APPENDIX I2:

CONSTRUCTION EMPr

PROPOSED UMKHOMAZI WATER PROJECT PHASE 1

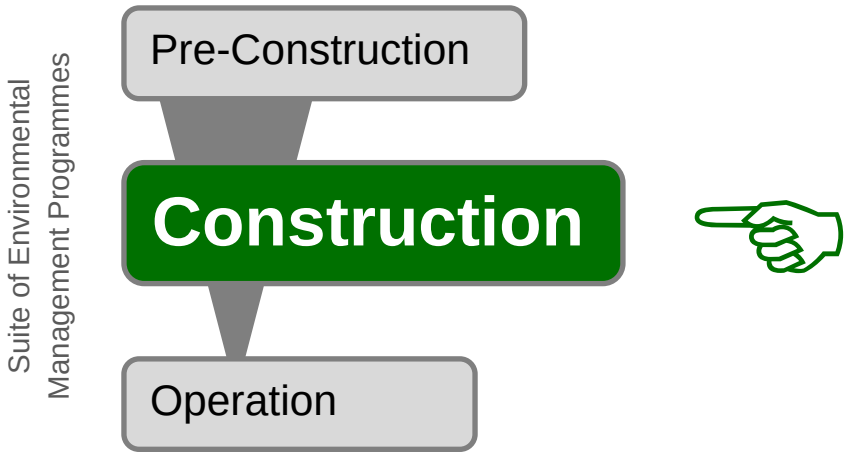
Potable Water Component

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME

FINAL

November 2016

DEA Ref. No.: 14/12/16/3/3/3/95



TITLE AND APPROVAL PAGE

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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
DEDTEA	Department of Economic Development, Tourism and Environmental Affairs
DEA	Department of Environmental Affairs
DM	District Municipality
DMR	Department of Mineral Resources
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
DoT	Department of Transport
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EKZNW	Ezemvelo KZN Wildlife
EMC	Environmental Monitoring Committee
EMPr	Environmental Management Programme
GN	Government Notice
Ha	Hectare
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Party
km	Kilometre
km^2	Square kilometre
KZN	KwaZulu-Natal
ℓ	Litres
LM	Local Municipality
m	Metre
m^2	Square meters
m^3	Cubic metre
mm	Millimetre
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NWA	National Water Act (Act No. 36 of 1998)
OHS	Occupational Health and Safety
SANS	South African National Standard
uMWP-1	uMkhomazi Water Project Phase 1
WSS	Water Supply System
WTW	Water Treatment Works

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.*
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.*
Incident	*An unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property.*
Monitoring	*A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.*
Potable Water	*Water that is fit or suitable for drinking.*
Project Area	*The greater area within which the project is executed. Extends beyond the construction domain.*
Raw Water	*Natural (untreated) water found in the environment, such as water from bodies*

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

1 PURPOSE OF THIS DOCUMENT

The uMkhomazi Water Project Phase 1 (uMWP-1), which entails the transfer of water from the undeveloped uMkhomazi River (also known as the Umkomaas or Mkomazi) to the existing Mgeni system, is currently being investigated through a Feasibility Study. This transfer scheme is deemed to be the most viable option to provide a large volume of water to fulfil the long-term water requirements of the Mgeni system. The uMWP-1 consists of both Raw Water and Potable Water components which are being undertaken by the Department of Water and Sanitation (DWS) (previously known as the Department of Water Affairs (DWA)) and Umgeni Water, respectively.

The proposed uMWP-1 Potable Water component consists of the following:

- A Water Treatment Works (WTW) and potable water storage reservoir in the uMlaza River valley; and
- Potable water pipeline from the WTW to Umlaas Road where it connects into the existing ’57 Pipeline owned by Umgeni Water.

This document serves as the **Environmental Management Programme** (EMPr), as contemplated in Regulation 33 of Government Notice (GN) No. R. 543 (18 June 2010), for the construction phase of the project. It was developed in support of the Environmental Impact Assessment (EIA) that was undertaken for the project.

2 DOCUMENT ROADMAP

As a minimum, the EMPr aims to satisfy the requirements stipulated in Regulation 33 of GN No. R. 543 (18 June 2010), as promulgated in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998). **Table 1** presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: EMPr Roadmap in relation to GN No. R. 543

Chapter	Title	Correlation with G.N. No. R543	
1	Purpose of this Document	–	
2	Document Roadmap	–	
3	Project Background and Motivation	–	
4	Project Location		
5	Overview of Project	–	
6	EMPr Framework	–	
7	Environmental Assessment Practitioner	R33(a)	Details of – (i) the person who prepared the EMPr; and (ii) the expertise of that person to prepare an EMPr.
8	Environmental Governance Framework	–	
9	Roles & Responsibilities	R33(d)	An identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b).
10	Monitoring	R33(e)	Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon
11	Environmental Training & Awareness Creation	R33(j)	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; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.
12	EMPr Review	–	
13	Environmental Activities, Aspects and Impacts	R33(c)	A detailed description of the aspects of the activity that are covered by the draft environmental management programme.
14	Sensitive Environmental Features	–	
15	Implementation Programme	R33(b)	Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by the EIA Regulations, including environmental impacts or objectives in respect of –

Chapter	Title	Correlation with G.N. No. R543	
			(i) planning and design; (ii) pre-construction and construction activities; (iii) operation or undertaking of the activity; (iv) rehabilitation of the environment; and (iv) closure, where relevant.
		R33(f)	As far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures.
		R33(g)	A description of the manner in which it intends to - (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) remedy the cause of pollution or degradation and migration of pollutants; (iii) comply with any prescribed environmental management standards or practices; (iv) comply with any applicable provisions of the Act regarding closure, where applicable; (v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.
		R33(h)	Time periods within which the measures contemplated in the environmental management plan must be implemented.
		R33(i)	The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity.

3 PROJECT BACKGROUND AND MOTIVATION

The current water resources of the Integrated Mgeni Water Supply System (WSS) are insufficient to meet the long-term water requirements of the system. The Integrated Mgeni WSS is the main water source that supplies about five million people and industries in the eThekwini Municipality, uMgungundlovu District Municipality (DM) and Msunduzi Local Municipality (LM), all of which comprise the economic powerhouse of the KwaZulu-Natal (KZN) Province.

The Integrated Mgeni WSS comprises the Midmar, Albert Falls, Nagle and Inanda Dams in KZN, a water transfer scheme from the Mooi River and the newly constructed Spring Grove Dam. The current system (Midmar, Albert Falls, Nagle and Inanda Dams and Phase 1 of the Mooi Mgeni Transfer Scheme) has a stochastic yield of 334 million m^3/a (measured at Inanda Dam) at a 99% assurance of supply. The short-term augmentation measure, Phase 2 of the Mooi Mgeni Transfer Scheme, currently being implemented with the construction of Spring Grove Dam, will increase water supply from the Integrated Mgeni WSS by 60 million m^3/a. However, this will not be sufficient to meet the long-term requirements of the system.

Pre-feasibility investigations indicated that the development of the undeveloped uMkhomazi River, to transfer water to the existing Mgeni system, most likely will fulfil this requirement. The uMkhomazi River is the third-largest river in KZN in terms of mean annual runoff.

The uMWP-1 consists of both Raw Water and Potable Water components which are being undertaken by DWS and Umgeni Water, respectively. A simplified diagrammatic representation of the overall transfer scheme is provided in **Figure 1**. This report only focuses on the uMWP-1 Potable Water component.

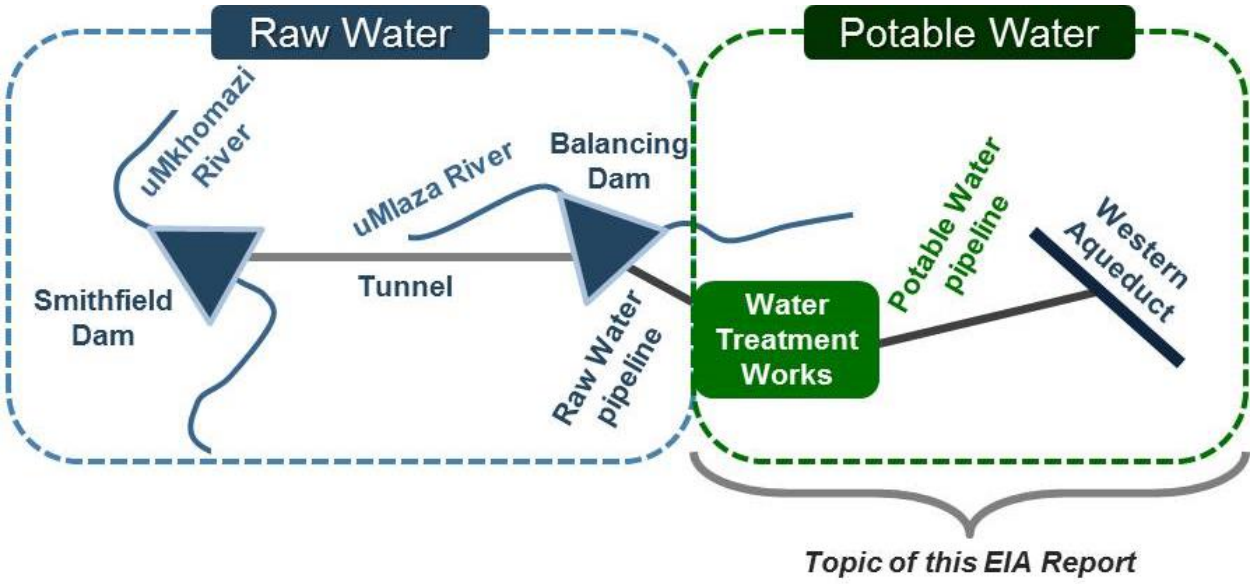

Figure 1: Simplified diagram of uMWP-1 components

4 PROJECT LOCATION

The preferred layout for the uMWP-1 Potable Water components, as established through the EIA, is shown in **Figure 2**.

The uMWP-1 Potable Water project area is situated in the southern part of KZN, in the uMgungundlovu DM. The western part falls within the Richmond LM and the eastern part in the Mkhambathini LM.

The majority of the project area is located on privately owned land which is predominantly used for commercial farming and forestry. In the north-eastern part the pipeline crosses the light industrial area of Umlaas Road.

The nearest town to the western part of the project area is Richmond, which is located more than 10km to the south-west of the WTW at Baynesfield Estate. The potable water pipeline route travels past the north of Hopewell. Apart from Umlaas Road and Hopewell, the project infrastructure is located within rural areas.

The location of the project infrastructure was influenced by various factors, such as topography and associated elevation, impacts to the receiving environment, existing servitudes, existing structures and infrastructure, access, site constraints and geotechnical conditions (amongst others). From a technical perspective, a primary determinant in siting the infrastructure was ensuring the correct elevation to maintain a gravity fed system.

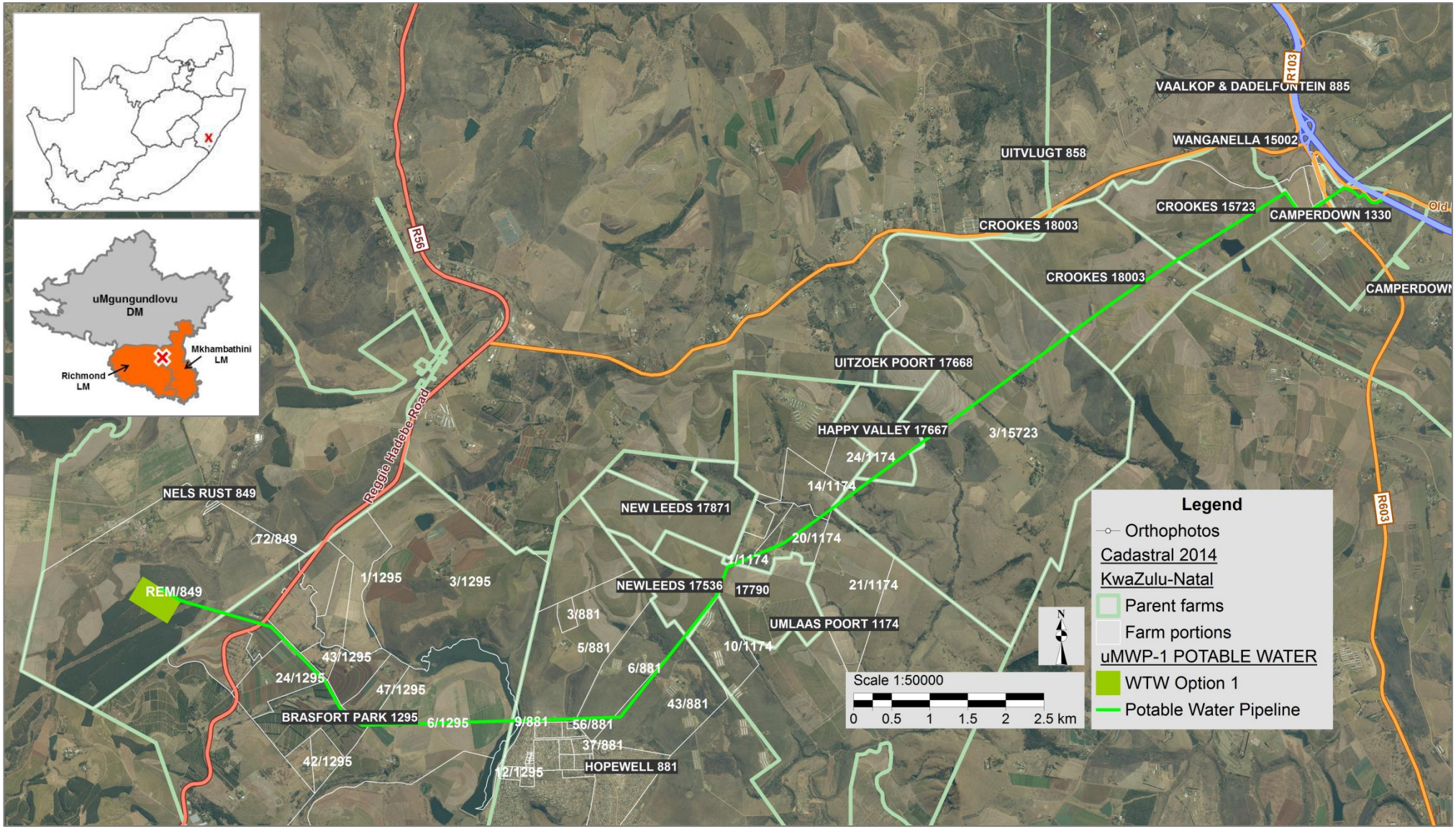

Figure 2: **Locality Map – uMWP-1 Potable Water (preferred layout)**

5 OVERVIEW OF PROJECT

The components of uMWP-1 Potable Water are listed in **Table 2**.

Table 2: uMWP-1 Potable Water Project Components

Potable Water Component	Associated Infrastructure
WTW & Potable Water Reservoir	❖ Access roads ❖ 600 m by 350 m (21 Ha) WTW, which includes (amongst others): • Control room • Inlet works • Chemical storage area • Pre-chlorination facility • Clarifiers • Filters • Post-chlorination facility • Sludge holding tanks • Thickeners • Sludge storage area • Sludge dewatering area ❖ Reservoir for storage of treated water ❖ Operator's offices ❖ Parking facilities ❖ Fencing
Potable Water Pipeline	❖ Access roads ❖ Two x 2500mm gravity pipelines running in parallel ❖ Chambers and valves

6 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;
2. **Construction EMPr** (theme of this document); and
3. Operational EMPr.

It is recommended that a Rehabilitation Management Plan be developed, which should include additional measures identified during construction to supplement the reinstatement and rehabilitation provisions included in the EMPr for the construction phase (if necessary)

The Construction EMPr provides performance criteria required to address potential environmental impacts during the construction phase of the uMWP-1 Potable Water project. This Report must be read in conjunction with the EIA Report.

The scope of the Construction 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 Construction EMPr; and
- Provide legislative framework.

7 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed by Umgeni Water as the independent Environmental Assessment Practitioner (EAP) to undertake the EIA for the proposed uMWP-1 Potable Water component.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety 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 3** below, and their respective Curricula Vitae are contained in in the body of the EIA Report.

Table 3: 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, North-West; • Construction of the Spring Grove Dam, as part of the Mooi-Mgeni Transfer Scheme Phase 2, KZN; • Ncwabeni Off-Channel Storage and associated infrastructure, KZN; • Mokolo Crocodile West Water Augmentation Project (water transfer scheme), Limpopo; and • Foxwood Dam and associated infrastructure, Eastern Cape.
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, KZN; • Upgrade of the Sunderland Ridge Waste Water Treatment Works and bulk sewer line situated on the Hennops River, Gauteng; and • Empangeni Bulk Outfall Sewer, 40km pipeline, KZN.

8 ENVIRONMENTAL GOVERNANCE FRAMEWORK

8.1 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);
- Construction Regulations (2014); and
- Explosives Act (No. 15 of 2003).

The various forms of authorisation that will be required for the project are listed in **Table 4**.

