water & sanitation

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PROPOSED DEVELOPMENT OF FOXWOOD DAM & ASSOCIATED INFRASTRUCTURE

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME

DRAFT

November 2015

[DEA Reference - 14/12/16/3/3/1/2/817]

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for DWS

AMENDMENTS PAGE

Date	Nature of Amendment	Amendment No.	Signature
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LIST OF ACRONYMS & ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEDEAT	Department Economic Development, Environmental Affairs and Tourism
DEAT	Department of Environmental Affairs and Tourism
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EC	Eastern Cape
ECDRPW	Eastern Cape Department of Roads and Public Works
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
FSL	Full Supply Level
GIS	Geographical Information System
GN	Government Notice
ha	Hectare
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Party
km	Kilometre
m	Metre
MPRDA	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NDP	National Development Plan
NWA	National Water Act (Act No. 36 of 1998)
NWRS2	National Water Resource Strategy 2
SANS	South African National Standard

DEFINITION OF KEY TERMS

Auditing	*A systematic and objective assessment of an organisation's activities and services conducted and documented on a periodic basis.*
Competent	*Combination of knowledge, qualifications and experience specific to the work or task being performed.*
Construction Area	*Immediate site influenced by specific construction activities, as approved by the Project Manager.*
Construction Domain	*Entire footprint required for the construction of the overall project components.*
Dam	*Any barrier dam and any other form of impoundment used for the storage of water.*
Environment	*The surroundings in which humans exist and which comprise:* • *The land, water and atmosphere of the earth.* • *Micro-organisms, plant and animal life.* • *Any part or combination of a) and b) and the interrelationships among and between them.* • *The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that can influence human health and well-being.*
Environmental Aspect	*Those components of the company's activities, products and services that are likely to interact with the environment.*
Environmental Feature	*Elements and attributes of the biophysical, economic and social environment.*
Environmental Impact	*The change to the environment resulting from an environmental aspect, whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.*
Environmental Management Programme (EMPr)	*A detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and/or limiting or preventing negative environmental impacts are implemented during the life-cycle of a project.*
Environmental Objective	*Overall environmental goal pertaining to the management of environmental features.*
Environmental Target	*Performance requirement that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.*
Impervious	*Not permeable; not allowing liquid to pass through. Resistant to movement of water.*
Government Waterworks	*A waterwork (e.g. water storage dams, water transfer schemes and flood attenuation works) owned or controlled by the Minister of Water and Environmental Affairs and includes the land on which it is situated.*
Monitoring	*A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.*
Project Area	*The greater area within which the project is executed. Extends beyond the construction domain.*

Reserve	*In terms of the National Water Act (Act No. 36 of 1998), the Reserve is the quantity and quality of water required -* *(a) to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be relying upon, taking water from, or being supplied from, the relevant water resource; and* *(b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.*
Sensitive environmental features	*Environmental features protected by legislation (e.g. heritage resources), or identified during the EIA as sensitive through specialists' findings and input received from Interested and Affected Parties.*
Watercourse	*A geomorphological feature characterized by the presence of a streamflow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water. According to the National Water Act (Act 36 of 1998), a watercourse constitutes a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which, or from which, water flows, and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.*
Weir	*An overflow structure built across an open channel to raise the upstream water level and/or to measure the flow of water. A measuring or gaging weir is calibrated for depth of flow over the crest. A weir generally consists of a rectangular, trapezoidal, triangular, or other shaped notch, located in a vertical, thin plate over which water flows.*

1 PURPOSE OF THIS DOCUMENT

The Department of Water and Sanitation (DWS) is investigating the feasibility of developing a multi-purpose dam on the Koonap River outside of Adelaide in the Eastern Cape (EC). The proposed site is known as the Foxwood Dam site.

The proposed project consists of the following:

- Major storage dam (Foxwood Dam);
- Bulk water supply pipeline and pump station;
- Gauging weir;
- Access roads (construction and operational phases);
- Quarry and borrow areas;
- Eskom supply to the dam and gauging weir;
- Relocate existing infrastructure (including water supply canal, R344, MR00639, Telkom telephone line and Eskom power line);
- Construction camp; and
- Permanent offices and accommodation for dam operator.

This document serves as the **Environmental Management Programme** (EMPr) for the construction phase, as contemplated in Regulation 23 of Government Notice (GN) No. R. 982 (4 December 2015), for the proposed development of Foxwood Dam and the associated infrastructure. It was developed in support of the Environmental Impact Assessment (EIA) for the project

2 DOCUMENT ROADMAP

As a minimum, the EMPr aims to satisfy the requirements stipulated in Appendix 4 of GN No. R. 982 (4 December 2014). **Table 1** presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: EMPr Roadmap in relation to GN No. R. 982

Chapter	Title	Correlation with GN No. R. 982
1	Purpose of this Document	–
2	Document Roadmap	–
3	Project Background and Motivation	(a) Details of - (i) The EAP who prepared the EMPr; and (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.
4	Overview of Project	–
5	EMPr Framework	–
6	Environmental Assessment Practitioner	–
7	Environmental Governance Framework	–
8	Roles & Responsibilities	–
9	Monitoring	(g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).
		(h) The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).
		(k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).
		(l) A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.
10	Environmental Training & Awareness Creation	(m) An environmental awareness plan describing the manner in which- (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.
11	EMPr Review	–
12	Environmental Activities, Aspects and Impacts	(b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.
13	Sensitive Environmental Features	(c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.
14	Implementation Programme	(d) A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental

Chapter	Title	Correlation with GN No. R. 982
		impact assessment process for all phases of the development including- (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) Where relevant, operation activities.
		(e) A description and identification of impact management outcomes required for the aspects contemplated in paragraph (d).
		(f) A description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to - (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practices; (iii) Comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.
		(i) An indication of the persons who will be responsible for the implementation of the impact management actions.
		(j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.

3 PROJECT BACKGROUND AND MOTIVATION

3.1 DWS Project Life-cycle

The standard DWS project life-cycle consists of the phases presented in **Figure 1**.

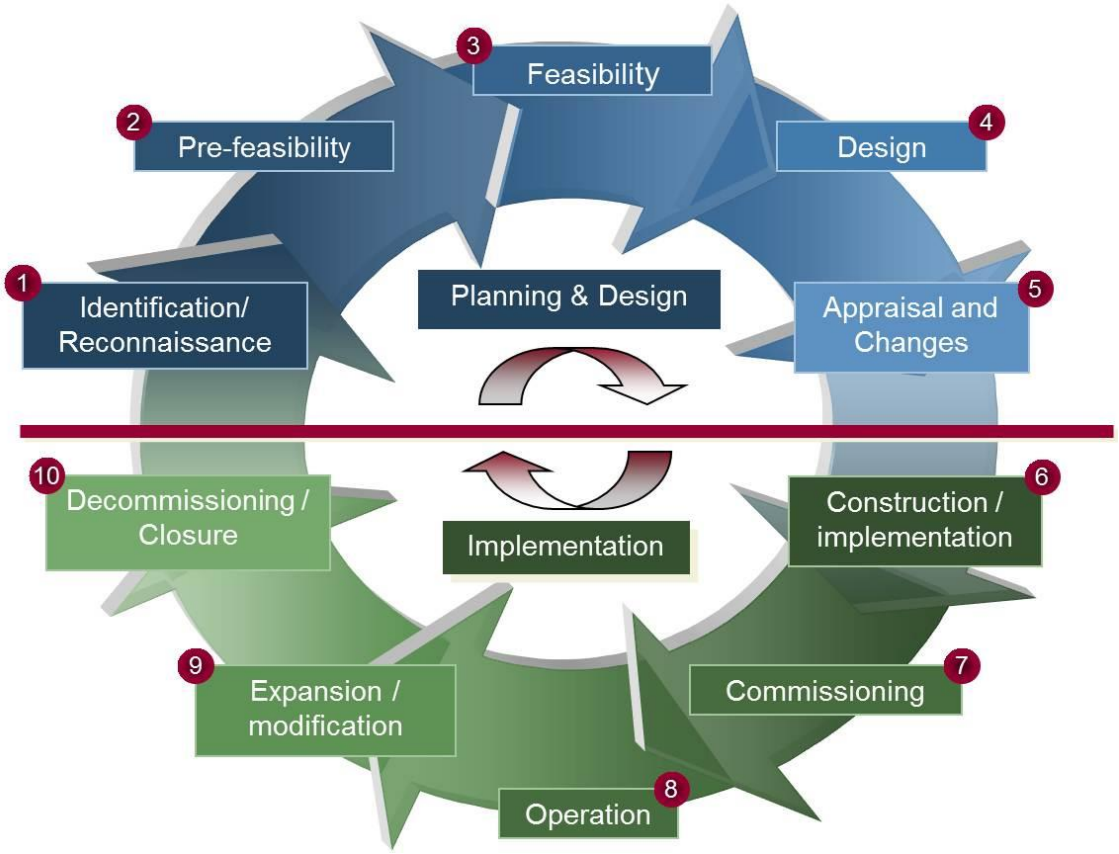

Figure 1: Generic DWS Project Life Cycle for Water Resource Management

The DWS is investigating the feasibility of developing the proposed Foxwood Dam as a multi-purpose dam on the Koonap River outside of Adelaide in EC. A Technical Feasibility Study was completed by Arup (Pty) Ltd at sufficient detail to refine the scheme configuration and costs and to investigate all aspects of the proposed option(s) in sufficient depth to enable the decision-maker to make an informed and accountable decision. The overall Feasibility Study, which includes the EIA, makes a final recommendation on the preferred option which is submitted with motivation to management for approval and funding.

3.2 Background and Motivation

Adelaide (and surrounding towns) has suffered water shortages in the past. Investigations into the potential development of the water resource within the Koonap River Valley date back to the 1960's. In the 90's Foxwood Dam was re-considered to augment domestic supplies as well as for

some development of commercial irrigation. The scheme was not developed due to farmers not accepting the resultant cost of water.

The Nxuba Local Municipality (LM) raised the issue of water shortages at the 2009 EC Water Indaba. In response, DWS proposed a comprehensive Feasibility Study for Foxwood Dam alongside other options, which included:

- Improvement of water-use efficiency (Water Conservation and Demand Management);
- Enlargement of the off-channel storage scheme;
- Exploration and exploitation of groundwater resources; and
- Enlargement of the Fish River to Adelaide pipeline.

The motivation for the project stems from the strategic initiative to mobilize the water resources in the area as a stimulus for socio-economic development in this rural, economically depressed region. This initiative would support the objectives of the National Development Plan (NDP) and is consistent with the National Water Resource Strategy 2 (NWRS2).

Development of the Foxwood Dam would, in the first instance, provide additional, high assurance water supplies for domestic use; this would significantly improve the resilience of the limited supplies now available from the Koonap River without the benefit of storage, and would make water available to meet any increasing needs for domestic, municipal and industrial use.

The effective development of a major storage dam at the Foxwood site would regulate the variable runoff in the Koonap River to the extent that, after full provision is made for maintaining the Reserve to ensure the health and integrity of the resource itself, a significant quantity of water would be made available for irrigation development at an appropriate level of assurance. It is this resource that would be mobilized, together with land and human resources in the region, to provide a stimulus for socio-economic development. This vision is assessed in the context of agricultural development, land reform and rural development policies within the framework of the NDP.

3.3 Project Location

The project area is situated in central part of the EC, in the Amatole District Municipality (DM) and Nxuba LM (refer to maps contained in **Figures 2** and **3**). From a southern direction the proposed dam wall site (coordinates 32˚40’30”S, 26˚16’0”E) is accessed via the R344 (off the R63).

The town of Adelaide and the Bezuidenhoutville Township are located to the south-east of the dam. Adelaide lies 37 km west of Fort Beaufort, on the R63 between Bedford and Fort Beaufort, and is situated in the foothills of the Winterberg Mountain range. Adelaide serves as an administrative and decision-making centre in the region. It is predominantly a farming town, in a beef, mutton, wool and citrus farming district.

The project infrastructure is mostly located on privately-owned properties that are primarily used for agricultural practices, except for the land in the south-eastern part of the project footprint which is owned by the municipality.

The properties that are directly affected by the proposed development are shown in **Figure 4** and listed in **Table 2**.

