

APPENDIX I3:

OPERATIONAL EMPr



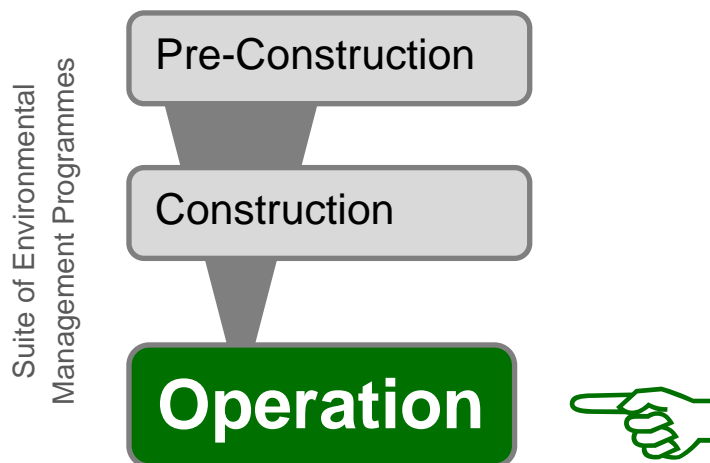
PROPOSED UMKHOMAZI WATER PROJECT PHASE 1
Potable Water Component

OPERATIONAL
ENVIRONMENTAL MANAGEMENT PROGRAMME

FINAL

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AMENDMENTS PAGE



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TABLE OF CONTENTS

| | | |
|--|--|------------|
| TITLE AND APPROVAL PAGE | | I |
| AMENDMENTS PAGE | | II |
| TABLE OF CONTENTS | | III |
| LIST OF ACRONYMS & ABBREVIATIONS | | VI |
| DEFINITION OF KEY TERMS | | VII |
| 1 PURPOSE OF THIS DOCUMENT | | 1 |
| 2 DOCUMENT ROADMAP | | 2 |
| 3 PROJECT BACKGROUND AND MOTIVATION | | 4 |
| 4 PROJECT LOCATION | | 5 |
| 5 OVERVIEW OF PROJECT | | 7 |
| 5.1 Project Components | | 7 |
| 5.2 WTW | | 7 |
| 5.2.1 Process and Layout | | 7 |
| 5.2.2 Operation and Maintenance | | 8 |
| 6 EMPR FRAMEWORK | | 10 |
| 7 ENVIRONMENTAL ASSESSMENT PRACTITIONER | | 11 |
| 8 ENVIRONMENTAL GOVERNANCE FRAMEWORK | | 12 |
| 8.1 Legal Framework | | 12 |
| 8.2 Procedures | | 14 |
| 9 ROLES & RESPONSIBILITIES | | 16 |
| 9.1 DEA | | 16 |
| 9.2 Umgeni Water | | 16 |
| 9.3 Subcontractor’s Environmental Officer | | 17 |
| 10 MONITORING | | 18 |

| | | |
|--------------|---|-----------|
| 10.1 | General | 18 |
| 11 | ENVIRONMENTAL TRAINING & AWARENESS CREATION | 19 |
| 12 | EMPR REVIEW | 20 |
| 13 | ENVIRONMENTAL ACTIVITIES, ASPECTS AND IMPACTS | 21 |
| 13.1 | Environmental Activities | 21 |
| 13.2 | Environmental Aspects | 22 |
| 13.3 | Potential Significant Environmental Impacts | 22 |
| 14 | SENSITIVE ENVIRONMENTAL FEATURES | 24 |
| 15 | IMPLEMENTATION PROGRAMME | 26 |
| 15.1 | General Requirements | 26 |
| 15.2 | Administrative Requirements | 27 |
| 15.3 | Environmental Awareness Creation | 28 |
| 15.4 | On-going Consultation with Community and Affected Parties | 29 |
| 15.5 | Maintenance of Pipeline Servitude | 30 |
| 15.6 | Management of Leaks | 31 |
| 15.7 | Management of Pipeline Scouring | 32 |
| 15.8 | Management of Existing Services | 32 |
| 15.9 | Management of Staff | 33 |
| 15.10 | Management of Ablution Facilities | 34 |
| 15.11 | Management of Visual Aspects | 35 |
| 15.12 | Management of Water | 36 |
| 15.13 | Management of Storage and Handling of Non-Hazardous Material | 37 |
| 15.14 | Management of Storage and Handling of Hazardous Material | 38 |
| 15.15 | Management of Waste | 40 |
| 15.16 | Management of Pollution Generation Potential | 41 |
| 15.17 | Management of Flora | 42 |

| | | |
|--------------|---|-----------|
| 15.18 | Management of Fauna | 44 |
| 15.19 | Management of Emergency Procedures | 45 |
| 15.20 | Management of Health and Safety | 46 |
| 15.21 | Management of Reinstatement and Rehabilitation | 47 |

LIST OF TABLES

| | | |
|----------|---|----|
| TABLE 1: | EMPR ROADMAP IN RELATION TO GN NO. R. 543 | 2 |
| TABLE 2: | UMWP-1 POTABLE WATER PROJECT COMPONENTS | 7 |
| TABLE 3: | EMPR CORE TEAM MEMBERS | 11 |
| TABLE 4: | AUTHORISATIONS THAT MAY BE REQUIRED FOR THE PROJECT | 12 |
| TABLE 5: | ENVIRONMENTAL RESPONSIBILITIES OF PROJECT TEAM - WTW | 17 |
| TABLE 6: | ACTIVITIES ASSOCIATED WITH OPERATIONAL PHASE | 21 |
| TABLE 7: | ENVIRONMENTAL ASPECTS ASSOCIATED WITH OPERATIONAL PHASE | 22 |
| TABLE 8: | POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS - OPERATIONAL PHASE | 22 |

LIST OF FIGURES

| | | |
|-----------|--|---|
| FIGURE 1: | SIMPLIFIED DIAGRAM OF UMWP-1 COMPONENTS | 4 |
| FIGURE 2: | LOCALITY MAP – UMWP-1 POTABLE WATER (PREFERRED LAYOUT) | 6 |
| FIGURE 3: | WTW AND SLUDGE TREATMENT FACILITY ORGANOGRAMS | 8 |

LIST OF APPENDICES

| | | |
|------------|---|-------------------------------|
| APPENDIX A | : | Process Schematics of the WTW |
| APPENDIX B | : | WTW Layout |