Table 4: Authorisations required for the implementation of the project

Description	Legal Reference	Regulatory Authority
Approval required for listed activities in terms of the EIA Regulations (18 June 2010) associated with the project. Scoping and EIA process conducted.	• National Environmental Management Act (No. 107 of 1998) • EIA Regulations (GN No. R. 543, R. 544, R. 545 and R. 546 of 18 June 2010)	DEA

Description	Legal Reference	Regulatory Authority
The project entails the following activities that constitute water uses in terms of Section 21 of the National Water Act (No. 36 of 1998): • Section 21(c) - Impeding or diverting the flow of water in a watercourse (instream works for crossing of watercourses by the pipeline); and • Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse (instream works for crossing of watercourses by the pipeline). • 21(g) - Disposing of waste in a manner which may detrimentally impact on a water resource	• National Water Act (No. 36 of 1998)	DWS
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) • KZN Heritage Act (No. 04 of 2008)	Amafa aKwaZulu-Natali
Permits to be obtained for the removal and transportation of endangered fauna and flora.	• National Environmental Management: Biodiversity Act (Act No. 10 of 2004) • Natal Nature Conservation Ordinance (15 of 1974)	Ezemvelo KZN Wildlife (EKZNW)
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 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 (2014) 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
- ❖ Umgeni Water will need to conform to all its legal obligations as part of the acquisition of land for the construction and operation of the project.

8.2 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 Umgeni Water Particular Specification for Environmental Management of Construction Projects (contained in Appendix A) in the form of minimum standards and measures to be implemented by the Contractor. The EMPr and Specification are regarded as complimentary and where any contradictions exist the latter will take preference.

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; and
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 managing spoil material;
- 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.

9 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 3**.

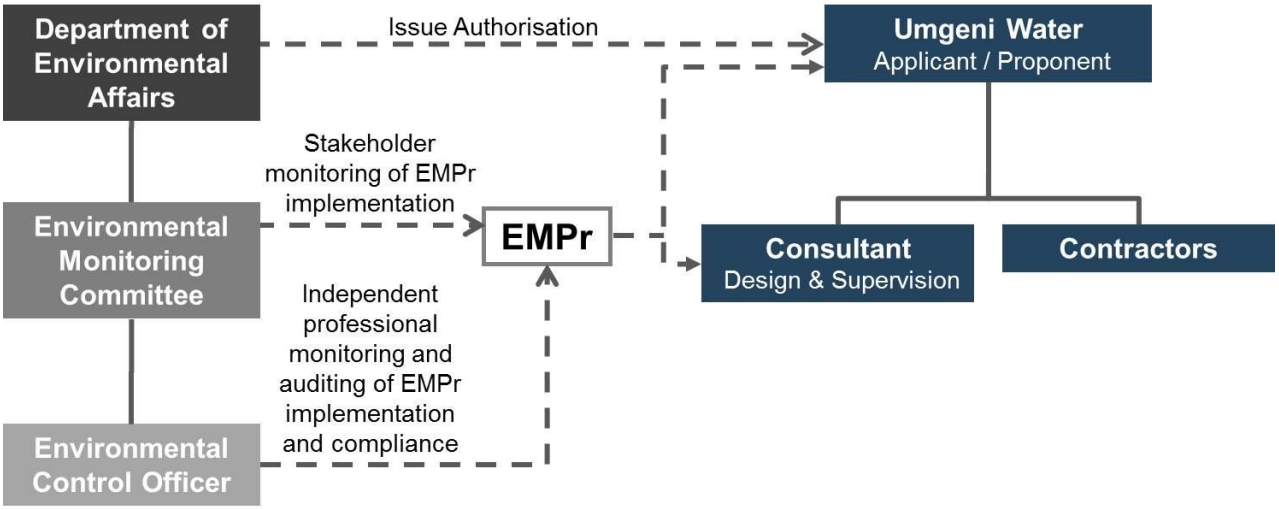

Figure 3: Institutional Arrangements: Roles & Responsibility

9.1 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) (if established) 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.

9.2 Umgeni Water

Umgeni Water is the applicant in terms of National Environmental Management Act (No. 107 of 1998). Umgeni Water 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 Umgeni Water.

9.3 Environmental Monitoring Committee

An EMC may 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).

9.4 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 (if established) and the other project role players.

9.5 Environmental Control Officer

The ECO is a competent (minimum of 3 years' experience) and independent representative, who acts as the EMC (if established) 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 (if established) 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 and water quality).

9.6 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 and 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.

10 MONITORING

Monitoring is required to ensure that the receiving environment 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.

10.1 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.

10.2 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, include the following:

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

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 may include more detailed requirements in terms of environmental monitoring.

10.3 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 (if established) and DEA for their records.

Auditing of compliance with the Environmental Authorisation and EMPr 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 and EMPr, remain valid -
    a. Ensure that the compliance with the conditions of the Environmental Authorisation and EMPr 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 and EMPr; and
        ii. The ability of the measures contained in the EMPr 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 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 and EMPr.

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).

11 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 pre-construction and construction phases 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 Zulu and English are the dominant languages 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.

The Contractor must compile a project-specific Environmental Training and Awareness Programme, taking into consideration the abovementioned factors, during the pre-construction phase to be approved by the Project Manager.

12 EMPr REVIEW

Due to its dynamic nature, the EMPr for uMWP-1 Potable Water will be reviewed and revised when necessary to ensure continued environmental improvement.

Following detailed design and planning, the EMPr may need to be revised to render the management actions more explicit and accurate to the final project specifications. Changes to the EMPr shall also be required where the existing system:

- Following detailed design and planning, the EMPr may need to be revised to render the management actions more explicit and accurate to the final project specifications;
- 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.

13 ENVIRONMENTAL ACTIVITIES, ASPECTS AND IMPACTS

13.1 Environmental Activities

The main project activities as well as high-level environmental activities undertaken in the construction phase are listed in **Table 5**.

Table 5: Activities associated with Construction Phase

Project Phase: Construction
Project Activities
• Site establishment
• Relocation of infrastructure
• Prepare access roads
• Establish construction camps
• 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
• Create haul roads
• Temporary river diversion for pipeline crossings
• Electrical supply
• Pipe delivery, offloading and stringing
• Construction of pipeline
• Construct air and scour valves
• Construct access chambers
• Install final Cathodic Protection measures and AC mitigation measures
• Crossing of major roads and railway lines via pipe jacking
• Install pipeline markers
• Construction of WTW
• Cut and cover activities
• Stockpiling of material
• Waste and wastewater management
High Level Environmental Activities
• Diligent compliance monitoring of the EMPr, environmental authorisation and other relevant environmental legislation

Project Phase: Construction
• 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
• Implement environmental monitoring programme (air quality, water quality, noise, traffic, social)
• Reinstatement and rehabilitation of construction domain
• Convene EMC Meetings (if established)
• On-going consultation with I&APs
• Other activities as per Construction EMPr

13.2 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 environmental aspects listed in **Table 6** have been identified for the proposed project during the construction phase, which are linked to the project activities (note that only high level aspects are provided):

Table 6: 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

Project Phase: Construction
• Poor waste management practices – hazardous and general solid, liquid
• Wastage of water
• Disturbance to landowners / tenants / occupiers of land
• Poor management of pollution generation potential
• Damage to significant flora
• Damage to significant fauna
• Influence to resource quality of the uMlaza 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
• Disturbance of heritage resources and cultural features
• Poor reinstatement and rehabilitation

13.3 Potential Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable. Refer to **Table 7** for the potential significant impacts associated with the preceding activities and environmental aspects for the construction phase.

Table 7: Potential Significant Environmental Impacts - Construction Phase

Environmental Factor	Potential Issues / Impacts
Land Use	• Servitude restrictions • Loss of cultivated land and timber land within construction domain • Change of land use at WTW
Climate	• Greenhouse gas emissions
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 compaction • Soil contamination • Loss of topsoil and fertile soil • Disturbance of contaminated soils during construction
Geohydrology	• Groundwater pollution due to spillages and poor construction practices • Intersection of pipeline trench with aquifers – localised impacts to groundwater flow through dewatering of excavations such as the lowering of the local water table • Water for construction purposes may be drawn from local boreholes • Potential increased groundwater recharge along cleared construction servitude
Hydrology	• Alteration of flow regimes at river crossings due to impediments and diversions
Water Quality	• Sedimentation from instream works, runoff from cleared areas and dewatering

Environmental Factor	Potential Issues / Impacts
	• Inflow of contaminated storm water • Release of contaminants from equipment and concreting activities at pipeline crossings • Water quality impacts due to spillages and poor construction practices
Aquatic Ecology	• Disruptions to aquatic biota community due to water contamination, alteration of flow and disturbance to habitat during construction (particularly relevant to construction activities that take place instream or in close proximity to watercourses) • Spread of noxious / declared weeds
Riparian & Instream Habitat	• Loss of riparian and instream vegetation within construction domain • Destabilisation of channel morphology at river crossings
Water use	• Water quality deterioration and disturbance to flow caused by construction activities may adversely affect downstream water users • Elevated sediment levels may damage downstream pumpstations and reticulation, where users abstract water from the watercourse • Water abstracted from watercourses for construction purposes • Impacts to water users associated with Mapstone Dam, depending on the nature of the crossing
Wetlands	• Impacts to wetland characteristics at crossings of pipeline and access roads
Terrestrial Ecology	• Impacts to sensitive terrestrial ecological features • Potential loss of significant flora and fauna species • Damage / clearance of habitat of conservation importance • Proliferation of exotic vegetation
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 • Use of private access roads and local road network • Impact to visual quality and sense of place • Light pollution
Agriculture	• Disruptions to farming operations as a result of construction-related use of existing access roads • Loss of cultivated land and timber land within construction domain • Loss of fertile soil through land clearance • Loss of grazing land within construction domain • Risks to livestock
Air Quality	• Excessive dust levels • Greenhouse gas emissions
Noise	• Localised increases in noise during construction
Historical & Cultural Features	• Damage to heritage resources through construction activities • Disruptions to tourism activities at the Heritage Centre, Baynesfield Estate
Existing Structures & Infrastructure	• Crossing of existing infrastructure (e.g. power lines, telephone lines, pipelines, railway lines) • Pipeline passes in close proximity to existing structures (such as dwellings, chicken houses)

Environmental Factor	Potential Issues / Impacts
Transportation	• Increase in traffic on the local road networks • Disruptions to road users as a result of construction • Damage to roads used by heavy construction vehicles and plant • Various road crossings along potable water pipeline - public and private roads affected • Railway line crossings • Creation of temporary and permanent access roads
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 activities at Baynesfield

14 SENSITIVE ENVIRONMENTAL FEATURES

Within the context of the project area, cognisance must be taken of the following sensitive environmental features (some shown in in **Figure 4**) for which mitigation measures are included in the EIA Report and EMPrs:

- All watercourses in the project area, which includes the uMlaza River and its tributaries (including drainage lines), are regarded as sensitive and require suitable protection from the construction and operational activities. All activities of the project life-cycle to comply with the National Water Act (Act No. 36 of 1998).
- Known heritage resources situated in relative close proximity to the project infrastructure, which need to be suitably safeguarded, include the following:
  - Stead family cemetery (29°46'10.71"S; 30°25'10.77"E);
  - Stead family church (29°46'09.40"S; 30°25'09.30"E); and
  - Baynesfield Methodist church & cemetery (29°46'22.06"S; 30°21'35.10"E).
- Although the majority of the project area is disturbed, protected fauna and flora species may occur in certain areas (wetland crossings), which need to be protected against the project's potential adverse impacts. All project activities to comply with the National Environmental Management: Biodiversity Act (Act No. 10 of 2004), National Forests Act (Act No. 84 of 1998) and Natal Nature Conservation Ordinance (15 of 1974) in this regard. Sensitive species to be identified as part of the pre-construction survey. If relocation is not required, then these species and their habitat need to be adequately protected from construction activities.
- This project is situated in an area of generally high avifaunal sensitivity (based on the bird species recorded in the broader area), particularly in the western parts. However, much of the site is already transformed for agriculture and forestry, leaving little natural habitat for red listed bird species.
- Commercial agriculture is the primary land use in the western and central parts of the project area, and the majority of the infrastructure is situated on cultivated land. Construction and operational activities need to be planned and coordinated in consultation with the affected farmers.
- Through the options selected it was attempted to minimise the impacts to the future desired land use in the Umlaas Road Light Industrial Development Node. Firm guidance was also received from multiple I&APs in this regard, which lead to the refinement of the pipeline route options in this area.
- A particularly steep area is encountered along pipeline route Option 1 to the east of Mapstone Dam. Measures need to be implemented to prevent erosion at all steep areas (including along access roads).

- All traffic and pedestrians on the public roads are regarded as sensitive and measures need to be implemented to safeguard these road users. To minimise impacts to the transportation network, all major roads and railway lines will be crossed via pipe jacking.
- Baynesfield Estate is strategically located in terms of the project footprint and key infrastructure components (including the uMWP-1 tunnel outlet, balancing dam, raw water pipeline and WTW). Impacts to agricultural activities on the property need to be controlled to ensure minimal loss of high potential agricultural land. Ongoing communication and engagement with the Baynesfield Trust needs to be maintained during the project life-cycle. The construction activities associated with the uMWP-1 Raw Water and Potable Water need to be synchronised in such a way as to reduce the overall disturbances to the farming operations and tourism activities at the estate.
- Dust-intolerant crops such as avocado orchards are located on the Baynesfield Estate, and suitable mitigation measures need to be implemented to suppress dust caused by construction activities in this area.
- All existing infrastructure and structures are regarded as sensitive and need to be safeguarded from construction activities until they have been relocated, where avoidance is not possible.
- Prevent construction-related nuisance (including noise, dust, vibration) to sensitive socio-economic receptors, which include:
  - The homesteads located on The Mynde Farm and Kyalami Farm;
  - The Hopewell community;
  - Dwellings situated in close proximity to the pipeline route;
  - Chicken houses situated alongside the pipeline route; and
  - Businesses and residential areas in the Umlaas Road area, situated in close proximity to the pipeline route.
- Properties 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 secured.

The sensitivity map shown in **Figure 4** needs to be made available to the implementation team (including the Project Manager, Environmental Control Officer and Contractor) in GIS format to allow for further consideration and adequate interpretation at an appropriate scale. The map must be supplemented with the findings of the environmental sensitivity walk down survey and any other findings during the project life-cycle.

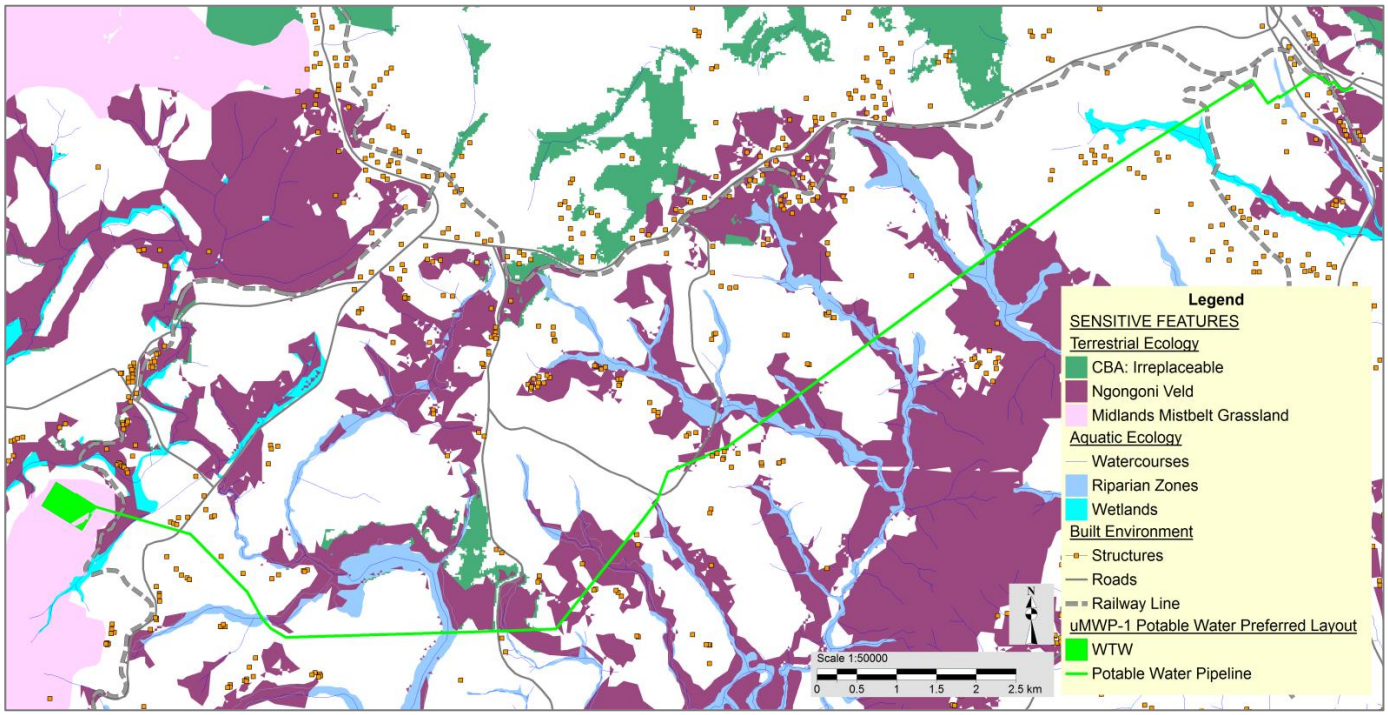

Figure 4: Sensitivity Map

15 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**.

15.1 General Requirements

General requirements during the construction phase include the following:

- Design to consider and incorporate environmental requirements and sensitive environmental features;
- Define and communicate roles and responsibilities for the implementation of the EMPrs;
- Undertake negotiations and confirm arrangements with landowners and/or land users regarding:
  - Use of the R56, D360, R624, P547, R603, D125 (and all other public roads, as relevant) and all private roads, with associated traffic arrangements;
  - Land occupancy (construction facilities);
  - Domestic animals (avoiding impacts to livestock);
  - Protocol for lodging complaints;
  - Possible loss of access;
  - Existing structures and infrastructure (including temporary and permanent water management structures and infrastructure);
  - Fencing and gate dimensions for traversing servitude;
  - Traversing patterns of game and/livestock;
  - Access to game and/livestock drinking points;
  - Security; and
  - Opening and closing of gates and access to private property.
- Ensure that all existing structures within the construction area are identified and recorded.
- Construction activities to remain within the construction servitude.
- Acquire additional timber land around WTW Option 1 to utilise screening offered by existing pine trees. For the WTW the construction domain needs to be contained within the site

boundary to avoid disturbance outside of the eventual plant's footprint. All external areas that are not associated with permanent infrastructure and the operation of the scheme need to be adequately rehabilitated.

