction purposes requires authorisation.
- **Removal of graves -** Permits are required for the removal of graves in terms of the National Heritage Resources Act (No 25 of 1999) section 36.

6. MANAGEMENT AND MITIGATION PLANS

This section provides specific and detailed management and mitigation plans for the construction phase of the project. Each management and mitigation plan deals with a specific construction or environmental aspect. The management and mitigations plans structure provides for a section that describes the purpose of the aspect, the specific components of the aspect, objectives and targets for each component and specific management and mitigation requirements.

Table 6.1. provides a summary of the identified management and mitigation plans and relevant components per management and mitigation plan.

Table 6.1: Management and Mitigation Plans

Management and Mitigation Plans
CHAPTER 6.1
Socio-economic management plan
Influx of job seekers
Outflow of labourers
Formal employment opportunities to local individuals
Animal- human conflict
Temporary loss of cultivated land
Temporary loss of grazing land
Integration with local communities
Physical splintering
Employment Strategy
Exit Strategy
CHAPTER 6.2
Community Consultation and Disclosure
Environmental Monitoring Committee
Complaints management
CHAPTER 6.3
Construction site
Establishment of site office
Ablution facilities
Eating areas
Training and induction of construction staff
Handling and disposal of contaminated water
Hazardous material storage
Vehicle and equipment refuelling
Water conservation
Contractors camp and lay down areas

Management and Mitigation Plans
Batching Plants
Roads and Access
Gates and fences
Site Closure
CHAPTER 6.4
Solid Waste Management
Domestic waste
Construction waste
Hazardous waste
CHAPTER 6.5
Visual Aesthetics
Raising of Tzaneen dam
Visual of new dam
CHAPTER 6.6
Air Quality
Truck transport and road dust entrainment
Excavation and earthworks
Stockpiles and spoil dumps
Vehicle and machinery emissions
Dust on Citrus
CHAPTER 6.7
Noise Control
General noise
Noise from plant and machinery
Noise from blasting
Noise from vehicles
CHAPTER 6.8
Traffic
Additional turning lanes
Construction signage
Traffic movement of construction vehicles
CHAPTER 6.9
Water Management
Stormwater runoff and discharge
Erosion protection
Floodlines
Proximity to rivers, streams and/or wetlands
Water abstracted from rivers/streams
River crossings/alteration of water courses
Pollution control
CHAPTER 6.10
Aquatic Ecosystem
Removal of riparian vegetation
Reinforcement and protection of downstream banks and streambed
Drainage of all farm dams within the dam basin
Aquatic Life monitoring

Management and Mitigation Plans
CHAPTER 6.11
Material Sourcing and Earthfill Stockpiles
Material sourcing
Earthworks/stockpiles
CHAPTER 6.12
Topsoil
Topsoil stripping
Topsoil stockpiling
Topsoil storage
CHAPTER 6.13
Spoil Management
Locating spoil disposal sites
Transporting spoil
CHAPTER 6.14
Fauna and flora
Protection of ecologically sensitive areas/ habitats and endangered fauna and flora
Weeds and alien vegetation
Rare and protected species
Firewall regimes
CHAPTER 6.15
Heritage
Protected heritage sites
Chance heritage finds
CHAPTER 6.16
Health and Safety
Disaster management plan
Safety of construction workers
Construction related diseases
CHAPTER 6.17
Site Rehabilitation
Disturbed areas to be rehabilitated
Re-vegetation of disturbed areas
Souring of material from borrow areas and blasting areas
Maintenance of rehabilitative measures
Rehabilitation of marginal vegetation
CHAPTER 6.18
Monitoring
Noise monitoring
Air quality monitoring
Water quality monitoring
Aquatic life monitoring

Each management and mitigation plan includes objectives, targets and mitigation requirements. If the mitigation requirements are found to be insufficient to effectively mitigate

potential negative impacts the contractor may be instructed to prepare a detailed method statement to effectively mitigate potential negative impacts.

6.1 SOCIO - ECONOMIC MANAGEMENT PLAN

6.1.1 Purpose

Construction activities have the potential to impact on the social environment to a fairly large extent. This social management and mitigation plan ensures that construction activities are managed in such a manner that the positive impacts may be enhanced and the negative impacts are minimised as far as possible.

6.1.2 Components

The following components have been addressed in this social mitigation plan:

a) Influx of job seekers.
b) Outflow of labourers.
c) Formal employment opportunities to local individuals.
d) Temporary loss of cultivated land.
e) Animal –human conflict.
f) Temporary loss of grazing land.
g) Integration with local communities.
h) Physical splintering.
i) Employment strategy.
j) Exit Strategy.

a. Influx of job seekers

Objective

Manage the impact that the influx of job seekers might have on composition and functioning of the local community, with particular concern for the impact that these job seekers might have on the local residents' sense of safety and security.

Targets

- Establish an employment strategy that is known and communicated to potential job seekers that will include the formation of a labour desk.
- Prevent loitering of individuals at the construction village and construction site.
- Prevent the formation of informal settlements in or close to the construction village and the construction site.

Management and mitigation requirements

A recruitment policy and process should be finalised in consultation with the municipalities and Traditional Authorities (establishment of a labour desk). Communicate employment procedures / policy to local stakeholders, especially community representative organisations and ward councillors.

- Have clear rules and regulations for access to the construction village / site office to control loitering. Consult with the local South African Police services (SAPS) to establish standard operating procedures for the control and/or removal of loiterers at the construction site.
- Construction workers should be clearly identifiable as far as practical.
- The contractor should monitor areas where people gather in the field on a regular basis as this is normally the first indication that (informal) settlement might take place in the area.
- The construction site should be fenced and access should be controlled by means of a security access point.

b. Outflow of labourers

Objective

To ensure that, where local labourers leave the area in search of employment, they do not have a negative impact on the community.

Targets

- Ensure an informed labour force and community in terms of issues related to migrant labour, particularly health risks.
- Build capacity within the local community.
- Ensure a more sustainable economic injection into the local community that can be sustained over the longer term.

Management and mitigation requirements

- Develop skills transfer plans (e.g. portable skills training) that would enable a worker to move from one project to another project within the same area.
- Payment should comply with applicable Labour Law legislation in terms of minimum wages.
- Where local labourers are employed on a more permanent basis, cognisance should be taken of the Labour Law in terms of registering the worker with the

Unemployment Insurance Fund (UIF), Pay as you earn (PAYE), workman's compensation and all other official bodies as required by law. This would enable the worker to claim UIF as a means of continuous financial support when the worker's position on the construction team has either become redundant or once the construction phase comes to an end.

c. Formal employment opportunities to local individuals

Objective

- Establish a labour desk to facilitate local employment opportunities.
- Ensure that the project benefit the affected local areas during the construction phase by extending economic benefits to these community members through the creation and offering of employment opportunities.
- Ensure that formal employment opportunities benefit local residents and/or service providers.

Targets

- Employ people from the community as far as possible.
- Offer training opportunities to ensure sustainable skills development within the community.
- Provide for alternative employment opportunities through the development of portable and other skills;
- Ensure a more sustainable economic injection into the local community that can be sustained over the longer term.

Management and mitigation requirements

- Unskilled job opportunities should be afforded to local residents. Local trade unions could assist with the recruitment process to counteract the potential for social mobilisation.
- Equal opportunities for employment should be created to ensure that the local female population also have access to these opportunities. Females should be encouraged to apply for positions.
- Individuals with the potential to develop their skills should be afforded training opportunities. The DWA or its appointed contractors should be involved in this process.

- Mechanisms should be developed to provide alternative solutions for creating job security upon completion of the project. This could include formal and/or informal training on how to look for alternative employment, information on career progression, etc. to ensure that people are equipped to seek other jobs with the skills that they have gained.
- Payment should comply with applicable Labour Law legislation in terms of minimum wages.
- Where local labourers are employed on a more permanent basis, cognisance should be taken of the Labour Law in terms of registering the worker with the Unemployment Insurance Fund (UIF), Pay as You Earn (PAYE), workman's compensation and all other official bodies as required by law. This would enable the worker to claim UIF as a means of continuous financial support when the worker's position on the construction team has either become redundant or once the construction phase comes to an end.
- Compensation for land should not be restricted to financial compensation. The DWA should enter into negotiations with the tribal authority to determine their needs and the most appropriate form of compensation, which should rather be in the form of development projects.

d. Temporary loss of cultivated land

Objective

Minimise the loss of cultivated land, thereby minimising the potential economic loss of income for the farmer.

Targets

- Curbing economic losses on cultivated land as a result of the physical space required for the construction process.
- The rehabilitation of cultivated land to its original standard before the commencement of the construction phase.

Management and mitigation requirements

- The temporary loss of cultivated land should be included in the negotiation process with the landowner.
- The area outside of the dam basin should be rehabilitated to the same condition as prior to the construction activities.

e. Animal- human conflict

Objective

To ensure that animals and people are unharmed during the construction of the proposed dam at the site known as Nwamitwa.

Target

To create awareness among construction works about the dangers of crocodiles and hippos within the Letaba River.

Management and mitigation requirements

- Construction workers are to be educated and trained to stay away from dangerous animals. Particular emphasis should be on crocodiles and hippos.
- Construction workers should be restricted to their camp sites at night to prevent encounters with these animals.
- During working hours workers are to remain vigilant of possible hippo or crocodile appearances.

f. Temporary loss of grazing land

Objective

Minimise the loss of grazing land, thereby minimising the potential economic loss of income for the farmer.

Targets

The replacement of grazing land to its original standard outside the dam basin before the commencement of the construction phase.