Table 2: Directly affected properties

SG Code	Farm Name & No.	Erf / Ptn
C02500000000008700002	Olifants Drift 87	2
C02500000000008700000	Olifants Drift 87	
C02500010000000100000	Adelaide	1
C02500000000011100000	111	
C02500010000056900000	Adelaide	569
C01000000000012900000	Leeuw Hoek 129	
C01000000000008600000	Rooidam 86	
C01000000000012600002	Mancasana Drift (Petronella) 126	2
C01000000000012600000	Mancasana Drift (Petronella) 126	
C01000000000012600001	Mancasana Drift (Petronella) 126	1
C01000000000012600003	Mancasana Drift (Petronella) 126	3
C02500000000008600005	Elands Drift 86	5
C02500000000008600003	Elands Drift 86	3
C02500000000008600007	Elands Drift 86	7
C02500000000008600004	Elands Drift 86	4
C02500000000008600006	Elands Drift 86	6
C02500000000008600001	Elands Drift 86	1
C02500000000008600002	Elands Drift 86	2
C01000000000011600000	Fathers Poort 116	
C01000000000011500000	Doornkloof Mouth 115	

Figure 2: Regional Map (***Note – not all sub-components shown***)

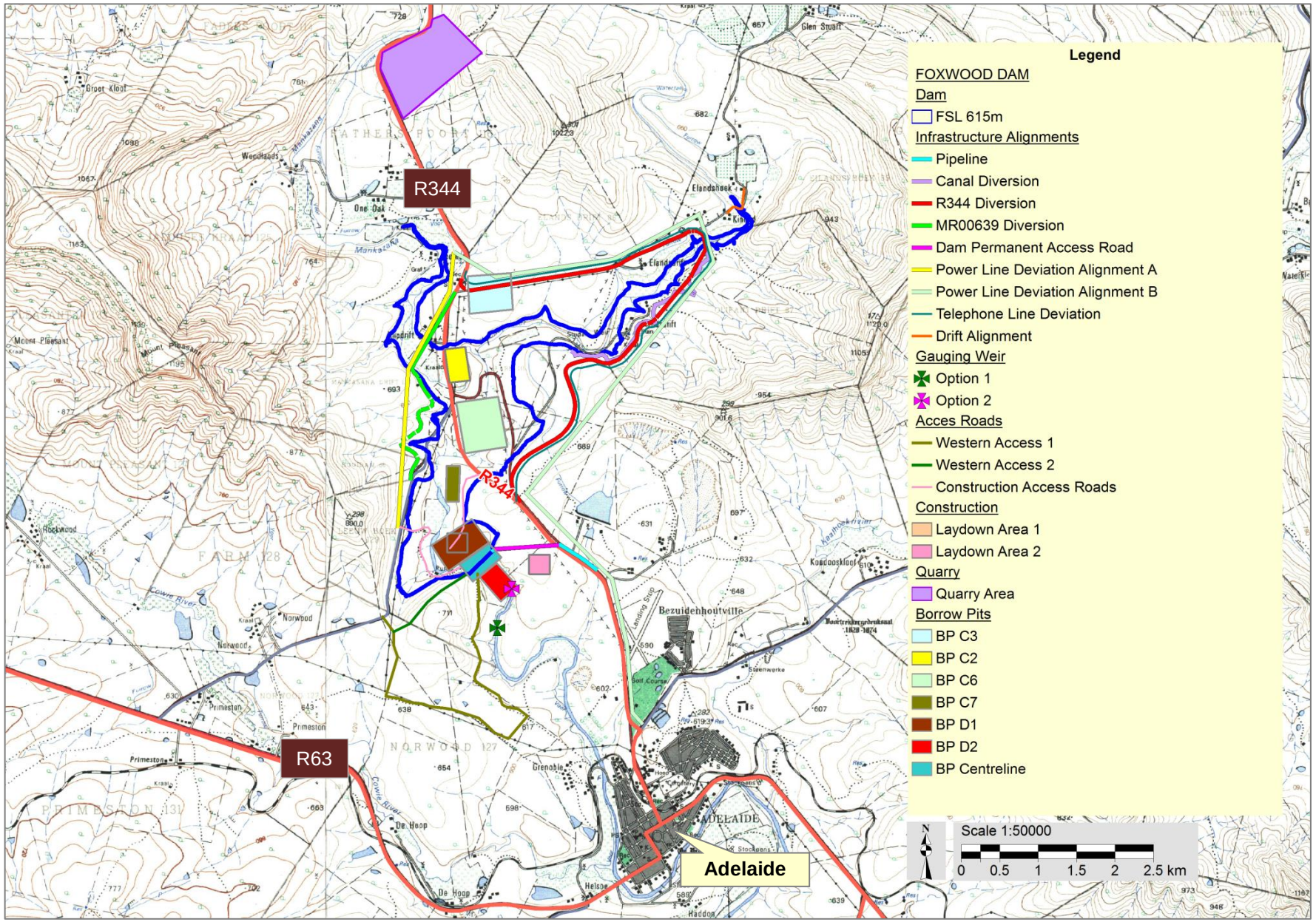

Figure 3: Locality and Topographical Map

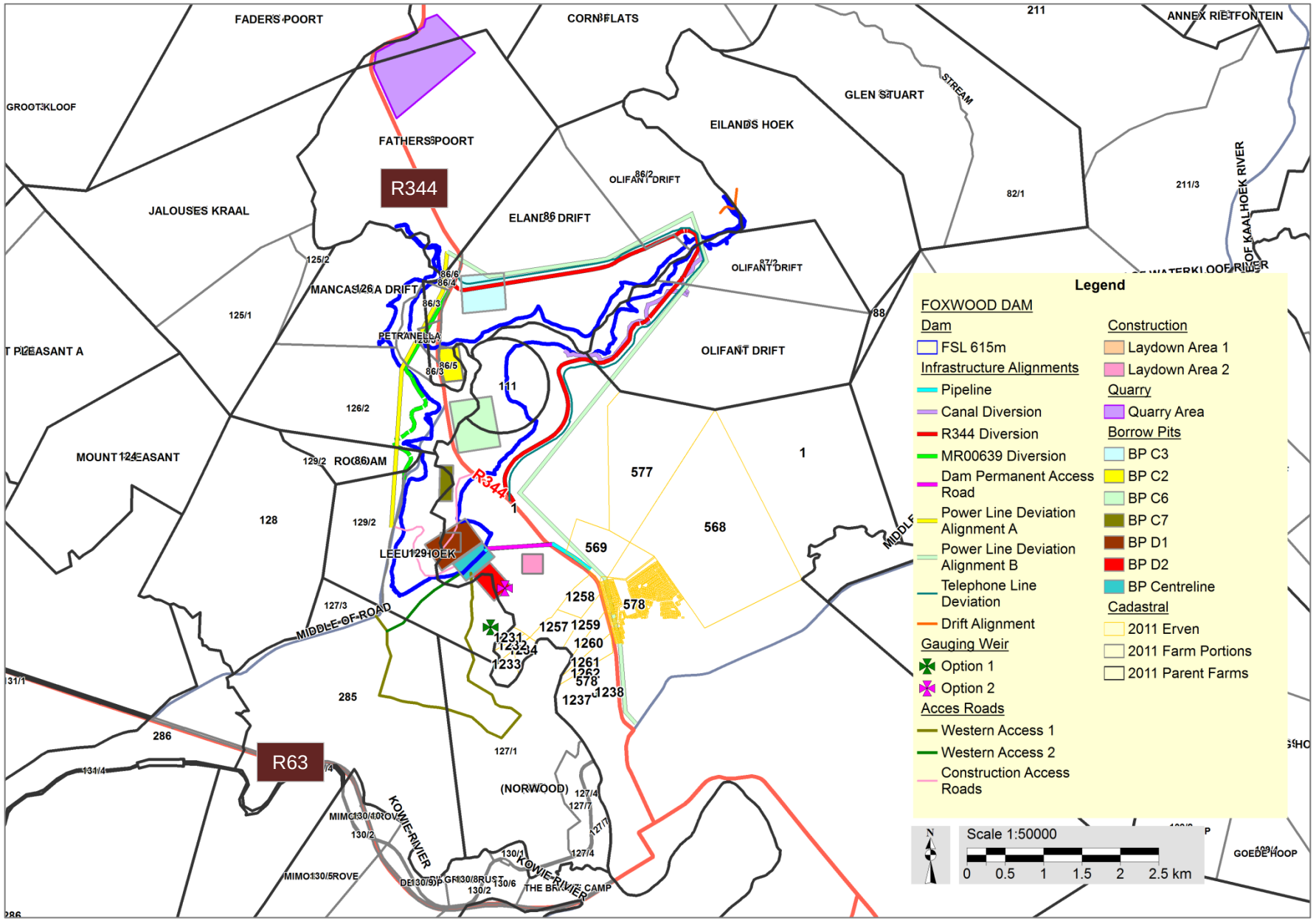

Figure 4: Cadastral Map

4 OVERVIEW OF PROJECT

The project components are listed in **Table 3** and shown in **Figures 3 - 4**.

Table 3: Project Components

Project Components	Associated Infrastructure
Major storage dam (Foxwood Dam)	1. Dam wall 2. Embankment 3. Dam outlet works (including dam intake tower, tunnel and outlet valve house) 4. Access roads (construction and operation) 5. Quarry and earthfill borrow areas 6. Electrical supply 7. Construction camp (temporary) 8. Operator's offices and accommodation (permanent)
Bulk water supply pipeline	1. Pump station 2. Pipeline and associated structures (chambers, Cathodic Protection measures, AC mitigation measures, pipeline markers)
Gauging Weir	1. Weir and associated instrumentation 2. Access roads (construction and operation) 3. Electrical supply 4. Satellite construction camp
Relocation of Infrastructure	1. Relocate water supply canal 2. Relocate R344 3. Relocate MR00639 4. Relocate Telkom telephone line 5. Relocate Eskom power line 6. Relocate drift (low level crossing)

5 EMPr FRAMEWORK

Due to the extent of the overall project, the following EMPrs were developed to deal with the various key components of the project:

1. Pre-Construction EMPr; and
2. Construction EMPr.

The following EMPrs will be developed as further information becomes available during the implementation of the project:

1- Search, Rescue and Relocation Management Plan;

2- Foxwood Dam Impoundment EMPr, which needs to make provision for the following (amongst others) –
   a. Dam safety management;
   b. Water quality management;
   c. Ecological Water Requirements releases;
   d. Managing impacts to land use and biodiversity in the dam basin ;

3- Rehabilitation Management Plan; and

4- Operational EMPr, which will complement the Operation and Maintenance Manual and needs to make provision for the following (amongst others) –
   a. Dam safety management;
   b. Operational Rules;
   c. Erosion management;
   d. Shoreline management;
   e. Access management;
   f. Ongoing engagement with I&APs;
   g. Control of alien invasive species;
   h. Firebreak management; and
   i. Biodiversity management.

This EMPr provides performance criteria required to address potential environmental impacts during the construction phase of the Foxwood Dam. This Report must be read in conjunction with the EIA Report.

The scope of the EMPr is as follows:

- Establish management objectives during the construction phase in order to enhance benefits and minimise adverse environmental impacts;
- Provide targets for management objectives, in terms of desired performance;
- Describe actions required to achieve management objectives;

- Outline institutional structures and roles required to implement the EMPr; and
- Provide legislative framework.

6 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed by DWS as the independent EAP to undertake the environmental assessment for the proposed development of Foxwood Dam.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy, which was founded in December 1999. The company is directed by a team of experienced and capable environmental engineers, scientists, ecologists, sociologists, economists and analysts. The company has offices in Randburg (Gauteng), Durban (KZN) and Rustenburg (North West Province).

The core members of Nemai Consulting that were involved with compiling the EMPr for the project are captured in **Table 4** below, and their respective Curricula Vitae are contained in in the body of the EIA Report.

Table 4: EMPr Core Team Members

Name	Qualifications	Experience
Mr D. Henning	MSc (Aquatic Science)	15 years' experience. Prepared EMPs and acted as the Environmental Control Officer (ECO) on various projects, including: • 80km bulk water pipeline from Randfontein to Rustenburg; • Construction of the Spring Grove Dam, as part of the Mooi-Mgeni Transfer Scheme Phase 2; • Fish barrier on the Mooi River upstream of Spring Grove Dam; • Ncwabeni Off-Channel Storage and associated infrastructure; and • Mokolo Crocodile West Water Augmentation Project (water transfer scheme).
Mr C. Chidley	• B.Sc Eng (Civil); • BA (Economics, Philosophy) • MBA	22 years' experience. Prepared EMPs and acted as the ECO on various projects, including:: • Raising of Hazelmere Dam; • Upgrade of the Sunderland Ridge Waste Water Treatment Works and bulk sewer line situated on the Hennops River; • Empangeni Bulk Outfall Sewer, 40km pipeline.

7 ENVIRONMENTAL GOVERNANCE FRAMEWORK

7.1 Legal Framework

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

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

- Constitution of the Republic of South Africa, (No. 108 of 1996);
- National Environmental Management Act (No. 107 of 1998);
- National Water Act (No. 36 of 1998);
- Mineral and Petroleum Resources Development Act (No. 28 of 2002);
- National Environmental Management: Biodiversity Act (No. 10 of 2004);
- National Environmental Management: Waste Act (No. 59 of 2008);
- National Heritage Resources Act (No. 25 of 1999);
- National Veld and Forest Fire Act (No. 101 of 1998);
- National Environmental Management Protected Areas Act (No. 57 of 2003);
- Environmental Conservation Act (No. 73 of 1989);
- National Environmental Management Air Quality Act (Act No. 39 of 2004);
- Integrated Coastal Management Act (Act No. 24 of 2008);
- Animal Protection Act (No. 71 of 1962);
- Conservation of Agricultural Resources Act (No. 43 of 1983);
- Hazardous Substances Act (Act No. 15 of 1973);
- Occupational Health and Safety Act (No. 85 of 1993); and
- Explosives Act (No. 15 of 2003).

The various forms of authorisation that will be required for the project are listed in **Table 5**.