- ❖ Ensure that a suitable water source is in place to supply water to the irrigators downstream of Mapstone Dam, in consultation with the Upper Umlaas Irrigation Board, for the period during which their normal supply will be influenced by the construction of the pipeline within the basin.
- ❖ Ensure that acceptable flow is maintained in uMlaza River downstream of Mapstone Dam during the construction of the pipeline within the basin.
- ❖ Reconfigure the layout of the WTW site to avoid the power line servitude, as far as possible, in further consultation with Eskom.
- ❖ Construction and operational activities need to be planned and coordinated in consultation with the affected farmers in order to minimise impacts on crop production.
- ❖ Construction material (e.g. soil) may only be obtained from legal verified sources.
- ❖ The EMPr will be linked to the project's overall Environmental Management System (EMS) (if applicable), where the EMS constitutes an iterative process that aims achieve continuous improvement and enhanced environmental performance.

15.2 Administrative Requirements

Management Objective:

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

Target:

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

Management Actions:

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

Responsibilities:

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

Monitoring Requirements:

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

Implementation Timeframe:

Throughout the duration of the construction period.

15.3 Construction Site Planning and Layout

Management Objective:

Proper planning and layout of the construction domain to ensure protection of sensitive environmental features. Refer to features highlighted in **Section 14**, findings from pre-construction survey, further environmental studies, etc.

Target:

1. No negative impacts to sensitive environmental features as a result of poor construction site planning and layout.
2. A 100% of the construction footprint is to be included in the pre-construction survey.

Management Actions:

- Conduct a pre-construction survey of the area to be affected. This must include site investigations with photographic records.
- Suitable specialist(s) are to identify sensitive environmental features (including fauna, flora and heritage sites) where special care needs to be taken, and implement the required suitable mitigation measures to safeguard these features (e.g. barricading, signage and awareness creation). Refer to the findings of the EIA specialist studies.
- A suitable specialist is to identify protected plants and trees. Any protected plants or trees in proximity to the construction domain that will remain, should be marked clearly (danger tape, fencing, etc.) 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.

- The Contractor is to produce a site plan for the approval of the Project Manager/Engineer 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. Refer to suggested content of this plan mentioned in the Pre-Construction EMPr.

Responsibilities:

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

Monitoring Requirements:

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

Implementation Timeframe:

Prior to the establishment of any construction site for the overall project.

15.4 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 are to have completed appropriate environmental training before being allowed on the construction site.
2. A record of environmental training undertaken is to be kept on site.

Management Actions:

- Environmental Training and Awareness Programme to be developed, which is to be approved by the Project Manager.
- 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/Engineer and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

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

Implementation Timeframe:

Throughout the duration of the construction period.

15.5 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 are to be acknowledged within 5 working days and are 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 Hopewell Township.
- Establish processes and procedures to effectively verify and address complaints and claims received.
- Complaints or liaison 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 the 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 and Zulu.
- Convene a meeting with RCL to discuss (amongst others):
  - Establish specific requirements of RCL;
  - Confirm construction methodology to be adopted on all RCL properties;
  - Confirm access restrictions and requirements;
  - Confirm location of existing infrastructure and structures and identify suitable mitigation measures in consultation with RCL;
  - Requirements for sanitation facilities;
  - Temporary fencing between construction servitude and the chicken houses;
  - Seek to minimise impacts to existing farming operations on RCL properties;
  - Ensure compliance with RCL's biosecurity protocols in relation to the construction and maintenance of the pipeline on their properties; and
  - Confirm reinstatement and rehabilitation requirements.

Responsibilities:

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

Monitoring Requirements:

- Public complaints register.

Implementation Timeframe:

Throughout the duration of the construction period.

15.6 Site Clearing

Management Objective:

- Manage environmental impacts associated with site clearing.
- External to the WTW site, pipeline construction servitude and construction-related facilities, ensure that only areas that are specifically required for the construction purposes are cleared.

Target:

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

Management Actions:

- Restrict site clearing activities to the construction area / domain.
- Clearing of vegetation is 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.
- A Method Statement is 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) are to monitor the clearing activities, with particular focus on heritage resources and graves, as well as protected fauna and flora species.

Responsibilities:

- Project Manager/Engineer 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.

Implementation Timeframe:

Prior to and during clearing of any construction site.

15.7 Site Establishment

Management Objective:

Minimise negative 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 demarcated construction areas 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:

- The Contractor is to produce a site plan for the approval by the Project Manager/Engineer 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 camps in areas where sensitive environmental features will not be impacted on.
- Obtain permission from directly affected landowners for site camps.
- Site Camp 2 (ERF 881 Portion 5 Hopewell) needs to be positioned in consultation with RCL.
- Facilities and structures shall be located with due cognisance of 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 of construction activities and equipment are within their lawfully acceptable limits as per SANS 10103.

- Minimise public disturbance from lighting of the construction camp and site. For example, proper design of the placing (zones), height, type, direction (inward rather than outward) and intensity of floodlights, without compromising safety.
- Establish a local SMME recruitment preference policy.
- Land required for the construction servitude must be acquired in accordance with statutory requirements.

Responsibilities:

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

Monitoring Requirements:

- Intact barricading.
- Public complaints register.
- Contractor's method statement.
- Registered construction servitude.

Implementation Timeframe:

Prior to and during site establishment.

15.8 Management of Existing Services

Management Objective:

- Prevent impacts to existing services.
- Adhere to agreements made with owners of the services.

Target:

1. No unwarranted complaints regarding adverse impacts to existing services.
2. No adverse impacts to existing services.
3. All relevant approvals to be obtained prior to working within existing servitudes (including roads, railway line, gas pipeline, power lines, telephone lines, etc.).

Management Actions:

- Identify and record all existing services.
- Conform to requirements of relevant service providers. Agreements to be in place.

- 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.
- No interruptions to RCL's waterline and borehole accessibility.
- 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.

Implementation Timeframe:

Throughout the duration of the construction period.

15.9 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 2**.
- Ensure that the community have reasonable access to the land during construction.
- Ensure proper access control.
- Prevent unlawful access to the construction domain.
- Adhere to agreements made with individual landowners and community members regarding access.
- Ensure the safety of all road users by implementing proper signage and traffic control measures.

- Limit construction-related nuisance to service nodes.

Target:

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

Management Actions:

- Undertake negotiations and confirm arrangements with the private landowners regarding the use of the D360, D125, other relevant public and private roads and associated traffic arrangements.
- Determine and document the road conditions of the R56, D360, R624, P547, R603, D125 (and all other public roads, as relevant), as well as all private access roads that will be affected by construction traffic, as relevant.
- Selective upgrade of the D360, the intersection of the R56 and P315 (access to WTW) 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.
- Obtain the necessary approval for road upgrades, pipe-jacking and wayleave for road construction from the KZN Department of Transport (DoT), as applicable.
- Any clearing for access or haul roads outside the demarcated works area shall only be undertaken after approval from the Project Manager/ Engineer.
- Temporary access roads are to be suitably rehabilitated.
- Ensure temporary accommodation of traffic where any public or private roads are to be affected by construction activities.
- When construction vehicles are required to cross the R617 or R56 appropriate safety and traffic calming measures need to be in place. This will include flag men, speed reductions and warning signage.
- Make provision for community members to access their properties safely.
- No disruption to access and egress of RCL facilities and to the delivery and transportation of chicks and eggs.
- A speed limit of 40 km/h should be applied on public and other roads within the project area.
- Ensure appropriate traffic safety measures are implemented to make provision for blind rises and sharp bends on the DR360 and other relevant roads within the construction domain.

- The payloads delivered by heavy vehicles need to be recorded and audited to prevent overloading of heavy vehicles.
- Abnormal load permits must be acquired for the transport of abnormal loads.
- Traffic accommodation to South-African Road Traffic Signs Manual standards where any construction affects an existing road.
- Time restrictions for delivery vehicles through built-up and socially sensitive areas.
- Implement traffic monitoring which includes –
  - Baseline traffic monitoring, 1 year ahead of construction, to confirm the traffic status quo on the road links that are to be worst affected.
  - Traffic Monitoring during the construction period, to confirm whether the traffic increase is similar to forecasted increase, whether the contractor complies with activity time restrictions, whether posted speed limits are adhered to, etc.
  - Overloading Management through auditing of bulk construction material delivery slips to ensure high-level adherence to current legislation.
  - Monitoring of dangerous locations (e.g. truck crossings, schools, road diversions etc.).
  - Traffic monitoring after completion of construction (operation phase), 6 months after construction to confirm the new level of traffic resulting from normal operations.
  - Evidence of the actual impact on the local road network as well as the effect of implemented mitigation measures can then be readily made available.
- Based on the observed condition of the R617 and R56 pavement it is recommended that a more detailed pavement investigation be done to determine the pavement condition to refine the pavement maintenance action plan for the construction phase;
- Permission is required from the Project Manager/Engineer for the movement of any vehicles and/or personnel outside of designated working areas.
- Access roads are to be maintained in a suitable condition.
- Clearly mark pedestrian-safe access routes within the construction areas.
- Suitable erosion protective measures are to be implemented for access roads during the construction phase.
- Traffic safety measures (e.g. traffic warning signs, flagmen) are to be implemented where applicable.
- Clearly demarcate all construction access roads.
- Proper access control is 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 is 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 community facilities in Hopewell Township, remain easily and safely accessible at all times. Limit the construction-related nuisance to these areas.

Responsibilities:

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

Monitoring Requirements:

- Public complaints register.
- Signage displayed and maintained.
- Contractor's method statement.
- Maintenance of access control to construction sites.
- Maintenance of access roads.

Implementation Timeframe:

Throughout the duration of the construction period.

15.10 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 the Natal Nature Conservation Ordinance (15 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.

Implementation Timeframe:

Throughout the duration of the construction period.

15.11 Management of Labour Force

Management Objective:

- Ensure suitable management of the labour force to prevent security-related issues or disturbance to landowners and community members.
- Optimise the use of local labour.
- 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:

- Prohibit 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 the workforce off-site.
- 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' in consultation with local authorities, 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.
- Implement applicable training of labour to benefit individuals beyond completion of the project.
- Implement a 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/Engineer and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Labour-related targets.

Implementation Timeframe:

Throughout the duration of the construction period.

15.12 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 site offices. The location of conservancy tanks is to be approved by the Project Manager/Engineer.
- 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 the proper utilisation, maintenance and management of toilet, wash and waste facilities.
- The entrances to the toilets shall be adequately screened from public view.
- These facilities will be maintained in a hygienic state and serviced regularly.
- Toilet paper shall be provided.
- The Contractor shall 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.
- No ablution facilities may be placed in the vicinity of RCL's chicken houses. Exact buffer to be established in consultation with RCL.
- Should shower facilities be provided for use by staff on site, the following controls must be imposed:
    - Proper positioning of the shower, and specifically its discharge point, shall 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/Engineer and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Maintenance register for ablution facilities.
- Waste disposal certificates.
- Contractor's method statement.

Implementation Timeframe:

Throughout the duration of the construction period.

15.13 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 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.
- Prepare de-establishment plan for construction camp for approval by the Project Manager.
- See requirements in EMPr for *Management of Waste, Management of Water, Management of Labour Force, Management of Ablution Facilities, Management of Storage and Handling of Non-Hazardous Material, Management of Workshop and Equipment, etc.*

Responsibilities:

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

Monitoring Requirements:

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

Implementation Timeframe:

Period from when the construction camp is created up to de-establishment.

15.14 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 not earmarked for operational purposes (part of infrastructure footprint) must be suitably rehabilitated.

Responsibilities:

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

Monitoring Requirements:

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

Implementation Timeframe:

Throughout the duration of the construction period.

15.15 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.
3. Existing water use entitlements not to be affected.

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.

Implementation Timeframe:

Throughout the duration of the construction period.

15.16 Management of Topsoil

Management Objective:

Ensure suitable removal, storage, and transportation of topsoil for re-use during rehabilitation.

Target:

1. At least 95% of recovered topsoil from disturbed areas is 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 is to be adequately protected from contamination from construction activities and material.
- Protect stored topsoil from compaction.
- Wind and water erosion-control measures are 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, on areas to be rehabilitated.

Responsibilities:

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

Monitoring Requirements:

- Condition of topsoil stockpiles.
- Dust monitoring.
- Rehabilitated areas.
- Contractor's method statement.

Implementation Timeframe:

Prior to site clearing up to when topsoil is used for rehabilitation.

15.17 Management of Excavations

Management Objective:

- Minimise environmental impacts associated with excavations.

Target:

1. No damage to sensitive environmental features outside construction area during excavations.
2. No harm to people or animals as a result of excavations.

Management Actions:

- Construction activities to remain within the designated construction servitude.
- 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 (2014). 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.

Implementation Timeframe:

Prior to excavations up to reinstatement.

15.18 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.

Implementation Timeframe:

Period during which materials are stored and handled on site.

15.19 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.
- Appropriate signage to be displayed at storage areas for hazardous substances.
- 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.
- No storage areas for hazardous materials may be located in the vicinity of RCL's chicken houses. Exact buffer to be established in consultation with RCL.

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.

Implementation Timeframe:

Period during which hazardous materials are stored and handled on site.

15.20 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.

Implementation Timeframe:

Throughout the duration of the construction period.

15.21 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.
- Include specific provisions for managing impacts to sensitive bird species (including Blue Swallow and Cranes), as established as part of the noise and vibration monitoring programme (refer to Pre-Construction EMPr).
- No blasting is permitted on any farms owned by RCL or within 1 kilometre of any of its poultry facilities. Alternative construction methods must be used.

Responsibilities:

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

Monitoring Requirements:

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

Implementation Timeframe:

Prior to blasting up to safe completion of blasting.

15.22 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*).
- Wastewater from workshop to be disposed in accordance with the EMPr section on *Management of Water*.

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.

Implementation Timeframe:

- Period from when the workshop is created up to de-establishment.
- Period during which equipment is utilised.

15.23 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.
  - 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.
  - Establish noise thresholds for chicken houses in consultation with RCL. Ensure noise levels from construction activities do not exceed these thresholds.
- **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.

Implementation Timeframe:

Throughout the duration of the construction period.

15.24 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 Natal Nature Conservation Ordinance (15 of 1974).
- Include mitigation measures identified as part of environmental sensitivity walk down survey (refer to Pre-Construction EMPr).
- Search, rescue and relocation for protected flora species, which is to be conducted by a suitably qualified specialist.
- Ongoing identification of protected plants and trees.
- Any protected plants or trees in proximity to construction areas 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, in accordance with the requirements of the Conservation of Agricultural Resources Act (No. 43 of 1983) and GN No. R. 598 (Alien and Invasive Species Regulations, 2014) in terms of the National Environmental Management: Biodiversity Act (No. 10 of 2004).
- 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, wherever possible.
- Where possible, transplant plant material to designated areas.
- Rehabilitation Management Plan to be developed, which will include additional measures identified during construction to supplement the reinstatement and rehabilitation provisions included in the EMPr. Targets to be specified for re-growth.
- No construction equipment, vehicles or unauthorised personnel will be allowed onto areas that have been rehabilitated. 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 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 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.
- Barricading of protected flora species.
- Encroachment of alien invasive plants and noxious weeds.
- Successful rehabilitation.
- Contractor's method statement.

Implementation Timeframe:

From pre-construction phase up to end of defects liability period (as relevant for specific management actions).

15.25 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), Natal Nature Conservation Ordinance (15 of 1974) and Animal Protection Act (No. 71 of 1962).
- Include mitigation measures identified as part of environmental sensitivity walk down survey (refer to Pre-Construction EMPr).
- Search, rescue and relocation for protected fauna species, which is to be conducted by a suitably qualified specialist.
- 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 may 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.

Implementation Timeframe:

From pre-construction phase up to end of defects liability period (as relevant for specific management actions).

15.26 Management of Watercourses

Management Objective:

- Ensure that the watercourses (including the uMlaza River and its tributaries, 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.
- Structure and functions of watercourses affected by construction activities to be returned to pre-construction state.

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.
  - Ensure that a suitable water source is in place to supply water to the irrigators downstream of Mapstone Dam, in consultation with the Upper Umlaas Irrigation Board, for the period during which their normal supply will be influenced by the construction of the pipeline within the basin.
  - Ensure that acceptable flow is maintained in uMlaza River downstream of Mapstone Dam during the construction of the pipeline within the basin.
- **River morphology** -

- Reinstate (shaping) and rehabilitate (indigenous riparian vegetation) affected areas in riparian zone and watercourse channel. Structure and function to be returned to pre-construction state.
- 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. Crossing points to be approved by Project Manager.
- 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 wastewater 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.

Implementation Timeframe:

- Measures pertaining to the general protection of water resources - throughout the duration of the construction period.
- Measures pertaining to working within the riparian zones of watercourses - prior to watercourse crossings up to reinstatement and rehabilitation of affected watercourses.

15.27 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:

- Comply with provisions of the Heritage Management Plan (contained in Appendix A).

Responsibilities:

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

Monitoring Requirements:

- Permits.
- Contractor's method statement.

Implementation Timeframe:

Throughout the duration of the construction period.