LIST OF ACRONYMS & ABBREVIATIONS

| | |
|-----------------------|---|
| AIDS | Acquired Immunodeficiency Syndrome |
| DAFF | Department of Agriculture, Forestry and Fisheries |
| DEA | Department of Environmental Affairs |
| DM | District Municipality |
| 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 |
| km² | Square kilometre |
| KZN | KwaZulu-Natal |
| ℓ | Litres |
| LM | Local Municipality |
| m | Metre |
| m² | Square meters |
| m³ | Cubic metre |
| MHI | Major Hazard Installation |
| 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 | <i>A systematic and objective assessment of an organisation's activities and services conducted and documented on a periodic basis.</i> |
| Competent | <i>Combination of knowledge, qualifications and experience specific to the work or task being performed.</i> |
| Environment | <i>The surroundings in which humans exist and which comprise:</i> <ul style="list-style-type: none"> • <i>The land, water and atmosphere of the earth.</i> • <i>Micro-organisms, plant and animal life.</i> • <i>Any part or combination of a) and b) and the interrelationships among and between them.</i> • <i>The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that can influence human health and well-being.</i> |
| Environmental Aspect | <i>Those components of the company's activities, products and services that are likely to interact with the environment.</i> |
| Environmental Feature | <i>Elements and attributes of the biophysical, economic and social environment.</i> |
| Environmental Impact | <i>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.</i> |
| Environmental Management Programme (EMPr) | <i>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.</i> |
| Environmental Objective | <i>Overall environmental goal pertaining to the management of environmental features.</i> |
| Environmental Target | <i>Performance requirement that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.</i> |
| Incident | <i>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.</i> |
| Monitoring | <i>A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.</i> |
| Potable Water | <i>Water that is fit or suitable for drinking.</i> |
| Project Area | <i>The greater area within which the project is executed. Extends beyond the construction domain.</i> |
| Raw Water | <i>Natural (untreated) water found in the environment, such as water from bodies like dams and rivers.</i> |
| Sensitive environmental features | <i>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.</i> |
| Watercourse | <i>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</i> |

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.

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 operational 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 | |
|---------|-------|--------------------------------|---|
| | | | <ul style="list-style-type: none"> (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) | <p>A description of the manner in which it intends to -</p> <ul style="list-style-type: none"> (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 eThekweni 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 m³/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 m³/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.

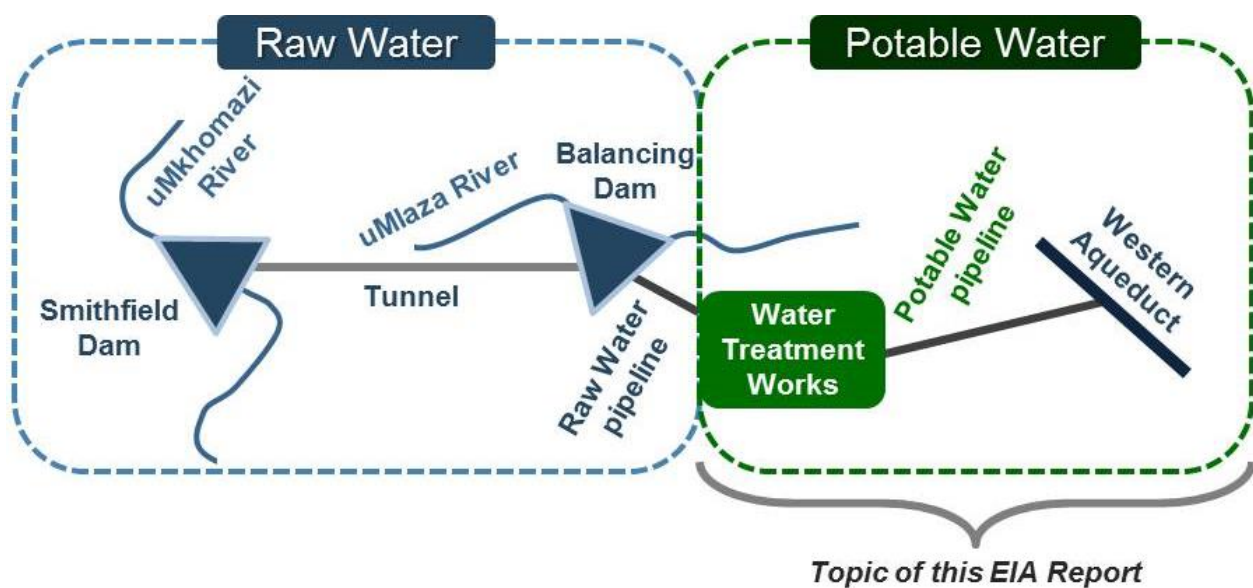


Figure 1: Simplified diagram of uMWP-1 components

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.