Table 5: Authorisations required for the implementation of the project

Description	Legal Reference	Regulatory Authority
Approval required for listed activities in terms of the EIA Regulations (4 December 2014) associated with the project. Scoping and EIA process conducted.	• National Environmental Management Act (No. 107 of 1998) • EIA Regulations (GN No. R. 982, R. 983, R. 984 and R. 985 of 4 December 2014)	DEA
The project entails the following activities that	• National Water Act (No. 36 of 1998)	DWS

Description	Legal Reference	Regulatory Authority
constitute water uses in terms of Section 21 of the National Water Act (NWA) (No. 36 of 1998): • Taking water from a water resource (water abstraction from Foxwood Dam to supply the town of Adelaide); • Storing water (Foxwood Dam); • Impeding or diverting the flow of water in a watercourse (instream works for Foxwood Dam, gauging weir, road realignment, access roads, etc.); and • Altering the bed, banks, course or characteristics of a watercourse (instream works for Foxwood Dam, gauging weir, road realignment, access roads, etc.).		
Permits to be obtained if protected trees are to be cut, disturbed, damaged, destroyed or removed.	• National Forests Act (No. 84 of 1998)	Department of Agriculture, Forestry and Fisheries (DAFF)
Permits to be obtained if heritage resources are to be impacted on and for the removal of graves.	• National Heritage Resources Act (No. 25 of 1999)	EC Provincial Heritage Resources Authority
Although exempted, DWS must still submit Environmental Management Programmes for all borrow areas and quarry situated outside of the Government Waterworks for approval.	• Minerals and Petroleum Resources Development Act (No. 28 of 2002)	Department of Mineral Resources (DMR)
Permit to be obtained for the removal and transportation of endangered fauna and flora.	• Nature and Environmental Conservation Ordinance (19 of 1974)	EC Department Economic Development, Environmental Affairs and Tourism (DEDEAT)
Permits required for blasting.	• Explosives Regulations (GN R109 of 17 January 2003)	SAPS Explosives

Additional legal requirements include the following:

- ❖ All waste (general and hazardous) generated during the construction may only be disposed of at appropriately licensed sites in terms of National Environmental Management: Waste Act (No. 59 of 2008);
- ❖ Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), the Occupational Health and Safety Act (No. 85 of 1993), relevant associated Regulations, and applicable SANS and international standards;
- ❖ The storage of general or hazardous waste in a waste storage facility must comply with the norms and standards in GN No. R. 926 of 29 November 2013;
- ❖ Construction Regulations (2003) published under the Occupational Health and Safety Act (No. 85 of 1993) apply to construction activities including “the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work”. A “health and safety plan” which addresses hazards identified, and includes safe work procedures to mitigate, reduce or control the hazards identified, is required under this Act; and

- DWS will need to conform to all its legal obligations as part of the acquisition of land for the construction and operation of the project.

7.2 Project Specifications

The EMPr focuses more on performance criteria for environmental compliance, whereas the detail on how the project is to meet these performance criteria is provided in the project specification in the form of minimum standards and measures to be implemented by the Contractor. The Contractor shall provide detailed method statements on how the performance criteria will be met, through the application of the specification. These methods are to be reviewed and approved by the Project Manager to ensure that they are adequate.

The Method Statements must be project- and site specific and should explain in detail the following:

1. The manner in which the work is to be undertaken;
2. The estimated schedule for the works (timing);
3. The area where the works will be executed (location);
4. The materials and plant / equipment needed for the works;
5. The necessary mitigation measures that need to be implemented to adequately safeguard the environment, construction workers and the public (where applicable);
6. Training of employees;
7. Roles and responsibilities;
8. Monitoring and reporting requirements;

The list of method statements required to assist in the implementation of this EMPr includes at least the following (where applicable):

- Method Statement for site clearing;
- Method Statement for establishing the construction camp;
- Method Statement with regard to waste and wastewater management;
- Method Statement to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage of carbon fuels and oils;
- Method Statement for dust control;
- Method Statement for the storage and handling of hazardous substances;
- Method Statement for management of concrete and batching plants;
- Method Statement for river diversions;
- Method Statement for borrow areas and quarry;
- Method Statement for controlling alien invasive species and noxious weeds;
- Method Statement for the decommissioning of the construction works area; and
- Method Statement for rehabilitation of construction footprint.

8 ROLES & RESPONSIBILITIES

A high-level outline of the institutional arrangements for the implementation of the EMPr during the pre-construction and construction phases of the project, as well as the conditions of the Environmental Authorisation, is provided in **Figure 5**.

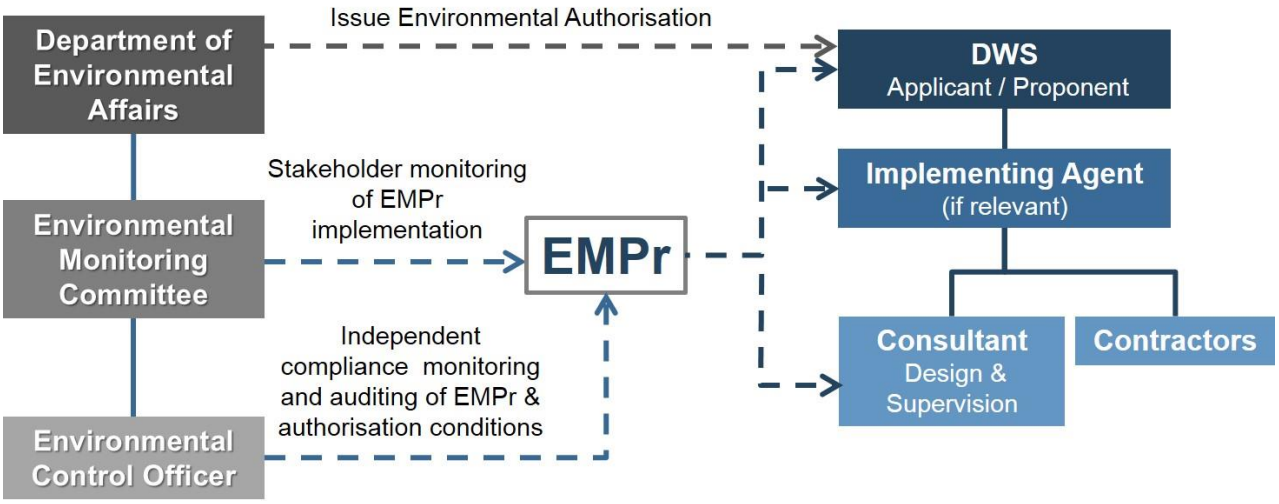

Figure 5: Institutional Arrangements: Roles & Responsibility

8.1 DEA

DEA is the mandated authority in terms of the National Environmental Management Act (No. 107 of 1998) that determines whether authorisation can be issued for the project, following a decision-making process conducted as part of the EIA. Conditions are included in the Environmental Authorisation, which need to be complied with by the project applicant.

DEA also fulfils a compliance and enforcement role with regards to the authorisation. The Department may perform random inspections to checks compliance. DEA will also serve as an active member of the Environmental Monitoring Committee (EMC) and will review the monitoring and auditing reports compiled by the ECO.

Amendments may be required to the EMPr or the Environmental Authorisation, based on adaptive management to the site conditions and the technical requirements of the project. These amendments will need to be approved by DEA.

8.2 DWS

DWS is the applicant in terms of National Environmental Management Act (No. 107 of 1998). DWS is also referred to as the project proponent and is ultimately responsible for the

development and implementation of the EMPr and ensuring that the conditions in the Environmental Authorisation are satisfied. The liability for non-compliance thus rests with DWS.

DWS may appoint an implementing agent for the project and arrangements for compliance need to be formalised between these parties.

8.3 Environmental Monitoring Committee

An EMC will be established before commencement of any construction activities, and will serve as an additional mechanism for monitoring the implementation of the EMPr and compliance with the Environmental Authorisation as well as for improving communication amongst key stakeholders. The committee will have an advisory, monitoring and "watch-dog" role for the duration of the construction phase of the project. This committee will report to the Director-General of DEA.

Appropriate Terms of Reference for the EMC will need to be prepared, which will include roles and responsibilities, membership and functionality (amongst others).

8.4 Project Manager

The Project Manager has over-all responsibility for managing the Contractors and for ensuring that the environmental management requirements are met. During the construction phase, the Project Manager will be the proponent's (or implementing agent's) construction manager. During the operations phase it is expected that this role will be fulfilled by the operations manager.

The Project Manager will be on site and the responsibilities of this party will include the following (amongst others):

- Overseeing of all environmental matters and compliance with all environmental requirements and authorisations; and
- Act as the interface between the ECO, EMC and the other project role players.

8.5 Environmental Control Officer

The Environmental Control Officer (ECO) is a competent (minimum of 3 years' experience) and independent representative, who acts as the EMC monitoring representative for the conducting of independent audits and performing a secretariat function for the EMC.

The ECO will undertake weekly inspections of the site and at least 6 monthly full compliance auditing against the EMPr and Environmental Authorisation. The aforementioned reports will be submitted to the Project Manager, EMC and DEA for their records.

The ECO will also check the following:

- The record of environmental incidents (spills, impacts, legal transgressions, etc.) as well as corrective and preventive actions taken;
- The public complaints register in which all complaints are recorded, as well as actions taken; and
- Results from the environmental monitoring programme (air, noise, water quality).

8.6 Contractor's Environmental Officer

The primary role of the competent Environmental Officer (minimum of 3 years' experience) is to coordinate the environmental management activities of the Contractor on site.

Specific responsibilities of the Environmental Officer, who will be on site, will include the following:

- Aiding the Contractor to comply with all the project's environmental management requirements;
- Assisting the Contractor in compiling Method Statements;
- Facilitating environmental activities and environmental awareness training of all persons on site;
- Exercise an internal compliance management system on behalf of the Contractor;
- Inspect the site as required to ensure adherence to the management actions of the EMPr and the Method Statements;
- Ensuring that environmental monitoring (air, noise, water quality) is being undertaken;
- Complete Site Inspection Forms on a regular basis;
- Provide inputs to the regular environment report to be prepared by the ECO (as required);
- Liaise with the construction team on issues related to implementation of, and compliance with, the EMPr;
- Maintain a record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; and
- Maintain a public complaints register in which all complaints are recorded, as well as actions taken.

9 MONITORING

Monitoring is required to ensure that the receiving environment at Foxwood Dam and the associated infrastructure is suitably safeguarded against the identified potential impacts, and to ensure that the environmental management requirements are adequately implemented and adhered to during the execution of the project.

9.1 Baseline Monitoring

Baseline monitoring will be undertaken to determine the pre-construction state of the receiving environment, and it is discussed further in the Pre-Construction EMPr.

9.2 Environmental Monitoring

Environmental monitoring entails checking, at pre-determined frequencies, whether thresholds and baseline values for certain environmental parameters are being exceeded. The parameters and sampling localities used during the baseline monitoring will form the basis of the environmental monitoring programme.

The environmental parameters to be included as part of the environmental monitoring programme, which is to be undertaken by the Contractor, includes the following:

1. Air Quality –
   - Dust fallout;
   - Particulate matter (PM_{10});
2. Noise; and
3. Water quality.

The following requirements need to be incorporated into the programme:

- Monitoring during normal operations, abnormal situations and emergency situations (e.g. unexpected spillage of hazardous substance);
- Measuring equipment must be accurately calibrated;
- Adequate quality control of the sampling must be ensured;
- Analysis is to be undertaken at a SANS 17025 certified laboratory;
- Certified methods of testing must be employed;
- Where legal specifications exist for testing and sampling methods, these must be taken into account; and
- Establish a process for identifying and implementing corrective measures.

Note that the specifications will include more detailed requirements in terms of environmental monitoring.

9.3 Compliance Monitoring and Auditing

Compliance monitoring will commence in the pre-construction phase, where those conditions in the Environmental Authorisation that need to be adhered to prior to project implementation will need to be checked and recorded, as well as to check compliance with the provisions in the Pre-Construction EMPr. Compliance monitoring will be completed at the end of the defects liability period to check the performance of rehabilitation measures and whether the related objectives have been met.

The ECO will undertake weekly inspections of the site and at least 6 monthly full compliance auditing against the EMPr and Environmental Authorisation. The aforementioned reports will be submitted to the Project Manager, EMC and DEA for their records.

Auditing of compliance with the Environmental Authorisation, EMPr and Closure Plan (separate document) must be conducted in accordance with Regulation 34 of GN No. R 982 (4 December 2014) in terms of the following:

1. The holder of an Environmental Authorisation must, for the period during which the Environmental Authorisation, EMPr and the Closure Plan, remain valid -
    a. Ensure that the compliance with the conditions of the Environmental Authorisation, EMPr and the Closure Plan is audited; and
    b. Submit an environmental audit report to DEA.
2. The environmental audit report must-
    a. Be prepared by an independent person with the relevant environmental auditing expertise;
    b. Provide verifiable findings, in a structured and systematic manner, on-
        i. The level of performance against and compliance of an organization or project with the provisions of the requisite Environmental Authorisation or EMPr and the Closure Plan; and
        ii. The ability of the measures contained in the EMPr and the Closure Plan, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity;
    c. Contain the information set out in Appendix 7 of GN No. R 982 (4 December 2014); and
    d. Be conducted and submitted to DEA at intervals as indicated in the Environmental Authorisation.
3. The environmental audit report must determine-
    a. The ability of the EMPr and the Closure Plan to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis and to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and

b. The level of compliance with the provisions of Environmental Authorisation, EMPr and the Closure Plan.

A document handling system must be established to ensure accurate updating of EMPr documents, and availability of all documents required for the effective functioning of the EMPr. Supplementary EMPr documentation could include:

- Method Statements;
- Site instructions;
- Emergency preparedness and response procedures;
- Record of environmental incidents;
- Non-conformance register
- Training records;
- Site inspection reports;
- Monitoring reports;
- Auditing reports; and
- Public complaints register (single register for maintained for overall site).

10 ENVIRONMENTAL TRAINING & AWARENESS CREATION

Training aims to create an understanding of environmental management obligations and prescriptive measures governing the execution of the project. It is generally geared towards project team members that require a higher-level of appreciation of the environmental management context and implementation framework for the project.