15.28 Management of Emergency Procedures

Management Objective:

- Minimise environmental impacts associated with emergency procedures.

Target:

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

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. Cigarette 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).
- All Major Incidents (i.e. uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property) to be reported to DEA.

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.
- Incident Register and Report.

Implementation Timeframe:

Throughout the duration of the construction period.

15.29 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 (2014) 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 (2014).
- 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 and 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 (2014).
- Contractor to implement management actions.

Monitoring Requirements:

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

Implementation Timeframe:

Throughout the duration of the construction period.

15.30 Management of Reinstatement and Rehabilitation

Management Objective:

- Adequate reinstatement and rehabilitation of construction areas.
- Conduct concurrent or progressive rehabilitation of areas affected by construction activities.

Target:

1. Complete site clean-up.
2. Reinstate and rehabilitate areas disturbed by construction activities.

Management Actions:

- **Removal of structures and infrastructure**
  - After the construction phase, the affected area 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 temporary access roads utilised during construction and which are 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 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.
  - No spoil sites to be located within the vicinity of any of the RCL chicken houses.
- **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 dangerous excavations by backfilling and grading, as required.
  - In general, no slopes steeper than 1(V):3(H) are permitted in cut-and-fill areas, 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 to blend in with the surrounding landscape, where possible.
  - Ensure that no excavated material or stockpiles are left on site 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, 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.
  - 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.

Implementation Timeframe:

Throughout the duration of the construction period, as relevant to the concurrent or progressive reinstatement and rehabilitation of affected areas. Up to end of defects liability period.

APPENDIX A

HERITAGE MANAGEMENT PLAN

PROPOSED UMKHOMAZI WATER PROJECT PHASE 1 POTABLE WATER COMPONENT

Heritage Management Plan

May 2015

Prepared by:

Name	Qualification	Professional Registration
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DEFINITIONS

Alter: means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or other decoration or any other means.

Archaeological: means

- Material remains resulting from human activity which is in a state of disuse and is in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.
- Rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years including any area within 10m of such representation.
- Wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act 15 of 1994, and any cargo, debris or artifacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation.
- Features, structures and artifacts associated with military history which are older than 75 years and the sites on which they are found.

Conservation: in relation to heritage resources includes identification, protection, maintenance, preservation and sustainable use of places or objects in order to safeguard their cultural significance.

Council: means Amafa aKwaZulu-Natali Heritage Council established in terms of section 5(1) of the KwaZulu-Natal Heritage Act

Cultural significance: aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Development: any physical intervention, excavation, or action, other than those caused by natural forces, which may, in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including—

- construction, alteration, demolition, removal or change of use of a place or a structure at a place;

- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising, a place, including the structures or airspace of a place;
- constructing or putting up for display signs or hoardings;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil.

Grave: means a place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such a place.

Heritage resource: means any place or object of cultural significance. i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Heritage site: in relation to the Province of KwaZulu-Natal, means –
(a) a Heritage Landmark site;
(b) a Provincial Landmark site; or (c) those heritage resources referred to in sections 33, 34, 35 and 42 of the KwaZulu-Natal Heritage Act

Intangible heritage: means the intangible aspects of inherited culture, and may include
(a) cultural tradition;
(b) oral history;
(c) performance;
(d) ritual;
(e) popular memory;
(f) skills and technique;
(g) indigenous knowledge systems; and
(h) the holistic approach to nature, society and social relationships

Palaeontological means any fossilized remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossil ferrous rock intended for industrial use, and any site which contains such fossilized remains or trace.

Public monuments and memorials: all monuments and memorials:

- erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organization funded by or established in terms of the legislation of such a branch of government; or

- which were paid for by public subscription, government funds, or a public-spirited or military organization, and are on land belonging to any private individual.

Structures: means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.

A. BACKGROUND

The current water resources of the Integrated Mgeni Water Supply System (WSS) are insufficient to meet the long-term water requirements of the system. Pre-feasibility investigations indicated that Phase 1 of the uMkhomazi Water Project (uMWP-1), which entails the transfer of water from the undeveloped uMkhomazi River to the existing Integrated Mgeni WSS, is the scheme most likely to fulfil this requirement.

The overall uMWP-1 project consists of two components, namely a Raw Water component and a Potable Water component (see Table 1 below):

Table 1: Simplified overview of uMWP-1 Components

uMWP-1 Component	Infrastructure	Proponent
Raw Water	1. A new dam at Smithfield on the uMkhomazi River near Bulwer. 2. Water conveyance infrastructure (including a ± 32 km long tunnel and a pipeline) to a balancing dam in the Baynesfield area. Alternatives under consideration for the tunnel alignment and location of the balancing dam.	Department of Water and Sanitation
Potable Water	3. A water treatment works in the uMlaza River valley. 4. A gravity pipeline to the Umgeni Water bulk distribution reservoir system, below the reservoir at Umlaas Road.	Umgeni Water

This document serves as the Heritage Management Plan (HMP) for the uMWP-1 Potable Water component.

The HMP will be submitted in support of the environmental authorisation application for the project to the Department of Environmental Affairs (DEA). The HMP is considered part the Environmental Management Programme (EMPr) for the uMWP Potable Water Component and should therefore be read in conjunction with the EMPr and Heritage Impact Assessment (HIA) undertaken for the project.

B. OBJECTIVES OF THE HMP

Heritage resources are considered to be very sensitive, and many are considered symbolic, spiritual and sacred by communities. Many heritage resources are formally protected and require permits or licences from Amafa aKwaZulu-Natali (Amafa) to be disturbed, damaged or destroyed.

The HMP aims to facilitate the protection of known or newly discovered cultural heritage or archaeological resources ('chance finds') during the pre-construction, construction and operational phases of the project by establishing a protocols/standard procedures for project role players for dealing with such resources. The HMP will provide guidance regarding heritage resources that will be unavoidably impacted by the proposed development in terms of mitigation measures that will alleviate to some degree such impacts.

The HMP will refer to the legislation and permitting requirements associated with the destruction or disturbance of such resources.

The HMP aims to provide procedures/guidelines:

- To prevent the disturbance, destruction and/or removal of known or discovered heritage resources without the necessary permits or licences;
- To manage or prevent any development activities taking place within a specified distance of a heritage resource that are to remain *in situ* in close proximity to the project;
- To prevent any structures older than sixty years from being demolished, damaged or altered without the necessary permits or licences;
- To prevent any destruction, alteration or exhumation from taking place at traditional burial places and graves of victims of conflict without following the necessary and regulated processes and protocols;
- To control the destruction, alteration or disturbances of battlefield sites, archaeological sites, paleontological sites, historic fortifications, meteorite and meteorite impact sites without the necessary permits or licences; and
- To encourage an integrated approach to heritage and natural resource management among all stakeholders.

C. LEGAL CONTEXT

Heritage resources in KwaZulu-Natal (KZN) are currently protected and regulated by the KZN Heritage Act, 2008 (No. 4 of 2008) (KZNHA) which came into effect on the 12 February 2009 and the KZN Heritage Regulations, 2012 that were gazetted on 02 April 2012. The regulations provide the process that must be followed when applications are contemplated to disturb, remove or destroy heritage resources in the Province.

Amafa implements both the KZNHA and the National Heritage Resources Act (No. 25 of 1999) (NHRA), the latter in terms of a Memorandum of Understanding with SAHRA. All authorizations in the Province are submitted to and reviewed by Amafa. Where the KZNHA does not regulate a matter pertaining to a KZN heritage resource, this will then fall under the provisions of the NHRA.

In terms of Chapter 8 of the KZNHA, the following heritage resources are afforded general protection:

- Section 33(1)(a) - Structures: No structure which is, or may be reasonably expected to be older than 60 years may be demolished, altered or added to without prior written approval of the Council having been obtained on written application to the Council;
- Section 34 - Graves of victims of conflict: No person may damage, alter, exhume or remove from its original position (a) the grave of a victim of conflict (b) a cemetery made up of such graves (c) any part of a cemetery made up of such graves without prior written approval of the Council having been obtained on written application to the Council;
- Section 35(1)(a) - Traditional burial places: No grave not otherwise protected by this Act, and (1)(b) graves not located in a formal cemetery…may be damaged, altered, exhumed, removed from its original position, or otherwise disturbed without the prior written approval of the Council having been obtained on written application to the Council;
- Section 36(1) - Battlefield sites, archaeological sites, rock art sites, paleontological sites, historic fortifications, meteorite or meteorite impact sites: No person may destroy, damage, excavate, alter, write or draw upon, or otherwise disturb (any of the above) …without prior written approval from the Council on written application to the Council".

D. RESPONSIBILITIES

The Applicant / Developer, Consulting Engineers, Contractor, Environmental Consultant and Environmental Control Officer will comply with the specifications of this report. The Contractor and Heritage Specialist are also responsible for ensuring that all sub-contractors, construction personnel, specialists and suppliers appointed also adhere to the conditions of the HMP.

Umgeni Water

Umgeni Water must ensure that the conditions of the Environmental Authorisation (EA) are adhered to at all times, through oversight of the Consulting Engineer/s, who will oversee the Contractors. Umgeni Water must ensure that known heritage resources are preserved in accordance with the relevant requirements, or if this is not possible that the necessary approvals are obtained for the disturbance or demolition of heritage resources and that this is executed in accordance with the HMP.

Project Manager

The Project Manager has over-all responsibility for managing the Contractors and for ensuring that the environmental management requirements are met.

The Project Manager must ensure that the construction of the proposed Water Treatment Works (WTW) and associated infrastructure (access roads, pipelines, etc.) accommodate, where possible, the preservation of known heritage resources and that the Contractor preserves these resources in accordance with the HMP.

The Project Manager is also responsible for ensuring that any heritage resource discoveries made by the Contractor (and staff) during construction are cordoned off and afforded the required investigations by the Environmental Control Officer (ECO) and a registered Heritage Specialist as described by this HMP and the HIA.

Contractor

The Contractor refers to the main Contractor/s appointed to undertake the construction of the project, or portion of the construction of the project. The Contractor must ensure that known heritage resources are preserved *in situ* in the manner described by this HMP as required by the relevant legislation, and that all construction staff are aware of the preservation requirements. The Contractor must ensure that all construction activities honour the buffer requirements for known heritage resources as defined by this report.

The Contractor must also ensure that the Environmental Officer communicates the discovery of new heritage resources to the Engineer immediately, and that all staff are made aware of the procedures necessary to cordon off and avoid the new discoveries until such time as a heritage specialist has determined a way forward.

Environmental Consultant

The Environmental Consultant refers to Nemai Consulting who are the company responsible for seeking environmental authorisation for project in terms of the National Environmental Management Act (Act No. 107 of 1998), the development of the EMPr and the HMP. The Environmental Consultant must ensure that the identified heritage resources during the environmental investigations are communicated to Umgeni Water such that these items can be accommodated in the design of the associated infrastructure.

Environmental Control Officer

The ECO provides input and environmental guidance on site in order to ensure adherence to the EMPr and general project environmental sustainability, and will monitor and audit construction activities in relation to their compliance with the EMPr and its supporting documents. The ECO will also monitor the preservation of known heritage resources, and will document the procedures and outcomes surrounding new discoveries in the audit process.

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.

The Environmental Officer must ensure that the mitigation and management options for the preservation of known heritage resources as determined by the HIA, HMP and EMPr are implemented.

In the event of new discoveries of heritage resources during construction, Environmental Officer must ensure that a registered heritage specialist and relevant authorities are consulted and the necessary investigations are undertaken to determine a way forward, and that this is communicated to the Project Manager and to the Contractor.

DEA

DEA are the environmental authority for this project. The DEA must ensure compliance with the EMPr and general environmental sustainability. The DEA must audit the environmental monitoring process and reports prepared by the ECO, including documentation pertaining to the preservation of known heritage resources or the discovery of new heritage resources. The DEA

are to implement disciplinary action on the Applicant if non-compliance with the HMP is deemed severe enough.

Amafa

Amafa are the heritage authority in KZN who will ensure the preservation of known heritage resources, or that the demolition or disturbance of known heritage resources are undertaken with the necessary authorisations. Amafa will also provide guidance, where necessary, when chance finds of heritage resources are found.

E. HERITAGE RESOURCE MANAGEMENT

1) General

According to section 5 (1)(a) of the NHRA, heritage resources have lasting value in their own right and provide evidence of the origin of South African society and as they are valuable, finite, non-renewable and irreplaceable, they must be carefully managed to ensure their survival.

Section 3 of the NHRA provides an extensive list of heritage resources that form part of the national estate:

(a) places, buildings, structures and equipment of cultural significance;

(b) places to which oral traditions are attached or which are associated with living heritage;

(c) historical settlements and townscapes;

(d) landscapes and natural features of cultural significance;

(e) geological sites of scientific or cultural importance;

(f) archaeological and paleontological sites;

(g) graves and burial grounds, including—

(i) ancestral graves;

(ii) royal graves and graves of traditional leaders;

(iii) graves of victims of conflict;

(iv) graves of individuals designated by the Minister by notice in the *Gazette*;

(v) historical graves and cemeteries; and

(vi) other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);

(h) sites of significance relating to the history of slavery in South Africa;

(i) movable objects, including:

(i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;

(ii) objects to which oral traditions are attached or which are associated with living heritage;

(iii) ethnographic art and objects;

(iv) military objects;

(v) objects of decorative or fine art;

(vi) objects of scientific or technological interest; and

(vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

2) Known Heritage Resources

2.1) Identified Heritage Sites

There are a number of identified heritage sites within the project area that must be avoided. These sites must be protected during the construction phase through the establishment of suitable buffer areas around these sites. The sites are tabulated below together with a description, applicable protection in terms of the KZNHA and proposed mitigation measures.

Table 2: Identified heritage sites

Description	Location	Protection	Significance	Mitigation
Stead family cemetery	29°46'10.71"S 30°25'10.77"E	Section 35 (1)	High	Buffer of 30m around cemetery; permanent fencing of cemetery Potable water pipeline is re-aligned away from cemetery.
Stead family church	29°46'09.40"S 30°25'09.30"E	Section 33	High	Buffer of 30m around church Potable water pipeline is re-aligned away from cemetery.
Baynesfield Methodist church & cemetery	29°46'22.06"S 30°21'35.10"E	Section 33 & Section 35 (1)	High	15m buffer around Church and cemetery.
Old farm structure	29°46'00.98"S 30°22'06.13”E	Section 33	Low-Medium	15 m buffer around structure.

2.2) Protected structures

According to the permit application procedures of the KZN Heritage Regulations (2012), any person wishing to demolish, alter or make an addition to a structure which is, or which may reasonably be expected to be older than 60 years as described in Section 33 of the KZNHA, must make written application to the Amafa Council in terms of Regulation 2 of these Regulations. It is deemed unlikely that any structures will need to be demolished for this component of the overall project.

2.3) Graves

According to Regulation 4 of the KZN Heritage Regulations (2012), a person intending to damage, alter, exhume, or remove from its original position or otherwise disturb a grave not located in a formal cemetery, must obtain prior written approval from the Council.

Although the potable water pipeline is situated near to the Stead family cemetery which is protected in terms of section 35 (1) of the KZNHA, it is recommended that the pipelines be moved

/ re-aligned a substantial distance from the cemetery and that the cemetery is protected by a buffer.

2.4) Archaeological and palaeontological sites

In terms of Regulation 5 of the KZN Heritage Regulations (2012), a person wishing to destroy, damage, excavate, alter, write or draw upon, or otherwise disturb any battlefield site, archaeological site, rock art site, palaeontological site, or meteorite or meteorite impact site must obtain prior written approval of the Council.

There are no identified archaeological or palaeontological sites that will be affected by the Potable Water component of the project.

2.5) General Procedures

Amafa will issue a permit to the person who will undertake or directly supervise the proposed work, i.e. the person who will take legal responsibility for ensuring that the work is undertaken according to the permit requirements. This might be an Umgeni Water official (in the case of a permit to destroy a structure, for example); or an archaeologist (in case of a permit to undertake sampling or excavation of an archaeological site, or undertake or supervise the exhumation and/or reinterment of a burial).

All permit applications be advertised in the Government Gazette, allowing for a 30-day period for objections/responses to be lodged prior to the issuing of any permits. In addition, stakeholders – such as the municipality, the neighbours, and heritage conservation bodies – must be notified via registered mail. The applicant must bear the costs involved.

The KZN Heritage Regulations (2012) require that anyone wishing to make representations regarding any application must notify Amafa within 14 days of the Gazette notice of their intention to lodge objections. If no objections are received within that period, Amafa will issue the permit.

The regulations allow 90 days for the processing of applications from the date when all required documentation has been received. Amafa urge applicants to consult stakeholders before submitting their applications to obviate delays.

2.6) Protection of Heritage Resources during Construction Phase

Some heritage resources are situated close to the associated infrastructure (potable water pipeline) and it has been recommended that these sites remain *in situ*. These heritage sites need to be protected from construction activities.

Typically, buffers are placed around these heritage sites using highly visible barrier fencing to prevent construction staff from having free access and to preserve the heritage resource/s. The barrier fence must be supported by vertical droppers that are planted into the ground at requisite intervals. Red and white danger tape (or similar measures) must be woven through the fence in order to increase visibility to drivers of vehicles and construction crew on the ground.

Construction staff must be made aware that buffer areas are 'no go' areas. Barricading cannot be moved, removed or altered in any way without the approval of the ECO in consultation with the Project Manager and a heritage specialist.

2.5) Protection of Heritage Resources during Operational Phase

Permanent barricading must be checked by the maintenance teams to ensure that the barricading is in good condition. If there is damage or removal of such barricading then the maintenance team must have the mandate to repair or replace the barricading.