Management and mitigation requirements

- Mitigation measures should be implemented to avoid any negative impact on animals (e.g. fencing off the construction area).
- Grazing areas outside the dam basin should be rehabilitated to its original grazing conditions to ensure that cattle can continue to graze in the area once they are returned to the area.
- Where the area cannot be rehabilitated to its original condition within a short space of time, DWA or its appointed contractor(s) should provide alternative food

sources to the farmer for the time period required for natural rehabilitation to occur within the grazing area.

g. Integration with local communities

Objective

Minimise potential conflict and possible health risks between the local residents and the construction workers.

Targets

- Controlled access at the construction village and construction site.
- Empowering local females to reduce their vulnerability.

Management and mitigation requirements

- Raise awareness amongst workers about local traditions and practices;
- Ensure that the local community communicate their expectations of construction workers' behaviour with them.
- To ensure that the local traditions and cultures are respected, local residents should play an active participatory role in the planning process.

h. Physical splintering

Objective

Ensuring the safety of community members.

Targets

- Providing a safe passageway for community members through or around the site.
- Fencing off the construction site.

Management and mitigation requirements

- Provide a safe passage way for community members to minimise the impact on movement patterns.
- Fence off the construction site to prohibited unauthorised access by community members, thereby placing themselves in potential unnecessary danger.

i. Employment strategy

Objective

To minimise loss of employment and income associated with loss of productive land through the establishment of a labour desk.

Targets

- Align employment opportunities to farm workers directly impacted.
- Communicate loss of employment to farm workers from affected farms well in advance.

Management and mitigation requirements

- A register of farm labourers from the farms to be inundated by the proposed dam needs to be taken to assist with enabling employment opportunities being provided for the farm workers that will directly be affected during the construction.
- Loss of employment needs to be communicated, to the directly affected farm workers, well in advance so that other plans can be made or jobs can be sought.

j. Exit Strategy

Objective

- To ensure that the pull-out of workers and the contractors from the site known as Nwamitwa is adequately planned and managed.
- To identify potential impacts (both negative and positive) resulting from the exit of workers and the contractor and develop appropriate mitigation measures.
- To ensure that all the post-construction impacts are adequately addressed.

Target

- Drafting of an Exit Policy document
- Implementation of strategies.

Management and mitigation requirements

- The EMC should consider preparing an Exit Policy document.

6.2 COMMUNITY CONSULTATION AND DISCLOSURE

6.2.1 Purpose

The community consultation process should ensure an ongoing process of community participation that should run in parallel with the activities during the pre-construction and construction phases. This could be achieved by the formation of a committee to inform and monitor the planning and implementation process.

6.2.2 Components

a) Environmental Monitoring Committee.
b) Complaints management.

a. Environmental Monitoring Committee

Objectives

To regularly monitor and review the progress towards adhering to the specific conditions of the CEMP and Environmental Authorisation.

Targets

Regular Environmental Monitoring Committee meetings.

Management and Mitigation requirements

Arrange regular Environmental Monitoring Committee meetings with an agenda and minutes of the previous meeting.

b. Complaints management

The DWA will identify and maintain open liaison channels to ensure that all queries and/or complaints from affected parties are addressed with the shortest possible delay.

Objectives

- To establish and maintain a system of records which provide full documentation of complaints handling.

- To timeously and effectively address all complaints received.
- To timeously inform affected parties of disruptive activities.

Targets

- Establish processes and procedures to effectively address all complaints received.
- All complaints will be acknowledged within 28 days of receipt.
- Respond effectively to all complaints received within 28 days, unless additional information and/or clarification are required.

Management and mitigation requirements

The DWA shall open and maintain a Complaints Register and an Incidents Register in which all complaints or incidents received from the community must be recorded. The following information must be recorded in the Complaints Register:

- The name and contact detail of the complainant (if not anonymous).
- The date, time and nature of the complaint.
- The response and investigation undertaken.
- Which actions were taken and who the person responsible for the action was.

The following must be recorded in the Incidents Register:

- The name of the person/s involved in the incident.
- The date, time and nature of the incident.
- The response and reason for the incident.
- The actions that were taken.

If the construction staff is approached by the community they will be polite and courteous and assist them with locating the relevant personnel who will deal with the complaint.

The DWA will inform the affected parties in writing of disruptive activities at least 24 hours before hand. This can take place by way of leaflets and must include the contact information for the Resident Engineer and the Contractor.

6.3 CONSTRUCTION SITE

6.3.1 Purpose

This management and mitigation plan defines the establishment and management of the construction site to prevent or minimise environmental impacts these might cause.

6.3.2 Components

The plan is made up of the following components:

a) Establishment of the site office.
b) Ablution facilities.
c) Eating areas.
d) Training and induction of construction staff.
e) Handling and disposal of contaminated water.
f) Hazardous materials storage.
g) Vehicle and equipment refuelling.
h) Water conservation.
i) Contractors Camp and lay down areas.
j) Batching Plants.
k) Roads and Access.
l) Gates and fences.
m) Site closure.

a. Establishment of the site office

Objective

To minimise impacts associated with the establishment and operation of the site office.

Target

Successfully located site office.

Management and mitigation requirements

- The Contractor shall produce a site plan showing the positions of all buildings (e.g. site office and workshops), vehicle wash areas, fuel storage areas, stockpile

areas, and other infrastructure for the approval of the Engineer prior to the establishment of the site.

- The site office should as far as possible be located in an area which has already been cleared or disturbed by previous human activity and should be as level as possible.
- Materials, soil stockpile areas, fuels, chemical storage areas, concrete batching areas, and vehicle maintenance areas shall be located away from environmentally sensitive areas and protected from stormwater runoff, fire, and access by unauthorised persons.
- The placement of buildings and equipment will be done to minimise the footprint and visual impact of the sites.
- Down-lighting will be used at night and the Contractor shall ensure that lighting on site does not interfere with road traffic or cause a reasonably avoidable disturbance to the surrounding community or other users of the area.
- Large indigenous trees within the confines of the site that will be retained are to be adequately protected and indicated on the construction layout maps.
- Vehicles and equipment shall undergo regular maintenance to identify and remedy fuel and oil leaks, as well as remove any combustible material.
- Appropriate fire suppression equipment and trained personnel shall be available on-site during construction.
- Locate and clearly indicate convenient access routes, temporary loading and packing areas, and turning circles so that vehicle movement can be confined to these areas.
- Locate temporary waste bins and skips so that they are easily accessible for removal.

b. Ablution facilities

Objective

To ensure that where ablution facilities are supplied that the facilities comply with norms and standards.

Targets

- Sufficient ablution facilities supplied at all construction sites.
- Ablution facilities comply with applicable norms and standards.

Management and mitigation requirements

The Contractor must provide ablution facilities for the construction staff. The following should be taken into consideration for the location and management of ablution facilities:

- Ablution facilities provided will include shelter, toilets, and washing facilities.
- Toilets will be provided at the preferred ratio of 1 toilet per 15 workers, but not less than 1 toilet per 30 workers.
- Sanitation facilities shall be located within 100 m of any point of work, but not closer than 50 m from any water body.
- All temporary/portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause.
- Entrances to toilets will be adequately screened from public view.
- Only approved portable chemical toilets will be provided at work areas in residential areas.
- Ablution facilities provided shall be maintained in a hygienic state and serviced regularly to ensure proper operation.
- No spillage will be allowed when the toilets are cleaned or serviced.
- The contents of chemical toilets will be removed to an approved disposal site – no discharge into the environment or burying of sewage must be allowed.
- The toilets will be services and cleaned on the last construction day before the builder's holiday.
- Wash areas shall be placed and constructed in such a manner so as to ensure that no pollution occurs, including groundwater pollution.

c. Eating areas

Objective

The contractor must ensure that the people working on the project have a safe area to eat their meals.

Target

All people involved in the project are to be well informed of the designated eating areas.

Management and mitigation requirements

- The Contractor shall designate eating areas for all his staff within the Construction Site.
- No eating of meals shall take place outside these designated areas without the approval of the Engineer.
- Waste bins shall be provided and emptied regularly.
- Temporary shade must be provided.

d. Training and induction of staff

Objective

The Contractor must ensure that all people involved in the project (including sub-contractors, casual workers, etc.) are aware of and familiar with the environmental requirements for the project.

Target

All people who are involved with the project are aware of the environmental requirements for the project.

Management and mitigation requirements

The Contractor has the responsibility to provide the site foreman with environmental training and to ensure that he is capable of passing the information to all the construction staff. Training of the construction staff shall include:

- How construction activities can impact on the environment and what can be done to mitigate such activities.
- Possible disturbance to birds, animals, and reptiles, and their respective habitats shall be minimised.
- Construction staff shall be made aware of what possible archaeological or historical objects look like and to notify the ECO if such an object is found.
- Management and minimising of waste.
- Maintenance of equipment to prevent the accidental discharge or spillage of fuel, oil, lubricants, and other chemical.
- Responsible handling of chemicals and spills.
- Emergency procedures and incident reporting.

The ECO will monitor the performance of the construction staff to ensure that the points that were relayed during their training and induction have been understood and are being followed. If required, a translator may be requested to explain aspects of the environmental requirements or acceptable social behaviour that are unclear.

The Contractor will ensure that construction staff are aware of the following rules:

- No alcohol or drugs are allowed on site.
- No firearms allowed on site.
- Pets are not allowed on site.
- Firewood may not be harvested from the site or from adjacent areas.
- Trespassing on neighbouring properties is forbidden.
- Cigarette butts will not be disposed of in the bushland or grassland areas.
- Fines shall be implemented for transgressions.

e. Handling and disposal of contaminated water

Objective

To ensure the handling and disposal of contaminated water is done within the framework of applicable acts and regulations.