Awareness creation strives to foster a general attentiveness amongst the construction workforce to sensitive environmental features and an understanding of implementing environmental best practices. The various means of creating environmental awareness during the construction phase of the project may include:

- Induction course for all workers before commencing work on site;
- Refresher courses (as and when required);
- Daily toolbox talks, focusing on particular environmental issues (task- and area specific);
- Courses must be provided by suitably qualified persons and in a language and medium understood by the workers. It is noted that Xhosa is the dominant language in the area;
- Erect signage and barricading (where necessary) at appropriate points in the construction domain, highlighting sensitive environmental features (e.g. grave sites, protected trees); and
- Place posters containing environmental information at areas frequented by the construction workers (e.g. eating facilities).

Training and awareness creation will be tailored to the audience, based on their designated roles and responsibilities. Records will be kept of the type of training and awareness creation provided, as well as containing the details of the attendees.

11 EMPr REVIEW

Due to its dynamic nature, the EMPr for Foxwood Dam and its associated infrastructure will be reviewed and revised when necessary to ensure continued environmental improvement. Changes to the EMPr shall be required where the existing system:

- Does not make adequate provision for protecting the environment against the construction activities;
- Needs to be modified to meet conditions of statutory approval;
- It is not achieving acceptable environmental performance;
- Requires changes due to the outcome of a monitoring or auditing event or management review;
- Provides redundant, impracticable or ineffective management measures; and
- In terms of Regulation 34 of GN No. R 982 (4 December 2014).

The amendment of the EMPr will be undertaken in terms of Regulation 34 – 37 of GN No. R 982 (4 December 2014), as applicable.

12 ENVIRONMENTAL ACTIVITIES, ASPECTS AND IMPACTS

12.1 Environmental Activities

The main project activities as well as high-level environmental activities undertaken in the construction phase are listed in **Table 6**.

Table 6: Activities associated with Construction Phase

Project Phase: Construction
Project Activities
❖ Site establishment
❖ Relocation of structures and infrastructure
❖ Prepare access roads
❖ Establish construction laydown areas
❖ Bulk fuel storage
❖ Delivery of construction material
❖ Transportation of equipment, materials and personnel
❖ Storage and handling of material
❖ Construction employment
❖ Site clearing (as necessary)
❖ Excavation
❖ Blasting
❖ River diversion for building of dam
❖ Establishment and operation of crusher
❖ Establishment and operation of batching plant
❖ Establishment and operation of materials testing laboratory
❖ Create haul roads
❖ Create quarry and borrow areas
❖ Construction of embankments, bottom outlet and spillways
❖ Concrete Works
❖ Steel works
❖ Mechanical and Electrical Works
❖ Temporary river diversion for gauging weir and pipeline crossings
❖ Electrical supply
❖ Construction of gauging weir
❖ Construction of pipeline
❖ Cut and cover activities
❖ Stockpiling (sand, crushed stone, aggregate, etc.)
❖ Waste and wastewater management
High Level Environmental Activities
❖ Diligent compliance monitoring of the EMPr, Closure Plan, Environmental Authorization and other relevant environmental legislation
❖ Ongoing search, rescue and relocation of red data, protected and endangered species, medicinal plants, heritage resources and graves (based on area of influence of the construction activities) – permits to be in place

Project Phase: Construction
❖ Implement environmental monitoring programme (air quality, water quality, noise, traffic, social)
❖ Finalise Resource Management Plan (RMP) process prior to impoundment
❖ Develop Rehabilitation Management Plan for approval by DEA
❖ Reinstatement and rehabilitation of construction domain (outside of inundation areas, as necessary)
❖ Develop EMPr for Operational Phase for approval by DEA
❖ Continued implementation of resettlement plan
❖ Convene EMC Meetings
❖ On-going consultation with Interested and Affected Parties (I&APs)
❖ Other activities as per Construction EMPr

12.2 Environmental Aspects

Environmental aspects are regarded as *those components of an organisation's activities, products and services that are likely to interact with the environment and cause an impac*t. The following environmental aspects have been identified for the proposed development of Foxwood Dam and associated infrastructure, which are linked to the project activities (note that only high level aspects are provided):

Table 7: Environmental Aspects associated with Construction Phase

Project Phase: Construction
Environmental Aspects
❖ Inadequate consultation with landowners/ tenants / occupiers of land
❖ Inadequate environmental and compliance monitoring
❖ Lack of environmental awareness creation
❖ Indiscriminate site clearing
❖ Poor site establishment
❖ Poor management of access and use of access roads
❖ Inadequate provisions for working on steep slopes
❖ Poor transportation practices
❖ Poor fencing arrangements
❖ Erosion
❖ Disruptions to existing services
❖ Disturbance of topsoil
❖ Poor management of excavations
❖ Inadequate storage and handling of material
❖ Inadequate storage and handling of hazardous material
❖ Poor maintenance of equipment and plant
❖ Poor management of labour force
❖ Pollution from ablution facilities
❖ Inadequate management of construction camp
❖ Poor waste management practices – hazardous and general solid, liquid
❖ Wastage of water
❖ Disturbance to landowners / tenants / occupiers of land

Project Phase: Construction
❖ Poor management of pollution generation potential
❖ Damage to significant flora (if encountered)
❖ Damage to significant fauna (if encountered)
❖ Influence to resource quality of the Koonap River and its tributaries from river diversions, in-stream works and activities in the riparian zones (and a buffer area of 50m)
❖ Environmental damage where drainage lines are crossed
❖ Environmental damage of sensitive areas
❖ Disruption of archaeological and cultural features (if encountered)
❖ Poor reinstatement and rehabilitation
❖ Inadequate RMP development process

12.3 Potential Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable. Refer to **Table 8** for the potential significant impacts associated with the preceding activities and environmental aspects for the construction phase.

Table 8: Potential Significant Environmental Impacts - Construction Phase

Environmental Factor	Potential Issues / Impacts
Land Use	❖ Loss of land used for agriculture and game farming ❖ Loss of natural areas ❖ Servitude restrictions ❖ Loss of cultivated land within construction domain
Climate	❖ Greenhouse gas emissions ❖ Potential changes in the micro-climate of the area surrounding the reservoir
Geology	❖ Unsuitable geological conditions ❖ Sourcing of construction material ❖ Blasting ❖ Disposal of spoil material
Topography	❖ Visual impact in river valleys ❖ Erosion of affected areas on steep slopes
Soil	❖ Soil erosion ❖ Soil contamination
Geohydrology	❖ Groundwater pollution due to spillages and poor construction practices
Hydrology	❖ Alteration of flow regimes
Water Quality	❖ Sedimentation from instream works ❖ Water quality impacts due to spillages and poor construction practices
Aquatic Ecology	❖ Disruptions to aquatic biota community due to water contamination, alteration of flow, loss of instream habitat (dam) and disturbance to habitat during construction (watercourse crossings)
Riparian Habitat	❖ Loss of riparian and instream vegetation within construction domain ❖ Loss of fuelwood, medicinal and herbal plants, building material and raw products for handicrafts within construction domain
Water use	❖ Impacts to existing water users
Estuary	❖ Impacts to the Great Fish Estuary in terms of flow alterations, sediment regime, habitat alteration, water quality and overall ecosystem health
Terrestrial Ecology	❖ Impacts to sensitive terrestrial ecological features ❖ Potential loss of significant flora and fauna species

Environmental Factor	Potential Issues / Impacts
	❖ Damage / clearance of habitat of conservation importance ❖ Proliferation of exotic vegetation ❖ Loss of medicinal plants
Socio-economic Environment	❖ Loss of land within construction domain ❖ Risk to livestock ❖ Nuisance from dust and noise ❖ Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes, anti-social behaviour, and incidence of HIV/AIDS) ❖ Land claims ❖ Safety and security ❖ Relocation of access roads ❖ Use of local road network ❖ Impact to visual quality and sense of place ❖ Light pollution
Agriculture	❖ Loss of cultivated land within construction domain ❖ Loss of grazing land within construction domain ❖ Loss of stock watering points within construction domain ❖ Disruptions to farming operations as a result of construction-related use of existing access roads ❖ Loss of fertile soil through land clearance
Air Quality	❖ Excessive dust levels ❖ Greenhouse gas emissions
Noise	❖ Localised increases in noise during construction
Historical and Cultural Features	❖ Destruction or damage of heritage resources through construction activities ❖ Relocation of graves
Existing Structures & Infrastructure	❖ Impoundment to affect the following – • R344 • MR00639 • Canal • Power line • Telephone line • Furrows • Various buildings • Farming-related infrastructure • Private access roads
Transportation	❖ Increase in traffic on the local road networks ❖ Re-alignment of R344 and MR00639 ❖ Develop temporary access roads ❖ Risks to road users
Solid Waste	❖ Waste generated from site preparations (e.g. plant material) ❖ Domestic waste ❖ Surplus and used building material ❖ Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags) ❖ Wastewater (sanitation facilities, washing of plant, operations at the batching plant, etc.) ❖ Disposal of excess spoil material (soil and rock) generated as part of the bulk earthworks
Aesthetics	❖ Visual quality and sense of place to be adversely affected by construction activities
Tourism	❖ Influence to tourism potential

13 SENSITIVE ENVIRONMENTAL FEATURES

Cognisance must be taken of the following sensitive environmental features that should be afforded additional care and protection, as reflected in the Sensitivity Map contained in **Figure 6**:

- Steep slopes are encountered in the project area and measures to prevent erosion would need to be employed for construction activities in these areas. Steep areas include –
  - Left- and right flank at dam wall;
  - Western shoreline of proposed Full Supply Level (FSL);
  - North-eastern shoreline of proposed FSL, which includes a section of the relocated R344, canal, power line and telephone line; and
  - Quarry site.
- All watercourses, including the Koonap and Mankazana Rivers and their tributaries (including drainage lines), are regarded as sensitive and require suitable protection from the construction activities. All construction activities to comply with the National Water Act (Act No. 36 of 1998).
- All existing infrastructure and structures are regarded as sensitive and need to be safeguarded from construction activities until they have been relocated and the redundant sections removed (as relevant).
- Protected fauna and flora species occur in the area, which need to be protected against the project's potential adverse impacts. All construction activities to comply with the National Environmental Management: Biodiversity Act (No. 10 of 2004), National Forests Act (No. 84 of 1998) and Nature and Environmental Conservation Ordinance (19 of 1974). Sensitive species to be identified as part of the pre-construction survey. If relocation is not required, then these species need to be adequately protected from construction activities.
- All traffic and pedestrians on the public roads are regarded as sensitive and measures need to be implemented to safeguard these road users.
- The northern sections of the deviated R344, telephone line and power line follow the DR 02491. The DR 02491 will need to be upgraded to meet the standards associated with a "R" route, as per the requirements of the EC Department of Roads and Public Works.
- A number of grave sites and structures older than 60 years were identified within the project area. The final locations of all heritage and cultural features will be confirmed as part of the Phase 2 Heritage Impact Assessment, Archaeological Impact Assessment and Paleontological Impact Assessment. These features may not be disturbed without following legal protocol.
- Prevent construction-related nuisance to the Presbyterian Church Adelaide Primary School, which is situated on Portion 4 of the Farm Elands Drift 86 along the R344.
- Existing communication channels need to be duly respected and adhered to when engaging with the community.
- Private land may not be accessed unless consent has been granted by the landowner, or until the land acquisition process has been concluded, or a construction servitude has been registered.

- The noise and air quality monitoring programme needs to take cognizance of sensitive receptors, such as dwellings on surrounding farms and Bezuidenhoutville (located more than 1.5 km to the south-east of the dam wall).
- Livestock and unauthorised access to the construction domain needs to be prevented. Excavations to be adequately safeguarded.

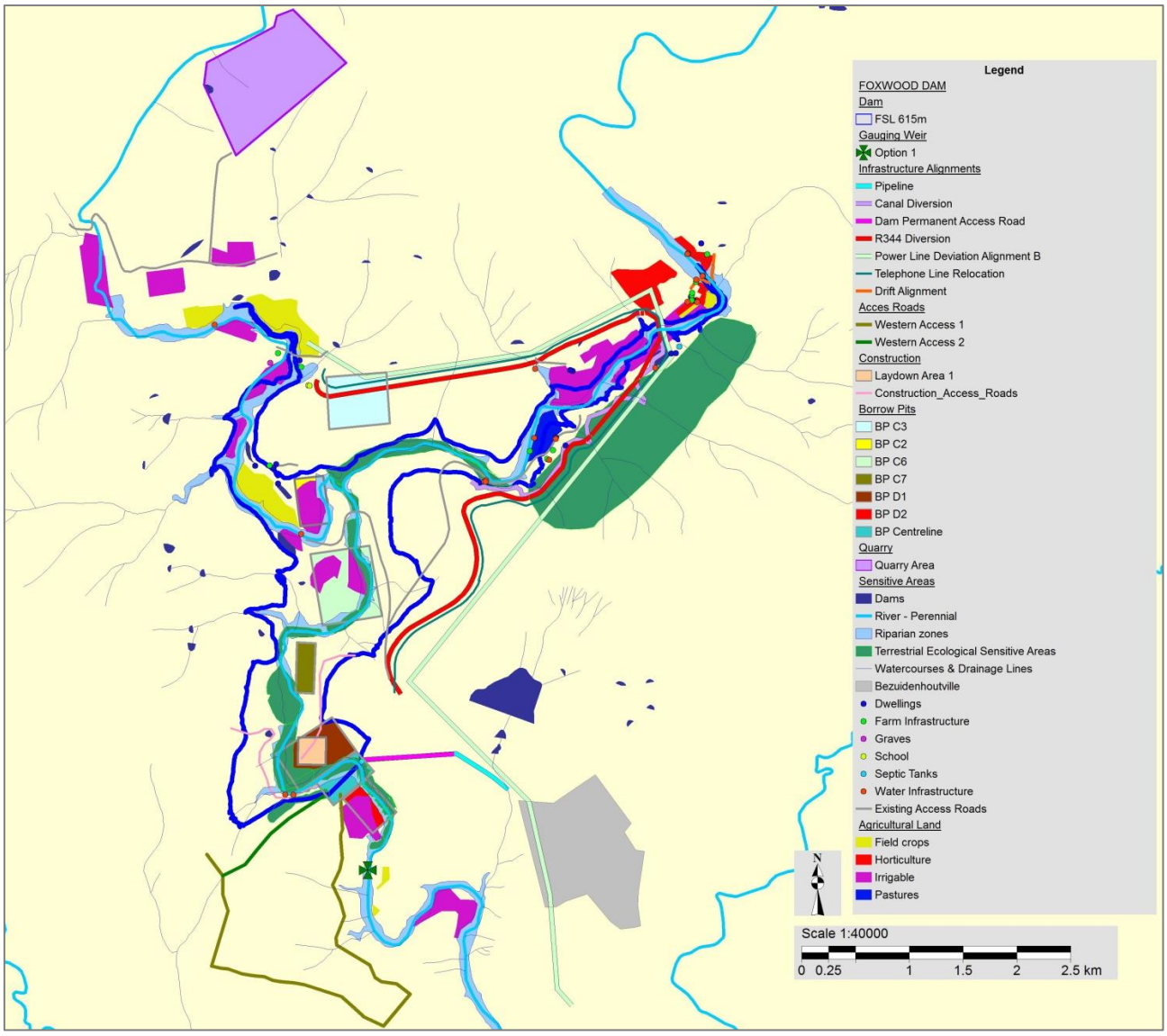

Figure 6: Sensitivity Map

The sensitivity map shown in **Figure x** needs to be made available to the implementation team (including the Project Manager, ECO and Contractor) in GIS format to allow for further consideration and adequate interpretation at an appropriate scale.