Upon inspection of protected sites, if damage is noted to the heritage resource, the maintenance team must inform Umgeni Water as well as Amafa about the damage. A registered heritage specialist must be called to site to inspect the damage and report to both Amafa and Umgeni Water about what needs to be done to repair the damage (if possible) and to protect the site / remains from further damage.

3) Newly Discovered Heritage Resources ('Chance Finds')

It is possible that not all heritage resources were identified during the HIA and subsequent assessments either due to poor visibility (overgrown vegetation, for example) or sub-surface archaeological remains not visible until excavations start.

When such finds occur, then the following protocol must be adhered to in order to ensure that the heritage resources are not damaged and mitigation measures can be implemented so to avoid delaying the project unduly:

- All management and construction staff involved in construction on site are to be advised of the nature of heritage resource material and informed of their obligation to report any item that they may deem to be heritage sites that they may happen upon during the construction processes;
- If heritage resources are found during construction, all work will cease in the area affected and the Contractor will immediately inform the Project Manager;
- The site foreman must cease all work at the site where the item / site has been uncovered;

- The site must be cordoned using fencing and / or danger tape;
- The ECO must be advised immediately of the discovery of such material;
- A registered heritage specialist must be called to site for inspection. Amafa must be informed about the finding;
- The heritage specialist will assess the significance of the resource and provide guidance on the way forward;
- Permits to be obtained from Amafa if heritage resources are to removed, destroyed or altered;
- All heritage resources found in close proximity to the construction area to be protected by a 10m buffer (or as recommended by the ECO) 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 unless under direction of a heritage specialist;
- Should any remains be found on site that is potentially human remains, the South African Police Service should also be contacted; and
- If there are chance finds of fossils during construction, a palaeontologist must be called to the site in order to assess the fossils and rescue them if necessary (with an Amafa permit). The fossils must then be housed in a suitable, recognized institute.

APPENDIX B

UMGENI WATER PARTICULAR SPECIFICATION FOR ENVIRONMENTAL MANAGEMENT OF CONSTRUCTION PROJECTS

UMGENI WATER PARTICULAR SPECIFICATION FOR ENVIRONMENTAL MANAGEMENT OF CONSTRUCTION PROJECTS

1. SCOPE

This specification is additional to the South African Bureau of Standards Standardised Specification (SABS) for Civil Engineering Contracts and must be read in conjunction with the said specification.

This specification covers the principles, responsibilities and requirements generally applicable to implement effective environmental management during the execution of any construction contract. The aim of this specification is to ensure that construction activities are conducted in accordance with the spirit of Umgeni Water's Environmental Policy, namely:

Umgeni Water will conduct its activities relating to water management in an environmentally and socially responsible manner.

2. INTERPRETATIONS

This specification contains clauses that are generally applicable to the implementation of effective environmental management on construction contracts. Interpretations of, and variations to, this specification are set out in the project specification.

2.1 Supporting specifications:

Reference is made to the SABS 1200 standards which are to be read in conjunction with this specification. All aspects of these SABS requirements which are relevant to environmental management during construction contracts will apply.

2.2 Principles

The following principles should be considered at all times during construction phase activities:

- The Environment is considered to be composed of both biophysical and social components.
- Construction is a disruptive activity and all due consideration must be given to the environment, particularly the social environment, during the execution of a project to minimise the impact on affected parties.
- Minimisation of areas disturbed by construction activities will minimise many of the construction related environmental impacts of the project and reduce rehabilitation requirements and costs.
- As minimum requirements, all relevant standards relating to international, national, provincial and local legislation, as applicable, shall be adhered to. This includes requirements relating to waste emissions (e.g. hazardous, airborne, liquid and solid), waste disposal practices, noise regulations, road traffic ordinance etc.
- All effort should be made to minimise, reclaim or recycle 'waste' material.

3. DEFINITIONS

For the purpose of this specification, the definitions given in SABS 1200 shall apply.

Additional definitions which shall apply to this specification are as follows:

Environmental Control Officer: Either an Umgeni Water Environmental Management staff member or an Environmental Consultant assigned to the project on a part or full-time basis. The Environmental Control Officer will be part of the Project staff and will advise the Engineer on all environmental matters relating to the works, in terms of this specification and the project specification, if applicable.

Environmental Officer : Either an Umgeni Water employee (e.g. Quality Assurance Inspector) or

Consultant designated to monitor the implementation and compliance with the environmental specifications and environmental management plan on a daily basis.

Cleared surface: "surface vegetation" as referred to in SABS 1200 C 2.3 will be deemed to be any woody or herbaceous vegetation but exclude grasses, sedges, rushes and reeds.

Clearing and grubbing shall for the purpose of this specification mean the removal of all woody and herbaceous vegetation including stumps, but excluding grass and groundcover vegetation.

Engineer: Is to read Engineer or Supervisor (in the case of the NEC contract), whichever is applicable to the Contract.

Interested and Affected Parties (IAP): All persons who may be affected by the project either directly or indirectly, or who have an interest or stake in the area to be affected by the project. I&AP's include landowners, tribal or local authorities, public interest groups etc.

Liquid Waste Stream: Any reagent solutions, fuels, oils, greases, contaminated run-off, sewerage and wash water, hydrocarbons, etc.

Open Trench: Open trench will, for the purpose of this specification, be deemed to include: clearing and grubbing; stripping of topsoil; trenching; placing of bedding; pipe-laying; placing of selected fill; backfilling to ground level; removing excess material; construction of cross berms to channel water (if required); and replacement of topsoil to final finished level (refer to Figure 1: Appendix A).

Progressive Reinstatement: Reinstatement of disturbed areas to topsoil profile on an ongoing basis, immediately after selected construction activities (e.g. backfilling of a trench) are completed. This allows for passive rehabilitation (i.e. natural re-colonisation by vegetation) to commence. See also 'Open Trench' and 'Rehabilitation'.

Project Manager: The person responsible for co-ordinating and integrating activities across multiple, functional lines.

Rehabilitation: Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement re-vegetation of a disturbed area and the insurance of a stable land surface. Re-vegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.

Riparian vegetation: Vegetation occurring on the banks of a river or stream (i.e. vegetation fringing a water body). In this specification, riparian vegetation in terms of removal, storage and replacement (see PSZB 17.1 and PSZB 17.2), is only applied to sedge, grass, ground-cover, reed, bulrush, or herbaceous component of riparian vegetation and excludes the woody component.

Sedges: Grass-like plants growing in wetland/ marshy areas or adjacent to water.

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

Timeous: At least 5 working days prior to an activity.

Topsoil: This is defined as the A horizon of the soil profile. Topsoil is the upper layer of soil from which plants obtain their nutrients for growth. It is often darker in colour, due to the organic (humic) fraction. Topsoil is deemed for the purposes of this specification as the layer of soil from the

surface to the specified depth required for excavation (see PSZB 5.3, relevant SABS 1200 clause and project specification). Where topsoil is referred to, it is deemed to be both the soil and grass / ground cover fraction. (see 'Cleared Surface'). Should no clear A-Horizon be present the top 200 mm shall be deemed as topsoil.

Veld: This is defined for the purpose of this specification as unimproved natural vegetation areas (e.g. grasslands).

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

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

Wetland Vegetation: Vegetation which is indicative of a wetland environment - for example, sedges, rushes, reeds, hydrophilic grasses and ground-covers, but for the purposes of this specification excludes woody species.

Xeriscaping: Landscaping with vegetation which has a low water usage. The objective is to conserve as much water as possible, whilst still beautifying an area (i.e. conservation and aesthetics). Concept embraces utilising indigenous as opposed to exotic plants.

4. ABBREVIATIONS

DWAF	:	Department of Water Affairs and Forestry
ECO	:	Environmental Control Officer
EMP	:	Environmental Management Plan
EMPR	:	Environmental Management Programme Report
EO	:	Environmental Officer
IAPs	:	Interested and Affected Parties
IEM	:	Integrated Environmental Management
MSDS	:	Material Safety Data Sheet
NEC	:	New Engineer Contract or The Engineering and Construction Contract

: Indicates the project environmental specification must be referred to, to clarify the clause.

5. DRAWINGS

Drawings referred to in this specification are included in Section 9 of the Contact Document 'List of Drawings' or in Appendix A.

6. FORMS

Forms referred to in this specification are included in Section 6 of the contract Document 'Forms to be completed by the Tenderer'

7. CONDITIONS OF CONTRACT

7.1 Duties and Powers of the Project Manager

The Project Manager is ultimately responsible for ensuring compliance with the environmental specification and upholding Umgeni Water's Environmental Policy on a project.

The Project Manager:

- arranges information meetings for or consults with I&AP's about the impending construction activities;
- may on the recommendation of the Engineer and /or Environmental Officer order the Contractor to suspend any or all works on site if the Contractor or his Subcontractor/ supplier fails to comply with the said specifications;

- maintains a register of complaints and queries by members of the public at the site office as per appended pro-forma (Appendix B). This register is forwarded to the ECO on a monthly basis.

7.2 Duties and Powers of the Engineer / Supervisor (NEC)

The Engineer or Supervisor is responsible for:
- enforcing the environmental specification on site;
- monitoring compliance with the requirements of the specification;
- assessing the Contractor's environmental performance in consultation with the Environmental Officer from which a brief monthly statement of environmental performance is drawn up for record purposes;
- documenting, in conjunction with the Contractor, the state of the site prior to construction activities commencing. This documentation will be in the form of photographs or video record.

7.3 Duties and Powers of the Environmental Control Officer

The Environmental Control Officer:
- briefs the Contractor about the requirements of the Environmental Specification and/ or Environmental Management Plan, as applicable;
- advises the Project Manager and Engineer/ Supervisor about the interpretation, implementation and enforcement of the Environmental Specification and other related environmental matters;
- attends site meetings, as necessary;
- monitors the Constructor's compliance with this specification and the project environmental specification as applicable;
- undertakes periodic audits of the effectiveness of the environmental specifications on the site;
- communicates environmental policy issues to the Project Manager;
- provides technical advice relating to environmental issues to the Engineer/ Supervisor and Project Manager;
- reports on the performance of the project, in terms of environmental compliance, in the "Water Quality Status of Rivers and Impoundments in the Umgeni Water Operational Area and Environmental Compliance of Umgeni Water Activities" report.

7.4 Duties and Powers of the Environmental Officer

The Environmental Officer:
- attends site meetings;
- monitors the site for compliance with the Environmental Specification and EMP;
- reports on the performance of the project in terms of environmental compliance to the ECO and Project Manager as per the pro-forma attached as Appendix C;
- liases with the ECO and/ or New Works Environmental Officer on matters of policy and those requiring clarity and advice.

7.5 Extent of the Contractor's Obligations

The Contractor is required to:
- provide information on previous environmental management experience and company environmental policy in terms of the forms contained in Section 6 of the Document;
- supply method statements for all activities requiring special attention as specified and/or requested by the Project Manager, Environmental (Control) Officer and/or Engineer during the duration of the Contract;
- be conversant with the requirements of this environmental specification, the project specification and environmental management plan, as applicable;
- brief his staff about the requirements of the environmental specification;

- comply with requirements of the Environmental (Control) Officer in terms of this specification and the project specification, as applicable, within the time period specified;
- ensure any sub-contractors/ suppliers who are utilised within the context of the contract comply with the environmental requirements of the Employer, in terms of the specifications. The Contractor will be held responsible for non-compliance on their behalf;
- bear the cost of any delays, with no extension of time granted, should he or his Sub-Contractors/ Suppliers contravene the said specifications such that the Engineer orders a suspension of work. The suspension will be enforced until such time as the offending party(ies), procedure, or equipment is corrected;
- bear the costs of any damages/ compensation resulting from non-adherence to the said specifications or written site instructions;
- comply with all applicable legislation in terms of 7.6 below;
- ensure that he informs the engineer timeously of any foreseeable activities which will require input from the Environmental (Control) Officer.

The Contractor will conduct all activities in a manner that minimises disturbance to directly affected residents and the public in general, and foreseeable impacts on the environment.

7.6 Compliance with Applicable Laws

The supreme law of the land is “The Constitution of the Republic of South Africa”, which states:
“Every person shall have the right to an environment which is not detrimental to his or her health or well being”
Laws applicable to protection of the environment in terms of Environmental Management (and relating to construction activities) include but are not restricted to:

Animals Protection Act , Act No 71 of 1962
Atmospheric Pollution Prevention Act, No 45 of 1965
Conservation of Agricultural Resources Act, No 43 of 1983
Environmental Conservation Act, No 73 of 1989
Environmental Planning Act, Act No 88 of 1967
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, No 36 of 1947
National Veld & Forest Fire Act, No 84 of 1998
Forest and Veld Conservation Act, Act No 13 of 1941
Hazardous Substances Act, No 15 of 1973
Lake Areas Development Act No 34 of 1975
Land Survey Act, No 9 of 1921
Minerals Act, No 50 of 1991
Mountain Catchment Act, No 63 of 1970
National Environmental Management Act, No 107 of 1998
National Heritage Resources Act of 1999
National Monuments Act, No 28 of 1969
National Parks Act, No 57 of 1976

National Resources Development Act, Act No 51 of 1947
Occupational Health and Safety Act, No 85 of 1993
Professional Engineering Act, No 46 of 2000
Provincial and Local Government Ordinances and Bylaws
Soil Conservation Act, Act No 76 of 1969
Water Act, No 36 of 1998
Water Services Act, No 108 of 1997

and all regulations and municipal by-laws framed there under and amendments there to.

7.7 Compliance with the Environmental Specification

The Contractor is deemed not to have complied with the Environmental Specification if :

- within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of clauses ;
- if environmental damage ensues due to negligence ;
- the Contractor ignores or fails to comply with corrective or other instructions issued by the Project Manager or Engineer within a specified time ; and
- the Contractor fails to respond adequately to complaints from the public.

Application of a penalty clause will apply for incidents of non-compliance. The penalty imposed will be per incident. Unless stated otherwise in the project specification, the penalties imposed per incident or violation will be:

Failure to demarcate working servitudes	R 1500
Working outside of the demarcated servitude	R 2000
Failure to strip topsoil with intact vegetation	R 2000
Failure to stockpile topsoil correctly	R 1500
Failure to stockpile materials in designated areas	R 1000
Pollution of water bodies (including increased suspended solid loads)	R 2000
Failure to provide adequate measure to control storm water runoff	R 1000
Failure to provide adequate sanitation	R 750
Unauthorised removal of woody vegetation	R 3000
Failure to erect temporary fences	R 750
Failure to provide adequate waste disposal facilities and services	R 750
Failure to reinstate disturbed areas within the specified time-frame	R 3000
Failure to rehabilitate disturbed areas within the specified time-frame	R 3000
Any other contravention of the project specific specification	R 2000
Any other contravention of the particular (general) environmental specification	R 500

The scope of the Project Environmental Specification is to set out project specific interpretations of, variations and additions to the Particular Specification. Should any conflict arise between the Project and Particular Specification, the project specification shall take preference.

PSZA : SITE ESTABLISHMENT AND HOUSEKEEPING

PSZA 1: Layout

The Contractor will take into account any of the limitations identified in the project specification with regard to establishment of site, in particular the location of access routes, and establishment layout.

Notwithstanding the provision of a project specification, the Contractor will provide the Project Manager and Environmental Control Officer with a layout design of the site indicating the position

of all of the following, as applicable: offices, ablution facilities, storage areas, workshops, laboratories, batching plant, particulate matter stockpile area (i.e. soil/ granular chemicals/ cement fines etc), waste disposal facilities, hazardous substances storage area, access routes, etc.

The accommodation of labour on-site is discouraged. Should accommodation be required the Contractor shall furnish the following details to the Project Manager and ECO : type of structures, water supply, sanitation, cooking facilities, control of waste water. All accommodation are to be removed at the end of the contract

This layout plan is to be submitted prior to site establishment for acceptance. Any changes to this plan require review by the Project Manager in conjunction with the ECO. The Contractor will take into account prevailing wind directions when designing the site layout to minimise impacts due to dust, unpleasant odours etc.

The Contractor will take into account the positions of residences when designing the site layout in order to minimise noise impacts on the residents.

Site security lighting is to be positioned such that the direct beam is focused away from residential properties and does not pose a nuisance or danger to road users.

No site establishment will be allowed within 100 m of a water body or drainage channel or on a flood plain unless approved by the Environmental (Control) Officer or specified in the project specification.

PSZA 2 : Site Clearance

No trees or shrubs may be removed without the prior permission of the Environmental Officer, unless in keeping with the final site reinstatement and rehabilitation plan.

Topsoil is to be stripped from all areas where permanent or temporary structures and access roads are to be constructed. Topsoil conservation is to be in terms of clause PSZB 5.3 of this document.

PSZA 3 : Services

3.1 Sanitation

Portable chemical toilets are to be utilised at site unless a connection to sewer is possible or a proper septic tank system is installed. In the case of the septic tank, the installation will require the relevant approvals from the local authority and will require removal upon completion of the contract, unless otherwise directed.

Sanitation facilities will be located within 100 m from any point of work, but not closer than 50 m to a water body.

3.2 Solid Waste Facilities

Facilities for solid waste collection are to be provided. These are to be at least a 200ℓ drum and clearly identified as the point for waste disposal.

Waste is to be separated into paper, glass and metal with separate collection points for each. The Contractor will ensure that the appropriate recycling contractors receive this waste.

The Contractor is to institute a daily litter collection programme. The collected waste is to be disposed of regularly and proportionately to its generation at a site designated for waste disposal.

No burning will be permitted on any site unless by approved incineration methods and in a low risk fire area. In the case of incineration, ash is to be co-disposed with spoil in a designated spoil dump. No burying of waste will be allowed on any site.

3.3 Cooking and Heating Facilities

No open fires will be allowed anywhere on site.