Targets

- No discharge of polluting elements to any stormwater drain, stream or river.
- 100% compliance to relevant standards.

Management and mitigation requirements

- No discharge of pollutants such as cement, concrete, lime, chemicals, fuels, or oils will be allowed into any water resource.
- Grey water from kitchens, showers, and/or sinks shall be discharged in an appropriate manner.
- Runoff from fuel depots, workshop areas, wash bays, and concrete swills shall be diverted through an inline oil trap before being released into the stormwater system.
- Wash areas shall be placed and constructed in such a manner so as to ensure that no pollution occurs, including groundwater pollution.

- Contaminated water must be stored in an appropriate manner and removed by tanker to an appropriate disposal facility.

f. Hazardous materials storage

Objective

To ensure that hazardous materials storage is effective and compliant with national, provincial and local regulatory requirements.

Target

Ensure 100 % compliance to national, provincial, and local regulatory requirements.

Management and mitigation requirements

Hazardous materials include diesel, petroleum, oil, bituminous products, cement, solvent-based paints, lubricants, explosives, drilling fluids, pesticides, herbicides and Low Pressure Gas (LPG). Material Safety Data Sheets (MSDSs) shall be available on site for all hazardous substances to be used on site.

- Materials storage areas will not be allowed in close proximity to ecologically sensitive areas.
- Materials storage areas shall be sited outside the 1:50 year flood line of watercourses.
- Storage areas shall be roofed with impervious material.
- Hazardous chemicals or potentially hazardous chemicals used during construction shall be stored in secondary containers and all relevant MSDSs shall be available on site.
- The relevant emergency procedures relevant to particular chemicals used on site, as per the MSDSs and suppliers guidelines, will be followed in the event of an emergency.
- The contractor shall prevent discharge of any pollutants such as cement, concrete, lime, chemicals, fuels, and oils into any water sources and adequate stormwater control measures will be implemented where these substances are handled.

g. Vehicle and equipment refuelling

Objective

To ensure that vehicle, plant and equipment refuelling is practiced in such a manner that no secondary pollution or emergency situation is created.

Targets

- Storage of flammable material shall be done according to prescribed standards at all times.
- Refuelling of vehicles and equipment shall be done according to prescribed standards at all times.

Management and mitigation requirements

- Fuel (petrol and diesel) may be stored on site provided that all measures specified here are strictly adhered to.
- All liquid fuels and oils should be stored in suitable above ground storage tanks or in tanks with lids, which will be kept firmly shut and under lock and key at all times.
- In the case of above ground storage tanks, written permission shall be obtained from the Chief Fire Officer for the installation.
- Areas around fuel tanks are to be bunded as per the requirements of SANS 089:1999 Part 1.
- Above ground fuel tanks will be at least 3.5 metres from buildings, boundaries, and any other combustible or flammable materials.
- Tanks will not be used for the storage of liquids other than those with a Flash point in excess of 40°C.
- All storage tanks shall be removed after construction.
- The rated capacity of tanks shall provide sufficient capacity to permit expansion of the product as a result of temperature variations.
- Only empty and externally clean tanks may be stored on bare ground – empty but externally dirty tanks shall be sealed and stored where the ground has been protected.
- Any electrical or petrol-driven pumps shall be equipped and positioned so as not to cause any danger of ignition of the product.

- If fuel is dispensed from 210 litres drums, the proper dispensing equipment will be used to minimise spill potential. This equipment shall be stored in a waterproof container when not in use.
- Under no circumstances may drums be tipped to dispense fuel.
- Fuel storage tanks and drums will not be over-filled.

The following shall be taken into consideration for the placement of fuel storage areas:

- The gradient of the ground must slope away from environmentally sensitive areas.
- Access to facilities to and around the site must be adequate to allow supply vehicles to enter and leave easily.
- Fire protection, security, and general service facilities in the area, including the fire services response time.
- Good housekeeping e.g. the removal of flammable materials such as rubbish, dry vegetation, and oil soaked soil.
- In the interest of security, the facility shall be so enclosed as to prevent unauthorised access.
- The minimum distances between containers shall be as prescribed in SANS 10089-1:2003.

Bunding at these facilities shall comply with the following guidelines:

- A slope of at least 1:100 away from the tank shall be provided for at least 15 metres or the distance to the bund wall toe, whichever is less.
- The volumetric capacity of the bunded area will be a minimum of 110% of the volume of the largest tank. To allow for the volume occupied by the tanks, the capacity of the bunded area that encloses more than one tank shall be calculated after the volume of all the tanks, other than the largest tank, below the height of the bund wall has been deducted.
- The wall of the bunded area shall be of earth or concrete, and shall be designed to be liquid tight and to withstand a full hydrostatic head of water. Earthen walls of height 1 metre or more shall have a flat section, not less than 0.6 metres wide at the top. The slope of an earthen wall shall not exceed the angle of repose of the material of which the wall is constructed.
- The wall height of the bunded area shall be restricted to 1.8 metres.

- The minimum distance between a tank and the toe of an interior bund wall shall be at least 1.5 metres.
- Each bunded area that contains two or more vertical tanks shall be subdivided at least by intermediate bund wall or by drainage channels, to prevent spills from one tank from endangering adjacent tanks within that bunded area.
- Where provision is made for draining water from bunded areas, such drains shall be so controlled as to prevent flammable or combustible products from entering natural water courses or stormwater drains. Under fire conditions, the controls of such drainage shall be accessible from outside the bunded area.
- No storage of combustible materials shall be permitted in any bunded area.
- Suitable drainage facilities shall be provided to deal with surface water and to dispose of fire fighting water. The water used to control a fire shall be of an acceptable quality (free from hydrocarbons, solvents, alcohols and any additives) before the water is passed into drains.
- Suitable and adequate supplies of absorbents shall be available at all times to control and absorb any spillages.

h. Water conservation

Objective

To minimise water use and maintain sustainability.

Targets

- To ensure regular maintenance of all pipes and taps.
- To ensure water use is kept within allocated water limits.

Management and mitigation requirements

The Contractor will take all possible measures to minimise water use on site and this will include monitoring of pipes for leaks, closing taps when not in use, efficient use of water for washing of plant, recycling water as much as possible etc. The quantity of water used for construction purposes must be monitored i.e. 50 water tankers for dust control and close circuit series of sludge dams at batching plant.

i. Contractors camp and lay-down areas

Objective

To ensure all lay down areas are allocated designated areas.

Target

To ensure all laydown areas are restricted to designated areas

Management and mitigation requirements

- Locate all storage areas and material laydown sites within predetermined zones.
- Additional areas required by the Contractor for laydown and storage must be approved by the Engineer.
- Keep the camp and all its storage and laydown areas secure and neat at all times and employ appropriate access control measures during construction.
- Clearly indicate which activities are to take place within which areas of the site using demarcation and/or signage.
- Position security lighting so that it does not pose a nuisance to residential properties or tourist facilities or a danger to road users.
- Locate all other structures (including site offices, site laboratories, substations, workshops, wash bays, stores, substations etc.) as per the approved layout plan.

j. Batching plants

Objective

To assign designated areas for batching plants.

Targets

- To prevent sludge runoff into the natural water system.
- To prevent contamination of the natural water system.

Management and mitigation requirements

- Position batching plants optimally.
- Do not locate batching plants or associated sludge dams within the 1:20 year floodline and at least 5 meters from the riparian zone.
- Protect the batching plant on the up-slope side with a gulley / earth berm or sandbag system to deflect clean surface runoff away from the plant.

- Contain the batching plant on the down-slope side with a drain and earth berm and silt fence system at least 0.5m high to control contaminated runoff and construction water emanating from within the plant.
- Collect all construction water and contaminated runoff emanating from within the batching plant (and associated wash bays) and contain within a sludge dam for later disposal in the appropriate manner.
- Such sludge dams shall be designed to manage the daya to day operational volumes generate at the site.
- Clean out all sludge dams before the optimal functioning of the dam is affected, and dispose of the sludge in an appropriate manner.
- Ensure that appropriate measures are in place to prevent the overflow of sludge dams during heavy rains and storm conditions. A method statement to this effect shall be provided by the Contractor for approval by the Engineer.
- Scrap waste, concrete and cement sludge from the batching plant should be removed at least monthly, and dispose of in an appropriate manner.

k. Roads and access

Objective

To prevent traffic congestion.

Target

To ensure all construction vehicles use approved roads.

Management and mitigation requirements

- Develop all permanent and temporary roads and access routes as indicated on the approved site establishment plan.
- Slight deviations of alignment are permitted, so as to avoid significant vegetation specimens and communities, natural features and sites of cultural and historical significance identified by the ECO or Cultural Heritage specialist. These deviations must be approved by the Engineer.
- Minimise the construction of access and haul roads.
- Where construction will obstruct existing access, be sure to allow for alternative temporary access routes.

- Any additional routes and turning areas required by the Contractor must be approved by the Engineer in consultation with the ECO, indicating the position and extent of the proposed route/area.
- Plan access routes to avoid significant vegetation specimens and communities, natural features and sites of cultural and historical significance.
- Routes should not traverse slopes with gradients in excess of 8%. Where this is unavoidable, stabilise the road surface using methods approved by the Engineer.
- Minimise routes through drainage lines and riparian zones wherever possible. Where access through drainage lines and riparian zones is unavoidable construction should be perpendicular to the drainage line. Avoid roads that follow drainage lines within the floodplain.
- Enforce speed limits at all times on site roads.
- Allow for safe pedestrian crossing where necessary.
- Maintain all access routes and roads adequately in order to minimise erosion and undue surface damage. Repair rutting and potholing and maintain stormwater control mechanisms.
- Runoff from roads must be managed to avoid erosion and pollution problems.
- Maintain all construction related roads in a functional manner.
- The Engineer will indicate whether or not it is necessary to keep a photographic record of private roads used to access work areas.