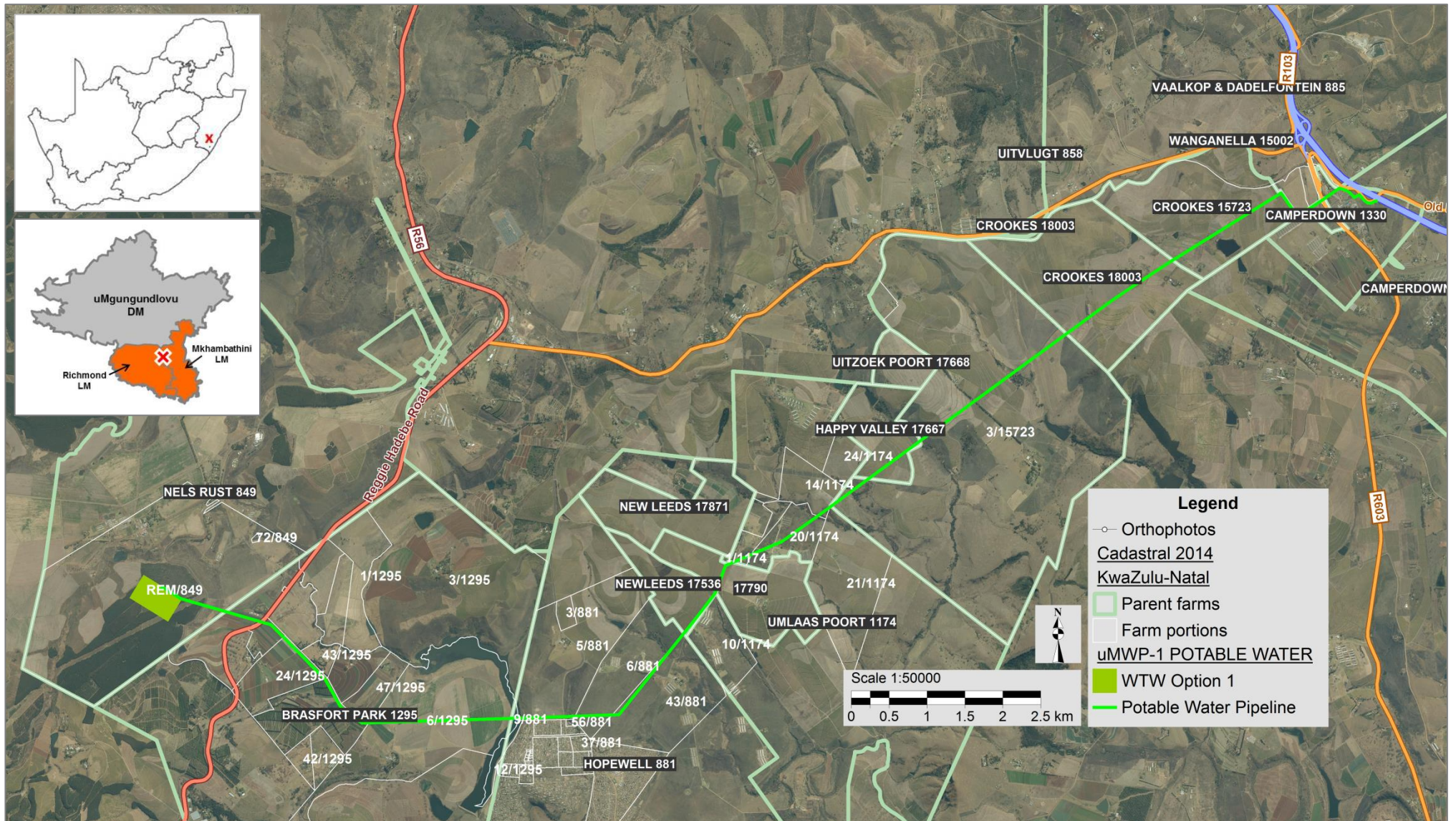


Figure 2: Locality Map – uMWP-1 Potable Water (preferred layout)

5 OVERVIEW OF PROJECT

5.1 Project Components

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 | <ul style="list-style-type: none"> ❖ Access roads ❖ 600 m by 350 m (21 Ha) WTW, which includes (amongst others): <ul style="list-style-type: none"> ● 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 | <ul style="list-style-type: none"> ❖ Access roads ❖ Two x 2500mm gravity pipelines running in parallel ❖ Chambers and valves |

5.2 WTW

5.2.1 *Process and Layout*

The WTW's basic unit processes include:

- ❖ Chemical dosing, allowing for:
 - Oxidation of iron and manganese;
 - Stabilization;
 - Addition of a coagulant/flocculant;
 - Addition of a ballasting agent;
 - Chlorination – pre and post chlorination is required.
- ❖ Flash mixing and coagulation;
- ❖ Flocculation;
- ❖ Sedimentation;
- ❖ Filtration;

- ❖ Disinfection; and
- ❖ Sludge dewatering and thickening.

Appendix A contains the envisaged process schematics for the plant and unit processes. The layout of the proposed WTW is provided in **Appendix B**.

5.2.2 Operation and Maintenance

Figure 3 shows the proposed organogram for the WTW and the sludge treatment facility.

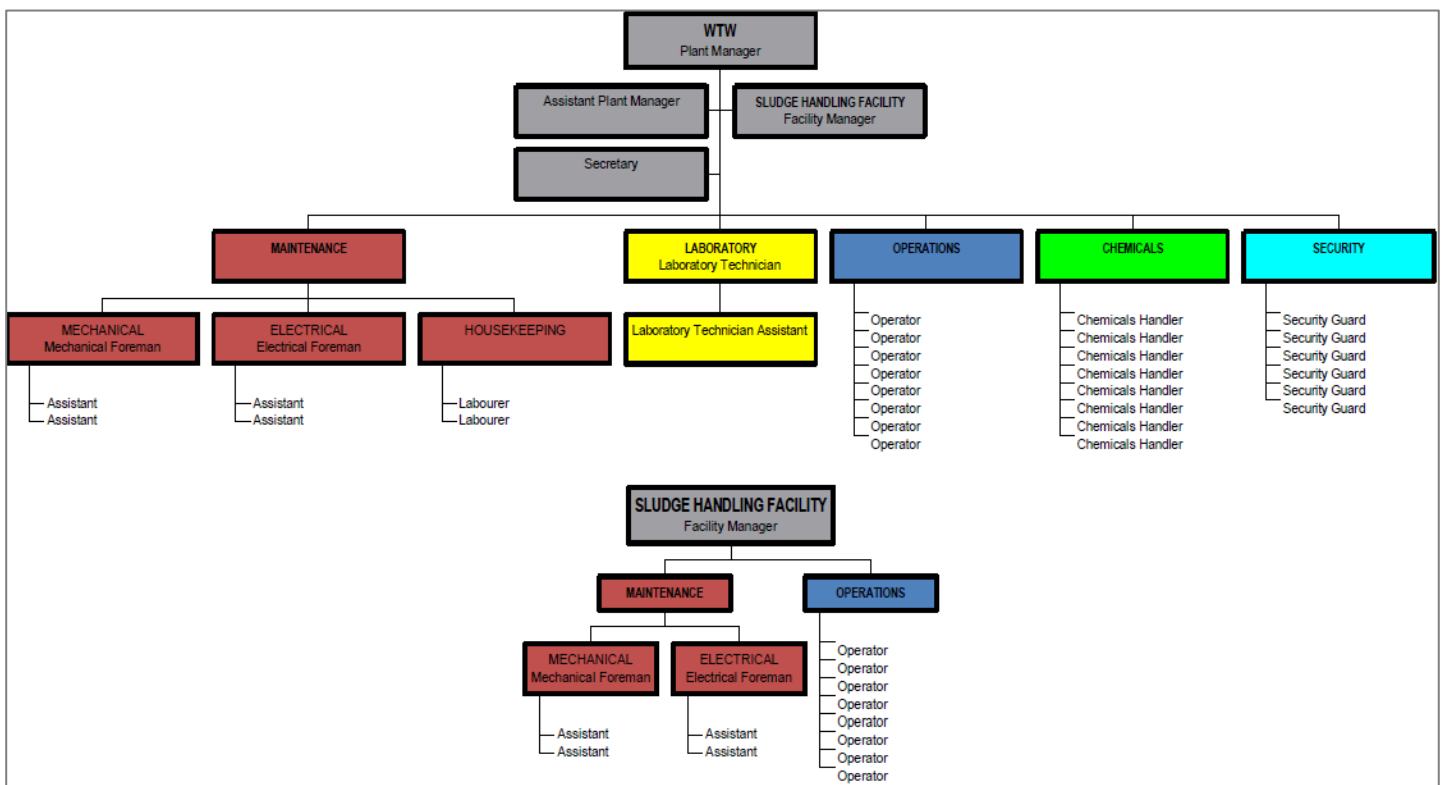


Figure 3: WTW and sludge treatment facility organograms

Drinking water treatment plants require skilled personnel for successful operation and maintenance. The more complex the treatment processes and technologies employed at the plant, the more skilled the process controller and operator(s) need to be. Even though the proposed WTW consists of conventional treatment processes with technologies that Umgeni Water operators will be mostly familiar with, the high-rate clarification process will be new to them and additional skills will have to be developed for personnel operating at this plant to ensure optimum plant performance and the safe supply of drinking water at all times. However, sufficient control will be incorporated to ensure that, if the water after clarification goes out of specification in a particular train, this train will be shut off and a warning given to the operator.