Contained fires (i.e. in a fire drum) will be allowed for heating and cooking only in designated areas, in other cases cooking is restricted to gas or electrical equipment.

PSZA 4 : Fuels, Hazardous Substances and other Liquid Pollutants

4.1 Storage and handling

All potentially hazardous raw and waste materials are to be handled by trained staff and stored on site in accordance with manufacturers instructions and relevant legal requirements. The product MSDS is to be lodged with the Engineer.

Storage and handling areas for fuels, lubricants, chemicals and other hazardous substances are to be paved with concrete to prevent accidental contamination of the soil. Alternatively, an impermeable liner may be placed beneath above-ground storage tanks. The integrity of the liner is to remain intact for the duration of the contract, until removal.

Open storage vessels, for example shutter lubricant drums, are to be stored under cover to prevent 'splash' contamination.

All storage areas are to be bunded (with at least sandbags) and have a peripheral collection drain, with oil interceptors (if required).

The bunded area is to be sufficiently large to contain a spillage equivalent to the volume of one container of the substances stored.

All products to be dispensed from 200 litre drums will be done so with appropriate equipment, and not dispensed by tipping of the drum.

Daily checks are to be conducted on the dispensing mechanism of above-ground storage tanks to ensure the timeously identification of faults.

Collection containers (e.g. drip trays) are to be placed under all dispensing mechanisms of hydrocarbon or hazardous liquid substances to ensure contamination from leaks and dispensing is contained.

The dispensing mechanism of diesel and petrol storage tanks is to be stored in a container when not in use.

4.2 Control of pollutants

A drainage diversion system is to be installed to divert runoff from areas of potential pollution, e.g. batching area, vehicle maintenance area, work shops, chemical and fuel stores, etc.

Contaminated runoff and waste water is to be directed into a collection system (e.g. sump, attenuation dam, PVC porta-ponds etc.) for treatment or collection and disposal. The final collection point (e.g. sump) is to be PVC lined.

Collected contaminated runoff/ wastewater is to be pumped out of the final collection point and disposed of at an appropriate landfill site. Sump liners are to be treated in the same manner.

The treated waste water, effluent and contaminated runoff may require analysis prior to discharge as detailed in the project specification or instructed by the Environmental Officer. Umgeni Water's Scientific Services Division may provide this function.

Details regarding proposed methods for treatment of pollutants are to be submitted to the Environmental (Control) Officer for acceptance upon award of the Contract .

Any spillages, irrespective of their size, are to be contained and cleaned up immediately. Umgeni Water's Environmental Control Officer and Pollution Control section are to be notified.
The Pollution Control section may provide technical assistance for clean up, if required.
No spills may be hosed down into a stormwater drain or sewer.

Use of specialised cleanup techniques and/ or products may be required depending on the spill. This will be instructed by the Environmental Control Officer. These will be to the Contractor's cost.

The Contractor shall ensure that all plant is in a good working order. Hydrocarbon (e.g. diesel, petrol, oil and hydraulic oil) leaks exceeding the normal operating parameters of the plant shall not be operated and repairs are to be affected within 24 hrs.

PSZA 5 : General
Site staff are not permitted to use any open water body or other natural water source (e.g. springs) for purposes of bathing, or the washing of clothes, machinery or vehicles. Nor draw water from a spring without the permission of the community utilising that spring.

PSZA 6 MEASUREMENT AND PAYMENT

Measurement and payment for compliance with clauses PSZA1 to 5 of the specification are deemed to be fully included in the Contractor's rates for fixed and time related Preliminary and General Items scheduled under SABS 1200 A or AA.

PSZB : CONSTRUCTION

PSZB 1 : Construction Methods and Programme

1.1 Construction Method
The Contractor will provide method statements for construction activities (14 working days prior to the activity commencing) relating to the following environments and those listed in the project environmental specification, unless methods have been prescribed in this or the project environmental specification:

- rivers, streams, or any other open water body;
- wetlands;
- access roads (see PSZB 13 below);
- steep slopes (i.e. steeper than 1:4) or less if friable material is present;
- indigenous bush/ forest;
- close proximity (i.e. 50 m or less) to a residential dwelling;
- drilling and/or blasting of rock.

If a construction method employed by the Contractor is not environmentally acceptable to the Employer, the Contractor may be instructed to cease the utilisation of that method in favour of a more environmentally acceptable one, proposed either by himself or the Employer.

1.2 Construction Programme
The Contractor will programme construction so as to minimise the impact on the environment and provide this programme to the Environmental Control Officer for perusal and acceptance at the onset of the contract period. The ECO is to made aware of any amendments to the construction programme or alterations to the scope of work in order that their impacts on the environment can be assessed.

The construction programme will need to take into account limitations of the environment in terms of construction activities. These may include scheduling construction in terms of seasonality of water bodies, growth and dormancy periods of fauna and flora, etc. The project specification will detail necessary requirements relating to specific aspects of the project which will require attention in terms of construction scheduling.

The Contractor (through the Project Manager) will ensure that all affected landowners/ authorities are advised of the proposed programme at the beginning of the contract period.

PSZB 2: Areas Occupied / Demarcation of site

Routes for temporary access and haul roads are to be located within the approved demarcated areas and vehicle movement is to be confined to these roads. Movement of vehicles outside the designated working areas is not permitted without authorisation from the Engineer.

All construction activities are restricted to working areas designated on the drawings and/or demarcated and approved by the Engineer. Materials including spoil are stockpiled at designated areas.

Any areas disturbed outside of the demarcated areas or without permission of the Environmental (Control) Officer or Engineer will be subject to reinstatement and rehabilitation (as per PSZC below) to the Contractor's cost.

In terms of pipeline projects, a general maximum working servitude width of 15 m will apply for machine excavation unless otherwise indicated in the project specification. A maximum width of 6 m will apply for manual excavation. These maximum working servitude widths may vary depending on the sensitivity of the environment, as detailed in the project specification.

In sensitive biophysical environments, for example wetlands, indigenous forest / bush, pristine natural grasslands, and sensitive social environments, as defined in the project specification or by the ECO, the working servitude is reduced as indicated in the project specification.

The working servitude shall contain all construction related activities, including, stockpiling of materials, placing of toilets, vehicle movement areas, etc.

Demarcation of linear projects (executed with machine excavation) and features (e.g. pipelines, access roads, etc.) will be by means of wooden stakes. These stakes will be at least 1 m high, painted white and placed at least every 15 m, on either side of the linear feature, in all areas where works are occurring. Progressive movement of stakes is required as linear projects progress.

In the case of a fenced site, the boundary fences will be denoted as the outermost limit of the site, but internal areas may be demarcated with stakes as above. The site boundaries of non-fenced, but 'contained' projects are to be delineated using stakes or temporary fencing, depending on the hazard which that site poses.

PSZB 3: Supply of Works Facilities
No water may be abstracted from water bodies for the purposes of construction, without approval of the Engineer in consultation with the Environmental Control Officer.

PSZB4: Cleanliness
SABS 1200 AD, clause 5.2.4, second sentence, is to read: "No rubbish or debris shall be deposited below the full supply level (FSL)."

PSZB 5: Site Clearance
5.1 Clearance
Spoil sites will require clearing and grubbing in addition to those areas in terms of SABS 1200 C 5.1.

The site shall only be cleared immediately prior to construction activities commencing i.e. at the last practicable stage.

Prior to the commencement of any vegetation clearing or tree felling activities, the Contractor is to timorously inform and confirm areas to be cleared onsite with the Environmental Control Officer (ECO).

Vegetation clearing will only commence after the site has been clearly demarcated by means of danger tape, temporary fencing or other approved methods. Clearing shall be contained to the demarcated working.

No trees or indigenous shrubs may be removed without the prior permission of the Environmental

(Control) Officer, unless in keeping with the final site reinstatement and rehabilitation plan.

5.2 Disposal of materials

Material obtained from clearing and grubbing operations shall be disposed of at appropriate municipal disposal facilities. They are not to be disposed of as per Paragraph 1 of Sub-clause 3.1 of SABS 1200 C. Vegetative material may not be burnt.

Wood obtained from clearing and grubbing operation remains the property of the landowner/ community and must be stacked at sites designated by relevant person. The Contractor will be required to remove and dispose of any wood from site at a designated site for vegetation disposal, should the landowner/ community not require it.

All tree trunks and branches of diameter greater than 50 mm are to be cut into lengths not exceeding 2400 mm.

Brush wood (i.e. < 50 mm diameter) is to be disposed of, or utilised as specified in the project specification or upon instruction of the Engineer.

5.3 Conservation of topsoil

The Contractor is required to strip topsoil (as defined in this specification) together with grass, groundcover and sedges from all areas where permanent or temporary structures are located, construction related activities occur, and access roads are to be constructed, etc. The depth to which topsoil will be stripped shall be 200 mm unless stated otherwise in the project specification.

Topsoil is to be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify.

Topsoil is to be replaced along the contour.

Topsoil is to be replaced by direct return (i.e. replaced immediately on the area where construction is complete), rather than stockpiling it for extended periods. This is feasible for progressive construction (e.g. pipelines), but not necessarily so for reservoirs, site establishments, dams, etc.

Topsoil stockpiles are not to exceed 2 m in height.

Topsoil stockpiles are to be maintained in a weed free condition (i.e. no 'broad-leafed' plants regarded as weeds in terms of the Conservation of Agricultural Resources Act No 43 of 1989, or those plants regarded as a 'general nuisance in the area' are to be growing on the stockpiles). The ECO will provide guidance as to which plants are weeds and require removal.
The stockpiles are not to be contaminated with sub-soil, or any other waste material.

Topsoil may not be compacted in any way, nor may any object be placed or stockpiled on it.

Topsoil which is to be stockpiled for periods exceeding 4 months is to be vegetated. In summer a mixture of *Eragrotis tef* (Teff) and *Eragrostis curvula* (Weeping Lovegrass) (ratio 1:2) is to be applied at an application rate of 6 kg/ha, unless otherwise instructed in the project specification.

In winter, a mixture of *Lolium multiflorum* (Annual/Italian Rye grass) and *Eragrostis curvula* (Weeping Lovegrass) (ratio 1:1) is to applied at an application rate of 6kg/ha (see PSZC 5.3 for sowing times), unless otherwise instructed in the project specification. Fertiliser is to be applied as per PSZC 5.2.

5.4 Cutting of trees

Any tree branches which require removal are to be properly pruned and sealant applied to the cut surface, if required.

The Contractor's attention is drawn to Sub-clause 5.2.3.3 of SABS 1200 C with respect to work in indigenous forests.

Any indigenous trees or bush which require removal in terms of the project, and which have not been identified in the project specification or EMP, are to be timeously indicated to the Environmental Officer prior to work affecting them.

5.5 Landscape Preservation and Conservation of Flora

Notwithstanding Clause 5.7 of SABS 1200 C, the Contractor will be required to transplant designated plants to alternative locations as specified in the project specification or identified by the ECO, upon the instruction of the Engineer.

Transplanting shall be undertaken by employing the following method:

Removal

- Mark the orientation of the tree/shrub (for example, the north-facing side of the trunk indicated by a small arrow made with indelible ink) trunk. Do not scratch a mark on the surface of the trunk;
- Delineate a circle from the trunk with a radius equivalent to the drip-line of the tree, or as indicated by the ECO on site;
- Excavate the tree with an intact rootball.

Replanting

- A hole 500 mm larger in diameter than the anticipated rootball must be prepared in advance of the tree removal in order that the tree can be replanted immediately;
- The tree must be positioned as per its original orientation;
- A planting method known as 'puddling' must be employed. This method involves the addition of soil and water simultaneously to expels air from the planting hole. Place the tree in its new hole, making sure the top surface of the rootball is level with the ground level. Place a hose pipe in the hole and leave it running whilst extra soil is added around the rootball;
- 'Compact' the tree in the hole and attach tree stays for stabilisation.

Compensatory planting of species may be required should transplantation not be feasible, as indicated in the project specification or upon instruction of the Engineer.

PSZB 6 Earthworks

6.1 Backfill material

With reference to SABS 1200 DB subclause 3.5, no material stripped or excavated which is classed, in terms of this specification, as topsoil, may be used as backfill in any excavation.

6.2 Excavation and backfilling

During excavation 'conservation of topsoil', as specified in PSZB 5.3 above will apply.

Excavated material is to be stockpiled along a pipeline trench within the working servitude, unless otherwise authorised. Figure 2 (Appendix A) illustrates a conceptual layout for working within a pipeline trench servitude.

Surplus excavated soft, intermediate and hard rock material shall not be disposed of along the pipeline trench as indicated in SABS 1200 DB subclause 5.6.3 and 5.6.4, but shall be removed to a spoil site (see PSZB 15 below) designated in the project specification, or indicated by the Engineer in conjunction with the Environmental Control Officer and Project Manager.

In certain cases, for example to help stabilise the disturbed area or to reinstate the natural aesthetics of an area, excess excavated intermediate and hard material may be disposed of in a designated manner along a pipeline trench, as indicated by the ECO and Project Manager, or in the project specification. In this case, rock material shall not exceed 250 mm in maximum dimension (see PSZC 2.1).

In terms of SABS 1200 DB 5.6.5 and SABS 1200 LB 3.4.2, deficiency of backfill material shall not be made up by excavation within the free haul distance of 0.5 km of site, without the prior approval of the Engineer of the source of the material. Where backfill material is deficient, it should ideally be made up by importation from an approved borrow pit (i.e. one which operates within the ambient of an EMPR.) (See also PSZB 14 below).

The Contractor will backfill in accordance with the requirements of progressive reinstatement.

The maximum length of open trench shall be specified in the project specification.

PSZB 7 : Safety

All works which may pose a hazard to humans and animals are to be adequately protected and appropriate warning signs erected. The Contractor's attention is drawn to SABS 1200 D section 5.1 in this regard.

With reference to SABS 1200 D 5.1.1.3, where blasting is required in terms of the project, the Contractor will ensure that all structures in the vicinity that could be affected by the activity will be inspected and their condition photographically recorded (as necessary), prior to blasting.

Notice of intent to blast is to be provided to landowners timeously.

Speed limits, appropriate to the vehicle driven, are to be observed at all times on access roads. Operators and drivers are to ensure that they limit their potential to endanger humans and animals at all times, by observing strict safety precautions.

PSZB 8 : Plant

8.1 Silencing of plant

With reference to SABS 1200 A amend: "built up areas" : to read as "all areas within audible distance of residents (albeit urban , peri-urban or rural areas)."

Appropriate directional and intensity settings are to be maintained on all hooters and sirens.

Silencer units on equipment and vehicles are to be maintained in good working order.

Construction activities are to be confined to normal working hours (07h00 - 17h00) Mondays to Fridays only.

8.2 Appropriate use of plant

The Contractor will at all times use plant which is appropriate to the task in order to minimise the extent of damage to the environment.

PSZB 9 : Dealing with Water on Works

9.1 Disinfection of Potable Water Infrastructure

Disinfection water is to be neutralised before release of this water to the environment.

9.2 Discharge of water from site

Any water which is discharged from site is to comply with the relevant Water Quality Guidelines implemented by DWAF.

Water discharged to the stormwater / sewer system may only be done so with the permission of the relevant local authority.

PSZB 10 : Control of Erosion
Surface erosion protection measures will be required to prevent erosion where slopes are steeper than 1:8 on all soil types.

Erosion protection measures required may include all or some of the below, as specified in the project specification or upon instruction of the Engineer in conjunction with the Environmental (Control) Officer:

- use of groundcover or grass
- construction of cut off berms (earth and/or rockpack) - these are to be angled across the contour and normally would approximate an angle of 30^{o} from the bisector of the contour.
- placing of brush wood on bare surface;
- pegging of wattle trunks or branches along the contour;
- hard landscaping, e.g. use of Loffelstein walls, ground anchors, gabions etc.

Scour chambers are to be fitted with energy dissipaters, or the jet of water directed onto a protected (i.e. grouted stone pitching/ rock pack/ reno mattress) area to dissipate water velocity and to control and prevent erosion.

Storm water drainage measures will be required on site to control runoff and prevent erosion.

PSZB 11 : Control of Pollution
No waste in a solid, liquid or gaseous state shall be emitted from or spilled on the site without the approval of the Engineer.

No mixed concrete shall be deposited directly onto the ground prior to placing. A board or other suitable platform is to be provided onto which the mixed concrete can be deposited whilst it awaits placing.

Excess concrete from mixing shall be deposited in a designated area awaiting removal to an approved landfill site, or for use in embanking around a reservoir, provided that it doesn't affect compliance with the technical specification.

The Contractor will contain wash water from cement mixing operations, by directing the water into a sump for collection. The material contained in the sump will be removed to an appropriate landfill site, or included in a reservoir embankment, provided that is doesn't affect compliance with the technical specification.

No concrete rubble shall be present within the top 1.5 m of the embankment.

Liquid wastes will not be disposed of to storm water drains. They may be disposed of to sewer only if permitted by (local council) legislation.

In the event of pollution of a water body (including sediment loading), the Contractor will provide alternative water supply to users of that water body until the quality of the water body is restored to its previous unpolluted state. For the sake of this clause, pollution is deemed to be a state which is substandard to the normal quality of the water body, but is not necessarily in contravention of the South African Water Quality guideline standards for a prescribed activity.

Any ancillary damages resulting from pollution of a water body will be repaired / remediated at the Contractor's cost.

Where, due to construction requirements, pollution of a water body may potentially occur, the

Contractor is to ensure adequate measures (e.g. attenuation/ settlement dams / oil absorbent products) are in place to prevent pollution. A method statement is to be provided to this effect (see PSZB 1).