I. Gates and fences

Objective

To protect all sensitive areas.

Target

To ensure all sensitive areas or areas of historical significance are fenced and protected.

Management and mitigation requirements

- Protect and maintain existing private property, fences and gates.
- Respect the open or closed status of gates for the duration of the construction period.

- Small sensitive areas may be fenced where necessary, as the work site progresses.
- Limit clearing for fencing to the removal of trees and shrubs within 1 m of the fence line. No removal of the grass cover or topsoil is to occur within this width.
- Retain temporary fencing and/or gates in position until replaced by permanent fencing or until the Engineer directs their earlier removal.
- If temporary fencing and or gates are removed temporarily for the execution of any part of the Works then these must be reinstated as soon as practicable by the Contractor.

m. Site Closure

Objective

To have an appropriately cleared and rehabilitated site after construction.

Target

- Properly cleared construction site.
- All rehabilitation measures have been implemented successfully.

Management and mitigation measures

In the event of temporary or permanent site closure the Contractor shall check the site, ensure that the items included in a comprehensive site closure checklist to be issued to the Contractor by the Environmental Officer are addressed.

Fuels / flammables / hazardous materials stores

- Fuel stores are as low in volume as practicable.
- There are no leaks.
- The outlet is secure and locked.
- The bund is empty.
- Fire extinguishers are serviced and accessible.
- The area is secure from accidental damage through vehicle collision.
- Emergency and contact numbers are available and displayed.
- There is adequate ventilation in enclosed spaces.
- There are no stores or containers within the 1:50 year flood line.

Safety

- Site safety checks have been carried out in accordance with the Occupational Health and Safety Act (No. 85 of 1993) prior to site closure.
- That there is an inspection schedule and log for use by security or contracts staff.
- All trenches and manholes are secured.
- Applicable notice boards are in place and secured.
- Emergency and Management contact details are prominently displayed.
- Security personnel have been briefed and have the facilities to contact or be contacted by relevant management and emergency personnel.
- Night hazards such as reflectors, lighting, traffic signage etc have been checked.
- Fire hazards identified and the local authority notified of any potential threats e.g. large brush stockpiles, fuels etc.
- Pipe stockpiles are wedged / secured.
- Scaffolds are secure.
- Structures vulnerable to high winds are secured.

Erosion

- Wind and dust mitigation measures are in place.
- Excavated and filled slopes and stockpiles are at a stable angle and capable of accommodating normal expected water flows.
- Re-vegetated areas have a water schedule and the supply to such areas is secured.
- There are sufficient detention ponds or channels in place.

Water contamination and pollution

- Hazardous fuel stores are secure.
- Cement and materials stores are secure.
- Toilets are empty and secured.
- Refuse bins are empty and secured.
- Bunding is clean and treated with appropriate material that will absorb/ breakdown and where possible be designed to encapsulate minor hydrocarbon spillage.
- Drip trays are empty & secure.

6.4 SOLID WASTE MANAGEMENT

6.4.1 Purpose

The inappropriate handling and disposal of solid waste materials can impact on both human safety and risk contamination of the natural environment. This management and mitigation plan covers the handling and disposal of solid waste, including domestic, construction, and hazardous waste, generated during construction. The general waste management principles of prevent, minimise, recycle or re-use, with disposal as a last option will apply. Only permitted, registered and municipal landfills will be considered as options for disposal of waste.

6.4.2 Components

The plan is made up of the following components:

a) Domestic waste.
b) Construction waste.
c) Hazardous waste.

a. Domestic waste

Objective

To ensure that all domestic waste generated during construction is disposed of at a municipal waste disposal facility.

Target

Domestic waste is disposed of at a municipal waste disposal facility.

Management and mitigation requirements

- A refuse control system will be established for the removal of domestic waste.
- The Contractor will ensure that the site is kept clean and tidy at all times.
- Littering will not be allowed on site.
- The excavation and use of rubbish pits on site is forbidden.
- Burning of rubbish is forbidden.

- Timber, metal, oil, paper, bricks, tyres, batteries and any other major recyclable wastes will be stored in safe, secure areas.
- A separate oil container will be used to ensure that oil wastes are contained.
- Maintenance and domestic refuse (e.g. scrap metal, packaging materials, etc) will be collected in appropriate bins for recycling or sent to a landfill site at regular intervals for disposal.
- All chemical drums will be transported to a designated and bunded area when empty before appropriate disposal.

b. Construction waste

Objective

To ensure that construction waste is disposed of at a municipal waste disposal facility.

Targets

- The collection of construction waste will be done daily.
- Construction waste will always be disposed of at a municipal waste disposal facility.
- 100% construction waste disposal record.

Management and mitigation requirements

- Construction waste will be recycled or re-used in the construction process.
- Waste that cannot be re-used or recycled will be disposed of at the nearest appropriate and licensed waste disposal site - disposal records will be kept.
- Waste will not be buried and/or burnt on site.
- A sufficient number of refuse bins that are wind and animal/scavenger proof will be provided.
- Regular clearing and disposal of litter and rubble.
- Where waste is to be transported by truck, it will be covered appropriately.

c. Hazardous waste

Objective

To ensure that hazardous waste, such as bitumen, tar, oil, etc. is disposed at a registered waste disposal facility for toxic/hazardous material.

Target

Hazardous waste will always be disposed of at a registered waste disposal facility for toxic/hazardous material.

Management and mitigation requirements

Oil and lubricant waste management:

- Used oil, lubricants, and cleaning materials from the maintenance of vehicles and machinery shall be collected in a holding tank and sent back to the supplier.
- Water and oil will be separated in an oil trap. Oils collected in this manner will be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at approved waste disposal sites for toxic/hazardous materials. Oil collected by a mobile servicing unit will be stored in the service unit's sludge tank and discharged into the safe holding tank for collection by the specialist oil recycling company.
- All used filter materials shall be stored in a secure bin for disposal off site.

6.5 VISUAL/ AESTHETICS

6.5.1 Purpose

There are several general visual mitigating measures which must be applied either during the construction phase or operation phase to prevent/minimise impact on the community.

6.5.2 Components

a) Raising of Tzaneen Dam wall.
b) Visual impact of new dam.

a. Raising of the Tzaneen dam wall

Objective

To decrease visual impacts caused due to the raised dam wall.

Target

To minimise visual impacts caused by the proposed raised dam wall.

Management and mitigation requirements

- Hoarding of construction site facilities to screen views where possible.
- Limit route and duration of large machine activities.

b. Visual impact of new dam

Objective

To decrease visual impacts cause by the proposed dam.

Target

To minimise visual impacts caused by the proposed dam.

Management and mitigation requirements

- Limit areas of invasiveness. The extent of unnecessary damage to natural surrounds must be kept to a minimum.

- Hoarding should be erected to screen the excavation and construction activities where possible as well as to prevent local passers-by from entering an unsafe site. The hoarding should be painted in natural colours or can be constructed out of natural materials, i.e. woven grass / wattle.
- Discourage the unnecessary usage of high voltage lights during through-night construction.
- Utilise existing roads to divert traffic away from construction sites.
- Limit the number and usage of visually intrusive traffic signage.
- All new roads and bridges should mimic the style and visual character of the existing infrastructure.
- All new roads routed through untransformed land should be regarded as least favourable.

6.6 AIR QUALITY

6.6.1 Purpose

To maintain the emissions of dust particulates and exhaust fumes to a minimum to prevent causing nuisance conditions in surrounding areas.

6.6.2 Components

a) Truck transport and road dust entrainment.
b) Excavation and Earthworks.
c) Stockpiles and spoil dumps.
d) Vehicle and machinery emissions.
e) Dust on citrus.

a. Truck transport and road dust entrainment

Objective

To avoid exceeding ambient dust levels at the construction sites.

Target

Successfully investigate all exceedances of the ambient dust levels at the defined control point.

Management and mitigation requirements

- Vehicles travelling along the access roads must adhere to speed limits to avoid creating dust.
- A maximum speed limit of 40 km/hr must be adhered to on all site roads.
- Construction camp and haulage road construction areas (these are areas that have been stripped of vegetation) must be dampened to avoid excessive dust.
- Where dust is unavoidable, screening may be required.
- Development a method statement for identified activities that results in exceedance of the ambient dust levels at the control point.

b. Excavation and Earthworks

Objective

To ensure dust emissions are kept to a minimum.

Target

To reduce dust emissions, and to keep within the South African standards.

Management and Mitigation requirements

- Re-vegetate dry, exposed areas to stabilise surfaces.
- Only remove secure covers in small areas and not all at once.
- All activities must be damped down, especially during dry weather.
- Development a method statement for identified activities that results in exceedance of the ambient dust levels at the control point.

c. Stockpiles and Spoil dumps

Objective

To ensure dust particles from stockpiles and spoil dumps are kept to a minimum.

Target

Locate stockpiles in areas least susceptible to heavy winds.

Management and mitigation requirements

- Limit the height and slope of the stockpiles to reduce wind entrainment. For example, a flat shallow stockpile will be subject to less wind turbulence than one with a tall conical shape.
- Keep stockpiles or mounds away from the site boundary, sensitive receptors and watercourses. If necessary, take into account the predominant wind direction to reduce the likelihood of affecting sensitive receptors.
- Make sure the stockpiles are maintained for the shortest possible time.
- Seed, re-vegetate or turf long term stockpiles to stabilise surfaces or use surface binding agents
- Erect fences of similar height and size to the stockpile to act as wind barriers and keep these clean using wet methods. Porous fences or hedges often make the most suitable shelter.