The on-site sludge treatment facility will be operated as its own entity, with specially trained operators and technicians. The sludge treatment facility manager will report to the WTW plant manager, but from an organizational point of view, the two facilities will be independent.

Operations, chemicals and security personnel will have shift teams for continuous, 24-hours a day operation of the treatment works. Plant operators and chemical handlers will have four teams that operate in 8 hour shifts while security will have three teams that operate in 12 hour shifts. Due to the plant not situated in or close to a town, Umgeni Water will most probably have to permanently employ security staff, instead of employing a specialist contractor for this function. Critical equipment will be provided with standby units in case of failure, but maintenance teams will also be on stand-by for after-hours emergency breakdowns.

The WTW will have a proper operating manual containing all the details necessary to successfully operate and understand processes and procedures of the plant. The following information will be included in the manual, as a minimum:

- ❖ The commissioning procedure and plant settings after successful commissioning;
- ❖ All plant-related drawings and diagrams. This includes layout, mechanical, and piping and instrumentation drawings as well as electrical wiring diagrams and any other drawings which may be useful for plant operation and maintenance;
- ❖ Complete functional description of the process including the control philosophy;
- ❖ Illustrated operating instructions including start-up, shut-down, backwashing, regeneration and/or cleaning procedures and emergency actions to be taken in the case of possible equipment failures;
- ❖ Maintenance instructions to include the descriptions and required frequency of all maintenance tasks;
- ❖ Equipment data sheets and manufacturer's operation and maintenance instructions;
- ❖ Procedures for chemicals preparation with cautionary notes and clearly visible signage for hazardous chemicals. Clear instructions for emergency procedures to be followed in case of an accident involving chemicals must be easily visible and available;
- ❖ Chemicals suppliers contact details;
- ❖ Trouble shooting notes with contact details for emergency action;
- ❖ Suggested typical plant operating parameters, such as chemical dosing, flow rates and head losses. After commissioning, such values that are fine-tuned during the commissioning process should be included in the commissioning report and included in the operation and maintenance manual; and
- ❖ Sample calculations where applicable.

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

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

The aim of the Operational EMPr is as follows:

- ❖ Establish management objectives during the operational 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 Operational 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 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: <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • B.Sc Eng (Civil); • BA (Economics, Philosophy) • MBA | 22 years' experience. Prepared EMPs and acted as the ECO on various projects, including: <ul style="list-style-type: none"> • 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

Activities during the operational phase will be undertaken according to recognised best industry practices and will include measures prescribed within this EMPr. This EMPr informs Umgeni Water about the organisation's duties in the fulfilment of the project objectives, with particular reference to the mitigation of environmental impacts that may potentially be caused by operational activities associated with the project. Obligations imposed by the EMPr are legally binding in terms of environmental legislation.

All project activities must comply with the relevant South African legislation and regulations. 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);
- ❖ Disaster Management Act (Act No. 57 of 2002);
- ❖ Construction Regulations (2014); and
- ❖ Major Hazard Installation Regulations (2001).

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

Table 4: Authorisations that may be required for 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. | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • DEA |

| Description | Legal Reference | Regulatory Authority |
|---|---|--|
| <p>The project entails the following activities that constitute water uses in terms of Section 21 of the National Water Act (No. 36 of 1998):</p> <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • National Water Act (No. 36 of 1998) | <ul style="list-style-type: none"> • DWS |
| <p>Permits to be obtained if protected trees are to be cut, disturbed, damaged, destroyed or removed.</p> | <ul style="list-style-type: none"> • National Forests Act (No. 84 of 1998) | <ul style="list-style-type: none"> • Department of Agriculture, Forestry and Fisheries (DAFF) |
| <p>Permits to be obtained if heritage resources are to be impacted on and for the removal of graves.</p> | <ul style="list-style-type: none"> • National Heritage Resources Act (No. 25 of 1999) • KZN Heritage Act (No. 04 of 2008) | <ul style="list-style-type: none"> • Amafa aKwaZulu-Natali |
| <p>Permits to be obtained for the removal and transportation of endangered fauna and flora.</p> | <ul style="list-style-type: none"> • National Environmental Management: Biodiversity Act (Act No. 10 of 2004) • Natal Nature Conservation Ordinance (15 of 1974) | <ul style="list-style-type: none"> • Ezemvelo KZN Wildlife (EKZNW) |
| <p>Of the various options considered for the management of the sludge generated at the WTW, the most feasible option during the EIA was deemed to be the disposal at a landfill. A letter was received from the uMgungundlovu DM, which commits to accepting the sludge at the proposed regional landfill. If another option for sludge management is to be pursued then the need for a waste management licence must be confirmed.</p> | <ul style="list-style-type: none"> • National Environmental Management: Waste Act (No. 59 of 2008) | <ul style="list-style-type: none"> • DEA |
| <p>There will not be any discharge to a watercourse from the normal operations of the WTW. Based on the outcomes of the design phase, if provision needs to be made for any discharge, the necessary approval processes will need to ensue.</p> | <ul style="list-style-type: none"> • National Environmental Management Act (No. 107 of 1998) • National Water Act (No. 36 of 1998) • National Environmental Management: Waste Act (No. 59 of 2008) | <ul style="list-style-type: none"> • DEA • DWS |
| <p>A Major Hazard Installation (MHI) means an installation:</p> <ol style="list-style-type: none"> 1. Where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or 2. Where any substance is produced, used, handled or stored in such a form and quantity that it has the potential to cause a major incident. <p>The proposed WTW may be classified as a MHI. A preliminary MHI screening study and Risk Assessment will be conducted for the plant by Umgeni Water.</p> | <ul style="list-style-type: none"> • Occupational Health and Safety Act (No. 85 of 1993), • MHI Regulations (GN R.692 of 30 July 2001) | <ul style="list-style-type: none"> • Department of Labour |

Additional legal requirements that may apply 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.

Other Policies that are in place at Umgeni Water include:

- ❖ Umgeni Water Sustainability Policy; and
- ❖ Umgeni Water Safety, Health and Environmental Policy.

8.2 Procedures

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 procedures to be developed by Umgeni Water. These procedures are to be reviewed and approved by the relevant designated Managers to ensure that they are adequate.