14 IMPLEMENTATION PROGRAMME

The framework for the subsequent management measures consists of the following:

- **Management objectives** – i.e. desired outcome of management measures for mitigating negative impacts and enhancing the positive impacts related to project activities and aspects (i.e. risk sources);
- **Targets** – i.e. level of performance to accomplish management objectives;
- **Management actions** – i.e. practical actions aimed at achieving management objectives and targets;
- **Responsibilities**; and
- **Monitoring requirements**.

14.1 Administrative Requirements

Management Objective:

- Ensure that all administrative measures and arrangements associated with the compliance with the Environmental Authorisation, EMPr and Closure Plan are in place.

Target:

- Administrative measures and arrangements confirmed, checked, maintained.
- Document control procedure in place, in accordance with Environmental Management System to be employed on site.

Management Actions:

- Financial provision made for the implementation of the conditions of the Environmental Authorisation and the mitigation measures contained in the EMPr and Closure Plan. Differentiate between those requirements that relate to the Proponent, Contractor, environmental team and other responsible parties.
- Document control procedure to be provided and adhered to.
- Filing system to be provided and maintained.

Responsibilities:

- Proponent – administrative provisions for compliance.
- Project Manager and ECO - checking.
- Contractor – administrative provisions for compliance.

Monitoring Requirements:

- Document control procedure.

- Filing systems.
- Financial provisions (e.g. bill of quantities, budgets, etc.).

14.2 Construction Site Planning and Layout

Management Objective:

Planning and layout of construction domain to ensure protection of sensitive environmental features. Refer to features highlighted in **Section 13**, Sensitivity Map (**Figure 6**), findings from pre-construction survey, further environmental studies, etc.

Target:

No impacts to sensitive environmental features as a result of construction site planning and layout.

Management Actions:

- Conduct pre-construction survey of area to be affected by development of Foxwood Dam and the associated infrastructure (refer to requirements contained in the Pre-Construction EMPr).
- Suitable specialist(s) to identify sensitive environmental features (including fauna, flora and heritage sites) where special care needs to be taken and implement suitable mitigation measures to safeguard these features (e.g. barricading, signage and awareness creation).
- Suitable specialist to identify protected plants and trees. Any protected plants or trees in proximity to the construction area that will remain, should be marked clearly and must not be disturbed, defaced, destroyed or removed, unless otherwise specified by the Project Manager. Acquire the necessary permits under the National Forests Act (No. 84 of 1998) if avoidance of protected trees is not possible.
- Contractor to produce a site plan for the approval of the Project Manager prior to the establishment of the site, which aims to identify construction activities, facilities and structures in relation to sensitive environmental features. This plan will serve as a spatial tool that facilitates the execution of the construction phase with due consideration of sensitive environmental features.

Responsibilities:

- Proponent - acquire permits.
- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Photographic record of pre-construction survey of areas to be affected by construction activities.
- Approved site plan.
- Barricading and signage.
- Records of awareness creation.

14.3 Environmental Awareness Creation

Management Objective:

Ensure that the Contractor, construction workers and site personnel are aware of the relevant provisions of the EMPr, sensitive environmental features and agreements made with the affected landowners and community members.

Target:

1. All construction workers and employees to have completed appropriate environmental training.
2. A record of environmental training undertaken to be kept on site.

Management Actions:

- The Contractor must arrange that all of his employees and those of his sub-contractors go through the project specific environmental awareness training courses before the commencement of construction and as and when new staff or sub-contractors are brought on site.
- The environmental training is compulsory for all employees and structured in accordance with their relevant rank, level and responsibility, as well as the Environmental Specification as they apply to the works and site.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Records of environmental training and awareness creation.

14.4 On-going Consultation with Community and Affected Parties

Management Objective:

- Establish and maintain a record of all complaints and claims against the project and ensure that these are timeously and effectively verified and responded to.
- Adhere to agreements made with individual landowners and community members regarding communication.

Target:

1. All complaints and claims to be acknowledged within 5 working days and to be responded to within 10 working days of receipt, unless additional information and / or clarification are required.
2. No deviations from agreements made with individual landowners and community members.

Management Actions:

- Establish lines of communications with landowners and community members.
- Existing communication channels need to be duly respected and adhered to when engaging with the Bezuidenhoutville Township.
- Establish processes and procedures to effectively verify and address complaints and claims received.
- Complaints or liaisons with landowners and community members with regard to environmental aspects, compensation or disturbance to activities or animals, must be recorded, reported to the correct person and a record of the response is to be entered in the complaints register.
- Provide relevant contact details to landowners and community members for queries / raising of issues or complaints.
- Provide all information, especially technical findings, in a language that is understandable to the general public. The dominant local languages include English, Afrikaans and Xhosa.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.

14.5 Site Clearing

Management Objective:

- Manage environmental impacts associated with site and basin clearing.
- External to the dam basin, ensure that only areas that are specifically required for the construction purposes are cleared.

Target:

No damage to sensitive environmental features outside of construction area, including marked and barricaded heritage resources, protected trees, watercourses, cultivated areas, structures and infrastructure.

Management Actions:

- Restrict site clearing activities to construction area / domain and basin.
- Clearing of vegetation to be conducted in a phased manner (where possible), with due consideration of the search and rescue activities. Vegetative cover for sensitive areas such as riparian zones is to remain for as long as possible.
- Method Statement to be developed, which will provide the details of how site clearing will be executed. Where possible, clearing by hand is recommended in order to create employment opportunities.
- Maintain barricading around sensitive environmental features.
- Avoid any disturbance to demarcated sensitive environmental features.
- Suitably experienced personnel (relevant to the potentially affected environmental features) to monitor the clearing activities, with particular focus on heritage resources and graves, as well as protected fauna and flora species.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- No clearing outside of construction domain.
- Intact barricading.
- Public complaints register.
- Contractor’s method statement.

14.6 Site Establishment

Management Objective:

Minimise environmental impacts associated with site establishment.

Target:

1. No deviations from agreements made with individual landowners and community members.
2. No damage to sensitive environmental features outside construction area during site establishment.
3. No access or encroachment into no-go areas.
4. No justifiable complaints regarding general disturbance and nuisance received from the affected landowners and community members.

Management Actions:

- Contractor to produce a site plan for the approval by the Project Manager prior to the establishment of the site, which aims to identify construction activities, facilities and structures in relation to sensitive environmental features. This plan will serve as a spatial tool that facilitates the execution of the construction phase with due consideration of sensitive environmental features.
- Locate construction and labour camps in areas where sensitive environmental features will not be impacted on.
- Facilities and structures shall be located according to the terrain and geographical features of the project site.
- Positioning of the storage and lay-down areas should aim to minimise visual impacts.
- Maintain barricading around sensitive environmental features until the cessation of construction works.
- Control the movement of all vehicles and plant (including suppliers), such that they remain on designated routes and comply with relevant agreements.
- Ensure noise levels are within their lawfully acceptable limits as per SANS 10103.
- Minimise disturbance from lighting of the construction camp and site. For example, limit the height from which floodlights are fixed, identifying zones and directions of high and low lighting requirements with the focus of the lights being inward, rather than outward, avoid directing the light towards the direction from where it would be most visible, unless otherwise requested by the community, without compromising safety.
- Establish a local SMME recruitment preference policy.

- Land inside Foxwood Dam's purchase line as well as land required for appurtenant works must be acquired in accordance with statutory requirements.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Intact barricading.
- Public complaints register.
- Contractor's method statement.
- Relocation Plan.

14.7 Management of Relocation of Services

Management Objective:

- Prevent adverse environmental impacts associated with the relocation of existing services.
- Adhere to agreements made with owners of the services to be relocated.

Target:

1. No unwarranted complaints regarding the improper relocation of services.
2. No impacts caused by the relocation of services.
3. All relevant approvals to be obtained prior to relocation of services.

Management Actions:

- The following services will be affected by the impoundment–
  - R344;
  - MR00639;
  - Canal;
  - Power line;
  - Telephone line;
  - Furrows;
  - Various buildings;
  - Farming-related infrastructure;
  - Fences;
  - Septic tanks (where relevant); and
  - Private access roads.

- Identify and record all existing services.
- Conform to requirements of relevant service providers (e.g. ECDRPW, Telkom, Eskom, Amatola Water). Agreements to be in place.
- Determine requirements for services within inundation area, which may include decommissioning, demolition, removal, leave as is,
- Existing septic tanks to be opened and filled with un-compacted soil.
- Ensure access to infrastructure is available to service providers at all times.
- Immediately notify service providers of disturbance to services. Rectify disturbance to services, in consultation with service providers. Maintain a record of all disturbances and remedial actions on site.
- Notify landowners of any disruptions to essential services.
- Deviate landowners' existing services (e.g. reticulation, irrigation lines), where possible, to accommodate construction activities.
- Land acquisition and compensation to adhere to legal framework.
- Adequate reinstatement and rehabilitation of affected environment.
- See requirements in EMPr for *Management of Waste*.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Contractor's method statement.
- Agreements with owners of services.

14.8 Management of Access and Traffic

Management Objective:

- Ensure that all construction vehicles use only dedicated access routes to construction sites, as shown in the layout map in **Figure 3**.
- Ensure that the community have reasonable access to the land during construction.
- Ensure proper access control.
- Prevent unlawful access to construction domain.
- Adhere to agreements made with individual landowners and community members regarding access.
- Ensure the safety of all road users.

- Limit construction-related nuisance to service nodes.

Target:

4. No reports of construction vehicles using other unauthorised routes.
5. No complaints regarding blocking of access to farms.
6. No direct harm to livestock and wild animals due to inadequate access control.
7. No carrying of unsafe loads. Permits to be obtained for abnormal loads.
8. No speeding.
9. No accidents.

Management Actions:

- Undertake negotiations and confirm arrangements with the private landowners regarding the use of the DR 02491 and traffic arrangements.
- Determine and document the road conditions of the DR 02491 and R344, as relevant.
- Selective upgrade of the DR 02491, western access roads and other relevant access roads (see layout map) to ensure that they are capable of accommodating the type of vehicles and/or mechanical plant using these roads.
- Any clearing for access or haul roads outside the demarcated works area shall only be undertaken after approval from the Project Manager.
- Temporary access roads outside of dam basin to be suitably rehabilitated.
- Ensure temporary accommodation of traffic, where the DR 02491, R344 and MR00639 is affected by construction activities.
- Make provision for community members to access their properties safely.
- Speed limit of 40km/h on public and other roads within the project area to be adhered to.
- Ensure appropriate traffic safety measures are implemented to make provision for blind rises and sharp bends on the DR 02491, R344 and MR00639.
- Permission required from the Project Manager for the movement of any vehicles and/or personnel outside of designated working areas.
- Access roads to be maintained in a suitable condition.
- Clearly mark pedestrian-safe access routes.
- Suitable erosion protective measures to be implemented for access roads during the construction phase.
- Traffic safety measures (e.g. traffic warning signs, flagmen) to be implemented.
- Clearly demarcate all access roads.
- Proper access control to be maintained to prevent livestock from accessing construction areas.

- All fences erected for construction purposes (e.g. fences around camp sites, fencing around trenches, etc.) should be inspected on a daily basis to detect whether any damage has occurred. Damaged fences / barricading to be repaired immediately.
- Consult with property owners, local authorities and communities to ensure that all affected parties are informed of the timing and extent of any disruptions.
- Ensure that service nodes such as the Presbyterian Church Adelaide Primary School and the community facilities in Bezuidenhoutville Township remain easily and safely accessible at all times. Limited construction-related nuisance to these areas.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Signage displayed.
- Contractor's method statement.