- Development a method statement for identified activities that results in exceedance of the ambient dust levels at the control point.

d. Vehicle and machinery emissions

Objective

To ensure that vehicle and machinery emissions comply to acceptable norms and standards.

Target

- All construction vehicles and machinery emissions will be screened on a weekly basis.
- All construction vehicles and machinery will be serviced on a monthly basis, with a major service every six month.
- Any construction vehicle or machine that does not comply with the emission standard shall immediately be withdrawn from service.
- Complaints received regarding emissions from construction vehicles or machinery shall immediately be attended to.

Management and mitigation requirements

- Service construction vehicles and machinery on a monthly basis, with a major service every six months.
- The contractor shall inspect all construction vehicles and machinery every morning for defects (indicator lights, oil leaks, etc) and excessive emissions.
- Vehicle emissions shall be tested as per the described methods and standards every week.
- All vehicles not complying to the specified standard shall be removed from service.
- All complaints received pertaining to construction vehicle emissions shall be recorded as well as the actions taken to rectify the situation.

e. Dust on Citrus

Objective

To avoid exceeding ambient dust levels at the construction sites.

Target

Successfully investigate all exceedances of the ambient dust levels at the defined control point.

Management and Mitigation

- Vehicles travelling along the access roads must adhere to speed limits to avoid creating dust, with particular emphasis around citrus areas.
- A maximum speed limit of 40 km/hr must be adhered to on all site roads.
- Where dust is unavoidable, screening may be required.
- Development a method statement for identified activities that results in exceedance of the ambient dust levels at the control point.
- Acceptable levels of dust for citrus must be determined and measured at the closest orchards (which will be in the dam basin).

6.7 NOISE CONTROL

6.7.1 Purpose

There is several general noise mitigating measures/principles which must be applied during the construction phase in order to prevent/minimise impacts on the identified noise sensitive areas. The requirements apply to all of the construction areas of the project.

6.7.2 Components

a) General noise mitigation.
b) Noise from the plant and machinery.
c) Noise from blasting.
d) Noise from vehicles.

a. General Noise Mitigation

Objective

To minimise noise levels.

Target

To ensure noisy operations are restricted to day time hours.

Management and mitigation requirements

- The induced ambient noise levels in the residential areas of Ka-Malubana Village shall not exceed 50dBA during the day and 40dBA at night.
- Noisy operations should be combined so that they occur where possible at the same time.
- Construction activities are to be contained to working hours during the day and early evening. Night-time activities near noise sensitive areas should be avoided wherever possible.
- Deliveries of material and any noisy offloading activities should be restricted to the day.

- With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the contractor should liase with local residents on how best to minimise impact, and the local population should be kept informed of the nature and duration of intended activities.
- As construction workers operate in a very noisy environment, it must be ensured that their working conditions comply with the requirements of the Occupational Health and Safety Act (OHSA) (Act No 85 of 1993). Where necessary ear protection gear should be worn.
- Given that construction activities will expose workers to excessive noise rating levels it is recommended that a baseline noise survey also be conducted as soon as possible following commencement of site activities. This noise survey will quantify worker exposures to noise during typical activities and allow for informed comment on the relative risks to hearing presented by various activities – i.e. identify sources of excessive noise and allow for demarcation of noise zones. A formal noise survey will also permit structuring of an appropriate audiometric examination protocol for construction workers – as required by the Noise Induced Hearing Loss Regulations – OHSA Act 85 of 1993.

b. Noise from the plant and machinery

Objective

To minimise noise emanating from the construction activities, this may be a nuisance to the surrounding residential areas.

Target

To ensure noise machinery are located away form sensitive areas.

Management and mitigation requirements

Construction site yards, concrete batching plants, asphalt batching plants, construction worker camps and other noisy fixed facilities should be located well away from noise sensitive areas. Once the proposed final layouts are made available by the contractor(s), the sites must be evaluated in detail and specific measures designed in to the system.

c. Noise from Blasting

Objective

To ensure noise levels are kept to a minimum during blasting.

Target

To ensure blasting is restricted to daytime hours.

Management and mitigation requirements

Blasting operations are to be strictly controlled with regard to the size of explosive charge in order to minimise noise and air blast, and timings of explosions. The number of blasts per day should be limited, blasting should be undertaken at the same times each day and no blasting should be allowed at night.

d. Noise from Vehicles

Objective

To minimise noise levels caused by construction vehicles

Target

To ensure compliance with requirements of the Occupational Health and Safety Act (Act No 85 of 1993).

Management and mitigation requirements

- All construction vehicles, plant and equipment are to be kept in good repair.
- Truck traffic should be routed away from noise sensitive areas, where possible.

6.8 TRAFFIC

6.8.1 Purpose

Construction activities inherently have the potential to impact on traffic flow and patterns. Compliance to the road safety measures and recommendations would minimise disruptions and negative impacts to traffic flow and patterns.

6.8.2 Components

a) Additional turning lanes.
b) Construction signage.
c) Traffic movement of construction vehicles.

a. Additional turning lanes

Objective

The objective is to maintain a good level of service at the access intersection to the constructing sites and the borrow pits.

Target

The target is to ensure safety and to minimise delays for the general traffic on the affected roads.

Management and mitigation requirements

Due to the increased activity of heavy construction vehicles on the roads network it is proposed that turning lanes are provided to minimise the conflict points with the general road users. These turning lanes should to be at the intersections with the access roads to borrow pits and construction sites. These will be permanent on access roads maintained after construction.

b. Construction signage

Objective

The objective is to warn the general public of construction traffic.

Target

The target is to ensure road safety along the public roads and to increase awareness of slow moving vehicles.

Management and mitigation requirements

- Due to the public nature of the roads it is recommended that adequate construction signage is in place to inform the public of increased construction activities in the affected areas by placing adequate signage.
- Traffic signs should warn construction vehicles of the presence of pedestrians and school children along the road. Likewise, traffic signs should warn community road users of the presence of construction vehicles.

c. Traffic movement of construction vehicles

Objective

Ensuring road safety for regular road users and construction vehicles.

Targets

- Regulation of construction traffic to minimise the impact on regular road users.
- Regulation of normal road traffic to minimise impact of construction activities on these road users and to ensure a safe passageway for both these road users as well as normal road users.

Management and mitigation requirements

- Construction traffic should only make use of approved routes.
- The number of trucks that pass through communities should be kept to a minimum.
- The Engineer shall prepare a method statement that will consider alternatives to transporting goods through towns for haulage of high volume construction material.
- Implement traffic flow controls where road closure or partial road closure is unavoidable. This can either be in the form of providing alternative access routes via detours and/or the use of 1-way traffic flow control.
- In the event of 1-way traffic flow control, trained personnel should be used to regulate the traffic to prevent severe delays at waiting points.

6.9 WATER MANAGEMENT

6.9.1 Purpose

Construction activities inherently have the potential to impact on the water environment, specifically surface water. This management and mitigation plan ensures that construction activities are managed in such a manner that any negative impacts are mitigated or prevented.

6.9.2 Components

a) Stormwater runoff and discharge.
b) Erosion protection.
c) Floodlines.
d) Proximity to rivers, streams and/or wetlands.
e) Water abstracted from river and streams.
f) River crossings / alteration of water courses.
g) Pollution control.

a. Stormwater runoff and discharge

Objectives

To ensure that stormwater runoff and discharge are effectively controlled.

Targets

- No flooding as a result of stormwater control measures.
- No erosion as a result of stormwater control measures.
- No silt pollution as a result of stormwater control measures.

Management and mitigation requirements

- Suitable means for the control and disposal of accumulated stormwater which may run off from any earthworks, building or paving shall be provided.
- The disposal of stormwater to any street surface shall first be confirmed with the Local Authority that adequate capacity is available.
- No stormwater shall be allowed to enter any drainage installation.

b. Erosion protection

Objectives

To ensure that all stormwater outlets are protected against erosion.

Targets

No erosion channel formation as a result of stormwater outlets.

Management and mitigation requirements

- Identified areas where erosion could occur must be appropriately protected by installing the necessary temporary and/or permanent drainage works as soon as possible and by taking other appropriate measures to prevent water from being concentrated in rivers/streams and from scouring slopes, banks or other areas.
- Any erosion channels which develop during the construction period must be suitably backfilled, compacted and restored to a proper condition (i.e. vegetated etc.).
- Where excavation takes place, the affected area should be properly stabilised and revegetated to minimise erosion risk.
- Appropriate mitigation to control sediment input into rivers will be required during construction.
- Stormwater control measures must, amongst others, consider and provide for the following:
    - use of siltscreens;
    - use of straw bales as filters, which are placed across the flow of overland stormwater overlays:
    - channelling stormwater run-off through natural grassland buffer areas (at least 20m);
    - silting of stormwater pipes in adjoining developments and townships as a result of run-off from the rail reserve shall not be permitted. If this does occur, it shall be the responsibility of the concessionaire to clean out the pipes to the satisfaction of the relevant municipality;
    - gabions or stormwater control structures should be used to disperse stormwater flows and/or prevent and control erosion where necessary along rivers or streams;
    - in the case of high volumes of stormwater flow, retention ponds must be provided;

- all erosion protection measures have to be maintained on a continual basis;
- corrective actions have to be taken as and when required to stop any signs of erosion;
- regular inspections by competent personnel need to be undertaken at especially:
  - inlet and outlet points of drainage structures,
  - stormwater release points, and
  - along sections where drainage structures are laid on steep slopes.
- Where possible, stormwater should be released in grassy areas which act as a natural filter and to reduce the erosion potential of the water.
- The stabilization of headcuts during the construction phase to prevent erosion and sedimentation will be undertaken through various methods to limit or eliminate erosion and sedimentation i.e. gabions, rock packing, vegetation establishment, bales and poles, vegetation sausages and top soil simulation.

c. Floodlines

Objectives

To ensure that no construction activities take place within predetermined floodlines.