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

❖ **Potable Water Pipeline** –

- Environmental Training & Awareness Creation;
- Stormwater management;
- Erosion control;
- Storage and handling of hazardous substances;
- Access control;
- Management of scouring events;
- Controlling alien invasive species and noxious weeds;
- Rehabilitation;
- Waste management;
- Engaging with Interested and Affected Parties (I&APs);

❖ **WTW** –

- Environmental Training & Awareness Creation;
- Chemicals off-loading and loading;
- Chemical storage and dosing;
- Operation of specific plant components (e.g. sludge and backwash plant);
- Operation of meters;
- Clean water sampling;
- Sludge plant - backwashing of filters;
- Engaging with I&APs;
- Disconnection of chlorine drums
- Connection of chlorine drums
- Cleaning of specific plant components (e.g. gravity thickeners);
- Waste management;
- Sludge management;
- Filling of lime hoppers;
- Oil leak inspection;
- Topping up scrubber unit;
- Sampling contents of scrubber;
- Pumping the contents of scrubber unit to holding tank;
- Working with dangerous goods (e.g. thinners, turpentine, paint, fuel);
- Lighting;
- Noise and vibrations;
- Pests management;
- Energy / fuel Consumption;
- Incident Management Protocol;
- Fire Panel Procedure; and
- Emergency Response Plan.

9 ROLES & RESPONSIBILITIES

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 (may include conditions related to the operational phase), 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 check compliance. DEA will also serve as an active member of the Environmental Monitoring Committee (EMC) and will review the monitoring and auditing reports compiled by the ECO.

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

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.

Due to the focus of this EMPr on the operational activities associated with the project, Umgeni Water will ultimately be responsible for the implementation, monitoring, enforcement and review of management measures contained in this document. Where external subcontractors are to be used for operation and maintenance activities, the provisions of this EMPr will also apply to them.

Environmental audits will be performed by Umgeni Water at various stages of the project life-cycle to ensure compliance with relevant legislation and the principle of best practice. An environmental team will oversee compliance with the Operational EMPr during the operational phase of the WTW and potable water pipeline. A monitoring programme will be implemented, which will include pre-determined targets, objectives and indicators.

The proposed project team is shown in **Table 5**.

Table 5: Environmental Responsibilities of Project Team - WTW

| Function | Responsibility |
|--------------------------|---|
| Works Manager & Operator | <ul style="list-style-type: none"> • The overall management of the project and implementation, administration and enforcement of the Operational EMPr. • Ensuring compliance with any other environmental legislation which may be applicable to the project. • Take action if the Operational EMPr is not adhered to. • Monitor the undertaking of environmental awareness. |
| Environmental Officer | <ul style="list-style-type: none"> • Monitoring, reviewing and verifying compliance with the Operational EMPr. • Inspect the site and surrounding areas regularly with regard to compliance with the Operational EMPr. • Report on the progress and performance of the Operational EMPr. • Ensure that the necessary environmental authorisations and permits have been obtained. |

9.3 Subcontractor's Environmental Officer

At certain stages Umgeni Water may need to appoint a sub-contractor to undertake maintenance works. The sub-contractor will need to ensure that a competent Environmental Officer (minimum of 3 years' experience) is designated for the works, where this party will coordinate the environmental management activities of the sub-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

10.1 General

Compliance monitoring during the operational phase will entail checking and recording adherence to the Operational EMPr as well as those conditions in the Environmental Authorisation that are relevant to the Operational Phase.

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.

The following documentation and records, which are applicable to the operational phase of the project, will be kept on site:

- ❖ Audit reports;
- ❖ Training records;
- ❖ Consultation / meeting records;
- ❖ Incident records;
- ❖ Corrective and preventative action;
- ❖ Equipment maintenance;
- ❖ Access negotiations;
- ❖ Complaints register;
- ❖ Records of all remediation / rehabilitation activities;
- ❖ Copy of the Operational EMPr file; and
- ❖ Environmental approvals, permits, licences, etc.

An audit will be undertaken within the first six months of operation to ensure the Operational EMPr implementation systems are in place. Audits will then be undertaken on a six monthly basis for the first 2 years of operation. The long-term audit requirement will be determined based on track record established during the initial stages of the operation.

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), as well as the system adopted by Umgeni Water.

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 Umgeni Water's staff and subcontractors to sensitive environmental features and an understanding of implementing environmental best practices. The various means of creating environmental awareness during the operational phase of the project may include:

- ❖ Induction course for all workers before commencing operation and maintenance work;
- ❖ 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 at the WTW;
- ❖ Place posters containing environmental information at areas frequented by the staff (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.

Umgeni Water must compile a project-specific Environmental Training and Awareness Programme for the WTW and potable water pipeline, taking into consideration the abovementioned factors, during the operational phase to be approved by the relevant designated 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 operational 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
- ❖ Based on requirements stipulated in 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 operational phase are listed in **Table 6**.

Table 6: Activities associated with Operational Phase

| <u>Project Phase: Operation</u> |
|--|
| Project Activities |
| <ul style="list-style-type: none"> • WTW operation – <ul style="list-style-type: none"> ○ Raw water intake ○ Chemical dosing ○ Phase separation (Clarification and Filtration) ○ Sludge treatment process ○ Chemical storage, disinfection and final water storage ○ Administrative buildings ○ General housekeeping, security and biodiversity • WTW mechanical, electrical and civil maintenance – <ul style="list-style-type: none"> ○ Routine planned maintenance ○ Major breakdown repairs ○ Minor breakdown repairs • Raw Water Pipeline – <ul style="list-style-type: none"> ○ Create access track along pipeline servitude ○ Conduct routine maintenance inspections of the project infrastructure ○ Scouring of pipeline, where the water conveyed and stored within this system will be released into the receiving watercourses along the alignment from scour valves ○ Undertake maintenance and repair works, where necessary • On-going consultation with directly affected parties • Comply with Operation and Maintenance Manual • Adhere to Operating Rule |
| High Level Environmental Activities |
| <ul style="list-style-type: none"> • Erosion and alien invasive plants monitoring programme • On-going consultation with I&APs • Other activities as per EMPr for Operational Phase |

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 impact*. The environmental aspects listed in **Table 7** 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 7: Environmental Aspects associated with Operational Phase

| Project Phase: Operation | |
|---------------------------------|---|
| Environmental Aspects | |
| • | Inadequate consultation with landowners/ tenants / occupiers of land |
| • | Inadequate environmental and compliance monitoring |
| • | Inadequate management of access, routine maintenance and maintenance works |
| • | Inadequate management of vegetation |
| • | Poor scouring practices for bulk water pipeline |
| • | Inadequate management of light pollution from WTW |
| • | Inadequate management of handling and storage of chemicals at WTW |
| • | Inadequate management of storm water at WTW |
| • | Release of sub-standard wastewater from the WTW during emergency situations |
| • | Inadequate management of WTW residue and other waste types |
| • | Uncontrolled emissions from chemical storage areas |
| • | Failure to comply with health, safety and environmental specifications |

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 8** for the potential significant impacts associated with the preceding activities and environmental aspects for the construction phase.