14.9 Fencing arrangements

Management Objective:

- Protect and maintain existing fences.
- Fencing arrangements to adequately protect livestock and game animals from construction activities.
- Adhere to agreements made with individual landowners and/or land users regarding fencing.
- Minimise disturbance to animals.

Target:

1. No deviations from agreements made with individual landowners and/or land users regarding fencing.
2. No direct harm to livestock and game animals due to inadequate fencing arrangements.
3. Disturbed or damaged fencing to be reinstated / replaced to meet pre-existing conditions.

Management Actions:

- Any damaged fencing is to be replaced to meet pre-existing conditions.

- All fences erected for construction purposes (e.g. fences around camp sites, fencing around trenches, etc.) should be inspected on a daily basis to detect whether any damage has occurred, and should be repaired immediately, to prevent animals from escaping, to prevent easy access for poaching, and intrusion by predators.
- On farms or in areas where livestock / game occur, erect fences according to appropriate specifications (depending on the type on animals that occur on the farms) for the construction camps and construction servitude to protect animals from construction-related activities.
- Fences on game farms should be constructed to meet the following requirements:
  - The fence should be straight and vertical;
  - All the straining posts should be firmly and vertically anchored;
  - All the posts should extend to the same height above ground level by corresponding to the terrain form;
  - The straining posts and droppers should not be too far apart – the closer they are, the firmer the fence;
  - Each wire strand should be firmly attached to the standards or line posts at a specific height above ground level and should be a certain distance apart from each other;
  - The droppers should be neatly and evenly spaced between the standards. The wire strands should be firmly attached to maintain the proper space between the strands and to prevent vertical movement;
  - Fences should never be constructed of inferior quality material. Therefore, fencing material with the SABS mark should be used; and
  - Comply with Nature and Environmental Conservation Ordinance (19 of 1974) with regards to the accommodation of relevant large mammal species.
- The height on fences on game farms should be constructed depending on the type of animals that occurs on the farm.
- Where necessary, electrified fences on game farms should be erected according to appropriate specifications depending on the type of animals that occur on the property. Safety precautions should be implemented for electrified fences. All electrified fences should comply with minimum safety standards.
- Fences to be constructed over dongas or streams should meet specific requirements as fences over such features can become insecure and lead to the escape of valuable animal or provide access to predators.
- Where necessary, game screens should be erected to minimise construction-related impacts (e.g. noise) to animals on game farms.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Agreements with landowners.
- Fencing register.

14.10 Management of Labour Force

Management Objective:

- Ensure suitable management of labour force to prevent security-related issues or disturbance to landowners and community members.
- Optimise use of local labourers.
- Provide a work environment that is conducive to effective labour relations.

Target:

1. No complaints from landowners and community members regarding trespassing or misconduct by construction workers.
2. All unskilled labour to be sourced from local communities.

Management Actions:

- Prevent trespassing of construction workers on private property.
- Workers should be provided with identity cards and should wear identifiable clothing.
- Make suitable provision for accommodation of workforce off-site.
- Provision to be made for families of employed workers during the construction phase.
- Creating nuisances and disturbances in or near communities shall be prohibited.
- Machine / vehicle operators shall receive clear instructions to remain within demarcated access routes and construction areas.
- Designated smoking areas should be provided, with special bins for discarding of cigarette butts.
- Establish a ‘labour and employment desk’, which is not to be situated at the site.
- Create opportunities for the employment of women.
- Where possible use labour-intensive methods of construction.
- Use local labour as far as possible, where necessary (e.g. unskilled labour).

- Develop a community labour agreement with targets for employment and for progression.
- Training of labour to benefit individuals beyond completion of the project.
- Implement an STD and HIV/AIDS awareness and prevention programme amongst labourers. The contractor should provide an adequate supply of free condoms to all workers. Condoms should be located in the bathrooms and other communal areas on the construction site and at the construction camps. If viable, a voluntary counselling and testing programme should be introduced.

Responsibilities:

- Proponent – employment targets.
- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Labour-related targets.

14.11 Management of Ablution Facilities

Management Objective:

- Minimise environmental impacts associated with ablution facilities.

Target:

1. No environmental contamination associated with ablution facilities.
2. Minimise visual impact associated with ablution facilities.

Management Actions:

- Provide sufficient ablution facilities (e.g. mobile / portable / VIP toilets) at the construction camp and along construction sites, which conform to all relevant health and safety standards and codes.
- No pit latrines, french drain systems or soak away systems shall be allowed. Install and maintain conservancy tanks for any residential labour camp. Location of conservancy tanks to be approved by the Project Manager.
- Toilets may not be situated within 100 meters of any water body or within the 1:100 year flood line.

- A sufficient number of toilets shall be provided to accommodate the number of personnel working in any given area. Toilets may not be further than 100 m from any working area. Toilet facilities supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 15 workers.
- All temporary / portable / mobile toilets shall be secured to the ground to prevent them from toppling over due to wind or any other cause.
- Ensure utilisation, maintenance and management of toilet, wash and waste facilities.
- The entrances to the toilets will be adequately screened from public view.
- These facilities will be maintained in a hygienic state and serviced regularly.
- Toilet paper will be provided.
- The Contractor will ensure that no spillage occurs when the toilets are cleaned or emptied and that a licensed service provider removes the contents from site. Disposal of such waste is only acceptable at a licensed waste disposal facility.
- Should shower facilities be provided for use by staff staying on site, the following controls must be imposed:
  - Positioning of the shower, and specifically its discharge point, will be carried out to ensure that erosion and build up of detergents does not occur.
  - All discharge from the shower and other washing facilities must be managed to prevent environmental contamination.
  - Use of the shower facilities must be limited to staff or authorised persons only.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Maintenance register for ablution facilities.
- Disposal certificates.
- Contractor’s method statement.

14.12 Management of Construction Camp

Management Objective:

- Minimise environmental impacts associated with construction camp.

Target:

1. No environmental contamination associated with construction camp.
2. Minimise visual impact associated with construction camp.
3. No complaints regarding the construction camp.

Management Actions:

- Construction camp to be screened to minimise the visual impact, where practicable.
- Open uncontrolled fires will be forbidden at the site camp. Rather, 'contained' cooking mechanisms will be used (e.g. gas stoves or an enclosed braai facility).
- All cooking to be undertaken in designated cooking and eating areas. The cooking area will be positioned such that no vegetation is in close proximity thereto, including overhanging trees. An area around the cooking area will be cleared such that any escaping embers will not start an uncontrolled fire.
- Eating areas will be designated and demarcated.
- The feeding, or leaving of food for animals, is strictly prohibited.
- Sufficient vermin / weatherproof bins will be present in this area for all waste material.
- Dish washing facilities will be provided to ensure that wastewater is disposed of appropriately.
- Failure to comply with the general code of conduct, or the rules and procedures implemented at the construction camp will result in disciplinary actions.
- Provide safe potable water for food preparation, drinking and bathing.
- Install and maintain conservancy tanks without causing pollution of nearby watercourses.
- All services required for the labour camp to be arranged with the Nxuba Local Municipality. Requisite approvals to be in place.
- Prohibit the felling of trees for firewood.
- Provide medical and first aid facilities at the camp area.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Contractor's method statement.
- Disposal certificates.
- Service agreements with Nxuba Local Municipality for labour camp.

14.13 Management of Visual Aspects

Management Objective:

- Minimise impacts to the aesthetics / visual quality.
- Ensure that the visual appearance of the construction site is not an eyesore the adjacent areas.

Target:

1. No complaints regarding impacts to visual quality.

Management Actions:

- Advertising and lighting will be in accordance with relevant standards.
- Lighting must not constitute an eyesore / hazard to users of the road and the surrounding community.
- Lighting will be sufficient to ensure security but will not constitute 'light pollution' to the surrounding areas.
- The site will be shielded /screened to minimise the visual impact, where practicable.
- Where practicable, development designs to compliment the natural surroundings in order to preserve a sense of place.
- On-going housekeeping to maintain a tidy construction area.
- After the construction phase, the areas disturbed that are located outside of the dam basin and that are not earmarked for operational purposes must be suitably rehabilitated.

Responsibilities:

- Project Manager and ECO - checking.

- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Contractor's method statement.

14.14 Management of Water

Management Objective:

- Minimise environmental impacts associated with stormwater as well as water services for construction workers.

Target:

1. No visual evidence of erosion caused by wastewater or stormwater practices.
2. No environmental contamination associated with wastewater or stormwater practices.

Management Actions:

- All construction activities to comply with the National Water Act (Act No. 36 of 1998).
- During the construction stage, water will be required for various purposes, such as concrete batching, washing of plant and equipment in dedicated areas, dust suppression, potable use by construction workers, etc. Water for construction purposes will be sourced directly from watercourses on site and groundwater (boreholes) will also be utilised. Water tankers will also supply water to the site.
- Prevent leakages from pipes or taps.
- Establish a dedicated vehicle maintenance area and wash-bay, where suitable stormwater management measures are in place to prevent pollution.
- Manage stormwater from construction site to avoid environmental contamination and erosion.
- Stormwater runoff from workshops, vehicle maintenance area, wash-bay and other potential pollution sources shall be collected and treated in hydrocarbon separation pits/tanks before discharged to drains and waterways.
- All wastewater discharges to comply with legal requirements associated with the National Water Act (Act No. 36 of 1998), including the General Authorisation that specifically deals with S21 (f) and (g) water uses.
- Wastewater discharges to form part of water monitoring programme.
- Prevent erosion on access roads due to construction traffic.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Water monitoring programme – discharges.
- Contractor's method statement.

14.15 Management of Topsoil

Management Objective:

- Ensure suitable removal, storage, transportation of topsoil for reuse during rehabilitation.

Target:

1. >95% of recovered topsoil from disturbed areas to be stored for future use.
2. No visual evidence of erosion from topsoil stockpiles.
3. No visual evidence of erosion from areas where topsoil has been reinstated.

Management Actions:

- Determine the average depth of the topsoil prior to excavations.
- Identify suitable areas to store topsoil.
- Remove topsoil from areas to be affected by construction activities.
- Prevent mixing of topsoil with subsoil.
- Topsoil to be adequately protected from contamination from construction activities and material.
- Protect stored topsoil from compaction.
- Wind and water erosion-control measures to be implemented to prevent loss of topsoil.
- Following the construction phase, the topsoil should be placed as the final soil layer prior to seeding for areas to be rehabilitated outside of the dam basin.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Topsoil stockpiles.
- Dust monitoring.
- Rehabilitated areas.
- Contractor's method statement.

14.16 Management of Excavations

Management Objective:

- Minimise environmental impacts associated with excavations.

Target:

1. No damage to sensitive environmental features outside construction area during excavations.

Management Actions:

- Construction activities to remain within the designated construction areas.
- Subsoil and overburden should be stockpiled separately to be returned for backfilling in the correct soil horizon order.
- Suitable barricading to be erected around open excavations / trenches, as per the Construction Regulations (2003). Provide signage as a warning of open excavations.
- Divert runoff away from excavations, where necessary.
- Trench lengths will be kept as short as practically possible.
- Trench walls are to be stabilised using battering, shoring and bracing or similar techniques depending on the stability of the trench sides.
- Inspect open trenches at least daily to ensure that animals have not become trapped. Such animals will be safely removed and released, where possible. Special equipment for handling of venomous snakes should be available on site to ensure safe removal.
- Filing of trenches to make provision for subsidence.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Barricading of excavations.

- Excavation register.
- Contractor's method statement.

14.17 Management of Storage and Handling of Non-Hazardous Material

Management Objective:

- Effective and safe management of materials on site, in order to minimise the impact of non-hazardous materials on the environment.

Target:

1. No pollution due to handling, use and storage of non-hazardous material.

Management Actions:

- Materials to be suitably stored to prevent environmental contamination and visual impacts. Storage requirements to be determined based on chemical qualities of material and Material Safety Data Sheets (MSDS).
- Where required, stored material to be protected from rain and run-off to avoid environmental contamination.
- Materials to be appropriately transported to avoid environmental contamination. Loose loads (e.g. sand, stone chip, refuse, paper and cement) to be covered.
- Suitable remedial measures, depending on the nature of the contaminant and the receiving environment, to be instituted for spillages.
- Materials to be suitably used to prevent environmental contamination.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Evidence of spillages.
- MSDS register.
- Contractor's method statement.

14.18 Management of Storage and Handling of Hazardous Material

Management Objective:

- Ensure the protection of the natural environment and the safety of personnel on site, by the correct management and handling of hazardous substances.

Target:

1. No pollution due to handling, use and storage of hazardous material.
2. In the event of a spill, appropriate containment, clean up and disposal of contaminated material. Spills to be cleaned within 24 hours.

Management Actions:

- Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), the Occupational Health and Safety Act (No. 85 of 1993), relevant associated Regulations, and applicable SANS and international standards.
- Storage and use of hazardous materials will be strictly controlled to prevent environmental contamination, and must adhere to the requirements stipulated on the MSDS.
- Where flammable liquids are being used, applied or stored the workplace must be effectively ventilated.
- No person may smoke in any place in which flammable liquid is used or stored.
- Install an adequate number of fire-fighting equipment in suitable locations around the flammable liquids store.
- Where flammable liquids are decanted, the metal containers must be are bonded or earthed.
- No flammable material (e.g. paper, cleaning rags or similar material) may be stored together with flammable liquids.
- Staff that will be handling hazardous materials must be trained to do so.
- Any hazardous materials (apart from fuel) must be stored within a lockable store with a sealed floor. Suitable ventilation to be provided.
- All storage tanks containing hazardous materials must be placed in bunded containment areas with impermeable surfaces. The bunded area must be able to contain 110% of the total volume of the stored hazardous material.
- MSDSs, which contain the necessary information pertaining to a specific hazardous substance, must be present for all hazardous materials stored on the site.
- Spill kits must be available for the cleanup of hazardous material spillages.
- Provide secondary containment where a risk of spillage exists.