Targets

- Determine the 1:20, 1:50 and 1:100 floodlines for all rivers and streams at which construction activities will take place.
- Draw maps with an appropriate scale to show all construction activities in relation to the 1:20, 1:50 and 1:100 floodlines.
- No unauthorised activities within the 1:100 year floodline.
- Where possible construction activities should only take place during low flow periods when as little of the construction site and exposed sediment is in contact with the flow as possible.

Management and mitigation requirements

Floodlines (1:20, 1:50 and 1:100 year) should be determined prior to construction to ensure risks are adequately managed. These must also be clearly indicated on the layout plans.

d. Proximity to rivers, streams and/or wetlands

Objectives

To ensure that construction activities close to rivers, streams and / or wetlands do not negatively affect rivers, streams and / or wetlands.

Targets

- No impact on riparian vegetation.
- No impact on wetland vegetation.
- No silt pollution in rivers and streams as a result of construction activities.

Management and mitigation requirements

- Where appropriate, large individual indigenous riparian trees should be avoided during construction and should be marked on site.
- Appropriate design and mitigation measures must be developed to prevent impacts on the natural flow regime of the water courses i.e. through placement of structures/support.
- If this is not possible, measures must be developed to minimise impacts on surface water i.e. erosion, siltation, pollution etc.
- The proximity of construction activities in relation to springs, wetlands and streams shall be clearly shown on a map with a 1:10 000 scale.
- A wetland professional shall be appointed to confirm the extent of wetlands through soil sampling.
- No construction activities shall take place within any wetland boundary.
- All construction activities shall be 50 meters from the edge of any river/stream or outside the 1:20 year floodline, whichever is the greatest.
- A water quality and quantity monitoring plan shall be developed and implemented.
- This plan shall include monitoring points, frequency of samples, and variables that should be analysed.
- Water sampling will be done as per the water monitoring program.
- Water quality results shall be compared to “GA general limit” and a compliance report prepared.
- Pollutants collected will be stored in sealed drums for recycling.

e. Water abstracted from river and streams

Objectives

To obtain authorisation for water abstraction and to minimise impacts to the aquatic and riverine ecosystems.

Targets

- Obtain all authorisations in terms of Section 21 of the National Water Act (No.36 of 1998).
- No surface run-off of oils, cement, litter, paints etc. which could pollute nearby streams and rivers.

Management and mitigation requirements

- Any abstraction of water for construction purposes must be approved by DWA.
- Prevention and mitigation measures must be implemented to ensure water quality is not adversely affected by such abstraction.

f. River crossings / alteration of water courses

Objectives

To prevent and mitigate disturbance and change to the riparian zones and instream habitats of rivers and streams during construction of water course crossings.

Targets

- No impact on riparian vegetation.
- No impact on wetland vegetation.
- No silt pollution in rivers and stream as a result of construction activities.

Management and mitigation requirements

- All construction roads in or adjacent to the riparian zone should be aligned and managed so as to minimise disturbance of the riparian zone and instream habitats.
- For natural watercourses, the original geometry, topography and geomorphology in both cross-sectional and longitudinal profile should be reinstated at above or below river crossings.

- For controlling sediment input into any rivers, streams or wetland the use of hay bales packed in rows across diversions and active flow areas could limit sedimentation inputs and buffer the pH:
  - such bales will need to be removed and disposed of after construction;
  - other alternative methods for controlling sediment should also be considered;
  - all coffer dams, causeway and construction materials should be removed from the river and riparian zone immediately after construction at the site is completed;
  - disturbed areas of the riparian zone should be re-vegetated using either a specified seed mix and/or appropriate indigenous trees where necessary and according to slope and risks in terms of bank erosion along the rivers or streams;
  - ripping and discing of temporary access and construction roads in the riparian zone should be undertaken in order to assist with natural vegetation re-establishment and the control of bank erosion;
  - large individual indigenous riparian trees should be avoided during construction where appropriate.
- The mitigatory methods should be audited during construction, and monitored for a period thereafter, until full rehabilitation is assured and stability demonstrated.

g. Pollution control

Objectives

To ensure no pollution of any river, stream and / or wetland with grease, hydrocarbons, suspended solids, etcetera.

Targets

- The results of samples taken of the river shall show no deterioration in water quality from the background water quality.
- All incidents shall be reported to the relevant office of the Department of Water Affairs.
- No complaints regarding water pollution.

Management and mitigation requirements

- Storage, handling and disposal of fuels, oils, lubricants and other potentially harmful chemicals (and their containers) shall be done under proper supervision in accordance with the manufacturer's instructions.
- Containers that contained toxic or harmful materials shall not be rinsed and re-used.
- Such containers shall not be stored or disposed on site. These containers shall be destroyed to prevent re-use and disposed in accordance with the manufacturers instructions at a permitted waste disposal facility.
- Certificates of safe disposal shall be kept on record.
- Discharges of liquid waste shall under no circumstances be allowed.
- Where pollution of a water body may potentially occur, the contractor shall ensure adequate measures (e.g. containment, drainage diversion systems, attenuation, settlement dams, and oil absorbent products) are in place to prevent pollution.
- Areas where cement is mixed and containers washed shall be confined to a minimum sized area, which is bunded, so that contaminated runoff is contained.
- Any spillages of pollutants, irrespective of size, shall be contained and cleaned immediately.

6.10 AQUATIC ECOSYSTEMS

6.10.1 Purpose

Construction activities inherently have the ability to negatively impact on aquatic and riparian vegetation. The following mitigation measures will help to ensure that the negative impacts can be avoided or adequately mitigated.

6.10.2 Components

a) Removal of riparian vegetation.
b) Reinforcement and protection of the downstream banks and streambed.
c) Drainage of all farm dams within the dam basin.

a. Removal of riparian vegetation

Objective

- To maintain aquatic habitats at the proposed dam.

- To ensure riverine habitats are maintained during dam basin clearance.

Target

- To prevent impact on the river system during vegetation removal.
- To ensure riparian habitats are maintained during dam clearance.

Management and mitigation requirements

- Phased removal of vegetation, limiting the amount of exposed areas and confining the majority of disturbances to the dry season.
- Translocation of red data or riparian plant species to alternative sites.
- Accurate floodline calculation.
- Prevent exotic vegetation encroachment.
- Adequate provision of inundated habitats for fish and aquatic macro invertebrates must be provided for or remain, which will not decay quickly or disrupt the physical or chemical characteristics of the water.

b. Reinforcement and protection of downstream banks and streambed

Objective

To ensure that the river banks are protected against erosion.

Targets

- To prevent erosion of the river banks.
- To stabilise the riverbanks and beds.

Management and mitigation requirements

Adequate strategies must be implemented for the reinforcement and protection of the downstream banks and streambed so as to stabilise and reduce erosion of the banks and bed. In addition to riparian vegetation rehabilitation, engineered structures must be put in place to reduce the turbulence and velocities of discharged waters.

c. Drainage of all farm dams within the dam basin

Objective

To ensure that the Letaba river system remains genetically pure.

Target

To prevent exotic fish from entering into the Letaba river system.

Management and Mitigation Requirements

All farm dams within the dam basin of the proposed new dam must be thoroughly drained, well before the closure of the proposed dam at the site known as Nwamitwa and checks must be made by the Limpopo Provincial Department of Agriculture to ensure that no pools of water containing fish are left behind.

6.11 NATURAL MATERIALS SOURCING, AND EARTHWORKS/ STOCKPILES

6.11.1 Purpose

To ensure that materials are sourced from authorised operations and that stockpiled material potential impacts the environment is limited.

6.11.2 Components

The plan is made up of the following components:

a) Materials sourcing.
b) Earthworks /stockpiles.

a. Materials sourcing

Objectives

To ensure that materials used for construction are from authorised operations.

Targets

100% record of the source of all materials.

Management and mitigation requirements

The Contractor will prepare a source statement to indicate the sources of all materials (including topsoil, sand, natural gravel, stone, asphalt, etc.) and submit these to the Engineer for approval, which must include sources from commercial suppliers.

b. Earthworks/ Stockpiles

Objectives

To ensure that material stockpiled does not negatively impact on the surrounding environment.

Targets

Stockpiles are constructed and maintained appropriately.

Management and mitigation requirements

During the life of the stockpiles, the following measures will be taken:

- Stockpiles will be positioned and sloped to create the least visual impact.
- Stockpiles will not be allowed underneath trees or against the trunks of trees.
- Stockpiles will be constructed and maintained to avoid erosion of the material and contamination of the surrounding environment.
- Stockpiles will be kept free of all alien vegetation.
- The heights of stockpiles should be minimised as far as possible to reduce wind entrainment and stockpiles should be located as far away from sensitive receptors as possible
- Windbreaks should be erected around stockpiles where possible in order to reduce wind entrainment of dust emissions

Once stockpiles have been removed, the following measures will be taken:

- The site will be re-instated to its original condition.
- No foreign material generated and/or deposited during construction will remain on the site.

6.12 TOPSOIL MANAGEMENT

6.12.1 Purpose

To ensure that topsoil is suitably stored for the subsequent use in the rehabilitation and re-vegetation of the site.

6.12.2 Components

Prior to site establishment and any earthmoving operations, the Contractor will strip and stockpile all topsoil within the footprint of the construction activities.

a) Topsoil stripping.
b) Topsoil stockpiling.
c) Topsoil storage.

a. Topsoil stripping

Objective

To ensure topsoil is removed for subsequent use and re-vegetation.

Target

To ensure vegetation is removed for subsequent use and rehabilitation.