Table 8: Potential Significant Environmental Impacts - Operational Phase

| Environmental Factor | Potential Issues / Impacts |
|-----------------------------|---|
| Land Use | <ul style="list-style-type: none"> • Servitude restrictions • Permanent loss of cultivated land and timber land • Permanent change of land use at WTW |
| Geology | <ul style="list-style-type: none"> • Unsuitable geological conditions |
| Topography | <ul style="list-style-type: none"> • Visual impact • Erosion of affected areas on steep slopes |
| Geohydrology | <ul style="list-style-type: none"> • Degradation of pipeline structure over time – leaching of contaminants • Groundwater pollution due to leaching of contaminated runoff from WTW |
| Hydrology | <ul style="list-style-type: none"> • Altered flow regimes at river crossings (dependent on permanent flow impediments) |

| Environmental Factor | Potential Issues / Impacts |
|--|--|
| | <p>such as pipeline encasement and tie-in at banks)</p> <ul style="list-style-type: none"> ● Possible permanent pipe bridge over Mapstone Dam ● Water releases – <ul style="list-style-type: none"> ○ Pipeline testing and commissioning ○ Scouring events ○ Pipeline ruptures |
| Water Quality | <ul style="list-style-type: none"> ● Release of water during pipeline testing and commissioning to watercourses could lead to elevated sediment levels ● Release of contaminated storm water from WTW to the receiving environment ● Discharge at scour valves - potable water (containing residual chlorine) released to watercourses |
| Aquatic Ecology | <ul style="list-style-type: none"> ● Disturbance to aquatic biota due to water quality deterioration caused by contaminated runoff from WTW entering a watercourse, release of potable water from the pipeline, and sedimentation (maintenance works, scouring events) ● Potential permanent impacts caused at river crossings – <ul style="list-style-type: none"> ○ Loss of aquatic habitat ○ Impacts to migration of aquatic biota |
| Riparian & Instream Habitat | <ul style="list-style-type: none"> ● Release of water (pipeline testing and commissioning, scouring events, pipeline ruptures) to watercourses could cause erosion ● Permanent loss of riparian and instream vegetation at river crossings ● Erosion of channel at areas that were disturbed during construction ● Exposed pipeline |
| Wetlands | <ul style="list-style-type: none"> ● Permanent impacts to wetland characteristics (<i>see above issues pertaining to hydrology, water quality, aquatic ecology and habitat</i>) |
| Terrestrial Ecology | <ul style="list-style-type: none"> ● Possible permanent loss of significant flora and fauna species ● Servitude through grassland areas ● Proliferation of exotic vegetation |
| Socio-economic Environment | <ul style="list-style-type: none"> ● Use of local road network for operation and maintenance purposes ● Impact to visual quality and sense of place associated with WTW ● Light pollution from WTW ● Health and safety risks associated with WTW, linked to MHI status |
| Planning | <ul style="list-style-type: none"> ● Servitude restrictions ● Sterilisation of land for conflicting development |
| Agriculture | <ul style="list-style-type: none"> ● Permanent loss of cultivated land due to pipeline aboveground structures (chambers, markers) and WTW (dependent on site selected) ● Permanent loss of timber land at WTW and along pipeline servitude ● Use of farm roads for operation and maintenance purposes |
| Noise | <ul style="list-style-type: none"> ● Noise from WTW operations |
| Transportation | <ul style="list-style-type: none"> ● Use of local road network for operation and maintenance purposes |
| Aesthetics | <ul style="list-style-type: none"> ● Visual quality and sense of place could be adversely affected by WTW |

14 SENSITIVE ENVIRONMENTAL FEATURES

Within the context of the project area, cognisance must be taken of the following sensitive environmental features for which mitigation measures are included in the EIA Report and EMPs for the project life-cycle:

- ❖ 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 and operational 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. Operation and maintenance 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.
- ❖ 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 nuisance associated with operation and maintenance activities (e.g. noise, dust and 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. Servitude agreement to be abided by.

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**.

Where relevant, all management measures in the Pre-Construction and Construction EMPs need to be carried forward to the operational phase, depending on the nature of the operation and maintenance activities and the receiving environment to be affected. Specific management measures for the operation phase follow.

15.1 General Requirements

General requirements during the operational 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 Operational EMPr;
- ❖ Undertake negotiations and confirm arrangements with landowners and/or land users regarding (as relevant):
 - Use of all private roads, with associated traffic arrangements;
 - Domestic animals (avoiding impacts to livestock);
 - Protocol for lodging complaints;
 - Existing structures and infrastructure (including temporary and permanent water management structures and infrastructure);
 - Security; and
 - Opening and closing of gates and access to private property.
- ❖ Improvements to access roads to be made, where necessary, after approval from the relevant authority;
- ❖ Develop and implement an environmental awareness programme;
- ❖ Operation and maintenance activities to remain within the pipeline servitude.
- ❖ Prevent encroachment into the Eskom servitude, adjacent to the WTW.

- ❖ Operational activities need to be planned and coordinated in consultation with the affected farmers in order to minimise impacts on crop production.

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 for the WTW and pipeline.

Management Actions:

- Financial provision is made for the implementation of the conditions of the Environmental Authorisation and the mitigation measures contained in the EMPr.
- Document control procedure is to be provided and adhered to.
- Filing system is to be provided and maintained.

Responsibilities:

- Umgeni Water – administrative provisions for compliance and checking.

Monitoring Requirements:

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

Implementation Timeframe:

Operational phase.

15.3 Environmental Awareness Creation

Management Objective:

- Ensure that all 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 employees are to have completed appropriate environmental training before being allowed to undertake operation and maintenance activities.
2. A record of environmental training undertaken is to be kept, as part of the document control procedure.

Management Actions:

- Environmental Training and Awareness Programme to be developed, which is to be approved by Umgeni Water.
- All employees and sub-contractors to go through the project specific environmental awareness training courses before being allowed to undertake operation and maintenance activities.
- 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.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Records of environmental training and awareness creation.

Implementation Timeframe:

Operational phase.

15.4 On-going Consultation with Community and Affected Parties

Management Objective:

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

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, as well as servitude agreements.

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.
- Establish specific requirements of RCL for the operational phase of the project. Confirm access restrictions and requirements for RCL properties.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Public complaints register.

Implementation Timeframe:

Operational phase.

15.5 Maintenance of Pipeline Servitude

Management Objective:

- Manage environmental impacts associated with servitude maintenance.
- Safeguarding of sensitive environmental features.
- Restrict operation and maintenance activities to the pipeline servitude.

Target:

1. No damage to be caused to sensitive environmental features (including heritage resources, protected trees, watercourses, cultivated areas, structures and infrastructure) outside of the pipeline servitude.
2. No complaints from landowners.