PSZB 12 : Control of fire

The Contractor will ensure he has the necessary fire fighting equipment on site in terms of SABS 1200. This will include at least rubber beaters when working in 'veld' areas, and at least one fire extinguisher of the appropriate type when welding activities are undertaken, irrespective of the site.

The Contractor is to ensure he is aware of the requirements of landowners, especially forestry plantation owners, in terms of fire control regulations on their property. Specific fire fighting requirements will be detailed, as necessary, in the project specification.

A minimum requirement for construction in commercial forestry areas will be a water bowser/ cart (min. 5000 litres) equipped with a pump and hose (minimum 30 m) which shall be permanently on site, unless otherwise stated in the project specification.

PSZB 13 : Use and Maintenance of Access Facilities

13.1 Responsibility

The Project Manager [not the Contractor (SABS 1200 AD 5.3.1)] will be responsible for obtaining permission for temporary and permanent rights of way over all private property affected by project activities.

The Project Manager will ensure that the Contractor has kept a photographic record of all access facilities and that these are reinstated to a state not worse than upon commencement of the project and to the satisfaction of the landowner (not withstanding that the project's objective is not to upgrade landowners' access roads).

13.2 Fencing

Temporary fencing is to consist of 1.2 m bonnox fencing, or similar, suitably tensioned and supported on 1.8 m fencing standards at 3 m intervals, with all necessary straining posts and stays.

All temporary fencing as indicated by the Engineer is removed on completion of the contract.

13.3 New Access Roads

Any construction roads created for execution of the project are to be designed to incorporate adequate drainage and water attenuation structures.

Any access roads which incorporate 'cut and fill' aspects and/or which are to be surfaced during construction are to be authorised by the Environmental Control Officer and Project Manager. Prior to construction of the road, the Contractor will be required to provide a sketch plan of the road layout (referenced to local topographic, natural and man-made structures). Slope steepness, road width, drainage structures and their frequency will need to be documented and accompany the sketch layout.

Construction access roads may not be wider than that necessary (maximum width 4 m) for movement of vehicles in one direction only. Should two way traffic be required, points people are to control vehicle movement on the 'single lane' road or passing bays are to be used where specified in the project specification or as identified by the Engineer in conjunction with the Environmental Control Officer, unless otherwise stated in the project specification.

The cut and fill slopes of permanent roads will require grassing, as specified in the project specification or by the ECO, to increase stability and reduce aesthetic impacts. Hard landscaping may be required as per the project specification.

Temporary construction roads will require rehabilitation on completion of construction activities for

which they were required. These roads will require rehabilitation as per PSZC 4 or as specified in the project specification. In the case of access 'tracks', only ripping to loosen compaction will be required unless otherwise stated by the ECO or project specification.

Access roads created by the project may only remain unrehabilitated on written request of the landowner, with his acceptance of the state of the road and a clause that the landowner accepts all responsibility for the road and its state.

13.4 Maintenance of Existing Access Roads

The Contractor will record, photographically, the state of existing roads which are to be used for access, prior to plant utilising these roads.

During the contract period, the Contractor will ensure that all existing water attenuation and drainage structures are maintained in a state in which they can optimally perform their function.

Upon completion of the construction period, the Contractor will ensure that the access roads are returned to a state not worse than prior to construction commencing.

PSZB 14 : Borrow Pits

Where the Contractor is required to import material this shall be from commercial sources or borrow areas specified in the project specification.

The Contractor may source material from alternative borrow pits provided: the site location; method of winning material and reinstatement and rehabilitation are environmentally acceptable and approved by the ECO.

In this regard, the Contractor shall give the ECO in writing, 30 days prior to opening up alternative borrow pits the following information for acceptance:

- quantities of borrow material required;
- method statement for excavation of material including depth and extent of excavation;
- anticipated 'active life' of the borrow area;

- proposal for reinstatement and rehabilitation of borrow area, including final profile;
- written approval from the landowner/ relevant authority that material may be removed from their land subject to their stated conditions, requirements, and royalties, and if the proposal is acceptable to the ECO.

Development and rehabilitation of borrow pit areas are likely to include the following activities (but these must not be regarded as exhaustive):

- Stripping and stockpiling of topsoil as per PSZB 5.3 of this specification;
- Removal (to nominal depth of 500 mm) and stockpiling of sub-soil;
- Infill of borrow pit with spoil material;
- Contouring of borrow pit to approximate natural topography and/ or reduce erosion impacts on the site;
- Placement of excavated subsoil over spoil material;
- Placement of stripped topsoil on subsoil;
- Grassing of topsoil in terms of clause PSZC 4 of this specification.

The Contractor is to familiarise himself with the requirements of the Minerals Act No 50 of 1991 in terms of borrow pit development, and the requirements of the EMPR, as applicable.

PSZB 15 : Spoil Sites

Where the Contractor is required to spoil material, spoil sites must be identified which are environmentally acceptable and approved by the ECO, unless spoil site areas have been identified in the project specification, in which case these will be the designated spoil sites.

If no spoil sites have been previously identified together with reinstatement and rehabilitation criteria, the Contractor is to provide the following information to the E(C)O at least 30 days prior to

requiring sites to spoil material:

- the location, description of and access to alternative sites identified in order that they may be assessed;
- the quantity of material to be spoiled;
- the type of material to be spoiled (i.e. blast rock/ excavated rock/ soft shale/ subsoil etc.);
- the proposed method of spoiling;
- the proposed reinstatement and rehabilitation plan including final profile;
- written approval from the landowner/ relevant authority that material may be spoilt on land subject to their stated conditions and requirements and if the proposal is acceptable to the ECO.

Development and rehabilitation of spoil areas are likely to include the following activities (but these must not be regarded as exhaustive):

- Stripping and stockpiling of topsoil as per PSZB 5.3 of this specification;
- Removal (to nominal depth of 500 mm) and stockpiling of sub-soil;
- Placement of spoil material;
- Contouring of spoil site to approximate natural topography and/ or reduce erosion impacts on the site;
- Placement of excavated subsoil over spoil material;
- Placement of stripped topsoil on subsoil;

Grassing of topsoil in terms of clause PSZC 4 of this specification.

PSZB 16 : Nuisance

16.1 Dust

At all times the Contractor shall control dust on the site, access roads, borrow pits and spoil dumps with water, chemical soil stabilisers or temporary surfacing as specified in the project specification or upon instruction of the Engineer. Additional dust attenuation measures, for example screens, may be required as specified in the project specification.

Dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments. These impacts include visual pollution, decreased safety due to reduced visibility, health aspects, and ecological impacts due to dust particle accumulation.

On gravel or earth roads, vehicle speeds may not exceed 45 km per hour.

16.2 Noise

The operational layout of the construction site is to be designed to control and reduce noise from source (see clause PSZA 1).

Machinery and vehicle silencer units are to be maintained in good working order. Offending machinery and /or vehicles will be banned from use on site until they have been repaired.

Construction activities generating output levels of 85 dB(A) or more (excessively noisy), in residential areas, are to be confined to working hours (08h00 - 17h00) Mondays to Fridays only.

'Normal' or 'noisy' working hours may only be extended with the prior written approval of the Project Manager, who has been notified, at least 7 days in advance, of the impending work requiring extension.

The Project Manager will ensure that the neighbours are timeously forewarned of imminent noisy activities.

Should community complaints be received with regard to noise generation, the Contractor will, at the discretion of the Project Manager and Environmental Control Officer, provide an independent and registered noise monitor to undertake a survey of noise output levels from site, and implement measures to reduce noise to legislated levels.

16.3 Visual

All site establishment components, as well as equipment, will be positioned to limit visual intrusion

to neighbours (see clause PSZA 1 above).

The type and colour of roofing and cladding materials are to be selected to reduce reflection.

Security lighting (both temporary and permanent) and lighting required for specific works activities must be placed such that it is not a nuisance to residents and the general public.

16.4 Interference with neighbours and public

No construction staff may approach site neighbours, for whatever reason, without the knowledge and permission of the Project Manager.

Complaints from neighbours and public with regard to interference from contract staff will be regarded in a serious light, and the offender(s) may be subject to disciplinary action.

16.5 Disruption of Services

Disruption of services, e.g. road access, water and electricity, must be kept to a minimum at all times.

Where service disruption is unavoidable, the Contractor is to advise the Project Manager (at least 7 days in advance), who in turn will timeously warn the affected parties.

PSZB 17 : Special Environments

17.1 Wetlands

Pipeline trenches which traverse wetlands shall be constructed as specified in the project specification. The Contractor will submit a method statement for work in wetland areas as per PSZB 1.1

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

The Contractor shall submit a method statement for review at least 14 days prior to commencing construction in a wetland.

The Contractor will remove all wetland vegetation, as indicated in the project specification or by the ECO, with their root ball intact. This vegetation is to be kept moist at all times. It is to be placed in the shade and covered with moistened hessian cloth until replanting, which is to be undertaken immediately surface reinstatement is complete.

No construction materials may be stockpiled in any wetland areas.

The pre-construction profile of the wetland shall be returned to one similar as before construction, with no created “ridge or channel” features present.

17.2 River/ stream courses

The Contractor shall submit a method statement for review 14 days prior to commencing construction. The method statement should highlight (but not be confined to) the following issues :

- detailed plan of crossing including pipe protection works;
- how water flow will be diverted during construction (if applicable);
- containment of contaminated runoff and waste water;
- width of working servitude (if not already detailed in project specification);
- final expected profile of river/ stream banks;
- reinstatement and rehabilitation of river/ stream banks.

The Contractor will remove herbaceous riparian vegetation as indicated in the project specification or by the ECO, with their root ball intact. This vegetation is to be kept moist by means of placing it

in the shade, covered with moistened hessian cloth until it is replanted.

The Contractor shall not modify the banks or bed of a water course unless as specified in the project specification.

Rocks for use in gabion baskets/ reno mattresses may not be obtained from a water course.

The Contractor will not pollute any water body as a result of construction activities (see also PSZB 11).

The Contractor shall not cause any physical damage to any aspects of a water course, other than those necessary to complete the works as specified and in accordance with the accepted method statement

Where a stream or river crossing requires the diversion of water, a method statement is to be provided to the ECO in this regard for review.

PSZB 18 MEASUREMENT AND PAYMENT

Measurement and payment for compliance with clauses of the specification will be made as follows. All other costs of compliance are deemed to be included in the Contractor's rates.

Item Unit

a) Areas occupied/ Demarcation of Site

Wooden Stakes

Supply installation and removal on completion per linear meter of boundary staked……....m

b) Site Clearance

Site Clearance as specified shall be scheduled in SABS 1200 and shall include the costs of complying with this specification

c) Conservation of Topsoil

Measurement for this item will be per m^3 and will be inclusive of clearing and grubbing all in one operation.

Removal and replacement of topsoil as specified shall be as scheduled in the relevant SABS 1200 specification (SABS 1200 D)

Grassing of temporary topsoil stockpiles

(i) Supply of materials and planting as specified……..……m^2

(ii) Maintenance by watering, weeding and fertilising……...……...m^2

d) Landscape preservation and Conservation of flora

Transplanting of trees/ shrubs of main stem girth:

a) up to 400 mm.....……...Sum

b) over 400 mm..…….....…….Sum

The rate shall include removal, replanting and watering of plants as specified.

e) Control of Fire

Provision of fire fighting equipment as specified shall be scheduled in SABS 1200 A, AA, AD and AH.

f) Temporary Fencing

Supply, installation, maintenance and removal of temporary fencing as per specification…....m

g) Nuisance

(i) Dust
Control of dust as specified shall be scheduled in the applicable SABS 1200 specification

h) Special Environments
(i) Wetlands
Removal of vegetation with intact root zone (minimum depth 150 mm)…..…..m^2

PSZC : REINSTATEMENT AND REHABILITATION

Scope: The intention of this section is to ensure that the condition of the areas disturbed by the project are returned to a state that approximates what they were before the project or better, within reason. The concept of progressive reinstatement is fundamental to cost effective (both financial and environmental) rehabilitation of a site. This concept must be followed at all times. Where landscaping is utilised, the concept is to utilise and restore indigenous plants to the site, in terms of the concept of xeriscaping.

Reinstatement will be required for all areas disturbed by the project. For pipeline projects, this will include the full working servitude, not just the top of actual excavation as per SABS 1200 DB (subclause 5.9.1.1)

Reinstatement and rehabilitation will ensure that all areas disturbed by the project are returned, within reason, to a state not worse than before the project commenced.

The Contractor will reinstate and rehabilitate all disturbed areas outside of the demarcated working area (as defined in terms of clause PSZB 2 or the project specification) at his own cost and to the satisfaction of the Environmental Control Officer and Project Manager.

PSZC 1 : Housekeeping:
All areas are to be cleared of rubble associated with construction. This includes the removal of surplus materials, excavation and disposal of consolidated waste concrete and concrete wash water, litter, etc.

All soil contaminated by hydrocarbons, for example from leaking machines, refuelling spills etc., is to be excavated to the depth of contaminant penetration, placed in 200 litre drums and removed to an appropriate landfill site.

PSZC 2 : Finishing

2.1 Final Grading
Final levels of all disturbed areas are, where feasible in terms of the project requirement, to be consistent with the natural topography of the area.

In certain instances, it will be acceptable to reinstate rock onto a works area (e.g. pipeline servitude), provided that that rock does not exceed 250 mm in maximum dimension and is placed in a manner consistent with the natural surrounds as indicated by the ECO and Project Manager.

All drainage lines affected by construction are to be reinstated to approximate their original profile. Where this is not feasible due to technical constraints, the profile is to be agreed upon by the ECO and Project Manager.

All compacted (disturbed) areas (including stockpile areas) are to be ripped (along contour) to a depth of 150 mm prior to the replacement of topsoil.

2.2 Topsoiling
Topsoil is to be replaced to a minimum depth of 100 mm, unless otherwise specified in the project specification (e.g. in the case of agricultural lands)

Topsoil is not to be compacted, but once replaced is to be scarified (to a depth of 50mm)

consistent with the natural contour.

If insufficient topsoil is available, subsoil or similar material may be used that may be a suitable substrate after addition of soil improving substances e.g. compost, pH rectifiers (lime or gypsum) etc. Soil testing may be required at an approved facility.

PSZC 3 : Reinstatement of water courses and wetland areas

The Contractor will ensure that water course banks are returned to their original profile unless the project specification states otherwise.

The surface reinstatement of wetland areas is to ensure that no depressions remain which could act as channels for preferential water flow thereby affecting the hydrological regime of the wetland.

The Contractor will preserve all riparian and wetland vegetation for use in rehabilitation of those environments. This vegetation is to be kept moist at all times. It is to be placed in the shade and covered with moistened hessian cloth until replanting, which is to be undertaken immediately surface reinstatement is complete.

Plants are to be, as nearly as possible, replanted in areas from which they were removed.

PSZC 4 : Vegetation Re-establishment

The Contractor will ensure that all areas disturbed by contract activities are revegetated to the specified standard.

This standard is deemed to be an 85 % cover with no areas in excess of 0.04 m^2 / m^2 remaining unvegetated.

Revegetation shall match the vegetation type which previously existed (e.g. kikuyu pastures are to be returned to kikuyu pasture; 'veld' grass to 'veld' grass, etc.), unless stated otherwise in the project specification.

Prior to re-grassing, and if required:

- the area is to be scarified or ripped (along contour) to a depth of 50 mm to loosen compaction.
- weeds present on site are to be removed.

Re-grassing, where required, will be either by means of seeding, instant turf (sods), sprigs or plugs as specified in the project specification or as specified by the ECO.

Where sprigs or plugs are utilised, they are to be planted at 200 mm centres. The fertiliser shall be applied as per PSZC 5.2. During summer, 25mm of irrigation shall be applied each week until reasonable (*60%*) ground cover has been obtained. During winter 15mm of irrigation shall be applied each week until reasonable (*60%*) ground cover has been obtained. The amount of irrigation to be applied will make up the difference between rainfall recorded on site and minimum requirement.

Where instant turf is utilised, it shall be laid as specified in the project specification. The fertiliser shall be applied as per PSZC 5.2. During summer, 25mm of irrigation shall be applied each week until all the turf is visibly growing. During winter 15mm of irrigation shall be applied each week until all the turf is visibly growing. The amount of irrigation to be applied will make up the difference between rainfall recorded on site and minimum requirement.

Grassing shall be undertaken by a specialist grassing Sub-contractor, unless permission is granted otherwise by the Engineer upon receipt of a written motivation from the Contractor.

The Contractor shall state in writing when the regrassing operation will commence and its expected duration (dates).

Grassing in 'veld' areas is to be undertaken as per PSZC 5 below. *Cynodon dactylon* species may be excluded or substituted from this mixture at the discretion of the Environmental Control Officer, or as specified in the project specification. The seed bulk may be made up with the *Eragrostis tef*.

PSZC 5 : "Veld grass" Grassing Specification

The area to be grassed should be estimated and converted to hectares,
e.g. 100m X 100m = 10 000m^2 = 1ha. All fertilizer and seeding rates used in this specification are with respect to hectares.

5.1 Regional areas

For re-grassing three distinctive areas within Umgeni Water's operational area exist. These are defined as:

- the Coastal area (a narrow band running from the coast to ≈15km inland of the coast)
- the Coastal hinterland (a broad band (≈50km wide), generally defined as westwards of the coastal belt, eastwards of the Midlands area and below 800m a.s.l.)
- the Midlands area (west of Pietermaritzburg and above ≈ 800m a.s.l.).

5.2 Fertiliser

Standard 2:3:2 (N:P:K) fertiliser shall be used on all sites.

The rate of application will be:
(i) 200 kg/ha in the Coastal Hinterland areas, and
(ii) 300 kg/ha in the Midlands and Coastal areas.