Management and mitigation requirements

Soil shall be stripped in a phased manner, so as to retain vegetation cover for as long as possible to avoid prolonged exposure of soils to wind and water erosion.

b. Topsoil stockpiling

Objective

To stockpile topsoil for the subsequent use in the rehabilitation and re-vegetation of the site.

Target

To retain the usefulness of topsoil for the rehabilitation of the site.

Management and mitigation requirements

- All topsoil shall be stockpiled separately from subsoil and/or rocky material.
- No imported topsoil will be used as the final backfill layer.
- Stockpiles will be located away from rivers, stream, drainage lines, and areas of temporary or permanent inundation.
- Topsoil stockpiles shall be convex and shall not exceed 3 metres in height.

c. Topsoil storage

Objectives

To ensure topsoil is stored in a manner to allow re-vegetation later.

Targets

To ensure topsoil is stored in an adequate manner for re-use.

Management and mitigation requirements

- Topsoil must not be stored in or near sensitive areas.
- Stockpiled topsoil shall not be compacted.
- The Contractor will implement measures to prevent topsoil form being blown away or washed away.

6.13 SPOIL MANAGEMENT

6.13.1 Purpose

The purpose of the spoil (excavated subsoil) management plan is to ensure that spoil is stockpiled, transported and disposal in an appropriate manner.

6.13.2 Components

The plan is made up of the following components:

a) Locating spoil disposal sites.
b) Transporting spoil.

a. Locating spoil disposal sites

Objectives

- To ensure that social and environmental requirements are taken into consideration for the siting of the spoil stockpiles.
- To ensure that spoil is disposed of in an environmentally friendly manner complying with all regulatory requirements.

Targets

To prevent negative impacts occurring during disposal of spoil material.

Management and mitigation requirements

- The contractor will identify candidate spoil stockpile sites for use during construction.
- Spoil stockpiles shall be located away from seepage zones, flood lines, water resources and other ecologically sensitive areas and not within the 1:20 year floodline, or within a horizontal distances of 50m (whichever is greater) of a water course, drainage line or identified wetland.
- The contractor will estimate spoil volumes to be accommodated at potential sites by modelling the dump size, layout and form.
- The contractor shall develop a spoil stockpile plan, which will include the following :

  - Estimate size of stockpiles;
  - Means of erosion (wind and water) prevention measures;
  - Measures to prevent spoil dump contamination, vehicular and public access.
- Spoil stockpiles shall be sufficiently located away from seepage zones, flood lines, water courses and other ecologically sensitive areas.
- Stockpiles shall not have slopes steeper than 1 vertical: 2.5 horizontal.
- Spoil stockpiles should be protected with appropriate soil conservation measures from wind and water erosion. Depending on local conditions, such measures could include:
  - regular watering;
  - erosion control fabric; and
  - grass seeding.
- No waste, such as construction waste, building rubble and domestic waste will be allowed on the spoil stockpiles.
- Spoil stockpiles will be cleared of any alien vegetation.
- Stockpiles will not be allowed underneath trees or against the trucks of trees.
- Avoid spoil handling and dumping in windy or excessively rainy conditions.

b. Transporting of spoil

Objectives

To ensure that spoil is transported from the site of origin to the disposal site in a manner that will not create negative impacts.

Target

No complaints received from residents and road users regarding dust from spoil transport vehicles.

Management and mitigation requirements

- Vehicles should be routed away from noise sensitive areas wherever possible.
- In built up areas a speed limit of 40km/h for heavy vehicles will be strictly enforced.
- Vehicles transporting spoil material must be covered or soil sprayed with water before leaving site if transportation is required in excessively windy conditions at the discretion of the ECO.

6.14 FAUNA AND FLORA

6.14.1 Purpose

Construction activities inherently have the potential to impact on the environment, specifically flora and fauna. This management and mitigation plan ensures that construction activities are managed in such a manner that any negative impacts are mitigated or prevented.

6.14.2 Components

a) Protection of ecologically sensitive areas/ habitats and endangered fauna and flora.
b) Weeds and alien vegetation.
c) Rare and protected species.
d) Firewall regimes.

a. Protection of ecologically sensitive areas/habitats and endangered fauna and flora

Objective

- To minimise transformation and fragmentation of habitat for fauna and flora; and
- To minimise harvesting pressure on vegetation at the proposed new dam site

Targets

- Maintenance of viable corridors of natural habitat in the project area.
- Minimise impact on natural vegetation.
- Maintenance of vegetation in natural condition surrounding infrastructure.
- Maintenance of vegetation in natural condition surrounding infrastructure.
- Prevent unnecessary removal of vegetation.
- Ensure as little disruption to animals as possible.

Management and mitigation requirements

- Establish a holding nursery for local plants suitable for re-planting on rehabilitated surfaces after closure (construction camp, borrow pits).
- Areas cleared for temporary work outside of the future dam full supply level shall be stabilised as soon as possible.
- The trapping and relocation of targeted threatened, endemic and protected species, particularly small mammals and reptiles should be detailed in a method statement before filling of the proposed dam commences.
- Construction teams should not be allowed access to areas of untransformed vegetation where opportunities for poaching may be present. Penalties should be levied on any construction teams that transgress and poachers should be prosecuted under relevant provincial legislation.

b. Weeds and alien vegetation

Objective

To minimise invasion of alien plants at both Tzaneen dam and the proposed dam at the site known as Nwamitwa.

Targets

Maintenance of vegetation in natural conditions and surrounding infrastructure.

Management and mitigation requirements

- Restrict development footprint to absolute minimum area necessary.
- Rehabilitate disturbed sites through ripping of soil surface with a seed mix of relevant indigenous grasses appropriate to the specific area.

c. Rare and protected species

Objectives

- To minimise loss of individuals of rare and protected beetle species.
- To minimise loss of protected scorpion and baboon spider species.

Targets

- Viable populations of *Dromica oberprieleri* and *Megacephala regalis vansoni*, as well as other protected beetle species, remain after completion of construction activities.
- No impacts on populations of Flat Rock Scorpions (*Hadogenes troglodytes*) and minimal loss of individuals of protected baboon spiders and other protected scorpion species including *Opistophthalmus glabrifrons* and *Opistacanthus asper.*

Management and mitigation requirements

- Filling of Nwamitwa Dam, if approved, should be done and as far as possible within the adult activity period of *Dromica oberprieleri* (October - January).
- Pipeline and reservoir construction should avoid areas suitable as habitat for *H. troglodytes*, area disturbed during construction should be minimised as far as is feasible so as to reduce impacts on baboon spiders and other scorpion species.
- An appropriate invertebrate biodiversity-monitoring programme, for which baseline assessments of selected indicator taxa (e.g. *Dromica spp*.) must be undertaken prior to any development of the site.

d. Maintenance of firewall regimes

Objective

To minimise disruption of the natural fire regime on either side of the proposed dam.

Targets

Maintenance of equivalent fire regimes on both sides of the dam.

Management and mitigation requirements

Burns on both sides of dam should take place at similar frequency and at similar times.

6.15 HERITAGE

6.15.1 Purpose

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the development can be excavated/ recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan; hence they can be avoided or cared for in the future.

6.15.2 Components

a) Protected heritage sites.
b) Chance heritage finds.

a. Protected heritage sites

Objective

Protection of archaeological, historical and any other site or land considered being of cultural value within the project boundary against vandalism, destruction and theft.

Target

- To avoid disturbing sites of heritage importance.
- To avoid disturbing burial sites.

Management and mitigation requirements

- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site.
- Contractors and workers should be briefed on the locations of the existing heritage sites within the construction areas.

b. Chance heritage finds

Objective

To ensure heritage sites discovered are addressed in terms of legislation.

Target

The preservation and appropriate management of new discoveries in accordance with the National Heritage Resources Act (Act No. 25 of 1999). Should these be discovered during construction.

Management and mitigation requirements

- The contractors and workers should be notified that archaeological sites might be exposed during the construction work.
- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the ECO shall be notified as soon as possible.
- All discoveries shall be reported immediately to a museum, preferably one at which an archaeologist is available, so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken;
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1).

6.16 HEALTH AND SAFETY

6.16.1 Purpose

Construction activities inherently have the potential to impact on the health of the construction workers and the community. This management plan ensures that the community are made aware of the health implications and mitigation measures that would prevent or minimise the impacts caused.

6.16.2 Components

a) Disaster management plan.
b) Safety of construction workers.
c) Construction related illnesses.

a. Disaster management

Objective

Ensuring the health and safety of construction workers on site.

Targets

- Trained first aid workers on site.
- Standard operating procedure in the case of an emergency.

Management and mitigation requirements

- Develop and implement a disaster management plan for implementation during the construction phase.
- Identify suitable individuals that can be trained and used as first aid officers on site (levels 1 to 3). Training of these individuals should ideally take place during this phase of the project to ensure that qualified first aid officers are on site once construction commences.
- Consult with private ambulance services and/or hospitals so that they are aware of the project and would be able to provide emergency and/or medical services if needed.

b. Safety of construction workers

Construction workers health and safety in terms of their working conditions will be managed inline with the requirements of the Occupational Health and Safety Act (Act No 85 of 1993).

c. Construction related illnesses

Objective

To ensure that construction workers are informed of all construction related health risks.

Target

Ensure all workers are educated on the symptoms off all possible construction related illnesses.