Management Actions:

- The landowner should be notified that pipeline and servitude maintenance inspections will be undertaken, at least 10 working days prior to undertaking the inspection.
- Maintenance activities to be undertaken without causing any damage to access gates, access roads, fencing, any private property, reticulation or animals.
- Restrict operation and maintenance activities to the pipeline servitude.
- All access gates should be closed and locked as per the instruction of the landowner.
- Should maintenance or repair work be required on site, the landowner should be notified well in advanced. Maintenance work should be undertaken as per the Pre-Construction and Construction EMPs, as well as the Umgeni Water Particular Specification for Environmental Management of Construction Projects.
- All roads and tracks used for maintenance inspections and maintenance works should be maintained and repaired where necessary.
- Suitable stormwater measures to be implemented for access roads and tracks.
- All vehicle traffic will be restricted to access roads and tracks only, within the servitude. Where this is not possible, the landowner will need to be notified.
- On private farm roads, maintenance vehicles may not exceed a speed of 40km/h.

- Monitor erosion and undertake rehabilitate, where necessary.
- Avoid any disturbance to sensitive environmental features.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- No movement outside of servitude, unless the landowner has been notified.
- Public complaints register.

Implementation Timeframe:

Operational phase.

15.6 Management of Leaks

Management Objective:

- Ensure leaks are detected and repaired.

Target:

1. Timeous detection and repairing of leaks.

Management Actions:

- Routine inspection to include detection and timeous repairs of leaks.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Register.

Implementation Timeframe:

Operational phase.

15.7 Management of Pipeline Scouring

Management Objective:

- Prevent environmental impacts associated with scouring.

Target:

1. No visible signs of erosion channels caused by scouring.
2. No de-stabilisation of river morphology due to scouring.

Management Actions:

- Suitable erosion protection measures to be implemented to prevent erosion due to scouring.
- Manage impacts to resource quality (i.e. flow, water quality, riparian habitat, morphology and aquatic biota) of the uMlaza River and its tributaries, natural channels and drainage lines due to scouring.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Water quality monitoring.
- Inspection of affected watercourses.

Implementation Timeframe:

Operational phase.

15.8 Management of Existing Services

Management Objective:

- Prevent adverse environmental impacts associated with 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.
- Adequate reinstatement and rehabilitation of affected environment.
- Ensure compliance with RCL's biosecurity protocols in relation to the maintenance of the pipeline on their properties.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Public complaints register.
- Agreements with owners of services.

Implementation Timeframe:

Operational phase.

15.9 Management of Staff

Management Objective:

- Ensure suitable management of staff (including sub-contractors) to prevent security-related issues or disturbance to landowners and community members.
- 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 staff.

Management Actions:

- Prohibit trespassing of staff on private property.
- Staff should be provided with identity cards.
- Designated smoking areas should be provided, with special bins for discarding of cigarette butts.
- Use local labour as far as possible, where necessary (e.g. unskilled labour).
- Implement a STD and HIV/AIDS awareness and prevention programme amongst staff. Umgeni Water should provide an adequate supply of free condoms to all staff. Condoms should be located in the bathrooms and other communal areas. If viable, a voluntary counselling and testing programme should be introduced.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Public complaints register.
- Staff-related targets.

Implementation Timeframe:

Operational phase.

15.10 Management of Ablution Facilities

Management Objective:

Prevent environmental impacts associated with abluion facilities.

Target:

1. No environmental contamination associated with abluion facilities.

Management Actions:

- Provide sufficient abluion facilities at the WTW, which conform to all relevant health and safety standards and codes.
- 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.

- Ensure the proper utilisation, maintenance and management of toilet, wash and waste facilities.
- Sanitation facilities to be maintained in a hygienic state and serviced regularly. Licensed service provider to remove contents from site.
- Toilet paper shall be provided.
- Should shower facilities be provided for use by staff at the WTW, 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:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Public complaints register.
- Maintenance register for ablution facilities.
- Waste disposal certificates.

Implementation Timeframe:

Operational phase.

15.11 Management of Visual Aspects

Management Objective:

- Minimise impacts to the aesthetics / visual quality.

Target:

1. No unwarranted complaints regarding impacts to visual quality.

Management Actions:

- Maintain pine trees (old timber plantation) around WTW to optimise their screening function.
- 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.
- Where practicable, development designs to compliment the natural surroundings in order to preserve a sense of place.
- On-going housekeeping to maintain a tidy WTW and pipeline servitude.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Public complaints register.
- Visual inspection of WTW.

Implementation Timeframe:

Operational phase.

15.12 Management of Water

Management Objective:

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

Target:

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

Management Actions:

- All operational activities to comply with the National Water Act (Act No. 36 of 1998).
- 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 WTW to avoid environmental contamination and erosion.

- Stormwater runoff from workshops, vehicle maintenance area 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.
- Prevent erosion on access roads along pipeline.

Responsibilities:

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

Monitoring Requirements:

- Public complaints register.
- Water monitoring programme – discharges.
- Visual inspection of servitude.

Implementation Timeframe:

Operational phase.

15.13 Management of Storage and Handling of Non-Hazardous Material

Management Objective:

- Effective and safe management of materials at the WTW 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.
- 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:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Evidence of spillages.
- MSDS register.

Implementation Timeframe:

Operational phase.

15.14 Management of Storage and Handling of Hazardous Material

Management Objective:

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

Target:

1. No pollution due to handling, use and storage of hazardous material.
2. No harm to staff from handling and use of hazardous material.
3. Compliance with MHI requirements.
4. 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.
- In the event of spillages of hazardous substances the appropriate clean up and disposal measures are to be implemented.
- Spill reporting procedures to be displayed at all locations where hazardous substances are being stored.
- Hazardous materials will be disposed of at registered sites or handed to registered hazardous waste disposal facilities for disposal / recycling.
- Proper and timeous notification of any pollution incidents associated with hazardous materials.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Evidence of spillages.
- MSDS register.
- Training register.

- Disposal certificates.
- MHI Risk Assessment.

Implementation Timeframe:

Operational phase.

15.15 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.
- Maintain a clean and tidy WTW and pipeline servitude.
- 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 regularly, as required.

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.
- Ensure suitable housekeeping. .
- All waste will be disposed of at suitable licensed disposal sites, based on the waste type (general versus hazardous).

- Ensure that solid waste (including sludge) is transported so as to avoid waste spills en-route.
- Adhere to requirements of landfill where sludge from WTW is to be disposed of.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Public complaints register.
- Waste register.
- Recycling targets.
- Disposal certificates.

Implementation Timeframe:

Operational phase.

15.16 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. 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** -
 - Consider proximity of sensitive noise receptors to area where operation and maintenance activities are to take place when identifying mitigation measures for 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 so as to minimise disturbance to landowners and community members.

- No amplified music will be allowed. 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.
- **Dust** -
 - Speed limits to be strictly adhered to.
 - Take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, pre-notification of affected parties).
- **Lights** -
 - The position and type of lighting will be planned to ensure unnecessary light pollution will be eliminated.
 - All lighting installed must not lead to unacceptable light pollution to the surrounding community and natural environment (e.g. use of down-lighters).
- **Erosion** -
 - Protect areas that are susceptible to erosion through suitable measures (e.g. watering, planting, retaining structures, commercial anti-erosion compounds).
 - Any erosion channels caused by operation and maintenance activities to be suitably stabilised and rehabilitated.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Public complaints register.
- Evidence of pollution.
- Air, noise and water quality monitoring, as necessary.