- Drip trays to be placed under parked heavy vehicles, equipment and other receptacles of hazardous material to prevent spillages.
- In the event of spillages of hazardous substances the appropriate clean up and disposal measures are to be implemented.
- Spill reporting procedures to be displayed at all locations where hazardous substances are being stored.
- Hazardous materials will be disposed of at registered sites or handed to registered hazardous waste disposal facilities for disposal / recycling.
- Proper and timeous notification of any pollution incidents associated with hazardous materials.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Evidence of spillages.
- MSDS register.
- Training register.
- Disposal certificates.
- Contractor's method statement.

14.19 Management of Waste

Management Objective:

- Minimise environmental impacts associated with waste.
- Apply waste management principles to prevent, minimise, recycle or re-use, with disposal as a last option.

Target:

- No littering on construction site.
- Maintain a clean and tidy construction site.
- 100% record of all waste generated and disposed at waste disposal facilities.
- Valid disposal certificates for all waste disposed.
- Provision of adequate waste containers that are easily accessible and maintained.

- Waste bins to be removed and cleaned weekly.

Management Actions:

- Waste management activities must comply with the National Environmental Management: Waste Act (No. 59 of 2008).
- The storage of general or hazardous waste in a waste storage facility must comply with the norms and standards in GN No. R. 926 of 29 November 2013.
- Vermin / weatherproof bins will be provided in sufficient numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.
- Where possible, waste must be separated at source (e.g. containers for glass, paper, metals, plastics, organic waste and hazardous wastes).
- Establish and monitor recycling targets.
- Provide waste skips at the construction areas. These skips should be sufficient in number, the skip storage area should be kept clean, skips should be emptied and replaced before overflowing or spillage occurs.
- Ensure suitable housekeeping. .
- The Contractor will ensure that no burying, dumping or burning of waste materials, vegetation, litter or refuse occurs. All waste will be disposed of at suitable licensed disposal sites, based on the waste type (general versus hazardous).
- Ensure that solid waste is transported so as to avoid waste spills en-route.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Waste register.
- Recycling targets.
- Disposal certificates.
- Contractor’s method statement.

14.20 Management of Borrow Pits and Quarries

Management Objective:

- Minimise environmental impacts associated with borrow pits and quarries.

Target:

1. No environmental damage or pollution incidents associated with the use of borrow pits and quarries.

Management Actions:

- All borrow pits (C3, D2 and Centreline) and the quarry situated outside of the dam basin to be created, operated and rehabilitated in accordance with the EMPR, as authorised by the Department of Mineral Resources. These mining areas need to be rehabilitated in accordance with the Closure Plan.
- Remove, stockpile and preserve topsoil for re-use during rehabilitation.
- Implement suitable stormwater management measures at borrow pits / quarries.
- No direct discharge of sediment laden water without treatment.
- Manage dangerous conditions (e.g. steep slopes, loose and unstable material).
- Subject to approval, certain borrow pits and / or quarries may be utilised for the disposal of spoil material and inert building rubble.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Contractor's method statement.

14.21 Management of Blasting

Management Objective:

- Minimise environmental impacts associated with blasting.

Target:

1. Compliance with blasting-related legislation and standards.
2. No blasting-related impacts to private property, livestock or human health.

Management Actions:

- Prior to commencing with blasting activities, the blasting Contractor should submit a Method Statement which should comply with the Explosives Regulations (2003) and all relevant SANS standards and health and safety standards for mitigating blasting.
- The Contractor shall employ industry standard methods to control the impact of blasting and limit the risk of damage to buildings and structures by reducing blast vibrations induced in the rock mass, eliminating fly rock and limiting air-blast and noise to acceptable levels.
- Blast mats should be used wherever fly-rock may result in damage to any infrastructure or where it could result in death or injury of animals, or where damage could be caused to sensitive environmental features.
- Blasting operations should be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level of 140 decibels.
- All explosives shall be transported, stored and handled in accordance with applicable laws and good design engineering and constructions practices.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Noise and vibration levels.
- Public complaints register.
- Contractor's method statement.

14.22 Management of Workshop and Equipment

Management Objective:

- Minimise environmental impacts associated with workshops and equipment use.

Target:

1. No environmental contamination associated with workshops and equipment use.

Management Actions:

- Maintenance of equipment and vehicles will be performed in such a manner so as to avoid any environmental contamination (e.g. use of drip trays).

- No washing of plant may occur on the construction site. Plant to be washed in dedicated areas.
- Drip trays will be provided for the stationary plant and for the "parked" plant.
- All vehicles and equipment will be kept in good working order and serviced regularly. Leaking equipment will be repaired immediately or removed from the site.
- Suitable storage and disposal of hydraulic fluids and other vehicle oils (see section on *Management of Storage and Handling of H*azardous Material).

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Evidence of spillages.
- Water monitoring programme – discharges.
- Training register.
- Contractor's method statement.

14.23 Management of Pollution Generation Potential

Management Objective:

- Ensure that all possible causes of pollution are mitigated as far as possible to minimise impacts to the surrounding environment.

Target:

1. No complaints regarding pollution.
2. No measurable signs of pollution.
3. Dust fallout -
    a. Fenceline sites = Industrial Band (600 to 1200 mg/m^2/day);
    b. Community sites = Residential Band (< 600 mg/m^2/day);
    c. Comply with ASTM D1739; *SANS 1929, SANS 69.*
4. Particulate matter (PM_{10}) -
    a. 24 hr = 120 µg/m^3 (more than four times a year);
    b. Annual = 50 µg/m^3;
    c. Comply with the National Ambient Air Quality Standards.
5. Noise -

a. L_{Aeq} (equivalent continuous sound level) during daytime hours (07:00 to 22:00) = 45 dBA;
b. L_{Aeq} during night-time hours (22:00 to 07:00) = 35 dBA;
c. Comply with SANS 10103:2008.

6. Water quality – construction activities may not cause an adverse impact that results in more than a 10% change in baseline values.
7. All water discharges to comply with legal requirements associated with the National Water Act (Act No. 36 of 1998), including GN No. 399.

Management Actions:

- **Noise -**
  - The remote nature of the construction domain needs to be factored in to the mitigation of noise-related aspects.
  - The provisions of SANS 10103:2008 will apply to all areas at the perimeter of the site, within audible distance of residents.
  - Working hours to be agreed upon with Project Manager, so as to minimise disturbance to landowners and community members.
  - No amplified music will be allowed on the site. The use of radios, tape recorders, compact disc players, television sets etc. will not be permitted unless at a level that does not serve as an intrusion to adjacent land-owners.
  - Construction activities generating output levels of 85 dB or more will be confined to the hours during normal working hours.
  - The Contractor will take preventative measures (e.g. screening, muffling, timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisances from sources such as power tools.
- **Dust -**
  - Note that all dust suppression requirements should be based on the results from the dust monitoring and the proximity of construction activities to sensitive receptors.
  - Appropriate dust suppression measures or temporary stabilising mechanisms to be used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather. Dust suppression to be undertaken for all bare areas, including construction area, access roads, borrow pits, site yard, etc.
  - Speed limits to be strictly adhered to.
  - The Contractor will take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, pre-notification of affected parties).
- **Lights -**

- Prior to construction the position and type of lighting will be planned to ensure unnecessary light pollution will be eliminated.
- All lighting installed on site must not lead to unacceptable light pollution to the surrounding community and natural environment (e.g. use of down-lighters).

- **Erosion -**
  - Protect areas of the construction site that are susceptible to erosion (e.g. steep sections noted in **Section 13**), through suitable measures (e.g. watering, planting, retaining structures, commercial anti-erosion compounds).
  - Any erosion channels caused by construction activities to be suitably stabilised and rehabilitated.
  - All efforts to prohibit ponding on surface and ensure stormwater runoff is channelled from the site must be made. The method used will be appropriate to the expected stormwater flows and the topography and geology of the site.
- **Cement and Concrete Batching -**
  - Cement mixing to take place on an impervious surface (e.g. cement mixing pit).
  - Batching operations to take place in a designated area, which will be kept clean at all times.
  - Location of batching plant to be approved by the Project Manager, with due consideration of the relevant management measures contained in the EMPr (see EMPr sections on *Site Clearing*, *Site Establishment*, *Management of Water*, *Management of Waste*, etc.).
  - Ensure separation of clean and dirty water from batching plant.
  - Wastewater from batching operations to be disposed in accordance with the EMPr section on *Management of Water*. Contaminated water will not be discharged to the environment. Prevent overflow from contaminated wastewater storage area.
  - Waste concrete and cement sludge to be removed on a regular basis (to prevent overflowing) and to be disposed of at a suitable facility.
  - Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent hardening or leakage of cement.
  - Used cement bags will be stored so as to prevent windblown dust and potential water contamination. Used bags will be disposed of adequately at a licenced waste disposal facility.
  - Concrete transportation will not result in spillage.
  - Cleaning of equipment and flushing of mixers will not result in pollution, with all contaminated wash water entering the waste water collection system.
  - To prevent spillage onto roads, ready mix trucks will rinse off the delivery shoot into a suitable sump prior to leaving the site.

- Suitable screening and containment will be in place to prevent windblown contamination from cement storage, mixing, loading and batching operations.
- All contaminated water and fines from exposed aggregate finishes will be collected and stored in sumps and will be adequately disposed of.
- All visible remains of excess concrete will be physically removed on completion of the plastering or concrete pouring and disposed of in an acceptable manner.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.
- Contractor to conduct environmental monitoring for air quality (dust and PM_{10}), noise and water quality.

Monitoring Requirements:

- Public complaints register.
- Evidence of pollution.
- Review periodic results from environmental monitoring (water quality, air and dust).
- Contractor's method statement.
- Air, noise and water quality monitoring.

14.24 Management of Flora

Management Objective:

- Preserve protected flora species outside of construction areas.
- Control alien plants and noxious weeds.

Target:

1. No unpermitted disturbance to protected flora species.
2. Ongoing eradication of alien plants and noxious weeds.

Management Actions:

Note: *Refer to sections on construction site planning and layout, as well as site establishment for additional control measures for the protection of flora.*

- Comply with the requirements of the National Environmental Management: Biodiversity Act (No. 10 of 2004), National Forests Act (No. 84 of 1998), National Veld and Forest Fire Act (No. 101 of 1998) and Nature and Environmental Conservation Ordinance (19 of 1974).

- Compile and implement search, rescue and relocation plan for protected flora species.
- Search, rescue and relocation to be undertaken by a specialist.
- Ongoing identification of protected plants and trees.
- Any protected plants or trees in proximity to construction areas (outside of dam basin) that will remain, should be clearly marked and must not be disturbed, defaced, destroyed or removed, unless permitted and otherwise specified by the Project Manager.
- Acquire the necessary permits under the National Forests Act (No. 84 of 1998) if avoidance of protected trees is not possible.
- Control of alien invasive species and noxious weeds for disturbed areas outside of the dam basin, in accordance with the requirements of the Conservation of Agricultural Resources Act (No. 43 of 1983). Eradication method to be approved by the Project Manager and ECO.
- Implement a monitoring programme for eradication of alien invasive plants and noxious weeds.
- Retain vegetation within the construction site (outside of dam basin), wherever possible.
- Where possible, transplant plant material to designated areas.
- Rehabilitation Management Plan to be developed for disturbed areas outside of the dam inundation area. Targets to be specified for re-growth.
- No construction equipment, vehicles or unauthorised personnel will be allowed onto areas that have been rehabilitated outside of dam basin. Only persons / equipment required for maintenance thereof will be allowed to operate on rehabilitated areas.
- Removal of medicinal plants by construction workers will not be allowed. Programme to be implemented to source medicinal plants, in consultation with the relevant authorities.
- No trees to be felled for fuel purposes.
- Felled timber to be made available to the local community.
- Branches, leaves and non-useable wood to be chipped and used as mulch during rehabilitation.
- Contractor to test top 15 cm soil at predetermined distances for fertilizer requirements. All testing to occur at SANS 17025 (Agrilasa) laboratory.
- All reseeding activities will be undertaken at the end of the dry season (middle to end September) to ensure optimal conditions for germination and rapid vegetation establishment.
- The rehabilitated and seeded areas outside of dam basin must be harrowed after spreading the topsoil and fertilizer uniformly.
- Inspect rehabilitated area at three monthly intervals during the first and second growing season to determine the efficacy of rehabilitation measures.
- Take appropriate remedial action where vegetation establishment has not been successful or erosion is evident.

- Only locally indigenous vegetation is to be used for rehabilitation.
- Photographs of protected and sensitive flora species must be displayed in the construction camp to heighten awareness.

Responsibilities:

- Proponent - acquire permits.
- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Permits.
- Search, Rescue and Relocation Plan.
- Barricading of protected flora species.
- Encroachment of alien invasive plants and noxious weeds.
- Successful rehabilitation.
- Contractor's method statement.

14.25 Management of Fauna

Management Objective:

- Ensure the protection of animals (including livestock).
- Adhere to agreements made with landowners and community members regarding animals.

Target:

1. No direct / indirect harm to animals from construction activities.
2. No deviations from agreements made with individual landowners and community members regarding animals.