Management and mitigation requirements

- All contractors are to conduct a baseline risk assessment prior to performing any construction activities. This risk assessment must identify and evaluate all of the risks to the health and safety of persons engaging in construction activities. Focus illnesses should be on malaria, diarrhoeal disease, and sexually transmitted diseases.
- All construction workers should be subject to baseline (pre-employment) medical examinations. The structure of these examinations should be at the discretion of a registered Occupational Medical Practitioner.
- All workers are to have easy access to drinking water;
- All equipment is to be maintained according to their design specifications to prevent vibration stress;
- All defective or broken equipment and vehicles are to be removed from site until they are repaired;
- All staff is to be educated on the impacts and symptoms of vibration stress.
- Issuing appropriate personal protective equipment (brimmed hats or peaked caps) and enforcing the use of such PPE.
- Educating workers in ways and means of preventing malaria is also recommended. Priority should be given to ensuring that workers are aware of the benefits of:

- Limiting time out of doors after dark
- Wearing long sleeved shirts and long trousers after dark
- Making use of insect repellents
- Closing windows and doors of sleeping quarters at night

- Education and training of workers in ways and means of reducing their risks of diarrhoeal disease infection – i.e:
  - Avoid swimming or bathing in uncontrolled water sources
  - Avoiding drinking water from uncontrolled or unknown sources
  - Avoid urinating in water sources / courses
  - Follow good personal hygiene practices (washing hands etc)
  - Avoid eating food from unknown or suspect sources
  - Avoid raw or undercooked foods.

6.17 SITE REHABILITATION

6.17.1 Purpose

The purpose of the rehabilitation management plan is to successfully address, control, and mitigate the long-term well-being of the environment.

6.17.2 Components

a) Disturbed areas to be rehabilitated.
b) Re-vegetation of disturbed areas.
c) Sourcing of materials from borrow pits and blasting areas.
d) Maintenance of rehabilitative measures.
e) Rehabilitation of marginal vegetation.

a. Disturbed areas to be rehabilitated

Objective

To ensure all areas disturbed during construction footprint are rehabilitated to its natural state.

Target

To ensure all debri is removed from the site and rehabilitated.

Management and mitigation requirements

- Clear the site of all inert waste and rubble, including surplus rock, foundations and batching plant aggregates. After the material has been removed, the site shall be re-instated and rehabilitated.
- Load and haul excess spoil and inert rubble to fill in borrow pits/dongas or to dump sites indicated/approved by the ECO.
- Subject to approval by the Engineer in consultation with the ECO, certain borrow pits and/or quarries may be utilised for the disposal of waste rock and inert building rubble.

- Remove from site all domestic waste and dispose of in the approved manner at a municipal waste disposal site.

b. Re-vegetation of disturbed areas

Objective

To ensure natural habitats are maintained.

Target

- Removal of invasive alien plants
- Re-vegetation of nursery plants in a correct manner to encourage growth.

Management and mitigation requirements

- All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment.
- Planting should preferably be done during the rainy season.
- If impenetrable shale, rock, clay or a high water table is encountered, making the above hole sizes impossible, then seek advice from the Engineer.
- Where local soil has poor drainage, broken rock (approximately 75 mm in diameter) must be placed to a depth of 150 mm at the bottom of the planting hole prior to planting and backfilling with approved plant medium mixture.
- Backfill planting holes with excavated material/approved topsoil, thoroughly mixed with weed free manure or compost (per volume about one quarter of the plant hole), one cup of 2:3:2 fertiliser and an approved ant and termite poison.
- As much of the soil from container plants as possible must be retained around the roots of the plant during planting.
- The plant must be planted into the specified hole size with the approved soil, compost and fertiliser mix used to refill the plant hole and must cover all the roots and be well firmed down to a level equal to that of the surrounding in situ material.
- After planting, each plant must be well watered, adding more soil upon settlement if necessary.
- Add mulch to the surface area of the bermed basin.
- Where necessary, protect newly planted trees against wind, frost and wild animals by means of fencing, sacking or frost nets.

- Thoroughly water plants as required until the plants are able to survive independently (i.e. depending on the rainfall).
- Water aloes and bulbs once, directly after transplanting to settle the soil.
- Remove stakes and wire binds over time as required, as plants become established

c. Sourcing of material from borrow pits and blasting areas

Objective

To ensure disturbed areas are rehabilitated.

Target

- To make safe all borrow pit and excavation areas.
- To make safe all blasting areas.

Management and mitigation requirements

- Make safe all borrow pits, quarries and dangerous excavations by backfilling, grading and blasting as required.
- All soft material side slopes should be made up to a final layer with topsoil and re-vegetated to 1:3 meters.
- All weathered or hard rock slopes should be made up to a final layer of a 2 meters step every five meters, fenced off and allow for free draining.
- Programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. Compact in layers for best results.
- Backfill French drains, sludge dams and evaporation dams and compact, covering with a final layer of topsoil to a height of 100 mm above the surrounding ground surface.
- Deficiency of backfill may not be made up by excavating haphazardly within the Work Site.
- Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material.
- Dismantle and flatten temporary drifts and river crossings, reinstating all drainage lines to approximate their original profile.
- Shape all disturbed areas to blend in with the surrounding landscape.

- Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfill is smoothed over to blend in with the surrounding landscape.
- Blasting areas should be left as rough as possible to facilitate the establishment of vegetation.

d. Maintenance of rehabilitative measures

Objective

To ensure all disturbed areas are rehabilitated.

Target

Compliance of the mitigation requirements.

Management and mitigation requirements

- Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers (or other approved method). If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.
- Revegetation must match the vegetation type, which previously existed, unless otherwise indicated in the Contract or specified by the Engineer.
- Base the new carrying capacity of rehabilitated land on the status quo rather than the regional estimate.
- Control invasive plant species and weeds by means of extraction, cutting or other approved methods.

e. Rehabilitation of marginal vegetation

Objectives

To rehabilitate disturbed areas to their former state.

Targets

Full compliance of the rehabilitation plan.

Management and mitigation requirements

The contractor shall prepare a rehabilitation plan for acceptance by the Engineer prior to commencement of the rehabilitation work. This plan will detail, amongst other, the

following:

- The Contractor shall remove all visible weeds from the placement area and from the topsoil before replacing the topsoil.
- Topsoiling shall be spread evenly over the surface. The final prepared surface shall not be smooth, but furrowed to follow the natural contours of the land.
- Where sodding is required, light scarification shall be carried out to contain the sods.
- Monitoring of revegetated areas every 3 months during the first year and twice a year thereafter for coverage and exotic weeds and invader species.
- Revegetated areas showing less than 30 % coverage after one growing season shall be prepared and revegetated from scratch.
- Repair of any damage to revegetated areas to maintain coverage.
- Work areas will be rehabilitated as soon as possible after completion of construction activities in an area, to minimise the potential for erosion and maximise the established time after revegetation.
- Prior to initiating the rehabilitation programme, the Contractor will remove all remnants of building materials, concrete foundations, timber, and other debris from the site.
- Suitable, area-specific and naturally occurring rooted trees and grasses must be planted within a determined buffer zone within the dam basin so as to reduce the input of sediments and pollutants into the dam via runoff.
- Suitable, area-specific and naturally occurring riparian vegetation must be rehabilitated or restored downstream of the dam so as to aid in bank stability and erosion control.

6.18 MONITORING

6.18.1 Purpose

A series of environmental variables are to be monitored during the construction phase to ensure compliance with the relevant legislation.

6.18.2 Components

a) Noise monitoring.
b) Air quality monitoring.
c) Water quality monitoring.
d) Aquatic life monitoring.

a. Noise monitoring

Objective

Ensure noise generating activities are located away from sensitive areas.

Target

Ensure compliance with the National Noise Control Regulations and SANS 10103:2004 guidelines.

Monitoring Methods

As construction workers operate in a very noisy environment, it must be ensured that their working conditions comply with the requirements of the Occupational Health and Safety Act (Act No 85 of 1993). Regular monitoring during high construction activities need to be conducted.

b. Air Quality Monitoring

Objective

To prevent impact caused by dust emissions on communities and receiving environment.

Target

- To determine the source of the emissions, the directly and the impact on the receiving environment though source based performance indicators.
- To install a dust fallout monitoring network before the construction phase begins.

Monitoring methods

Source based performance indicators for the proposed construction operations would include the following:

- Maximum dustfall immediately downwind of the construction activities to be <1 200 mg/m^2/day.
- From all activities associated with the construction phase of the project, dustfall in close proximity to sensitive receptors should not exceed 600 mg/m^2/day.
- A dust fallout network comprising of ~3 single dust fallout buckets is recommended. The proposed locations of the dust buckets are indicated in Figure 9.1 of **Annexure F** and are selected in terms of maximum zones of impact due to the construction activities, with the additional aspect of exposure potential.

c. Water quality monitoring

Objective

To maintain current water quality.

Target

Prevent impact on aquatic life due to pesticides and herbicides.
To conduct regular water analysis to ensure current water quality

Monitoring Phase

Water samples for water quality analysis will be taken weekly for the first four weeks before construction is initiated, thereafter, and during construction a sample will be taken once a month. The samples will be analysed for all substances that can be expected to emanate from the construction site and/or the construction activities.

d. Aquatic life monitoring

Objective

To monitor invertebrate fish communities.

Target

Prevent impact on invertebrate fish communities during construction phase.

Monitoring phase

- During the construction phase the impact of the construction activities on fish communities will be measured against the baseline study undertaken during the pre-construction phase. Acceptable levels of change will have to be agreed as Targets.
- After commissioning (to be included in the Operation EMP to be drafted at a later stage) monitoring of the fish communities will continue however this could be less intensive than during construction.

6.19 SITE CLOSURE

Once the environmental items on the incidents register list have been addressed to the satisfaction of the ECO, the ECO will provide an environmental performance certificate confirming that the environmental specifications applicable to the Contractor(s) have been met. This certificate will be submitted to the Engineer prior to the final Certificate of Completion being issued.