5.3 Planting times

Summer (includes Spring) is considered to be between the 1 September and 28 (29) February.
Winter (includes Autumn) is considered to be between 1 March and 31 August.

Re-grassing will be undertaken (as far as possible) in summer as germination and establishment of grasses is most effective, assuming reasonable spring rains.

Vegetation re-establishment is likely in many cases to be held off until this suitable growing season.

Hydroseeding with a winter mix will only be specified where regrassing is urgently required and cannot wait until the summer season. In this case irrigation will be required as per PSZC 5.4 below.

5.4 Establishment and maintenance

During summer, 25mm of irrigation shall be applied each week until reasonable (*60%*) ground cover has been obtained.

During winter (where annual rye grass is specified) 15mm of irrigation shall be applied each week until reasonable (*60%*) ground cover has been obtained.
If rapid establishment is required, additional watering may be necessary as specified in the project specification

The amount of irrigation to be applied will make up the difference between rainfall recorded on site and the minimum requirement.

5.5 Grass Seed Selection and Application Rates

The specific seed selection and application rates for each of the defined areas are covered separately, as follows.

5.5.1 Coastal area

Summer mix (1 September - 28 February)

Grass species	Common name	General application rate (kg/ha)
Eragrostis tef	Teff	5
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	10
Digitaria eriantha	Smuts' fingergrass	5
Total		30

Winter mix (1 March - 31 August)

Grass species	Common name	General application rate (kg/ha)
Lolium multiflorum cultivar - Midmar	Annual/Italian rye grass	10
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	5
Total		25

5.5.2 Coastal hinterland.

Summer mix (1 September - 28 February)

Grass species	Common name	General application rate (kg/ha)
Eragrostis tef	Teff	5
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	10
Cenchrus ciliarus	Blue buffalo grass	2
Cynodon dactylon	Couch/Kweek/Star grass	10
Total		37

Winter mix (1 March - 31 August)

Grass species	Common name	General application rate (kg/ha)
Lolium multiflorum cultivar - Midmar	Annual/Italian rye grass	10
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	5
Cenchrus ciliarus	Blue buffalo grass	2
Cynodon dactylon	Couch/Kweek/Star grass	3
Total		30

5.5.3 Midlands area

Summer mix (1 September - 28 February)

Grass species	Common name	General application rate (kg/ha)
Eragrostis tef	Teff	4
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	10
Digitaria eriantha	Smuts' fingergrass	2
Cynodon dactylon	Couch/Kweek/Star grass	2
Paspalum notatum	Lawn paspalum	2
Total		30

Winter mix (1 March - 31 August)

Grass species	Common name	General application rate (kg/ha)
Lolium multiflorum cultivar - Midmar	Annual/Italian rye grass	10
Eragrostis curvula	Weeping lovegrass	10
Chloris gayana	Rhodes grass	5
Paspalum notatum	Lawn paspalum	2.5
Total		27.5

5.6 Seeding methods

Two methods are recommended, namely hydroseeding and hand-broadcasting. The required method shall be as specified in the project specification.

All seed supplied should be labelled in accordance with the Government Seed Act No. 20 of 1961 and the Contractor shall be required to produce such certification, if requested by the Engineer.

5.6.1 Hydroseeding

The Grassing Contractor shall be conversant with this method.

Cellulose pulp (consisting of either wood shavings, shredded straw, shredded paper or cotton waste) shall be added to the mix to be applied at a rate of 250 kg/ha.

In addition to the cellulose pulp, compost (consisting of either chicken litter, kraal manure, sugar cane filter cake or mushroom compost) shall be incorporated at a rate of $5m^3$/ha (≈100 X 50kg fertiliser bags/ha).

5.6.2 Hand-broadcasting

Fertiliser, at the appropriate rate, is to be distributed by hand in a manner to ensure that there is an even spread of fertiliser over the site. This is to be done prior to seeding.

The seed mix is to be weighed and made up in an appropriately large container which shall be stirred to ensure no settling out of the grass seed, and a uniform distribution of the different types of seed.

The seed is to distributed by hand in a regular grid broadcasting manner to ensure that there is an even spread of grass over the entire site.

The area seeded is to be raked over once the seed and fertiliser have been applied to incorporate these elements into the topsoil.

5.7 General

Where there is a possibility of neighbourhood livestock grazing a rehabilitated site these should, as far as is practicable, be excluded for the first 3 months of re-grassing.

PSZC 6 : Landscaping

Landscaping of the site may be required as indicated in the project specification.

Compensatory planting of trees or shrubs may be required should the transplantation of such not be successful in terms of PSZB 5.5 or due to plants removed in terms of PSZB 5.4

Planting of trees will be in accordance with the following method:

- All tree holes shall be square in plan;
- Tree holes shall be a minimum of 600 mm by 600 mm square by 700 mm deep;
- Holes are to be backfilled with excavated soil in a ratio of 3:1 with compost. The compost is to be weed free and have been composted at temperatures in the order of 65^{o}C. Where possible, any available topsoil should be placed in the hole at the level where the tree rootball will rest. A handful (half-a-cup) of each Superphosphate and 2.3.2 should be mixed into the soil-compost mix;
- The tree holes are to be backfilled to the point where the tree and its rootball are in the desired position. The tree is to be removed temporarily and the hole filled with water and allowed to drain away. This operation of watering and draining should be repeated at least four times in order that the surrounding ground and hole are thoroughly moist. The tree is then to be replaced and the remaining soil replaced;
- All trees shall be tied (using a tree tie) to a suitable timber stake planted in the ground to a depth of at least 500 mm. The stake shall have a minimum diameter of 35 mm and shall be at least 300 mm higher than the planted tree;
- Water retaining basins of at least 500 mm diameters are to be formed around each tree;
- The Contractor is to apply at least 10 litres of water per tree per fortnight for a period of at least 3 months.

The planting of shrubs will be in accordance with the tree planting method with the exception that the holes are to be a minimum of 400 mm by 400 mm square by 500 mm deep, and that the tree stakes and ties are not required.

PSZC 7 : Alien Plant Control

All sites disturbed by construction activities will be monitored for colonisation by invasive alien plant species.

The Environmental Control Officer will identify those plants which require removal during both the construction and maintenance period, for the Contractor's action.

The Environmental Control Officer will provide advice as to effective methods of removal and control of alien plant species.

PSZC 8 MEASUREMENT AND PAYMENT

Measurement and payment for compliance with clauses of the specification will be made as follows. All other costs of compliance are deemed to be included in the Contractor's rates.

ITEM	UNIT

(a) Finishing

(i) Final Grading
Ripping of compacted and disturbed areas to 150 mm depth…..…...…...m^2

Handtrimming……..……..… m^2

(ii) Topsoiling
Replacement of topsoil to minimum depth of 100 mm or such other depth as specified in the project specification……..……m^2

Scarification of replaced topsoil to depth of 50 mm and final hand trimming using spades and rakes……..……..m^2

Soil testing at an approved facility……..….sum per sample
Soil Improvements required prior to vegetation re-establishment:
Compost (supplied, placed and mixed into the soil)…..…...ton
pH Rectifiers (supplied, placed and mixed into the soil).....….....kg or ton
Fertiliser (2:3:2) (supplied, placed and mixed into the soil).....…...….....ton

(iii) Vegetation Re-establishment
Hand-broadcasting with appropriate grass seed mix.....…..... m^2 or ha
Deemed to be inclusive of soil preparation and improvements, materials and labour as specified in PSZC 5.

Hydroseeding with appropriate grass seed mix.....….....…….. m^2 or ha
Deemed to be inclusive of soil preparation and improvements, materials and labour as specified in PSZC 5.

Sprig planting…….....…. m^2 or ha
Deemed to be inclusive of soil preparation and improvements, materials and labour

Plug planting …….....….. ..m^2 or ha
Deemed to be inclusive of soil preparation and improvements, materials and labour

Instant Turf…….....…. m^2 or ha
Deemed to be inclusive of soil preparation and improvements, materials and labour
Maintenance…….. m^2 or ha
Deemed to be inclusive of watering, weeding, etc.

(c) Landscaping
(i) Planting of trees in bag sizes:
a) up to and including 10 litre……..…….Sum
b) over 10 litre up to and including 20 litre……..…….Sum
c) over 20 litre……..…….Sum

(ii) Planting of shrubs in bag sizes:
a) up to and including 10 litre……Sum
b) over 10 litre up to and including 20 litre……Sum

The rate shall include supply of plants and materials, preparation of plant holes, planting and maintenance until established.

APPENDIX A

Figure 1: Drawing No. 24247

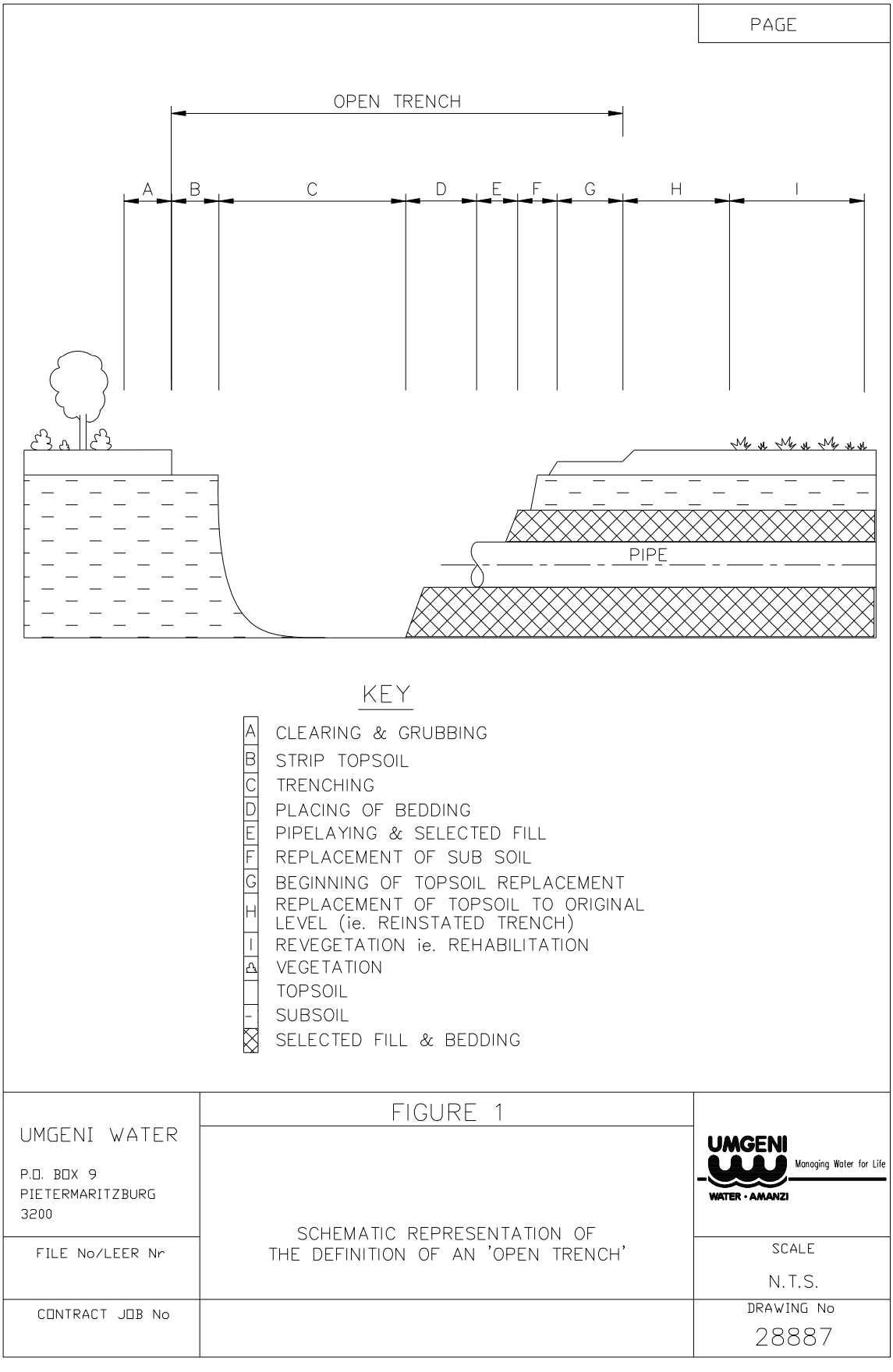
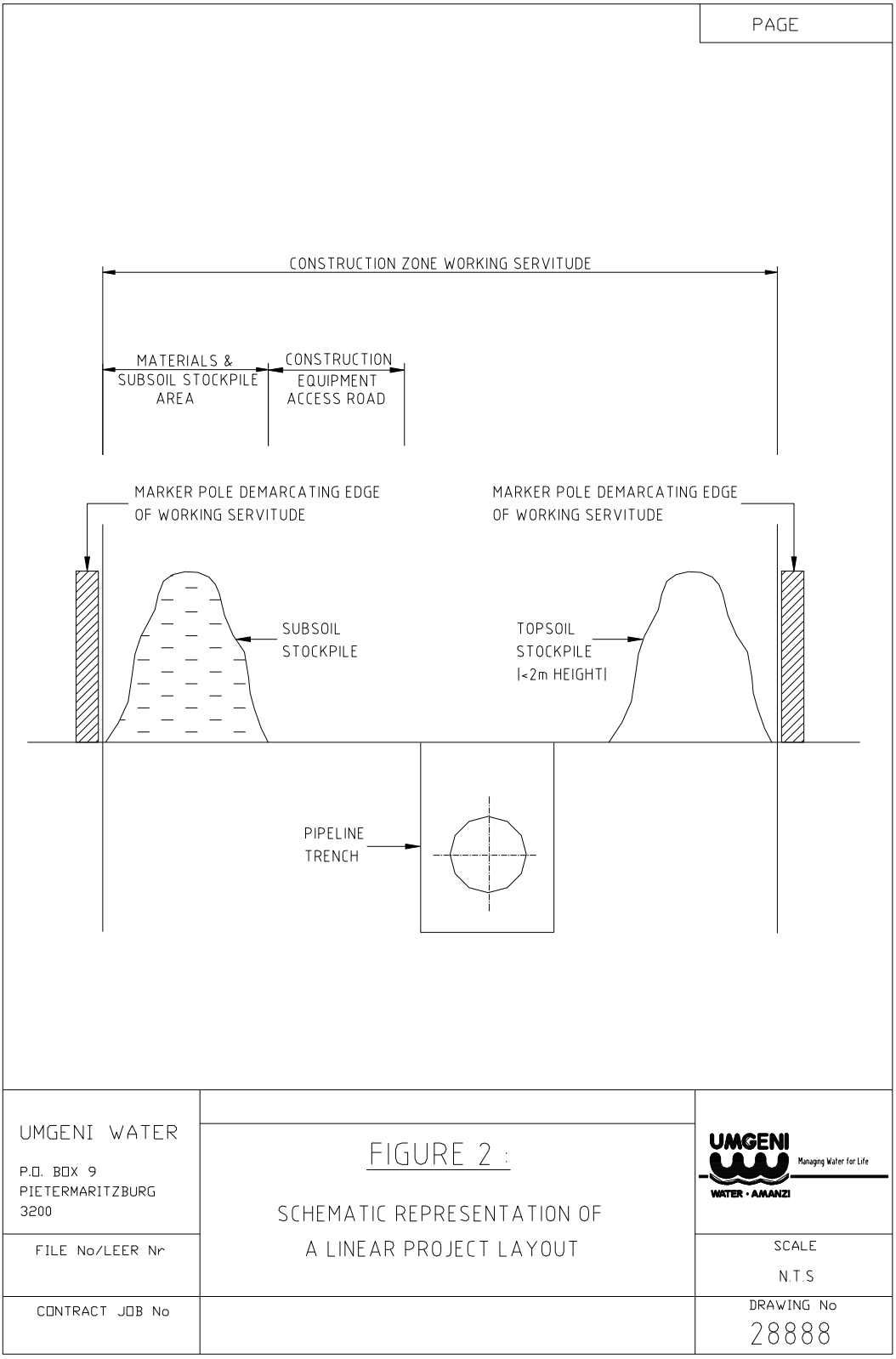


Figure 2: Drawing No. 24248



APPENDIX B

PUBLIC COMPLAINTS REGISTER

DATE	COMPLAINANT S NAME	DESIGNATION/ AFFILIATION	REASON FOR COMPLAINT	ACTION TAKEN	ACTION BY	ACTION BY DATE	ACHIEVED BY DATE	DATE REFERRED TO NW ECO

APPENDIX C

MONITORING OF COMPLIANCE WITH ENVIRONMENTAL SPECIFICATIONS

PROJECT NAME :

CONTRACT NUMBER :

PROJECT MANAGER :

ENGINEER'S REPRESENTATIVE / SUPERVISOR :

CONTRACTOR :

CONTRACT PERIOD (including start and completion dates) :

PERIOD COVERED :

REPORT PREPARED BY :

Signature

ENVIRONMENTAL CONTROL OFFICER REPORT

PROJECT NAME: CONTRACT NO.

DATE OF SITE INSPECTIONS DURING REPORTING PERIOD:

Specification Breach	Spec. No.	Remedial Action Recommended	Due Date	Authority Responsible	Action Taken

PUBLIC COMPLAINTS

Complainant	Designation/ Affiliation	Date of complaint	Reason for Complaint	Action taken and date

GOOD PERFORMANCE REPORT

L*ist any aspects of the Contract in which the Contractor is performing well and beyond that which is required in terms of the specification.*

PHOTOGRAPHS

***Include photographs which illustrate aspects of non-compliance and good performance*.**

Photograph 1 Caption	Photograph 2 Caption