Management Actions:

Note: *Refer to sections on construction site planning and layout, as well as site establishment for additional control measures for the protection of animals.*

- Comply with the requirements of the National Environmental Management: Biodiversity Act (No. 10 of 2004), Nature and Environmental Conservation Ordinance (19 of 1974) and Animal Protection Act (No. 71 of 1962).
- Compile and implement search, rescue and relocation plan for protected fauna species.

- Proper access control to be maintained to prevent livestock from accessing construction areas.
- Stringent and dedicated control of poaching.
- No fishing allowed.
- No wilful harm to any animals, unless a direct threat is posed to a worker's health or safety.
- Captured animals to be safely released to a similar habitat.
- Prepare emergency response procedure for dealing with snake bites, as venomous species occur in the area.
- Photographs of protected and sensitive fauna species must be displayed in the construction camp to heighten awareness.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Proponent - acquire permits.
- Permits.
- Contractor's method statement.

14.26 Management of Watercourses

Management Objective:

- Ensure that the watercourses (including the Koonap River, Mankazana River, natural channels, drainage lines) are protected and incur minimal negative impact to resource quality (i.e. flow, water quality, riparian habitat, morphology and aquatic biota).
- Existing water use entitlements not to be affected.

Target:

1. Unaltered downstream flow regime.
2. Downstream water quality to remain within acceptable ranges, as determined through baseline monitoring.
3. Ecological category not to be influenced by construction activities.

Management Actions:

- **Flow** -

- Minimise construction footprint where the construction activities take place in-stream or in close proximity (< 50 m) to watercourses.
- Prevent erosion on steep slopes.
- Minimise influence to downstream flow regime when diverting and impeding flow for cofferdams, temporary river crossings or for any other purposes.
- Do not hinder flow in natural drainage lines.
- Construction activities not to interfere with downstream water users.
- Water quality and quantity released from the Foxwood Dam site during construction will need to satisfy the Ecological Water Requirements for the Koonap River and Great Fish Estuary.

- **River morphology** -
  - Reinstate (shaping) and rehabilitate (indigenous riparian vegetation) affected areas outside of dam basin.
  - Install suitable buttressing to prevent future erosion, if required.
  - No illegal crossing of watercourses with construction plant. Suitable temporary river crossing to be built. Select most appropriate crossing point based on geotechnical conditions, sensitivity of riparian habitat (e.g. protected trees, large trees that afford bank stabilisation) and instream habitat, depending on technical feasibility.
  - No construction facilities (including storage areas, containers, chemical toilets, etc.) to be located within natural drainage lines.
- **Water quality** -
  - Conduct water quality monitoring at suitable up- and downstream sites on the affected watercourses.
  - All diffuse pollution sources to be managed to prevent pollution of the watercourses in the project area.
  - Storage area and ablution facilities not to be located closer than 50m from edge of riparian habitat.
  - Where necessary, install instream silt traps during construction within the watercourse channel and along the riparian habitat. Instream silt traps are to be maintained and serviced on a regular basis. The style of silt trap will depend on materials used and the water movement patterns. If silt traps are not deemed feasible, other suitable measures need to be taken to limit unnaturally high sediment volumes in the watercourses.
  - Implement suitable stormwater measures during construction to manage ingress of runoff into watercourses.
  - No waste water to be released to natural drainage lines.

- Ensure proper storage of material (including fuel, paint) that could cause water pollution. Ensure proper storage and careful handling of hazardous substances with spill prevention materials at hand.
- Reduce sediment loads in water from dewatering operations. All dewatering should be done through temporary sediment traps (e.g. straw bales). These are to be serviced regularly and removed when no longer in use. Materials can be re-used.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Review periodic results from water quality environmental monitoring.
- Erosion monitoring.
- Contractor's method statement.

14.27 Management of Archaeological and Cultural Features

Management Objective:

- Ensure that archaeological and cultural resources, as well as graves are protected.

Target:

1. No archaeological and cultural resources or graves to be damaged during construction.

Management Actions:

- Incorporate findings from Phase 2 Heritage Impact Assessment, Archaeological Impact Assessment and Palaeontological Impact Assessment.
- Compile and implement search, rescue and relocation plan for graves.
- For any chance finds, all work will cease in the area affected and the Contractor will immediately inform the Project Manager. A registered heritage specialist must be called to site for inspection. The relevant heritage resource agency (i.e. EC Provincial Heritage Resources Authority) must be informed about the finding.
- Permits to be obtained in terms of the National Heritage Resources Act (Act No. 25 of 1999) if heritage resources are to be impacted on and for the removal of graves.

- Exhumation and relocation of graves once families and affected communities have been consulted and permission received for relocation. All cultural practices in terms of removal of graves as requested by family / community to be complied with.
- All homesteads and graves situated in close proximity to the construction areas to be protected by a 20m buffer in which no construction can take place. The buffer to be highly visible to construction crews.
- Under no circumstances may any heritage material be destroyed or removed from site.
- Should any remains be found on site that is potentially human remains, the South African Police Service should also be contacted.

Responsibilities:

- Proponent - acquire permits.
- Proponent - appoint archaeologist.
- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Permits.
- Search, Rescue and Relocation Plan.
- Contractor's method statement.

14.28 Management of Emergency Procedures

Management Objective:

- Minimise environmental impacts associated with emergency procedures.

Target:

1. No site fires to be caused by construction activities and workers.
2. Approved emergency response procedures, where relevant.

Management Actions:

- **Fire** -
  - Comply with the National Veld and Forest Fire Act (No. 101 of 1998).
  - Work closely with the local fire protection association. Determine requirements and add to list of emergency telephone numbers. Keep a fire danger index displayed on site and

comply with requirements. Fire breaks are to be agreed with neighbours and the local fire protection association.
  - Proper emergency response procedure to be in place for dealing with fires.
  - Burning of waste is not permitted.
  - Suitable precautions will be taken (e.g. suitable fire extinguishers, water bowsers, welding curtains) when working with welding or grinding equipment.
  - All fire control mechanisms (fire fighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof and be approved by local fire services.
  - All staff on site will be made aware of general fire prevention and control methods, and the name of the responsible person to alert to the presence of a fire.
  - No fires are allowed on site, unless in dedicated areas approved by the Project Manager.
  - Firebreaks to be made for construction areas, as required.
  - Dedicated smoking areas to be provided. Sigarette butts may not be disposed of onsite.
- **Accidental Leaks and Spillages** -
  - Proper emergency response procedure to be in place for dealing with spills and leaks.
  - Ensure that the necessary materials and equipment for dealing with spills and leaks are available on site, where practicable.
  - Remediation of the spill areas will be undertaken to the satisfaction of the Project Manager.
  - In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of an appropriate absorbent material readily available to absorb, breakdown and where possible, encapsulate a minor hydrocarbon spillage.
  - All staff on site will be made aware of actions to be taken in case of a spillage.
  - Provide contact details of person to be notified in a case of spillages – signage to be displayed at strategic points within the construction domain (e.g. workshop, fuel storage area, hazardous material containers).

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Approved Emergency Response Plan.
- Training and awareness creation records.
- Signage displayed.

- Contractor's method statement.

14.29 Management of Health and Safety

Management Objective:

- Provide a safe working environment to construction workers and the public.

Target:

1. Approved Health and Safety Plan.
2. No incidents.
3. Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993), Construction Regulations (2003) and other relevant regulations.

Management Actions:

- Contractor to submit a Health and Safety Plan, prepared in accordance with the Health and Safety Specification, for approval prior to the commencement of work. These requirements are aligned with the Construction Regulations (2003).
- Fencing and barriers will be in place in accordance with the Occupational Health and Safety Act (Act No. 85 of 1993).
- Comply with the provisions of the Fencing Act (Act No. 31 of 1963).
- Applicable notice boards and hazard warning notices will be put in place and secured. Night hazards will be indicated suitably (e.g. reflectors, lighting, traffic signage).
- Emergency contact details will be prominently displayed.
- Two-Way Radio Systems should be used where cell phone coverage is poor.
- All construction personal must be clearly identifiable. All employees must also be issued with employee cards for identification purposes.
- All workers will be supplied with the required Personal Protective Equipment as per the Occupational Health and Safety Act (Act No. 85 of 1993).
- Maintain access control to prevent access of the public to the construction areas, as far as practicable.
- Use approved communication channels to inform the community of Occupational Health and Safety measures to prevent incidents involving community members.

Responsibilities:

- Project Manager and ECO - checking.

- Dedicated Occupational Health and Safety system to be implemented by Contractor's Safety Officer. To be monitored and audited by the Client's Safety Agent, in terms of the Construction Regulations (2003).
- Contractor to implement management actions.

Monitoring Requirements:

- Occupational Health and Safety system – checked by Safety Agent.

14.30 Management of Reinstatement and Rehabilitation

Note: *Reinstatement and rehabilitation only refer to areas outside of the dam basin that will not be inundated or used for operational purposes. Refer to further requirements in Closure Plan for borrow pits and quarry.*

Management Objective:

- Adequate reinstatement and rehabilitation of construction areas (outside dam basin).
- Conduct concurrent or progressive rehabilitation of areas affected by construction activities that are situated outside of the dam footprint.

Target:

1. Complete site cleanup.
2. Reinstate and rehabilitate areas disturbed by construction activities that are located outside of the dam basin.

Management Actions:

- **Removal of structures and infrastructure**
  - After the construction phase, the area outside of the dam basin must be rehabilitated by appropriate landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and vegetation establishment.
  - Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, and fixtures.
  - Ensure that all access roads utilised during construction which are outside of the dam basin and not earmarked for use during the operational phase, are returned to a usable state and/or a state no worse than prior to construction.
- **Inert waste and rubble**
  - Clear the site outside dam basin 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 Project Manager.
- Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site.

- **Hazardous waste and pollution control**
  - Remove from site all pollution containment structures.
  - Remove from site all temporary sanitary infrastructure and waste water disposal systems. Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner.
  - Comply with relevant provisions under the following EMPr sections: *Management of Storage and Handling of H*azardous *Material*, *Management of Water*, *Management of Waste*, *Management of Pollution Generation Potential*.
- **Final shaping**
  - Make safe all borrow pits, quarries and dangerous excavations outside of the dam basin by backfilling, grading and blasting as required. Comply with requirements in Closure Plan.
  - In general, no slopes steeper than 1(V):3(H) are permitted in cut-and-fill areas (outside dam basin), unless otherwise specified by the Project Manager. Steeper slopes require protection. New slopes must mimic the natural slopes and topography, where possible.
  - Programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. Compact in layers for best results.
  - Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material.
  - Shape all disturbed areas outside of the dam basin to blend in with the surrounding landscape, where possible.
  - Ensure that no excavated material or stockpiles are left on site (outside of the dam basin) and that all material remaining after backfill is landscaped to blend in with the surrounding landscape.
- **Topsoil replacement and soil amelioration**
  - Execute top soiling activity prior to the rainy season or any expected wet weather conditions.
  - Execute topsoil placement only after all construction work has ceased.
  - Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas of the construction site, including temporary access routes. Replace topsoil to the original depth.

- Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality.
- The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage.
- Do not use topsoil suspected to be contaminated with the seed of alien vegetation (e.g. black wattle). Alternatively, the soil is to be appropriately treated.
- Ensure that storm water run-off is not channelled alongside the gentle mounding, but that it is taken diagonally across it.
- Shape remaining stockpiled topsoil not utilised elsewhere in an acceptable manner so as to blend in with the local surrounding area.
- After topsoil placement is complete, spread available stripped vegetation randomly by hand over the top-soiled area.

- **Ripping and scarifying**
  - Rip and/or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers. Whether ripping and/or scarifying is necessary will be based on the site conditions immediately before these works begin.
  - Rip and/or scarify all disturbed (and other specified) areas of the construction site (outside of the dam basin), including temporary access routes and roads, compacted during the execution of the works.
  - Rip and/or scarify along the contour to prevent the creation of down-slope channels.
  - Do not rip and/or scarify areas under wet conditions, as the soil will not break up.
- **Planting**
  - *Transplanted plants*
    - All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment.
    - Transplanting entails the removal of plant material and replanting the same plants in another designated position.
    - Transplant trees and shrubs into designated positions.
    - Establish further specifications for transplanted plants.
  - *Nursery plants*
    - All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment.
    - Plant all trees, shrubs and individual plants in designated positions.
    - Planting should preferably be done during the rainy season.
    - After planting, each plant must be well watered, adding more soil upon settlement if necessary.

  - Establish further specifications for nursery plants.
- *Seeds and seedlings*
  - All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment.
  - Tree seedling material should be fresh and of local origin. Resist using plants from far afield as they may not be best suited to local climatic or soil conditions.
  - Small seedlings are likely to transplant more successfully than will large ones. These should be potted and kept under nursery conditions until they are large enough to plant out.
  - Establish further specifications for seeds and seedlings.

- **Grassing**
  - Suitably trained personnel must undertake grassing by making use of the appropriate equipment and grass species as specified by the terrestrial ecologist.
  - Sodding may be done at any time of the year, but seeding must be done during the summer when the germination rate is better.
  - Hydroseeding with a winter mix will only be specified where regrassing is urgent, and cannot wait for the summer.
  - Establish further specifications for sods, runners and hand seeding.
- **Maintenance**
  - Monitor the re-growth of invasive vegetative material (outside of the dam basin).
  - Cordon off areas that are under rehabilitation as no-go areas.
  - Revegetation must match the vegetation type, which previously existed, unless otherwise indicated by a suitable specialist.
  - Control invasive plant species and noxious weeds by means of extraction, cutting or other approved methods.
  - For planted areas that have failed to establish, replace plants with the same species as originally specified.
  - Establish further specifications for maintenance.