Implementation Timeframe:

Operational phase.

15.17 Management of Flora

Management Objective:

- Preserve protected flora species outside of WTW and pipeline servitude.
- 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:

- 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).
- Ongoing identification of protected plants and trees.
- Any protected plants or trees in proximity to servitude that will remain must not be disturbed, defaced, destroyed or removed, unless permitted.
- 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 at WTW and pipeline servitude 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).
- Implement a monitoring programme for eradication of alien invasive plants and noxious weeds.
- Retain vegetation within the servitude, wherever possible.
- Removal of medicinal plants by staff will not be allowed.
- No trees to be felled for fuel purposes.
- 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.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Permits.
- Encroachment of alien invasive plants and noxious weeds.
- Successful rehabilitation.

Implementation Timeframe:

Operational phase.

15.18 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 operation and maintenance activities.
2. No deviations from agreements made with individual landowners and community members regarding animals.

Management Actions:

- 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).
- Proper access control to be maintained.
- Stringent and dedicated control of poaching.
- No fishing allowed.
- No wilful harm to any animals, unless a direct threat is posed to staff'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.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Proponent - acquire permits.
- Permits.

- Contractor's method statement.

Implementation Timeframe:

Operational phase.

15.19 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 at the WTW 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 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.
 - Dedicated smoking areas to be provided. Appropriate disposal of cigarette butts.
- **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 at the WTW, where practicable.
 - Remediation of the spill areas.

- 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. 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 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 (e.g. workshop, 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:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

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

Implementation Timeframe:

Operational phase.

15.20 Management of Health and Safety

Management Objective:

- Provide a safe working environment to staff and the public.

Target:

1. Occupational Health and Safety System.
2. No incidents.
3. Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993) and relevant accompanying regulations.

Management Actions:

- Applicable notice boards and hazard warning notices will be put in place and secured.
- Emergency contact details will be prominently displayed.
- Two-Way Radio Systems should be used where cell phone coverage is poor.
- All staff will be supplied with the required Personal Protective Equipment as per the Occupational Health and Safety Act (Act No. 85 of 1993), depending on the hazards that they will be exposed to.
- Maintain access control to the WTW.
- Use approved communication channels to inform the community of Occupational Health and Safety measures to prevent incidents involving community members.

Responsibilities:

- Umgeni Water - implement management actions and checking.

Monitoring Requirements:

- Dedicated Occupational Health and Safety System to be implemented and audited.

Implementation Timeframe:

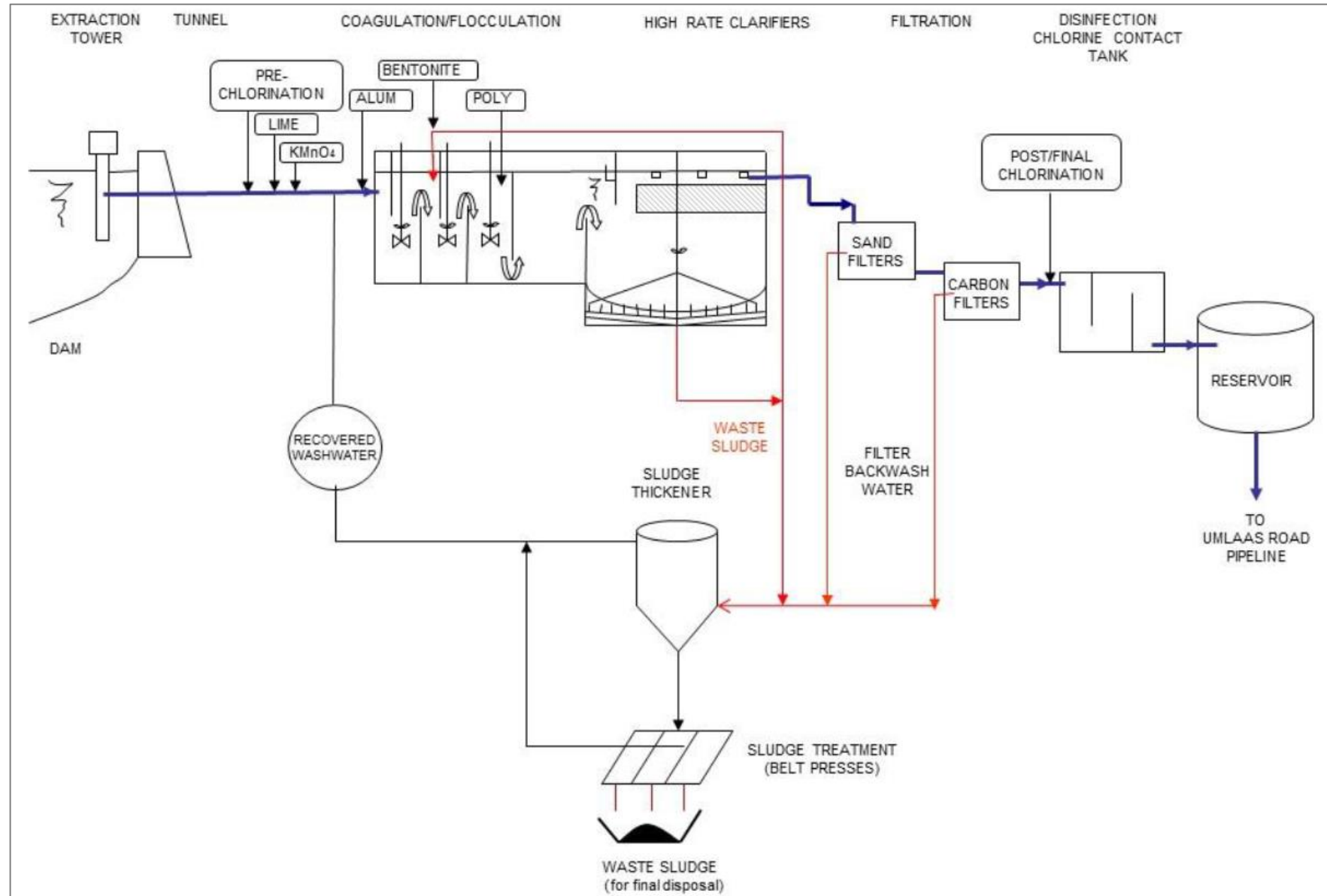
Operational phase.

15.21 Management of Reinstatement and Rehabilitation

Implement reinstatement and rehabilitation measures contained in the Construction EMPr and the Umgeni Water Particular Specification for Environmental Management of Construction Projects, as required.

APPENDIX A

PROCESS SCHEMATICS OF THE WTW



APPENDIX B

WTW LAYOUT

